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Forest Service

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REPORT AND DRAFT ENVIROMENTAL IMPACT STATEMENT

BLUE JOINT AND SAPPHIRE MONTANA WILDERNESS STUDY ACT AREAS

Bitterroot National Forest

REPORT AND DRAFT ENVIRONMENTAL IMPACT STATEMENT

Blue Joint and Sapphire Montana Wilderness Study Act Areas (P.L. 95-150)

Location: The Blue Joint Roadless Area is located on the Bitterroot and Salmon National Forests in Ravalli County, Montana and Lemhi County, Idaho.

The Sapphire Roadless Area is located on the Bitterroot and Deerlodge National Forests in Ravalli and Granite Counties, Montana.

Type of Action: Legislative

Responsible Federal Agency: United States Department of Agriculture, Forest Service

Responsible Official: John R. Block
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Public Comment Period Ends: JUL 15 1985

Abstract: The proposed action and six alternatives for managing the 65,860-acre Blue Joint and 117,030-acre Sapphire roadless areas are evaluated. Major issues are wilderness, roadless recreation, wildlife and fish habitat, water quality, visual quality, timber, and access for minerals. Aternative B emphasizes timber, mineral, and roaded recreation opportunities; Alternative C responds to nonmarket issues that can be achieved at little cost to market outputs and contains a minimal wilderness recommendation; Alternative E (Proposed Action) responds to all major issues with a mix of market and nonmarket outputs including a wilderness recommendation for Blue Joint Creek; Alternative F (No Action) maintains the areas' existing wilderness character and potential for inclusion in the National Wilderness Preservation System; Alternative G recommends wilderness for core areas having the highest wilderness attributes and is moderately responsive to other issues; Alternative H contains a large wilderness recommendation with reasonably good topographic boundaries; and Alternative J recommends wilderness for nearly the entire acreage.

SUMMARY

This is a summary of Chapters I through IV of the Report and Draft Environmental Impact Statement (DEIS) for the Blue Joint and Sapphire Montana Wilderness Study Act (P.L. 95-150) areas.

I. PURPOSE AND NEED

The DEIS describes a proposed action and six alternatives for management of the land and resources of the two wilderness study areas including contiguous roadless land. It documents the analysis and discloses the environmental consequences of implementing each of the alternatives.

Development of the DEIS followed direction from the Forest and Rangeland Renewable Resources Planning Act (RPA) as amended by the National Forest Management Act (NFMA), National Environmental Policy Act (NEPA), Montana Wilderness Study Act (MWSA), and implementing regulations of NFMA (36 CFR 219) and NEPA (40 CFR 1500-1508).

A. Planning Area

The Blue Joint area of 65,860 acres is a part of the Bitterroot Mountain Range in Ravalli County of west central Montana, with 490 acres in Lemhi County, Idaho. The Sapphire area of 117,030 acres is a part of the Sapphire Mountains in Ravalli and Granite Counties of west central Montana. The Bitterroot and Salmon Forests share the Blue Joint area, and the Bitterroot and Deerlodge Forests share the Sapphire area.

B. Issues, Concerns, and Opportunities

Fourteen issues were identified during MWSA public workshops in 1979. The following issue-related planning questions were formulated and used to guide the development of alternatives:

- What other federal lands are classified or proposed as wilderness or are under study as wilderness in the surrounding area and to what extent should they influence the classification of the study lands?

- What are the amount and kind of recreation opportunities the area presently supports or is capable of supporting?

- What are the principal game, nongame, and threatened and endangered species and what are the opportunities for habitat improvement?

- What type, condition, and amount of road or trail access does the area contain and what is the need for roaded forms of access?

- What is the relationship of costs to benefits in the extraction or utilization of Forest commodities, and what is the amount of economic dependency upon the study areas?

- What is the current type of motorized vehicle use and what is the potential for that use?

- What are the present conditions and uses of the area's watershed; what is its relative sensitivity to development activities?

- What is the timber potential of the area, and where is timber management most appropriate?

- What is the hardrock, oil and gas potential of the area and how should the area be managed for that potential?

- What is the present use, location, and opportunities for cutting household firewood; and what other energy needs, such as energy transmission corridors, should be considered?

- What is the present livestock use of the area and what is the potential for that use?

- What is the present landownership pattern, current access and use, and what is the opportunity for acquisition or to manage potential wilderness with inholdings?

- What is the present condition and the potential for serious fire and/or insect and disease infestation; what are the current protection measures, and what measures are needed?

- What are the wilderness attributes of the study area and to what extent are they suitable for wilderness?

II. ALTERNATIVES

Alternatives were developed to respond to public issues, management opportunities, cost efficiency, and net public benefits.

A. Range of Alternatives

Once the issues and opportunities were identified, information was needed to determine the areas' capability to respond to issues. Resource data, environmental and legal constraints, and economic information provided the basis for determining minimum and maximum resource supply potentials called benchmarks. These were determined Forest-wide. Alternatives were then formulated and tested against the benchmarks to assure a wide range of alternatives. The alternatives ranged from a market alternative emphasizing timber, range, and access for minerals to a nonmarket alternative emphasizing wilderness, wildlife, fish habitat, water quality, and scenery. Other alternatives provide varying degrees of response to issues. Each study area's contribution to the alternative was identified.

B. Description of Alternatives

Seven alternatives were considered in detail for each study area. Although they prescribe varying resource emphases, the wilderness potential will be maintained pending final resolution by Congress. Section C compares important resource and economic outputs for each study area.

1. Alternative B

This alternative emphasizes timber production opportunities. It has the most extensive road system which maximizes opportunities for roaded recreation. No wilderness is recommended. Several relatively large blocks of high elevation land that are not tentatively suitable nor efficient for timber production will remain unroaded unless accessed for minerals. The remainder will be roaded and developed. A low level of visual quality is provided. Timber harvest openings and access roads will dominate the landscape. Security cover for game animals is reduced and sediment in streams reduces catchable fish populations over time. The extensive roaded system enhances mineral opportunities.

2. Alternative C

This alternative responds to nonmarket issues that can be achieved at minimal cost to market outputs and emphasizes timber production. Isolated pockets and narrow stringers of tentatively suitable lands are removed from the timber base and recommended for wilderness, or roadless elk security/ semiprimitive recreation areas. Those portions having the widest variety of recreation opportunities and scenery are maintained in a near natural condition. A moderate level of visual quality is provided along major roads. Elsewhere, timber harvest openings will dominate the landscape. Sediment in streams reduces catchable fish populations over time. The extensive road system enhances mineral opportunities.

3. Alternative E - Proposed Action

A mix of market and nonmarket uses is provided with emphasis on recreation, wilderness, elk habitat, water quality, fisheries, visual quality, timber, and mineral issues. The Blue Joint drainage, which has very high wilderness attributes, is recommended for wilderness. Core areas containing the most variety of recreation opportunities and scenery, or high-use big-game summer habitat are managed for semiprimitive recreation or roadless security. A moderate level of visual quality is provided in the foreground and middleground adjacent to major roads. Elsewhere, timber harvest openings will dominate the landscape. Catchable fish populations remain at or near current levels.

4. Alternative F - Current Program (No Action)

MWSA areas are managed to maintain their wilderness character and potential for inclusion in the National Wilderness Preservation System as directed by P.L. 95-150. Land within the MWSA boundary is managed for semiprimitive recreation and/or roadless big-game security. Land outside is managed for a variety of uses consistent with existing management plans. No wilderness is recommended. Timber production within the MWSA boundary is foreclosed by legislative direction. Most land outside is managed for timber production. Natural levels of stream sediment and fish populations are maintained. Mineral exploration and development would be difficult due to legislative direction to maintain the areas wilderness character.

5. **Alternative G**

The alternative is similar to E but with emphasis on wilderness. Wilderness is recommended for large core areas having moderate to high wilderness attributes. Mineral exploration and development is foreclosed within the area recommended for wilderness. A high level of visual quality is maintained in the foreground and middleground viewed from both major and secondary travel corridors. Elsewhere, timber harvest patterns will dominate the landscape. Fish populations remain at or near the current level.

6. **Alternative H**

The alternative recommends wilderness for a large area having moderate or high wilderness attributes and reasonable topographic boundaries. Management on remaining lands emphasizes timber production. On this portion, timber harvest openings will dominate the landscape and a low level of visual quality is provided. Roadless security for big game is provided within the area recommended for wilderness. Fish populations will remain at or near current levels.

7. **Alternative J**

Nearly the entire area is recommended for wilderness; including land with low wilderness attributes and little variety or opportunity for recreation use. Natural conditions would be maintained. Opportunities for timber and mineral production are foreclosed.

C. **Comparison of Alternatives**

Selected resource and economic outputs for each MWSA area are compared in Tables 1 and 2.

Table 1
Resource Outputs for **Blue Joint** Area

Outputs	Unit	Alternative B	C	E	F	G	H	J
New wilderness	M Acres	0	16.8	28.5	0	44.7	59.6	65.2
Recreation	M Acres							
Roaded natural		49.0	35.2	17.6	.5	18.7	1.0	0
Semiprimitive		16.9	13.9	19.3	65.4	2.5	5.3	0
High mineral potential	M Acres	21.9	19.7	11.6	0	11.6	0	0
Roaded emphasis	Percent	83	75	44	0	44	0	0
Timber								
ASQ (decade 1)	MMCF/year	.49	.29	.45	0	.17	0	0
LTSY	MMCF/year	1.3	.9	.5	0	.5	0	0
Suitable land	M Acres	43.7	31.2	16.2	.4	17.5	.9	0
Fisheries streams by management emphasis	Miles							
Roaded		44	29	16	0	14	0	0
Semiprimitive		7	8	13	51	1	3	0
Wilderness		0	14	22	0	36	48	51
Total roads needed	Miles	260	190	100	0	90	0	0
Livestock forage	AUM's	290	230	190	130	180	130	130
PNV (4 percent)	MM$	2.6	2.8	.9	4.2	.4	3.6	3.7
Employment	Jobs	46	36	38	7	24	12	10

Table 2
Resource Outputs for **Sapphire** Area

Outputs	Unit	Alternative B	C	E	F	G	H	J
New wilderness	M Acres	0	10.4	0	0	54.4	92.5	116.1
Recreation	M Acres							
Roaded natural		75.5	64.5	34.7	9.2	46.0	14.6	0
Semiprimitive		41.0	41.7	81.8	107.4	16.2	9.4	0
High mineral potential	M Acres	8.0	4.8	1.8	1.0	2.4	1.0	0
Roaded emphasis	Percent	48	29	11	6	14	6	0
Timber								
ASQ (decade 1)	MMCF/year	.70	.54	.47	.12	.56	.22	0
LTSY	MMBF/year	1.9	1.8	.7	.4	.9	.4	0
Suitable area	M Acres	65.3	57.2	25.7	4.5	34.6	13.8	0
Fisheries streams by management emphasis	Miles							
Roaded		40	31	24	3	25	2	0
Semiprimitive		39	44	55	76	3	4	0
Wilderness		0	4	0	0	51	73	79
Total roads needed	Miles	592	513	226	75	309	130	0
Livestock forage	AUM's	610	600	540	420	540	480	450
PNV (4 percent)	MM$	9.0	12.2	5.8	6.5	7.3	7.8	5.7
Employment	Jobs	48	39	36	14	35	15	14

III. **AFFECTED ENVIRONMENT**

This section describes the environment that may be changed by the proposed action or alternative plans considered. It is presented for each roadless area.

A. General Setting

1. **Blue Joint**

The roadless area is located in Ravalli County of western Montana. It lies on the eastern slopes of the high mountainous Bitterroot Range, and is bordered on the west by the Frank Church-River of No Return Wilderness in Idaho. The area is forested except for dry, warm, south- facing slopes, and rock rubble and grassy balds at higher elevations. It is a triangular-shaped area running 13 miles north and south and ranging from 4 to 13 miles in width. Fifty percent of the area is over 7,000 feet in elevation. Stream bottoms are generally narrow with sideslopes rising steeply to narrow ridges.

Streamside meadows, a portion of the Southern Nez Perce Indian Trail, and wide panoramic views from major ridges are unique features. The area retains a high degree of natural integrity. However, some impacts are evident. Roads and timber harvest are visible on about 400 acres in Coal Creek and along the southern boundary as are several other primitive roads within the exterior boundary.

The Blue Joint drainage is entirely enclosed by high ridges offering outstanding solitude. Primitive recreation opportunities include hiking, big- and small-game hunting, fishing, and viewing a moderate diversity of vegetation and wildlife. Seventy-five percent of the boundary is well-defined by topographic features, the remainder is midslope either passing through or immediately above roads and development.

2. **Sapphire**

The roadless area is located in Ravalli and Granite Counties of western Montana. It lies along the crest of the Sapphire Range and is bordered on the south by the Anaconda-Pintler Wilderness. The area is forested except for several large streamside meadows and rock escarpment and rubble at higher elevations. It is a long area with a north-south orientation of about 25 miles with width ranging from 2 to 10 miles. Roaded intrusions pinch both the northern and southern portions to the area's minimum width. Sixty percent of the area is above 7,000 feet in elevation. Steep mountainous terrain is characteristic along the Sapphire crest and southern boundary. Lands primarily in the Ross and West Forks of Rock Creek are mostly rolling with flat creek bottoms. Glacial cirques, numerous lakes, evidence of historic mining activity, extensive areas of whitebark pine and subalpine larch, and wide panoramas from major ridges are unique features.

The roadless area retains a high degree of naturalness, however some impacts are evident. Mining activity is visible on 250 acres of private land. Firelines and primitive roads are evident in Martin Creek as are several other roads within the exterior boundary. A core area of about 50,000 acres contains the highest potential for solitude due to good topographic boundaries, size,

and few offsite intrusions. Primitive recreation opportunities include hiking, horseback riding, big- and small-game hunting, fishing, and viewing a moderate diversity of vegetation, wildlife, and historic mining. Most of the boundary is poorly defined by topography, lying midslope immediately above roads and development.

B. **Current Resource Situation**

Table 3
Resource Potential and Use for **Blue Joint** and Sapphire Areas

Resource	Unit	-----Roadless Area--------- Blue Joint	Sapphire
Gross area	Acres	65,860	117,030
Net area	Acres	65,860	116,530
Recreation			
Semiprimitive nonmotorized	RVD's	0	6,300
Semiprimitive motorized	RVD's	1,300	4,500
Roaded natural	RVD's	300	700
Wildlife and Fish			
Elk/deer summer habitat	Acres	61,409	116,530
Elk/deer winter habitat	Acres	4,451	0
Rocky Mountain goat habitat	Acres	400	9,000
Bighorn sheep habitat	Acres	2,000	1,000
Fisheries streams	Miles	51	79
Lakes	Number	0	24
Fisheries lakes	Acres	0	140
Livestock			
Suitable existing	Acres	1,172	25,864
Allotments	Number	1	6
Current use	AUM's	130	555
Other suitable (potential)	Acres	0	0
Timber			
Tentatively suitable	Acres	44,089	71,224
Standing volume	MMBF	410.6	546.3
Utility corridors (potential)	Number	1	1
Water development (existing)	Number	0	0
Mineral potential			
Very high	Acres	0	0
High	Acres	26,413	16,180
Moderate	Acres	37,477	23,123
Low	Acres	1,970	77,227
Mining claims	Number	15	47
Oil and gas potential			
High	Acres	0	0
Moderate	Acres	0	0
Low	Acres	65,860	116,530
Leases	Number	0	9
Leased area	Acres	0	19,225
Outfitters	Number	2	4
Trails	Miles	72	100

IV. ENVIRONMENTAL CONSEQUENCES

These are the expected effects of activities scheduled to implement an alternative. Effects of major activities and resource programs are described as quantitative or qualitative changes from the current situation.

Measures to mitigate adverse effects are important considerations in the formulation of management standards and prescriptions. Minimum management requirements established by law are also a part of all prescriptions. These items are discussed in Appendix B of Forest Plan DEIS's.

A. Wilderness

Establishment of wilderness can reduce contributions to the local economy and PNV since timber and mineral production are foregone. On the other hand, recreation dependent businesses will benefit. Natural appearing landscapes are maintained. The buildup of natural fuels may increase the risk of large intense wildfires. Timber and minerals are irretrievably lost unless Congress makes special provisions in the establishment law. Control of insects, disease and fire is generally restricted.

B. Roadless

Maintenance of roadless conditions can reduce contributions to the local economy and PNV since timber production is foregone and access for mineral production restricted. On the other hand, recreation dependent businesses will benefit. Natural appearing landscapes, semiprimitive recreation opportunities, and future consideration for wilderness are maintained. The buildup of natural fuels may increase the risk of large intense wildfire. Timber is irretrievably lost, unless the roadless status is changed during periodic revision of the Forest Plan. Control of insects, disease and fire may require special techniques.

C. Dispersed Recreation Use

Roadless designations provide semiprimitive recreation opportunities with the convenience of snowmobile, trailbike, and other mechanized use. Wilderness precludes such use and maintains solitude for the recreation experience. Roaded areas provide for a broad spectrum of use. Recreation use has a high value and a positive effect on PNV. Construction and maintenance of trails, trailhead facilities, and the concentration of users at sites causes erosion, soil compaction, and loss of vegetation. When considered in total, these are minor effects but important to onsite users.

D. Range Management

In riparian areas vegetation removal, streambank trampling, and soil compaction can have significant effects on soil, water, vegetative productivity, fisheries, and recreation use. Proper management of cattle can reduce, but not eliminate, these impacts. Use is expected to remain at current levels.

E. Timber Management

1. Timber Harvest

Timber harvest and associated activities have a significant effect on the environment and are important to the economic base and PNV. Several mills are dependent upon timber harvest from National Forest lands. In most cases, even-aged harvest systems--clearcut and shelterwood--are prescribed. These systems provide the best opportunity for reducing fire hazards, controlling insects and disease, and are the least costly. Future production is enhanced by replacement of slow-growing stands with young vigorous stands. Dispersal of timber harvest will create a diversity of age classes with normal rotations of about 120 years where timber production is emphasized, 160 years to meet cover/forage objectives on winter range, and 200 years or longer to maintain partial retention visual quality objectives on sensitive landscapes. Old growth will be reduced. Wildlife favored by younger vegetative stages will be enhanced, and old-growth dependent species reduced. Appearance of landscapes will change. Harvest patterns will dominate the landscape under a timber or winter range emphasis. Recreation patterns will shift from semiprimitive to roaded forms of use. Some soil erosion, reduced water quality, and fish habitat loss is inevitable. The most impact occurs under a high timber emphasis due to the extent of harvest and associated activities.

2. Yarding Methods

The most soil disturbance associated with timber harvest results from tractor yarding, while syline and aerial yarding cause less disturbance. All methods may help reduce competition and ensure prompt reforestation. Tractor yarding may displace fertile topsoil and increase the risk of significant sheet erosion during intense rainstorms. Tractor yarding is generally appropriate on slopes under 40 percent, skyline yarding on steeper slopes, and aerial yarding on extremely steep slopes or sensitive soils. Soil compaction caused by tractor yarding on clayey soils can reduce productivity. Soil erosion, reduced water quality, fish habitat, and soil compaction are the most pronounced under a high timber emphasis due to the extent of activities.

3. Debris Reduction and Site Preparation

Debris created by timber harvest along with natural accumulations is generally burned to reduce fuels to acceptable limits, prepare sites for reforestation, and reduce the risk of wildfire in newly established stands. Burning also removes barriers to animal movement and encourages grass and shrub production for wildlife and livestock forage. It removes unsightly debris, but also creates short-term scorched and blackened vistas. It exposes mineral soil and removes competing vegetation to increase seedling survival. Smoke causes short-term reduction in air and visual quality. Burning also has a high potential for reducing site productivity since soils are bared, some erosion is inevitable and fertile organic layers may be consumed in a hot fire. Effects are most pronounced under a high timber emphasis due to the extent and concentration of activities.

4. **Road System**

Road construction and maintenance have a marked effect on other resources primarily due to the displacement of large amounts of soil, shifting of recreation use patterns, and changes in the natural landscape. Roads provide access for timber harvest and motorized recreation, facilitate mineral exploration and development, but foreclose future consideration for wilderness or semiprimitive nonmotorized recreation. Roads crossing open areas or steep slopes are highly visible and remain so for many years. They often cross game trails and change use patterns. Big-game security is reduced by increased access. Some soil erosion, lowered water quality, and degradation of fish habitat is inevitable.

From 4 to 8 acres of land are disturbed for each mile of road constructed. Road density varies from 2 to 7 miles per square mile with reduced densities on steep slopes and/or in areas of sensitive soils. Road construction is a major cost and has a marked effect on PNV. Each road will provide access for the initial timber harvest and at least two future entries before existing timber stands are removed. Consequently, early costs are high and PNV is negative for 3 to 4 decades. PNV is positive after the road system is completed in 3 or 4 decades. Cost in the early decades reduces returns to the U.S. Treasury.

Roads are an irreversible commitment since they are essentially permanent features of the landscape. If roads are not built, timber cannot be economically harvested and an irretrievable loss of a resource occurs. If roads are built, the future potential for wilderness and semiprimitive recreation are foregone.

5. **Tree Planting**

The primary objective is rapid reforestation to minimize the effects of competing vegetation, and to reduce the time until future harvest. This results in accelerated visual recovery and vegetative protection of soils. Rapid reforestation reduces forage production for wildlife and livestock but speeds the recovery of big-game hiding and thermal cover. Planting can also minimize insect and disease problems by establishing stands of mixed species, which may enhance the value of future harvests. Planting is costly, buy mostly done by contract which directly benefits the local economy.

6. **Thinning**

The objective is to reduce competition among trees. Fewer but larger trees are more valuable for harvest. Slash created by thinning is a short-term fire hazard. Removal of insect or disease infested and slow-growing trees maintains stand vigor. Precommercial thinning is costly and can result in decreased PNV.

F. **Minerals and Energy Resources**

Although hardrock mineral potential is rated moderate to high over portions of the area, little activity has occurred to date. Significant discovery and development would have a drastic effect on the onsite environment but would probably occupy a very small area. Vegetation and soils around mines, wellhead locations, and waste disposal sites would be affected and not easily rehabilitated. Some erosion will occur and water quality will be lowered.

G. **Fire Management**

1. **Fire Suppression**

Fire suppression minimizes damage to timber stands. It also promotes old-growth forests, reduces the diversity of age classes and younger species, and provides a high degree of cover but little forage. Loss of soil due to construction of firelines will occur despite preventive measures. Protection from burning leads to accumulation of fuels and increases the risk of large intense fires. Loss of timber to insects and disease is likely to increase because sources of infection are not burned.

2. **Managed Fire**

These are fires allowed to burn in accordance with a predetermined set of conditions, either to allow fire to play a more natural role in the ecosystem or to accomplish specific management objectives such as fuel reduction or site preparation. Fire tends to increase forage for livestock and wildlife, increase vegetative and animal diversity, favor animal species that prefer early vegetative stages and decrease those that prefer old growth. In addition, fuels consumed reduce the severity of future fires. Soil is bared, the potential for erosion increased, and water quality may be reduced. Smoke generated will reduce visual and air quality.

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I. PURPOSE AND NEED FOR ACTION

A. Introduction

The purpose of this Report and Draft Environmental Impact Statement (DEIS) is to evaluate suitability for wilderness of the 65,860-acre Blue Joint and the 117,030-acre Sapphire roadless areas as directed by the Montana Wilderness Study Act (MWSA). These are two of the 11 eleven roadless areas identified in the Bitterroot Forest Plan DEIS (Figure I-1).

Objectives are to respond to issues and concerns identified for the roadless areas by the public and Forest personnel, and incorporate a discussion of land uses. Alternatives were developed in the Forest planning process under provisions of the National Forest Management Act (NFMA). Consequently, the outputs and effects shown for each roadless area are a part of those for the corresponding Forest-wide alternatives.

This document describes a proposed action and six alternatives for management of the land and resources within each area. It is the basis for public review and comment at formal, public hearings as directed by the Montana Wilderness Study Act. The report also describes the affected environment and significant environmental effects of implementing alternatives.

Development of this report followed direction from the Forest and Rangeland Renewable Resources Planning Act (RPA) as amended by the National Forest Management Act (NFMA), National Environmental Policy Act (NEPA), Montana Wilderness Study Act (MWSA), and implementing regulations of NFMA (36 CFR 219) and NEPA (40 CFR 1500-1508).

Recommendations in this report are part of the proposed National Forest Land and Resource Management Plans (Forest Plans), which are detailed in separate publications for the Bitterroot, Deerlodge, and Salmon Forests.

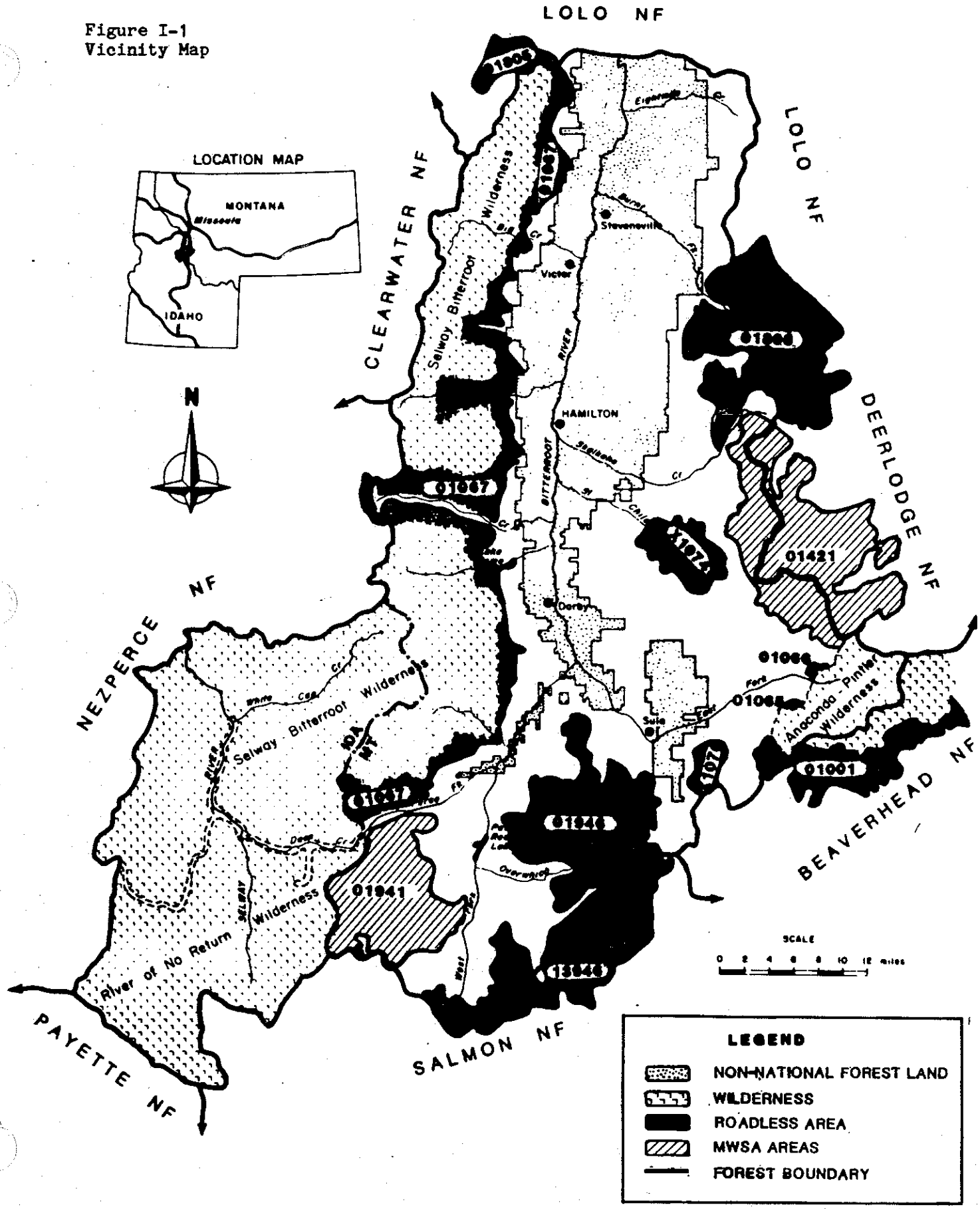
Until Congress makes a final decision on wilderness designation, and subject to valid existing rights and uses, the study areas will be managed to maintain their existing wilderness character and potential for inclusion in the National Wilderness Peservation System.

B. Legislative Background

On November 1, 1977, Congress passed the Montana Wilderness Study Act (P.L. 95-150). The Act requires the Secretary of Agriculture to study and make recommendations to the President on the wilderness suitability of nine separate National Forest areas in Montana containing 973,000 acres. Blue Joint and Sapphire, which are the subject of this study, are two of these nine areas. The President is required to make recommendations on management of these areas to Congress.

In the MWSA, Congress specified that the areas be studied using the procedures in Sec. 3(b) and 3(d) of the Wilderness Act (P.L. 88-577). This procedure included: determining suitability for wilderness preservation; public notice and hearings; notice to the governor of Montana, county governments, and federal departments and agencies concerned; and incorporating hearing and governmental agency and department comments in the report to Congress.

Figure I-1
Vicinity Map



The MWSA also extended the notice of public hearing to 60 days.

In February 1980, the Forest Service issued a news release outlining the process of studying the nine MWSA areas. Six of the areas were to be studied in the Forest planning process and three of the areas were to be studied in a separate study report. The Blue Joint and Sapphire areas were to be studied in the Forest planning process outlined in the National Forest Management Act.

C. General Planning Area Description

1. Blue Joint Area

The 65,860-acre Blue Joint roadless area is located in southwestern Ravalli County in western Montana with 490 acres in Lemhi County, Idaho. It includes the wilderness study area identified by P.L. 95-150 plus contiguous roadless land (Figure I-2). Hamilton, Montana, is about 45 air miles to the north and Salmon, Idaho, is 40 air miles to the south.

The Blue Joint area is a triangular-shaped area running 13 miles north and south and ranging in width from 4 to 13 miles. The west side borders the Frank Church-River of No Return Wilderness in Idaho for about 17 miles. It lies on the eastern slopes of the Bitterroot Mountains, ranging in elevation from 4,900 to 8,600 feet with with 50 percent of the area over 7,000 feet. Blue Joint Creek, by far the largest stream, drains the northwestern segment; and Chicken, Deer and West Creeks drain the southeast portion. Stream bottoms are generally narrow with sideslopes rising steeply to narrow ridges. Slopes on more than one-half of the area are in excess of 60 percent, thereby confining most use to stream bottoms or ridgetops. The area is forested except for streamside meadows, drier south- facing slopes, and at higher elevations where rock rubble and grassy balds are common. In the Blue Joint Creek drainage, forest fires in the late 1800's burned over most of the area. Today, small-sized lodgepole pine covers this portion contrasting with the rest of the area. Large meadows in the headwaters of Deer and Blue Joint Creeks are unique and break the canopy of almost solid forest cover.

2. Sapphire Area

The 117,030-acre Sapphire roadless area lies along the crest of the Sapphire Mountains in Ravalli and Granite Counties of west central Montana. It includes the wilderness study area identified by P.L. 95-150 plus contiguous roadless land (Figure I-3). Hamilton and Philipsburg, the county seats, are about 25 air miles to the northwest and northeast respectively. The Anaconda- Pintler Wilderness borders the area to the south and the Stony Mountain and Mount Emerine roadless areas are adjacent, but not contiguous, to the northern boundary.

The area has a north-south orientation of about 25 miles with the width varying from 2 to 10 miles. Steep mountainous terrain is characteristic along the southern boundary and the Sapphire crest, which runs north-south through the middle of the area. Remaining lands, primarily in the West and Ross Forks of Rock Creek, are mostly gentle rolling slopes and flat creek bottoms. Alpine glaciation has had a profound effect. Glacial scouring has produced steep, rocky cirque basins and trough walls along the crest and southern boundary.

Figure I-2
Blue Joint Area Map

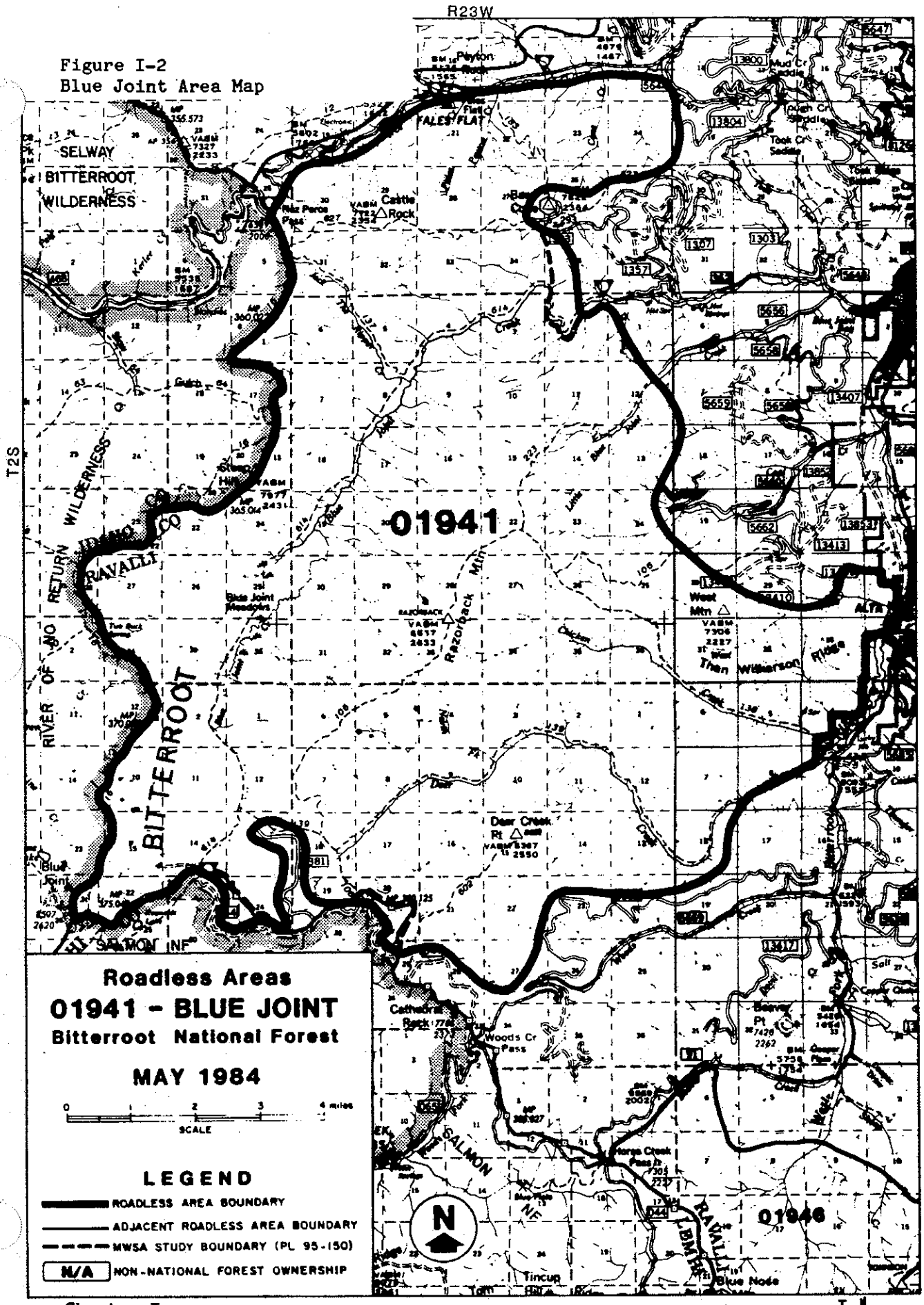
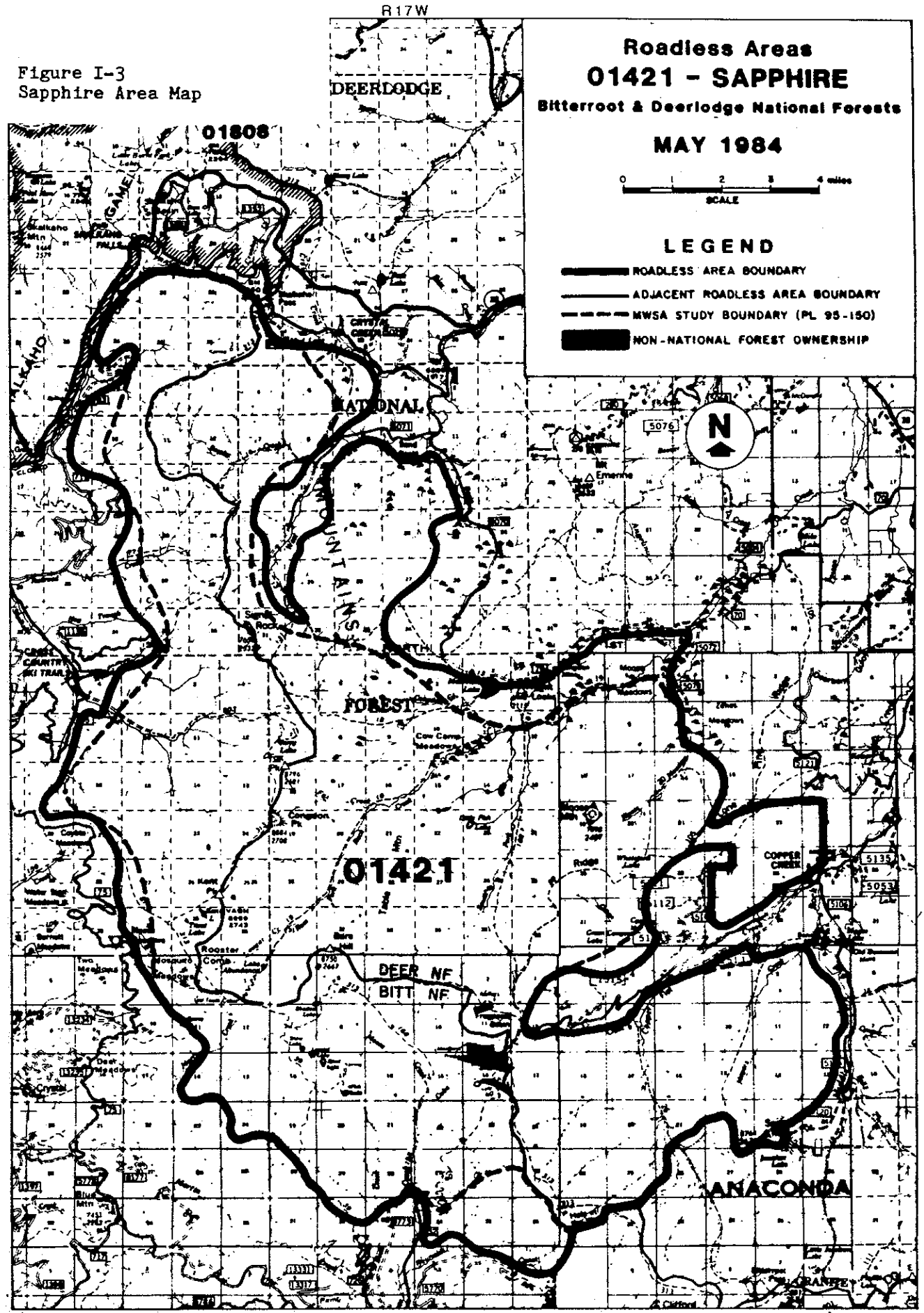


Figure I-3
Sapphire Area Map



Elevations range from 5,000 feet at some points along the lower boundary to 9,000 feet at Kent Peak. Sixty percent of the area is above 7,000 feet. Twenty-four small lakes and numerous potholes dot the Sapphire crest. Streamside meadows break the forested landscape at lower elevations whereas exposed bedrock and rubble predominate along the Sapphire crest and the southern portion bordering the Anaconda-Pintler Wilderness.

D. **Scope of Issues to be Addressed**

Ten public workshops were conducted throughout Montana in September of 1979 to identify issues relating to the MWSA areas. The following planning questions were developed from the issues recorded during the workshops and from mailed-in public comments:

- What other federal lands are classified or proposed as wilderness or are under study as wilderness in the surrounding area and to what extent should they influence the classification of the study lands?

- What are the amount and kind of recreation opportunities the area presently supports or is capable of supporting?

- What are the principal game, nongame, and threatened and endangered species and what are the opportunities for habitat improvement?

- What type, condition, and amount of road or trail access does the area contain and what is the need for roaded forms of access?

- What is the relationship of costs to benefits in the extraction or utilization of Forest commodities, and what is the amount of economic dependency upon the study areas?

- What is the current type of motorized vehicle use and what is the potential for that use?

- What are the present conditions and uses of the area's watershed; what is its relative sensitivity to development activities?

- What is the timber potential of the area, and where is timber management most appropriate?

- What is the hardrock, oil and gas potential of the area and how should the area be managed for that potential?

- What is the present use, location, and opportunities for cutting household firewood; and what other energy needs, such as energy transmission corridors, should be considered?

- What is the present livestock use of the area and what is the potential for that use?

- What is the present landownership pattern, current access and use, and what is the opportunity for acquisition or to manage potential wilderness with inholdings?

- What is the present condition and the potential for serious fire and/or insect and disease infestation; what are the current protection measures, and what measures are needed?

- What are the wilderness attributes of the study area and to what extent are they suitable for wilderness?

A separate effort to identify public issues and management concerns was made as part of the Forest planning process. Planning questions were developed to display the issues recorded during workshops and from mailed-in comments. These Forest Plan issues closely resembled the MWSA issues. An additional issue was identified: How should the Blue Joint and Sapphire MWSA areas be managed?

E. Readers Guide

The remainder of the DEIS is organized as follows:

Chapter II describes alternatives by showing the resource outputs, costs, benefits, and major effects of meeting the objectives of each alternative. The environmental, economic, and social effects of alternatives are briefly compared.

Chapter III provides a brief discussion of the existing condition of physical, biological, social, and economic components of the environment that may be affected by Forest management.

Chapter IV identifies the environmental consequences which could result from Forest management activities scheduled in each alternative.

The glossary contains definitions of technical terms and abbreviations.

II. ALTERNATIVES

A. Introduction

This chapter presents the development, description, and comparison of alternative ways for managing the land and resources within both wilderness study areas including contiguous roadless lands. The study areas were included in a Forest-wide analysis in the Forest planning process and were assigned to varying wilderness and nonwilderness management emphases depending upon the goals and objectives of specific Forest-wide alternatives. The development process included an analysis of the management situation (Section II C) which determinedfigure mum and maximum resource opportunities and output potential.

Alternative descriptions, beginning on II-5 for the Blue Joint area and II-53 for the Sapphire area, identify alternative objecties and how th respond to issues. Resource, economic, social, and assignment results are also described. Comparisons of resource values which change significantly among alternatives begin on II-39 for the Blue Joint area and II-84 for the Sapphire area.

Maps are provided which display the resource management emphasis for the alternatives.

B. Alternative Development

Forest planning began by identifying public issues and management concerns. Once the issues were known, information was needed to determine the Forests' capability to respond to each issue--the analysis of the management situation. Resource data, economic information and legal constraints were examined. Benchmarks were developed and analyzed to measure resource and economic interrelationships and output ranges for alternative development.

Alternatives were developed to respond to issues, present net value (PNV), and net public benefits (NPB). (See Glossary for definitions of these abbreviations and other technical terms.) A single, numeric NPB value was not calculated since monetary values associated with some resources such as timber cannot be added to the qualitative value of nonpriced benefits like a scenic view. An understanding of the various types of values and interrelationships associated with Forest outputs aids decision makers in the selection of an alternative that maximizes net public benefits. (See Appendix B of Forest Plan DEIS's for a discussion of NPB.)

Fifteen issues were addressed in alternatives for the two areas. These included the 14 planning questions from the statewide MWSA workshops of 1979, plus one Forest-wide planning question. Issues are summarized in Chapter I.

C. Analysis of the Management Situation

Benchmarks are indicators of single or multiple resource supply potentials for a specified area. Forest-wide benchmarks were developed to identify maximum and minimum opportunities for resources such as wilderness, timber, livestock and wildlife forage, and to determine the mix of resources and schedule of outputs and costs that maximized present net value. There was no analysis specific to MWSA areas; however, each area's contribution has been approximated.

Forest-wide benchmarks established the minimum and maximum supply potential for issue related resources. In addition, projected demand is estimated for 5 decades. Supply and demand analysis for various resource values follows.

1. **Developed Recreation**

a. **Forest-wide**

Current recreation developments, including campgrounds, boating, picnic sites, and a ski area are adequate to meet projected demand for the next 50 years; however, expansion of existing facilities will be necessary at several heavily used recreation complexes.

b. **MWSA Areas**

No demand was identified.

2. **Roaded Dispersed Recreation**

a. **Forest-wide**

Current dispersed capacity is more than ample to meet projected demand for the next 50 years.

b. **MWSA Areas**

No demand was identified.

3. **Roadless Semiprimitive Recreation**

a. **Forest-wide**

Projected demand in 50 years would require designating about one-half of the current roadless acreage for semiprimitive recreation use.

b. **MWSA Areas**

Both roadless areas could contribute towards this demand.

4. **Wilderness**

a. **Forest-wide**

Projected demand can be accommodated within existing wilderness for about 50 years, at which time expansion of the wilderness system would be needed.

b. **MWSA Areas**

Both roadless areas could contribute towards this demand.

5. **Elk Winter Range**

a. **Forest-wide**

Potential forage production could sustain elk populations above the current level.

b. **MWSA Areas**

Neither roadless area would contribute much due to the small amount of winter range, which is the limiting habitat factor.

6. **Fish**

a. **Forest-wide**

Catchable trout populations decline in direct proportion to the amount of stream sedimentation caused by road construction and timber harvest; but remain well above Regional Guide targets.

b. **MWSA Areas**

Existing habitat within both roadless areas is at or near the optimum. Catchable trout populations will parallel Forest-wide projections in direct proportion to the amount of development.

7. **Livestock Forage**

a. **Forest-wide**

Forage production is more than ample to meet projected demand.

b. **MWSA Areas**

Suitable lands in both roadless areas are currently under permit and neither would contribute significantly if demand increased.

8. **Timber**

a. **Forest-wide**

All RPA targets for the next 50 years can be met.

b. **MWSA Areas**

A significant portion of the tentatively suitable lands within the two roadless areas would be needed to meet the target; however, current production levels on each Forest could be sustained without entry into these roadless areas.

9. **Present Net Value (PNV)**

a. **Forest-wide**

The maximum PNV occurs when most tentatively suitable land is developed for timber production and first decade timber volume is about one-half of current production. Development within roadless areas proceeds at a proportionately slower pace in decades 1 and 2 than for the remainder of the Forest.

b. **MWSA Areas**

The maximum PNV is $6.6 million for the Blue Joint area and $14.0 million for the Sapphire area. Development for timber production begins slowly with about 3 percent of the suitable base harvested in the first two decades. Development then accelerates in decades 3 through 5.

10. **Benchmarks Eliminated from Further Consideration**

Maximum PNV and maximum resource level benchmarks were eliminated from further consideration as alternatives since they do not meet minimum policy constraints such as minimum visual quality objective (maximum modification).

The minimum level benchmark defined the minimum cost of public landownership and the resource outputs incidental to Forest management. It was eliminated since the maximum wilderness alternative is nearly the same for MWSA areas.

The current direction benchmark was designed to duplicate current management direction but without budget constraints. It was eliminated and replaced by the current program (no action) alternative which is constrained by the current budget.

D. **Alternatives - Blue Joint Area**

1. **Range of Alternatives**

The range of Forest-wide alternatives was developed by first designing required alternatives (Peterson, 1983 May 13):

- -- Current program (no action).
- -- Market opportunity emphasis.
- -- Nonmarket opportunity emphasis.
- -- 1980 RPA Program.
- -- Significant wilderness which evaluates the potential for maintaining or increasing commodity outputs.
- -- Wilderness assignment for each roadless area in at least one alternative.
- -- Nonwilderness assignment for each roadless area in at least one alternative.

Additional alternatives were then designed to respond to the full range of issues and management concerns and to assure a wide range of resource outputs and expenditure levels.

Forest-wide alternatives were then compared to the management opportunities and issues for the roadless area to determine if a wide range of resource outputs and expenditure levels, responsive to MWSA issues was provided. Coordination between Forests assured a reasonable match for the objectives and tentative boundaries for wilderness recommendations.

Figure II-1 displays where each alternative fits within the range of several issue related items.

2. Alternatives Eliminated from Further Consideration

The following alternatives were considered but eliminated from detailed study. In all cases, these were Forest-wide alternatives which result in identical or similar management emphases, outputs and effects for MWSA areas as the alternative selected for detailed study. Consequently, they are not needed to achieve a wide range of resource use in the MWSA alternatives.

On the Bitterroot Forest, Alternative A was eliminated because timber and range outputs are similar to Alternative B. Alternative D was eliminated because the area recommended for wilderness is the same as Alternative J. Alternative E1 was eliminated because management emphasis is identical to Alternative E.

On the Salmon Forest, Alternatives 3, 4, 7, 9 and 10 were eliminated because the areas recommended for wilderness is the same as Alternative 2. Alternatives 5 and 6 were eliminated because management emphasis is the same as Alternative 1.

3. Alternative Descriptions

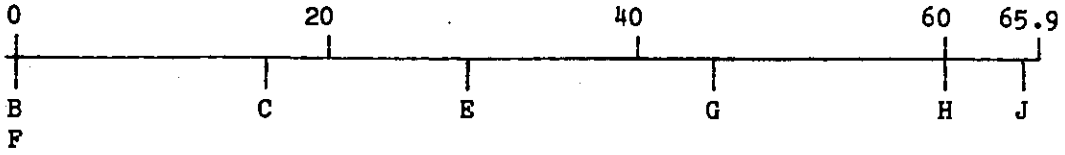
The seven alternatives considered in detail correspond with the goals and objectives established in Bitterroot Forest Plan Alternatives B, C, E, F, G, H, and J. Salmon Forest alternatives with similar goals and objectives were matched with Bitterroot Forest alternatives.

Matched alternatives are:

Bitterroot Forest	B	C	E	F	G	H	J
Salmon Forest	2	2	12	1	8	2	11

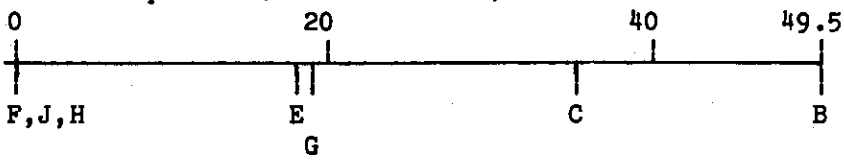
Figure II-1
Range of Alternatives for **Blue Joint** Area

Area Recommended for Wilderness (thousand acres)

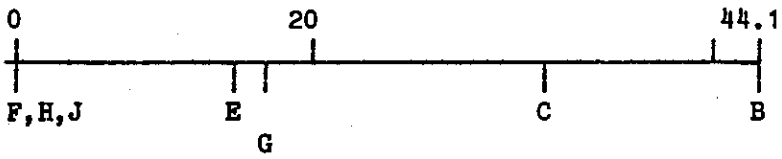


Semiprimitive Designation (thousand acres)

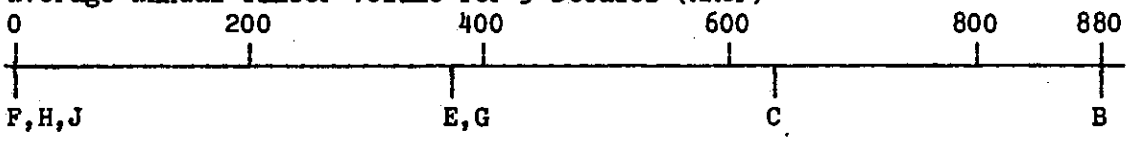
Roaded Emphasis (thousand acres)



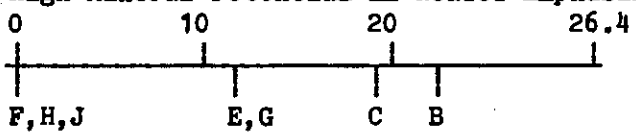
Suitable Timberland (thousand acres)



Average Annual Timber Volume for 5 Decades (MMCF)



High Mineral Potential in Roaded Emphasis (thousand acres)



Present Net Value (million dollars)

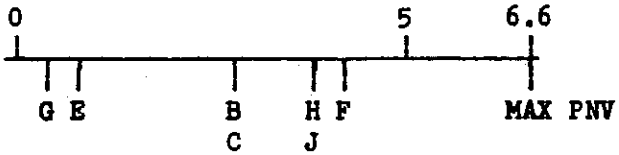
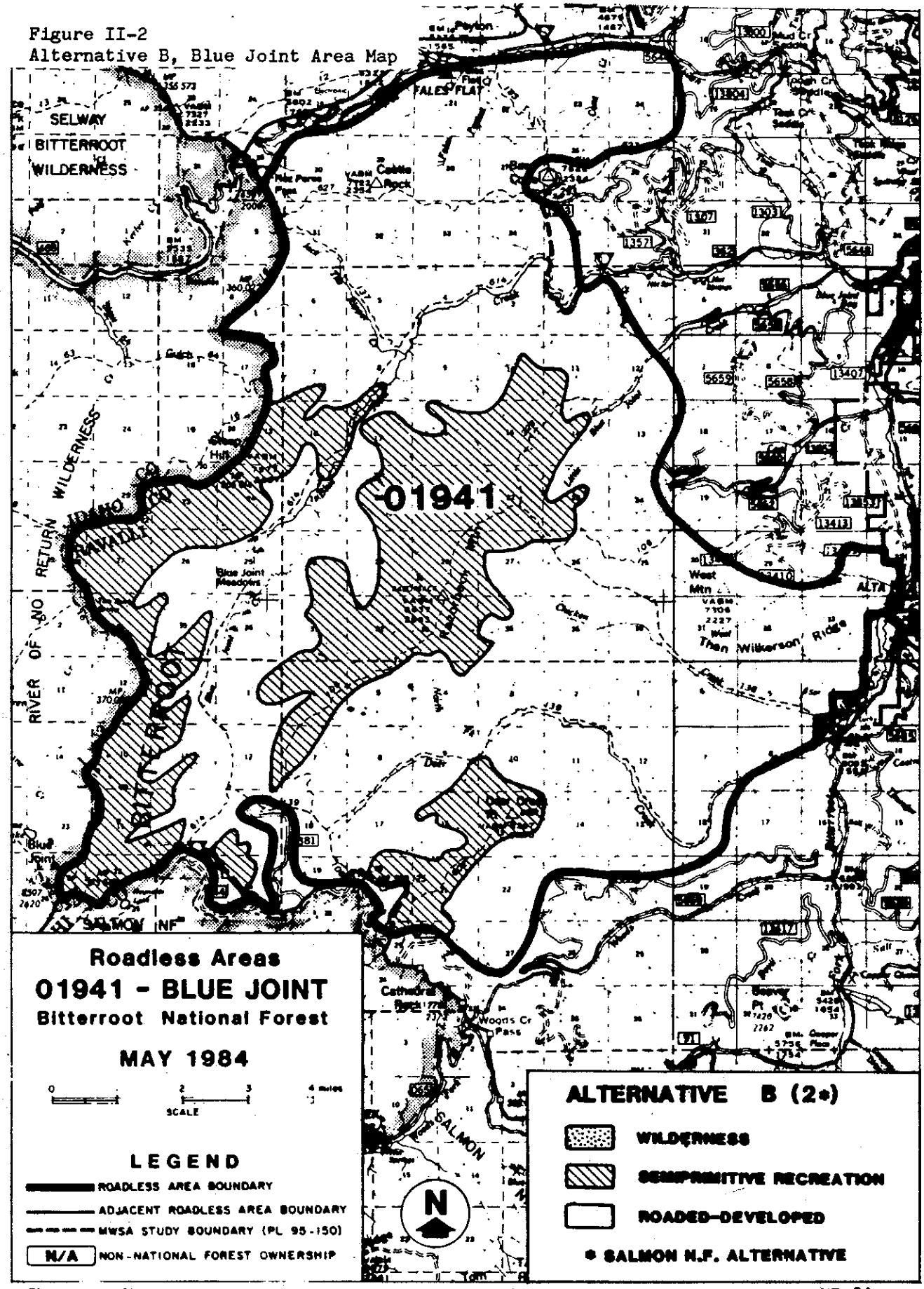


Figure II-2
Alternative B, Blue Joint Area Map



a. **Alternative B**

This alternative emphasizes timber and mineral opportunities. No wilderness is recommended; however, several relatively large blocks of high elevation land that are not tentatively suitable for timber production would be managed for unroaded recreation opportunities.

(1) **Dispersed Recreation**

That portion of the area having the highest scenic value and variety of recreation opportunities will be readily accessible by road. The recreation opportunity setting for the roadless area is comprised of 74 percent roaded natural and 26 percent semiprimitive (motorized and nonmotorized).

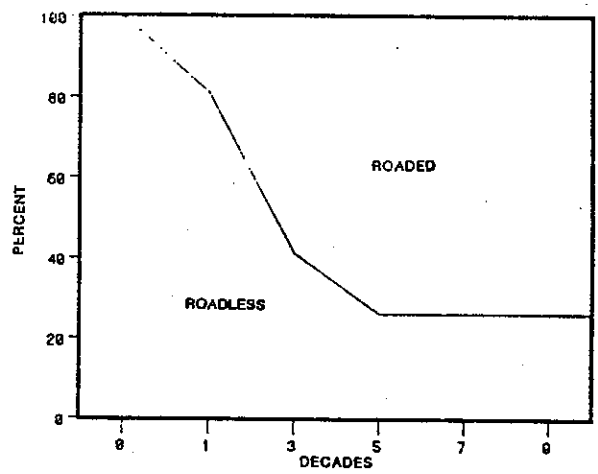
(2) **Wilderness**

No wilderness is recommended.

(3) **Roadless**

About 26 percent of the roadless area consisting of several relatively large but narrow blocks of land not tentatively suitable for timber production will be maintained in a near natural condition. These are primarily high elevation ridge crests along the Montana/Idaho State line and Razorback Ridge. They may be crossed by roads to provide access to other management areas or for minerals production. Remaining lands are scheduled for timber production and will lose their roadless character within 50 years. The expected rate of development is shown in Figure II-3.

Figure II-3
Rate of Development for Blue Joint Area, Alternative B



(4) **Cultural Resources**

The naturalness adjacent to the Southern Nez Perce Indian Trail would be compromised by timber harvest and the trail crossed by roads at least once.

(5) **Visual Quality**

A moderate level of visual quality is maintained in the foreground viewed from the West Fork and Nez Perce Trail roads and several larger high elevation blocks of land will not be developed for timber production. Elsewhere, timber harvest patterns and associated road access will dominate the landscape.

(6) **Wildlife**

About 26 percent of the roadless area consisting of high elevation lands along major ridge tops will provide near natural security for elk, deer and mountain goats. Travel restrictions, primarily road closures, will be necessary to provide hunting season security on the remaining lands scheduled for development. Easier access will likely result in more restrictive hunting seasons than currently exist. Bighorn sheep spring and summer range north of Bare Cone will be roaded for timber production. All of the alternatives provide adequate habitat to maintain viable levels of other game and nongame species listed in Chapter III.

(7) **Fish and Water Quality**

Eighty seven percent of fisheries streams are in a roaded management emphasis. Sediment increases to levels that affect spawning, causing a drop in catchable fish in decade 3. Most of the reduction in habitat occurs in lower gradient streams outside the roadless area. Sediment yield peaks about 20 years later, then declines as the road system nears completion and new construction stabilizes and revegetates. However, fish population continues to decline due to removal of old trees that formally died, toppled, and became an important source for maintenance or creation of pools.

(8) **Timber**

Ninety-nine percent of the tentatively suitable land, and all land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(9) **Minerals and Energy Resources**

Eighty-three percent of the land rated as high mineral potential will eventually be accessed by roads constructed primarily for timber production. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified on the basis of mineral showings or data, and where it is the next logical step in the development of the mineral resource.

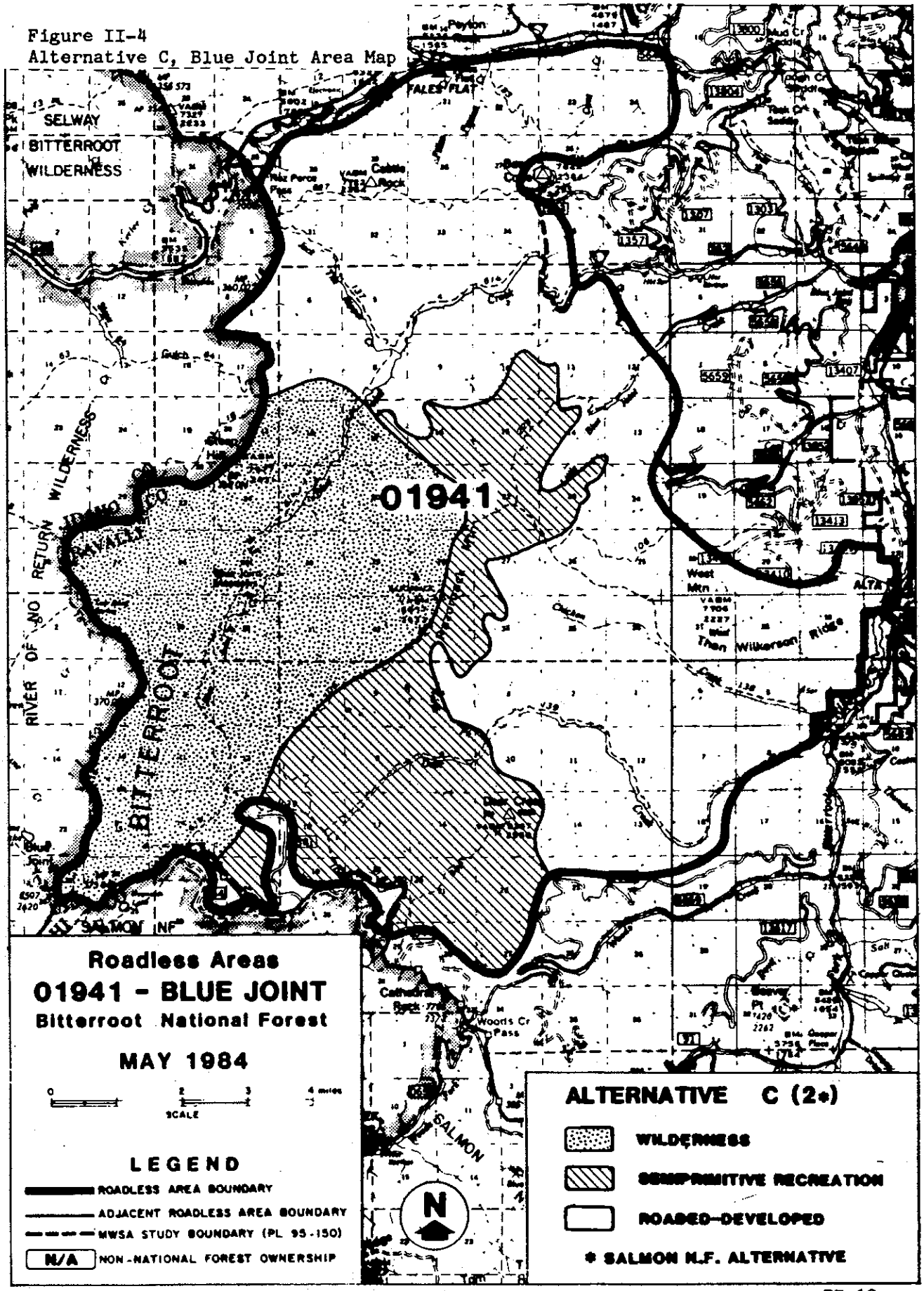
(10) **Road System**

Approximately 260 miles of road are needed to complete the system. Capital investment is needed where low value species and/or high construction costs preclude full payment for the road system from initial timber harvest. These are confined to collector roads providing access to or within a drainage. Average annual construction in decade 1 is 3 miles of which about one-third are capital investment. Construction mileage increases significantly in decades 2 and 3, then rapidly declines as the road system nears completion.

(11) **Socioeconomic**

Present net value is $2.6 million which is 40 percent of the potential. The primary reasons for the foregone investment opportunity are high timber harvest objectives in early decades and dispersal of harvest activities to meet visual quality objectives. Annual receipts will not exceed annual expenditures until the road system is complete. New timber opportunities could provide 39 local jobs.

Figure II-4
Alternative C, Blue Joint Area Map



b. **Alternative C**

This alternative emphasizes timber opportunities but provides for wilderness and semiprimitive recreation opportunities that can be achieved at little cost to market outputs.

(1) **Dispersed Recreation**

Portions of the area having the widest variety of recreation opportunities and scenery are maintained in a near natural condition; including, the headwaters of Blue Joint and Deer Creeks. These will become readily accessible for day use from trailheads at the boundary. The recreation opportunity setting for the roadless area is comprised of 54 percent roaded natural and 46 percent semiprimitive.

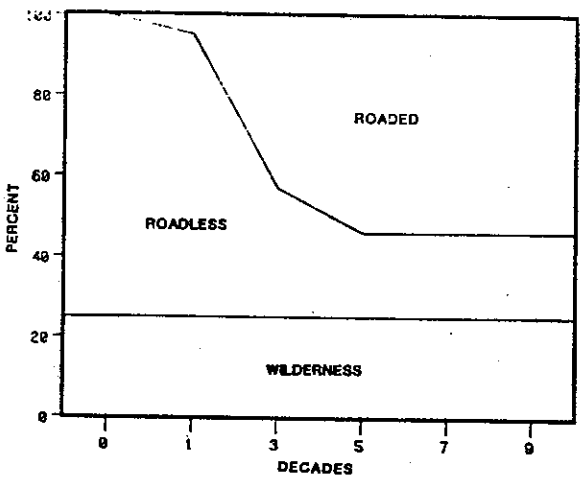
(2) **Wilderness**

Wilderness is recommended for about 25 percent of the roadless area in the headwaters of Blue Joint Creek. The area has moderate wilderness attributes, a good topographic boundary, is contiguous with the Frank Church-River of No Return Wilderness in Idaho, and would have little effect on market outputs.

(3) **Roadless**

In addition to recommended wilderness, about 21 percent of the roadless area consisting of a relatively large and compact block of land in the headwaters of Deer Creek will remain roadless. Land not suitable for timber production comprises most of the acreage; however, isolated pockets and stringers of tentatively suitable land are included. Fringes of the roadless area along the boundary may be crossed by roads to provide access to other management units. Remaining lands are scheduled for timber production and will lose their roadless character within 50 years. The expected rate of development is shown in Figure II-5.

Figure II-5
Rate of Development for Blue Joint Area, Alternative C



(4) **Cultural Resources**

The naturalness adjacent to the Southern Nez Perce Indian Trail would be compromised by timber harvest and the trail crossed by roads in at least one place.

(5) **Visual Quality**

A moderate level of visual quality is maintained in the foreground viewed from the West Fork and Nez Perce Trail Roads and natural levels on roadless and wilderness designations. Elsewhere, timber harvest patterns and associated road access will dominate the landscape.

(6) **Wildlife**

About 46 percent of the roadless area consisting of the headwaters of Blue Joint and Deer Creeks provide near natural security for elk, deer, and mountain goats. Both areas contain excellent elk habitat and are heavily used as security during the hunting season. Travel restrictions, primarily road closures, will be necessary to provide security on the remaining lands scheduled for development. Easier access will likely result in more restrictive hunting seasons than currently exist. Bighorn sheep spring and summer range north of Bare Cone will be roaded for timber production.

(7) **Fish and Water Quality**

Sediment increases to levels that affect spawning, causing a drop in catchable fish in decade 3 with most of the reduction in habitat occurring in lower gradient streams outside the roadless area. Cumulative effects are somewhat reduced by the 41 percent of fishery streams and adjacent lands that will remain in a near natural condition. Sediment yields peak in decade 5, then decline as the road system nears completion and new construction stabilizes and revegetates. Fish populations then recover slightly due to sediment yield decreases, but remain well below the current level because of reductions in the debris source needed to maintain pools.

(8) **Timber**

Seventy-one percent of the tentatively suitable land and 88 percent of the land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(9) **Minerals and Energy Resources**

Seventy-five percent of the high mineral potential land will eventually be accessed by roads constructed primarily for timber production, and on 11 percent

mineral opportunities would likely be foreclosed by wilderness subject to valid existing rights. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified on the basis of mineral showings or data, and where it is the next logical step in the development of the mineral resource.

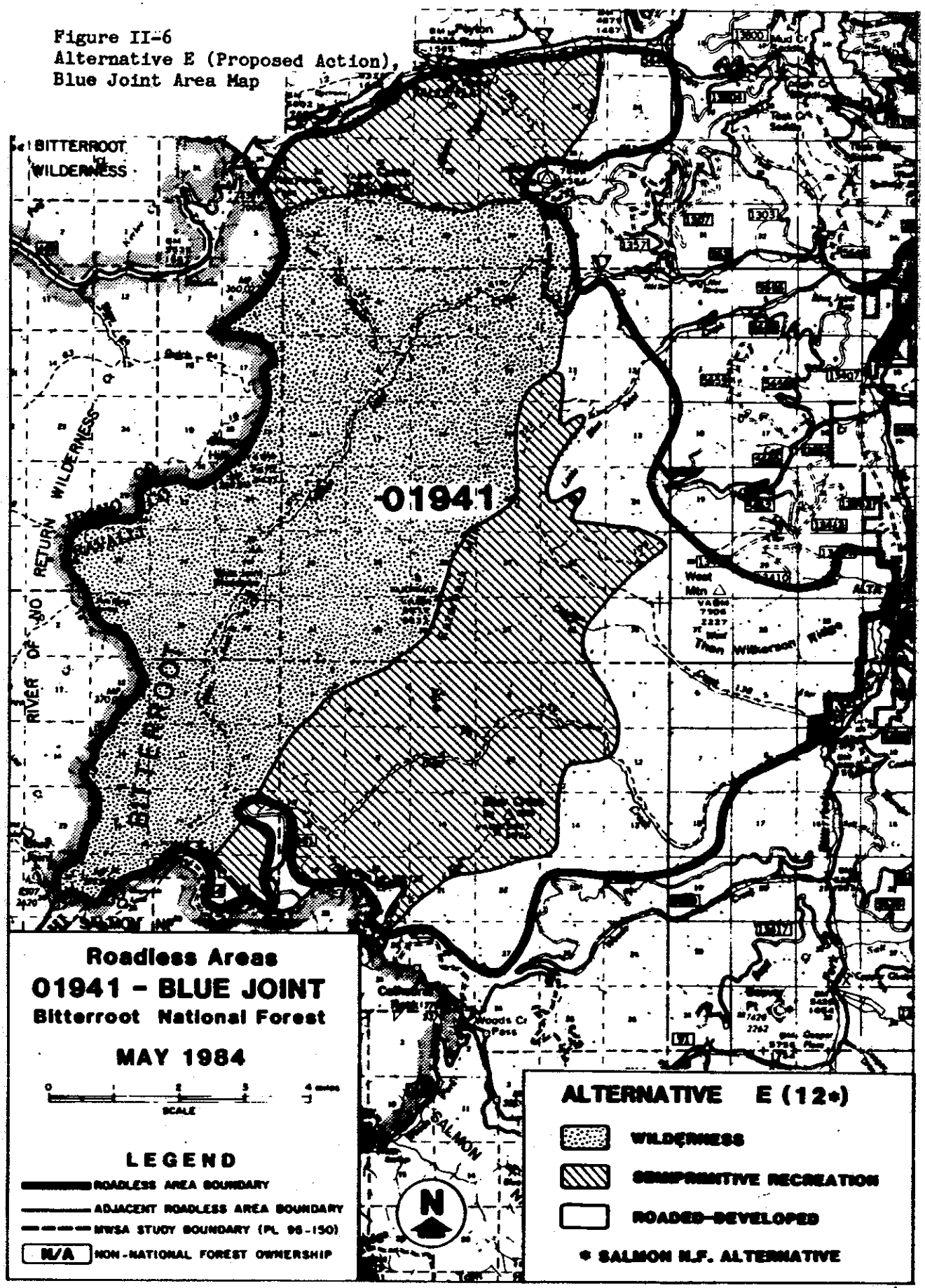
(10) **Road System**

Approximately 190 miles of road are needed to complete the system. Average annual road construction in decade 1 is 2 miles of which about one-third is capital investment. Construction mileage increases significantly in decades 2 and 3, then rapidly declines as the road system nears completion.

(11) **Socioeconomic**

Present net value is $2.8 million which is 43 percent of the potential. The primary reasons for the foregone investment opportunity are high timber harvest objectives in the early decades, dispersal of harvest activities to accomplish minimal visual quality and elk habitat objectives, removal of land from the timber base, and to provide a moderate level of recreation management. Annual receipts will not exceed annual expenditures until the roads system is complete. New timber opportunities could provide 29 local jobs.

Figure II-6
Alternative E (Proposed Action),
Blue Joint Area Map



c. Alternative E - Proposed Action

This alternative responds to major issues by providing a mix of market and nonmarket uses and outputs. It is similar to Alternative G but with a shift in emphasis from wilderness to semiprimitive recreation. The shift recognizes an abundance of primitive nonmotorized recreation opportunities in existing nearby wilderness and the need for maintaining some motorized recreation opportunities in a natural setting.

(1) Dispersed Recreation

A core area containing most of the variety in recreation opportunities and scenery is maintained in a natural or near natural condition; including all of Blue Joint Creek and the headwaters of Deer and Chicken Creeks. Interior portions would receive primarily overnight use due to distances involved. Exterior portions would become readily accessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting is comprised of 27 percent roaded natural and 73 percent semiprimitive.

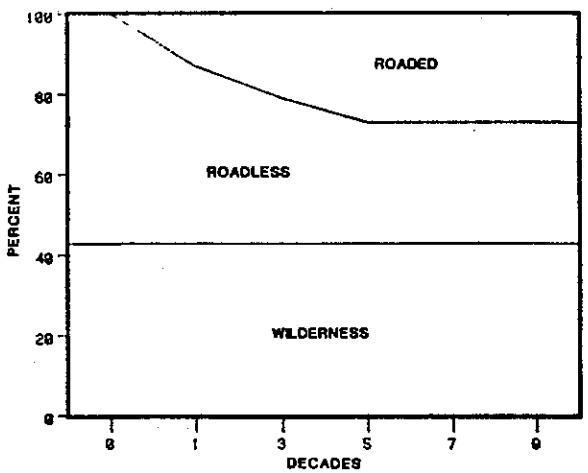
(2) Wilderness

Wilderness is recommended for the Blue Joint drainage or 43 percent of the roadless area. The area has high wilderness attributes, an excellent topographic boundary, is contiguous with and would provide additional width to the Frank Church-River of No Return Wilderness, incorporates streamside meadows which are rare in the northern portion of the adjacent wilderness and would have a low to moderate effect on market outputs.

(3) Roadless

In addition to the wilderness recommendation, about 29 percent of the roadless area consisting of a large core area with a good topographic boundary will remain roadless. Remaining lands are scheduled for timber production and will lose their roadless identity within 50 years. The expected rate of development is shown in Figure II-7.

Figure II-7
Rate of Development for Blue Joint Area, Alternative E (Proposed Action)



(4) **Cultural Resources**

The naturalness of the Southern Nez Perce Indian Trail and surroundings is maintained.

(5) **Visual Quality**

A moderate level of visual quality is maintained in the foreground and middleground viewed from the West Fork and Nez Perce Trail Roads and natural levels on roadless and wilderness designations. Elsewhere, timber harvest patterns and associated road access will dominate the landscape.

(6) **Wildlife**

About 73 percent of the roadless area consisting of the Blue Joint drainage, upper portions of Deer and Chicken Creeks, and bighorn sheep lambing areas north of Bare Cone will be maintained in a natural or near natural condition. These areas contain good or better elk habitat. Some are moderately used while other areas are used heavily for security by deer, elk and mountain goats during the hunting season. Travel restrictions, primarily road closures, are necessary to provide security on the remaining lands scheduled for development. The balance of natural and road closure security should maintain hunting seasons and restrictions at about the present level.

(7) **Fish and Water Quality**

Area-wide, catchable fish populations will remain at or very near the current level since 70 percent of the fishery stream mileage and adjacent lands will remain in a near natural condition. However, on that portion that will be roaded and developed, sediment increases to levels that affect fish spawning and food supply causing a drop in catchable fish in decade 3 with most of the reduction in habitat occurring in lower gradient streams outside the roadless area. Sediment yield peaks about 20 years later, then declines as the road system nears completion and new construction stabilizes and revegetates. Populations then recover to near current levels due to decreased sediment and provisions to maintain debris caused pools in fishery streams.

(8) **Timber**

Thirty-seven percent of the tentatively suitable land and 51 percent of the land having the highest potential productivity will be managed for scheduled timber output.

(9) **Minerals and Energy Resources**

Twenty-two percent of the high potential mineral opportunities would likely be foreclosed by wilderness, subject to valid existing rights, and 44 percent will eventually be accessed by roads constructed primarily for timber production. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified on the basis of mineral showings or data, and where it is the next logical step in the development of the mineral resource.

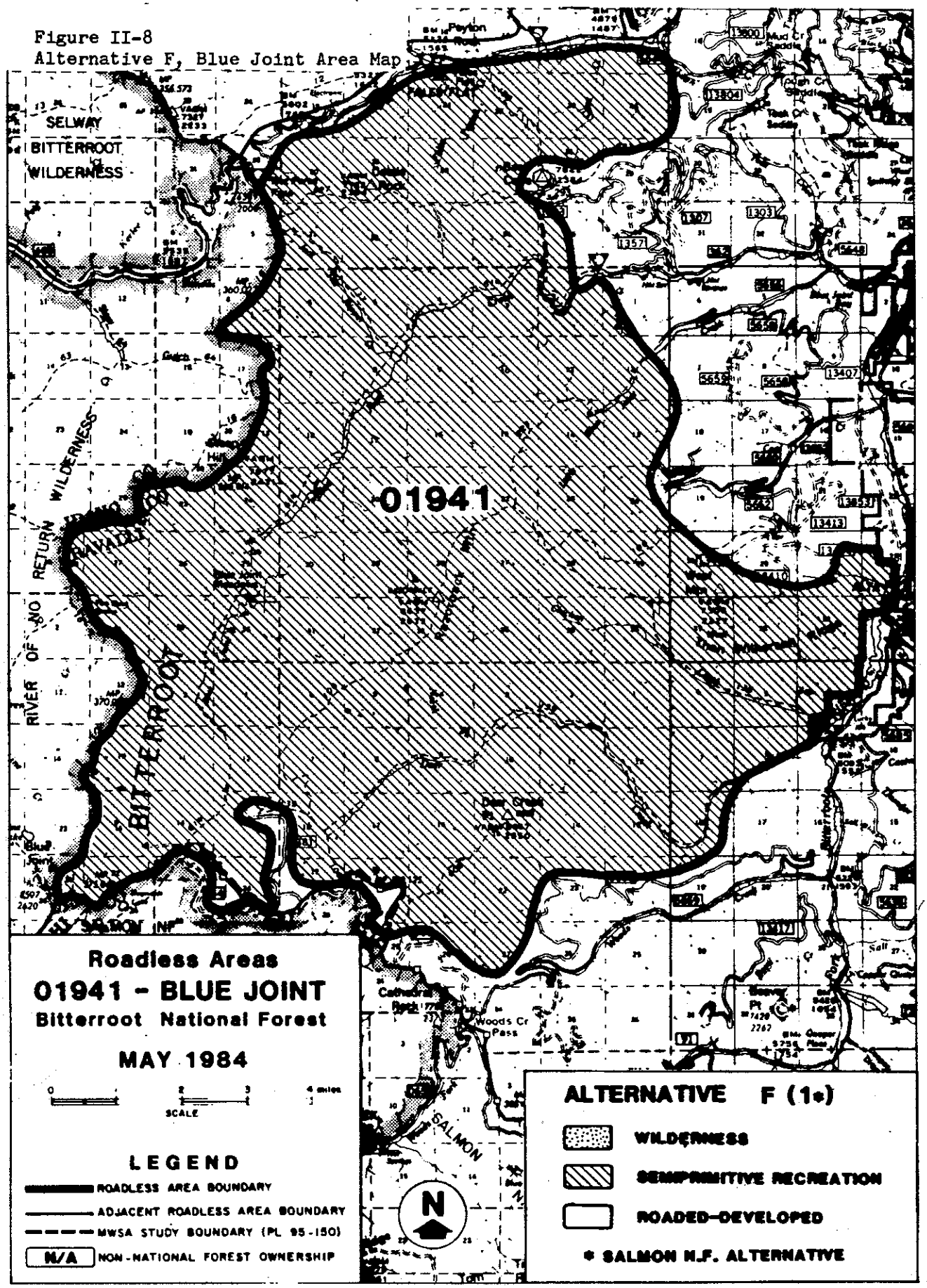
(10) **Road System**

Approximately 100 miles of road are needed to complete the system. Average annual road construction in decade 1 is 3 miles of which about one-third is capital investment. Construction mileage increases significantly in decades 2 and 3, then rapidly declines as the road system nears completion.

(11) **Socioeconomic**

Present net value is $0.9 million, which is 14 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base, high timber harvest objectives in the early decades, dispersal of timber harvest activities to provide a moderate level of visual quality, riparian area protection, and to provide a moderate level of recreation management. Annual receipts will not exceed annual expenditures until the road system is complete. New timber opportunities could provide 31 local jobs.

Figure II-8
Alternative F, Blue Joint Area Map



d. Alternative F - Current Program (No Action)

This alternative continues current direction consistent with existing management plans, policies, standards, and guidelines. MWSA areas are managed to maintain their wilderness character and potential for inclusion in the National Wilderness Preservation System as directed by P.L. 95-150. The areas would be managed for roadless semiprimitive recreation.

(1) Dispersed Recreation

The entire roadless area is managed in a near natural condition including lands along the exterior boundary with little variety in recreation opportunities.

Interior portions would receive primarily overnight use due to distances involved. Exterior portions are readily accessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting is 100 percent semiprimitive.

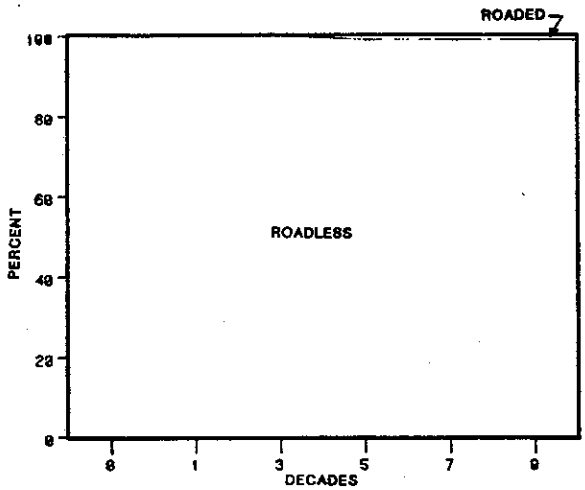
(2) Wilderness

No wilderness is recommended.

(3) Roadless

The area will remain roadless except for existing development in Coal Creek. Wilderness character and potential for inclusion in the National Wilderness Preservation system will be maintained in accordance with direction established by P.L. 95-150. Figure II-9 shows the area's roadless status.

Figure II-9
Roadless Status for Blue Joint Area, Alternative F



(4) Cultural Resources

The naturalness of the Southern Nez Perce Indian Trail and surroundings is maintained.

(5) **Visual Quality**

A natural level of visual quality is maintained on the entire area.

(6) **Wildlife**

Natural conditions will be maintained for the entire area. No change in current hunting season length, or other restrictions is expected.

(7) **Fish and Water Quality**

Natural levels of sediment and fish populations will be maintained.

(8) **Timber**

No lands within the boundaries established by the Montana Wilderness Study Act will be managed for timber production. Tentatively suitable lands are identified as not suitable for timber production.

(9) **Minerals and Energy Resources**

Exploration and development would be difficult due to legislative direction to maintain the area's roadless and undeveloped character. Prospecting and exploration could proceed without the benefit of roads.

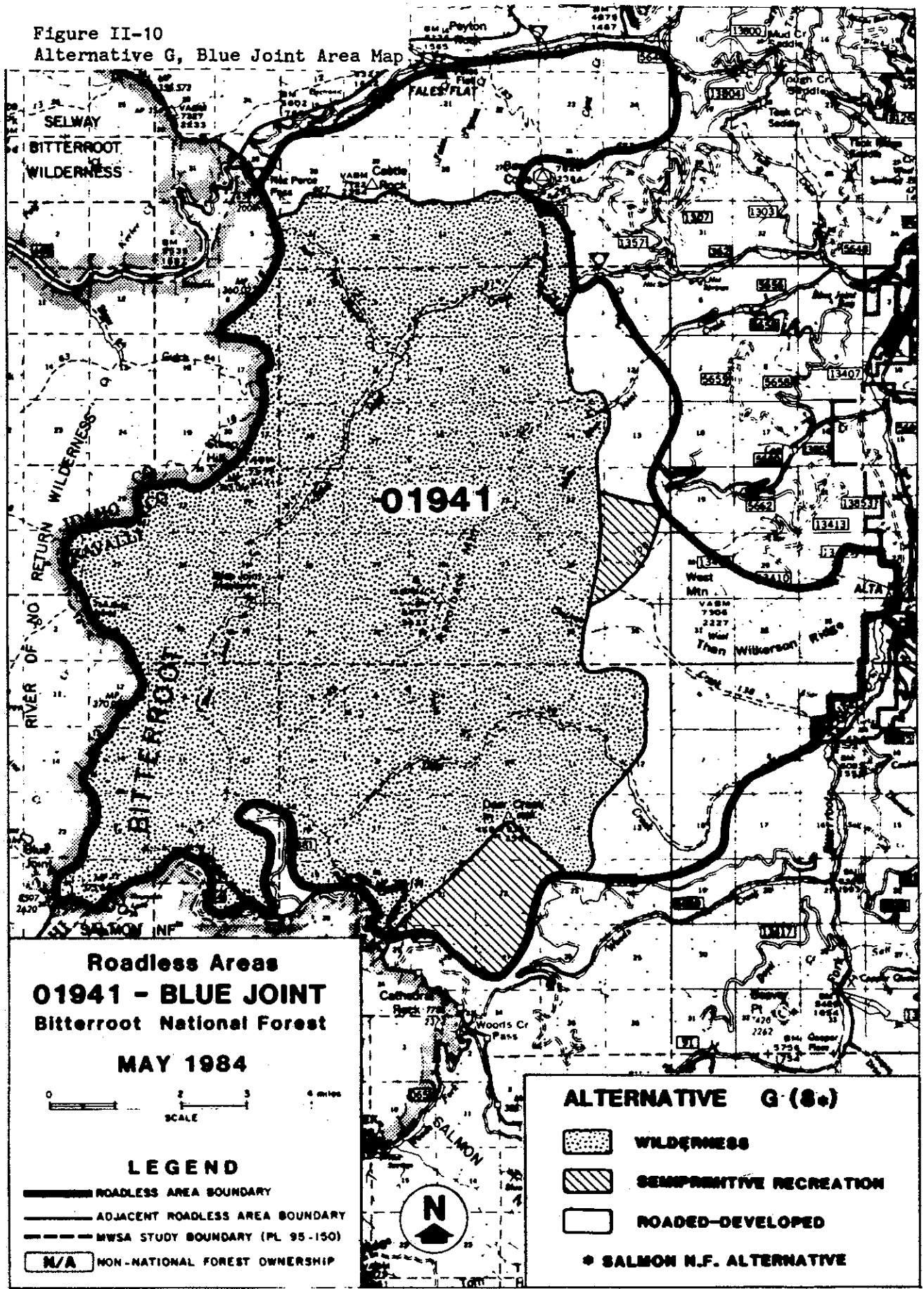
(10) **Road System**

The entire area will remain unroaded except for existing development in Coal Creek.

(11) **Socioeconomic**

Present net value is $4.2 million which is 64 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base and providing moderate level of recreation management. The local employment potential would remain at the present level of 7 jobs since the area does not contribute toward commodity outputs.

Figure II-10
Alternative G, Blue Joint Area Map



e. Alternative G

The alternative responds to major issues by providing a mix of market and nonmarket uses and outputs. Portions recommended for wilderness have high wilderness attributes, public support for wilderness, good topographic boundaries, and low to moderate effect on market outputs.

(1) Dispersed Recreation

A core area containing most of the variety in recreation opportunities and scenery is maintained in a natural condition; including all of Blue Joint and the headwaters of Deer and Chicken Creeks. Interior portions would receive primarily overnight use due to distances involved. Exterior portions will become assessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting is comprised of 28 percent roaded natural and 70 percent semiprimitive.

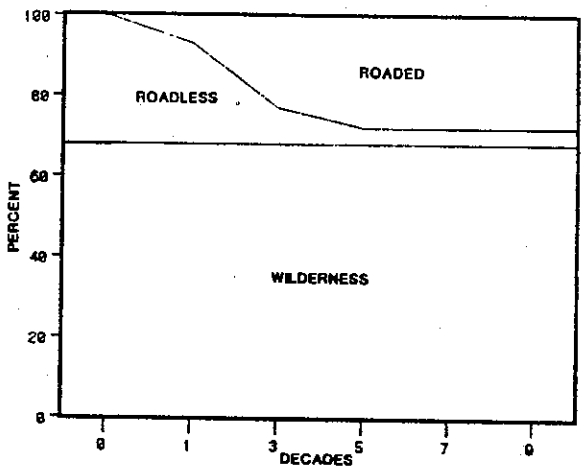
(2) Wilderness

Wilderness is recommended for 68 percent of the area including the Blue Joint drainage and headwaters of Chicken and Deer Creeks. The area has moderate to high wilderness attributes, a good topographic boundary in most places, is contiguous with and would provide additional width to the Frank Church-River of No Return Wilderness, incorporates streamside meadows which are rare in the northern portion of the adjacent wilderness, and would have a low to moderate effect on market outputs.

(3) Roadless

In addition to the wilderness recommendation, about 4 percent of the roadless area will remain roadless. Remaining lands are scheduled for development and will lose their roadless identity within 50 years. The expected rate of development is shown in Figure II-11.

Figure II-11
Rate of Development for Blue Joint Area, Alternative G



(4) **Cultural Resources**

The naturalness of the Southern Nez Perce Indian Trail from Bare Cone to the state line is maintained by a wilderness recommendation to the south and to the north a partial retention visual quality objective.

(5) **Visual Quality**

A high level of visual quality is maintained in the foreground and middleground viewed from the West Fork, Nez Perce Trail, and other major Forest roads providing access to the area; and natural levels on roadless and wilderness designations. Elsewhere, harvest patterns and associated access roads will dominate the landscape.

(6) **Wildlife**

About 72 percent of the roadless area consisting of the Blue Joint drainage and upper portions of Deer and Chicken Creeks will be maintained in a natural condition. These areas contain good or better elk habitat. Some are used moderately and others used heavily for security by deer, elk and mountain goats during the hunting season. Travel restrictions, primarily road closures, provide security on the remaining lands scheduled for development. Hunting seasons and restrictions should be maintained at the present level.

(7) **Fish and Water Quality**

Area-wide, catchable fish populations will remain near the current level since 74 percent of the fisheries streams and adjacent lands will remain in a near natural condition. However, on that portion that will be roaded and developed, sediment increases to levels that affect fish spawning and food supply causing a drop in catchable fish in decade 2 with most of the reduction in habitat occurring in lower gradient streams outside the roadless area. Sediment yield peaks in the third decade then declines as the road system nears completion and new construction stabilizes and revegetates. Populations then recover due to decreased sediment but remain slightly below the current level because of reductions in the debris source to maintain pools.

(8) **Timber**

Forty percent of the tentatively suitable land and 48 percent of the land having the highest potential productivity will be managed for scheduled timber outputs.

(9) **Minerals and Energy Resources**

Forty-nine percent of the high potential mineral opportunities would likely be foreclosed by wilderness, subject to valid existing rights, and 44 percent will eventually be accessed by roads constructed primarily for timber production. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified on the basis of mineral showings or data, and where it is the next logical step in the development of the mineral resource.

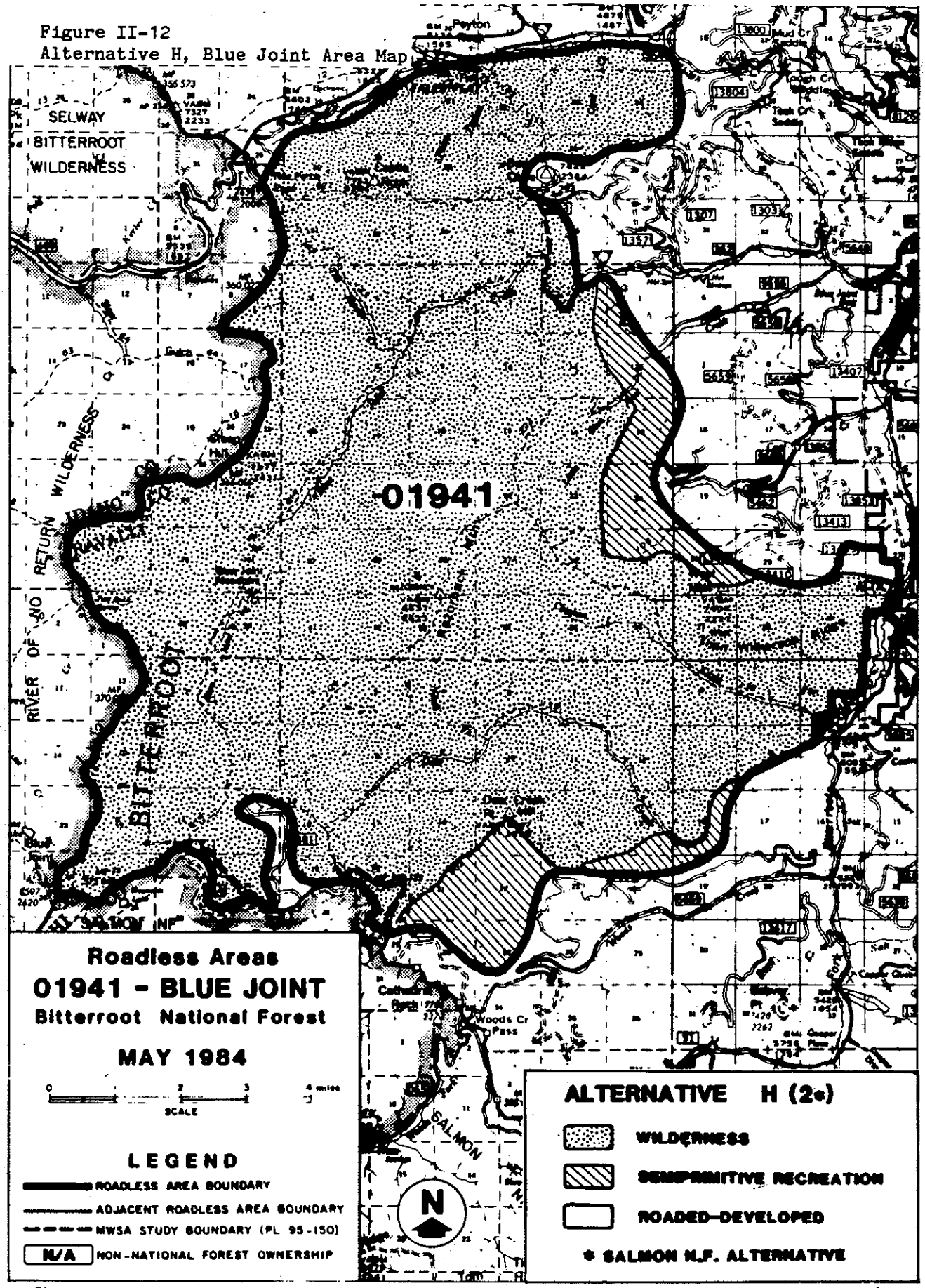
(10) **Road System**

Approximately 90 miles of road are needed to complete the system. Average annual road construction in decade 1 is 1 mile of which about one-third is capital investment. Construction mileage increases in decades 2 and 3, then declines as the road system nears completion.

(11) **Socioeconomic**

Present net value is $0.4 million which is 6 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base, dispersal of timber harvest to provide for high levels of visual quality, wildlife habitat and riparian area protection, high timber harvest objectives in the early decades and a high level of recreation management. Annual receipts will not exceed expenditures until the road system is complete. New timber opportunities could provide 17 local jobs.

Figure II-12
Alternative H, Blue Joint Area Map



f. Alternative H

This alternative recommends wilderness for those portions defined by reasonable topographic boundaries and moderate or higher wilderness attributes.

(1) Dispersed Recreation

The entire roadless area excluding existing roads and development in Coal Creek and including lands along the boundary with little variety in recreation opportunities is managed primarily for natural conditions. Interior portions would receive primarily overnight use due to distances involved. Exterior portions are readily accessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting is 2 percent roaded natural and 98 percent semiprimitive.

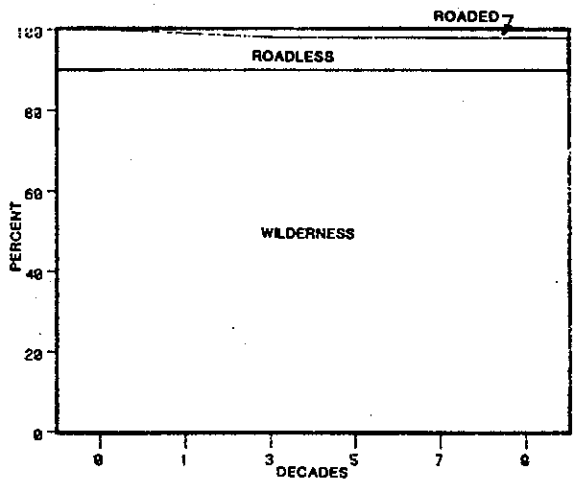
(2) Wilderness

Wilderness is recommended for 90 percent of the roadless area. Excluded are roads and timber harvest in Coal and Woods Creeks and fringes of the roadless area having very low wilderness attributes.

(3) Roadless

In addition to the wilderness recommendation, about 8 percent of the roadless area excluding roads and timber harvest in Coal Creek will remain roadless. The expected rate of development is shown in Figure II-13.

Figure II-13
Rate of Development for Blue Joint Area, Alternative H



(4) Cultural Resources

The naturalness of the Southern Nez Perce Indian Trail and surroundings is maintained.

(5) **Visual Quality**

A natural level of visual quality is maintained in wilderness and roadless designations. Elsewhere, harvest patterns and associated access roads will dominate the landscape.

(6) **Wildlife**

About 98 percent of the roadless area will be maintained in a natural condition. This area contains both fair and better elk habitat. Some is lightly used and other portions heavily used for security by deer, elk and mountain goats during the hunting season. The roadless security area is expected to maintain hunting seasons and restrictions at the present level.

(7) **Fish and Water Quality**

Natural levels of sediment and fish populations are maintained.

(8) **Timber**

Two percent of the tentatively suitable land and 2 percent of the land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(9) **Minerals and Energy Resources**

Ninety-two percent of the high potential mineral opportunities would likely be foreclosed by wilderness subject to valid existing rights and zero percent will eventually be accessed by roads constructed primarily for timber production. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified on the basis of mineral showings or data, and where it is the next logical step in the development of the mineral resource.

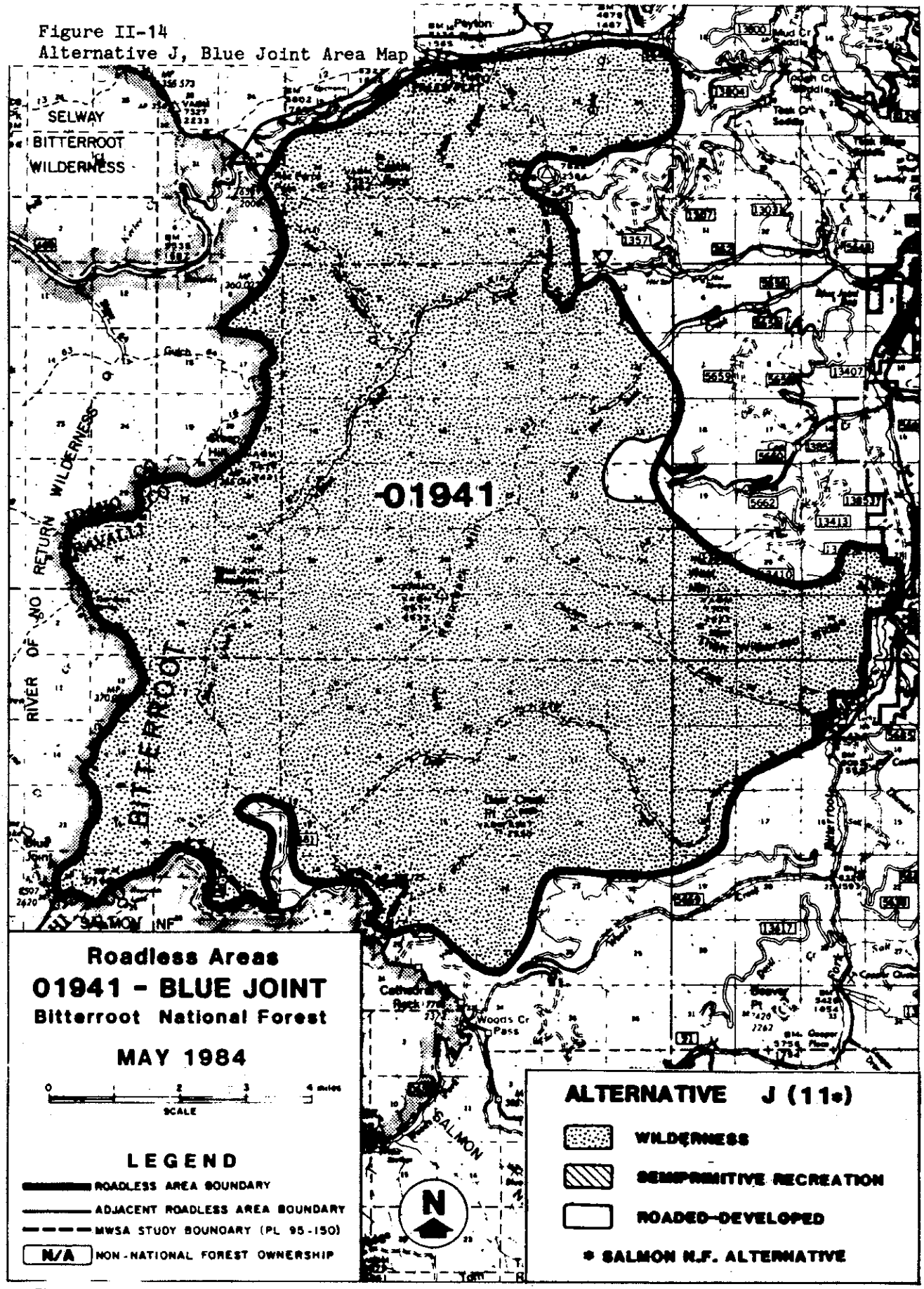
(10) **Road System**

The entire area, except for existing roads in Coal Creek, will remain unroaded.

(11) **Socioeconomic**

Present net value is $3.6 million which is 55 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base and providing a high level of recreation/wilderness management. The high level of recreation/wilderness management could provide 4 local jobs.

Figure II-14
Alternative J, Blue Joint Area Map



g. Alternative J

This alternative recommends wilderness for nearly the entire roadless area.

(1) Dispersed Recreation

The entire roadless area except for existing roads and timber harvest in Coal Creek is managed for natural conditions. This includes land along the boundary with little variety in recreation opportunities. Interior portions would receive primarily destination overnight use due to distances involved. Exterior portions are accessible for either day or destination types of use from trailheads near the boundary. The recreation opportunity setting is 1 percent roaded and 99 percent semiprimitive.

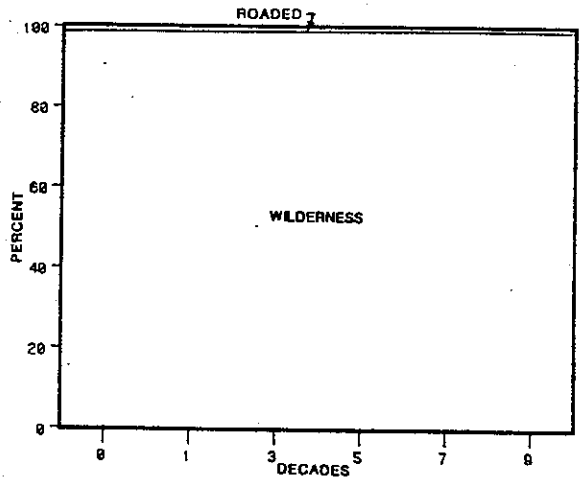
(2) Wilderness

Wilderness is recommended for nearly the entire roadless area excepts for roads and timber harvest in Coal Creek.

(3) Roadless

There is no roadless designation. Figure II-15 shows the area recommended for wilderness.

Figure II-15
Wilderness Recommendation for Blue Joint Area, Alternative J



(4) Cultural Resources

The natural integrity of the Southern Nez Perce Indian Trail and surroundings is maintained.

(5) Visual Quality

A natural level of visual quality is maintained in the wilderness designation.

(6) **Wildlife**

Natural conditions are maintained for the entire roadless area except for existing development in Coal Creek. Elk, deer and mountain goat habitat ranges from fair to excellent and use as security during hunting season ranges from to light to heavy. There should be no change from current hunting season length and restrictions.

(7) **Fish and Water Quality**

Natural levels of sediment and fish populations will be maintained.

(8) **Timber**

Approximately 600 acres or 1 percent of the tentatively suitable land will be managed for timber production.

(9) **Minerals and Energy Resources**

Exploration and development opportunities on 26,400 acres having high mineral potential would likely be foreclosed by wilderness designation subject to valid existing rights.

(10) **Road System**

The entire area will remain unroaded, except for existing development in Coal Creek.

(11) **Socioeconomic**

Present net value is $3.7 million which is 56 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base and providing a high level of recreation/wilderness management. The high level of recreation management could provide 10 local jobs.

4. **Comparison of Alternatives**

a. **Management Emphasis by Alternative**

Management prescriptions have been grouped into three management emphases: roaded, semiprimitive recreation, and wilderness. The roaded emphasis will eventually preclude wilderness. Timber, range, winter range, partial retention, and riparian are examples of prescriptions included. The semiprimitive recreation emphasis will likely maintain the roadless character for future consideration as wilderness. The semiprimitive recreation prescription is the only one included in this emphasis. The wilderness emphasis is the wilderness prescription.

Table II-1 displays acreage assignments by management emphasis and the expected rate of development for each alternative. Table II-2 displays the tentatively suitable timberland, land of highest timber potential (50-84 CF/acre/year), and land of highest mineral potential by acreage and management emphasis.

Table II-1
Management Emphasis for **Blue Joint** Area
(thousand acres)

Management Emphasis	Forest	Alternative						
	Bitterroot	B	C	E 1/	F	G	H	J
	Salmon	2	2	12	1	8	2	11
Nonwilderness designation		65.9	49.1	37.4	65.9	21.2	6.3	.7
Roaded emphasis		49.0	35.2	17.6	.5	18.7	1.0	0
Bitterroot Forest		49.0	35.2	17.6	0.0	18.7	1.0	0
Salmon Forest		0	0	*	.5	0	0	0
Semiprimitive recreation emphasis		16.9	13.9	19.3	65.4	2.5	5.3	0
Bitterroot Forest		16.4	13.4	19.3	65.4	2.5	5.3	0
Salmon Forest		.5	.5	*	0	0	0	0
Wilderness designation		0	16.8	28.5	0	44.7	59.6	65.2
Bitterroot Forest		0	16.8	28.5	0	44.2	59.1	64.7
Salmon Forest		0	0	0	0	.5	.5	.5
Area developed by								
Decade 1		12.2	3.5	8.8	0	4.7	0	0
Bitterroot Forest		12.2	3.5	8.8	0	4.7	0	0
Salmon Forest		0	0	*	0	0	0	0
Decade 5		65.9	35.7	17.6	.5	18.7	1.0	0
Bitterroot Forest		65.4	35.2	17.6	0	18.7	1.0	0
Salmon Forest		.5	.5	*	.5	0	0	0
Area roadless in **								
Decade 1		53.7	45.6	28.1	65.9	16.5	5.3	0
Bitterroot Forest		53.2	45.1	28.1	65.4	16.5	5.3	0
Salmon Forest		.5	.5	*	.5	0	0	0
Decade 5		0	13.4	19.3	65.4	2.5	5.3	0
Bitterroot Forest		0	13.4	19.3	65.4	2.5	5.3	0
Salmon Forest		0	0	*	0	0	0	0
Current roadless acres		65.9	65.9	65.9	65.9	65.9	65.9	65.9
Bitterroot Forest		65.4	65.4	65.4	65.4	65.4	65.4	65.4
Salmon Forest		.5	.5	.5	.5	.5	.5	.5

1/ Proposed Action.
* Salmon Forest will develop nonwilderness management emphasis at a later date.
** Does not include wilderness designations.

Table II-2
Suitable Timberland and Mineral Potential by Management Emphasis for **Blue Joint**
(thousand acres)

Management Emphasis	Forest	Alternative						
	Bitterroot	B	C	E 1/	F	G	H	J
	Salmon	2	2	12	1	8	2	11
Tentatively suitable land								
Roaded emphasis (suitable)		43.7	31.2	16.2	.4	17.5	.9	0
Bitterroot Forest		43.7	31.2	16.2	0	17.5	0	0
Salmon Forest		0	0	*	.4	0	0	0
Semiprimitive recreation emphasis		.4	6.8	15.4	43.7	2.4	4.5	0
Bitterroot Forest		0	6.4	15.4	43.7	2.4	4.5	0
Salmon Forest		.4	.4	*	0	0	0	0
Wilderness emphasis		0	6.1	12.1	0	24.2	38.7	43.5
Bitterroot Forest		0	6.1	12.1	0	23.8	38.3	43.1
Salmon Forest		0	0	*	0	.4	.4	.4
Highest Timber Potential**								
Roaded emphasis		10.9	9.6	5.6	0	6.2	.2	0
Semiprimitive recreation emphasis		0	.6	2.5	10.9	.3	1.0	0
Wilderness emphasis		0	.7	2.8	0	4.4	9.7	10.9
High mineral potential								
Roaded emphasis		21.9	19.7	11.6	0	11.6	0	0
Bitterroot Forest		21.9	19.7	11.6	0	11.6	0	0
Salmon Forest		0	0	0	0	0	0	0
Semiprimitive recreation emphasis		4.5	3.8	9.0	26.4	1.9	2.0	0
Bitterroot Forest		4.5	3.8	9.0	26.4	1.9	2.0	0
Salmon Forest		0	0	0	0	0	0	0
Wilderness emphasis		0	2.9	5.8	0	12.9	24.4	26.4
Bitterroot Forest		0	2.9	5.8	0	12.9	24.4	26.4
Salmon Forest		0	0	0	0	0	0	0

1/ Proposed Action.
* Salmon Forest will develop nonwilderness management emphasis at a later date.
** All on Bitterroot Forest.

b. **Impacts**

(1) **Designation: Wilderness**
Management Emphasis: Wilderness

Nearly the entire area is recommended for wilderness in Alternative J with recommendations of 25, 43, 68, and 90 percent in Alternatives C, E (Proposed Action), G, and H respectively. Recommendations would expand the wilderness system either as an addition to the Frank Church-River of No Return Wilderness or as a new wilderness. Alternative C preserves land with high wilderness attributes while minimizing effects on market outputs. Alternative E (Proposed Action) incorporates that portion having the highest wilderness attributes, G adds land with high attributes, and H and J add more land with moderate to low attributes.

Timber production is precluded on tentatively suitable land: all land in Alternative J, 14 percent in C, and 27, 54, and 87 in E (Proposed Action), G, and H respectively. All land tentatively suitable for timber production amounts to 8 percent of the Forest-wide total.

Wilderness precludes consideration of semiprimitive recreation management in Alternative J and reduces the acreage available in C, E (Proposed Action), G, and H. Recreation use will continue to be dominated by hunting, fishing, and camping.

Mineral exploration and development is foreclosed subject to valid existing rights. All land rated as high potential is withdrawn in Alternative J and 11, 22, 49, and 96 percent in Alternatives C, E (Proposed Action), G, and H respectively.

Nonpriced benefits and costs include:

- A natural seting is maintained.
- The wilderness system expands.
- A natural level of big-game forage and cover is maintained. Cover/forage ratios will be determined by natural events such as wildfire.
- Vegetative diversity tends toward old growth as modified by wildfire.
- Old-growth dependent wildlife species are favored.
- Natural watersheds and fish habitat are maintained.

Economic and social effects vary depending on the amount of tentatively suitable timberland and area of high mineral potential recommended for wilderness. The wood products and mining industries would not be supported by this emphasis. Wilderness could attract more tourism and enhance outfitter activities. Publics interested in wilderness and primitive recreation opportunities would be pleased, whereas those favoring mechanized use in a natural setting would not.

(2) **Designation: Nonwilderness**
Management Emphasis: Roaded

Timber, range, winter range, partial retention, roaded retention, and riparian management prescriptions are in this emphasis. Some land is included in the emphasis in all alternatives. About 75 percent of the area is in this emphasis

in Alternative B. Less than 2 percent is in Alternatives F, H and J.

Nearly all tentatively suitable timberland is assigned to this emphasis in Alternative B, 71 percent in C, and 37 percent in E (Proposed Action) and G. High-value old growth is scheduled for early removal; however, due to long rotations, substantial old growth will be retained in partial retention, roaded retention, and riparian prescriptions. Early harvest is also scheduled in lodgepole pine stands which occupy much of the area.

Roads and timber harvest will foreclose future consideration for wilderness by the end of the fifth decade; however, more than 50 percent will remain roadless at the end of decade 1. The roadless character would be changed to one including roads, lessening the naturalness of the area as well as solitude. Present semiprimitive recreation use would be disrupted as the recreation setting changes to roaded.

Access for mineral and energy exploration is enhanced as the road system expands. Lands of high mineral potential would be readily accessible in Alternatives B and C, and about 44 percent accessible in (Proposed Action), and G.

Transitory forage for livestock and wildlife is created by timber harvest.

Nonpriced benefits and costs include:

- Visual quality will be at the lowest level (maximum modification) in Alternative B and the highest in G.
- Characteristics for future consideration as wilderness or semiprimitive recreation are foregone by the end of the fifth decade.
- Seourity cover for elk and other game will be greatly reduced in Alternatives B and C; however, road closures could mitigate this effect.
- Vegetative diversity tends towards younger age classes in Alternatives B, C, and E (Proposed Action), but retains a sizeable old-growth component in G.
- Water quality is reduced but mitigated by high standards for road construction and maintenance.
- Local wood products employment increases above current levels in Alternatives B, and C, remains at current levels in E (Proposed Action) and F, and declines in G.

Economic effects vary depending on the amount of land that is suitable for timber production and the degree of constraints for visual, wildlife, and watershed values. The greatest positive effect is for Alternatives B and C where most tentatively suitable land is retained in the timber base with few constraints. The wood products and mining industries are supported by this emphasis. Publics favoring roadless or wilderness characteristics would not be pleased; however, much of the area would remain like it is for another 10 years. Those publics seeking semiprimitive recreation would have to shift use elsewhere. Outfitters could continue operations although the hunting experience would be altered.

(3) **Designation: Nonwilderness**
Management Emphasis: Semiprimitive Recreation

The semiprimitive recreation prescription is the only one in this emphasis.

Some land is included in this emphasis in all alternatives except J. The highest level is in Alternative F with nearly the entire area and the lowest in G at 4 percent. In B, this emphasis is confined to several relatively large, high elevation blocks that are not suitable for timber production.

Except for possible mineral entry, roadless characteristics will be retained within a core area in Alternatives C, E (Proposed Action), F, G and H, and the land will remain available for future consideration as wilderness. The roadless character of the land would be maintained as would the wilderness attributes of naturalness and solitude. Current forms of recreation use will continue. Trailbike, snowmobile, and chain saw use are compatible.

Current levels of livestock use would continue.

Cover/forage relationships for wildlife will basically be determined by natural events such as wildfire, but can be modified by prescribed fire.

Roads are not needed for surface management purposes but will be permitted for mineral activities where construction is justified on the basis of mineral showings or data, and where it is the next logical step in development of the mineral resource. Fourteen, 13, and 100 percent of lands with high mineral potential are assigned this emphasis in Alternatives C, E (Proposed Action), and F respectively.

Timber production is precluded on 15, 35, and 99 percent of the tentatively suitable timber base in Alternatives C, E and F respectively. No tentatively suitable timberland is assigned this emphasis in Alternative B, and only isolated and intermingled lands in Alternative C. Alternatives E (Proposed Action) andG incorporate lands of higher site quality, much of which would be difficult to develop because of low product values and/or difficult terrain.

Nonpriced benefits and costs include:

- A predominantly natural setting is maintained.
- The wilderness option is retained for future consideration.
- Near natural cover/forage ratios for big game are retained but may be modified by prescribed fire.
- Vegetative diversity tends toward old growth, but may be modified by prescribed fire.
- Old-growth dependent wildlife are favored.
- Natural watersheds and fish habitat are retained.
- The current mix of recreation use is retained.
- Access for mineral exploration would not be provided by timber harvest.

Economic and social effects vary depending upon the amount of tentatively suitable timberland in this emphasis. The wood products industry is not supported by this emphasis. Miners could continue to operate; however, costs would be higher without road access. Land would remain much like it is, thus supporting current recreation use, livestock grazing, and outfitters.

c. Resource Outputs

This section discusses major resource outputs and economic effects among alternatives. Table II-3 displays management prescriptions by alternative.

Table II-3
Management Prescription Assignments for the Blue Joint Area
(thousand acres)

Management Prescription**	Forest Bitterroot Salmon	Alternative B 2	C 2	E* 12	F 1	G 8	H 2	J 11
Nonwilderness		65.9	49.1	37.4***	65.9	21.2	6.3	.7
Roaded								
Timber/Range		44.6	31.0	14.8	.5	10.2	1.0	0
Winter Range		1.4	1.4	.6	0	0	0	0
Partial Retention		2.7	2.6	2.0	0	6.0	0	0
Riparian		.3	.3	.2	.0	.7	0	0
Roaded Retention		0	0	0	0	1.8	0	0
Semiprimitive Recreation		16.9	13.9	19.3	65.4	2.5	5.3	0
Wilderness		0	16.8	28.5	0	44.7	59.6	65.2****
Total		65.9	65.9	65.9	65.9	65.9	65.9	65.9

* Proposed Action.

** Each management prescription provides for some or all of the various resource uses. Prescription goals, objectives, standards and practices are described in detail in Appendix B of the Forest Plan DEIS's and in the planning records. A brief description follows.

Management Prescription	Management Goals
Timber and Range	Provide for cost efficiency of timber management and a high level of domestic livestock grazing. Provide for other resource uses including mineral exploration, elk habitat management on winter range, maximum modification visual quality objective, and roaded recreation.
Winter Range	Optimize elk habitat on winter range. Provide for other resource uses including timber management, roaded recreation, modification visual quality objective and domestic grazing.
Partial Retention	Manage to meet the partial retention visual quality objective. Provide for compatible resource uses including timber management, range management, elk management on winter range, and roaded recreation.
Riparian	Manage riparian zones for native wildlife and fish species. Provide for compatible resource uses including timber management, elk habitat management on winter range, roaded recreation, partial retention visual quality objective, and livestock grazing.
Roaded Retention	Manage to meet the retention visual quality objective. Provide for compatible resource uses including timber management, range management, elk management on winter range, and roaded recreation.
Semiprimitive Recreation	Manage undeveloped, roadless areas for semiprimitive recreation. Provide for the management of resources compatible with roadless recreation including wildlife habitat improvement and range management.
Wilderness	Recommend for wilderness. Manage to maintain wilderness attributes. Mechanized uses are appropriate pending Congressional action. Provide primitive recreation experiences.

*** Bitterroot Forest acreage only.

****Allows for minor boundary adjustments.

(1) Recreation

Dispersed recreation occurs in roaded natural and semiprimitive settings. Semiprimitive opportunities in Alternatives E (Proposed Action) and G include area with the greatest diversity of recreation opportunities, scenery, and present and anticipated future use.

No developed recreation outputs are attributed to any alternative. Minimal facilities such as parking and stock ramps will be necessary at major trailheads for unroaded dispersed recreation users and are provided in all alternatives.

(2) Wilderness

All Alternatives except B and F contain wilderness recommendations. All land recommended for wilderness is contiguous to existing wilderness. Alternative C recommends an area having moderate to high wilderness attributes and could be classified with little effect on market outputs. Alternatives E (Proposed Action) and G contain core areas having high wilderness attributes and excellent topographic boundaries. Alternative H contains those lands having moderate to high wilderness attributes and a reasonably good topographic boundary. Alternative J recommends wilderness for nearly the entire area.

(3) Roadless

In addition to wilderness, some lands will be managed for semiprimitive recreation use and will remain roadless. This includes most lands in Alternative F and sizeable portions in B, C, and E (Proposed Action).

Those lands scheduled for roads and development will lose their roadless character over time; however, portions will remain roadless and available for reconsideration as potential wilderness at the end of this planning period (10-15 years). Except for minor fringes, contiguous to wilderness or semiprimitive designations, this category will lose its roadless character within 5 decades. Alternative B will have few lands meeting the 5,000-acre minimum criteria for wilderness at the end of 30 years.

(4) Visual Quality

Visual quality objectives of preservation, retention, and partial retention provide high levels of protection for the visual resource. The rich natural diversity of high elevation landforms, rock, meadows and vegetation are protected in all alternatives.

Alternatives F, H, and J maintain natural conditions for all or most of the area. Alternatives B and C provide for the most roads and development and also have the lowest (maximum modification) visual quality objective. Portions of the land in Alternatives E (Proposed Action) and G will also be developed but with objectives to maintain a moderate to high level of visual quality in areas seen from major travel corridors.

(5) Wildlife

All alternatives were designed to maintain minimum viable populations of wildlife and fish.

Elk is the wildlife species of greatest public interest. Winter range, the limiting habitat factor, is nearly nonexistent and there is adequate summer range and cover in all alternatives to maintain resident herds. However, hunting season security is necessary to provide stable trends in hunting opportunities since elk become increasingly vulnerable to harvest as access becomes easier and cover decreases from current levels. Road closures and roadless security areas provide the means of controlling hunter access, reducing animal vulnerability, and stabilizing season lengths and bag limits. Roadless security in Alternative B is primarily confined to lands not tentatively suitable for timber production. Hunting season length and bag limits may become increasingly restrictive in Alternatives B and C with easier access. Significant roadless security is provided in Alternatives E (Proposed Action), and G, and roadless security would be maintained for all or most of the area in Alternatives F, H, and J.

Old-growth dependent species will have increasingly less habitat in Alternatives B, C, E (Proposed Action), and G; however, a large portion of E (Proposed Action) and G will be managed to maintain natural conditions which will favor old growth. The expected result is reduced populations of old-growth dependent wildlife species.

Since wildlife are a product of their environment, the maintenance of a diverse vegetative community results in a diverse community of wildlife species. Natural conditions will be maintained on some acres in all alternatives, thereby favoring old-growth vegetation. Other vegetative classes will be created by timber harvest, fire, and insects or disease. All alternatives provide diverse habitats with Alternatives B and C having less old growth than other alternatives.

(6) Fish and Water Quality

Sediment delivered to and amount of large woody debris for pool/riffle maintenance in fisheries streams are indicators of the effects of management activities on the catchable trout population. Sediment delivery varies by the amount of road construction and timber harvest. The amount of large woody debris is a function of riparian management and there is no effect until the fifth decade when the current supply has rotted and needs replacement.

Catchable trout population drops in decades 2-4 in Alternatives B and C as sediment increases to levels that affect spawning, fry emergence and food supply. Catchable trout should remain at or near existing levels in Alternatives E (Proposed Action) and G and would not be affected by development in Alternatives F, H, and J.

(7) Livestock

Suitable lands for livestock grazing are currently fully occupied. No significant change in use is anticipated.

(8) Timber

The amount of land suitable for timber production varies according to objectives established for each alternative. Practically all tentatively suitable land is managed for scheduled timber outputs in Alternative B. Isolated pockets and narrow streamside strips are removed from the suitable base in Alternative C and additional lands are removed in Alternatives E (Proposed Action), G, and H. Alternatives B and C retain practically all the most productive lands in the timber base. E (Proposed Action) and G retain most of the better lands in the timber base and those least sensitive to roading and development. Alternatives F and J have no scheduled timber production.

(9) Minerals and Energy Resources

Minerals have been evaluated both for potential and availability for mineral entry. Oil and gas potential is low. Road systems constructed for the management of surface resources will near completion in 30 years. Alternatives B and C will provide access to most areas of high mineral potential, E (Proposed Action) and G to less than 50 percent, and F, H, and J to practically none of these areas.

(10) Nonfederal Lands

The roadless area is entirely National Forest land.

(11) Road System

Roads needed vary according to the size of the land base that will be managed for timber production. The road system will be nearing completion in three decades. Alternatives B and C will require the most roads and F, H, and J the least.

(12) Utility Corridor

Consideration of a powerline corridor through the roadless area was eliminated by establishment of the Frank Church-River of No Return Wilderness in 1980 (P.L. 96-312).

(13) Fire

Alternatives vary in the application of fire management prescriptions by the amount of land recommended for wilderness. In wilderness, prescriptions range from immediate control where public safety or other resource values are important to monitoring where desirable to restore fire to the ecosystem.

(14) Socioeconomic

One of the primary purposes of planning is to determine which alternative provides the highest net public benefit. Net public benefit is the overall value to the nation of all outputs and positive effects (benefits) less all the associated inputs and negative effects (costs) of producing priced and nonpriced outputs from National Forest land. Net public benefit represents the sum of priced outputs, represented by present net value (PNV), plus the value of nonpriced outputs.

PNV represents the dollar difference between the discounted value, at 4 percent, of all priced outputs and all costs over the planning period. Priced outputs include those with market values such as timber, range, mineral leases; and non-market values such as dispersed recreation. PNV was calculated for Forest-wide alternatives and the maximum PNV benchmark. The roadless area's contribution was then proportioned based on the analysis areas that occur in the roadless area. In Table II-4, the alternatives are ranked from highest to lowest PNV. The difference in PNV between the maximum PNV benchmark and the alternatives represents opportunity cost, or PNV foregone to provide priced or nonpriced benefits (Figure II-16).

Timber harvest level and associated road construction generally have the greatest effect on PNV. Each road constructed will provide access for initial timber harvest and at least two future entries before existing timber stands are removed. This is due to dispersal of harvest activities to meet visual quality, fish, and wildlife objectives. Consequently, road construction mileage and costs are high, usually resulting in a negative PNV for 3 to 4 decades when the road system nears completion. Thereafter, PNV is usually positive.

Returns to the U.S. Treasury are displayed in Table II-5. Returns result primarily from the sale of timber and therefore vary by the value and volume of timber harvest in each alternative. Twenty-five percent of the returns to the U.S. Treasury are distributed to state and local governments.

The most important nonpriced outputs are the assignment of roadless area to wilderness and semiprimitive recreation, visual quality, wildlife and fish habitat, and local income and employment. Table II-4 compares nonpriced benefits among alternatives.

Personal income and employment in Ravalli and Missoula Counties change as a result of changes in timber harvest, recreation use, livestock grazing, and Forest Service expenditures (Table II-5). Differences among alternatives are primarily due to different timber outputs and Forest expenditures.

Table II-4
Comparison of Priced and Nonpriced Benefits for Blue Joint Area

Benefits	Unit of Measure	Alternatives						
		F	J	H	C	B	E*	C
Priced Benefits								
Present Net Value	Million dollars	4.2	3.7	3.6	2.8	2.6	0.9	0.4
Opportunity Cost based on a maximum PNV of $6.6MM	Million dollars	2.4	2.9	3.0	3.8	4.0	5.7	6.2
Indicators of Nonpriced Benefits								
Semiprimitive recreation/elk security	Percent of roadless area	90	0	8	21	26	29	4
Wilderness/elk security	Percent of roadless area	0	99	90	25	0	43	68
Fish Habitat	Miles of fisheries streams in wilderness or semiprimitive recreation	51	51	51	22	7	35	37
Minerals	Percent of high mineral potential in roaded emphasis	0	0	0	75	83	53	53
Local employment	Total jobs first decade	7	10	12	36	46	38	24

* Proposed Action.

Figure II-16
Blue Joint Present Net Value and Opportunity Cost

Maximum PNV = $6.6MM)

Assigns 22.2M acres to minimum level; assigns 43.7M acres to timber production; minimal timber is cut in decades 1 to 4; meets minimum management requirements.

Assigning 65.4M acres to semiprimitive recreation with a low level of recreation management foregoes $2.4MM.

F (PNV = $4.2MM)

A high level of recreation management and assigning wilderness and semiprimitive recreation at about 65M acres foregoes an additional $0.5MM.

J (PNV = $3.7MM)
H (PNV = $3.6MM)

Assigning 30.7M acres to wilderness and semiprimitive recreation, 31.2M acres to timber production, and providing for low level of visual quality and recreation management and high levels of employment and income in decades 1-4 foregoes $3.8MM.

C (PNV = $2.8MM)

Assigning 16.9M acres to semiprimitive recreation, 43.7M acres to timber production, and continuing a low level of visual quality and recreation management and high levels of employment and income in decades 1-4 foregoes an additional $0.2MM.

B (PNV = $2.6MM)

Assigning 47.8M acres to wilderness and semiprimitive recreation, 16.2M acres to timber production, and providing a moderate level of visual quality, a high level of recreation management and a moderate level of employment/income in decades 1-4 foregoes an additional $1.7MM.

E (PNV = $0.9MM)

Assigning 47.2M acres to wilderness and semiprimitive recreation, 17.5M acres to timber production, providing a high level of visual quality and continuing a high level of recreation management and a moderate level of employment/income in decades 1-4 foregoes an additional $0.5MM.

G (PNV = $0.4MM)

Table II-5
Average Annual Outputs for **Blue Joint** Area

Resource	Unit of Measure	Forest Bitterroot Salmon	Alternative/Benchmark B 2	C 2	E 1/ 12	F 1	G 8	H 2	J 11
Roaded recreation	M RVD's								
Decade 1			18	16	8	0	8	0	0
Decade 3			32	27	14	0	14	0	0
Decade 5			51	44	22	0	22	1	0
Semiprimitive recreation	M RVD's								
Decade 1			7	5	5	14	1	2	0
Decade 3			4	4	5	17	1	1	0
Decade 5			5	6	9	27	1	2	0
Wilderness recreation	M RVD's								
Decade 1			0	3	4	0	7	9	9
Decade 3			0	5	7	0	12	16	16
Decade 5			0	7	10	0	18	23	25
Management emphasis*	M Acres								
Roaded management			49.0	35.2	17.6	0.5	18.7	1.0	0
Semiprimitive management			16.9	13.9	19.3	65.4	2.5	5.3	0
Wilderness management			0	16.8	28.5	0	44.7	59.6	65.2
Elk forage potential on winter range	M Elk								
Decade 1			0	0	0	0	0	0	0
Fisheries streams in	Miles								
Roaded emphasis			44	29	16	0	14	0	0
Semiprimitive emphasis			7	8	13	51	1	3	0
Wilderness emphasis			0	14	22	0	36	48	51
Potential livestock forage	M AUM's								
Decade 1			.13	.15	.14	.13	.13	.13	.13
Decade 3			.21	.22	.18	.13	.19	.13	.13
Decade 5			.29	.23	.19	.13	.18	.13	.13
Area harvested	Acres								
Decade 1			187	112	178	0	77	0	0
Decade 3			401	291	124	0	147	0	0
Decade 5			622	434	320	0	323	0	0

* Acres may not add due to rounding.
1/ Proposed Action.

Table II-5 (continued)

Resource	Unit of Measure	Forest Bitterroot Salmon	Alternative/Benchmark B 2	C 2	E 1/ 12	F 1	G 8	H 2	J 11
Allowable sale quantity	MMCF								
Decade 1			.49	.29	.45	0	.17	0	0
Decade 3			.94	.71	.28	0	.34	0	0
Decade 5			1.59	1.00	.61	0	.60	0	0
Long-term sustained yield	MMCF		1.3	0.9	0.5	0	0.5	0	0
Total road needs	Miles		260	190	100	0	90	0	0
Road construction*	Miles/year								
Decade 1			3	2	3	0	1	0	0
Decade 3			7	7	1	0	2	0	0
Decade 5			2	1	1	0	1	0	0
Local Forest-related employment									
Decade 1	Jobs		46	36	38	7	24	12	10
Local Forest-related income									
Decade 1	M$		850	630	740	110	430	180	170
Returns to U.S. Treasury	M$								
Decade 1			260	220	230	0	150	0	0
Decade 3			480	340	190	0	210	0	0
Decade 5			1560	1010	550	0	580	0	0
Returns to States	M$								
Decade 1			60	60	60	0	40	0	0
Decade 3			120	80	50	0	50	0	0
Decade 5			390	250	140	0	150	0	0
Present net value (4%)	MM$	-	2.6	2.8	0.9	4.2	0.4	3.6	3.7

* About 40 percent is capital investment construction.
1/ Proposed Action.

E. Alternatives - Sapphire Roadless Area

1. Range of Alternatives

The range of Forest-wide alternatives was developed by first designing required alternatives (Peterson, 1983 May 13):

- -- Current program (no action).
- -- Market opportunity emphasis.
- -- Nonmarket opportunity emphasis.
- -- 1980 RPA Program.
- -- Significant wilderness which evaluates the potential for maintaining or increasing commodity outputs.
- -- Wilderness assignment for each roadless area in at least one alternative.
- -- Nonwilderness assignment for each roadless area in at least one alternative.

Additional alternatives were then designed to respond to the full range of issues and management concerns and to assure a wide range of resource outputs and expenditure levels.

Forest-wide alternatives were then compared to the management opportunities and issues for the roadless area to determine if a wide range of resource outputs and expenditure levels, responsive to MWSA issue was provided. Coordination between Forests was necessary to assure a reasonable match for the objectives and tentative boundaries for wilderness recommendations.

Figure II-17 displays where each alternative fits within the full range for several issue related items.

Figure II-17
Range of Alternatives for Sapphire Roadless Area

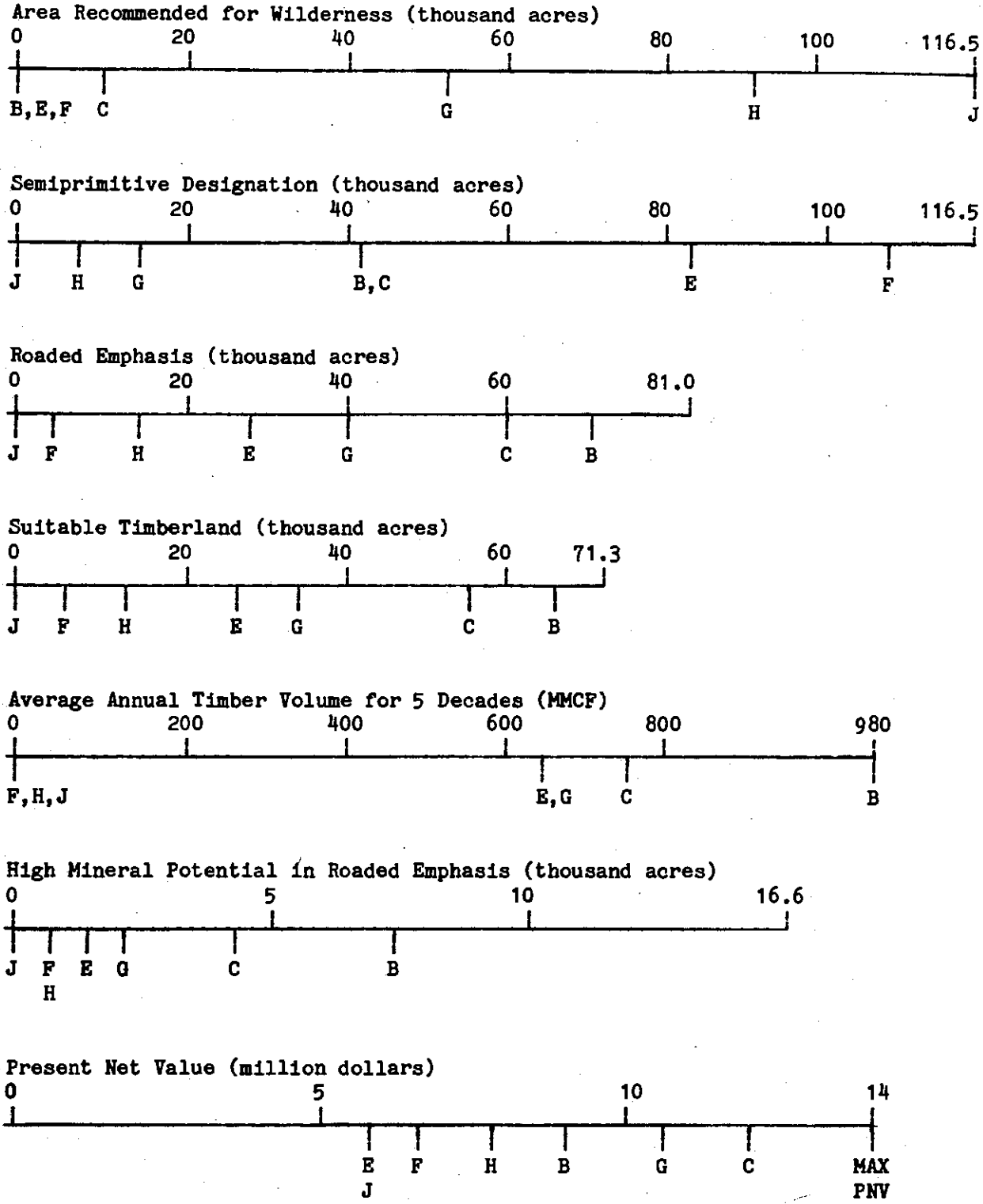
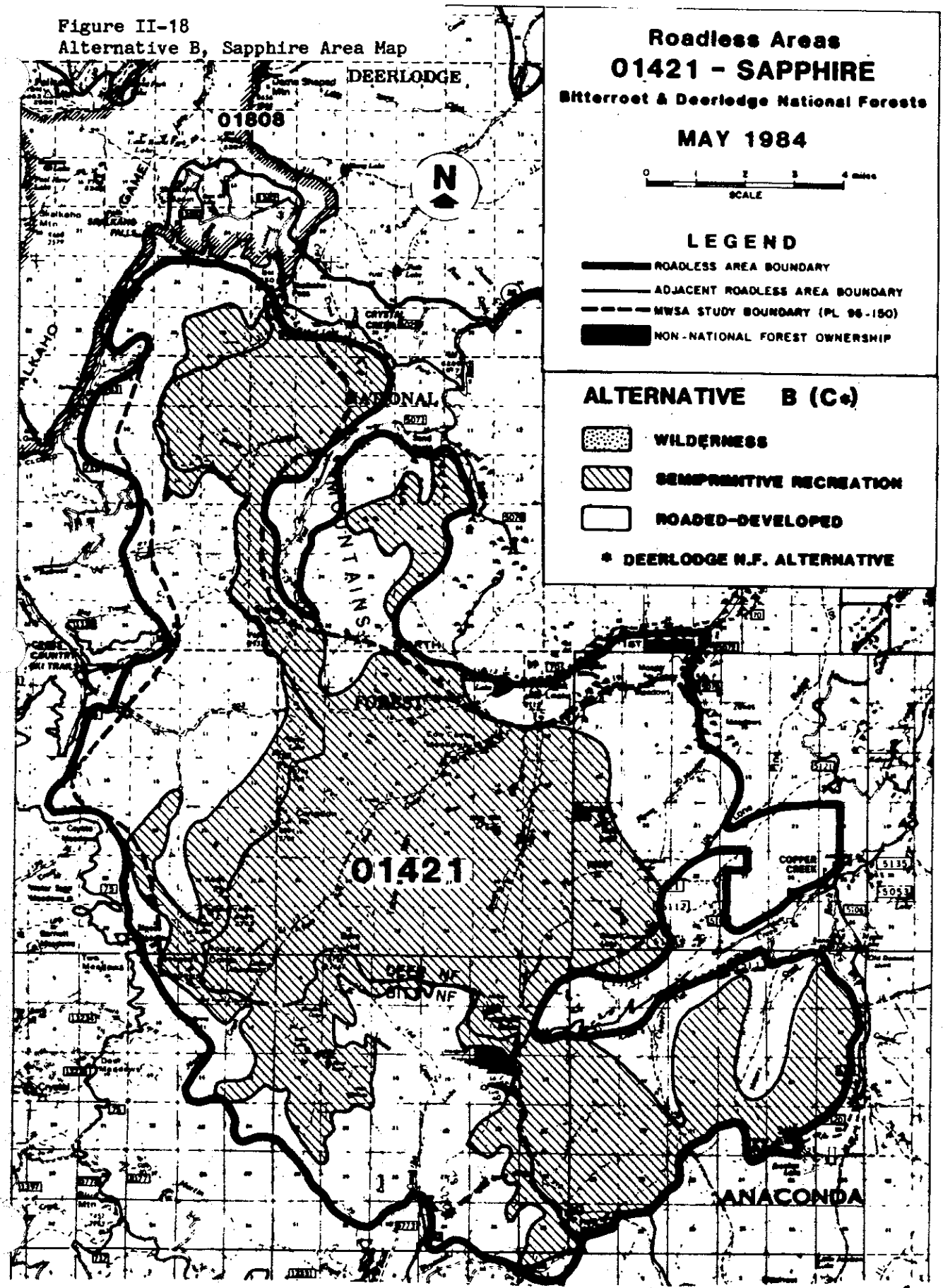


Figure II-18
Alternative B, Sapphire Area Map



2. Alternatives Eliminated from Further Consideration

The following alternatives were considered but eliminated from detailed study. In all cases, these are Forest-wide alternatives which for MWSA areas resulted in identical or similar management emphases, outputs and effects as the alternative selected for detailed study. Consequently, they were not needed to achieve a wide range of resource use in the MWSA alternatives.

On the Bitterroot Forest, Alternative A was eliminated because timber and range outputs were similar to Alternative B; Alternative D was eliminated because the same area was recommended for wilderness as Alternative J; and Alternative E1 was eliminated because management emphasis is identical to Alternative E.

On the Deerlodge Forest, Alternatives B and F were eliminated because management emphasis is identical to Alternative C; D and N were eliminated because management emphasis is similar to Alternative M; and Alternatives G and I were eliminated because management emphasis is similar to Alternative K.

3. Alternative Descriptions

The seven alternatives considered in detail correspond with the goals and objectives established in Bitterroot Forest Plan Alternatives B, C, E (Proposed Action), F, G, H, and J. Deerlodge Forest alternatives were examined and those with similar goals and objectives matched with the Bitterroot Forest alternatives:

Bitterroot Forest	B	C	E	F	G	H	J
Deerlodge Forest	C	L	M	A	E	K	J

a. Alternative B

This alternative emphasizes timber and mineral opportunities. No wilderness is recommended; however, several relatively large blocks of high elevation land that are not tentatively suitable or not efficient for timber production would be managed for unroaded recreation opportunities.

(1) Dispersed Recreation

Portions of the area having the widest variety of recreation opportunities and scenery are maintained in a near natural condition; including most of the Ross' Fork of Rock Creek and the headwaters of Moose, Sleeping Child, and Skalkaho Creeks. The recreation opportunity setting for the roadless area is comprised of 65 percent roaded natural and 35 percent semiprimitive.

(2) Wilderness

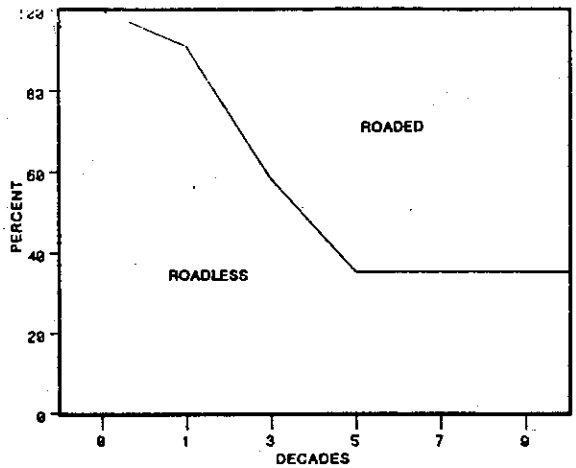
No wilderness is recommended.

(3) Roadless

About 35 percent of the roadless area consisting of several large blocks of land not tentatively suitable or not efficient for timber production will remain in a near natural condition. These are primarily high elevation ridge crests along the Sapphire Divide and Whetstone Ridge, but includes a

significant portion of the Ross' Fork of Rock Creek. They may be crossed by roads to provide access to other management areas or for mineral production. Remaining lands are scheduled for timber production and most will lose their roadless character within 50 years. The expected rate of development is shown in Figure II-19.

Figure II-19
Rate of Development for Sapphire Area, Alternative B



(4) Visual Quality

A moderate level of visual quality is maintained in the foreground viewed from the Skalkaho Highway and natural levels in several blocks of high elevation land which will not be developed for timber production. Elsewhere, timber harvest patterns and associated road access will dominate the landscape.

(5) Wildlife

About 39 percent of the roadless area consisting primarily of high elevation lands along major ridge tops, but including most of the Ross Fork of Rock Creek and lower elevation grassland, will provide near natural security for elk, deer and mountain goats. Travel restriction, primarily road closures, will be necessary to provide hunting season security on the remaining lands scheduled for development. Easier access will likely result in more restrictive hunting seasons than currently exist. All of the alternatives provide adequate habitat to maintain other game and nongame wildlife species listed in Chapter III.

(6) Fish and Water Quality

Fifty one percent of fishery streams are in a roaded management emphasis. Sediment increases to levels that affect spawning, causing a drop in catchable fish in decades 3 or 4 with most of the reduction in habitat occurring in lower gradient streams outside the roadless area. Sediment yield peaks about 20 years later, then declines as the road system nears completion, and new construction stabilizes and revegetates. However, fish populations continue to

decline due to removal of old trees that formerly died, toppled, and became an important source for creation or maintenance of pools.

(7) **Timber**

Ninety-two percent of the tentatively suitable land and all land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(8) **Minerals and Energy Resources**

Forty-eight percent of the high mineral potential land will eventually be accessed by roads constructed primarily for timber production. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified by mineral showings or data, and where it is the next logical step in the development of the mineral resource.

(9) **Nonfederal Lands**

Periodic harvest of timber will occur on lands adjoining private inholdings.

(10) **Road System**

Approximately 590 miles of roaded are needed to complete the system. Capital investment is needed where low value species and/or high construction costs preclude full payment for the road system from initial timber harvest. These needs are confined to collector roads providing access to or within a drainage. Average annual road construction in decade 1 is 3 miles of which one-third is capital investment. Construction mileage increases significantly in decades 2 and 3, then rapidly declines as the road system nears completion.

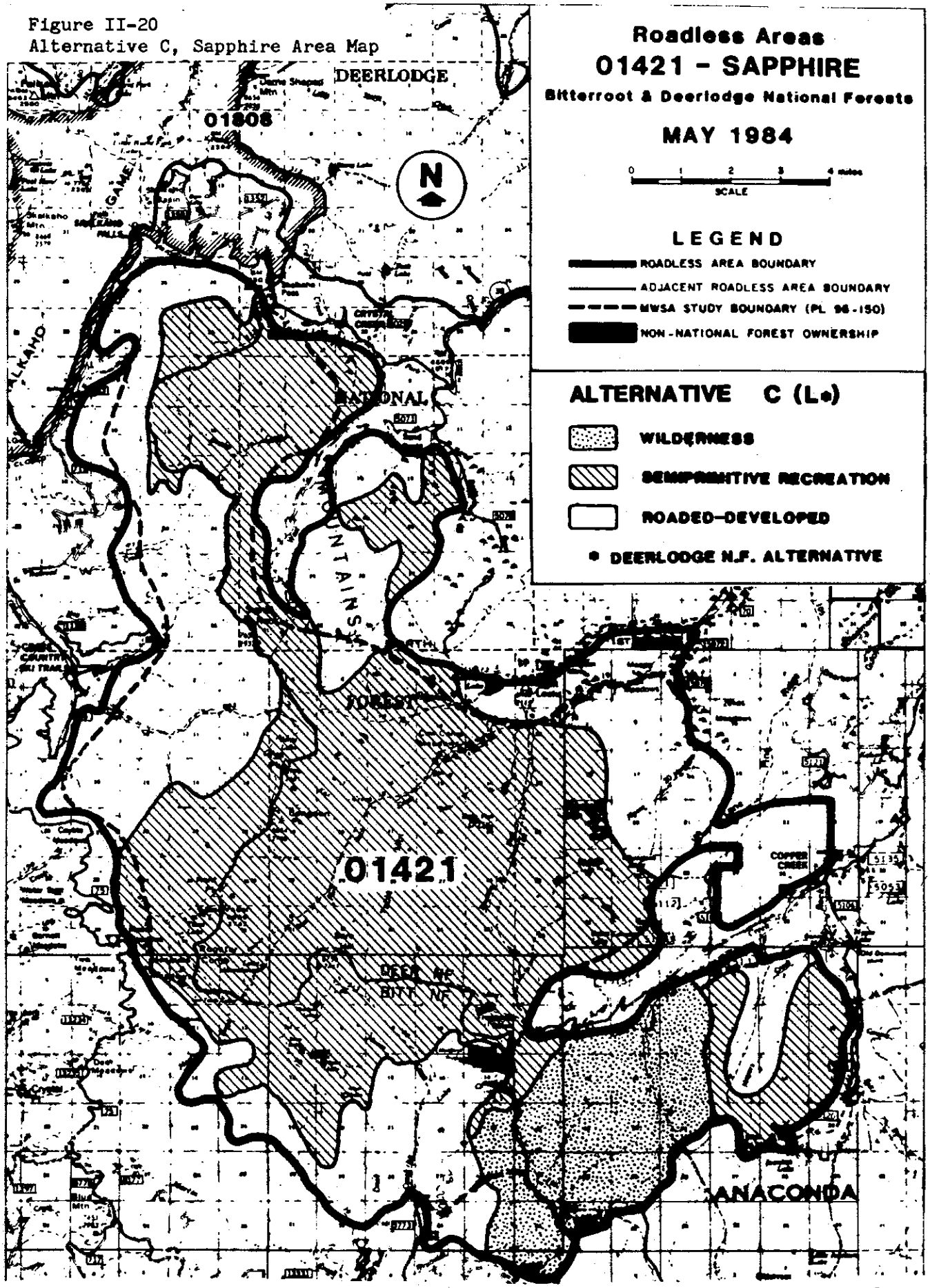
(11) **Utility Corridor**

The potential powerline corridor crossing the Sapphire Divide in the vicinity of Railroad Creek remains available for such use.

(12) **Socioeconomic**

Present net value is $9.0 million which is 64 percent of the potential. The primary reasons for the foregone investment opportunity are maximizing timber harvest in the early decades and dispersing harvest activities to accomplish minimal visual quality objectives. Annual receipts will not exceed annual expenditures until the road system is complete. New timber opportunities will provide 34 local jobs.

Figure II-20
Alternative C, Sapphire Area Map



b. **Alternative C**

Emphasize timber opportunities but provide for wilderness and semiprimitive recreation opportunities that can be achieved at little cost to market outputs.

(1) **Dispersed Recreation**

Portions of the area having the widest variety of recreation opportunities and scenery are maintained in a near natural condition; including most of the Ross Fork of Rock Creek and the headwaters of Moose, Sleeping Child, and Skalkaho Creeks. The recreation opportunity setting for the roadless area is comprised of 55 percent roaded natural, and 45 percent semiprimitive.

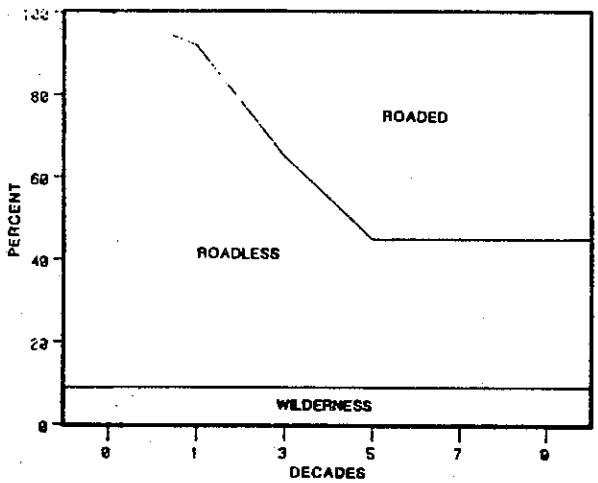
(2) **Wilderness**

Wilderness is recommended for 9 percent of the roadless area to the south of the Copper Creek Road and private land in the vicinity of Frogpond Basin. It has moderate wilderness attributes, is contiguous with the Anaconda-Pintler Wilderness, would have little effect on market outputs, and would provide a better wilderness boundary in Copper Creek which currently headwaters in wilderness.

(3) **Roadless**

In addition to the wilderness recommendation, about 36 percent of the roadless area consisting of large and compact blocks of land along the crest of the Sapphire Divide will remain roadless. Land not tentatively suitable for timber production comprises most of the acreage; however, isolated pockets and stringers of tentatively suitable land are included. Fringes of the roadless area along the boundary may be crossed by roads to provide access to other management units. Remaining lands are scheduled for timber production and most will lose their wilderness character within 50 years. The expected rate of development is shown in Figure II-21.

Figure II-21
Rate of Development for Sapphire Area, Alternative C



(4) **Visual Quality**

A moderate level of visual quality is maintained in the foreground viewed from the Skalkaho Highway and natural levels on semiprimitive and wilderness designations. Elsewhere, timber harvest and road access will dominate the landscape.

(5) **Wildlife**

About 49 percent of the roadless area consisting of most of the Ross Fork of Rock Creek and the headwaters of Skalkaho and Moose Creeks provide near natural security for elk, deer and mountain goat. These areas contain excellent elk habitat and are heavily used for security during the hunting season. Travel restrictions, primarily road closures, are necessary to provide security on the remaining lands scheduled for development. Easier access will likely result in more restrictive hunting seasons than currently exist.

(6) **Fish and Water Quality**

Sediment increases to levels that affect spawning, causing a drop in catchable fish in decades 3 or 4 with most of this reduction occurring in lower gradient streams outside the roadless area. Cumulative affects are somewhat reduced by the 61 percent of fishery streams and adjacent lands that will remain in a near natural condition. Sediment yield peaks about 20 years later, then declines as the road system nears completion and new construction stabilizes and revegetates. Fish population then recovers slightly due to sediment yield decreases, but remains well below the current level because of reductions in the debris source needed to maintain pools.

(7) **Timber**

Eighty percent of the tentatively suitable land and 84 percent of the land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(8) **Minerals and Energy Resources**

Twenty-nine percent of the high mineral potential land will eventually be accessed by roads constructed primarily for timber production, and on 4 percent, mineral opportunities would likely be foreclosed by wilderness subject to valid existing rights. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified by mineral showings or data, and where it is the next logical step in the development of the mineral resource.

(9) **Nonfederal Lands**

Periodic harvest of timber will occur on lands adjoining private inholdings.

(10) **Road System**

Approximately 513 miles of road are needed to complete the system. Average annual road construction in decade 1 is 3 miles of which one-third is capital investment. Construction mileage increases significantly in decades 2 and 3, then rapidly declines as the road system nears completion.

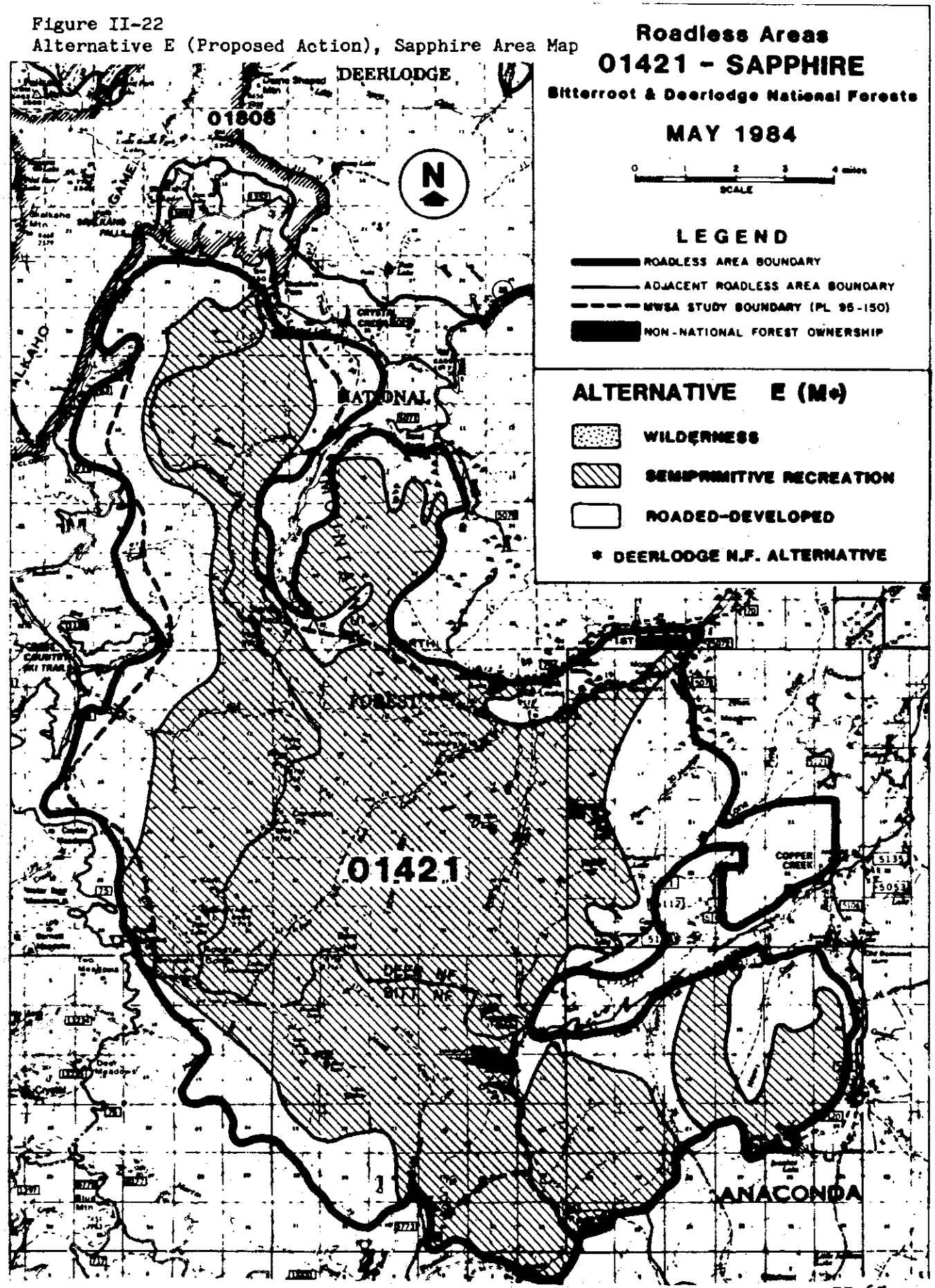
(11) **Utility Corridor**

The potential powerline corridor crossing the Sapphire Divide in the vicinity of Railroad Creek remains available for such use.

(12) **Socioeconomic**

Present net value is $12.2 million which is 87 percent of the potential. The primary reasons for the foregone investment opportunity are high timber harvest objectives in the early decades, dispersal of harvest activities to accomplish minimal visual quality and elk habitat objectives, removal of land from the timber base, and to provide a moderate level of recreation management. Annual receipts will not exceed annual expenditures until the road system is complete. New timber opportunities would provide 25 local jobs.

Figure II-22
Alternative E (Proposed Action), Sapphire Area Map



c. Alternative E - Proposed Action

This alternative responds to major issues by providing a mix of market and nonmarket uses and outputs. It is similar to Alternative G but with a shift in emphasis from wilderness to semiprimitive recreation. The shift recognizes an abundance of primitive nonmotorized recreation opportunities in existing nearby wilderness and the need for maintaining some motorized (e.g., snowmobile, trailbike, chainsaw) recreation opportunities in an otherwise natural setting.

(1) Dispersed Recreation

A compact core area containing most of the variety in recreation opportunities is maintained in a near natural condition including the crest of the Sapphires, Ross Fork of Rock Creek, Moose Creek, and the headwaters of Skalkaho, Sleeping Child, and Martin Creeks. Portions of the area would become readily accessible for day use from trailheads near the boundary. The recreation opportunity setting is 30 percent roaded natural and 70 percent semiprimitive.

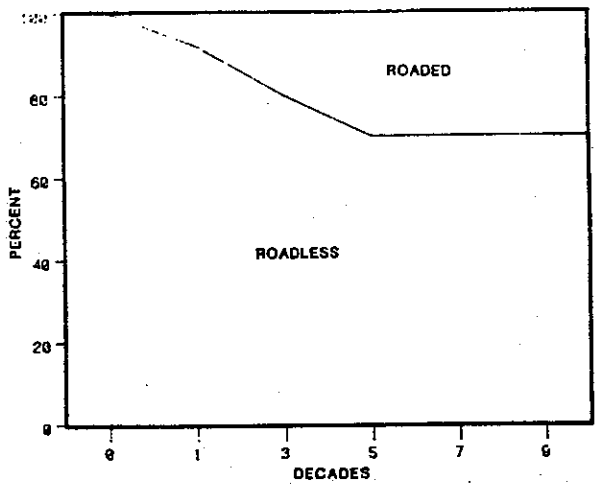
(2) Wilderness

No wilderness is recommended.

(3) Roadless

About 70 percent of the roadless area consisting of a large compact core along the Sapphire Divide from the Anaconda-Pintler Wilderness to Signal Rock and a relatively narrow corridor along the remainder of the Divide to the Skalkaho Highway will remain roadless. Remaining lands are scheduled for development and most will lose their roadless identity within 50 years. The expected rate of development is shown in Figure II-23.

Figure II-23
Rate of Development for Sapphire Area, Alternative E (Proposed Action)



(4) **Visual Quality**

A moderate level of visual quality is maintained in the foreground and middleground viewed from the Skalkaho Highway and a natural level in the semiprimitive designations. Elsewhere, timber harvest and associated access roads dominate the landscape.

(5) **Wildlife**

About 74 percent of the roadless area consisting of Ross Fork of Rock Creek, Moose and Skalkaho Creeks will be maintained in a near natural condition. These areas contain good or better elk habitat and are monderately to heavily used for security by elk, deer and mountain goats during the hunting season. Travel restrictions, primarily road closures, provide security on the remaining lands scheduled for development. The balance of natural and road closure security should maintain hunting seasons and restrictions at about the present level.

(6) **Fish and Water Quality**

Area wide, catchable fish populations will remain at or very near the current level since 70 percent of the fishery stream mileage and adjacent lands will remain in a near natural condition. However, on that portion that will be roaded and developed, sediment increased to levels that affect fish spawning and food supply causing a drop in catchable fish in decades 3 or 4 with most of the reduction occurring in lower gradient streams outside the roadless area. Sediment yield peaks about 20 years later, then declines as the road system nears completion and new construction stabilizes and revegetates. Populations then recover to near current levels due to decreased sediment and provisions to maintain debris caused pools in fishery streams.

(7) **Timber**

Thirty-six percent of the tentatively suitable land and 48 percent of the land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(8) **Minerals and Energy Resources**

Eleven percent of the high mineral potential land will eventually be accessed by roads constructed primarily for timber production. The remainder will not require roads for the management of surface resources; however, roads will be permitted where construction is justified on the basis of mineral showings or data, and where it is the next logical step in the development of the mineral resource.

(9) **Nonfederal Lands**

Private inholdings in the vicinity of Frogpond Basin will not be affected since natural conditions will be maintained.

(10) **Road System**

Approximately 226 miles of road are needed to complete the system. Average annual road construction in decade 1 is 3 miles of which one-third is capital investment. Construction mileage increases significantly in decades 2 and 3, then rapidly declines as the road system nears completion.

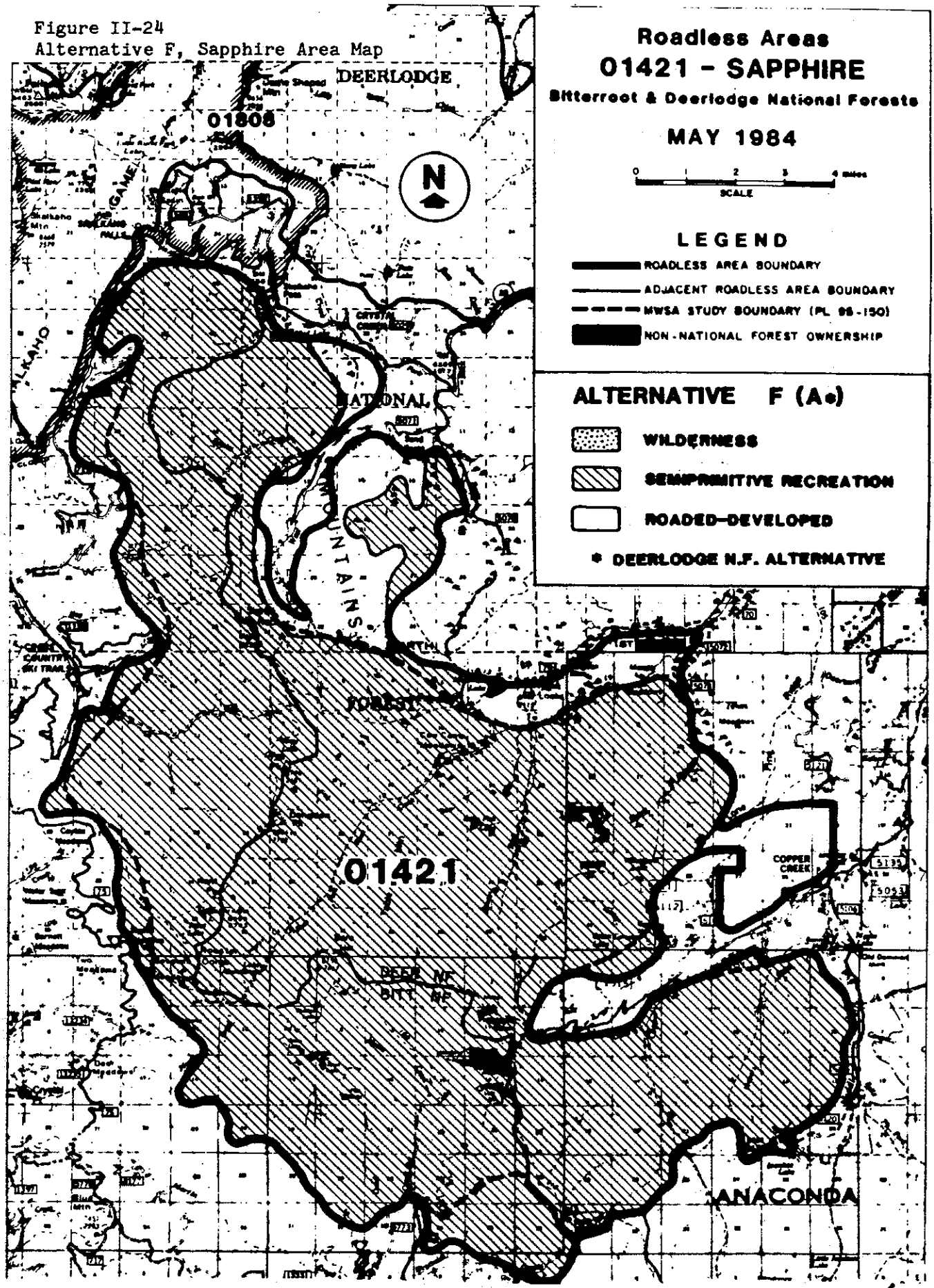
(11) **Utility Corridor**

The potential powerline corridor crossing the Sapphire Divide in the vicinity of Railroad Creek remains available for such use. About 3/4 mile would be constructed without the benefit of roads.

(12) **Socioeconomic**

Present net value is $5.8 million which is 41 percent of potential. The primary reasons for this foregone investment opportunity are removal of land from the timber base, high timber harvest objectives in the early decades, disperal of timber harvest activities to provide a high level of visual quality along the Skalkaho Highway, riparian area protection, and to provide a moderate level of recreation management. Annual receipts will not exceed annual expenditures until the road system is complete. New timber opportunities would provide 22 local jobs.

Figure II-24
Alternative F, Sapphire Area Map



d. Alternative F - Current Program (No Action)

This alternative continues current direction consistent with existing management plans, policies, standards, and guidelines. MWSA areas are managed to maintain their wilderness character and potential for inclusion in the National Wilderness Preservation System as directed by P.L. 95-150. The areas would be managed for semiprimitive recreation.

(1) Dispersed Recreation

That portion of the area within the Montana Wilderness Study Act boundary is managed in a near natural condition; including lands along the exterior boundary with little variety in recreation opportunities. Interior portions would receive primarily overnight use due to distances involved. Exterior portions are readily accessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting for the roadless area is comprised of 8 percent roaded natural and 92 percent semiprimitive.

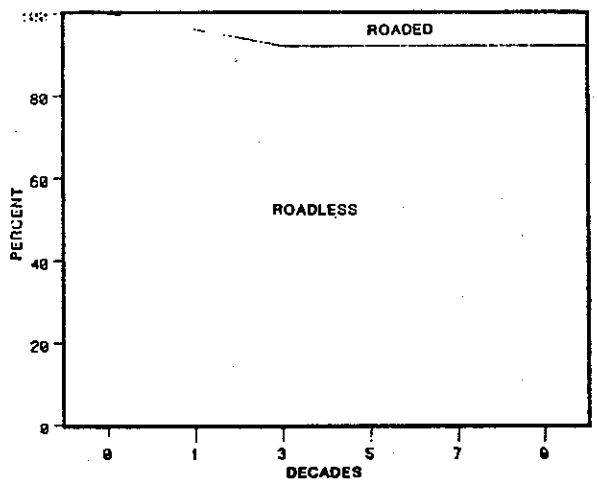
(2) Wilderness

No wilderness is recommended.

(3) Roadless

About 92 percent of the roadless area consisting of all land within the Montana Wilderness Study Act boundary remain roadless and wilderness character maintained in accordance with direction established by the act. Remaining lands on the Deerlodge National Forest are scheduled for development and most will lose their roadless identity in 50 years. The expected rate of development is shown in Figure II-25.

Figure II-25
Rate of Development for Sapphire Area, Alternative F



(4) **Visual Quality**

A natural level of visual quality is maintained on lands within the Montana Wilderness Study Act boundary. Elsewhere, timber harvest patterns and associated access roads will dominate the landscape.

(5) **Wildlife**

About 96 percent of the roadless area would be maintained in a near natural condition. Travel restrictions, primarily road closures provide security on the remaining lands scheduled for development. The abundance of undeveloped land is expected to maintain hunting seasons and restrictions at the present level.

(6) **Fish and Water Quality**

Catchable fish population remains at present levels since 96 percent of fishery streams and adjacent lands will remain in a near natural condition.

(7) **Timber**

About 6 percent of the tentatively suitable land will be managed for scheduled timber outputs.

(8) **Minerals and Energy Resources**

Ninety-four percent of the lands having high mineral potential are within the MWSA boundary and would be very difficult to develop for minerals due to legislative direction to maintain the area's roadless undeveloped character. Prospecting and exploration could proceed without the benefit of roads.

(9) **Nonfederal Lands**

Private inholdings are not affected since natural conditions would be maintained.

(10) **Road System**

Approximately 75 miles of road are needed to complete the system. Average annual road construction in decade 1 is 1 mile of which one-third is capital investment.

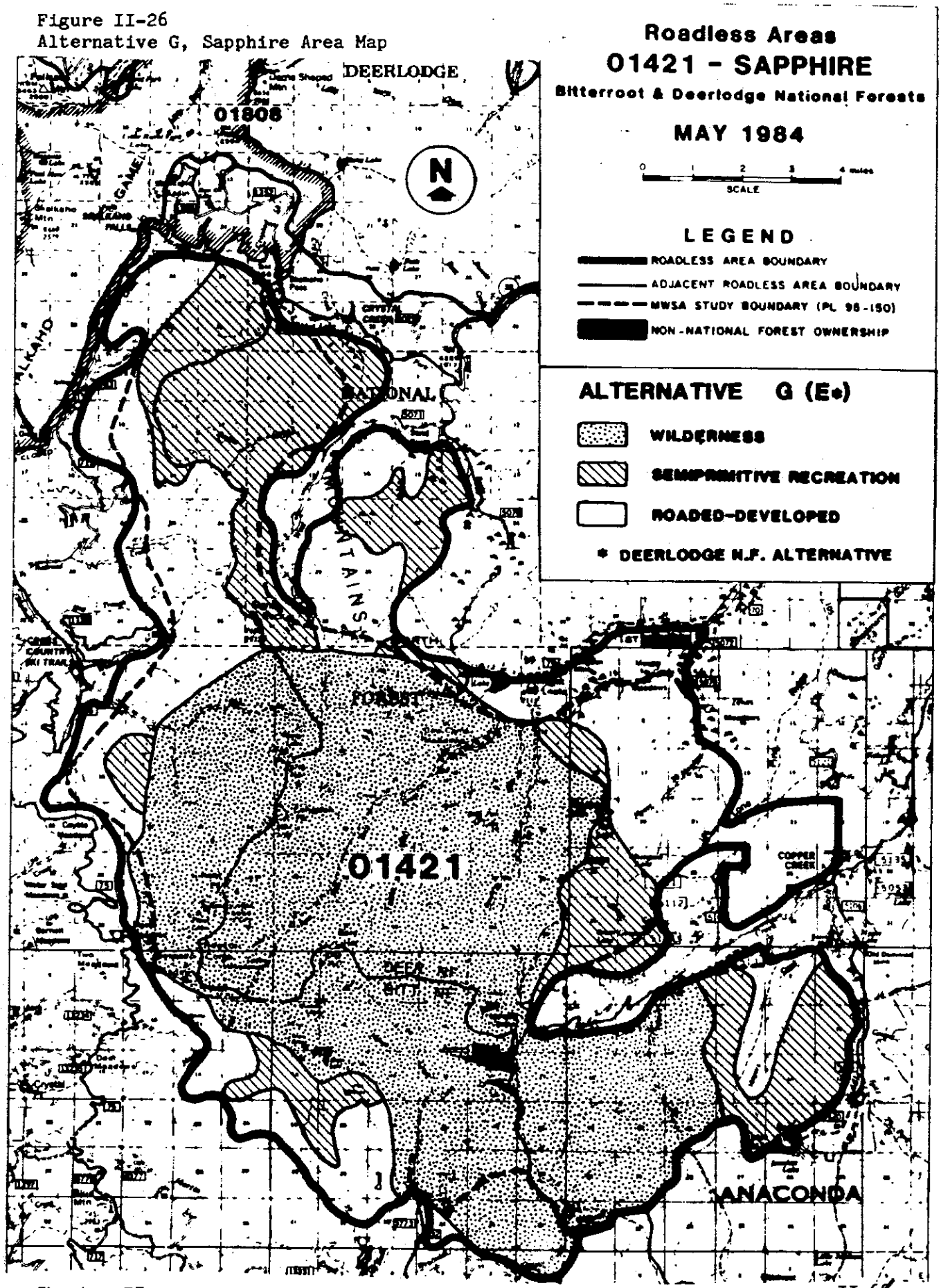
(11) **Utility Corridor**

Direction in the Montana Wilderness Study Act precludes consideration of a potential powerline corridor crossing the Sapphire Divide in the vicinity of Railroad Creek.

(12) **Socioeconomic**

Present net value is $6.5 million which is 46 percent of potential. The primary reasons for the foregone investment opportunity are; removing land from the timber base and to providing a moderate level of recreation management. The local employment potential would remain at the present level of 14 jobs.

Figure II-26
Alternative G, Sapphire Area Map



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e. Alternative G

The alternative responds to major issues by providing a mix of market and nonmarket uses and outputs. Portions recommended for wilderness have high wilderness attributes, most apparent support for wilderness, good topographic boundaries, and low to moderate affect on market outputs.

(1) Dispersed Recreation

A compact core area containing most of the variety in recreation opportunities and scenery is maintained in a natural condition; including most of the Ross Fork of Rock Creek, Moose Creek, and the headwaters of Skalkaho and Sleeping Child Creeks. Interior portions would receive primarily overnight use due to distances involved. Exterior portions would become readily accessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting is comprised of 39 percent roaded natural, and 61 percent semiprimitive.

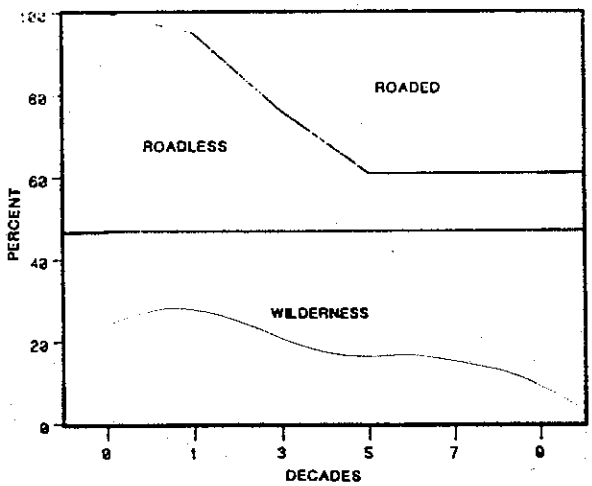
(2) Wilderness

Wilderness is recommended for 47 percent of the roadless area including the Ross Fork of Rock Creek, Moose Creek, and the headwaters of Martin, Sleeping Child, and Skalkaho Creeks. The area has high wilderness attributes, a good topographic boundary, and would have a low to moderate effect on market outputs.

(3) Roadless

In addition to the wilderness recommendation, about 14 percent of the roadless area including a small area immediately south of the Skalkaho Highway will remain roadless. Remaining lands are scheduled for development and most will lose their roadless identity within 50 years. The expected rate of development is shown in Figure II-27.

Figure II-27
Rate of Development for Sapphire Area, Alternative G



(4) **Visual Quality**

A high level of visual quality is maintained in the foreground and middleground viewed from the Skalkaho Highway and other major Forest roads providing access to the area; and natural levels on semiprimitive and wilderness designations. Elsewhere, timber harvest patterns and associated access roads will rapidly dominate the landscape.

(5) **Wildlife**

About 66 percent of the roadless area consisting of most of the Ross Fork of Rock Creek, Moose, and Skalkaho Creeks will be maintained in a natural condition. These areas contain good elk habitat and are moderately to heavily used for security by elk, deer and mountain goats during the hunting season. Travel restrictions, primarily road closures, provide security on the remaining lands scheduled for development. The balance of natural and road security is expected to maintain the hunting season and restrictions at about the present level.

(6) **Fish and Water Quality**

Area wide, catchable fish populations will remain near the current level since 69 percent of the fishery stream mileage and adjacent lands will remain in a near natural condition. However, on that portion that will be roaded and developed, sediment increases to levels that affect fish spawning and food supply causing a drop in catchable fish in decade 3 or 4 with most of the reduction in habitat occurring in lower gradient streams outside the roadless area. Sediment yield peaks about 20 years later, then declines as the road system nears completion and new construction stabilizes and revegetates. Populations then recover due to decreased sediment but remain slightly below the current level because of reductions in the debris source to maintain pools.

(7) **Timber**

Fifty percent of the tentatively suitable land and 47 percent of the land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(8) **Minerals and Energy Resources**

Eighty-six percent of the high potential mineral opportunilties would likely be foreclosed by wilderness subject to valid existing rights and 14 percent will eventually be accessed by roads constructed primarily for timber production.

(9) **Nonfederal Lands**

Private inholdings in the vicinity of Frogpond Basin are within the wilderness recommendation but could be easily removed by minor boundary adjustment.

(10) **Road System**

Approximately 309 miles of road are needed to complete the system. Average annual road construction in decade 1 is 2 miles of which one-third is capital investment. Construction mileage increases significantly in decades 2 and 3, then rapidly declines as the road system nears completion.

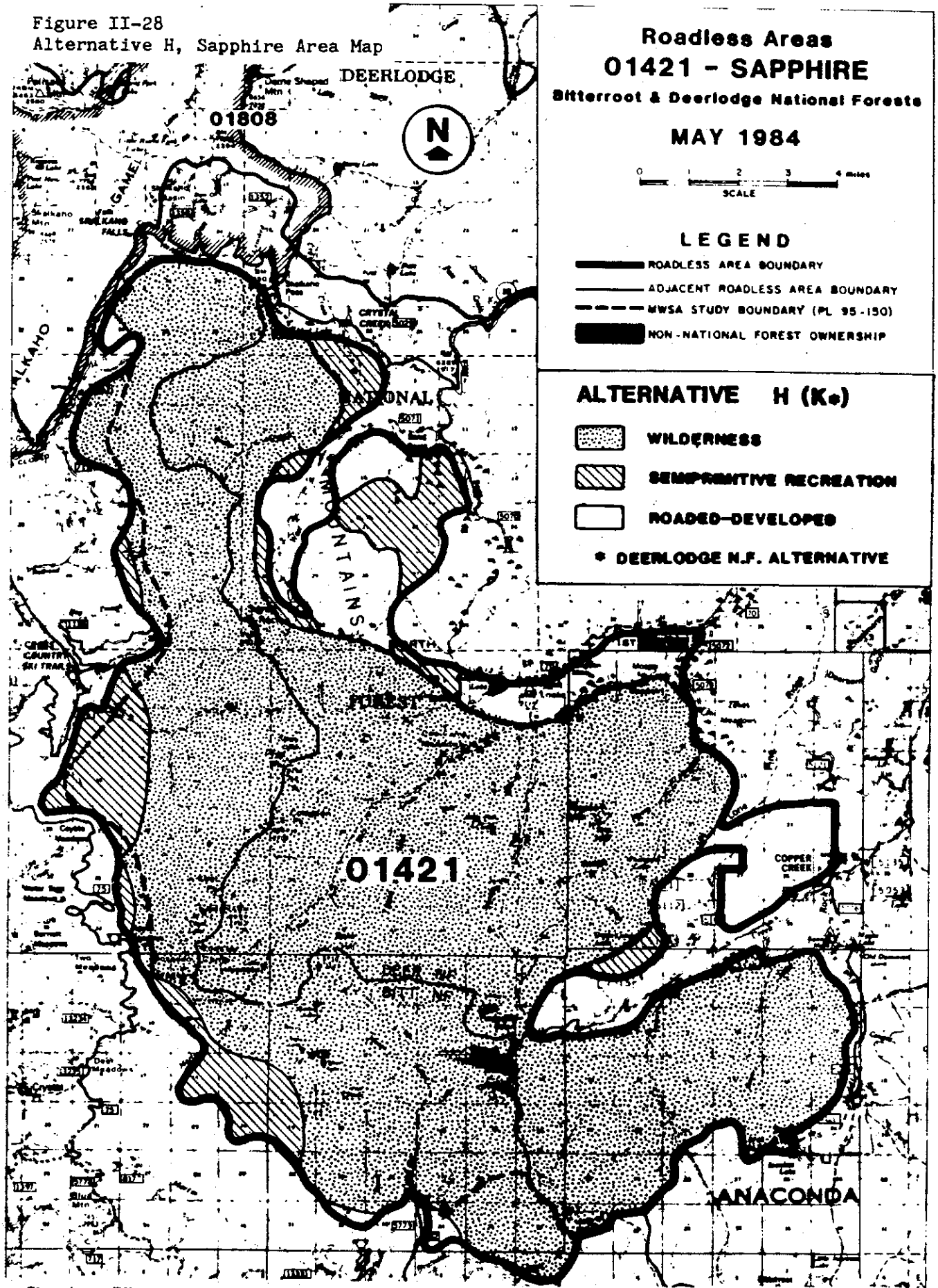
(11) **Utility Corridor**

The potential powerline corridor crossing the Sapphire Divide in the vicinity of Railroad Creek remains available for such use.

(12) **Socioeconomic**

Present net value is $7.3 million which is 52 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base; dispersal of timber harvest to provide for high levels of visual quality along travel corridors; wildlife habitat, security, and riparian area protection; high timber harvest objectives in the early decades; and a high level of recreation management. Annual receipts will not exceed expenditures until the road system is complete. New timber opportunities would provide 21 local jobs.

Figure II-28
Alternative H, Sapphire Area Map



f. Alternative H

This alternative recommends wilderness for those portions defined by reasonable topographic boundaries and moderate or higher wilderness attributes.

(1) Dispersed Recreation

That portion of the roadless area within the Montana Wilderness Study Act boundary is managed primarily for natural conditions. Interior portions would receive overnight use due to distances involved. Exterior portions are readily accessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting is 13 percent roaded natural, and 87 percent semiprimitive.

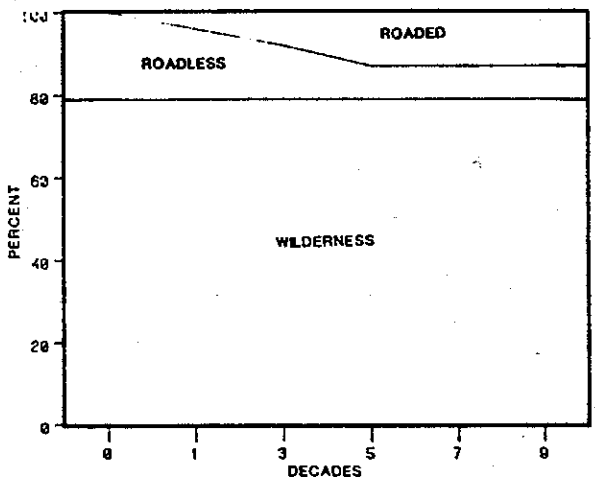
(2) Wilderness

Wilderness is recommended for about 79 percent of the roadless area. Excluded are most fire roads and dozer constructed fireline in Martin Creek and Skalkaho Creek and fringes of the roadless area having low wilderness attributes.

(3) Roadless

In addition to the wilderness recommendation, about 8 percent of the roadless area will remain roadless. Remaining lands are scheduled for development and most will lose their roadless identity within 50 years. The expected rate of development is shown in Figure II-29.

Figure II-29
Rate of Development for Sapphire Area, Alternative H



(4) Visual Quality

A natural level of visual quality is maintained in wilderness and semiprimitive designations. Elsewhere, harvest patterns and associated access roads will dominate the landscape.

(5) **Wildlife**

Natural conditions will be maintained on 88 percent of the roadless area. This portion contains fair or good elk habitat and is used as security by elk, deer and mountain goats during the hunting season. Travel restrictions, primarily road closures, provide security on the remaining lands scheduled for development. The abundance of unroaded land is expected to maintain hunting season length and restrictions at the current level.

(6) **Fish and Water Quality**

Although 13 percent of the area will be roaded and developed all fishery streams and adjacent lands will remain in a near natural condition. On that portion scheduled for roads and development sediment increase to levels that affect spawning and food supply resulting in reduced fish populations, but only in streams outside the roadless area.

(7) **Timber**

Nineteen percent of the tentatively suitable land and 2 percent of the land having the highest potential productivity (50-84 CF/acre/year) will be managed for scheduled timber outputs.

(8) **Minerals and Energy Resources**

Ninety-four percent of the high potential mineral opportunities would likely be foreclosed by wilderness, subject to valid existing rights and 6 percent will eventually be accessed by roads constructed primarily for timber production.

(9) **Nonfederal Lands**

Private inholdings in the vicinity of Frogpond Basin are within the wilderness recommendation but could be easily removed with minor boundary adjustment.

(10) **Road System**

Approximately 137 miles of road are needed to complete the system. Average annual road construction in decade 1 is 1 mile of which one-third is capital investment.

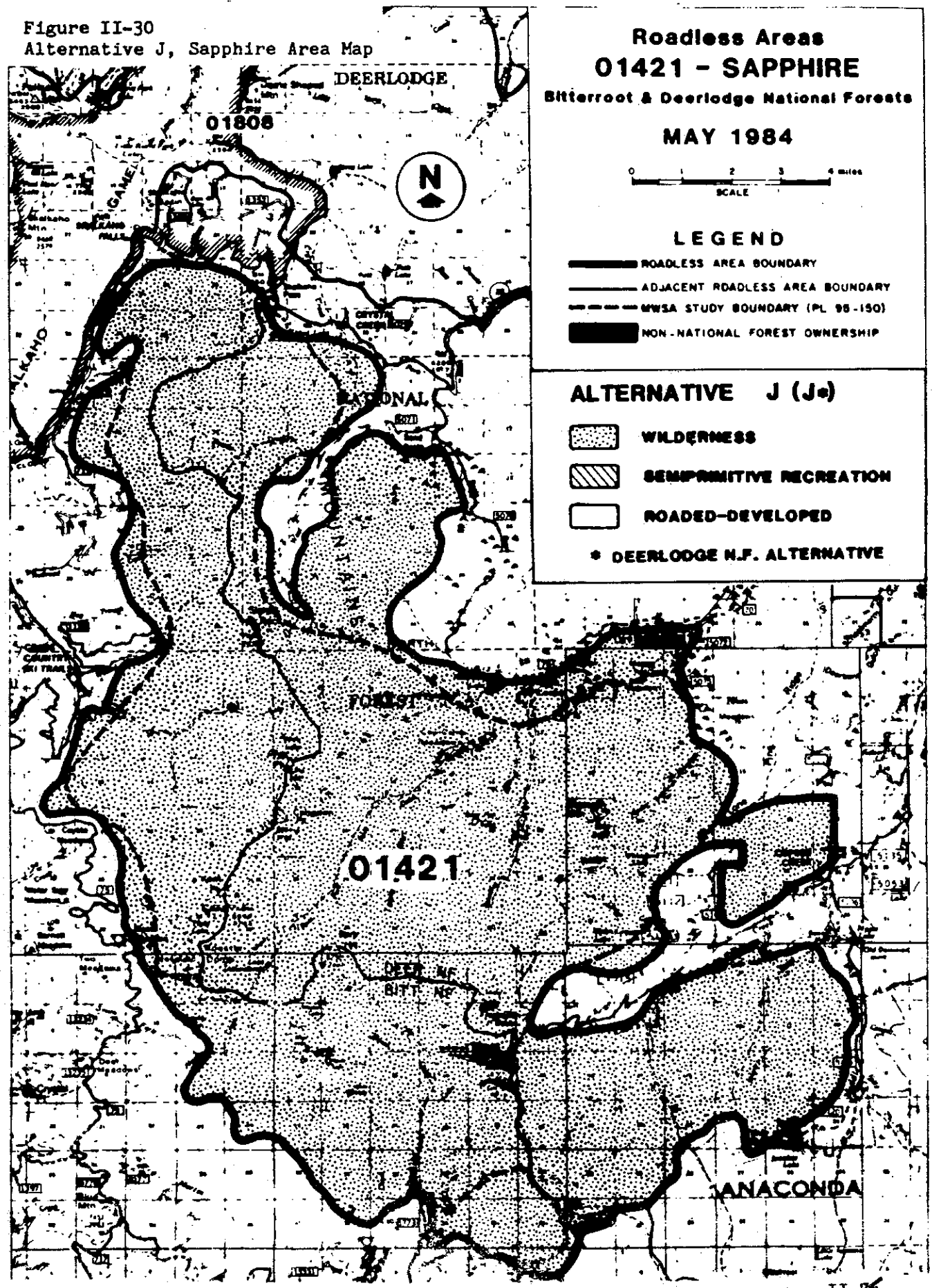
(11) **Utility Corridor**

The wilderness recommendation precludes consideration of a potential powerline corridor crossing the Sapphire Divide in the vicinity of Railroad Creek.

(12) **Socioeconomic**

Present net value is $7.8 million which is 55 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base and providing a high level of recreation/wilderness management. The local employment potential would remain at present levels since most of the area does not contribute toward commodity outputs.

Figure II-30
Alternative J, Sapphire Area Map



g. Alternative J

This alternative recommends wilderness for nearly the entire roadless area.

(1) Dispersed Recreation

Nearly all of the roadless area is managed for natural conditions. This includes considerable land along the boundary with little variety in recreation opportunities. Interior portions would receive primarily overnite use due to distances involved. Exterior portions would be accessible for either day or destination use from trailheads near the boundary. The recreation opportunity setting is 100 percent semiprimitive.

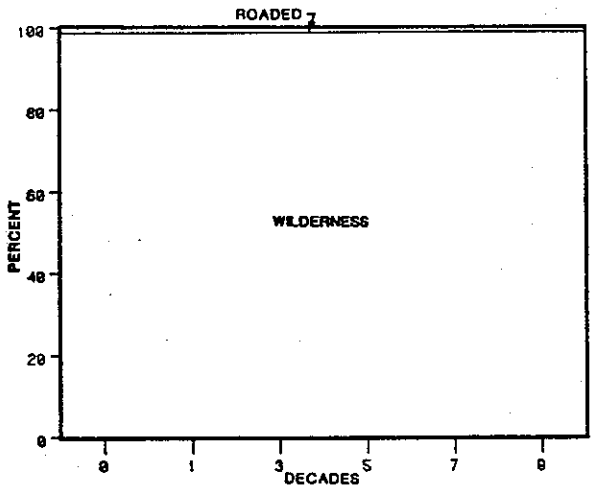
(2) Wilderness

Wilderness is recommended for nearly the entire area.

(3) Roadless

There is no roadless designation. Figure II-31 shows recommended wilderness.

Figure II-31
Wilderness Recommendation for Sapphire Area, Alternative J



(4) Visual Quality

Nearly the entire area is recommended for wilderness with a preservation visual quality objective.

(5) Wildlife

Natural conditions are maintained for the entire roadless area. This includes fair to excellent elk, deer and mountain goat habitat and light to heavy use for security during the hunting season. There should be no change from current hunting season length and area restrictions.

(6) **Fish and Water Quality**

Natural levels of sediment and fish populations will be maintained.

(7) **Timber**

No lands will be managed for timber production.

(8) **Minerals and Energy Resources**

Exploration and development opportunities on the 16,600 acres having a high potential would likely be foreclosed by wilderness, subject to valid existing rights.

(9) **Nonfederal Lands**

Private inholdings are within the wilderness recommendation but could be easily removed with minor boundary adjustment.

(10) **Road System**

The entire area will remain unroaded.

(11) **Utility Corridor**

The wilderness recommendation precludes consideration of a potential powerline corridor crossing the Sapphire Divide in the vicinity of Railroad Creek.

(12) **Socioeconomics**

Present net value is $5.7 million which is 41 percent of potential. The primary reasons for the foregone investment opportunity are removal of land from the timber base and providing a high level of recreation/wilderness management. The local employment potential would remain at the present level since the area does not contribute toward commodity outputs.

4. **Comparison of Alternatives**

a. **Management Emphasis by Alternative**

Management prescriptions have been grouped into four management emphases: roaded, unroaded, semiprimitive recreation, and wilderness. The roaded emphasis will eventually preclude wilderness. Timber, range, winter range, partial retention, and riparian are prescriptions included. The unroaded emphasis may preclude wilderness, at least in the short-term, due to timber harvest or range improvements. Unroaded retention, range, and wildlife are prescriptions included. The semiprimitive recreation emphasis will likely maintain the roadless character for future consideration as wilderness. Recreation and semiprimitive recreation prescriptions are included. The wilderness emphasis is the wilderness prescription.

Table II-6 displays acreage by management emphasis and the expected rate of development for each alternative. Table II-7 displays tentatively suitable timberland, highest timber potential (50-84 CF/acre/year), and highest mineral potential by acreage and management emphasis.

Table II-6
Management Emphasis for Sapphire Area
(thousand acres)

Management Emphasis	Forest	Alternative						
	Bitterroot	B	C	E 1/	F	G	H	J
	Deerlodge	C	L	M	A	E	K	J
Nonwilderness designation		116.5	106.2	116.5	116.5	62.2	24.0	4
Roaded emphasis		70.8	59.8	30.0	4.5	39.9	14.1	0
Bitterroot Forest		33.3	26.0	17.4	0	17.4	1.2	0
Deerlodge Forest		37.5	33.8	12.6	4.5	22.5	12.9	0
Unroaded emphasis		4.7	4.7	4.7	4.7	6.1	.5	0
Bitterroot Forest		0	0	0	0	1.4	0	0
Deerlodge Forest		4.7	4.7	4.7	4.7	4.7	.5	0
Semiprimitive recreation emphasis		41.0	41.7	81.8	107.4	16.2	9.4	0
Bitterroot Forest		10.8	15.6	26.7	44.1	4.9	6.9	0
Deerlodge Forest		30.2	26.1	55.1	63.3	11.3	2.5	0
Wilderness designation		0	10.4	0	0	54.4	92.5	116.1
Bitterroot Forest		0	2.5	0	0	20.4	36.0	43.7
Deerlodge Forest		0	7.9	0	0	34.0	56.5	72.4
Area developed by								
Decade 1		10.8	9.1	9.8	1.1	5.6	2.6	0
Bitterroot Forest		8.3	6.5	8.7	0	3.8	0	0
Deerlodge Forest		2.5	2.6	1.1	1.1	1.8	2.6	0
Decade 5		75.5	64.4	34.6	9.2	46.0	14.7	0
Bitterroot Forest		33.3	26.0	17.4	0	18.8	1.2	0
Deerlodge Forest		42.2	38.4	17.2	9.2	27.2	13.5	0
Area roadless in *								
Decade 1		105.7	97.0	106.7	115.4	56.5	21.4	0
Bitterroot Forest		35.8	35.1	35.4	44.1	19.9	8.1	0
Deerlodge Forest		69.9	61.9	71.3	71.3	36.6	13.3	0
Decade 5		41.0	41.7	81.9	107.3	16.2	9.3	0
Bitterroot Forest		10.8	15.6	26.7	44.1	4.9	6.9	0
Deerlodge Forest		30.2	26.1	55.2	63.2	16.3	2.4	0
Current roadless acres		116.5	116.5	116.5	116.5	116.5	116.5	116.5
Bitterroot Forest		44.1	44.1	44.1	44.1	44.1	44.1	44.1
Deerlodge Forest		72.4	72.4	72.4	72.4	72.4	72.4	72.4

* Does not include wilderness designations.
1/ Proposed Action.

Table II-7
Suitable Timberland and Mineral Potential by Management Emphasis for Sapphire (thousand acres)

Management Emphasis	Forest	Alternative						
	Bitterroot	B	C	E 1/	F	G	H	J
	Deerlodge	C	L	M	A	E	K	J
Tentatively suitable land								
Roaded emphasis		65.3	57.2	25.7	4.5	34.6	13.8	0
Bitterroot Forest		27.8	23.4	13.1	0	12.1	.9	0
Deerlodge Forest		37.5	33.8	12.6	4.5	22.5	12.9	0
Unroaded emphasis		.5	.5	.5	.5	1.5	0	0
Bitterroot Forest		0	0	0	0	1.0	0	0
Deerlodge Forest		.5	.5	.5	.5	.5	0	0
Semiprimitive recreation emphasis		5.5	8.4	45.1	66.3	8.2	6.0	0
Bitterroot Forest		0	3.2	14.7	27.8	2.5	4.8	0
Deerlodge Forest		5.5	5.2	30.4	38.5	5.7	1.2	0
Wilderness emphasis		0	5.2	0	0	27.0	51.5	70.9
Bitterroot Forest		0	1.2	0	0	12.2	22.1	27.4
Deerlodge Forest		0	4.0	0	0	14.8	29.4	43.5
Highest timber potential*								
Roaded emphasis		8.7	7.3	4.2	0	4.1	.2	0
Unroaded emphasis		0	0	0	0	.3	0	0
Semiprimitive recreation emphasis		0	1.1	4.5	8.7	.5	2.0	0
Wilderness emphasis		0	.3	0	0	3.8	6.5	8.7
High mineral potential								
Roaded emphasis		8.0	4.8	1.8	1.0	2.4	1.0	0
Bitterroot Forest		4.5	1.3	0	0	0	0	0
Deerlodge Forest		3.5	3.5	1.8	1.0	2.4	1.0	0
Unroaded emphasis		0	0	0	0	0	0	0
Bitterroot Forest		0	0	0	0	0	0	0
Deerlodge Forest		0	0	0	0	0	0	0
Semiprimitive recreation emphasis		8.6	11.1	14.7	15.6	0	0	0
Bitterroot Forest		1.3	3.8	5.8	5.8	0	0	0
Deerlodge Forest		7.3	7.3	8.9	9.8	0	0	0
Wilderness emphasis		0	.7	0	0	14.2	15.6	16.6
Bitterroot Forest		0	.7	0	0	5.8	5.8	5.8
Deerlodge Forest		0	0	0	0	8.4	9.8	10.8

* All on Bitterroot Forest.
1/ Proposed Action.

b. **Impacts**

(1) **Designation: Wilderness**
Management Emphasis: Wilderness

nearly the entire area is recommended for wilderness in Alternative J, with recommendations of 9, 47, and 79 percent in C, G, and H respectively. Recommendations would expand the wilderness system as a new wilderness or as additions to the Anaconda-Pintler Wilderness. Alternatives C and G incorporate portions of the area having high wilderness attributes and H and J include additional land with low to moderate attributes.

Timber production is precluded on tentatively suitable land--all in Alternative J, and 7, 38, and 72 percent in C, G, and H respectively. All tentatively suitable timberland amounts to 5 percent of the Forest total for the Bitterroot and 7 percent for the Deerlodge Forests.

Wilderness classification precludes semiprimitive recreation emphasis designation in Alternative J and reduces the acreage available in C, G, and H. Recreation use will continue to be dominated by hunting, fishing, and camping. Mechanized trailbike, snowmobile, and chain saw use would be prohibited.

Mineral exploration and development is foreclosed subject to valid existing rights. All land rated as having a high mineral potential is withdrawn from mineral entry in Alternative J and 4, 86, and 94 percent in C, G, and H respectively.

Current livestock use would continue.

Nonpriced benefits and costs include:

- A natural setting is maintained.
- The wilderness system expands.
- A natural level of big-game forage and cover is maintained. Cover/forage ratios would be determined by natural events such as wildfire.
- Vegetative diversity tends toward old growth as modified by a more nearly natural role for wildfire.
- Old-growth dependent wildlife species are favored.
- Natural watersheds and fish habitat are maintained.

Economic and social effects vary depending on the amount of tentatively suitable timberland recommended for wilderness. The wood products and mining industries would not be supported by this emphasis. However wilderness could enhance primitive and semiprimitive recreation opportunities and outfitter activities. Publics interested in wilderness opportunities would be pleased, whereas those favoring mechanized use in a natural setting would not.

(2) **Designation: Nonwilderness**
Management Emphasis: Roaded

Timber, range, partial retention, and riparian prescriptions are in this emphasis. Some land is included in this emphasis in all alternatives except J. The highest level is in B with about 61 percent of the roadless area and the lowest in F at 4 percent.

Ninety-two percent of the tentatively suitable timberland is included in this emphasis in Alternative B; 80 percent in C; and from 19 to 49 percent in Alternatives E (Proposed Action), G, and H. The lowest is in J at <1 percent and F at 6 percent. High-value old growth is scheduled for early removal; however, due to long rotations substantial old growth will be retained in partial retention and riparian prescriptions. Early harvest is also scheduled in lodgepole pine stands which blanket much of the area.

Roads and timber harvest will foreclose future consideration for wilderness by the end of the fifth decade; however, over 80 percent of the land in this emphasis will remain unroaded and undeveloped at the end of decade 1. The roadless character changes as roads lessen the naturalness and solitude. Semiprimitive recreation use would be disrupted as the recreation setting changes to roaded.

Access for mineral and energy exploration is enhanced as the road system expands. Land of high mineral potential would be 48 percent accessible in Alternative B; 29 percent in C; and from 6 to 14 percent accessible in E (Proposed Action), F, G, and H.

Transitory forage for livestock and wildlife is created by timber harvest.

Nonpriced benefits and costs include:

- Visual quality will be maximum modification except along the Skalkaho Highway in Alternatives B, and H and along most travel corridors in G.
- Characteristics for future consideration as wilderness are foregone by the end of the fifth decade.
- Security cover for elk and other game will be greatly reduced in Alternatives B and C; however, road closures could mitigate this effect.
- Vegetative diversity tends toward younger age classes in Alternatives B, C, E (Proposed Action), and H but retains a sizeable old-growth component in G.
- Water quality is reduced but mitigated by high standards for road construction and maintenance.
- Local wood products employment increases significantly in Alternatives B, C, E (Proposed Action) and G due to new timber opportunities.

Economic effects vary depending upon the amount of land that is suitable for timber production and the degree of constraints for visual and watershed values. The greatest positive effect is for Alternatives B, and C where most tentatively suitable land is retained in the timber base with few constraints to recognize other values. The wood products and mining industries are supported by this emphasis. Publics favoring roadless or wilderness characteristics would not be pleased; however, much of the area would remain like it is for another 10 years. Those publics using the area for semiprimitive recreation would have to adjust to a roaded setting or shift use elsewhere. Outfitters could continue operations although the hunting experience would be altered.

(3) **Designation: Nonwilderness**
Management Emphasis: Semiprimitive Recreation

The semiprimitive recreation prescription is in this emphasis on the Bitterroot and the recreation prescription on the Deerlodge. Some land is included in this emphasis in all alternatives except J. The highest level is in F which incorporates all land within the MWSA boundary and the lowest in H at 8 percent. In B, lands assigned this emphasis are relatively large high elevation blocks that are not suitable or not efficient for timber production.

Except for possible mineral entry, roadless characteristics for a core area in Alternatives C, E (Proposed Action), F, G, and H will be retained and the land will remain available for future consideration as wilderness. Besides the roadless character, wilderness attributes of naturalness and solitude will also be maintained. Current recreation use will continue. Trailbike, snowmobile, and chain saw use is compatible with this emphasis.

Current levels of livestock use would continue.

Cover/forage relationships for wildlife will be determined by natural events such as wildfire but can be modified by prescribed fire or direct habitat improvement.

Roads are not needed for surface management purposes but will be permitted for mineral activities where construction is justified on the basis of mineral showings or data, and where it is the next logical step in the development of the mineral resource. Fifty-two percent of those lands having a high mineral potential are in this emphasis in Alternative B and 67, 89, and 94 percent in C, E (Proposed Action), and F respectively.

Timber production is precluded on 12, 65, 93, 12, and 8 percent of the tentatively suitable timberland in Alternatives C, E (Proposed Action), F, G, and H respectively. Tentatively suitable land in Alternative B is not efficient for timber production. C and G includes other lands of low site quality. Alternative E (Proposed Action) incorporates lands of higher site quality, much of which would be difficult to develop because of low product values and/or difficult terrain.

Nonpriced benefits and costs include:

- A predominantly natural setting in maintained.
- The wilderness option is retained for future consideration.
- Near natural cover/forage ratios for big game are retained but may be modified by prescribed fire or other direct habitat improvement.
- Vegetative diversity tends toward old growth but may be modified by prescribed fire.
- Old-growth dependent wildlife are favored.
- Natural watersheds and fish habitat are retained.
- The current recreation use is retained.

Wood products and mining industries are not supported by this emphasis. Miners could continue to operate; however, costs would be higher without road access provided by surface management. Land would remain much like it is currently, thus supporting current recreation use, livestock grazing, and outfitters.

(4) **Designation: Nonwilderness**
Management Emphasis: Unroaded

The unroaded retention prescription is in this emphasis on the Bitterroot and the range and wildlife prescription on the Deerlodge. About 4 percent of the roadless area is in this emphasis in Alternatives B, C, E (Proposed Action), F, and G.

Timber harvest forecloses future consideration for wilderness by the end of the fifth decade, at least in the short term. Most land would remain available for wilderness at the end of the first decade. Current recreation use would be maintained.

From 1 to 2 percent of the tentatively suitable timberland is included in this emphasis in Alternatives B, C, E (Proposed Action), F, and G. High-value old growth is scheduled for early removal; however, due to long rotations, significant old growth will be maintained. This emphasis is not cost efficient since timber harvest is limited to expensive aerial systems.

Mineral exploration and development is an appropriate use but would be difficult due to lack of road access. No lands rated as high mineral potential are included in this emphasis.

Transitory forage for livestock and wildlife is created by timber harvest.

Nonpriced benefits and costs include:

- A high level of visual quality will be retained.
- Future consideration for semiprimitive recreation will be retained.
- Vegetative diversity tends toward a balance in age classes including old growth.
- Water quality and fisheries remain at high levels.
- Unroaded big-game security areas are retained.
- Present recreation opportunities are maintained.

From a social and economic standpoint, timber is available for management, thus supporting the wood products industry. Mining is compatible with the emphasis although costs would be high without road access provided by surface management. Although the naturalness of the area would be impacted, the roadless character would be retained, thus supporting current semiprimitive recreation uses, and future consideration as wilderness.

c. Resource Outputs

This section discusses the variation of major resource outputs and economic effects among alternatives. Table II-8 displays management prescription assignments by alternative.

Table II-8
Management Prescription Assignments for Sapphire Area
(thousand acres)

Management Prescription**	Forest	Alternative B	C	E*	F	G	H	J
	Bitterroot	C	L	M	A	E	K	J
Nonwilderness		116.5	106.2	116.5	116.5	62.3	24.0	.4
Roaded								
Timber/Range	Bitterroot	33.3	26.0	13.8	0	15.3	1.2	0
Timber	Deerlodge	37.5	33.8	12.6	4.5	22.5	12.9	0
Partial	Bitterroot	0	0	3.3	0	2.0	0	0
Retention	Deerlodge	0	0	0	0	0	0	0
Riparian	Bitterroot	0	0	.4	0	.2	0	0
	Deerlodge	0	0	0	0	0	0	0
Unroaded Reten.	Bitterroot	0	0	0	0	1.4	0	0
Range/Wildlife	Deerlodge	4.7	4.7	4.7	4.7	4.7	.5	0
Semi. Recreation	Bitterroot	10.8	15.6	26.7	44.1	4.9	6.9	0
Recreation	Deerlodge	30.2	26.1	55.1	63.3	11.3	2.5	0
Wilderness	Bitterroot	0	2.5	0	0	20.4	36.0	43.7***
	Deerlodge	0	7.9	0	0	34.0	56.5	72.4
Total		116.5	116.5	116.5	116.5	116.5	116.5	116.5

*Proposed Action.
**Each management prescription provides for some or all resource uses. Prescription goals, standards, and practices are described in Appendix B of Forest Plan DEIS's and planning records. Brief descriptions follow.

Management Prescription	Management Goals
Timber and Range	Provide for cost efficiency of timber management and a high level of domestic livestock grazing. Provide for other resource uses including mineral exploration, maximum modification visual quality objective, and roaded recreation.
Partial Retention	Manage to meet the partial retention visual quality objective. Provide for compatible resource uses including timber management, range management, and roaded recreation.
Riparian	Manage riparian zones for native wildlife and fish species. Provide for compatible resource uses including timber management, roaded recreation, partial retention visual quality objective, and livestock grazing.
Unroaded Retention	Manage to meet the retention visual quality objective. Provide for compatible resource uses including timber management, range management, and unroaded or semiprimitive recreation.
Wildlife	Manage for big-game spring, summer and fall habitat emphasizing both forage and cover requirements.
Range	Manage primarily for livestock while managing big-game habitat at current levels. Increased forage production form range investments are designated for livestock, and coordinated with other resources.
Semiprimitive Recreation	Manage undeveloped, roadless areas for semiprimitive recreation. Provide for the management of resources compatible with roadless recreation including wildlife habitat improvement and range management.
Wilderness	Recommend for wilderness. Manage to maintain wilderness attributes. Mechanized uses are appropriate pending Congressional action. Provide primitive recreation experiences.

***Allows for minor boundary adjustments.

(1) Recreation

Dispersed recreation occurs in roaded natural and semiprimitive settings. Semiprimitive opportunities in Alternatives E (Proposed Action) and G include area with the greatest diversity of recreation opportunities, scenery, and present and anticipated future use.

No developed recreation outputs are attributed to any alternative. Minimal facilities such as parking and stock ramps will be necessary at major trailheads for unroaded dispersed recreation users and are provided in all alternatives.

(2) Wilderness

All Alternatives except B, E (Proposed Action) andF contain wilderness recommendations. All land recommended for wilderness is contiguous to existing wilderness. Alternative C encompasses an area having moderate to high wilderness attributes and could be classified with little effect on market outputs. Alternative G contains core areas having high wilderness attributes and excellent topographic boundaries. Alternative H contains those lands having moderate to high wilderness attributes and a reasonably good topographic boundary. Alternative J recommends wilderness for nearly the entire area.

(3) Roadless

In addition to wilderness, some lands will be managed for semiprimitive recreation use and will remain roadless. This includes most lands in Alternative F and sizeable semiprimitive designations in B, C, and E.

Those lands scheduled for roads and development will lose their roadless character over time; however, portions will remain roadless and available for reconsideration as potential wilderness at the end of this planning period (10-15 years). Except for minor fringes, contiguous to wilderness or semiprimitive designations, this category will lose its roadless character within 5 decades. Alternative B will have significant land meeting the 5,000-acre minimum criteria for wilderness at the end of 50 years.

(4) Visual Quality

Visual quality objectives of preservation, retention, and partial retention provide high levels of protection for the visual resource. The rich natural diversity of high elevation landforms, rock, meadows, vegetation, and cirque lakes are protected in all alternatives.

Alternatives F, H, and J maintain natural conditions for all or most of the area. Alternatives B and C provide for the most roads and development and also have the lowest (maximum modification) visual quality objectives. Portions of the land in Alternatives E (Proposed Action) and G will also be developed but with objectives to maintain a moderate to high level of visual quality in areas seen from major travel corridors.

(5) Wildlife

All alternatives are designed to maintain minimum viable populations of wildlife and fish.

Elk is the wildlife species of greatest public interest. Winter range, the limiting habitat factor, is nearly nonexistent and there is adequate summer range and cover in all alternatives to maintain resident herds. However, hunting season security is necessary to provide stable trends in hunting opportunities since elk become increasingly vulnerable to harvest as access becomes easier and cover decreases from current levels. Road closures and roadless security areas provide the means of controlling hunter access, reducing animal vulnerability, and stabilizing season lengths and bag limits. Roadless security in Alternative B is primarily confined to lands not tentatively suitable for timber production. Hunting season length and bag limits may become increasingly restrictive alternatives in B and C with easier access. Significant roadless security is provided in Alternatives E (Proposed Action), and G, and roadless security would be maintained for all or most of the area in Alternatives F, H, and J.

Old-growth dependent species will have increasingly less habitat in Alternatives B, C, E (Proposed Action), and G; however, a large portion of E (Proposed Action) and G will be managed to maintain natural conditions which will favor old growth. The expected result is reduced populations of old growth dependent wildlife species.

Since wildlife are a product of their environment, the maintenance of a diverse vegetative community results in a diverse community of wildlife species. Natural conditions will be maintained on some acres in all alternatives, thereby favoring old growth vegetation. Other vegetative classes will be created by timber harvest, fire, and insects or disease. All alternatives provide diverse habitats with Alternatives B and C having less old growth than other alternatives.

(6) Fish and Water Quality

Sediment delivered to and amount of large woody debris for pool/riffle maintenance in fisheries streams are indicators of the effects of management activities on the catchable trout population. Sediment delivery varies by the amount of road construction and timber harvest. The amount of large woody debris is a function of riparian management and there is no effect until the fifth decade when the current supply has rotted and needs replacement.

Catchable trout population drops in decades 2-4 in Alternatives B and C as sediment increases to levels that affect spawning, fry emergence and food supply. Catchable trout should remain at or near existing levels in Alternatives E (Proposed Action) and G and would not be affected by development in Alternatives F, H, and J.

(7) Livestock

Suitable lands for livestock grazing are currently fully occupied. No significant change in use is anticipated.

(8) Timber

The amount of land suitable for timber production varies according to objectives established for each alternative. Practically all tentatively suitable land is managed for scheduled timber outputs in Alternative B. Isolated pockets and narrow streamside strips are removed from the suitable base in Alternative C and more land removed in Alternatives E (Proposed Action), G, F, and H. Alternatives B and C retain practically all highest site quality lands in the timber base. E (Proposed Action) and G retain most of the more productive timber lands and those lease sensitive to roading and development. Alternative J has no scheduled timber production.

(9) Minerals and Energy Resources

Minerals have been evaluated both for potential and availability for mineral entry. Oil and gas potential is low. Road systems constructed for the management of surface resources will near completion in 30 years. Alternatives B and C will provide access to most areas of high mineral potential; E (Proposed Action) and G less than 50 percent of these areas; and F, H, and J provide very little access.

(10) Nonfederal Lands

Private holdings are concentrated along the eastern boundary and in the vicinity of Frogpond Basin. Most adjacent National Forest land would be managed for timber production in Alternatives B and C, for wilderness in G, H, and J, and for semiprimitive recreation in Alternatives E (Proposed Action) andF.

(11) Road System

Roads needed vary according to the size of the land base that will be managed for timber production. The road system will be nearly completed in three decades. Alternatives B and C will require the most roads and F, H, and J the least.

(12) Utility Corridors

Alternatives B, C, E (Proposed Action), and G maintain a corridor option in the headwaters of Railroad Creek. Wilderness forecloses this option in Alternatives F, H, and J.

(13) Fire

Alternatives vary in the application of fire management prescriptions by the amount of land recommended for wilderness. In wilderness, prescriptions range from immediate control where public safety or other resource values are important to monitoring where desirable to restore fire to the ecosystem.

(14) Socioeconomic

One of the primary purposes of planning is to determine which alternative provides the highest net public benefit. Net public benefit is the overall value to the nation of all outputs and positive effects (benefits) less all the associated inputs and negative effects (costs) of producing priced and nonpriced outputs from National Forest land. Net public benefit represents the sum of priced outputs, represented by present net value (PNV), plus the value of nonpriced outputs.

PNV represents the dollar difference between the discounted value, at 4 percent, of all priced outputs and all costs over the planning period. Priced outputs include those with market values such as timber, range, mineral leases; and nonmarket values such as dispersed recreation. PNV was calculated for Forest-wide alternatives and the maximum PNV benchmark. The roadless areas contribution was then proportioned based on the analysis areas that occur in the roadless area. In Table II-9 alternatives are ranked from highest to lowest PNV. The difference in PNV between the maximum PNV benchmark and the alternatives represents opportunity cost, or PNV foregone to provide priced or nonpriced benefits.

Timber harvest level and associated road construction generally have the greatest effect on PNV. Each road constructed will provide access for initial timber harvest and at least two future entries before existing timber stands are removed. This is due to dispersal of harvest activities to meet visual quality, fish, and wildlife objectives. Consequently, road construction mileage and costs are high, usually resulting in a negative PNV for 3 to 4 decades when the road system nears completion. Thereafter, PNV is usually positive.

Returns to the U.S. Treasury are displayed in Table II-10. Returns result primarily from the sale of timber and therefore vary by the value and volume of timber harvest in each alternative. Twenty-five percent of the returns to the U. S. Treasury are distributed to state and local governments (Table II-10).

Significant nonpriced outputs are the assignment of roadless area to wilderness and semiprimitive recreation, visual quality, wildlife and fish habitat, and local income and employment. Table II-9 compares nonpriced benefits among alternatives.

Personal income and employment in Ravalli, Granite, and Missoula Counties change as a result of changes in timber harvest, recreation use, livestock grazing, and Forest Service expenditures (Table II-10). Differences among alternatives are primarily due to different timber outputs and Forest expenditures.

Table II-9
Comparison of Priced and Nonpriced Benefits for Sapphire Area

Benefits	Unit of Measure	Alternatives						
		C	B	H	G	F	E*	J
Priced Benefits								
Present Net Value (4%)	Million dollars	12.2	9.0	7.8	7.3	6.5	5.8	5.7
Opportunity Cost Based on a Maximum PNV of $14 MM	Million dollars	1.8	5.0	6.2	6.7	7.5	8.2	8.5
Indicators of Nonpriced Benefits								
Semiprimitive recreation/elk security	Percent of roadless area	36	35	8	14	92	70	0
Wilderness/elk security	Percent of roadless area	9	0	79	47	0	0	100
Fish habitat	Miles of fisheries streams in wilderness or roadless	48	39	77	54	76	55	79
Minerals	Percent of high mineral potential in roaded emphasis	29	48	6	14	6	11	0
Local employment	Total jobs decade 1	39	48	15	35	14	36	14

*Proposed Action.

Figure II-32
Sapphire Present Net Value and Opportunity Cost

K (PNV = $14MM)

Assigns 51.4M acres to minimum level and roadless; assigns 65.1M acres to timber production; minimal timber is cut in decades 1 and 2; and meets minimum management requirements

Assigning 52.1M acres to wilderness and semiprimitive recreation, 64.5M acres to timber production, and providing for a high level of timber, employment and income in decades 1-4 foregoes $1.8MM.

C (PNV = $12.2MM)

Assigning 41M acres to semiprimitive recreation, 75.5M acres to timber production, and providing the highest level of timber volume, employment and income in decades 1-4 foregoes an additional $3.2MM.

B (PNV = $9.0MM)

Assigning 101.9M acres to wilderness and semiprimitive recreation, 14.6M acres to timber production, and providing a low level of timber volume, employment and income foregoes an additional $1.2MM.

H (PNV = $7.8MM)

Assigning 70.6M acres to wilderness and semiprimitive recreation, 46M acres to timber production on efficient areas and/or with moderate visual constraints and moderate to high level of employment and income foregoes an additional $0.5MM.

G (PNV = $7.3MM)

Assigning 81.8M acres to semiprimitive recreation, 34.7M acres to timber production on efficient areas and/or with moderate visual and high riparian constraints, and moderate level of employment and income foregoes an additional $1.5MM.

E (PNV = $5.8MM

Assigning 107.4M acres to semiprimitive recreation with a low level of recreation management foregaoes $7.5MM

F (PNV = $6.5MM)

Assigning 116M acres to wilderness with a high level of recreation management foregoes an additional $0.8MM

J (PNV = $5.7MM)

Table II-10
Average Annual Outputs for **Sapphire** Area

Resource	Unit of Measure	Forest Bitterroot Salmon	Alternative/Benchmark B 2	C 2	E 1/ 12	F 1	G 8	H 2	J 11
Roaded recreation	M RVD's								
Decade 1			17	15	10	2	8	6	0
Decade 3			53	47	28	9	30	15	0
Decade 5			106	96	55	21	68	28	0
Semiprimitive recreation	M RVD's								
Decade 1			23	22	25	27	11	3	0
Decade 3			29	26	38	41	13	4	0
Decade 5			31	24	48	57	9	23	0
Wilderness recreation	M RVD's								
Decade 1			0	2	0	0	8	12	14
Decade 3			0	3	0	0	13	22	25
Decade 5			0	1	0	0	7	12	21
Management emphasis*	M Acres								
Roaded management			70.8	59.8	30.0	4.5	39.9	14.1	0
Unroaded management			4.7	4.7	4.7	4.7	6.1	.5	0
Semiprimitve management			41.0	41.7	81.8	107.4	16.2	9.4	0
Wilderness management			0	10.4	0	0	54.4	92.5	116.1
Fisheries streams in	Miles								
Roaded emphasis			40	31	24	3	25	2	0
Semiprimitive			39	44	55	76	3	4	0
Wilderness			0	4	0	0	51	73	79
Potential livestock forage	M AUM								
Decade 1			.50	.50	.49	42	.49	.48	.45
Decade 3			.54	.53	.51	.42	.51	.48	.45
Decade 5			.61	.60	.54	.42	.54	.48	.45
Area harvested	Acres								
Decade 1			576	197	168	44	198	118	0
Decade 3			1,714	757	339	52	494	97	0
Decade 5			1,387	1,248	442	126	472	126	0
Allowable sale quantity	MMCF								
Decade 1			.70	.54	.47	.12	.56	.22	0
Decade 3			2.43	2.14	.97	.16	1.43	.36	0
Decade 5			2.58	2.13	1.09	.38	1.38	.37	0

* Acres may not add due to rounding.
1/ Proposed Action.

Table II-10 (continued)

Resource	Unit of Measure	Forest Bitterroot Salmon	Alternative/Benchmark B 2	C 2	E 1/ 12	F 1	G 8	H 2	J 11
Long-term sustained yield	MMCF		1.93	1.83	.68	.38	.86	.37	0
Total road needs	Miles		592	513	226	75	309	130	0
Road construction*	Miles/year								
Decade 1			3	3	3	1	2	1	0
Decade 3			16	12	6	1	8	2	0
Decade 5			7	6	3	1	7	1	0
Local Forest-related employment	Jobs								
Decade 1			48	39	36	14	35	15	14
Local Forest-related income	M$								
Decade 1			911	732	675	211	680	253	111
Returns to U.S. Treasury	M$								
Decade 1			310	258	252	25	216	41	0
Decade 3			1,243	1,061	586	53	765	116	0
Decade 5			2,278	1,782	1,107	226	1,224	201	0
Returns to States	M$								
Decade 1			80	59	65	6	49	10	0
Decade 3			308	268	151	13	194	29	0
Decade 5			567	445	282	56	311	50	0
Present net value (4%)	MM$	-	9.0	12.2	5.8	6.5	7.3	7.8	5.7

* About 40 percent is capital investment construction.
1/ Proposed Action.

F. References

Peterson, R. Max. (Letter to John B. Crowell, Jr., Assistant Secretary). National Forest land management planning. Washington, DC: Forest Service, USDA; 1983 May 13.

III. AFFECTED ENVIRONMENT

This chapter describes the environment that may be changed by implementation of the proposed action or alternative plans considered. A description is presented for each roadless area with the first part describing the general setting, the second an analysis of wilderness suitability, and the third the current resource situation.

A. Blue Joint Roadless Area

1. General Setting

This area is identified by number 01941 (Bitterroot Forest) and 13941 (Salmon Forest). Roadless area acreage is:

National Forest	Gross Acres	Net Acres
Bitterroot	65,370	65,370
Salmon	490	490
Total	65,860	65,860

Access is provided to many points along the boundary by Forest roads which tie in with U.S. Highway 93, some 20 miles to the northeast. Within the area, a network of eight trails provides access along major drainages and ridgetops.

Blue Joint is a triangular-shaped area running 13 miles north and south and ranging in width from 4 to 13 miles. The west side borders the Frank Church-River of No Return Wilderness in Idaho for about 17 miles. The rest of the boundary is defined by roads; primarily the West Fork Road and extensions from it. The Nez Perce Trail Road defines the northern boundary separating this area from the adjacent Selway-Bitterroot Wilderness and contiguous roadless lands. Likewise, the Reynolds Lake Road defines the southern boundary, separating the area from that portion of the Frank Church-River of No Return Wilderness in the headwaters of Reynolds Creek. Seventy-five percent of the boundary is well-defined by topographic features such as ridgetops or streams, and the remainder is at midslope above roads and/or timber harvest.

Elevations range from 4,900 to 8,600 feet. The area is generally a high, mountainous region with 50 percent of the area over 7,000 feet. Razorback Ridge and Razorback Mountain, dominant features, divide the area into northwest and southeast portions. Blue Joint Creek, by far the largest stream, drains the northwestern segment; and Chicken, Deer, and West Creeks drain the southeast. Stream bottoms are generally narrow with sideslopes rising steeply to narrow ridges. Slopes on more than one-half of the area are in excess of 60 percent, thereby confining most use to stream bottoms or ridgetops.

The area is forested except for the unique large meadows in the headwaters of Deer and Blue Joints Creeks, dry south-facing slopes, and rock rubble and grassy balds at higher elevations. Tree species are predominantly Douglas-fir and ponderosa pine on the warmer, lower elevation sites and lodgepole pine on cooler sites at midslope. Near the top of the higher ridges, whitebark pine is a dominant species. Ground cover is primarily pine grass, snowberry, and ninebark at lower elevations and beargrass or grouse whortleberry on higher, cooler sites.

In the Blue Joint drainage, forest fires in the late 1800's burned over most of the area. Today, stands of small lodgepole pine cover this portion contrasting with the rest of the area.

2. Analysis of Wilderness Suitability

Wilderness suitability is determined by both the degree to which an area possesses the basic characteristics necessary for wilderness designation, as defined by the Wilderness Act, as well as the degree to which an area can be managed as wilderness.

a. Wilderness Attributes

(1) Natural Integrity and Appearance

Activities that have significantly altered natural processes are minimal and located just inside the eastern and southeastern boundaries. Less than 1 percent of the area has been impacted. These include all or portions of seven timber sale cutting units totaling about 170 acres and 3 miles of associated access roads. The boundary could be defined to exclude these impacts. There is a 3/4-mile fire road in the extreme headwaters of Blue Joint Creek, and about 1 mile of dozer constructed trail in lower Blue Joint Creek.

These impacts are readily apparent to any visitor when onsite; however, the remainder of the area appears natural. The roads have permanently altered natural processes, but cutting units will recover to nearly natural conditions in 20-30 years.

(2) Opportunities for Solitude

The northwest portion of the area is entirely enclosed by high ridges and provides outstanding solitude. This feeling is enhanced by the many miles of wilderness to the west and south. No development can be seen or heard.

Solitude is somewhat less in the southeast portion. About 2 miles of road in Deer Creek, outside the area, form a roaded intrusion into the headwaters of that drainage. Distant views include roads and timber sale activity just outside the area.

Civilization appears close at hand along the northern and eastern boundaries and from that portion within Woods Creek. About 40 percent of the area provides outstanding opportunities for solitude, another 40 percent provides high to moderate opportunities, and 20 percent provides low opportunities.

(3) Primitive Recreation Opportunities

These include hiking, big- and small-game hunting, fishing, and viewing a moderate diversity of vegetation and wildlife. Challenging opportunities are rare.

(4) **Other Features**

Significant scenic attractions include two prominent landmarks, meadows in the upper reaches of Blue Joint and Deer Creeks, and wide panoramas viewed from the major divides. The landmarks are Castle Rock, the remnant of a volcanic plug, and a natural rock arch east of the confluence of Jack the Ripper and Blue Joint Creeks. Part of the Southern Nez Perce Indian Trail traverses the ridge between Nez Perce Pass and Bare Cone Lookout in the northern portion of the area. Several archeological sites are associated with the trail.

b. **Manageability and Boundaries**

RARE II areas 01941 and 04941 comprises the roadless area. The following adjustment in net acres has taken place since the RARE II inventory:

	---National Forest---		Total
Adjustment	Bitterroot	Salmon	Acres
RARE II inventory	126,500	19,905	146,405
Added to wilderness (P.L. 96-312)	-65,100	-19,415	-85,005
Refined acreage calculation	+3,970		+3970
Current inventory	65,370	490	65,860

Approximately 85,000 acres have been designated wilderness by P.L. 96-312 which established the Frank Church-River of No Return Wilderness. Boundary decisions excluded two parcels in Idaho from wilderness. These are contiguous with the congressionally designated Blue Joint Wilderness Study Area.

The roadless area is bordered on the west by 17 miles of the Frank Church-River of No Return Wilderness. Boundaries are well-defined by topography along 75 percent of the perimeter. The remainder would be difficult to describe and locate on-the-ground since it is midslope, either passing through or lying immediately above roads and development. Roads and timber harvest in Coal Creek and Woods Creek would not be realistic to manage as wilderness. Eliminating these impacts would remove about 4,000 acres from consideration as wilderness and would place boundaries on recognizable topographic features. The area could be managed as an addition to the Frank Church-River of No Return Wilderness or as a separate wilderness.

Boundary adjustment can enhance wilderness attributes. A large area composed of the Blue Joint drainage (45 percent of the area) contains exceptional wilderness characteristics. It is entirely enclosed by high ridgetops which effectively screen out off-area evidence of civilization. Another 15 percent in the upper reaches of Deer and Chicken Creeks has high wilderness characteristics but is less effectively screened from off-area impacts. The above boundary adjustments enhance the area's naturalness and solitude and retain most of the highest primitive recreation attributes and special features. Solitude is also enhanced by the adjoining wilderness.

The area is entirely National Forest. Nonconforming uses consist of a minor amount of trailbiking, snowmobiling, chain saws for clearing trails and firewood cutting by hunters and campers. There are no contractual agreements or known statutory rights, and no oil or gas leases.

c. **Need**

(1) **Proximity to Existing Wilderness and Population Centers**

Table III-1
Proximity of Regional Wilderness Areas to Blue Joint Area

Wilderness	General Location	Proximity to Blue Joint Area	Thousand Acres
Anaconda-Pintler	Western Montana	Less than 50 miles	159
Selway-Bitterroot	West central Montana	Less than 50 miles	251
	East central Idaho	Less than 50 miles	1,089
Welcome Creek	Western Montana	Less than 50 miles	28
Subtotal	Three areas	Less than 50 miles	1,527*
Gospel Hump	Central Idaho	50 to 100 miles	206
Mission Mountains	Western Montana	50 to 100 miles	74
Rattlesnake	Western Montana	50 to 100 miles	33
Frank Church-River of No Return	Central Idaho	50 to 100 miles	2,239
Scapegoat	Western Montana	50 to 100 miles	240
Subtotal	Five areas	50 to 100 miles	2,792**
Absaroka-Beartooth	South central Montana	100 to 200 miles	922
Bob Marshall	Western Montana	100 to 200 miles	1,009
Cabinet Mountains	Northwestern Montana	100 to 200 miles	94
Eagle Cap	Northeastern Oregon	100 to 200 miles	294
Gates of the Mountain	Central Montana	100 to 200 miles	29
Great Bear	Western Montana	100 to 200 miles	287
Hells Canyon	West central Idaho	100 to 200 miles	84
Hells Canyon	Northeastern Oregon	100 to 200 miles	108
Lee Metcalf	South central Montana	100 to 200 miles	259
Red Rock Lakes	South central Montana	100 to 200 miles	32
Sawtooth	Central Idaho	100 to 200 miles	217
Wenaha-Tucannon	Northeastern Oregon	100 to 200 miles	66
Wenaha-Tucannon	Southeastern Washington	100 to 200 miles	111
Subtotal	11 areas	100 to 200 miles	3,513
Total	19 areas	Less than 200 miles	7,832

* Another 309,000 acres in four areas have been administratively endorsed for wilderness in RARE II.

** Another 395,000 acres in four areas have been administratively endorsed for wilderness in RARE II.

Table III-2
Regional Population Centers and Distance from Blue Joint Roadless Area

Population Center	Less Than 50 Miles Areas	Less Than 50 Miles M Acres	51-100 Miles Areas	51-100 Miles M Acres	101-200 Miles Areas	101-200 Miles M Acres	201-300 Miles Areas	201-300 Miles M Acres
Spokane, WA	0	0	0	0	5	240	6	160
Boise, ID	0	0	0	0	5	290	6	110
Pocatello, ID	0	0	0	0	0	0	11	400
Missoula, MT	3	155	8	245	0	0	0	0
Great Falls, MT	0	0	0	0	11	400	0	0
Billings, MT	0	0	0	0	0	0	11	400

(2) **Contribution to the Wilderness Preservation System**

Classification as wilderness would add streamside meadows which are rare in the northern portion of the Frank Church-River of No Return Wilderness. Other ecosystems and wildlife species are well-represented in existing wilderness. It would provide added width to the Selway-Bitterroot and Frank Church-River of No Return Wildernesses, which are relatively narrow in this vicinity. Climax forest wildlife such as marten and pileated woodpecker would benefit, and unroaded security areas for big-game animals would be provided. Habitat for the genetically pure bighorn sheep herd would be added.

(3) **Public Interest**

Most of the Montana portion is a congressionally designated wilderness study area (P.L. 95-150). No wilderness is proposed in the Idaho state bill (1984) nor has the Governor recommended wilderness for any portion. The Montana state bill (S. 2850) is silent on this area.

In the 1983 public involvement on roadless areas, the Blue Joint area was one of the priority areas with public support for wilderness classification. The area is valued because of its wildlife, scenic beauty--especially the high elevation meadows--and its proximity to existing wilderness areas. There is also concern that without a formal unroaded classification, this type of use would be short-lived.

The area is valued by other publics for nonwilderness uses because of snowmobile and trailbike use, and timber and mineral potential. A typical concern is the need for additional acres developed for commodity production to expand and improve the depressed economy of the valley and Montana.

In RARE II, approximately 84 percent of responses to the DEIS supported wilderness for the area. The majority of local publics supported nonwilderness in the 1974 unit planning process, but not necessarily development options.

3. **Current Resource Situation**

a. **Resource Potential and Use for Blue Joint Roadless Area**

Table III-3
Resource Potential and Use for Blue Joint Roadless Area

Category	Unit	Forest		
		Bitterroot	Salmon	Total
Gross area	Acres	65,370	490	65,860
Net area	Acres	65,370	490	65,860
Recreation				
Primitive	RVD's	0	0	0
Semiprim. nonmotorized	RVD's	0	0	0
Semiprim. motorized	RVD's	1,300	0	1,300
Roaded natural	RVD's	200	100	300
Wildlife habitat				
Elk and deer				
Summer range	Acres	60,919	490	61,409
Winter range	Acres	4,451	0	4,451
Rocky mountain goat	Acres	400	0	400
Bighorn sheep	Acres	2,000	0	2,000
Fisheries streams	Miles	51	0	51
Lakes	Number	0	0	0
Fisheries lakes	Acres	0	0	0
Water developments	Number	0	0	0
Range				
Current use	AUM's	130	0	130
Suitable rangeland	Acres	1,172	0	1,172
Current allotments	Number	1	0	1
Other suitable	Acres	0	0	0
Timber				
Tentatively suitable	Acres	43,662	427	44,089
Standing volume	MMBF	409.4	1.2	410.6
Potential productivity				
Nonforest	Acres	10,884	69	10,947
0-19 $ft.^3$/acre/year	Acres	10,824	0	10,824
20-49 $ft.^3$/acre/year	Acres	32,755	427	33,182
50-84 $ft.^3$/acre/year	Acres	10,907	0	10,907
Potential corridors	Number	1	0	1
Mineral potential				
Very high	Acres	0	0	0
High	Acres	26,413	0	26,413
Moderate	Acres	37,477	0	37,477
Low	Acres	1,480	490	1,970
Mining claims	Number	15	0	15
Oil and gas potential				
Very high	Acres	0	0	0
High	Acres	0	0	0
Moderate	Acres	0	0	0
Low	Acres	65,370	490	65,860
Leases	Number	0	0	0
Leased area	Acres	0	0	0
Outfitters	Number	1	1	2
Trails	Miles	72	0	72

b. **Selected Resource Values**

(1) **Recreation**

Current use is very light consisting primarily of big-game hunting but also includes day hiking, wildlife viewing, horseback riding, camping, and fishing. Major attractions include trails and campsites along the several larger streams and meadows. The State Line and Razorback Ridge Trails provide varied subalpine scenery near the crests.

(2) **Cultural Resources**

A portion of the Southern Nez Perce Indian Trail traverses the ridge crest forming the divide between Blue Joint Creek and the Nezperce Fork of the Bitterroot River. Several archaeological sites are associated with the trail. Little else is known about cultural remains.

(3) **Wildlife and Fish**

Wildlife includes elk, mule deer, bighorn sheep, moose, black bears, mountain lions, wolverines, pileated woodpeckers, golden eagles, hawks, ravens, blue ruffed and Franklin grouse, cutthroat, dolly varden, and brook trout, and a host of smaller animals and birds.

A unique wildlife resource is the bighorn sheep herd believed to be genetically pure, a rarity in the contiguous 48 states. Sheep use is concentrated along the northern boundary in the vicinity of Castle Rock, where rocky sections are used for lambing. This herd also inhabits the Selway-Bitterroot roadless area and the Selway Bitterroot Wilderness area to the north.

(4) **Water Quality**

This is a relatively high water-producing area. Stream runoff is estimated at 85,000 acre-feet/year, much of which is stored behind Painted Rocks Dam for irrigation and to maintain instream flows on the lower Bitterroot River. There are no structures, diversions, or ditches within the area.

(5) **Livestock**

Approximately 130 animal unit months of grazing occur in meadows bordering the upper reaches of Deer and Blue Joint Creeks.

(6) **Ecology**

Varied topography, aspect, elevation and precipitation contribute towards a moderate diversity of ecosystems. The area is on the fringes of the Selway-Bitterroot ecosystem which has been identified by the U.S. Fish and Wildlife Service as a possible grizzly bear recovery area (USDI, 1982). The plant Penstemon lemhiensis is considered vulnerable to extinction and may be present (Bosworth, 1984).

(7) Timber

About 44,000 acres, 65 percent of the area, are tentatively suitable for timber production. Unsuitable lands are concentrated at the highest elevations along the state line, Razorback Ridge, and south-to west-facing slopes dispersed through the area. Lower elevation, warmer sites are the most productive. Potential productivity on about 75 percent of the tentatively suitable land is 20-49 cubic feet/acre/year and on the remainder is 50-84 cubic feet/acre/year. The standing timber volume is 411 million board feet. Currently, the area is not in the timber base nor does it contribute to the sales program.

(8) Minerals and Energy Resources

The U.S. Geological Survey and Bureau of Mines have conducted a mineral survey and prepared a report for the area (Lund and others, 1984). Hardrock mineral potential is rated high for about 40 percent of the area in the vicinity of Bare Cone Lookout, Jack the Ripper Creek, Steep Hill, Deer Creek Point, and Lower Deer Creek. Forty claims have been located, of which 15 are lode and 25 placer. Examination of claims revealed only a few prospect pits and trenches with little or no evidence of production.

Traditional theory places the oil and gas potential as low. There are no oil and gas leases.

(9) Land Use Authorizations

These consist of two outfitter permits.

(10) Nonfederal Lands

The area is entirely National Forest.

(11) Other Considerations

(a) Fire

Fire occurrence is low and the potential for large, intense fires is moderate due to heavy accumulations of down fuels, particularly in lodgepole pine stands that were decimated by mountain pine beetles in the 1930's. Heavy fuels are concentrated in the mid reaches of Chicken and Deer Creeks.

(b) Insects and Disease

Insects and diseases are generally endemic; however, dwarf mistletoe reduces annual growth in some areas (USDA, 1980). About 300 acres of lodgepole pine stands and 4,300 acres of Douglas-fir and spruce stands have high-risk ratings and will become increasingly susceptible to beetle attack.

(c) Socioeconomic

Population in Ravalli County grew rapidly in the late 1960's and throughout the 1970's (56 percent from 1970-1980). Most of this growth is attributed to southward expansion of bedroom communities serving the Missoula area, and to an influx of retirees and others seeking a rural and scenic lifestyle in this and other portions of the county. Most growth is occurring in rural areas outside

of towns. There has been little expansion of basic industry accompanying population growth. Newcomers are seeking residential acreages in a rural setting to take advantage of the Bitterroot Valley's relatively mild climate, scenery, and open space amenities.

Major concerns of the valley's residents are keeping up with the needs and services of a growing population and maintaining the pleasant lifestyle of country living. Darby is the location of several lumber mills and is the center of the wood products industry in the valley. Workers in the industry are concerned over land use designations since their livelihood depends upon Forest land for timber harvest. Tourism is a growing industry.

B. Sapphire Roadless Area

1. **General Setting**

This area is identified by number 01421, the same as in RARE II. Roadless area acreage is:

National Forest	Gross Acres	Net Acres
Bitterroot	44,416	44,116
Deerlodge	72,614	72,414
Total	117,030	116,530

Access is provided to many points along the boundary from State Highway 38 and from Forest roads in Rock, Copper, Moose, Martin, and Skalkaho Creeks. A network of 17 trails provides access within.

The area has a north-south orientation of about 25 miles with width varying from 2 to 10 miles. Road corridors in Copper Creek and the West Fork of Rock Creek extend toward the crest of the Sapphires. These intrusions reduce the width of both the northern and southern portions. Practically the entire boundary is midslope, lying above existing roads, timber harvest or mineral development.

Glacial scouring has produced steep, rocky cirque basins and trough walls along the crest and southern boundary. Remaining lands, primarily in the West and Ross Forks of Rock Creek are rolling hills with flat creek bottoms. Glacial deposits reworked by flowing water characterize most valleys east of the crest. Elevations range from 5,000 feet at some points along the lower boundary to 9,000 feet at Kent Peak. Sixty percent of the area is above 7,000 feet.

Prominent landmarks include Bare Hill, Kent, and Congdon Peaks, and Signal Rock. The Sapphire Mountain crest divides the area into nearly equal parts. Drainages flowing to the east are Copper Creek, and the Ross and West Forks of Rock Creek, a nationally recognized "blue ribbon" trout fishery. Moose, Martin, and Skalkaho Creeks flow to the west and are tributaries of the Bitterroot River. Twenty-four small lakes and numerous potholes occur along the crest.

Geology is primarily granite intrusions. Landforms have been modified by past alpine glaciation with soils derived from the parent geology. Streamside meadows break the forested landscape at lower elevations; exposed bedrock and rubble predominate along the Sapphire crest, Whetstone Ridge, and the southern portion bordering the Anaconda-Pintler Wilderness. Douglas-fir and lodgepole

pine are the primary tree species with whitebark pine and subalpine larch at the highest elevations. Bunchgrass with scattered Douglas-fir occupies severe south- to west-facing sites. Douglas-fir is common on north exposures at lower elevations and lodgepole pine is common elsewhere. Ground cover is mainly snowberry, ninebark, and beargrass on drier sites, willow and redosier dogwood on cool moist sites, and grouse whortleberry or wood rush on severe cold sites at higher elevations.

2. Analysis of Wilderness Suitability

Wilderness suitability is determined by both the degree to which an area possesses the basic characteristics necessary for wilderness designation, as defined by the Wilderness Act, and the degree to which an area can be managed as wilderness.

a. Wilderness Attributes

(1) Natural Integrity and Appearance

This roadless area has retained a high degree of naturalness, with little evidence of human imprint. However, on about 3 percent of the area, some impacts are evident.

Old mining prospects and development are found on 250 acres of patented lands. There is active mining at Frogpond Basin on the Sapphire crest and just outside the southern boundary near Senate Mountain.

Firelines and primitive roads built during the Sleeping Child Fire are evident in Martin Creek. Those firelines built by clearing vegetation are healing rapidly, while dozer cuts on sideslopes have permanently altered the landscape. There are about 9 miles of dozer line ranging in width from 15 to 100 feet.

Several roads penetrate the area, including those at Frogpond Basin; along Congdon Creek, Moose Meadows Creek, Lone Pine Ridge, Skalkaho Creek; and firelines in Martin and Moose Creeks.

Both Trout and Kent Lake dams are breached.

There is evidence of domestic sheep use on the crest, although the area has mostly recovered and the disturbance would not be evident to most visitors.

(2) Opportunities for Solitude

A core area of about 50,000 acres composed of the Ross Fork of Rock Creek, headwaters of Copper Creek south of the Copper Creek road, Moose Creek, and the headwaters of Skalkaho and Sleeping Child Creeks has the highest potential for solitude due to good topographic boundaries, size, and few off-site intrusions.

Civilization appears close at hand near the roadless area boundary, most of which is located at midslope, above existing roads, timber harvest, or minerals development.

(3) **Primitive Recreation Opportunities**

Opportunities include hiking, horseback riding, big- and small-game hunting, fishing, and viewing a moderate diversity of vegetation, wildlife, and historic mining activity. The combination of accessible creek bottoms, gentle ridges, and meadows provides opportunities for cross-country travel, but on a limited basis due to rugged topography or dense forest cover over much of the area. Challenging opportunities are rare.

(4) **Other Features**

Features include glacial cirques along the Sapphire Mountain crest; historic mining activity; meadows; extensive areas of whitebark pine and subalpine larch; and wide panoramas from major ridges.

b. **Manageability and Boundaries**

The following adjustment in net acres has taken place since the RARE II inventory:

	-----National Forest----		Total
Adjustment	Deerlodge	Bitterroot	Acres
RARE II inventory	56,515	42,300	98,815
Developed or under contract	0	0	0
Land added to inventory*	+17,771	0	+17,771
Refined acreage calculation	-1,872	+1,816	-56
Current inventory	72,414	44,116	116,530

* These lands were in a completed unit plan and consequently did not go through RARE II.

Practically all of the current boundary would be difficult to describe and locate since it is midslope lying above existing roads and/or development. Adjusting boundaries to logical topographic breaks would remove 40,000 to 50,000 acres from consideration as wilderness. This adjustment would remove most exising mineral impacts, areas of known mineral potential, and better timber growing sites. The remaining portion, 45 percent of the total area, contains high wilderness attributes including primitive recreation opportunities and special features. It is nearly enclosed by high ridgetops which screen out most off-area impacts, and encompasses most of the Ross Fork of Rock Creek, Copper Creek, Moose Creek, and the upper reaches of Skalkaho Creek.

c. **Need**

(1) **Proximity to Existing Wilderness and Population Centers**

Table III-4
Proximity of Regional Wilderness Areas to Sapphire Roadless Area

Wilderness	General Location	Proximity to Sapphire Area	Thousand Acres
Anaconda-Pintler	Western Montana	Less than 50 miles	159
Selway-Bitterroot	West central Montana	Less than 50 miles	251
	East central Idaho	Less than 50 miles	1,089
Welcome Creek	Western Montana	Less than 50 miles	28
Subtotal	Three areas	Less than 50 miles	1,527*
Gospel Hump	Central Idaho	50 to 100 miles	206
Mission Mountains	Western Montana	50 to 100 miles	74
Rattlesnake	Western Montana	50 to 100 miles	33
Frank Church-River of No Return	Central Idaho	50 to 100 miles	2,239
Scapegoat	Western Montana	50 to 100 miles	240
Subtotal	Five areas	50 to 100 miles	2,792**
Absaroka-Beartooth	South central Montana	100 to 200 miles	922
Bob Marshall	Western Montana	100 to 200 miles	1,009
Cabinet Mountains	Northwestern Montana	100 to 200 miles	94
Eagle Cap	Northeastern Oregon	100 to 200 miles	294
Gates of the Mountain	Central Montana	100 to 200 miles	29
Great Bear	Western Montana	100 to 200 miles	287
Hells Canyon	West central Idaho	100 to 200 miles	84
Hells Canyon	Northeastern Oregon	100 to 200 miles	108
Lee Metcalf	South central Montana	100 to 200 miles	259
Red Rock Lakes	South central Montana	100 to 200 miles	32
Sawtooth	Central Idaho	100 to 200 miles	217
Wenaha-Tucannon	Northeastern Oregon	100 to 200 miles	66
Wenaha-Tucannon	Southeastern Washington	100 to 200 miles	111
Subtotal	11 areas	100 to 200 miles	3,513
Total	19 areas	Less than 200 miles	7,832

* Another 309,000 acres in four areas have been administratively endorsed for wilderness in RARE II.
** Another 395,000 acres in four areas have been administratively endorsed for wilderness in RARE II.

Table III-5
Regional Population Centers and Distance from Sapphire Roadless Area

Population Center	< 50 Miles Areas	< 50 Miles M Acres	51-100 Miles Areas	51-100 Miles M Acres	101-200 Miles Areas	101-200 Miles M Acres	201-300 Miles Areas	201-300 Miles M Acres
Spokane, WA	0	0	0	0	5	240	6	160
Boise, ID	0	0	0	0	5	290	6	110
Pocatello, ID	0	0	0	0	0	0	11	400
Missoula, MT	3	155	8	245	0	0	0	0
Great Falls, MT	0	0	0	0	11	400	0	0
Billings, MT	0	0	0	0	0	0	11	400

(2) **Contribution to the Wilderness Preservation System**

The large meadows in this area are lacking or rare in other nearby wildernesses. Other ecosystems, vegetative communities and wildlife species are well-represented in existing wilderness. Old-growth forest species such as pine marten and pileated woodpecker, and big-game animals would benefit from the security provided by wilderness.

(3) **Public Interest**

In RARE II about 16 percent of responses on the DEIS favored wilderness, 43 percent nonwilderness and 41 percent further planning. The majority of local publics supported nonwilderness in the unit planning process although not necessarily development options. In that process there appeared to be strong local support for roadless management for a sizeable portion of the area but with less restrictions than for wilderness.

In the 1983 roadless area public involvement, there was some support for wilderness because of watershed, wildlife, and proximity to the Anaconda-Pintler Wilderness.

Eighty-one percent of the area is a congressionally designated wilderness study area (P.L. 95-150). The Montana state bill (S. 2850) did not address this area.

3. **Current Resource Situation**

a. **Resource Potential and Use for Sapphire Roadless Area**

Table III-6
Resource Potential and Use for Sapphire Roadless Area

Category	Unit	Forest		Total
		Bitterroot	Deerlodge	
Gross area	Acres	44,416	72,614	117,030
Net area	Acres	44,116	72,414	116,530
Recreation				
Primitive	RVD's	0	0	0
Semiprim. nonmotorized	RVD's	3,300	3,000	6,300
Semiprim. motorized	RVD's	300	4,200	4,500
Roaded natural	RVD's	700	0	700
Wildlife habitat				
Elk and deer				
Summer range	Acres	44,116	72,414	116,530
Winter range	Acres	0	0	0
Rocky mountain goat	Acres	6,000	3,000	9,000
Bighorn sheep	Acres	1,000	0	1,000
Fisheries streams	Miles	26	53	79
Lakes	Number	8	16	24
Fisheries lakes	Acres	60	80	140
Water developments	Number	0	0	0
Livestock range				
Current use	AUM's	0	555	555
Suitable rangeland	Acres	5	25,859	25,864
Current allotments	Number	2	4	6
Other suitable	Acres	0	0	0
Timber				
Tentatively suitable	Acres	27,758	43,466	71,224
Standing volume	MMBF	270.3	276.0	546.3
Potential productivity				
Nonforest	Acres	6,957	1,890	8,847
0-19 ft.^{3}/acre/year	Acres	9,401	27,058	36,459
20-49 ft.^{3}/acre/year	Acres	19,032	43,466	62,498
50-84 ft.^{3}/acre/year	Acres	8,726	0	8,726
Potential corridors	Number	1	1	1
Mineral potential				
Very high	Acres	0	0	0
High	Acres	5,420	10,760	16,180
Moderate	Acres	15,613	7,510	23,123
Low	Acres	23,083	54,144	77,227
Mining claims	Number	5	42	47
Oil and gas potential				
Very high	Acres	0	0	0
High	Acres	0	0	0
Moderate	Acres	0	0	0
Low	Acres	44,116	72,414	116,530
Leases	Number	9	0	9
Leased area	Acres	19,225	0	19,225
Outfitters	Number	2	2	4
Trails	Miles			100

b. **Selected Resource Values**

(1) **Recreation**

Current use in most of the area is very light, and includes big-game hunting, fishing in lakes and major streams, hiking, horseback riding, and viewing subalpine vistas at higher elevations. Approximately 25 percent is motorized use, both trailbike and snowmobile. Big-game hunting along with extensive fishing, hiking, and camping in the Legend Lake area are the primary uses.

(2) **Cultural Resources**

Past minerals activity is of historic interest. Little else is known about cultural remains.

(3) **Wildlife and Fish**

Elk, mule deer, moose, and black bear are common to the area. Less common are Rocky Mountain goat, bighorn sheep, white-tail deer, and mountain lion. A great diversity of small animals and birds from wolverines, pine marten, golden eagles and pileated woodpeckers, to mice and ruby crowned kinglets are permanent or seasonal occupants. Larger streams and lakes support fishable populations of cutthroat, rainbow, and eastern brook trout.

(4) **Water Quality**

Water from streams flowing west to the Bitterroot River is used for irrigation; however, there are no water developments within the area. Eastward flowing streams contribute to the instream flow on lower Rock Creek, a nationally renowned "blue ribbon" trout fishery.

(5) **Livestock**

Suitable lands for grazing are primarily in the eastern portion of the area where three allotments provide about 555 animal unit months of forage. Grazing west of the Sapphire crest consists of cattle drifting from Frogpond Basin and lower elevation lands outside the area.

(6) **Ecology**

Varied topography, aspect, elevation, precipitation, and past alpine glaciation create a moderate diversity of ecosystems that are well-represented in existing wilderness. There are no known threatened or endangered species.

(7) **Timber**

Approximately 60 percent of the area is tentatively suitable for timber production. Standing timber volume is estimated at 546 MMBF. Better timber sites are concentrated at lower elevations and unsuitable lands are generally along the Sapphire crest. Potential productivity on about 88 percent of the tentatively suitable land is 20-49 cubic feet per acre per year and on the remainder is 50-84 cubic feet per acre per year. Currently most of the area is not in the timber base nor does it contribute to the sales program.

(8) Minerals and Energy Resources

The U.S. Geological Survey and Bureau of Mines have conducted a mineral survey and prepared a report for the area (Wallace and others, 1984). Hardrock mineral potential is rated high for about 14 percent of the area. Many old mines and prospects are found near the margins of intrusive igneous rock. Silver and manganese operations generally follow veins exposed at the surface. Sapphires have been mined for many years just outside the area to the northeast. Present mining operations within the area are on 250 acres of private land in Frogpond Basin and this portion is rated high for mineral potential due to existing development.

Signal Rock, the upper Ross Fork, Whetstone Ridge, Senate Mountain, Railroad, and Moose Creek areas are also rated high because of past prospecting and exploration. Although about 20 percent of the area is leased, traditional theory places the oil and gas potential as low.

(9) Land Use Authorizations

These consist of four outfitter permits and a potential road and utility corridor crossing the Sapphire crest in a low saddle at the head of Railroad Creek. This corridor was considered but rejected for powerline purposes by the Montana State Department of Natural Resources under provisions of the State Facility Siting Act. The corridor is also an alternative route for the Skalkaho Highway (State Highway 38).

Consideration of a major east/west power corridor through the roadless area was foreclosed by establishment of the Frank Church-River of No Return Wilderness in 1980 (P.L. 96-312).

(10) Nonfederal Lands

There are several groups of patented mining claims in Frogpond Basin and several isolated parcels of private land along the eastern boundary.

(11) Other Considerations

(a) Fire

Fire occurrence is low and the potential for large fires is moderate due to heavy accumulations of down fuel, particularly in lodgepole pine stands that were decimated by mountain pine beetle in the 1930's.

(b) Insects and Disease

Insects and disease are generally endemic; however, dwarf mistletoe reduces growth in some areas (USDA, 1980). About 14,000 acres of lodgepole pine stands have a high-risk rating and will become increasingly susceptible to mountain pine beetle attack. Most of the area contains nonhost species for spruce budworm.

(c) Socioeconomic

Phillipsburg is the county seat and major population center of Granite County. Population is relatively stable and the area is oriented toward agriculture and ranching. Area residents recognize the need for more industry; however, they also feel that industry should not supersede the natural resource values of the area. Fishing, hunting, and the area's scenic beauty are very important.

Phillipsburg was originally a mining boomtown and residents strongly support the minerals industry. Of major concern are restrictions on mining and mineral development. Highway 10A, which traverses the Flint Creek Valley, has been designated a scenic highway by the state. Consequently, tourism is a growing industry.

In Ravalli County, population grew rapidly in the late 1960's and throughout the 1970's (56 percent from 1970-1980). Most of this growth is attributed to southward expansion of bedroom communities serving the Missoula area, and to an influx of retirees and others seeking a rural and scenic lifestyle in this and other portions of the county. Most growth is occurring in rural areas outside of towns. There has been little expansion of basic industry accompanying population growth. Newcomers are seeking residential acreages in a rural setting to take advantage of the Bitterroot Valley's relatively mild climate, scenery, and open space amenities. Major concerns of the valley center around keeping up with the needs and services of a growing population and maintaining the pleasant lifestyle of country living. Darby is the location of several lumber mills and is the center of the wood products industry in the valley. Workers in the industry are concerned over land use designations since their livelihood depends upon forest land for timber harvest. Tourism is a growing industry.

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IV. ENVIRONMENTAL CONSEQUENCES

A. Introduction

This chapter forms the scientific and analytic basis for comparison of the alternatives, including the proposed action, described in Chapter II. Environmental consequences are the expected effects of management activities scheduled to implement an alternative. The effects of all the major activities and resource programs are discussed. The order of discussion begins with those activities or programs which have few effects and ends with those programs and activities which have the greatest effect on the physical and biological components of the environment. Economic and social effects are discussed where applicable.

The consequences are described as quantitative or qualitative changes from the current situation in terms of significance, magnitude, and duration. The discussion identifies consequences that are direct, indirect, cumulative, or unavoidable. The relationship of short-term use of resources to long-term productivity is also discussed along with irreversible and irretrievable commitment of resources.

Mitigation was an important consideration in the formulation of standards and guidelines, prescriptions, and minimum management requirements associated with each of the alternatives. These items are discussed in detail in Appendix B of the Forest Plan DEIS for each Forest.

This chapter is organized to avoid repetitious statements. For instance, the specific activities generated to enhance fish habitat are limited to few acres on the Forest. However, the efforts to maintain or improve fish habitat are inherent in several other activities (timber harvest, road building, livestock grazing, etc.). The discussion for specific activities associated with fish habitat improvement is short, but effects on fish habitat are discussed in sections related to other activities or resources. The following index will assist the reader in locating all discussions associated with a particular resource, use, or activity in this chapter.

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B. Wilderness

The amount of wilderness recommended in each alternative is dependent on the goals and objectives for that alternative. The activities in wilderness, primarily trail construction and maintenance, are discussed in section D of this chapter. Acres of wilderness for each alternative are shown in Table IV-1.

Table IV-1
Area Assigned to Roaded, Semiprimitive Recreation and Wilderness Emphases (thousand acres)

Roadless Area	Management Emphasis	Alternative B	C	E*	F	G	H	J
Blue Joint	Roaded	49.0	35.2	17.6	0.5	18.7	1.0	0
	Semiprim.	16.9	13.9	19.3	65.4	2.5	5.3	0
	Wilderness	0	16.8	28.5	0	44.7	59.6	65.2
Sapphire	Roaded	75.3	64.5	34.7	9.2	46.0	14.6	0
	Semiprim.	41.0	41.7	81.8	107.4	16.2	9.4	0
	Wilderness	0	10.4	0	0	54.4	92.5	116.1

* Proposed Action.

Wilderness classification reduces the present net value (PNV) because timber harvest is precluded. The contribution to local jobs and income is reduced because less timber will be processed in the area and the Forest will spend less money for salaries and contracts than if the areas were managed for timber production. However, those businesses and individuals dependent on recreation will benefit from the classification of wilderness since this increases the recreation opportunities.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

The establishment of wilderness has some effect on long-term productivity. Opportunities to increase productivity through management of timber and wildlife habitat resources are foregone. The maintenance of primitive recreation opportunities is maximized and maximum protection is given to old growth timber and its associated wildlife habitat. Threatened or endangered plant and animal species are protected but little can be done to improve their habitat. Natural appearing landscapes are preserved although buildup of natural fuels may increase risks of wildfire.

2. Irreversible and Irretrievable Commitment of Resources

Unless Congress revokes wilderness classification, timber products and minerals can be irretrievably lost.

3. Adverse Effects Which Cannot be Avoided

Control of insects, diseases, and noxious weeds is generally restricted or extremely costly because of the techniques required. Methods to suppress wildfires are restricted to those which cause little or no ground disturbance.

4. Conflicts with Other Land Management Plans

None identified.

C. Roadless

The area assigned to roadless management in each alternative is dependent on the goals and objectives for that alternative. The activities in roadless areas, primarily trail construction and maintenance, are discussed in section D of this chapter. Roadless assignment for each alternative is shown in Table IV-1.

Roadless classification reduces the PNV because timber harvest is precluded. The contribution to local jobs and income is reduced because less timber will be processed in the area and the Forest will spend less money for salaries and contracts. However, those businesses and individuals dependent on recreation will benefit since the mix of recreation opportunities will be maintained.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

The assignment of acreage to roadless management has some effect on long-term productivity. The productivity of resources is maintained but the opportunity to make the area more productive through intensive management is foregone. Roadlessness maintains the opportunity for semiprimitive recreation and is important in the maintenance of old growth timber and its associated wildlife habitat. Natural appearing landscapes are preserved although the opportunity for more intense wildfires is increased by the buildup of fuels.

2. Irreversible and Irretrievable Commitment of Resources

Assignment to roadless management is not irreversible, but changing the designation would involve an intensive analysis, including public involvement. Such analyses may occur each time the Forest Plan is reviewed, at least every 15 years. The result is an irretrievable loss of renewable resources, especially timber, that are produced but not harvested.

3. Adverse Effects Which Cannot be Avoided

Roadless designation means that timber harvest cannot occur. It also increases the difficulty of mineral exploration and development because of the lack of access. Many types of wildlife and fish habitat improvement may be impossible or expensive to accomplish. Control of insects, disease, wildfire, and noxious weeds will require special techniques.

4. Conflicts with Other Land Management Plans

None identified.

D. Dispersed Recreation Use

Dispersed recreation occurs on land and water which is not developed for intensive or concentrated recreation. Management activities include maintenance or construction of trails, trailheads, toilets, hitchracks, stock ramps, parking areas, and information signs. The effects of these activities on soils, water, and vegetation are significant for the small area disturbed, but few sites are involved. The acreage available for each category of recreation is shown in Table IV-1.

Roadless areas provide opportunities for people to have semiprimitive recreation experiences with or without the convenience of snowmobile, motorbike, or chainsaw use. Wilderness management precludes the use of such mechanized equipment and provides solitude in the recreation experience. Roaded areas provide the broadest spectrum of recreational use and, if roads are closed, can approximate semiprimitive conditions with the exception of the physical existence of roads. The projected use for all dispersed recreation is shown in Table IV-2.

Table IV-2
Projected Dispersed Recreation Use
(thousand recreation visitor days)

Roadless Area	Management Emphasis	Decade	Alternative B	C	E*	F	G	H	J
Blue Joint	Roaded Natural	1	18	16	8	0	8	0	0
		3	32	27	14	0	14	0	0
		5	51	44	22	0	22	1	0
	Semiprimitive	1	7	5	5	6	1	2	0
		3	4	4	5	7	1	1	0
		5	5	6	9	12	1	2	0
	Wilderness	1	0	3	4	0	7	9	9
		3	0	5	7	0	12	16	16
		5	0	7	10	0	18	23	25
Sapphire	Roaded Natural	1	17	15	10	2	8	6	0
		3	53	47	28	9	30	15	0
		5	106	96	55	21	68	28	0
	Semiprimitive	1	23	22	25	27	11	3	0
		3	29	26	38	41	13	4	0
		5	31	24	48	57	9	2	0
	Wilderness	1	0	2	0	0	8	12	14
		3	0	3	0	0	13	22	25
		5	0	4	0	0	19	32	41

* Proposed Action.

As projected use approaches capacity, recreation can either be limited to acceptable levels by a permit system or the quality of the recreation experience will be degraded. Excessive use in either the semiprimitive or wilderness settings can cause erosion, soil compaction, and loss of vegetation along main trails and at the more desirable campsites. These are minor effects from an area-wide standpoint but are important esthetic effects to those people using the trails.

Direct revenue from dispersed recreation is insignificant, but because values have been assigned to recreation visitor days, dispersed recreation has a high value and a positive effect on the present net value.

The effect of emphasis on recreation on the lifestyles in the area are similar to those discussed under Wilderness and Roadless Recreation.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The long-term effects of the short-term use of trailhead facilities, toilets, hitchracks, stock ramps, and loading areas will be similar to the effects of developed recreation sites on productivity. Although trails can be abandoned and may eventually return to near original condition, it is not likely to happen as long as the demand for dispersed recreation remains high.

2. **Irreversible and Irretrievable Commitment of Resources**

Once facilities and trails are constructed, they are likely to be maintained into the foreseeable future. The vegetation displaced by these facilities constitutes an irretrievable loss of resources.

3. **Adverse Effects which Cannot be Avoided**

The loss of vegetation displaced by the construction and maintenance of the facilities and trails cannot be avoided.

4. **Conflicts with Other Land Management Plans**

None identified.

E. Cultural Resources

The major purpose of the Forest's cultural resource management program is to catalog or preserve cultural resources and comply with various federal laws, regulations and policies. An inventory of sites where ground-disturbing activities are planned will be required in all alternatives. If a historical site is found before or during ground disturbance, it will be documented and evaluated for possible preservation. The affected Indian tribe will be consulted if a site appears to have religious or historical significance.

The Southern Nez Perce Indian Trail also crosses portions of the Forest in both Montana and Idaho. Under all alternatives, historic trails will be protected, however, short sections may be crossed by roads.

Protection of cultural resources will have little effect on the present net value since so few acres are involved. Some timber may not be harvested on or near the trails and other identified cultural sites but this volume will be small.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

The protection given to historic trails will have some effect on long-term productivity. The timber on and near the trails will not be harvested or will be harvested at less than maximum intensity.

Even though cultural surveys will be made prior to ground-disturbing activities, these surveys may not always be successful in finding a cultural resource prior to the time the activities occur. Should this happen, the ground-disturbing activity will be delayed while the area is inventoried and mapped. Analysis of the results of this inventory may show that the activity needs to be diverted away from the site or that the resource needs to be collected and/or catalogued before the activity proceeds. This can cause delay and, if the area is to be completely protected, will affect the long-term productivity of the site.

2. Irreversible and Irretrievable Commitment of Resources

Since the commitment to protect cultural resources is irreversible in the foreseeable future, the harvestable timber grown on these sites represents an irretrievable loss of that resource.

3. Adverse Effects Which Cannot be Avoided

Some ground-disturbing activities will inadvertently enter and disturb some cultural resources despite the care and intensity of surveys prior to the beginning of these activities.

4. Conflicts with Other Land Management Plans

None identified.

F. Threatened and Endangered Species

Suitable habitat for the threatened grizzly bear has been identified in the nearby Selway-Bitterroot ecosystem (USDI, 1982), but the habitat is thought to be unoccupied or does not have a viable population. The potential habitat is in wilderness or roadless areas. No activities are planned that could alter potential grizzly bear habitat. The Forests will cooperate in any future interagency recovery effort for which recovery goals have yet to be defined.

The current approximate distribution of gray wolves includes the Upper Lochsa, the upper Middle Fork of the Salmon, and the Big Hole-Salmon River divide. Wolves are sporadically sighted, but they are thought to be highly mobile individuals and no pack activity has been documented (USDI, 1983). No recent confirmed sightings have occurred. The wilderness areas, especially the Selway-Bitterroot and Frank Church-River of No Return, seem to be the most

likely places for wolves to become established, and the draft Wolf Recovery Plan (USDI, 1983) includes all of the Idaho portion of the Bitterroot Forest in the Idaho recovery area. No activities are planned in these areas which will adversely affect the potential wolf habitat. Forests will cooperate in any future interagency recovery effort for which recovery goals have yet to be defined.

Because of the location threatened and endangered species are likely to occupy if they are found, this program is unlikely to affect the economic base or change the lifestyle of the people in the area.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The only short-term use is the continued monitoring to see if threatened and endangered species occupy the Forest. Should this occur, there would be an effect on the long-term productivity in that certain restrictions would have to be applied to protect the species.

2. **Irreversible and Irretrievable Commitment of Resources**

There will be no irreversible or irretrievable commitment of resources unless threatened or endangered species occupy the Forest.

3. **Adverse Effects Which Cannot be Avoided**

There are no adverse effects associated with monitoring threatened or endangered species.

4. **Conflicts with Other Land Management Plans**

None identified.

G. **Wildlife Habitat**

Activities specific to the improvement of wildlife habitat are limited. Most of the management for wildlife habitat is associated with management of other resources, primarily timber harvest and road building. The area scheduled for burning, shrub planting, or shrub pruning to improve wildlife habitat is confined to winter range of which there is a negligible amount in either roadless area.

The objective of wildlife habitat improvement is to maintain productivity of winter range forage areas primarily by spring burning on grassland or mixed grass and shrubland. Most burns will be "cool" and vegetation will resprout rapidly. The soil surface will be exposed for a short time and there is a slight risk of accelerated erosion but the chance for a high intensity rainstorm in the spring is small. Air quality degradation is similar to that from slash control following timber harvest and managed fire.

A wide variety of nongame wildlife occur on the Forest and they are dependent upon a wide variety of habitats. No activities to directly manipulate nongame

habitat are planned, but other resource activities will alter nongame habitat and the changes will be evaluated and monitored.

State wildlife agencies are responsible for management of state-owned wildlife. They have no direct management responsibilities for wildlife habitat on National Forest land. But, because wildlife populations are directly related to the quality and extent of their habitat, National Forest land managers will coordinate their activities with the needs of wildlife.

This coordination has no direct effect on the environment, but results in recommendations concerning several activities, especially timber harvest and road management.

The specific activities associated with wildlife habitat improvement will not have much effect on the economic base or lifestyle of the area because of the few acres affected.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The productivity of areas that are burned, pruned or planted will be changed. If trees normally occupy these sites, some or all may be killed. This is especially true of tree seedlings which may occupy the area. The production of vegetation which big game prefer will be enhanced.

2. **Irreversible and Irretrievable Commitment of Resources**

The act of burning, pruning, or planting does not constitute an irreversible committment of the areas to this activity. Different areas will be scheduled for treatment each year. Areas burned in any one year may never be treated again. Areas pruned or planted will be affected by that activity as long as the plants survive. Any species removed or suppressed by any of the activities constitute an irretrievable loss of that resource.

3. **Adverse Effects Which Cannot be Avoided**

The soil surface will be exposed by burning for a few days or weeks and there is a slight risk of accelerated erosion. Air quality degradation is similar to that from slash control but the acreage proposed for burning is small and smoke generation will be slight.

4. **Conflicts with Other Land Management Plans**

None identified.

H. Fish Habitat

There are few activities specifically proposed to improve fish habitat. Some natural barriers to fish passage may be removed. Only one or two projects a year are anticipated so environmental effects will be inconsequential.

Some fisheries streams support less than their potential carrying capacity because they lack pools. The habitat could be improved by adding large woody

debris to create pools (Frear, 1982). The carrying capacity of the habitat would be improved by about one-third in the areas treated. A few large trees would be cut and in some cases water diverted into streambanks could cause short-term erosion and sedimentation. A small amount of habitat improvement is possible, however, stream surveys are not complete.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

The few projects associated with increasing fish passage and migration will cost little and will ensure that fish can occupy presently unavailable habitat. The creation of debris caused pools in streams lacking this habitat component will enhance the long-term productivity of the fishery.

2. Irreversible and Irretrievable Commitment of Resources

There are few irreversible or irretrievable commitments of resources associated with fish habitat improvement projects because so little area is involved. A few large trees along streams will be cut and left in the stream channel to create pools.

3. Adverse Effects Which Cannot be Avoided

Stream bottoms will be disturbed when fish barriers are removed. This may have minor short-term effects on the fish and insects which occupy these areas.

4. Conflicts with Other Land Management Plans

None identified.

I. Minerals and Energy Resources

The potential for mineral resources production is moderately high. Scattered claims are being worked and new deposits could be developed. Such activity would have a drastic effect on the onsite environment, but would occupy a very small area. Each proposed activity would be subjected to intensive environmental analysis prior to approval.

Although the potential for oil and gas or geothermal production appears to be low (Planning Record: Bitterroot Forest Minerals Overlay), leases have been issued on more than 19,000 acres. No exploration activity has occurred nor have any been positively planned for the future. As with other minerals, each proposal will be evaluated on a project by project basis.

Significant discovery and development of oil, gas, geothermal, or minerals would have a large effect on the physical, biological, economic and social environment. Vegetation and soils around mines, well-head locations, and waste deposits would be drastically affected. Water quality would be degraded. The influx of people would cause a change in lifestyle and have an impact on local schools, police and other community organizations and facilities. Area of high hardrock mineral potential is shown by management emphasis in Table IV-3.

Table IV-3
High Hardrock Mineral Potential
(thousand acres)

Roadless Area	Management Emphasis	Alternative B	C	E*	F	G	H	J
Blue Joint	Roaded	21.9	19.7	11.6	0	11.6	0	0
	Semiprimitive	4.5	3.8	9.0	26.4	1.9	2.0	0
	Wilderness	0	2.9	5.8	0	12.9	24.4	26.4
Sapphire	Roaded	8.0	4.8	1.8	1.0	2.4	1.0	0
	Semiprimitive	8.6	11.1	14.7	15.6	0	0	0
	Wilderness	0	0.7	0	0	14.2	15.6	16.4

* Proposed Action.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

Any exploration or development of energy or nonenergy resources is likely to have a long-term effect on the productivity of specific sites. Open pit mines, drill sites, waste deposits and roads are not easily rehabilitated. The disturbed sites are unlikely to be as productive as before disturbance. Leasing will not effect productivity.

2. **Irreversible and Irretrievable Commitment of Resources**

Leasing for oil and gas is not an irreversible commitment of a resource since the lease may never be subjected to exploration. However, once exploration and development of the resources occurs, the effects are irreversible. Such sites may be rehabilitated, but the vegetation lost while the development was in place is irretrievable as are the resources removed from the area.

3. **Adverse Effects Which Cannot be Avoided**

There are no adverse effects associated with leasing. However, if exploration or development occurs, soil will be disturbed, erosion will occur and water quality will be lowered. The visual resource may be degraded.

4. **Conflicts with Other Land Management Plans**

None identified.

J. Human and Community Development

A variety of programs provide employment for individuals in Forest activities. Full-time Forest Service employees live and work in and near the Forest. In summer, this number is supplemented by seasonal employees; most of them from local communities.

These programs have significant economic effect on the communities near the Forest but have little effect on the physical and biological environment.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The short-term use of Forest facilities for training young people may result in improvements in long-term productivity because segments of the public will gain an understanding of Forest management techniques and philosophies.

2. **Irreversible and Irretrievable Commitment of Resources**

None were identified.

3. **Adverse Effects Which Cannot be Avoided**

None were identified.

4. **Conflicts with Other Land Management Plans**

None identified.

K. Special Uses

The only special use permits in the area are outfitter permits. Though the effects of special uses may be drastic for the specific site, these uses are limited to a small acreage of the Forest. Each request for a new permit will be subjected to environmental analysis prior to issue.

Special uses do contribute to PNV because fees are collected from permittees. These fees do not offset the administrative costs of the program.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The vegetation on specific sites occupied by special uses is changed or destroyed. These effects will remain as long as the facilities do.

2. **Irreversible and Irretrievable Commitment of Resources**

The vegetation lost by the existence of outfitter facilities constitutes an irretrievable loss of resources.

3. **Adverse Effects Which Cannot be Avoided**

None identified.

4. **Conflicts with Other Land Management Plans**

None identified.

L. Rights-of-Way

Road and trail rights-of-way are acquired from private or other owners to provide access for timber harvest and recreation.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Rights-of-way give the Forest an opportunity to manage lands which might otherwise be unavailable. Productivity can be maintained or improved.

2. Irreversible and Irretrievable Commitment of Resources

Rights-of-way agreements can be cancelled although this is unlikely to happen in the foreseeable future. The resulting roads are an irreversible use and the vegetation removed by the construction and maintenance constitute an irretrievable loss of a resource.

3. Adverse Effects Which Cannot be Avoided

Adverse effects of the resulting roads are discussed in section Z.

4. Conflicts with Other Land Management Plans

None identified.

M. Property Boundary Location

The activity involves considerable manpower and time but has few environmental effects. Some vegetation may be trimmed or completely removed to establish line of sight for the survey instrument but this is temporary and inconsequential.

Boundary location establishes, with some finality, the property lines of Forest and other ownership. It enables owners to avoid activities on lands they do not own. Location of boundaries has no effect on PNV nor does it affect the economy of the area.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Location of boundary has no effect on productivity.

2. Irreversible and Irretrievable Commitment of Resources

There is no commitment of resources associated strictly with boundary location.

3. Adverse Effects Which Cannot be Avoided

Some vegetation may be removed or pruned but the effect should be short-lived.

4. Conflicts with Other Land Management Plans

None identified.

N. Landownership and Adjustment

Land exchange proposals are generally initiated by private owners. Land considered for exchange will vary by alternative. Each proposal will be subjected to appropriate analysis to help guide subsequent action.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Lands which enter private ownership following exchange will be managed as the new owner desires. Lands obtained by the Forest Service through exchange will be managed to maintain or enhance productivity.

2. Irreversible and Irretrievable Commitment of Resources

Lands entering private ownership through exchange are committed to whatever the new owner desires. Lands obtained by the Forest Service will be committed to particular uses according to the land management plan in effect at the time.

3. Adverse Effects Which Cannot be Avoided

None were identified.

4. Conflicts with Other Land Management Plans

None identified.

O. Fire Suppression

The purpose of fire suppression is to minimize damage to valuable resources by controlling and extinguishing fires. The extent of fire suppression activities depends on fire starts and weather so there are no differences among the alternatives.

Successful suppression has a favorable short-term effect in areas where timber management is prescribed because it protects the stands from burning.

Suppression also results in the establishment of old growth forests. Old growth dependent animals are favored and thermal cover is provided to many wildlife species even though forage is eliminated or suppressed by competition with the conifers. Protection from burning will lead to accumulation of fuels above natural levels and can result in large damaging fires when burning conditions are severe. Excessive heat generated by fires in dense, dry fuels consumes litter and duff and will create a temporary water repellant condition which can affect productivity and soil stability. Stream sedimentation is likely to occur after a hot litter and humus consuming fire (USDA, 1978). Loss of timber to insects and disease is likely to increase because sources of infection are not burned. Fireline construction with hand tools or heavy

equipment can increase the potential for soil erosion. The potential for soil movement is increased by use of heavy equipment on steep slopes or on soils susceptible to erosion.

The annual cost of fire suppression reduces the PNV. The fire suppression program creates jobs and income in the local economy.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

Effective fire suppression will minimize damage to existing stands of timber. However, the long-term change in vegetative composition and density may reduce productivity.

2. **Irreversible and Irretrievable Commitment of Resources**

Since the fire suppression program could be curtailed at any time, there is no irreversible commitment of resources.

3. **Adverse Effects Which Cannot be Avoided**

Loss of soil due to construction of firelines will occur despite preventive measures. Buildup of fuels will continue in areas protected by fire suppression.

4. **Conflicts with Other Land Management Plans**

None identified.

P. Managed Fire

Managed fires are fires which will be allowed to burn under observation in accordance with a predetermined set of conditions. Prescriptions for managed fires exist for the Anaconda-Pintler and Selway-Bitterroot Wildernesses. The same option is available to recommended wilderness, and roadless areas managed for semiprimitive recreation.

The effect of the managed fire program will depend on factors such as fuel loading, proximity to valuable resources, and current weather conditions. Fires tend to increase forage for big game by removing forest canopies or tall shrubs and encouraging forbs and low shrubs. Fires increase vegetative and animal diversity (Leege, 1968) and increase animal species that prefer early seral stages and decrease those that prefer dense forests. In addition, accumulated fuels are consumed which will reduce the severity of future fires. Managed fires seldom burn both overstory and understory because the hotter fires are usually suppressed. Even so, exposed soils lead to soil erosion which results in lower water quality for a short time. Fires may temporarily reduce visual and air quality (USDA, 1982).

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The act of allowing a fire to burn can have a long-term effect on the kind of vegetation and animals occupying the area. A future generation of the

overstory (trees or shrubs) may be entirely destroyed. Some of the present overstory, especially shrubs, is completely removed. Vegetative productivity is not destroyed and, in fact, may be temporarily enhanced by the availability of the minerals in the ash.

2. Irreversible and Irretrievable Commitment of Resources

If the fire is allowed to burn, the consumed material is irretrievable.

3. Adverse Effects Which Cannot be Avoided

The aftermath of the fire will remain visible for a short time. Soil is bared and water quality may be reduced for a short time by accelerated erosion. Smoke will be generated into the atmosphere.

4. Conflicts with Other Land Management Plans

None identified.

Q. Range Management

If properly managed, livestock grazing at the levels projected (Table IV-4) will have a minimal effect on the environment. Water developments, grassland burning, fencing, and noxious weed control activities may have effects on a site but their effect on the environment will be minimal. These activities will reduce the risk of environmental degradation by controlling use to acceptable levels or increasing available forage. In riparian zones, vegetation removal, streambank trampling, and soil compaction can have significant effects on soil, water, vegetative productivity, fisheries, and recreation use (Platts, 1979). Proper cattle management can minimize the risk of adverse environmental effects.

Table IV-4
Potential Livestock Forage
(thousand AUM's)

Roadless Area	Decade	Alternative B	C	E*	F	G	H	J
Blue Joint	1	.13	.15	.14	.13	.13	.13	.13
	3	.21	.22	.18	.13	.19	.13	.13
	5	.29	.23	.19	.13	.18	.13	.13
Sapphire	1	.50	.50	.49	.42	.49	.48	.45
	3	.54	.53	.51	.42	.51	.48	.45
	5	.61	.60	.54	.42	.54	.48	.45

* Proposed Action.

Cattle grazing may annoy recreationists because of smells, flies, visibility, noise, and manure on trails and around campsites.

The grazing program adds to the PNV. However, total contribution to PNV is less than 1 percent under any alternative. Though grazing is a historic use, livestock numbers have declined in recent years.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

The grazing of livestock will have little effect on long-term productivity. A few areas near watering places and salt will continue to be overused which will change the vegetative production of these small areas.

2. Irreversible and Irretrievable Commitment of Resources

There is a long tradition of cattle grazing. As long as this tradition exists, there is little likelihood that all livestock will be removed. The forage grazed by these livestock is a commitment of that resource.

3. Adverse Effects Which Cannot be Avoided

Conflicts will continue to exist between livestock and big game. Fences and water developments on rangeland will affect the visual resource. Recreationists will continue to be annoyed by smells, flies, sounds, and manure in some areas. Compaction and vegetation change will continue to occur in heavily used areas. Fish habitat and water quality will be adversely affected.

4. Conflicts with Other Land Management Plans

None identified.

R. Utility Corridors

An analysis has been made to define the kinds of land which should be avoided in permitting or constructing utility lines, and oil or gas pipelines. The analysis is based on information contained in the Pacific Northwest Long Range East-West Energy Corridor Study, Phase 1 (draft), Part A-Rocky Mountains, Part B-Cascade Mountains (Bonneville Power Administration, 1977). Potential corridor locations were inventoried. Avoidance areas are those where establishment and use conflict with land management objectives. Exclusion areas are those where such facilities are not allowed.

A corridor from south of Hamilton to the vicinity of Red River, Idaho, has been closed by the establishment of the Frank Church-River of No Return Wilderness. Another corridor extends from Anaconda, Montana to Hamilton in an east-west line just north of the Anaconda-Pintler Wilderness.

Only when the corridors are occupied does the impact occur. Prior to construction of a utility line or oil or gas pipeline, an appropriate analysis would be required to establish the final location of the facility and its

supporting road. The effects of the construction and maintenance of the facilities will then be displayed.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The existence of an unoccupied corridor has no effect on long-term productivity.

2. **Irreversible and Irretrievable Commitment of Resources**

The identification of the corridor is not an irreversible or irretrievable commitment of resources. However, as long as the corridor does not cross identified exclusion areas, the possibility of occupation by a utility does exist.

3. **Adverse Effects Which Cannot be Avoided**

Until occupation occurs, none are identified.

4. **Conflicts with Other Land Management Plans**

The utility corridor from south of Hamilton to the Red River area has been closed by establishment of the Frank Church-River of No Return Wilderness. The corridor just north of the Anaconda-Pintler Wilderness could be closed by additions to the wilderness area.

S. **Insects and Disease**

The primary tools of the pest management program are vegetative manipulation by timber harvest discussed in Section T and reforestation to selected tree species discussed in Section X.

There are no plans for use of pesticides under any alternative. Should the occasion arise, such proposals would be subjected to detailed analysis prior to initiation.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The application of appropriate silvicultural methods to control insects and disease increases the long-term productivity of the Forest from the standpoint of recoverable resources.

2. **Irreversible and Irretrievable Commitment of Resources**

The only control proposed is the application of silvicultural techniques which will minimize the effects of insects and disease. Immature timber killed by insects because of lack of control represent an irretrievable loss of that resource.

3. **Adverse Effects Which Cannot be Avoided**

None were identified.

4. **Conflicts with Other Land Management Plans**

None identified.

T. Timber Harvest

Timber harvest and associated activities have more effect on the physical and biological environment than other activities. The extent of the effects are dependent on management regimes selected. Timber yields in decades 1, 3 and 5 and long-term sustained yield (LTSY) are shown in Table IV-5.

Table IV-5
Timber Yield and Long-Term Sustained Yield
(million cubic feet)

Roadless Area	Decade	Alternative B	C	E*	F	G	H	J
Blue Joint	1	.49	.29	.45	0	.17	0	0
	3	.94	.71	.28	0	.34	0	0
	5	1.59	1.00	.61	0	.60	0	0
	LTSY	1.30	.90	.50	0	.50	0	0
Sapphire	1	.70	.54	.47	.12	.56	.22	0
	3	2.43	2.14	.97	.16	1.43	.36	0
	5	2.58	2.13	1.09	.38	1.38	.37	0
	LTSY	1.93	1.83	.68	.38	.86	.37	0

* Proposed Action.

Timber harvest is important to the economic base. Two local mills are dependent on National Forest timber harvest.

Any alternative which changes the amount of timber to be harvested will significantly change the total present net value and the lifestyle of local communities.

Growth rates lag behind long-term sustained yield because most of the land suitable for timber production supports mature trees which are beyond the culmination of mean annual increment and therefore have growth rates well below their potential. Growth is not significantly increased until a significant portion of the land suitable for timber is cutover, regenerated and producing young vigorous trees. The time required to improve growth is dependent on the proportion of existing young stands and the constraints that control harvest rates. Growth reaches 90 percent of long-term sustained yield in 7 to 11 decades depending on these two variables.

Timber management contributes to the PNV because the costs of timber management and road construction are less than the projected receipts from timber sales. Timber harvest and Forest expenditures contribute to local jobs and income.

The two general categories of silvicultural systems associated with timber harvest are even-aged and uneven-aged systems. Both systems are proposed for use in most alternatives and each has distinct effects. The systems are discussed below.

1. **Even-aged System of Harvesting Timber**

Clearcut and shelterwood methods of even-aged timber harvest are used in each alternative. In clearcutting, all trees are removed from the area in a single cut. In shelterwood cutting, a few trees are left in the area until seedlings have become established. These systems have potential for adverse environmental effects because all large trees are removed from the area in a short time, openings are created, and soil is exposed to erosion (Bethlahmy, 1967; Megahan and Kidd, 1972). The area harvested by clearcut and shelterwood methods is shown in Table IV-6.

Table IV-6
Area Harvested by Clearcut and Shelterwood Methods
(thousand acres)

Roadless Area	Decade	Alternative B	C	E*	F	G	H	J
Blue Joint	1	.19	.11	.18	0	.08	0	0
	3	.40	.29	.12	0	.15	0	0
	5	.62	.43	.32	0	.32	0	0
Sapphire	1	.58	.20	.17	.04	.20	.12	0
	3	1.71	.76	.34	.06	.49	.10	0
	5	1.39	1.25	.44	.13	.47	.13	0

Even-aged management has effects on the visual resource which vary by the visual quality objectives of each alternative. The greatest changes in scenery would occur in the high timber harvest alternatives in which large areas are assigned to modification or maximum modification visual quality objectives (USDA, 1977).

The maximum modification objective allows as much as one acre in every two to be in an unrecovered condition on gentle slopes. Visual recovery takes about 30 years (Planning Record: Bitterroot Forest Plan Note 159).

As trees are removed, evapo-transpiration is reduced and more water is infiltrated to the groundwater system. Evapo-transpiration is reduced most when even-aged harvest systems are used because the entire mature forest canopy is removed (USDA, 1973). In extreme cases this can lead to mass failure on steep slopes and clay soils (Dyrness, 1967; Fredrickson, 1970; Megahan, 1972). Mass failure hazards are generally low and potential problems will be dealt with on a case-by-case basis.

The increased infiltration and the tendency for snow to accumulate in openings results in increased water yield which usually occurs at the time of peak flow (Satterlund, 1972). The water regime for an area harvested by an even-aged management system usually recovers to preharvest conditions about 20 years after harvest (Garn and Malmgren, 1973). The increased flow is of little benefit to irrigators in the Bitterroot Valley because capacity does not exist to store the increased flow. Increased peak flow can affect the stability of streambanks and result in some erosion.

Even-aged management of riparian zones affects stream environments if trees are removed from the streambanks (Weaver, 1983). Increases in sediment above normal cause reduction in total fish populations (USDA, 1984). Bank stability is reduced and debris which could provide fish habitat is removed (Bryant, 1983; Frear, 1982). Most of the pools in Forest streams have been formed by woody debris (Planning Record: Bitterroot Forest Stream Inventories). The debris now in streams will eventually rot so the maintenance of satisfactory pool/riffle ratios depends on large trees falling into streams regularly. In the short term, fish populations are not affected, but in 40 years there will be a reduction in fish if large woody debris is not added. Stream temperatures are raised by the removal of streambank vegetation.

The effect on total fish population depends partly on how much of the riparian timberland area will be managed with even-aged systems (Franklin and others, 1981).

Even-aged harvest systems provide the best opportunity for reduction of fire hazard. In clearcuts, there are no living trees to be protected from slash disposal activities. Slash and other fuel reduction in shelterwood harvests is more difficult and costly because the standing trees must be protected.

More forage is produced by clearcutting than all other systems (Planning Record: Bitterroot Forest Plan Note 101). Less forage is produced in the shelterwood system and the forage response is shorter because trees occupy more of the site for longer time. Forage produced under a partial canopy seems to be less palatable than that produced in full light. Transitory range for cattle is created when harvest occurs on allotments. Cattle and big game use the forage produced and competition for forage could be a problem on some big-game winter range areas.

Even-aged harvest causes reduction in big-game cover, but increases diversity for other wildlife when openings are created in dense canopies (USDA, 1979). Wildlife species which prefer openings or sparse canopies will find more suitable habitat and those species prefering dense canopy or old growth trees will find less. Edges are created for those species which rest or hide in dense canopies and feed in the openings.

In all alternatives, at least 5 percent of the suitable timberland must be in old growth forest at all times (Planning Record: Bitterroot Forest Plan Note 73). The goal was exceeded in all alternatives because other constraints were even more limiting.

Even-aged harvest systems provide the best opportunity for control of insects and disease because most diseases and susceptible trees are removed and a

young, vigorous stand is initiated. Clearcutting may be the only system which provides this control if all trees are unhealthy. Where shade is necessary for seedling survival, a shelterwood cut may be appropriate provided the diseased overstory is removed before the young trees become infected.

Timber productivity is enhanced by proper application of any silvicultural system. Old, slow growing trees are replaced by young, faster growing trees and the growth rate can be sustained by precommercial and commercial thinning.

Clearcutting is the least costly method of harvesting trees. Shelterwood cutting is more costly because a second harvest of the remaining overstory is required. Costs vary by species harvested, land slope, yarding distance, and other factors but the removal of all trees from a site is cheaper per unit volume than removal of only a portion of the overstory. The lower costs are partially due to even-aged cutting units being easier to lay out and mark than other harvest units so slightly less manpower and time is required per unit of timber sold.

Even-aged management can adversely affect the recreation experience by disrupting trail systems or creating undesirable openings. The experience may be enhanced somewhat by careful placement of openings to create vistas.

a. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Even-aged harvest systems provide the best chance to improve the long-term productivity. To a large extent, insects and diseases are controlled, young and vigorously growing trees replace slow growing old trees, fire hazards are reduced, and the proper mix of tree species can be introduced. However, with these systems, it is more difficult to maintain visual quality. Some soil is lost and peak flows of water are increased. Habitat for wildlife species which prefer closed canopies is reduced but habitat for those species which prefer openings is increased.

b. Irreversible and Irretrievable Commitment of Resources

Although areas which have been harvested by even-aged systems may not be available in the future, the road system necessary for harvest has been constructed and considerable money has been expended in revegetation. Most areas harvested are irreversibly committed to timber harvest in the future. The wildlife habitat changed by the harvest and the dispersed recreation opportunities lost or drastically changed are irretrievable.

c. Adverse Effects Which Cannot be Avoided

Visual quality may be lowered by even-aged management. Some soil erosion will occur and water quality will be lowered. Wildlife habitat will decrease for species which prefer dense canopies. Fish habitat will be changed by harvest in riparian zones or by increased sedimentation. Semiprimitive recreation opportunities will be lost.

d. Conflicts with Other Land Management Plans

None identified.

2. Uneven-aged System of Harvesting Timber

Selection harvest, an uneven-aged management system, is prescribed only for riparian zones that have been assigned the riparian or retention prescriptions (Planning Record: Bitterroot Forest Management Practices). Those trees which are mature or over-mature are selected for harvest and the remaining canopy is undisturbed. The system has no effect on the visual resource, at least when viewed from a distance. Since only small openings are created, the harvest unit is not considered unrecovered. Water quality and quantity are not measurably affected because the canopy is not altered significantly, soils are not unduly disturbed, and the remaining trees are able to transpire the extra water. Little soil is bared and accelerated erosion is slight (Rice and others, 1972).

Since trees remain following harvest by selection, the system can be used to enhance fish habitat. However, those trees left to fall into the stream to form pools and riffles will reduce the total timber volume. In Alternative E (Proposed Action) uneven-aged management will be prescribed along all fisheries streams. Large trees will be left to protect the streambanks, provide shade, and eventually fall into the stream.

Fire and slash disposal are difficult to manage in selection harvest systems. There is little opportunity to reduce fuel loads and any slash generated by the harvest adds to the problem. There are few openings large enough to allow piling of slash so that burning will not harm the residual stand. Handpiling and winter burning can be done in certain areas and slash can be reduced by requiring that whole trees be yarded and the slash be disposed at the landings.

Little forage is produced by selection harvest (Planning Record: Bitterroot Forest Plan Note 101) except in some group selection units. Group selection involves harvest of groups of mature trees. Openings of two acres or less that provide good habitat for those species of wildlife that prefer to feed in openings but need trees for nesting and breeding are created. The forage produced in these small openings is not great and tends to disappear as the canopy of the remaining trees expands. Selection harvest has little effect on the cover requirements for big game.

The old growth characteristics of a stand can be retained at the expense of timber volume. If trees are left to die in order to create habitat for cavity nestors or debris dams for fish habitat, this timber volume is lost. In most cases, the older trees, at least those in excess of need for snags, will be removed by application of the selection system.

It is more difficult to control insects and diseases with selection harvest than with even-aged harvest systems. Providing the infection is not large, some control can be attained by group selection of the infected trees.

The selection system is more costly to apply than even-aged management systems because each tree must be marked (Planning Record: Bitterroot Forest Management Practices). Logging costs are high because little volume per acre is removed and care must be taken to protect the residual stand. Slash disposal is more difficult and costly.

Recreation quality is little disturbed by selection harvest systems. During the harvesting operation and for a short time thereafter, the noise and debris may disturb some recreationists but the evidence of the disturbance declines rapidly following completion of slash disposal.

a. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Timber harvest by the selection system has little effect on the natural long-term productivity of the area. Because of the system, there is little opportunity to enhance production by introduction of other tree species or by cultural practices such as thinning. Compared to even-aged management systems, the habitats of fish and many wildlife species are at least maintained and the opportunity to enhance that habitat exists. Visual quality is maintained.

b. Irreversible and Irretrievable Commitment of Resources

The application of selection harvest essentially commits an area to timber harvest and it is likely the areas will continue to be harvested by this system in the foreseeable future.

c. Adverse Effects Which Cannot be Avoided

There are few adverse effects associated with selection harvest. If applied intensively, there will be few snags for cavity nestors and stream debris enhancement. Recreation can be disrupted for a short time while the timber is being harvested.

d. Conflicts with Other Land Management Plans

None identified.

U. Logging Methods

The choice of a logging method depends largely on land slope and sensitivity of the soils. On slopes under 40 percent, tractor yarding is generally appropriate. On 40 to 60 percent slopes, cable or skyline systems are most often used. Helicopter or other aerial methods are prescribed for slopes over 60 percent with sensitive soils and on areas where roads cannot be constructed. The combination of logging systems prescribed for various sites is described in the Planning Record: Bitterroot Forest Management Prescriptions.

1. Tractor Logging

The largest impact on the visual resource involves the cutting of trees but most of the soil disturbance associated with logging is due to skidding the logs to landings. Logging with tractors causes soil disturbance on about 28 percent of the area (Megahan, 1980). If the soils are light colored, the redistribution of surface layers can be seen from long distances.

Tractor yarding has the potential to cause soil compaction, excessive soil disturbance and exposure of soil to water erosion (Megahan, 1980; Rice and others, 1972). Soil compaction is a problem on wet soils, especially those

with clay or high silt content. Compaction causes reduced infiltration capacity, air permeability, and productivity (Froelich, 1979a; 1979b; Froelich and others, 1980). Soil compaction can also cause overland flow, accelerated erosion, and stream sedimentation which reduces water quality. Forest soils most susceptible to compaction are those with high clay and silt content (Cullen and Montagne, 1981; Davis, 1978). Compaction can minimized by limiting tractor use to the dry season, requiring a cushion of snow, or operating on frozen soils. Skid trails can be located away from problem areas but, even with restrictions, some soil disturbance inevitably occurs when tractors are maneuvered in a logging unit. Most topsoils are thin. Displacement or mixing of the topsoil can degrade the fertility of disturbed soils. On especially sensitive soils, the number of skid trails can be limited or another logging system can be required. Except on very gentle slopes, tractor logging requires more roads than other logging methods. The effects of roads are discussed in section Z.

Removal of the organic layers or low growing vegetation bares the soil to raindrop splash erosion and overland flow during intense rainstorms (Bethlahmy, 1967; Megahan, 1980). The removal of this protection plus compaction causes a decrease in infiltration rate and the resulting overland flow can cause rills or gullies. In these situations proper and timely erosion control measures are necessary.

If tractors are allowed to operate in streams they can degrade the stream channel and increase sedimentation (Bjornn, 1974). Effects on streams and fish populations result from soil disturbance and erosion (Platts, 1980). An increased sediment load in streams causes the intergravel areas to become plugged, reduces insect populations, and causes fish eggs to smother from lack of circulating water (Phillips, 1971; Ritchie, 1972). To reduce these impacts tractors are not allowed to operate in or parallel to streams and crossings will be carefully planned to utilize temporary culverts or log or snow bridges.

Tractor logging has little effect on big-game cover. The major effect is the removal of the trees regardless of the logging method (Lyon, 1979a). Forage growth is stimulated by the scarification caused by tractors.

On soils where compaction is not a serious problem, tractor logging may be of some benefit. Exposure of mineral soil is necessary for seedling establishment (Smith, 1962) and tractor logging does expose mineral soil on about 28 percent of the area. However, if topsoil is excessively disturbed the productivity of the site is decreased (Froelich, 1979b).

Typically, tractor logging is the least expensive method available for getting logs to the landing. This can result in a greater return to the U.S. Treasury and the counties (Planning Record: Bitterroot Forest Management Practices).

Recreation disruption and noise of logging operations cause local, short-term degradation to recreation users. In alternatives with low timber harvest levels, the disturbance will be minimal because only a few timber sales will be active at any one time and these are likely to be scattered throughout the suitable timberland. In alternatives with high timber harvest levels there will be several concurrent sales and the recreation value of all those areas will be disturbed.

a. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

In most cases, tractor logging has little effect on long-term productivity. However, if tractor logging occurs on wet soils or on isolated pockets of clay soils, soil compaction will occur and productivity will be affected. Long-term productivity may be affected by soil loss. Short-term water quality and fish habitat degradation may occur if soil enters the stream.

b. **Irreversible and Irretrievable Commitment of Resources**

Tractor logging does not irreversibly commit the area to tractor logging in the future, but if the road system is designed for tractor logging, there is a strong possibility that tractors will be used. The soil lost or unduly disturbed by the tractors is an irretrievable loss.

c. **Adverse Effects Which Cannot be Avoided**

Tractor logging can leave skid trails which are unsightly to Forest visitors. Trails will eventually revegetate. During the logging operation, considerable noise and dust is generated by tractors and soils are disturbed.

d. **Conflicts with Other Land Management Plans**

None identified.

2. **Cable Logging**

For the purposes of this report, cable logging is defined as yarding 800 feet or less with any ground lead or skyline cable system. Cable logging, because of soil sensitivity, is used about 20 percent of the time on slopes less than 40 percent. About 70 percent of the less sensitive soils on slopes between 40 and 60 percent are cable logged. Most of the cable systems now used are capable of lifting one end of the log off the ground. The system has effects similar to tractor logging but the effects are not as severe because the weight and tread of the tractor is absent. However, cable corridors can be obvious and about 23 percent of the soil surface is disturbed (Megahan, 1980).

Cable logging usually does not cause soil compaction (Froelich and others, 1980). However, because the logs are dragged uphill and the slopes are generally steep, soil erosion and overland flow similar to tractor logging can occur so erosion control may be required in the cable corridors.

Cable logging generally requires less roads than tractor logging. The effects of roads are discussed in section Z.

a. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The use of cable systems to yard logs has no effect on the long-term productivity of a site.

b. **Irreversible and Irretrievable Commitment of Resources**

The fact that an area is logged by cable does not commit the area to be logged in the future. However, because the road system exists and considerable money will be invested in generating a new stand of trees, it is likely that the area will be logged by a cable system in the future. The soil lost is irretrievable.

c. **Adverse Effects Which Cannot be Avoided**

Considerable noise and dust are created by cable logging. Soils will be disturbed and some will erode into streams causing a loss of water quality and fish habitat. The visual quality will be lowered until vegetation grows and hides the view of skid trails.

d. **Conflicts with Other Land Management Plans**

None identified.

3. **Skyline Logging**

For the purposes of this report, skyline logging is defined as a cable system for yarding distances greater than 800 feet. The system is used on about 30 percent of the slopes between 40 and 60 percent and on about 20 percent of the logged area on slopes exceeding 60 percent. Its use on slopes of less than 60 percent is generally restricted to soils that are very sensitive to disturbance. Skyline logging has minimal effect on the visual resource because the upper end of the log is usually suspended above the soil. Therefore, the major disturbance to the soil is at the upper and lower ends of the skyline cable system. Edges of skyline units can be blended into the uncut forest with greater ease than with either tractor or cable systems. Fewer roads are necessary because external yarding distances are greater than for tractor or cable systems. Since roads have the longest and most permanent effect on the visual resource, especially on steep slopes, the logging system which requires the least road is the most desirable from a watershed and visual quality standpoint.

Skyline systems have a low potential for damaging soils except in cable corridors where logs are dragged. The system has low potential for environmental degradation because soil disturbance is confined to the cable corridors and few roads are necessary. Erosion control measures are relatively easy to apply in the corridors.

The topography associated with skyline systems creates problems for the disposal of slash. Steep slopes limit the use of machinery and handpiling is expensive. Firelines are difficult to build and broadcast burning is difficult to control on steep slopes without a good fireline. Since soil disturbance is minimal in skyline yarded sites, fire is often necessary to bare the soil for planting. The slash must be burned to maintain a balance between exposing mineral soil and losing control of the fire (USDA, 1978).

Skyline logging has little effect on forage or cover. Soil disturbance occurs on less than 23 percent of the area (Megahan, 1980) so forage species are not

particularily stimulated. The silvicultural system and post-logging fire have much more effect on forage and cover than skyline logging.

A well-stocked understory of trees can often be saved by applying a skyline system. In other cases, since little soil is disturbed, regeneration of tree seedlings is a problem unless fire can be used to bare soil. Productivity of the site will be reduced by the amount of time it takes for regeneration to be established (Smith, 1962).

Skyline logging is more expensive than tractor or cable logging (Planning Record: Bitterroot Forest Management Practices). Returns to the U.S. Treasury and counties are reduced as the costs of yarding increase.

Any logging operation causes disruption of recreation traffic on the roads within the active sale area. Interruptions of traffic may be longer for skyline operations than cable or tractor logging because equipment is difficult to move and may block the roads for several hours at a time.

a. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

Skyline logging causes little change in the long-term productivity of a site. Although there is some soil disturbance with skyline logging, little is eroded and water quality is seldom affected (Rice and others, 1972). If regeneration is delayed because of difficulties in site preparation, the productivity of the site is reduced.

b. **Irreversible and Irretrievable Commitment of Resources**

Roads are designed for use of long-line equipment and if harvest occurs in the future, some sort of skyline logging, or an equivalent system, will likely be used. There are no irretrievable commitments of resources.

c. **Adverse Effects Which Cannot be Avoided**

Despite the fact that skyline systems have fewer environmental consequences than other yarding systems, some soil will be lost or displaced, some water quality will be degraded, and some low growing vegetation will be destroyed. Since most skyline operations are on steep slopes, slash control will be more difficult because of the problems with fireline construction and piling slash, and any visual quality degradation will be readily visible. Recreation opportunities will be degraded while the harvest is occuring because of noise, dust and equipment in the roads. Since the system is costly, returns to the Treasury will be reduced.

d. **Conflicts with Other Land Management Plans**

None identified.

4. **Aerial Logging**

The only aerial system currently available is helicopters. As with skyline logging, helicopter logging units can easily be blended into the uncut forest.

Few roads are needed because external yarding distances are much greater than for conventional systems. Helicopter logging leaves the soil surface virtually undisturbed except at landings. The quarter- to half-acre landing areas are severely disturbed and often require extensive rehabilitation (Megahan, 1980). Helicopter logging disturbs less than two percent of the soil surface in the area logged (Megahan, 1980).

Because of soil conditions, helicopter logging is applied on 30 percent of the most sensitive soils on slopes of 40 to 60 percent and 80 percent of the time on slopes which exceed 60 percent. Because timber is lifted off the ground, there is virtually no soil disturbance and, therefore, erosion and water quality degradation are not problems even on sensitive soils and steep slopes.

Slash disposal is difficult on areas logged by helicopter. No heavy equipment is available to pile the slash or to construct firelines. Handpiling is quite expensive. The difficulty of slash control and the lack of mineral soil exposure can increase the probability of unwanted fire and have a significant effect on regeneration (Smith, 1962).

There is considerable noise generated by helicopters. This can have an undesirable effect on recreationists in the area and may affect the distribution and stress on wildlife.

The greatest effect of helicopter logging is the volume of traffic produced on the road away from the landing. Logs are moved very rapidly from the woods to the landing and trucks are usually loaded immediately. Twenty or more truck loads may be hauled from one landing in a day. The total volume of traffic would be the same as with other systems but the traffic would be concentrated in a shorter time.

a. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Helicopter logging has little effect on long-term productivity because of soil erosion but problems with slash control and regeneration may lengthen the following rotation and therefore reduce the productivity of the site. Since helicopter logging usually occurs on steep slopes, openings can be seen from long distances.

b. Irreversible and Irretrievable Commitment of Resources

Since roads are not built into the area, there is no irreversible commitment of the site to future timber harvest. However, since considerable time and effort is likely to be spent producing another generation of trees, the site has a high probability of being logged in the future. Because most helicopter logging operations take place where roads would cause undesirable effects, helicopters are the sole means of harvest. If helicopters were not used, the timber grown on these sites would be irretrievably lost.

c. Adverse Effects Which Cannot be Avoided

Because of the steep slopes, the logging operation is hard to screen and openings are usually visible for long distances. A high level of noise is generated in a helicopter logging operation. Slash control is difficult or

expensive. Regeneration may be delayed because of lack of mineral soil exposure.

d. Conflicts with Other Land Management Plans

None identified.

V. Slash Control

Limbs, tops, and cull logs usually must be removed from a timber harvest unit before regeneration can take place. The most common method of disposal is to burn the slash onsite, but in some cases large amounts are hauled away to be used as firewood. The objective of slash control and fuels management is to maintain fuel loading within acceptable limits for prevention and control of wildfire. Burning also helps prepare sites for regeneration and eliminates barriers to animal movement (Lyon, 1979b; Smith, 1962).

Slash may be tractor piled and burned on gentle slopes; handpiled and burned or broadcast burned regardless of slope (Planning Record: Bitterroot Forest Plan Note 114). In some situations where slash is not evenly distributed and a mature overstory has been left, underburning of concentrations of slash is the only effective method of disposal. Slash disposal activity varies directly with timber harvest level. Alternatives which generate the highest timber harvest also generate the highest level of slash control.

Slash disposal can cause short-term degradation of foreground viewing. In broadcast burning units, all residual vegetation is usually burned and the unit looks scorched and black. Visual degradation usually lasts only until the next growing season because forbs, grasses, and shrubs grow rapidly after fire (Stickney, 1980). Burned dozer piles leave scars that are readily visible onsite and, in some cases, from several miles away. Burned handpiles are virtually invisible to the casual observer after a short period of time. Hot underburns can cause scorch marks on trunks of remaining overstory and can kill lower branches. These visual effects will last until red needles fall and the scorched bark is replaced (USDA, 1982).

Air quality will be degraded by slash disposal (Komarek, 1970). Slash disposal activity will be concentrated in times when fuels are dry enough to burn, but weather is generally cool and humid so control is easiest. Suitable conditions occur for only a short time in the spring and fall. Fire weather conditions will be carefully monitored and burning allowed only when smoke will be rapidly dispersed. The higher the timber harvest level, the greater the air quality problem because more slash will have to be burned in the short time available.

Slash is either piled for burning or a fireline is built around the unit for broadcast burning. Slash burning increases soil disturbance by about 50% for tractor and cable yarding systems (Smith, 1979). On gentle slopes, tractors are used to pile slash in windrows. This activity has a high potential for degrading the soil (Klock, 1975). If care is not taken, topsoil, litter, and duff can be pushed into the piles. Excessive mineral soil is then exposed to erosion between the windrows and the windrows will not burn as well because the soil smothers the fire. If windrows and the soil beneath them are too dry when burned, the topsoil may be baked, become sterile and impervious to wetting

(Dyrness, 1976). The soil structure may be severely altered (USDA, 1978; Bennett, 1982). Little or no vegetation will grow to protect the soil from erosion during the several years necessary for recovery. Burning handpiles will have no noticeable effect on the soil. Small areas under the piles may be scorched, but handpiles are usually small and burn cool enough to cause little damage. Bennett (1982) described methods of controlling burn intensities to reduce risk of soil degradation and erosion. Soil losses caused by burning can be no greater than natural rates if fires are properly managed (Glassy, 1982; USDA, 1978).

Firelines around broadcast burn units may be a source of sediment if proper erosion control measures are not taken. Mineral soil must be exposed so fire will not creep over the line. The soil surface is then exposed to raindrop splash erosion and overland flow is likely. Ditches to divert water from the fireline into adjacent undisturbed areas are required.

Water yield is affected more by removal of trees than by slash disposal (Garn, 1974). The only measurable effect on water yield would occur where large areas of mineral soil were exposed and overland flow was increased by a decrease in infiltration rate. Water quality would be affected in the same way (DeByle and Packer, 1972). Overland flow could increase sediment delivery to the streams if a sufficient strip of undisturbed vegetation is not present between the burned unit and the stream (Snyder and others, 1975).

Slash disposal has an effect on fisheries or streams if water quality or quantity is affected. The removal of large woody material from streambanks may affect the formation of pools by destroying potential debris necessary for addition to the stream as instream debris decays (Frear, 1982). Overland flow from burned units may carry high levels of nutrients which will temporarily enrich the water and add to available fish food. The duration and magnitude of the nutrient flush is so short and small that detection of the result is unlikely (Snyder and others, 1975).

Slash disposal only has an effect on big-game cover when hiding cover that remains after logging must be burned when the slash is disposed. Forage may be temporarily reduced by slash disposal activities, but the reduced competition from trees and nutrients rapidly released by fire result in a flush of shrub, grass, and forb growth in the subsequent growing season (Planning Record: Bitterroot Forest Plan Note 101).

A totally clean forest floor is lacking cover for a wide variety of small animals, many of which depend on insects for food (USDA, 1979). The removal of all dead, down, and decaying logs removes a whole segment of the forest ecosystem. Some harmful insects and animals are eliminated, but beneficial ones also die or move. The objective of slash disposal should include provisions for leaving sufficient woody material to support the full complement of organisms present in the forest ecosystem.

Bark beetles and fungi can build up in slash and spread to living trees. Elimination of slash destroys the habitat for these insects and diseases and controls their spread (Furniss and Carolin, 1977). Dozer piling in a partial cut can result in mechanical damage to residual trees and make them subject to insect or disease attack.

Costs of slash disposal vary by piling method, size of unit, and slope (). Handpiling is more expensive than machine piling, small units cost more per acre than larger units, and units on steep slopes are more expensive to treat than those on gentle slopes. Unit cost is independent of alternative, but the higher the timber output, the higher the total slash disposal costs. Slash disposal is a necessary cost in the production of timber and has an effect on the calculation of PNV. The amount of slash disposal depends on the acres of timber harvested each year. Some slash control will be required on practically every acre. The area requiring treatment is roughly equivalent to the area harvested (Table IV-6).

Slash disposal activities affect recreation by creating smoke which may degrade air quality enough to cause local short-term problems (Komarek, 1970). Units harvested but unburned may be nearly impassable to people if slash loads are high. The problem would be greater in high timber output alternatives and when poor weather for burning causes a time lag between harvest and slash disposal.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Slash control, if properly done, has little effect on long-term productivity. Productivity is adversely affected if slash is not treated or is poorly treated. Dozer piling may cause a decline in long-term productivity if too much soil is displaced or erosion occurs. Burning when fuel or weather conditions are too dry may result in a hot burn that reduces long-term productivity. Most other effects of slash control are short-term and have little effect on productivity.

2. Irreversible and Irretrievable Commitment of Resources

Slash control does not irreversibly commit the area to any specific use in the future. The purpose of slash control is to provide suitable sites for another generation of trees to be established. The commitment to timber management for the site has been made and is probably not reversible. The material burned is irretrievably lost.

3. Adverse Effects Which Cannot be Avoided

The most obvious adverse effect is the generation of smoke. Though this effect is short lived, the more timber harvested, the more smoke. Vegetation will be scorched or blackened and mineral soil will be exposed to erosion forces.

4. Conflicts with Other Land Management Plans

None identified.

W. Site Preparation

The objective of site preparation is to create micro-sites where tree seedlings have a good chance for survival (Smith, 1962). Site preparation requires the removal of competing vegetation and exposure of mineral soil. The seeds and seedlings of most tree species planted in organic matter and duff dry out and fail to survive.

Site preparation is usually associated with logging and slash disposal activities. Dozers used to skid logs and pile slash displace litter and other organic matter and the result is enough mineral soil exposed to provide planting sites. Cable logging displaces some topsoil and broadcast burning or burning handpiles results in some spots where mineral topsoil is exposed. In units where insufficient mineral soil is exposed or competing vegetation has had time to regenerate, the soil surface must be scarified or the competing vegetation must be removed before planting. Scarification can be done by dozers or other machines on gentle slopes, and by hand on steeper slopes.

Site preparation has the same effect on visual quality, soils, water quality and quantity, and fish as the soil-disturbing portion of slash disposal.

Handscalping of individual tree planting sites is the least costly method of site preparation and handpiling and burning is the most expensive (). Handscalping is also least effective because less competing vegetation is removed and seedling failure is high. Machine scarification, piling, and burning is the most effective method because enough mineral soil is exposed and most competing vegetation is removed. It is possible to "overscarify" and cause damage to soil and water resources (DeByle and Packer, 1972)

Environmental effects of site preparation vary by factors other than alternatives, but the higher the timber output, the greater the potential for environmental degradation beoause there will be more site preparation activity.

1. **Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

Timber productivity depends in part on how quickly trees are established after harvest. Adequate site preparation is necessary to ensure seedling survival and give them a good start to compete with other vegetation. Care must be taken in site preparation so that the relatively thin topsoils are not removed. These soils are necessary for the maintenance of productivity.

2. **Irreversible and Irretrievable Commitment of Resources**

Site preparation does not irreversibly commit a site to timber management, but the investment of time and money is so great that it is very likely trees will be managed into the future. Soil lost or displaced by site preparation activities is irretrievable.

3. **Adverse Effects Which Cannot be Avoided**

The unsightly appearance of sites that have been prepared for regeneration is unavoidable and will remain until vegetation grows and screens the effect from view. Soils are inevitably eroded or displaced. If burning is used, smoke is generated. The noise and scars of site preparation can affect recreation use for a short time.

4. **Conflicts with Other Land Management Plans**

None identified.

X. Tree Planting

Tree planting occurs after harvest, slash disposal, and site preparation. The proportion of harvest areas to be planted varies by harvest method, land type, and prescription (Planning Record: Bitterroot Forest Management Prescriptions). Clearcuts are nearly always planted but shelterwood and selection harvest units generally regenerate naturally. The total area to be planted varies by timber output levels among alternatives.

Tree planting is also scheduled to occur in old burned-over areas. In the high timber output alternatives, most of the nonstocked areas are scheduled for planting. In the low timber output alternatives, fewer nonstocked acres are scheduled to be planted because of the high cost of site preparation and because planting these sites is a poor investment.

After the first decade, the amount of planting to be done in each alternative is directly proportional to the area to be harvested (Table IV-6).

The primary environmental effect of planting is the rapid regeneration of trees. This results in rapid recovery of the visual character of the landscape; return to preharvest levels of water yield, water quality, and time of peak flow; and protection of soils from erosion. Rapid regeneration causes forage to decrease because of shading and competition of the growing trees (Stickney, 1980) but speeds the process of recovery of big game hiding and thermal cover.

Insect and disease problems can be minimized by the establishment of a young, vigorous stand of trees. Often, the problems can further be minimized by planting a different species than was harvested or by planting a mixture of tree species. These different species may also enhance the value of the next generation of trees. However, care must be taken to assure that the trees introduced are compatible with the sites on which they are planted.

Planting is labor intensive and costs are high. It is more expensive to plant on slopes of over 40 percent, on thin, rocky soils, and on clearcuts because more seedlings are planted per acre. Most of the planting will be done by contract which will directly benefit the local economy.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Planting results in quick establishment of a new stand and shortens the time until next harvest. Other species or a mix of species can be introduced on the site, the loss to insects and diseases reduced, and more wood fiber produced. Planting should not affect the natural productivity of the site and will give protection to the soils by rapidly producing an overstory. Though this rapid growth of timber will reduce the forage available to livestock or big game, it will also provide the hiding and thermal cover needed by big game.

2. Irreversible and Irretrievable Commitment of Resources

The next generation of trees will probably be harvested and this is an irreversible commitment. Planting causes no irretrievable commitment of resources.

3. Adverse Effects Which Cannot be Avoided

Some of the plantings on the Forest will fail and the expense will be difficult to recover.

4. Conflicts with Other Land Management Plans

None identified.

Y. Timber Stand Improvement

Precommercial and commercial thinning are the two activities associated with timber stand improvement. Precommercial thinning occurs when the regenerated stand is about 30 years old (too small for commercial products) and again when the stand is about 70 years old (some commercial products). The objective of thinning is to reduce competition among crop trees so maximum growth per tree is realized (Smith, 1962). The fewer but larger trees will theoretically be more valuable at time of harvest.

Thinning can have a minor adverse effect on foreground viewing until the slash is burned or decays. The more open aspect of the thinned stands is likely to be pleasing to the casual observer (USDA, 1977).

The slash created by thinning is a fire hazard that is difficult to manage. Broadcast or underburning is usually not possible without damage to the remaining trees and handpiling and burning is expensive and may also result in damage. However, the relatively fine fuels are packed down by snow and decay within one or two years so the risk of losing the thinned stand to fire is low.

Thinned stands produce slightly more forage for a short time after thinning but this advantage is soon lost by the rapidly expanding canopy of the remaining trees (Planning Record: Bitterroot Forest Plan Note 101). Hiding cover for big game may be reduced by thinning but recovers rapidly as the remaining trees occupy the available space (USDA, 1979). A less diverse stand can result from thinning if the objective is to feature one species. Therefore thinning could affect the habitat of certain small animals, birds and insects. The removal of insect infested, diseased, and slow growing trees will result in a healthy, vigorous stand (Smith, 1962).

Precommercial thinning results in a decrease in PNV because timber yield tables show very little difference in yield, species composition, or average diameter between thinned and unthinned stands (Planning Record: Bitterroot Forest Timber Yield Tables). Precommercial thinning has been scheduled to reduce some potential insect and disease problems and to prevent stagnation of lodgepole pine stands.

No commercial thinning is scheduled. Commercial thinning has the same environmental effects as selection harvest, discussed under uneven-aged management.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Yield tables show no increase in the per acre volume of stands as a result of precommercial thinning. Average diameter is increased and therefore the timber should be more valuable.

2. Irreversible and Irretrievable Commitment of Resources

Thinning a stand implies an irreversible committment to harvest the remaining trees in the stand. In only unique situations would final harvest not occur. Some of the funds expended may not be retrievable.

3. Adverse Effects Which Cannot be Avoided

Some of the slash created by thinning will not be treated and a fire hazard will be present for a few years after thinning. Temporary loss of hiding cover will affect big-game use. Visual quality will be adversely affected for a short time.

4. Conflicts with Other Land Management Plans

None identified.

Z. Road System

Road construction and maintenance has a greater effect on other resources than any other Forest management activity. The primary effects are the displacement of large amounts of soil, increased vehicle access, and degraded visual quality. As roads are built into roadless areas, roadless recreation and wilderness management are precluded.

More roads are needed to complete the transportation system in Alternative B which would access most land tentatively suitable for timber production. In all the alternatives, most of the roads would be built by the end of the fifth decade (Table IV-7).

Table IV-7
Road Construction
(miles)

Roadless Area	Decade	Alternative B	C	E*	F	G	H	J
Blue Joint	1	30	20	30	0	10	0	0
	3	70	70	10	0	20	0	0
	5	20	10	10	0	10	0	0
	Total	260	190	100	0	90	0	0
Sapphire	1	30	30	30	10	20	10	0
	3	160	120	60	10	80	20	0
	5	70	60	30	10	70	10	0
	Total	590	510	230	75	310	140	0

* Proposed Action.

Roads provide access for increased motorized recreation, but eliminate primitive and semiprimitive opportunities. Wilderness attributes of roadless areas are foregone. People will either shift their recreation use to another roadless area or continue to use the same area and suffer a decrease in the quality of the recreation experience. People who prefer roaded recreation will have more opportunities.

Road management can mitigate potential conflicts in use. Seasonal or year-long road closures can provide a wide variety of recreational opportunities, even though the environment is slightly changed by the physical presence of the road.

Road construction can affect the basic character of the landscape by changing its color, texture, or line (USDA, 1977). Roads across open areas on steep slopes are visible for many miles. Cuts and fills are often visible even through a screen of vegetation. Where visual quality is important, the effect can be reduced by leaving vegetative screens, seeding, or treating cut and fill slopes with a darkening agent. Cuts and fills can be reduced to a minimum. The transportation system necessary to implement Alternative B would result in an adverse, though not unacceptable, visual effect (USDA, 1977).

Road construction can result in adverse effects to cultural resources but roads built for timber hauling can also facilitate exploration and development of mineral and oil and gas resources.

Roads often cross game trails and change animal movement patterns. Cover is destroyed and the security of an area is reduced by increased road access. Narrow roads built to follow the terrain with minimum cuts and fills reduce these impacts. Road closures can restore the security of big game to acceptable levels even though the road provides a travelway for horseback riders and hikers (Lyon, 1979a).

Road construction usually occurs in summer so few problems are created on the big-game winter range area. These roads, however, do increase access for hunters.

Road construction activity on big-game summer range displaces the animals. The displacement is usually beyond a topographic barrier (Lyon, 1979b). Road building can be scheduled to avoid activity in adjacent drainages so displacement will be minimized. New roads increase the access for both hunters and other recreationists. Displacement of elk will continue as long as heavy traffic is allowed. Parts of the habitat for some small animals will be destroyed by road construction but other habitat may be created for those animals who exist along the edge of the forest.

Roads in riparian zones cause significant sediment to be delivered to streams (Packer, 1965). This adversely affects fisheries by smothering eggs, fry, and food organisms. Fry and fingerlings lose hiding cover and are more vulnerable to predators. Water quality is affected by road building to the greatest degree of any Forest activity (Rice, 1981; Megahan 1974; 1975). Roads through wet areas are often responsible for triggering mass soil movement (Dyrness, 1967). Roads in riparian zones will conform to Forest-wide standards and guidelines in order to minimize adverse effects on riparian environments (Planning Record: Bitterroot Forest Management Practices). The most sediment is produced in alternatives prescribing the most roads.

In all alternatives, road building and timber harvest activities are constrained to minimize effects on the stream environment. Forest-wide mitigation measures have been applied by standards and guidelines to all road construction activities to reduce the sediment delivered to streams. Timber harvest and site preparation activities contribute about one-half the sediment yield increase.

Sediment delivered to streams has an adverse effect on trout populations. The most sediment is produced by road and timber activities in Alternatives B and C. The greatest sediment related reduction in catchable trout populations occurs in these Alternatives. Habitat improvements result in an increase in carrying capacity in Alternatives E (Proposed Action), G, and J.

Between four and eight acres of land are between the top of the cut and the bottom of the fill slope for every mile of road built. The area can be considered a clearcut with special reforestation problems. No trees will grow on the road surface, but will grow on some portions of the cut and fill slopes. There may be a slight reduction in productivity along the sides of roads across steep slopes, but no yield table reductions were made because the loss is insignificant (Pfister and others, 1977).

Roads built into roadless areas result in increased access and increase the potential for person-caused fires. However, this same access makes fire suppression easier by quick delivery of firefighters and providing fuel breaks for fire.

Road construction is a major cost in all alternatives. The cost reduces returns to the U.S. Treasury. Most of the roads will be built by local contractors, a significant benefit to the local economy.

Road construction is directly tied to timber harvest which tends to offset the cost of road building. In Alternative B, the transportation system is built quickly and timber harvest is relatively unconstrained resulting in a relatively large contribution to PNV. In Alternative J, no roads are built. All alternatives have a negative PNV through the third or fourth decade. After the early road investment has been offset by the value of the timber accessed, PNV is positive.

1. Short-term Use vs. Maintenance and Enhancement of Long-term Productivity

Construction of roads has a long-term effect on productivity. Even though efforts may be made to rehabilitate a road, the roadbed and cut and fill slopes will not produce as they did. If the roads remain active, this acreage is removed from the vegetative productivity of the area. Roads reduce habitat for some animals but the edges create habitat for others. Roads facilitate timber harvest and subsequent management activities which may have a positive effect on future productivity of the area. Roads change the type of recreation experience potential of an area. Open roads may interrupt animal movement patterns and allow access for hunters. Too much access can result in a reduction of big-game populations. Roads can have a long lasting impact on visual quality.

2. Irreversible and Irretrievable Commitment of Resources

Road construction is an irreversible commitment of resources since roads are essentially permanent features of the landscape. If roads are not built, timber cannot be economically harvested and an irretrievable loss of a resource occurs. If roads are built, wilderness potential and semiprimitive recreation and roadless wildlife habitat are irretrievably lost.

3. Adverse Effects Which Cannot be Avoided

Roads deteriorate the visual resource. Wildlife habitat and wildlife movement patterns are disrupted. Roadless recreation opportunities are lost. Wilderness potential is foregone. Road construction and maintenance cause the greatest amount of soil disturbance and erosion. Water quality of streams is lowered by sedimentation and fish habitat carrying capacity is reduced.

4. Conflicts with Other Land Management Plans

None identified.

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The following is a list of persons who prepared this environmental impact statement.

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Five years experience with Forest planning data.

VI. LIST OF AGENCIES AND ORGANIZATIONS

Following is a list of elected officials, agencies, and organizations who will receive copies of this document. Copies will also be sent to many individuals, local units of the listed agencies and organizations, and other organizations where interest was unkonwn as of November 1984.

A. Elected Officials

U.S. Congressional Delegation

Honorable Max Baucus
Honorable John Melcher
Honorable Pat Williams
Honorable Ron Marlenee
Honorable James McClure
Honorable Steve Symms
Honorable Larry Craig
Honorable Richard Stallings

State of Montana

Honorable Ted Schwinden
Honorable John Evans

Montana State Legislature

Granite County
- Senator Jack Haffey
- Representative Nancy Keenan

Ravalli County
- Senator Elmer Severson
- Representative Robert Thoft
- Representative Bernie Swift
- Representative Fred Thomas

County Officials

Chairman, Granite County Commissioners
Chairman, Ravalli County Commissioners
Chairman, Lemhi County Commissioners

B. Agencies - Federal

Department of Agriculture, Soil Conservation Service
Department of Defense, Army Corps of Engineers
Department of Energy, Federal Energy Regulatory Commission
Department of Interior, Bureau of Land Management
Department of Interior, Bureau of Indian Affairs
Department of Interior, Bureau of Mines
Department of Interior, Fish and Wildlife Service
Department of Interior, Geological Survey
Department of Interior, Heritage Conservation and Recreation Service
Department of Transportation, Federal Highway Administration
Environmental Protection Agency
Bonneville Power Administration

Agencies - State and Other

Columbia River Basin Commission
Water Resources Council
Advisory Council on Historic Preservation
Idaho Department of Fish and Game
Montana Governor's Planning Task Force
Montana Governor's Wilderness Committee
Bureau of Mines and Geology, College of Mineral Science and Technology
Cooperative Fishery Unit, Montana State University
Cooperative Wildlife Research Unit, University of Montana
Cooperative Extension Service
Montana Department of Fish, Wildlife and Parks
Montana Department of Health and Environmental Sciences
Montana Department of Natural Resources and Conservation
Montana Department of State Lands
Montana Historical Society
Montana Historic Preservation Office

C. Organizations

Alpha Engineer Montana, Inc.
Amax Exploration, Inc.
American Fisheries Society
American Wilderness Alliance
Amoco Production Company
Anaconda Chamber of Commerce
Anaconda Copper Company
Anaconda Pintler Wilderness Association
Anaconda Sportsmen's Club
Asarco Incorporated
Atlantic Richfield Company
Aurora Mining Company
Backcountry Horsemen
Bearmouth Logging
Bitterroot Conservation District
Bitterroot Log Homes
Black Pine Mining Company
Brent Mining Inc.
Burlington Northern
Butte Gun Club
CAP
Castle Mountain Corporation
Chaffin Creek Ranch
Champion Timberlands
Champlin Petroleum Company
Cominco American, Inc.
Conoco, Inc.
D Bar 6 Outfitters
Done-Wright Developments
Dunbar Sawmill
Eagle Stud Mill, Inc.
Eakin Ridge Outfitters

Earth First
El Centro De La Raza
Environmental Information Center
Exxon Corporation
Exxon Minerals Company
F.H. Stoltze Land and Lumber
Fairmont Hot Springs Resort
Fox Lumber Sales
Forest Planning
Friends of the Earth
Getty Mining Company
Gold Cup Exploration, Inc.
Granite Timber and Treating Plant
Hall Lumber Company
Happy Saddle Tramps
Idaho Conservation League
Impel Energy Corporation
Independent Petroleum Landman
Inland Forest Resource Council
Izaak Walton Leauge of America
Johns-Manville Sales Corporation
Kelly Logging
Kerr, Mc-Gee
Louisiana-Pacific Corporation
Masterlog Homes, Inc.
Meridian Land and Mineral
Missoula Snowgoers
Missoula White Pine Sash Company
Molycrop Inc.
Montana Association of Conservation Districts
Montana Logging Association
Montana Lumber Sales
Montana Mining Association - Deerlodge Chapter
Montana Oil Journal
Montana Outfitters and Guides Association
Montana Petroleum Association
Montana Pole & Treating Plant
Montana Snowmobile Association
Montana Wilderness Association
Montana Women in Timber
Montana Women's Association
Mountain States Legal Foundation
Mountain Timber Products
B.R.A.C. Legislative Director
National Forest Products Association
National Wildlife Federation
Natural Resources Clinic
National Resources Defense Council
Noranda Exploration, Inc.
National Off-Road Bicycle Association

North American Indian Alliance
Nyvatex Oil Corp.
Philipsburg Senior Citizens
Placer Amex, Inc.
Plum Creek Lumber
Ravalli County Fish & Wildlife Association
R & V Logging and Lumber
Rock Creek Protective Association
Senior Citizens, Deer Lodge County
Sierra Club - Rocky Mountain Office
Sleeping Child Defense Fund
Sleeping Child Hot Springs
Society for Preservation of Flint Creek Range
Stoltze-Conner Lumber Company
Student Action Center, University of Montana
Texaco
The American Forestry Association
The Wilderness Society
Trailing the Sun
Trans-Texas Energy, Inc.
Trout Unlimited
U.S. Borax
U.S. Steel Corporation
Union Oil Company of California
United Four Wheel Drive Associations
Utah International, Inc.
Western Environmental Trade Association
Western Interstate Engergy
Western Montana Fish and Game Association
Wildlife Management Institute
Wickes Forest Industries
Wilderness Society - Helena
Wilderness Society - Washington DC
Wirth Associates
Yale Law School

VII. GLOSSARY

-40: Symbol for land type group; all soils on slopes less than 40 percent.

Acre-foot: A measure of water volume equal to the amount that would cover 1 acre 1 foot deep (325,851 gallons or 43,560 cubic feet).

Activity: A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and range land outputs or achieve administrative or environmental quality objectives.

Allotment: See Range Allotment.

Allowable Sale Quantity: The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

Alternative: A combination of management prescriptions applied in specific amounts and locations to achieve a desired management goal.

Amenity Value: Typically used in land use planning to describe the resource properties for which market values are not or cannot be established.

Anadromous Fish: Fish which spend much of their adult life in the ocean returning to inland waters to spawn.

Analysis Area: One or more capability areas combined for the purpose of analysis in formulating alternatives and estimating various impacts and effects.

Animal Unit Month (AUM): The amount of feed or forage required by one mature cow (1,000 lb.) or equivalent for 1 month.

Arterial Road: Forest road that services a large land area and usually connects with a public road to form a network of primary travel routes.

AUM: See Animal Unit Month.

Available Forest Land: Land which has not been legislatively or administratively withdrawn from timber production by the Secretary of Agriculture or Forest Service Chief.

Base Sale Schedule: A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity.

Benchmark Levels: Benchmark information is developed in the analysis of the management situation. The results are used as reference points to compare against Forest alternatives and to define the range of feasible alternatives.

Benefit-Cost Ratio: Measure of economic efficiency, computed by dividing total discounted primary benefits by total discounted economic costs.

Benefit, Direct: A primary benefit that fulfills specified objectives of the policy, program, or project.

Benefit, Discounted: Benefit values adjusted so that future benefit values are reduced to the present time for comparison purposes. In this analysis these are timber, range, recreation, mineral and special use benefit values.

Benefit, Induced: A primary benefit from an output that is incidental to the ojectives of the policy, program, or project.

Best Management Practices: The set of practices applied during project implementation that ensure water related beneficial uses are protected and State water quality standards are met.

Biological Growth Potential: The average net growth attainable in a fully stocked natural forest stand.

Board Foot: A unit of measurement represented by a board one foot square and one inch thick.

Canopy: The more or less continuous cover of branches and foliage formed colletively by the crown of adjacent trees and other woody growth.

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

Capability Area: An area of land delineated for the purpose of estimating responses to various management practices, resource values, output coefficients, and multi-resource or joint production functions. Capability areas may be synonymous with ecological land units, ecosystems, or land response units. Capability areas are the single geographic delineations used to describe characteristics of the land and resources in integrated forest planning.

Capital Investment: Activities that create or improve capital assets to obtain benefits occurring during several planning periods. Some Forest capital investments are roads, trails, campground facilities, reforestation, genetic tree improvement, and precommercial thinning.

Carrying Capacity: (1) Range; the maximum stocking possible on a given range area without diminishing the forage crop in either amount or quality, or the value of related resources. (2) Recreation; the level of recreational use that a recreation site can provide without deterioration of the quality of the recreation experience or the resource. (3) Wildlife; the number of organisms of a given species and quality that can survive in, without causing deterioration of, a given ecosystem through the least favourable environmental conditions that occur within a stated interval of time.

Catchable Trout: Game fish 6 inches or longer.

CEQ: Council on Environmental Quality.

Class I Designation: An air quality classification in which the maximum allowable increase in concentration of sulfur dioxide over the baseline is two micrograms per cubic meter for the annual arithmetic mean, five micrograms per cubic meter in a 24 hour period, and 25 micrograms per cubic meter in a three hour period. The annual geometric mean of particulate matter shall not increase more than 5 micrograms per cubic meter above the baseline and the 24 hour maximum shall not increase more than 10 micrograms per cubic meter over the baseline.

CFR: Code of Federal Regulations.

Clearcutting: Harvesting of all trees in one cut. It prepares the area for a new, even-aged stand.

CMAI: See Culmination of Mean Annual Increment.

Collector Road: Forest road that collects traffic from local roads and/or terminal facilities. It serves a smaller land area that an arterial road.

Commercial Forest Land: See Tentatively Suitable Timberland.

Condition Class: Description of the existing tree vegetation as it relates to size, stocking density, and age.

Constraint: A restriction on the FORPLAN model in order to reach a desired objective.

Corridor Utility: A linear strip of land which has ecological, technical, economic, social, or similar advantages over other areas for the present or future location of transportation or utility routes.

Cost, Discounted: Costs adjusted so that future costs are reduced to the present time for comparison purposes. In this analysis these are fixed and variable Forest Service costs and cooperator costs.

Cost Efficiency: The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs, including environmental, economic, or social impacts are not assigned monetary values, but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate.

Cover/Forage Ratio: The ratio, in percent, of the amount of area in forage condition to that area in cover condition; the criteria by which potential deer and elk use of an area is judged.

Cubic Foot: The amount of timber equivalent to a piece of wood 1 foot by 1 foot by 1 foot.

Culmination of Mean Annual Increment (CMAI): The age at which the average annual growth is greatest for a stand of trees. Mean annual increment is expressed in cubic feet measure and is based on expected growth according to the management intensities and utilization standards assumed in accordance with 36 FR 219.16(a) (2) (i) and (ii). Culmination of mean annual increment includes regeneration harvest yields and any additional yields from planned intermediate harvests.

Cultural Resources: The physical remains of past human lives and areas important in legendary, historic, or sacred events.

DBH: See Diameter Breast Height.

Departure: A schedule which deviates from the principle of nondeclining even flow by exhibiting a planned decrease in the timber sale and harvest schedule at any time in the future.

Developed Recreation: Recreation that occurs where improvements enhance recreation opportunities and accommodate intensive recreation activities in a defined area.

Developed Recreation Site: Area where facilities are provided for concentrated public use, including campgrounds and picnic areas.

Diameter Breast Height (DBH): The diameter of a tree measured 4 1/2 feet above the ground.

Direct Effect or Impact: See Benefit, Direct.

Discount Rate: An interest rate that reflects the cost or time value of money. It is used in discounting future costs and benefits.

Discounting: An economic adjustment for the time value of money; mathematical reduction of costs and/or benefits which occur in the future to the present time for purposes of comparison.

Dispersed Recreation: Recreation activities not associated with developed facilities, such as hunting, backpacking, and wood gathering.

Diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

Elk Security Area: In this analysis, areas of 5,000 to 8,000 acres below 7,000-feet elevation, that provide high-use fall habitat for elk.

Ending Inventory Constraint: Constraint to ensure that the total timber volume left at the end of the planning horizon will equal or exceed the volume that would occur in a managed forest.

Energy Resources: See Leasable Minerals.

Elk Habitat Effectiveness: An index of the capability of an area to provide security for elk. It is based on hiding and thermal cover present and roads open to the public.

Even-aged Management: The application of a combination of actions that results in the creation of stands in which trees of esssentially the same age grow together. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

Extensive Timber Management: The practice of forestry on a basis of low operating and investment costs per acre.

Final Cut: Removal of the last seed bearers or shelter trees after regeneration is considered to be established under a shelterwood system.

Forage: Vegetation used for food by wildlife, particularly ungulate wildlife and domestic livestock.

FORPLAN: A computer model used to allocate land and schedule management practices for Forest Plan alternatives.

Fuels: Living or deadwood material which is capable of burning.

Fuels Management: Manipulation or reduction of fuels to meet Forest protection and management objectives while preserving or enhancing environmental quality.

FSH: Forest Service Handbook.

FSM: Forest Service Manual.

Growing Stock: The number or volume of trees growing in a forest or in a specified part of it.

Habitat Type: An aggregation of all land areas potentially capable of producing similar plant communities at climax.

Hiding Cover: Vegetation, primarily trees, capable of hiding 90 percent of an elk seen from a distance of 200 feet or less.

Indicator Species: A plant or animal species adapted to a particular kind of environment. Changes in its population can be used to assess impacts of management activities on the plant and animal community.

Induced Effect or Impact: See Benefit, Induced.

Industrial Wood: All commercial roundwood products except fuelwood.

Intensive Timber Management: The practice of forestry so as to obtain a high level of volume and quality of outturn per unit of area, through the application of the best techniques of silviculture and management.

Intermediate Harvest: Any removal of trees from a stand between the time of its formation and the regeneration cut. Most commonly applied intermediate cuttngs are release, thinning, improvement, and salvage.

Land Type: Third level of the land system inventory used in forest planning. Includes landform, soils, habitat type, lithology, structure, and climate to define fairly uniform units of land.

Leasable Minerals: Coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal stream.

Local Road: Connects terminal facilities with collector or arterial roads or public highways.

Locatable Minerals: Hardrock minerals.

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

LTSY: See Long-term Sustained Yield Capacity.

M: Thousand.

MM: Million.

MBF: Thousand Board Feet.

MMBF: Million Board Feet.

MMCF: Million Cubic Feet.

MN+4Q: Symbal for land type group; moderate to nonsensitive soils on 40 to 60 percent slopes.

Management Activity: See Activity.

Management Area: An area with a common management direction.

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

Management Practice: A specific activity, measure, course of action, or treatment.

Management Prescription: Management practices and intensity selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives.

Market Output: See Output, Market.

Market Value: The unit price of an output normally exchanged in a market after at least one stage of production, expressed in terms of what people are willing to pay as evidenced by market transactions.

Mature Timber: Trees that have attained full development, particularly height, and are in full seed production.

Maximum Modification: A visual quality objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

Mean Annual Increment: The total increase in girth, diameter, basal area, height, or volume of individual trees or a stand up to a given age divided by that age.

Minimum Management Requirements: Standards for resource protection, vegetative manipulation, silviculturist practices, even-aged management, riparian areas, soil and water, and diversity, to be met in accomplishing National Forest System goals and objectives.

Minimum Viable Population: See Viable Population.

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

Modification: A visual quality objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

Montana Wilderness Study Act Areas: Those areas that are required to be studied for their wilderness suitability under the Montana Wilderness Study Act of 1978 (Public Law 95-150).

MWSA: Montana Wilderness Study Act.

MWSA Areas: See Montana Wilderness Study Act Areas.

NDY: Nondeclining Yield. See Base Sale Schedule.

NEPA: National Environmental Policy Act.

NFMA: National Forest Management Act.

Net Public Benefits: An expression used to signify 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.

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

Nondeclining Even Flow or Yield: See Base Sale Schedule.

Nonenergy Resources: See Locatable Minerals.

Nonmarket Output: See Output, Nonmarket.

Nonmarket Value: The unit price of a nonmarket output not normally exchanged in a market at any stage before consumption, and thus must be inputed from other economic information.

Nonpriced Benefit: See Output, Nonmarket.

Nonstocked: Deforested land where woody vegetation is less than 15 feet tall and produces less than 40 percent crown cover as determined by aerial photogrammetry.

Objective Function: A FORPLAN term that describes the criteria to be optimized. Examples are maximize present net value and maximize timber harvest.

Old Growth: A forest stand with 15 trees greater than 20 inches d.b.h. (6 inches in lodgepole pine) and canopy closure that is 75% of site potential. The stand is uneven-aged or multistoried. There should be 1.5 snags per acre greater than 6 inches diameter; 0.5 snags per acre greater than 20 inches diameter; and 25 tons per acre of down material greater than 6 inches diameter. Heart rot and broken tops are common and mosses and lichens are present.

Opportunity Cost: An opportunity cost is value foregone. In this analysis it is a cost calculated as the difference between present net value of the alternative and the present net value of the maximum PNV increment.

Outputs: Forest resource goods, products, or services that are purchased, consumed, or utilized directly by people.

Output, Market: A good, service, or onsite use that can be purchased at a price.

Output, Nonmarket: A good, service, or onsite use not normally exchanged in a market.

Partial Retention: A visual quality objective which, in general, means man's activities may be evident but must remain subordinate to the characteristic landscape.

Planning Horizon: The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

Planning Period: One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

Planning Records: Documents and files that contain detailed information and decisions made in developing the Forest Plan. Available at the Bitterroot Forest Supervisor's Office, 316 North Third Street, Hamilton, Montana 59840.

Plan of Operation: A written plan submitted to the district ranger by a prospecting miner outlining proposed operations which might cause disturbance of surface resources.

PNV: See Present Net Value.

Poletimber: Live trees of commercial species at least 5 inches in diameter at breast height but smaller than sawtimber size, and of good form and vigor.

Practice: See Management Practice.

Precommercial Thinning: Reducing the density of a stand of trees before they reach commercial size to accelerate diameter growth and improve and average form of the trees remaining.

Present Net Value (PNV): 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 of managing the planning area.

Prescription: See Management Prescription.

Preservation: A visual quality objective that provides for ecological change only.

Priced Benefit: See Output, Market.

Primitive: Recreation opportunity spectrum classification. An essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. Motorized use within the area is not permitted.

Purchaser Credits: Credits timber purchasers receive applied toward the sale prices of timber in exchange for building the roads needed for access.

Range Allotment: Designated area of land available for domestic livestock grazing.

RARE II: Roadless Area Review and Evaluation II. The second nationwide assessment of potential wilderness areas and recommendations made to Congress.

Real Dollar Value: A monetary value which compensates for the effects of inflation.

Receipt Shares: The portion of receipts derived from Forest Service resource management that is distributed to state and county governments, such as the Forest Service 25 percent fund payments.

Receipts: Money collected from timber stumpage, livestock grazing, campgrounds, special use permits, and returned to the federal government.

Recreation Information Management (RIM): The Forest Service system for recording recreation facility condition and use.

Recreation Opportunity Spectrum: A system for planning and managing recreation resources that recognizes recreation activity opportunity, setting opportunity, and experience opportunity along a spectrum or continuum.

Recreation Visitor Day (RVD): One visitor day equals 12 hours.

Regeneration: The renewal of a tree crop, whether by natural or artificial means.

Research Natural Area (RNA): An area with typical or unique vegetation and associated biotic, soil, geologic, and aquatic features. The area is set aside to preserve a representative sample of an ecological community primarily for scientific and educational purposes; commercial and general public use is not allowed.

Retention: A visual quality objective which, in general, means man's activities are not evident to the casual forest visitor.

Returns: Undiscounted value of dollar receipts to the federal government, including timber stumpage receipts, grazing fees, and recreation fees.

RIM: See Recreation Information Management.

Riparian: That portion of the watershed or shoreline influenced by surface or subsurface waters, including stream or lake margins, marshes, drainage courses, and spring seeps.

RNA: See Research Natural Area.

ROS: See Recreation Opportunity Spectrum.

Roaded Natural: Recreation opportunity spectrum classification. Predominately natural-appearing environments with evidences of the sights and sounds of man. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities.

Roadless Area Review and Evaluation (RARE) II: The assessment of "primitive" areas within the National Forests as potential wilderness areas as required by the Wilderness Act. This refers to the second assessment documented in the final environmental impact statement of the Roadless Area Review and Evaluation, January 1979.

Rotation: The number of years between the formation or regeneration of a timber stand and its final cutting at a specific maturity stage.

RPA: The Forest and Rangeland Renewable Resources Planning Act of 1974.

RPA Program: The recommended national direction for long-range management of renewable resources on National Forest System lands.

Rural: Recreation opportunity spectrum classification. A substantially modified natural environment. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. Facilities for intensified motorized use and parking are available.

RVD: See Recreation Visitor Day.

Running Mean: A periodically calculated arithmetic mean for a time specified. For instance, the annually calculated mean of elk trend counts for the past three years.

S40M60: Symbol for land type group; moderate to nonsensitive soils on slopes over 60 percent and sensitive soils on 40 to 60 percent slopes.

SS+60: Symbol for land type group; sensitive soils on slopes over 60 percent.

Sale Schedule: The quantity of timber planned for sale by time period from the area of suitable land covered by a forest plan. The first period, usually a decade, of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained.

Salvage Harvest: The cutting of trees that are dead, dying, or deteriorating before their timber becomes worthless.

Sanitation Harvest: The removal of dead, damaged, or susceptible trees, essentially to prevent the spread of pests or pathogens and so promote forest hygiene.

Sawtimber: Trees containing at least one 12-foot sawlog or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. Softwood trees must be at least 9 inches in diameter and hardwood trees 11 inches in diameter at breast height.

Seed Tree Cutting: Removal of trees in a mature stand so as to affect permanent opening of its canopy (if there is no preparatory cutting to do this) and so provide conditions for securing regeneration from the seed of trees retained for that purpose; the first of the shelterwood cuttings under a shelterwood system.

Seedling/Sapling: A forest successional stage in which trees less than 5 inches in diameter are the predominant vegetation.

Selection Cutting: See Uneven-aged Management.

Semiprimitive Motorized: Recreation opportunity spectrum classification. A predominately natural or natural-appearing environment of moderate-to-large size. Concentration of users is low, but there is often evidence of other users. Motorized use is permitted.

Shelterwood Cutting: Designed to establish a new crop under a remaining portion of the old stand, providing both a seed source and protection of the site and seedlings.

Silvicultural System: A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced.

Site Preparation: A general term for removing unwanted vegetation, slash, roots, and stones from a site before reforestation.

Slash: Wood left over from timber and firewood cutting and usually piled to discourage fire from spreading quickly.

Stand: An aggregation of trees or other vegetative growth occupying a specific area and sufficiently uniform in composition (species), age arrangement, and condition as to be distinguishable from the other growth on adjoining lands.

Stipulation: A specific, required condition of an agreement between the land manager and a mineral lessee.

Stocking: A measure of timber stand density or the number of trees per acre.

Stream Order: A measure of the position of a stream in the hierarchy of tributaries. First order streams have no tributaries. Second order streams are formed by the confluence of two or more second order streams. They are considered third order until they join another third order or larger stream.

Suitability: The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

Suitable Timberland: Land that is to be managed for timber production on a regulated basis.

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

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

Third Order Stream: See Stream Order.

Threatened and Endangered Species: A species or subspecies of animal or plant whose prospects of survival and reproduction is in immediate jeopardy or likely to become so within the foreseeable future. Species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

Tiering: Refers to the coverage of general matters in broader environmental impact statement with subsequent narrower statements or environmental analyses incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.

Timber Base: The lands within the Forest capable, available, and suitable for timber production.

Timber Stand Improvement: All noncommercial intermediate cuttings and other treatments to improve composition condition, and increment of a timber stand.

Transitory Range: Suitable forage created for livestock use as a result of timber harvesting activities.

Uneven-Aged Management: The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Individual tree selection cutting involves the removal of selected trees of all size classes on an individual basis. Group selection cutting involves the removal of selected trees of all size classes in groups of a fraction of an acre up to 2 or 3 acres in size.

Unregulated Harvest: Harvest not charged against the allowable sale quantity.

Unsuitable Timberland: Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions; (d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge, as reflected in current research and experience; (e) there is at present, a lack of adequate information to responses to timber management activities; or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forest Plan.

Utility Corridor: See Corridor, Utility.

Viable Population: A population which has adequate numbers and dispersion of reproductive individuals to ensure the continued existence of the species population in the planning area.

Visual Management System: Forest Service system for identifying visual characteristics of the landscape and analyzing potential visual effects of resource management actions.

Visual Quality Objective (VQO): Goal for managing the visual appearance of National Forest land, based on physical features and people's concern for scenic quality. Five levels of visual quality objectives are used.

VQO: See Visual Quality Objective.

Wilderness Attribute: One of four attributes required or mentioned in the Wilderness Act (Natural Integrity, Apparent Naturalness, Outstanding Opportunity for Solitude, and Primitive Recreation). Supplemental attributes are outstanding ecological, geological, scenic, and historical features.

Work-Year: Approximately 2,000 working hours. May be filled by one person working yearlong or several people filling seasonal positions.

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