

Hyalite-Porcupine Buffalo Horn Wilderness Study Report



United States
Department of
Agriculture

Forest Service



Gallatin National Forest
FOREST PLAN

DRAFT REPORT AND ENVIRONMENTAL IMPACT STATEMENT

Hyalite-Porcupine-Buffalo Horn
Montana Wilderness Study Act Areas
P.L. 95-150

Location: The Hyalite-Porcupine-Buffalo Horn Study Area is located on the Gallatin National Forest in Gallatin and Park Counties, Montana.

Type of Action: Legislative

Responsible
Federal Agency: USDA - Forest Service

Responsible
Officials: John R. Block
Secretary of Agriculture
Washington, D.C.

For Additional
Information: Robert E. Breazeale
Forest Supervisor
Gallatin National Forest

Comments May
Be Sent to: Box 130
Bozeman, MT. 59771-0130
(406) 587-6700

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Abstract: Six alternatives including the Proposed Action, for managing the 155,000 acre Hyalite-Porcupine-Buffalo Horn Study Area are evaluated. Major issues are wilderness, wildlife habitat, recreation opportunities, water quality, mineral potential, and land ownership patterns. The alternatives are part of the larger forest-wide alternatives presented in the Forest Plan DEIS. The alternatives evaluate a range of wilderness and nowilderness options, including the Current Management Alternative. The Proposed Action Alternative represents the Forest Service recommendation to Congress for the management of this area.

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SUMMARY

I. Purpose and Need

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. The Hyalite-Porcupine-Buffalo Horn area, which is the subject of this study, is one of these nine areas. The President is required to make recommendations on management of these areas to Congress.

The purpose of this study report is to evaluate the Hyalite-Porcupine-Buffalo Horn area for its wilderness suitability and make a recommendation for its future management. It describes and documents the analysis of six different alternatives and describes the consequences of each. The proposed action of this study report (Alternative 7) is an integral part of the Proposed Gallatin National Forest Plan.

A. Planning Area

The Hyalite-Porcupine-Buffalo Horn Study Area contains approximately 155,000 acres of the Gallatin Range in southwestern Montana. The area includes the mountain divide lying between the Gallatin and Yellowstone rivers south of Bozeman, Montana. The study area is approximately 35 miles in length and 8 miles in width. The southern boundary lies adjacent to the northwest corner of Yellowstone National Park. The area is within Gallatin and Park counties. A large portion of the area is privately owned in a checkerboard ownership pattern.

Approximate ownership of the study area is:

National Forest	105,700 acres
Burlington Northern	36,000 acres
Other Private	6,700 acres
State of Montana	5,500 acres
City of Bozeman	1,100 acres
Total	155,000 acres

B. Issues, Concerns, and Opportunities

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 public comments:

1. What other Federal lands are classified or proposed as wilderness in the surrounding area? To what extent should they influence the classification of this study area?
2. What are the recreation opportunities presently, and what can the area support in the future?
3. What are the principal game, nongame, and threatened and endangered species and what are the opportunities for habitat improvement?
4. What type, condition, and amount of road or trail access does the area contain and what is the need for the future?
5. 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 area?
6. What is the current amount and type of motorized vehicle use and what is the potential for that use?
7. What are the present conditions and uses of the area's watersheds. What are their relative sensitivities to development activities?
8. What is the timber potential of the area, and where is timber management most appropriate?
9. What is the mineral potential of the area and how should the area be managed for that potential?
10. What is the present use and opportunity for cutting household firewood; and what other energy considerations, such as energy transmission corridors, need to be made?
11. What is the present livestock use of the area and what is the potential for that use?
12. What is the present landownership pattern and what is the opportunity to manage the area as wilderness with inholdings? What are the possibilities for ownership consolidations?
13. What is the present and future potential for serious fire and/or insect and disease infestation? What are the current protection measures, and what measures need to be taken in the future?
14. What are the wilderness attributes of the study area and to what extent are they suitable for wilderness?

A separate intensive effort to identify public issues and management concerns was made for the Gallatin National Forest as part of the Forest planning process. Fourteen planning questions were developed to display the issues recorded during workshops and from mailed comments. Most of these Forest Plan issues closely resemble or overlap the MWSA issues just listed. Two Forest Plan issues do not resemble the MWSA issues and are pertinent to this study:

Forest Plan Issue No. 2 - How should the Hyalite-Porcupine-Buffalo Horn area be managed?

Forest Plan Issue No. 9 - What special attention will be given to the use and management of riparian areas?

II. Alternatives

This chapter presents the description and effects of alternative ways of managing the Hyalite-Porcupine-Buffalo Horn both as wilderness and non-wilderness. Alternative 7 is the Proposed Action.

A. Alternative Descriptions

Alternative 1

This alternative continues present management recommendations for the Forest as provided in existing Forest and unit plans. It identifies the current level of goods and services and allows budget changes to meet costs over time.

The HPBH study area is assumed to be managed as nonwilderness consistent with the current recommendations of laws, policies, previous unit plans, and project environmental assessments.

Alternative 2

Emphasis on timber, grazing, minerals, and other resource outputs that produce an income to the government characterizes this alternative. All of the HPBH study area is given a nonwilderness management recommendation.

Alternative 3

This alternative highlights dispersed recreation with a moderate level of investment for fisheries, deer, and elk. Higher investments for grizzly bear management are intended to achieve reduced mortality. Low investments are assumed for timber and range programs. The 64,200 acres of National Forest land in the HPBH study area are recommended for wilderness plus 16,100 acres of Burlington Northern land which would be acquired.

Alternative 4

Alternative 4 attempts to meet the output targets identified as the Gallatin National Forest's share of the 1980 Forest and Rangeland Resource Planning Act (RPA) program. This alternative does not, however, meet the projected demand for developed recreation or targets for livestock grazing. Protection is provided for riparian areas and wildlife winter range.

Approximately 22,000 acres, representing the National Forest solid ownership portion of the Hyalite-Porcupine-Buffalo Horn Study Area, are recommended for wilderness classification.

Alternative 5

Alternative 5 recommends all of the existing roadless land as wilderness.

Of the National Forest lands in the Hyalite-Porcupine-Buffalo Horn Study Area, 105,300 acres would be recommended for wilderness. Also included within the borders of the study area are 5,500 acres of State of Montana land and 1,115 acres owned by the City of Bozeman. Access points into this area and into other wilderness acres will be developed only as needed to disperse use. In this alternative, 40,600 acres of private land would be acquired--35,400 from Burlington Northern and 5,200 acres of other private land which have not been developed.

Alternative 7

The goal of this alternative is to respond to a wide variety of social issues and management concerns in order to provide the highest possible level of net public benefits. This alternative would include designation of a special scenic area in the Hyalite Peaks area (23,100 acres) to be reserved for public recreation. A national recreation trail along the Gallatin Crest would also be proposed. Alternative 7 has been chosen as the Proposed Action for this study report. No wilderness is recommended in this alternative.

B. Alternative Comparisons

The following tables summarize the major outputs associated with each alternative and the acreage allocation for each alternative.

Table 1: Comparison of Alternatives for HPBH Study Area (Average Annual)

Resource Item or Result	Unit of Measure	Decade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
WILDERNESS								
Recommended to Congress	Acres	1	0	0	80,300	22,100	145,900	0
RECREATION								
Nonmotorized Dispersed	MRVD <u>1/</u>	1	35.2	15.5	26.1	26.1	0	37.8
		2	45.8	20.2	33.9	33.9	0	49.2
Primitive Dispersed		1	4.0	4.0	19.1	12.6	37.0	4.3
		2	4.6	4.6	21.9	14.5	42.5	4.9
Motorized Dispersed		1	7.0	7.0	6.2	6.9	0	7.5
		2	8.8	8.8	7.7	8.6	0	9.4
Total Dispersed		1	46.2	46.2	40.8	45.6	37.0	49.6
		2	59.1	59.1	49.0	57.0	42.5	63.5
WILDLIFE								
Elk Winter Range Capacity	Number of Elk	5	240	200	710	670	440	630
RANGE								
Programmed Stocking Level	AIM	2	290	5,420	60	3,840	290	1,840
MINERALS								
Available for Occupancy Lease	Acres	1	105,661	105,661	41,438	82,555	0	82,559
TIMBER								
Timber Harvest	MMBF	1	0	1.4	0	0	0	1.0
		2	2.7	3.0	0	1.5	0	0.3
Average Annual Harvest (Over 50 year period)	MMBF	1-5	2.0	2.5	0	1.5	0	1.4
Land Suitable for Timber Management	Acres	1	17,760	21,350	0	16,000	0	14,560
FACILITIES								
Road Construction and Reconstruction	Miles/Year	1	0	1.5	0	0	0	1.2
		2	3.1	3.4	0	1.5	0	0.2
ECONOMIC COMPARISONS								
Change of Employment from Alt. 1, Decade 1 <u>1/</u>	Person Years	1	0	3	-2	1	-1	7
		2	26	34	4	21	3	16
Personal Income change from Alt. 1, Decade 1 <u>2/</u>	Thousand Dollars	1	0	49	-15	12	-12	70
		2	285	357	35	200	25	128

1/ MRVD is Thousand Recreation Visitor Days

2/ Employment and income impact have been expressed here in terms of change from the current situation. All other values are expressed in totals.

Table 1: Comparison of Alternatives for HPBH Study Area (Average Annual)
(Cont'd)

Resource Item or Result	Unit of Measure	Decade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
ECONOMIC COMPARISONS (cont.)								
Returns to U.S. Treasury	Thousand	1	0	29	0	0	0	23
	Dollars	2	71	137	0	23	0	9
Present Value Returns @ 4 percent	Thousand Dollars	present	3,077	4,160	0	2,657	0	2,526
Returns to State	Thousand	1	0	7	0	0	0	5
	Dollars	2	17	34	0	5	0	2
Total Cost	Thousand	1	181	343	209	178	257	367
	Dollars	2	500	532	189	341	229	249
Budget to Implement	Thousand	1	181	333	209	178	257	359
	Dollars	2	477	509	189	331	220	249
Federal Receipts	Thousand	1	0	29	0	0	0	23
	Dollars	2	71	137	0	23	0	9
Present Value Benefits at 4%	Thousand Dollars	present	19,026	20,793	14,287	19,214	14,303	20,034
Present Value Costs at 4%	Thousand Dollars	present	7,740	9,472	4,275	6,244	5,091	7,972
Present Net Value at 4%	Thousand Dollars	present	11,286	11,321	10,012	12,970	9,212	12,062

Table 2: Allocation Acreage Summary of HPBH Alternatives

ALTERNATIVE ALLOCATION	Alternative 1 (Current Direction)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 7 (Proposed Action)
Dispersed Recreation (Nonroaded)		0	0	0	0	13,103
Wildlife and Recreation	13,201	961	21,555	13,136	0	42,803
Scenic Area	0	0	0	0	0	23,102
Wilderness	0	0	80,300	22,108	145,900	0
Big Game with Timber Management	0	0	0	927	0	1,774
Livestock Range	9,268	5,383	3,896	899	0	3,591
Timber Management	17,763	21,354	0	15,072	0	12,785
Near Natural	65,429	69,314	16,010	53,519	0	8,503
TOTAL	105,661	105,661	121,761	105,661	145,900	105,661

III. Affected Environment

This chapter describes the environment that may be affected by the alternatives.

A. Physical Environment

The topography of the study area is highly variable. The northern portion of the area contains jagged peaks, U-shaped valleys, and cirque basins. A more subdued and moderately rolling topography is found in the remaining portion. Elevations range from about 5,500 feet to over 10,300 feet. Some of the more prominent peaks include Mount Blackmore, Mount Bole, Hyalite Peak, Eaglehead and Fortress mountains. Major streams include the headwaters of Hyalite, Bozeman, Trail, Eightmile, Big, Rock, Tom Miner, Buffalo Horn, Porcupine, Portal, Moose, Swan, Squaw, and South Cottonwood creeks.

Soils vary from the relatively coarse-textured volcanics found in the more rugged peaks to the soft, sedimentary, and more erosive soils in the rolling areas. The more sensitive sedimentary soils are susceptible to mass failures and soil movement if disturbed through poorly conducted surface activities.

The HPBH study area provides about 126,000 acre-feet of water to the Gallatin and Yellowstone rivers. The quality of the water from the area is high; watersheds in the study area comprise headwaters of the Yellowstone and Gallatin Rivers, which are Blue Ribbon trout streams. Several streams have relatively high natural sediment yields. These include Porcupine, Twin Cabin, Buffalo Horn, and Tepee creeks. Many of the lakes in the study area sustain prime cold-water fisheries.

The City of Bozeman is dependent on the Bozeman and Hyalite drainages for its municipal water. The headwaters of these two watersheds are partially within the study area. The study area is also a very important source of water for irrigation in the Gallatin and Yellowstone drainages.

A mineral survey of the study area was conducted by the U. S. Geological Survey in 1978 and 1979. Their report indicates the area has low to moderate potential for hard-rock mineral development. The petrified wood found in the area has little commercial value due to its fractured, leached, and discolored properties.

For the most part, the visual resource within the area has not been altered by man's activities. The area contains a variety of visual characteristics ranging from the spectacular and rugged Hyalite Peaks with their cirque basins, waterfalls, and clear lakes to the more moderate slopes found in the southern portion of the area.

The natural-appearing landscapes could be changed by man's activities such as road construction, timber harvest, or minerals development.

Parts of the HPBH study area contain man-made structures and developments. These include roads, timber harvest areas on private lands, a trail network, electronic facilities for communications on Eaglehead Mountain and Twin

Peaks, Forest Service cabins at Windy Pass and in Buffalo Horn Creek, a private cabin in Upper Eightmile Creek, and four snow survey stations, one of which is equipped with electronic telemetry.

Approximately 21 miles of roads within the study area have been proposed or constructed by private landowners for access to their lands. It is expected that additional roads will be planned in the future. Existing plans for roads include access within the Rock, Steele, Porcupine, Pine, Big, Donahue, and Fox Creek drainages.

The trails in the study area are presently used by hikers, bikers, snowmobilers, and horsepackers. The Big Sky Snowmobile Trail passes through the area. Much of the existing trail network is in need of repair or relocation to provide improved distribution of recreationists.

B. Biological Environment

The biological environment of the study area is made up of inter-relationships between species within the Area's plant and animal communities. The vegetation, wildlife, and domestic livestock that could interact in the study area will be discussed here:

The HPBH study area supports a diverse pattern of vegetation communities. The various types are zoned in a generalized elevational distribution. The area supports grasslands at the lowest elevations, which generally graduate into Douglas-fir and/or limber pine; then into lodgepole pine, spruce, or subalpine forests. The higher elevations contain whitebark pine which continues to timberline and, finally, to alpine tundra or alpine turf.

Approximately 82,000 acres of the 105,661 acres of National Forest ownership within the study area are forested. Of these forested areas, about 31,000 acres of the National Forest land are classified as tentatively suitable for timber management activities. The productive forest land is most commonly located below 8,000 feet in elevation. Map 3 shows the commercial and noncommercial timber areas. The amount of timbered land available for harvest varies by alternative.

Most of the productive forest areas contain overmature timber which has been or is being killed by mountain pine beetle and dwarf mistletoe in lodgepole and whitebark pine, and by spruce budworm in Douglas-fir, subalpine fir, and Engelmann spruce.

Riparian areas border streams and other bodies of water. They support wetland vegetation influenced by high soil moisture. These productive areas are important to wildlife and domestic livestock. The vegetation also protects streambanks and reduces the amount of sediment reaching streams. Riparian areas also reduce flood flows and aid in sustaining stream flows during dry periods of the year.

The study area provides habitat for a wide variety of wildlife species. The more important species include elk, grizzly bear, moose, deer, mountain sheep, grayling, and trout.

Several endangered bald eagles winter along the Yellowstone and Gallatin rivers near the study area. There are no known bald eagle nesting sites within the study area.

The southern portion of the study area is occupied by the threatened grizzly bear. The occupied grizzly bear habitat in the study area is estimated to be 48,600 acres.

Elk, mule deer, and moose are the most heavily hunted species in the study area. Portions of two large elk herds from Yellowstone National Park migrate into the Upper Yellowstone River and the Porcupine and Buffalo Horn creeks areas to winter. The size of the herds depend upon the severity of the winter in the Park. The area also supports a population of native elk. About 240 elk are estimated to overwinter on National Forest land within the study area.

The mule deer generally winter at lower elevations outside of the study area. A healthy population of moose summer and winter within the area. The moose are dependent on the riparian areas. Also, approximately 140 Rocky Mountain bighorn sheep are found along the high ridges of the Gallatin Range throughout the study area.

Many species of raptors are found in the area. These include hawks, falcons, and owls. Very little change would be anticipated for these species through implementation of any of the alternatives.

The study area contains numerous lakes containing coldwater fish, in addition to about 49 miles of streams considered suitable for supporting trout populations. Fish species of the study area include rainbow, brook, cutthroat, and golden trout, mountain whitefish, and arctic grayling. The cutthroat and grayling have been classified by the State of Montana as "Species of Special Concern." There are no anadromous or threatened/endangered fish in the area.

The cold and clean waters discharged from the area's streams are important to the Blue Ribbon fisheries of the Yellowstone and Gallatin Rivers.

At present, there are seven active allotments within the study area. Opportunities exist to create more livestock grazing through improved management on existing allotments and the allocation of additional suitable grazing in new areas.

C. Social and Economic Environment

The communities most directly affected by decisions regarding the Hyalite-Porcupine-Buffalo Horn are the upper Gallatin and west side of the Yellowstone River. The upper Gallatin is made up of guest ranchers, outfitters, guides, motel owners, retirees, summer and winter recreationists, and other recreation-oriented businesses. The west side of the Yellowstone is made up of working ranches.

Of particular interest are traditional uses of the area, wilderness potential, and opportunities to develop timber, grazing, mineral, and recreation resources.

IV Environmental Consequences

Environmental consequences are the expected effects of activities scheduled to implement an alternative. They are described as quantitative or qualitative changes from the current situation in terms of significance, magnitude, and duration.

A. Wilderness

The designation of additional wilderness would result in lands being left undisturbed. Primitive recreation opportunities would be maintained in these areas, as well as big game security and old growth habitat. Wilderness designation would result in less timber available for harvest and would preclude mineral development in these areas. The opportunity for direct habitat improvement would be eliminated, although some habitat variety could be maintained by wildfires.

B. Roadless Areas

The designation of specific areas for roadless recreation management would essentially keep the areas as they are today. Motorized use by off-road vehicles such as trail bikes or snowmobiles could continue. If access were needed for mining or oil and gas exploration, it could be granted. There would be greater opportunities for wildlife habitat improvements than under wilderness designation.

C. Recreation

Generally, dispersed recreation activities do not have major effects on other resources. However, in areas of heavy use, some resource damage can occur. Recreational use beyond the land's carrying capacity can damage fragile terrain such as high alpine meadows.

D. Threatened and Endangered Species

No alternative is expected to adversely affect a threatened or endangered species. Minimum management requirements, Forest-wide standards, and management area standards ensure habitat protection for the grizzly bear and bald eagle, the only two threatened or endangered species now known to occur on the Gallatin National Forest. Standards for Management Situation Area 1 grizzly bear areas place first priority on grizzly bear recovery. (These are the areas considered necessary for grizzly recovery.)

E. Wildlife and Fish Habitat

Timber harvest and prescribed burning are the two principal activities scheduled to improve wildlife habitat. Improved livestock grazing practices, particularly in elk ranges and riparian areas, also improve wildlife habitat. Timber harvest and prescribed burns result in increased forage production, with an accompanying reduction in the security cover habitat component. Improved livestock grazing practices result in more forage being available for wintering big game.

Improvement of fish habitat on the Forest is brought about by building of pool development structures and installation of aeration devices to prevent fish winterkill. In addition, culverts that impede fish passage are replaced or altered to enable fish to return upstream for spawning. Effects on other resources would be nil.

F. Minerals

Development activities would have a significant effect on the onsite environment, but disturbances would occupy very small areas.

The potential for oil and gas production exists. If exploratory or development drilling were to occur, lease stipulations are available to minimize impacts on surface resources. Possible impacts could include additional roading on the Forest. Any future drilling activities could result in impacts on visual quality.

G. Fire Management

Fire suppression activities have a favorable effect in areas where timber management is prescribed because they protect 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. Protection from burning will lead to accumulations of fuels above natural levels and can result in large, damaging fires with burning conditions that are severe. Excessive heat generated by fires in dense, dry fuels consumes litter and duff which can affect productivity and soil stability. Stream sedimentation is likely to occur after a hot, litter and humus consuming fire.

A prescribed burning program can increase forage production and reduce fuel buildup with little attendant risk to soils and watershed.

H. Livestock Grazing

Livestock grazing can affect elk ranges if not carefully managed. When elk and domestic livestock both use elk winter range--even at different times of the year-- there is a potential for adverse impacts on both species. This comes through diminished levels of forage on the range when the elk need it and from reducing plant vigor for good forage production in subsequent growing seasons. This adverse effect can be limited by controlling livestock grazing through stocking levels and use of fencing.

Riparian areas can be affected by heavy grazing as streambanks break down and the stream is subject to increased sediment and nutrient levels affecting fisheries. These impacts can be avoided by controlling stocking levels and by use of range improvements such as fencing.

I. Timber Harvest

Clearcutting and shelterwood cutting systems, which produce even-aged timber stands, are the main harvest systems used on the Gallatin. These systems account for over 90 percent of the volume harvested. Uneven-aged harvest systems will be practiced on a limited basis in special areas because it is very difficult to successfully employ this in the timber types on this Forest.

The even-aged harvest that will predominate on the Gallatin has adverse effects on visual quality that are greater in the high harvest alternatives. Water yield from Forest lands would increase with even-aged harvest, but potential for erosion would be mitigated by limits on the equivalent clearcut area allowed in any one drainage. Clearcutting reduces big game security cover, but increases habitat diversity and created transitory forage that can benefit wildlife. The increased habitat diversity creates conditions where more different wildlife species will be found on the Forest.

Clearcutting can have adverse effects on riparian areas and fisheries habitat, but these effects would be mitigated by forestwide standards. Generally, roadless recreation opportunities are reduced in areas where timber harvest occurs, with a corresponding increase in motorized and roaded forms of recreation.

J. Road System

Road construction and management have a greater impact on other resources than any other Forest management activity. Primary effects are the displacement of large amounts of soil, reduced big game security, and decreased visual resource. The wilderness potential of existing roadless areas is eliminated by road construction within those areas. Road construction increases roaded recreation opportunities while decreasing unroaded recreation opportunities.

The public presently encounters serious access problems along some parts of the Forest boundary. Roads that allow the public to reach the Forest boundaries from highways or county roads increase opportunities for recreation and other activities like firewood gathering. The presence of roads can also reduce the difficulty and expense of minerals exploration or development projects. Forestwide standards for road construction/maintenance can reduce some of the negative effects of roading.

CHAPTER I. PURPOSE AND NEED FOR ACTION

A. Introduction

This study report is to determine the suitability of the 155,000-acre Hyalite-Porcupine-Buffalo Horn area for wilderness and to make a recommendation as to how the area should be managed. This is accomplished by analyzing six land use alternatives for the area. This report also has other objectives, as follows:

- (a) To extract and display the appropriate RARE II findings, (Forest Service, 1978),
- (b) to address issues and concerns identified for the study area by the general public and by Forest personnel,
- (c) to describe the affected environment and disclose the environmental consequences of implementing the Proposed Action and alternatives, and
- (d) to incorporate a discussion of land use for the Hyalite-Porcupine-Buffalo Horn Area into the larger context of forest planning under provisions of the National Forest Management Act (NFMA). Establishing this context provides an integrated picture of land use for the Forest as a whole.

This study report provides the basis for public review and comment at the formal, public hearings as directed by the Montana Wilderness Study Act (MWSA).

The proposed recommendation in this study report is an integral part of the proposed National Forest Land and Resource Management Plan (Forest Plan), which is detailed in a separate publication.

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. The Hyalite-Porcupine-Buffalo Horn area, which is the subject of this study, is one 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 nine areas be studied using the procedures in Sec. 3(b) and 3(d) of the Wilderness Act (P.L. 88-577). These procedures include:

- Determining suitability for wilderness designation.
- Public notice and hearings.
- Notice to Governor of Montana, county governments, federal departments, and agencies concerned.
- Sixty-day review period.
- Incorporating hearing record, and governmental agency and department comment in the report to Congress.

The Hyalite-Porcupine-Buffalo Horn area was also included in the RARE II study process which was initiated in June of 1977. All of the nine Montana Wilderness Study Act areas were included in the RARE II inventory. The purpose of RARE II was to study all roadless and undeveloped areas in the National Forest System and recommend them as either wilderness or nonwilderness.

The RARE II process did not meet all the requirements of the MWSA legislation. For instance, RARE II did not provide for public notice and hearings, and the incorporation of the hearing record in the report to Congress. Even so, the Forest Service decided to begin the evaluation of the MWSA areas by including them in the RARE II process to the extent possible. Through the RARE II process, all MWSA areas were placed in a "further planning" category until the remaining requirements of the MWSA legislation were completed. The final requirements of MWSA will be met by use of the evaluation and recommendations presented in this document as well as by the public hearings called for in P.L. 95-150.

C. General Area Planning Description

The Hyalite-Porcupine-Buffalo Horn Study Area contains approximately 155,000 acres of the Gallatin Range in southwestern Montana. The area includes the mountain divide lying between the Gallatin and Yellowstone rivers south of Bozeman, Montana. The study area is approximately 35 miles in length and 8 miles in width. The southern boundary lies adjacent to the northwest corner of Yellowstone National Park. The area is within Gallatin and Park counties. A large portion of the area is privately owned in a checkerboard ownership pattern (see the Vicinity Map at the end of the chapter).

Approximate ownership of the study area is:

National Forest	105,700 acres
Burlington Northern	36,000 acres
Other Private	6,700 acres
State of Montana	5,500 acres
City of Bozeman	1,100 acres
Total	155,000 acres

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 public comments:

1. What other Federal lands are classified or proposed as wilderness in the surrounding area? To what extent should they influence the classification of this study area?
2. What are the recreation opportunities presently, and what can the area support in the future?

3. What are the principal game, nongame, and threatened and endangered species and what are the opportunities for habitat improvement?
4. What type, condition, and amount of road or trail access does the area contain and what is the need for the future?
5. 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?
6. What is the current amount and type of motorized vehicle use and what is the potential for that use?
7. What are the present conditions and uses of the area's watersheds? What are their relative sensitivities to development activities?
8. What is the timber potential of the area, and where is timber management most appropriate?
9. What is the mineral potential of the area and how should the area be managed for that potential?
10. What is the present use and opportunity for cutting household firewood; and what other energy considerations, such as energy transmission corridors, need to be made?
11. What is the present livestock use of the area and what is the potential for that use?
12. What is the present landownership pattern and what is the opportunity to manage the area as wilderness with inholdings? What are the possibilities for ownership consolidations?
13. What is the present and future potential for serious fire and/or insect and disease infestation? What are the current protection measures, and what measures need to be taken in the future?
14. What are the wilderness attributes of the study area and to what extent are they suitable for wilderness?

A separate intensive effort to identify public issues and management concerns was made for the Gallatin National Forest as part of the Forest planning process. Fourteen planning questions were developed to display the issues recorded during workshops and from mailed comments. Most of these Forest Plan issues closely resemble or overlap the MWSA issues just listed. Two Forest Plan issues do not resemble the MWSA issues and are pertinent to this study:

Forest Plan Issue No. 2 - How should the Hyalite-Porcupine-Buffalo Horn area be managed?

Forest Plan Issue No. 9 - What special attention will be given to the use and management of riparian areas?

E. Organization of Chapters II, III, and IV

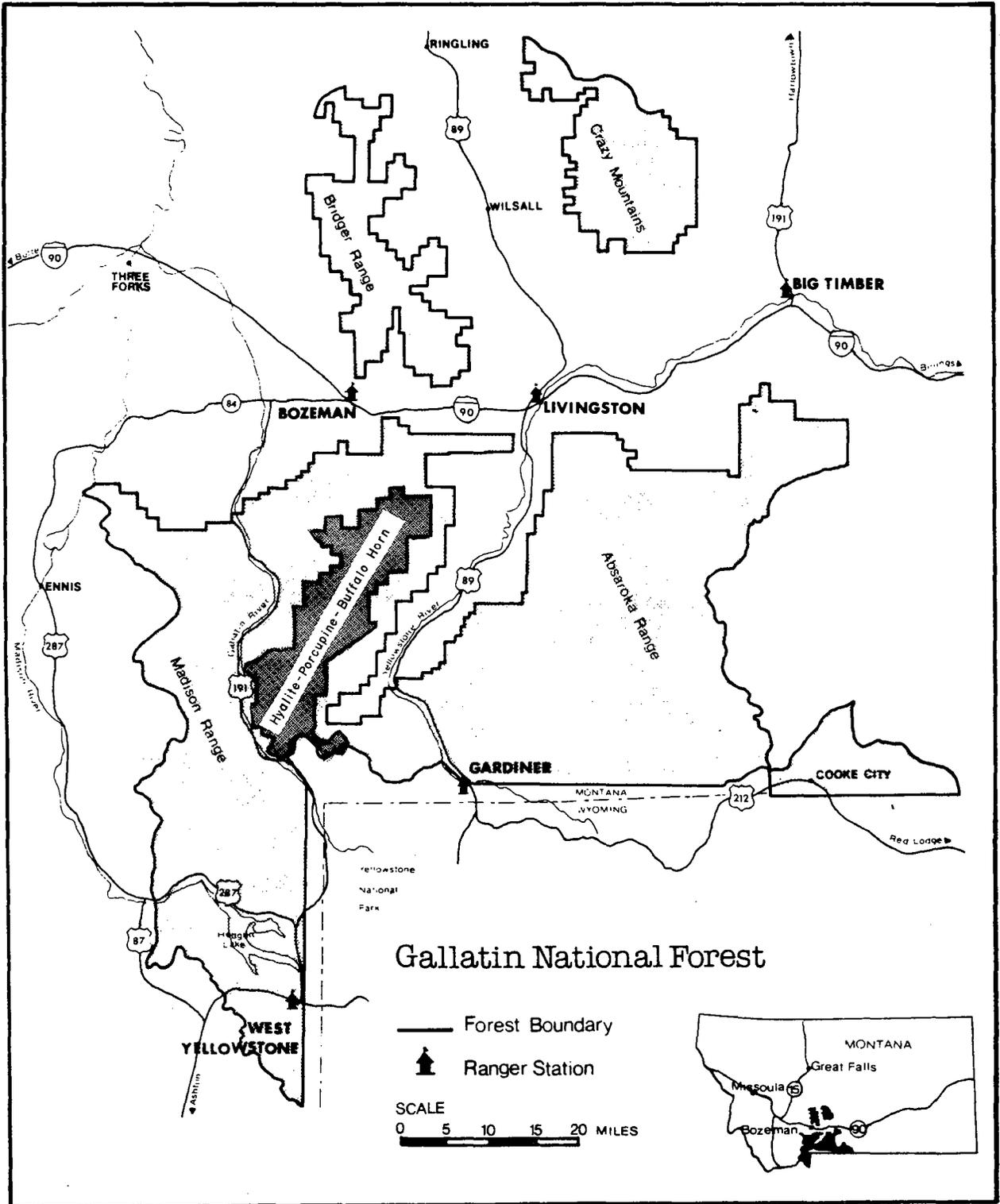
In Chapter II, "Alternatives including the Proposed Action," alternatives are described by showing the outputs, costs, and major effects of meeting different objectives. These outputs, costs, and effects are displayed by individual resources.

In Chapter III, "Affected Environment," the information analyzed in "Alternatives" and "Environmental Consequences" is used to describe the present situation as well as future conditions created by the implementation of each alternative.

In Chapter IV, "Environmental Consequences," the type and amount of activities are identified which would produce the outputs and create the costs already identified. These activities produce certain environmental consequences, beneficial and adverse; create a relationship between short-term use of man's environment and the maintenance and enhancement of long-term productivity; and may or may not irreversibly and irretrievably commit resources to certain uses.

Vicinity Map

Figure 1-1



II. ALTERNATIVES INCLUDING THE PROPOSED ACTION

A. Introduction

In the National Forest Management Act (NFMA) planning process, a land management alternative is a plan to guide management of the land and resources of the Forest from the current state to a desired future condition.

The requirements of the National Environmental Policy Act (NEPA) and the NFMA establish guidelines for alternative formulation. The alternatives considered in this chapter address issues and concerns; represent different combinations of the management prescriptions; schedule activities in different locations; and produce varying levels of outputs, goods, and services. The entire set of management prescriptions available for allocation is the same for all alternatives, but the number of acres allocated to each prescription differs by alternative.

B. The Development Process

The alternatives generated in the development process are a range of responses to the issues and management concerns identified at the beginning of the study process. They were developed as part of the Forest-wide alternatives and the analysis contained in this report was done as a part of the overall Forest planning process. This report, however, displays a more in depth analysis of the Hyalite-Porcupine-Buffalo Horn Study Area than was displayed in the Forest Plan DEIS.

1. Planning Steps

The following steps summarize how NEPA planning actions were accomplished:

STEP 1: Public issues were identified through a public participation process that included a series of public meetings and mailings. Management concerns and opportunities, identified by the Forest and district staff, were added.

STEP 2: Sixteen issue statements were addressed in the alternatives for the HPBH study report. This included 14 issue statements from the statewide Montana Wilderness Study Act workshops, plus those Forest planning issue statements that did not overlap the MWSA issues. The relevant issues and concerns are summarized in Chapter 1.

STEP 3: Management prescriptions, representing sets of compatible management practices, were developed by taskforces consisting of interdisciplinary team members, specialists, district rangers, and district personnel. These multiple use prescriptions incorporated management strategies in response to the planning questions.

STEP 4: Analysis areas were identified. These are areas of the Forest that have common characteristics and to which appropriate management prescriptions or groups of prescriptions can be applied.

STEP 5: Management costs and resource yields were developed for the management prescriptions. They varied according to the physical and biological aspects of the analysis areas where the prescription might be applied and also by the various management options available through the different prescriptions.

STEP 6: Supply potentials for each resource were determined with the FORPLAN model. Various assumptions, constraints, and objectives were used to establish benchmarks for supply potentials of each resource during the Analysis of the Management Situation (AMS). The FORPLAN model, the assumptions, constraints, and objectives are explained in detail in Appendix B of the Forest Plan DEIS. Benchmarks were established for the minimum level, maximum resource levels, and maximum present net value. Existing resource supply was compared to supply potentials of each benchmark. Opportunities to resolve issues and management concerns were identified for each resource by comparing existing to potential production levels.

STEP 7: Demand was estimated with an emphasis on goods and services highlighted in the planning questions. Demand was then compared with supply potential in the context of the planning questions to identify opportunities for adjusting outputs to better resolve public issues and management concerns. Demand estimates were also used to place a limit on the amount of output that was valued in the FORPLAN analysis.

STEP 8: Outline versions of alternatives were formulated jointly by the Forest Supervisor, management team, interdisciplinary team, and specialists. This effort was made after the initial draft of the Analysis of the Management Situation had been completed and made available to the staff. The outlines of the alternatives were revised in a series of meetings and consultations over a period of two months. This included review with a group of individuals selected from the general public who represented a wide variety of special interests. These steps resulted in the alternatives discussed in this chapter.

STEP 9: FORPLAN, a large scale linear programming model, was used to analyze the alternatives. The FORPLAN model allocated the forest resources for differing output levels of goods and services to meet the objectives of each alternative in the most cost-efficient way. The alternatives were modeled by using constraints on how the land was allocated and on the amount of outputs that could be produced. Imposing these constraints helped to meet objectives such as water quality, big game population levels, amount of wilderness, timber, or livestock grazing. Both market and nonmarket values were projected by decade, and interactions and conflicts between resource activities were estimated. Successive revisions and modifications--both in the modeling process and in the alternatives themselves--proceeded until a satisfactory range of attainable alternatives was produced which satisfactorily addressed the public issues and management concerns.

STEP 10: HPBH alternatives were evaluated within the alternatives for the Forest Plan. Using FORPLAN to evaluate the alternatives for the HPBH along with the alternatives for the Forest Plan allowed the total impacts of all resources

to be measured forestwide. Analysis areas were formulated so as to break out information specific to the HPBH for purposes of analysis.

The process of developing the alternatives is complex, and has necessarily been simplified here. For a more in-depth review of the process, see Appendix B of the Forest Plan DEIS.

2. Management Prescriptions

The NFMA regulations define management prescriptions as "management practices selected and scheduled for application on a specific area to attain multiple-use and other goals and objectives."

The interdisciplinary team and resource specialists developed a set of multiple resource management prescriptions applicable to the Gallatin National Forest and capable of addressing the public issues and management concerns. This set of prescriptions portrays a broad range of management emphases, intensities, management practices, standards and guidelines. The management standards and guidelines needed to accomplish the goals of a prescription include the necessary mitigation and resource coordination measures that are required by existing laws, regulations, and policies.

To develop ways of managing the study area for a variety of uses, the interdisciplinary team developed a set of rules that included economic and cost effectiveness considerations. These rules guide the assignment of management prescriptions to various parts of the Forest (referred to as analysis areas in FORPLAN). Within the rules and limitations of the model, the team considered all management prescriptions appropriate for each of the analysis areas in the study area. The team based the assignment of management prescriptions on the land's inherent capability for resource production. Rules developed by the interdisciplinary team and their rationale are in the Forest planning records.

For this basic set of management prescriptions applied to the land, the Forest team developed yield and cost or effect tables for FORPLAN modeling for each prescription. These prescriptions were used for the development of both benchmarks and alternatives after some initial screening analysis to determine cost effectiveness.

3. The Computer Model (FORPLAN)

FORPLAN was the fundamental analytical tool used by the interdisciplinary team to simultaneously allocate resources and schedule management practices over time, i.e., model different management alternatives. FORPLAN served two purposes in the wilderness study analysis. First, it provided an objective basis for the optimal allocation and scheduling of management prescriptions for each analysis area. Second, the analysis provided an effective tool to quantify outputs, costs, and acres allocated to management prescriptions.

Allocation and scheduling of management prescriptions for analysis areas was accomplished for each alternative by defining the objective function, constraints on outputs, and management practices used. For each alternative, one or more multi-resource prescriptions were selected for each of the analysis areas. Analysis for all alternatives considered in detail was carried out with the same objective function--the maximization of present net value defined

below. Use of this same objective function made resource relationships and tradeoffs comparable and convenient to track.

4. How Economic Efficiency Was Used in the Development of Alternatives

The National Forest Management Act requires that an extensive economic efficiency analysis be incorporated into the planning process. The purpose of this analysis on the Gallatin is threefold. First, it assures that each alternative contains the most cost-efficient combination of management activities which meets the objectives of that alternative. Second, it provides a means to evaluate or compare alternatives for the purpose of choosing among them. Third, it allows a quantitative starting point from which nonpriced costs and values can be assessed.

To address the first point, two steps were taken. First, the management prescriptions were constructed so that they combined the least cost management practices which would fulfill the goal of the prescription. Where the goal has been specified, the least cost management option is the most cost efficient.

Second, cost and value coefficients were developed for each of the management prescriptions considered by the interdisciplinary team. Where site characteristics such as slope and soil sensitivity would affect costs, different cost coefficients were specified. Given a wide range of management prescriptions with a variety of costs and benefits, cost efficient alternatives could be created.

Present net value (PNV) is the primary measure of economic efficiency used in creating and comparing alternatives. PNV is the discounted value of benefits over the 150-year planning horizon minus the discounted value of costs over the same period. PNV applies only to quantifiable outputs. A real discount rate of 4 percent was used to calculate the present value of future costs and benefits. The 4 percent rate approximates the rate of return on new private capital investment over and above the rate of inflation. It represents the minimum interest rate which Forest Service investments must earn to have as high an economic return as the average private corporate investment. In addition, a 7 1/8 percent discount rate was used to determine the sensitivity of the PNV to the discount rate.

In the FORPLAN model, cost and value coefficients were used to calculate the PNV per acre for each management prescription and timing choice. The costs included in the calculation of PNV can be placed in two categories: those included in FORPLAN and those calculated outside FORPLAN. Those included in FORPLAN affected the allocation and scheduling in each alternative; those calculated outside FORPLAN did not. The costs built into the FORPLAN model comprise about 97 percent of the total cost of each alternative. Those costs not contained in the formulation consist of additional costs for several activities, including collector road construction, minerals management, developed recreation site construction, and acquisition of private land for access.

Three resource outputs were priced in FORPLAN: timber, range, and recreation use. Timber prices are based on a stumpage value equation which predicts statistical high bid--that is, the price paid to the Forest Service for stumpage. Range is priced per animal unit month (AUM) of forage utilized. Four types of recreation visitor days (RVDs) are priced in the model: primitive,

(4) Minerals

9. Availability of minerals, oil, and gas - these potential resources were not given monetary values in FORPLAN. As a proxy for the unknown quantities, it was necessary to value in a nonpriced way the approximate availability for exploration and development that the land allocations of the various alternatives provided. This availability for exploration and development was considered for each alternative in the evaluation of public net benefit and is displayed later in this chapter.

(5) Protection

10. Reduction of insect and fire hazard -the potential for insect infestation and fire hazard is high over the long term. This is because the study area has large areas of mature and over-mature stands of timber which are highly susceptible to insects and wildfire. Timber harvest and fire management are the chief means of improving the age class distribution. This benefit is evaluated for each alternative.

(6) Other Benefits

11. Coordination and cooperation with other landowners because of the large number of adjacent and intermingled landowners, the Gallatin National Forest can both affect and be affected by their management. Coordinating Forest land uses with other landowners is viewed as an additional nonpriced benefit.

12. Local lifestyles - factors that could affect lifestyles are jobs and income dependent on resource-related industries, individual use of the forest resources, and access to public lands. These factors were considered for each alternative.

13. Amount of change - keeping changes in Forest management at a low level was considered to be a nonpriced benefit by the interdisciplinary team. The amount of change from the present will be addressed and evaluated in the alternatives. Of value to many people is a knowledge that the resource uses and outputs in the HPBH will not change markedly, that the way the land has been used traditionally can be expected to continue for some time. Some alternatives present a major change from the current direction and some show only minor changes. This change can be measured in terms of acres allocated to different emphasis and also by the resource outputs such as timber, range, and recreation.

C. Benchmarks

Benchmarks are an indication of the resource supply potentials that are available from a specified area of National Forest land. Benchmarks were determined by the outputs of a full wilderness alternative and a nonwilderness alternative which produced either the maximum or minimum amount of various resources such as wilderness, timber, motorized dispersed recreation, etc. There was no specific benchmark analysis performed for the HPBH as part of the Analysis of the Management Situation (AMS). The benchmarks resulted from the development of the alternatives and a comparison to the known situation as described in the Affected Environment (Chapter 3).

(1) Recreation

1. Recreation quality - within the alternatives, the assigned recreation values do not reflect such quality aspects as the dispersal of users, minimizing conflicts between user groups, and the desirable location of the required settings.
2. Recreation diversity - the opportunity for a diverse number of types of recreation such as wilderness, motorized, nonmotorized, or roadless recreation cannot be adequately portrayed in the assigned values used for PNW calculations. A measurement of recreational quality and diversity can be found in the number of acres given to recreation emphasis and in the amount of investment in road and trail construction and maintenance.
3. Free and low cost consumptive goods - benefits such as fuel wood, wild game, fish, Christmas trees or posts and poles, often of both recreational and more direct economic value to many people, are not assigned a dollar value in the FORPLAN analysis.
4. Visual quality - the benefit of visual quality is not included in the recreation values. The alternatives vary in their sensitivity to visual quality and each was evaluated according to how it met visual standards.

(2) Wildlife and Fish

5. Quality hunting and fishing - the quantity of big game hunting and fishing visitor days valued in the FORPLAN model varies by alternative. However, differences in the quality of these recreation experiences are not reflected in the PNW calculation. The hunting opportunity index discussed later in this chapter reflects opportunity to harvest big game under different alternatives.
6. Threatened and endangered species - the value of maintaining or restoring viable populations of these species is not included in PNW. The grizzly bear, a threatened species, does exist within the study area. Providing secure habitat for the grizzly to help recover the population is a nonpriced value which is evaluated for each alternative. A quantitative measurement, however, is the amount of land assigned to grizzly bear emphasis.

(3) Watershed

7. Water quality - water quality can be adversely affected by road construction, timber harvest, or other management activities. In some watersheds, development is shown to cause an increase in sediment production and a corresponding decrease in fish habitat and stream channel stability. Watershed values were not included in the calculation of PNW so these are evaluated as public net benefits for each alternative.
8. Riparian protection - the riparian vegetative zone is an integral part of the watershed value because it provides habitat for several animal species, protection to important stream fisheries, plus forage for big game and livestock.

D. Need/Opportunity For Change

The Montana Wilderness Study Act requires the Secretary of Agriculture to study and make recommendations to Congress on the wilderness suitability of the Hyalite-Porcupine-Buffalo Horn Study Area. These lands must be managed, subject to existing private rights, in such a way that their suitability for wilderness designation not be impaired until such time that Congress chooses to act.

1. Recreation

Wilderness designation would ensure a recreation opportunity for primitive recreation into the future. In contrast, nonwilderness would provide opportunities for a wide range of recreational experiences, including motorized and nonmotorized dispersed types, and fewer primitive opportunities in this particular area.

2. Wilderness

The opportunity exists to add up to 145,900 acres to the Wilderness Preservation System. National Forest land with wilderness character would be included. Undeveloped private lands within the study area would need to be acquired for wilderness.

3. Wildlife

Nonwilderness designation would allow numerous opportunities for wildlife habitat modification, including vegetative manipulation through timber harvesting and rangeland spraying.

4. Range

Opportunities exist to increase livestock grazing on nonwilderness lands through more intensive management and stocking of currently unallocated rangeland.

5. Timber

Nonwilderness status would allow the timber resources of the area to be more fully utilized and managed. Many timber stands have been depleted through insect infestations. These stands could be salvaged and put into more vigorous growth conditions through timber harvest.

6. Minerals

Mineral exploration and development would not be allowed within classified wilderness.

Table II-1 displays the maximum and minimum benchmark for outputs for the HPBH area associated with the public issues. The outputs displayed are average annual for the first decade unless otherwise indicated.

TABLE II-1. Average Annual Resource Production Benchmark Values

<u>Resource Item</u>	<u>Units</u>	<u>Minimum Benchmark</u>	<u>Maximum Benchmark</u>
Proposed Wilderness	Acres	0	145,900 ^{1/}
Motorized Dispersed Recreation	RVD	0	15,800
Nonmotorized Dispersed Recreation	RVD	15,000	37,800
Capable and Available Land for Timber Management	Acres	0	30,964
Suitable for Timber Management	Acres	0	25,454
Timber Sale Volume			
First Decade	MMBF	0	1.41
Fifth Decade	MMBF	0	6.00
Elk Winter Range Capacity	No. Elk	150	710
Area with Grizzly Emphasis	Acres	0	35,300
Grazing Potential (AUMs)	AUM	60	5,929
Budget Required to Implement, First Decade	M\$	102	359
Present Net Value (\$)	M\$	6,673	16,097

^{1/} This would include 105,300 acres of National Forest land and 40,600 acres of intermingled private land which would need to be acquired for wilderness. Some 2,100 acres of private land and 400 acres of National Forest land within the study area which is presently roaded and/or logged would be excluded. Another 5,500 acres of State land and 1,100 acres of City of Bozeman land would be located within the wilderness boundary but would not be acquired by the Forest Service for wilderness classification.

All forms of dispersed recreation presently available in the study area would continue and would increase over time. Motorized dispersed recreation would increase at the highest rate because road construction would make more opportunities for motorized recreation available. Nonmotorized and primitive recreation would increase but at somewhat lesser rates. Overall recreation use is estimated to increase by 72 percent over 50 years--from 46,200 visitor days to 79,400 visitor days annually. Alternative 1 is estimated to provide the second highest total recreation use of all the alternatives. Such increased use would result in increased conflict between the various types of recreation users. Wildlife populations would be subjected to increased stress from the higher levels of human activity.

Recreation activity could be restricted where necessary to minimize encounters between man and the grizzly bear.

The high levels of dispersed recreation would not be accompanied by corresponding high levels of investment in management, maintenance, and construction of trails and trailhead facilities. High levels of trail use without increased investment would result in a deteriorating trail system with increased erosion and sedimentation.

b. Wilderness

Under Alternative 1, none of the HPBH would be recommended for wilderness designation.

c. Visual Quality

In Alternative 1, visual resources (i.e., scenic values) would be considered in project level plans. Some 78,600 acres, or 74 percent of the 105,661 acres of National Forest land would be managed for high visual quality (i.e., retention and partial retention visual quality objectives).

d. Wildlife and Fish

(1) Elk

The HPBH Study Area includes 17,300 acres of elk winter range on National Forest lands. Another 2,900 acres of Burlington Northern Railroad Co. (BNRC) lands and 2,700 acres of State of Montana lands in the study area are considered elk winter range. Winter range capacity is considered to be the limiting factor to elk populations in this area. The National Forest winter range in the study area presently supports an estimated 240 elk on an average five-month basis. Under Alternative 1, this population would be maintained at the current level. This would be accomplished by a moderate level of investment in habitat improvement to maintain the present levels of forage production. Elk are used as the indicator species for the grass/forb/shrub habitat conditions related to early Forest successional stages.

E. Alternatives Considered in Detail

The Montana Wilderness Study Act requires the Secretary of Agriculture to make a recommendation to Congress on the wilderness suitability of the Hyalite-Porcupine-Buffalo Horn (HPBH) study area. A range of wilderness and nonwilderness alternatives for the HPBH was considered in the Forest Plan DEIS along with the current direction alternative. Seven alternatives were originally developed and Alternative 6 was eventually eliminated from further consideration because it was similar to Alternative 3.

The numbering of the six alternatives presented in this study report correspond to the Forest Plan DEIS alternatives. DEIS Alternative 1 corresponds to HPBH Alternative 1, for example. Forest Plan DEIS Alternative 8 and 9 for the study area are the same as Alternative 5. Alternative 3 and 6 are also the same. The following table will help illustrate this correspondence. It also illustrates how the HPBH Study Area is allocated:

<u>Forest Plan DEIS Alternative</u>	<u>HPBH Alternative</u>	<u>HPBH Allocation</u>
1	1	Nonwilderness
2	2	Nonwilderness
3,6	3	Wilderness (80,300 acres)
4	4	Wilderness (22,100 acres)
5,8,9	5	Wilderness (145,900 acres)
7 Proposed Action	7 Proposed Action	Nonwilderness

1. Alternative 1

Alternative 1 is the current direction alternative. This alternative has the objective of implementing the current recommendations for management on the Gallatin Forest. This alternative assumes a continuation of current management direction as has been set by various laws, policies, and assessments. Alternative 1 assumes the HPBH Study Area is managed as nonwilderness.

a. Recreation

The HPBH Study Area currently receives a high level of dispersed recreation. Much of this recreation is nonmotorized, and includes hiking and hunting. The Gallatin Petrified Forest, of which 19,200 acres is within the study area, is open to gathering samples of petrified wood on a permit basis.

The study area also provides a moderate level of primitive recreation, which is characterized by absence of motorized use, an unmodified environment, and a high level of solitude.

The Big Sky Snowmobile Trail traverses part of the study area in Porcupine and Buffalo Horn creeks for approximately 12 miles. This trail accounts for a large part of the present motorized recreation use in the HPBH. Motorbiking is also becoming more popular in portions of the areas.

Livestock are not grazed on important big game winter range under this alternative. The low level of livestock use on the elk summer range is not expected to have a measureable effect on elk populations in the HPBH Study Area.

f. Timber

Under Alternative 1, 17,760 acres are allocated to timber management prescriptions out of a total of 30,964 acres of commercial forest land. An average of 178 acres would be harvested each year over a 100-year period. The average annual volume of timber harvest from the study area under this alternative would be 1.8 million board feet. In addition to contributing to the Forest's output of usable wood products, this harvest level would permit some salvage and utilization of insect killed timber. It would also make additional areas available for firewood cutting.

Timber management under this alternative would result in replacement of large areas of overmature stands with a diversity of thrifty stands of various ages. Such stands would be less susceptible to insect epidemics and fire than the wild stands.

Timber harvest would provide an opportunity to sustain optimum forage/cover relationships for big game. At the same time, hiding cover would be removed and more open road access would be provided. This would result in changes in hunting conditions. Hunter success during the regular season could be greater overall, but a higher percentage of the game harvest would occur in the first few days of the season and chances for a kill later in the season would diminish. Road closures would be used to alleviate this situation.

This alternative is expected to result in construction of a total of 185 miles of local and collector roads within the study area over a 100-year period.

g. Water and Soils

This alternative would produce about a 1 percent increase in water yield as a result of timber harvest. There would also be minor increases in sedimentation from road construction. These levels would be extremely difficult to detect. Further, the natural siltation levels often vary more than 100 percent from year to year and sometimes vary by as much as ten-fold. Timber harvest on National Forest land would need to be coordinated with timber harvest on private land to minimize adverse effects to wildlife and water quality.

h. Minerals and Oil/Gas

The mineral potential of the study area is unproven. An assessment by the U. S. Bureau of Mines indicates a low potential for production of hardrock minerals. There may be some potential for oil and gas discovery in the area. Applications for oil and gas leasing on 33,900 acres of the study area are on file. Forest Service geologists have rated the area as having zero potential for hardrock minerals on a scale of zero to 100. For oil and gas potential, the geologists rated the area 78 on a zero to 100 scale.

Under this alternative, the entire study area is available for surface occupancy leases. In writing the leases, a wide range of legal stipulations are

(2) Species Favoring Old Growth

The goshawk is used as indicator species for habitat conditions characteristic of late forest successional stages. Ten percent in late forest succession of a 5,000 acre home range is considered optimum for a breeding pair of goshawks (Sara Johnson, pers. comm.). This alternative more than meets this requirements. Goshawks probably do not breed at elevations above 7,000 feet in the study area.

Alternative 1 is considered to have ample habitat capability to support viable populations of species requiring both early and late forest successional stages. By way of illustration, only 57 percent of the 30,964 acres of commercial forest land in the National Forest portion of the study area are considered suitable for timber harvest under this alternative. The remaining 43 percent of the commercial forest would have no timber harvest and would be available for wildlife that benefits from unmanaged timber stands. In addition, there would be additional forested lands which are not considered commercial forest.

(3) Bighorn Sheep

Approximately 140 Rocky Mountain bighorn sheep are found along the high ridges of the Gallatin Range throughout the study area. Under Alternative 1 this population would increase to approximately 210 head.

(4) Grizzly Bear

There are 35,300 acres of occupied grizzly bear habitat on National Forest land within the HPBH Study Area. All of area considered to be needed for recovery of the species would be managed to favor the grizzly.

(5) Fisheries

About 49 miles of stream capable of supporting trout are found within the National Forest portion of the study area. There may be slight short-term decreases in trout populations due to siltation from road construction and timber harvest. Continued livestock grazing in riparian areas without increased investment to regulate forage utilization results in streambank degradation. However, under this alternative the low levels of grazing currently practiced in the HPBH Study Area are not expected to significantly affect the fish populations.

e. RANGE

Livestock grazing under Alternative 1 would remain at the present permitted level of 290 Animal Unit Months in the study area. This is 5 percent of the estimated grazing capacity of 5,920 AUMs for the study area. This alternative would forgo a significant potential for increased livestock production and the related social and economic benefits.

The present pattern of grazing use would continue under this alternative. Investment in range improvement and improved grazing distribution systems would be at a low level. Present patterns of grazing in valley bottoms would result in slight degradation of streambanks over time. However this is not expected to be significant because of the low levels of grazing use in this alternative.

user groups. Wildlife populations would also be subjected to increased stress from the increased recreational activity.

b. Wilderness

Under Alternative 2, none of the HPBH would be recommended for wilderness designation.

c. Visual Quality

Alternative 2 assigns 74 percent of the National Forest portion of the study area to prescriptions which provide for high visual quality of landscape (e.g., retention or partial retention visual quality objectives). This does not take into account effects of activities which are not considered in the FORPLAN analysis, such as activities involving rights of access to private, intermingled lands, or possible minerals developments.

d. Wildlife and Fish

(1) Elk

Big game populations would decrease under this alternative. The capacity of the elk winter range in the study area would be about 200 animals--40 fewer than for Alternative 1 and 260 fewer than for Alternatives 3, 4, and 7, which are the highest elk alternatives. The reductions in elk habitat capacity would be caused by increased competition for forage by domestic livestock on elk winter range and less investment for big game habitat improvements.

Under Alternative 2, the elk winter range in the study area would be stocked with cattle and some of the bighorn sheep range along the crest of the Gallatin Divide would be apportioned to grazing of domestic sheep. Introducing domestic sheep grazing on this range could cause stress to the wild sheep and make them more vulnerable to diseases and parasites.

(2) Species Favoring Old Growth

Alternative 2 would provide an adequate level of old growth to maintain viable populations of species requiring old growth habitat conditions. In this alternative, 69 percent of the commercial forest land is allocated to timber management prescriptions; the remaining 31 percent would have no timber harvest. The 9,614 acres of commercial forest land not managed for timber would contribute to the needs of goshawk and other species requiring late forest succession or old growth habitats. In addition, the 50,500 acres of forested land not considered capable commercial forest land would further provide for those species.

The timber harvest would result in more open roads and less hiding cover for big game. This would lead to a greater percentage of the elk kill within the first few days of the regular hunting season. Hunting pressure on the big game herd would increase as a result of the improved access.

available as needed to protect surface resources. These stipulations include provision for protection of riparian areas, wildlife, archeological resources, water quality, and threatened and endangered species. If a high level of oil and gas activity, including exploratory drilling, were to occur, a separate environmental analysis would be prepared to consider the effects of each proposal and phase of activity.

i. Lands

Within the boundaries of the HPBH Study Area are 49,305 acres of nonfederal land. This total includes the following:

<u>Ownership</u>	<u>Acres</u>
Burlington Northern Railroad Co.	36,007
Other Private	6,717
Montana Department of Fish, Wildlife and Parks	5,466
City of Bozeman	1,115

Alternative 1 would have no impacts on these nonfederal lands.

j. Economics

This alternative has a present net value (PNV) of \$11,286,000. It has a benefit/cost ratio of 2.5. PNV and benefit/cost ratios for the alternatives are detailed in Table II-14.

2. Alternative 2

This alternative emphasizes the production of timber, livestock forage, and minerals from the National Forest. Investments in Alternative 2 are generally made to emphasize resource production.

a. Recreation

Total dispersed recreation outputs for Alternative 2 are second highest of the alternatives. These outputs are essentially the same as for Alternative 1. High levels of motorized and nonmotorized dispersed recreation contrast to a low level of primitive recreation. All forms of dispersed recreation presently available in the study area would continue and would increase under Alternative 2. There would be no developed recreation outputs from the study area under this alternative.

A low level of investment in trail construction, improvement, and maintenance would lead to degradation of existing trails with some increases in erosion and sedimentation.

As in Alternative 1, the high levels of increased recreation use over the next 50 years would be expected to result in increased conflict between different

g. Water and Soils

Alternative 2 would have the highest level of sedimentation of all the alternatives because it represents the highest levels of road construction. Sedimentation that would be produced has been estimated at 6.6 percent above the natural level of sediment production for the study area. This level would be essentially undetectable in light of the natural variations in runoff and siltation.

Increased runoff as a result of timber harvest is also expected to be negligible. The current mountain pine beetle epidemic is expected to outweigh the effects of timber harvest relative to overall increased runoff from the watersheds.

h. Minerals - Oil/Gas

Alternative 2 would have a high level of emphasis on minerals development. The entire study area would be available for surface occupancy leasing. The consequences of mineral development are difficult to assess because the mineral potential of the area and the level of possible activity are unknown. Mineral potential is estimated to be relatively low, and petroleum potential to be moderate. Any specific proposals for minerals projects would be subject to project environmental analysis.

Roads constructed for development of other resources would aid in the exploration for minerals in the study area.

i. Lands

This alternative would not affect the private, intermingled lands. No acquisition or exchange of private lands is anticipated in this alternative.

National Forest road developments which cross Burlington Northern Railroad Co. (BNRC) lands could be cost-shared based on the relative utility of the road to each party.

Generally, this alternative would increase access to the National Forest. The increased accessibility and use of the National Forest could cause increased trespass and related problems for intermingled private land owners.

j. Economics

The calculated present net value is \$11,321,000. The benefit/cost ratio is the lowest of any alternative at 2.2.

3. Alternative 3

This alternative would recommend creation of an 80,290-acre wilderness in the HPBH Study Area. Proposed boundaries would include 64,200 acres of National Forest and 16,090 acres now owned by Burlington Northern. The BNRC land would need to be acquired. Alternative 3 would make a moderate level of investment in fisheries, big game, and grizzly bear management. Emphasis would be on wilderness and wildlife, with de-emphasis of market-type outputs.

(3) Grizzly Bear

This alternative would have the least amount of occupied grizzly bear habitat in prescriptions which specifically favor grizzly bear populations. The portion of occupied habitat determined needed for the species would be managed to provide for its recovery.

(4) Fisheries

Alternative 2 would have the lowest level of trout output of the HPBH alternatives, with a estimated reduction of 485 catchable fish below the estimated potential population of 8,820 catchables. This would amount to a 5.5 percent reduction for the study area.

e. Range

Alternative 2 would provide the highest level of domestic livestock grazing of the HPBH alternatives. It would provide for grazing of 5,420 animal unit months (AUMs) compared with a current level of 290 AUMs for the study area. This increase in grazing would constitute a significant economic benefit to area ranching operations.

Livestock grazing under Alternative 2 would utilize some of the forage presently supporting the elk herd wintering in the area. This would reduce the capability of that winter range to support elk. Alternative 2 provides for livestock on bighorn sheep range. This could place increased stress on those animals.

Cattle grazing in occupied grizzly habitat would be increased by some 40 AUMs under this alternative.

f. Timber

Alternative 2 would have the highest allocation of acres to timber management prescriptions of all the alternatives. This alternative would assign 21,350 acres to timber management, with an annual harvest of 1.8 million board feet. Timber harvest operations would be conducted on an average of 214 acres per year within the study area. This level of timber management would provide the best opportunity to improve the production and vigor of the timber stands and to salvage the most amount of insect killed timber. Timber harvest would provide improved age class distribution in the stands over time. More vigorous and younger timber stands would result that would be less susceptible to widespread insect epidemics.

This alternative could be expected to result in construction of approximately 185 miles of roads within the study area, providing better access for motorized forms of recreation and for gathering home firewood. The main collector roads would generally remain open to public use, and approximately 30 percent of the local timber harvest roads would also remain open.

The increased timber harvest would result in a reduced level of hiding cover for elk. Timber harvest on National Forest land would be coordinated with harvest activities on private land to minimize adverse effects to wildlife and water quality.

d. Wildlife and Fish

(1) Elk

Big game winter range would be managed to increase forage production for elk and deer, and to maintain security and thermal cover. Elk winter range capacity in the HPBH Study Area would increase from the present 240 elk to an estimated 710. The available forage would be allocated primarily to big game needs resulting in a reduction in livestock grazing. Under this alternative, livestock grazing in the study area would be reduced from the present level of 290 AUMs to 60 AUMs.

There would be no timber harvest scheduled in the study area. Wildlife range improvement would be accomplished by prescribed fire on the 15,000 acres of winter range that is outside the proposed wilderness.

Roads constructed to access private land in winter range areas would be managed as single purpose roads. To maintain wildlife security, they would not be open to unrestricted public use.

(2) Bighorn Sheep

Bighorn sheep range would benefit from reduced cattle grazing. Some intensive wildlife habitat improvement would be practiced except in the area proposed for wilderness. The capacity of this range to support bighorn sheep is estimated to increase from the present 140 to 210 sheep.

(3) Grizzly Bear

Occupied grizzly bear habitat would be managed for grizzly bear emphasis. The 80 AUM of grazing that presently occurs in occupied habitat would be eliminated. This alternative would provide a good opportunity to assist in the recovery of the grizzly bear population. Recreation would be restricted in the occupied grizzly range to reduce man/bear confrontations.

(4) Habitat Diversity

In Alternative 3 the timber on the study area would be allowed to reach its natural pathological rotation except where prescribed burning for habitat improvement is practiced or where wildfire is allowed to occur. This extensive old growth would favor species dependent on late-forest successional stages. Wildlife species diversity would be less than in alternatives where more timber harvest is practiced.

(5) Fisheries

The estimated population for streams in the study area would be maintained at 8,820 catchable trout. This would remain constant over the next 50 years. Access to these streams for fishing would be limited because of the absence of roads.

a. Recreation

Alternative 3 would produce the second highest level of primitive recreation of the alternatives, due mainly to its wilderness acreage. Levels of motorized dispersed recreation would be slightly lower than would result from a continuation of current direction (Alternative 1). Total dispersed recreation for Alternative 3 would fall about 12 percent below that expected under current direction.

There would be no road construction for National Forest management in this alternative because there are no areas allocated to timber harvesting prescriptions. Therefore the motorized recreation developed in this alternative would be limited to trailbike and snowmobile. The area proposed for wilderness would be closed to motorized use. The rest of the area, including the Big Sky Snowmobile Trail, would remain open to motorized trailbike and snowmobile use.

This alternative would close 15,400 acres of the Gallatin Petrified Forest to recreational collection of petrified wood. Some 10,000 acres of the petrified forest would remain open to gathering of loose specimens by permit.

b. Wilderness

Alternative 3 would recommend that 80,290 acres be added to the National Wilderness Preservation System--64,200 National Forest acres and an additional 16,090 acres to be acquired from BNRC. The natural integrity of this area is unimpaired for the most part. The area contains three monitored snow courses, one of them equipped with an electronic transmitter. There are three electronic sites on Twin Packsaddle, and Eaglehead Peaks. The Twin Peaks site is conspicuous and can be seen from most high points on the area. Presently, motorbikes are allowed on the trails in the area, creating some noise impacts, but would not be allowed in the proposed wilderness.

The opportunity for solitude is high except in frequented areas like trail junctions, popular camping sites, or the better fishing lakes.

Managability of the area proposed as wilderness in this alternative would be high if the BNRC inholdings were acquired.

c. Visual Quality

Alternative 3 assigns 96 percent of the study area to prescriptions which provide high visual quality of landscape (e.g., preservation, retention, and partial retention visual quality objectives). There are a total of 101,765 acres assigned to these VQOs.

i. Lands

Included within the boundaries of the area proposed for wilderness under this alternative are 16,090 acres of Burlington Northern Railroad Co. (BNRC), and 3,740 acres of State of Montana lands. By definition, wilderness is limited to federal lands. In cases where privately owned land is completely surrounded by wilderness, the Wilderness Act of 1964 assures the landowners "adequate" access to their lands, or the private land may be exchanged for federal land of equal value.

For this alternative to be feasible, the private lands within the proposed wilderness boundary should be acquired. There would be serious difficulties in managing the wilderness proposed in Alternative 3 without acquiring the BNRC lands within the boundaries. BNRC has already obtained permission to construct roads across National Forest to access and harvest timber in parts of the area proposed as wilderness in Alternative 3--for one example, in the Rock Creek drainage. Roading and timber harvest within wilderness boundaries would be incompatible with wilderness values. The State lands inside the proposed wilderness for this alternative are being managed as wildlife habitat. This use is compatible with wilderness management of the federal acreage, and thus it is likely that the State lands would not need to be acquired.

Under the provisions of the Wilderness Act, acquisition of intermingled private land for wilderness may only be accomplished by donation, purchase, or exchange, and only, "if (1) The owner concurs in the acquisition or (2) The acquisition is specifically authorized by Congress." (Wilderness Act of September 3, 1964, 78 stat. 890.)

Land exchange to acquire private land for wilderness would have several consequences. A benefit would be an increase in potential for primitive, dispersed recreation because of increased wilderness acreage. The chief cost would be loss of the National Forest land elsewhere traded for the private inholdings. This forfeited land would probably be productive forest lands, since Burlington Northern has indicated that it will only trade productive forest for similar land. The ultimate effect of such trades would be to reduce the timber-growing land base of the Gallatin National Forest and, consequently, the annual programmed harvest.

j. Economics

Alternative 3 has a present net value of \$10,012,000. This is the second lowest level of all the HPBH alternatives. Conversely, this alternative has a benefit/cost ratio of 3.3, which is the second highest.

4. Alternative 4

This alternative recommends a 22,100 acre wilderness in the Hyalite Ridge area. Alternative 4 attempts to meet (RPA) objectives assigned to the Gallatin Forest. These represent the Gallatin's share of national targets of goods and services assigned to the National Forest system by Congress in 1980.

e. Range

Alternative 3 has the lowest level of livestock grazing in the HPBH of any alternative. The present stocking of 290 AUMs in the study area would be reduced to 60 AUMs over a ten year period. These reductions, while not of great magnitude, would have a significant effect on the nine permittees involved.

Reduced grazing levels in the riparian areas would improve the streambank conditions, resulting in lower levels of siltation in the streams.

f. Timber

Alternative 3 has no timber harvest within the study area. No roads are planned for management activities on National Forest lands, although some road proposals could arise in connection with minerals activities or through requests for access to private lands.

Absence of timber production in the study area would mean lower levels of timber-related employment for this alternative compared to alternatives with timber harvest. (Figures estimating employment under the alternatives are displayed in Table II-2 of Chapter 2.)

Timber stands in the area would tend to grow to old-growth forest conditions except where wildlife habitat improvement on winter range maintains an early forest condition. Insect epidemics and fire would eventually accomplish timber stand renewal as the timber stands became overmature and concentrations of dead fuels accumulated. This cycle would probably be in the nature of 300 to 400 years, however.

g. Water and Soils

Alternative 3 is expected to have no increase in sediment yield above the natural levels.

h. Minerals - Oil/Gas

This alternative has a low level emphasis on minerals development. The lack of roads in the area would make exploration more difficult and expensive.

Mineral development would not be permitted in the wilderness portion of the study area.

The effect of minerals activities in the non-wilderness portion of the study area is difficult to estimate. Potential for hardrock minerals for the study area has been rated very low and petroleum potential as moderate by Forest Service geologists. In the event of significant minerals activity, legal stipulations would be applied to leases or operating plans as necessary to protect surface resource values. These values would include riparian areas, threatened or endangered species habitat, archeological sites, and critical big game habitat.

mortality due to diseases and parasites. Under Alternative 4, the bighorn sheep population would have less chance to increase beyond its present level of 140 animals.

(3) Grizzly Bear

Only about 40 percent of the occupied grizzly bear habitat in the study area would be in prescriptions which provide for management favoring grizzly bear. The portion of occupied habitat needed for recovery of the species would be managed for that purpose. Alternative 4 would also initiate grazing of domestic sheep in occupied grizzly bear habitat which is unneeded for the bear's recovery.

(4) Species Favoring Old Growth

Needs of the goshawk and other species which depend on late forest successional stages for habitat would be met under Alternative 4 by providing 15,000 acres of commercial forest managed as old growth plus some 50,600 acres of non-commercial forest. Species benefited by forest openings would have available some 16,000 acres, or 52 percent, of the study area's commercial forest lands under management for timber production.

(5) Fisheries

Alternative 4 provides for a moderate level of trout production. The stream population levels on 49 miles of stream are estimated to decline by 2.7 percent over 50 years from 8,820 catchable fish at present to 8,580. These changes would result mostly from sedimentation due to road construction.

e. Range

Alternative 4 has a fairly high level of livestock grazing. It would provide for grazing 3,840 AUMs of domestic livestock annually. This level of livestock grazing would be accomplished by instituting intensive pasture management systems to increase productivity of currently used range lands and by utilizing forage that is surplus to wildlife needs on summer range. Forage on elk and bighorn sheep winter range would not be allocated to domestic livestock.

Increased utilization of the forage resource would result in significant economic benefit to area ranching operations.

f. Timber

Alternative 4 would have a moderate level of timber harvest from the study area. This alternative would allocate 16,000 acres of the 31,000 acres of commercial forest land to timber management prescriptions. An estimated 1.7 million board feet of timber would be harvested from 160 acres cut annually on the average.

This level of timber harvest would improve the productivity and vigor of the timber stands treated. The resulting managed stands would be more resistant to insects and disease. Opportunities for gathering firewood would be increased as a result of roads constructed to harvest timber.

a. Recreation

This alternative would produce about the same amount of dispersed recreation for the study area as would be expected from the current management direction (Alternative 1). Motorized dispersed recreation would be about the same as expected from present management. However, because Alternative 4 would contain designated wilderness, primitive recreation use would be greater than the levels expected from current management direction.

The area recommended for wilderness presently provides for motorized trailbikes use. This area would be closed to motorized travel under this alternative. The Big Snowmobile Trail would not be affected by Alternative 4. Recreational collection of petrified wood specimens in the Gallatin Petrified Forest would continue on a permit basis.

b. Wilderness

Alternative 4 recommends 22,100 acres to be added to the National Wilderness Preservation System. This recommended wilderness does not include private or other nonfederal lands within its boundary. While this alternative recommends the most rugged scenic topography of the study area as wilderness its relatively small size limits the opportunity for solitude and primitive recreation away from evidence of human activities.

c. Visual Quality

Alternative 4 ranks high for visual quality. Alternatives 1, 2, and 7, have fewer acres allocated to prescriptions that provide for high visual quality (i.e., preservation, retention, and partial retention VQO's). Alternatives 3 and 5 have greater acreage of the higher level VQO's. The 88,763 acres assigned the higher level VQO's under Alternative 4 represent 84 percent of the study area.

d. Wildlife and Fish

(1) Elk

Under Alternative 4, the 19,000 acres of elk winter range on National Forest land in the study area are intensively managed for big game production. This alternative is estimated to provide winter range habitat capacity for 670 elk. There would be no livestock grazing scheduled for the elk winter range. Roads in the winter range would be closed during critical periods to reduce stress to the wildlife populations and to maintain habitat security.

(2) Big Horn Sheep

This alternative would include grazing domestic sheep on an area along the Gallatin Divide which could provide for the expansion of the existing bighorn sheep range. Grazing of domestic sheep would be accomplished by avoiding areas currently used by the bighorn sheep. Grazing domestic sheep in this area could cause stress in the bighorn sheep population and could result in increased

balanced against the esthetic and primitive recreational uses to be realized from a larger wilderness area.

a. Recreation

Dispersed recreation in the study area under Alternative 5 is entirely primitive recreation. This is characterized as nonmotorized recreation in a natural environment with a high level of solitude and with an opportunity to apply outdoor skills having a high degree of challenge and risk. Examples of primitive recreation activities would include hiking, wilderness camping, hunting, or mountain climbing. Alternative 5 has the highest level of primitive recreation of any alternative, and almost twice that of Alternative 3.

Alternative 5 has the lowest total recreation output of the alternatives. This alternative is roughly comparable to the other alternatives for nonmotorized types of recreation. Lower total recreation use is explained by the lack of motorized recreational activities. Total visitor days of recreation produced under Alternative 5 would be expected to total about 78 percent of what would be produced under current management direction for the study area (Alternative 1) over the first five decades.

Although certain types of recreation would be eliminated within the wilderness boundaries--such as snowmobiling or trailbike riding--this loss would be offset to those preferring wilderness experiences by "opportunities for solitude or a primitive and unconfined type of recreation" (Wild. Act, 1964).

The study area includes some 19,200 acres of the Gallatin Petrified Forest, which is currently open to recreational gathering of petrified wood samples on a permit basis. Forest Service policy is that permits to remove common variety minerals will not be issued within wilderness areas (FSM 2323.74). Consequently, gathering petrified wood specimens would be discontinued in the portion of the petrified forest proposed for wilderness under Alternative 5. Gathering these specimens would continue to be permitted on the remaining 6,000 acres of the Gallatin Petrified Forest outside the study area boundaries.

b. Wilderness

This alternative would recommend 105,300 acres of the total 105,661 acres of National Forest land in the study area for designation as wilderness. There would be 40,600 acres of private land within the proposed wilderness boundaries. Most private lands within the study area would need to be acquired under this alternative.

Some road construction has taken place to access the private lands within the study area. This activity has rendered some 2,500 acres of the study area as unsuitable for wilderness. The area of National Forest land which is crossed by access roads, 600 acres of BNRC land, and 1,500 acres of other private land which have been developed.

The 1964 Wilderness Act defines wilderness as limited to federal land, which means that private lands within wilderness borders would not be constrained by wilderness classification for the area. Thus roading and logging of the checkerboard private land within the wilderness boundaries proposed under this alternative would be a serious possibility. Road permits to access inholdings

This alternative would result in construction of 175 miles of roads over a 100-year span. Approximately 120 miles of the 175 would be closed to provide for wildlife security. Sedimentation would increase as a result of the road construction but the increase would be virtually unnoticeable. Economic benefits in the form of timber industry jobs would accrue to the local communities.

There would be some timber harvest from the elk winter range. Such timber harvest together with and accompanying road management would be designed and scheduled to provide for optimum forage and cover relationships to sustain and maximize elk carrying capacity. Timber harvest on the private land would be considered in scheduling timber harvest on National Forest to provide for favorable cover/forage relationships sustained over time.

g. Water and Soils

There would be minor increases in water yield as a result of timber harvest under Alternative 4. These increases would amount to 1,127 acre feet per year at the fifth decade, or less than 1 percent of the normal 126,000 acre feet now flowing from the study area annually.

There would be similar minor increases in sediment load in the streams resulting from roads constructed under this alternative. This increase would have little effect on fisheries, irrigation, or general water-related recreational uses. Natural variations from year to year can differ from the averages by as much as ten-fold.

h. Minerals, Oil/Gas

Alternative 4 is supportive of minerals development. The proposed wilderness (22,100 acres) would not be available for mineral development. The remainder of the study area is open to leasing with specific resource protection stipulations.

i. Lands

Alternative 4 would have no effect on the private intermingled landownership. No acquisition or exchanges are anticipated. The area proposed for wilderness is entirely federal land. Cost share agreements would be implemented with BNRC to accomplish road construction serving checkerboard land areas owned by both parties.

j. Economics

Alternative 4 has the second highest present net value (PNV) at \$12,970,000. It is less than that of Alternative 5. The benefit/cost ratio for Alternative 4 is 3.1.

5. Alternative 5

This alternative allocates the entire study area which has not been encumbered by roads and timber harvest to wilderness. The consequences of Alternative 5 would be primarily the economic effects of commodity market potentials forgone,

(1) Elk

Under this alternative, no roads would be constructed on the winter range and no additional allocation of forage would be made for domestic livestock. For these reasons, the capacity of the winter range is estimated at 440 elk. Additional increases in elk output from National Forest winter range could result from acquisition of winter range now privately owned, but the lands are not included in this estimate in order to maintain a comparable base between alternatives.

(2) Bighorn Sheep

Bighorn sheep range would reach the same capacity obtained under Alternative 3.

(3) Wildlife Security

Wildlife security would be enhanced because no roads would be constructed into the area.

(4) Grizzly Bear

All occupied grizzly habitat in the study area would be managed for grizzly bear emphasis. This alternative and alternatives 8 and 9 would be the most supportive of grizzly bear needs because private lands would be acquired for wilderness.

Recreation use in the occupied grizzly bear habitat would be restricted if necessary to maintain grizzly bear security.

(5) Species Favoring Old Growth

In Alternative 5, natural cycles of vegetative growth and succession would be allowed to prevail as much as possible. The forested area would be largely old growth except that fire would be allowed its natural role as nearly as possible. The lodgepole pine forest is believed to have a natural fire cycle of 300 to 400 years (Romme 1981). These natural burns would be the only agent that would remove old growth stands and regenerate the area with early-succession-stage stands. This alternative would therefore be favorable for goshawk and other wildlife species requiring late-forest successional stages. Wildlife habitat diversity in the short-term would be reduced.

(6) Fisheries

Alternative 5 would have a high level of stream trout production equal to Alternative 3. The estimated population for streams in the study area is 8,820 catchable trout. As in Alternative 3, access to these streams for fishing would be limited because of the absence of roads.

e. Range

This alternative would maintain livestock grazing at the current levels within the study area.

have already been granted to Burlington Northern Railroad Co., and the company has expressed interest in timber harvest within parts of the area proposed for wilderness under this alternative. This would be incompatible with wilderness designation for the area.

Although BNRC is by far the largest private landowner in the alternative 5 wilderness area, owning 35,400 acres, 5,200 acres of other private ownership would also need to be acquired. The 5,466 acres of land in the area owned by the Montana Department of Fish, Wildlife, and Parks and the 1,115 acres owned by the City of Bozeman would be managed as wildlife range and watershed respectively. These uses would most likely not be in conflict with wilderness management, and acquisition of these other public lands would probably not be necessary. With this in mind, the total wilderness that would result in Alternative 5, including both federal and acquired private lands, would be as follows:

105,300	National Forest
35,400	BNRC
<u>5,200</u>	Other private
145,900	Total Alternative 5 Wilderness.

The area rates high in apparent naturalness and natural integrity. It has lesser ratings for opportunity for solitude. The reason for this is that the area, while larger than the alternative 3 wilderness, is still somewhat narrow. This limits the opportunity for isolation from the sights, sounds, and presence of others and from developments and evidence of human activities. The area also receives a moderately high rating for opportunity for primitive and unconfined recreation. While it does have a high challenge component related to steep hazardous terrain and dangerous wild animals, it is lacking in the vastness of scale component desirable for a maximum rating in this alternative.

As discussed previously, this area is proximate to 3,291,488 acres of designated and recommended wildernesses.

c. Visual Quality

Under Alternative 5, the entire proposed wilderness area would be assigned the most protective of the visual quality objectives --preservation. This would assure Alternative 5 of the highest visual quality for landscape of any of the study area alternatives. Alternatives 8 and 9 are equal to 5 because they also assign the entire area to wilderness.

d. Wildlife and Fish

Under Alternative 5 the entire study area would not be managed to maximize wildlife values. Habitat improvement could be practiced, but only when it would enhance the wilderness resource and as approved by the Chief of the Forest Service.

A national recreation trail would be proposed along the crest of the Gallatin Range from the end of the Hyalite road to Windy Pass. The trail would exit the study area at Portal Creek on the west side and Big Creek on the east side. The national recreation trail would not be extended south of Windy Pass to avoid encouraging increased human activity in occupied grizzly bear habitat.

The Gallatin Petrified Forest would remain available for recreation collection of petrified wood specimens by permit.

The Big Sky Snowmobile Trail would remain open to that recreational activity.

b. Wilderness

Alternative 7 would recommend no additions to the National Wilderness Preservation System. The proposed scenic area would be managed for its recreational values rather than its wilderness values.

c. Visual Quality

Alternative 7 has 87,511 acres assigned the high visual quality objectives of retention and partial retention. This is approximately 11 percent more acreage managed for high visual quality than under Alternative 1 (Current Direction). Generally, Alternative 7 falls in about the midrange of the alternatives in terms of the acreage managed for high visual quality.

d. Wildlife and Fish

(1) Elk

Alternative 7 would provide winter range capacity for an estimated 630 elk. There would be some 10,900 acres allocated to intensive wildlife management. Roads in the winter range would be closed seasonally as needed to reduce stress to wildlife during critical periods. Timber harvest in the winter range would be scheduled so the activity would be conducted during periods when the elk are absent. The timber harvest would be designed to provide an optimum cover/forage relationship.

(3) Bighorn Sheep

This alternative would initiate grazing of domestic sheep to a limited extent along the Gallatin Divide. Of the estimated 3,000 AUM capacity of this range that is considered surplus to the needs of the bighorn sheep herd, 1,260 AUMs would be allocated to domestic sheep under this alternative. This level of use is not expected to result in significant stress to the bighorn sheep population. There could be disruption of the travel pattern and interruption of traffic between the northern band and the southern band of bighorns. The smaller band presently benefits from these interactions for breeding purposes. This alternative does not provide sufficient range capacity for an increase in bighorn sheep.

This alternative provides for a special area of 33,260 acres in the Porcupine, Elkhorn, Buffalo Horn and Tepee Creeks area for wildlife management. Management goals for this area are for big game habitat grizzly bear security, and for

f. Timber

There would be no timber harvest under Alternative 5. This would mean a loss in timber productivity of some 1.4 to 1.8 million board feet per year from productive National Forest lands proposed for wilderness under this alternative. In addition, a further loss in timber production from National Forest would result from the land exchange necessary to implement the alternative. This loss would be from the National Forest lands outside the study area exchanged for the private lands to be acquired within the wilderness boundaries.

Fire would be allowed to play its natural role. Insect epidemics and fire would accomplish timber stand renewal on a 300 to 400 year cycle.

g. Water and Soils

Alternative 5 is expected to have no increases in sediment yields over and above the natural level.

h. Minerals - Oil/Gas

The 149,500 acre wilderness would not permit entry for mineral development.

i. Lands

As previously discussed, this alternative assumes acquisition of 35,400 acres of BNRC lands and 5,200 acres of other private land within the boundaries of the proposed wilderness.

This action could have beneficial effects to some private landowners involved in that it would enable them to consolidate their lands into more manageable and efficient units. However, some ranchers would experience disruption of their ranching operations. The consequences of this action for the general public would be the acquisition of wilderness type lands at the expense of relinquishing land elsewhere which has other resource values.

j. Economics

Alternative 5 has a present net value of \$33,260,000. This is the lowest PNV of the HPBH alternatives. Alternative 5 has a benefit/cost ratio of 2.8.

6. Alternative 7 - Proposed Action

This alternative proposes no wilderness, but instead proposes designation of a 23,100 acre scenic area in the Hyalite Peaks area, a national recreation trail along the Gallatin Divide, and a 33,260 acre wildlife and recreation area in the Porcupine-Elkhorn-Buffalo Creeks area.

a. Recreation

This alternative provides the highest level of dispersed recreation of all the alternatives. A full range of both motorized and nonmotorized recreation opportunities would be provided. As compared to the current direction alternative, moderate increases occur in all categories of dispersed recreation throughout the first five decades.

Timber harvest on the National Forest land would be coordinated with activities on the private land to provide for good wildlife habitat and watershed conditions.

g. Water and Soils

Roads constructed in the area would result in minor increases in sedimentation in the streams. Natural yearly variations are often over 100 percent and may vary by as much as ten-fold.

The study area is estimated to produce 126,000 acre feet of water at present. Under Alternative 7, timber harvest in the area could increase the total runoff slightly--by up to 1,156 acre-feet increase in the fourth decade. This is less than 1 percent of current flows.

h. Minerals

Alternative 7 will generally be supportive of mineral development. Restrictions would be imposed on operating plans and leases as necessary to protect surface values. The Hyalite Peaks Scenic Area would be evaluated for possible withdrawal from entry for hardrock mineral claims and from oil and gas leasing.

Possible effects of mineral development would be evaluated separately for specific proposals. Effects could be minor or major depending on the scope of the proposal.

i. Lands

Alternative 7 would have no effect on private landownership. Land exchanges would continue to be pursued where opportunities arise to improve management efficiency and mutual benefit to the public and private landowners.

j. Economics

This alternative has a PNV of \$12,062,000. The benefit/cost ratio for Alternative 7 is 2.5.

recreation opportunities. A more detailed discussion for management is found in the Forest Plan.

(4) Grizzly Bear

Under Alternative 7, the occupied grizzly bear habitat is allocated to prescriptions which give favorable emphasis to the welfare of the grizzly bear.

(5) Habitat Diversity

Alternative 7 provides for timber management on 14,560 acres of the 31,000 acres of commercial forest land in the study area. The remaining 16,440 acres would be managed as old growth timber land along with some 50,600 acres of noncommercial forest. This would provide adequate old growth forest for wildlife species dependent on late forest successional stage habitat.

(6) Fisheries

Alternative 7 would provide a high level of stream trout. However, sedimentation from road building could reduce stream trout populations by up to 3 percent in certain decades.

e. Range

Livestock grazing in the HPBH Study Area would increase from the present 290 AUMs to 1,840 AUMs over a 20-year period under Alternative 7. This increase would be accomplished by increasing the capacity of one allotment by intensive range management practices and by initiating livestock grazing on four new allotments. The additional grazing would be developed on surplus summer ranges. Domestic sheep grazing would not be initiated within occupied grizzly bear habitat.

Better utilization of the forage resource would result in significant economic benefits.

f. Timber

Alternative 7 has the lowest level of timber harvest of the four alternatives that program timber harvest from the study area. This alternative harvests an average of 1.4 million board feet of timber annually over a 100-year period. This harvest would come from 14,560 acres allocated for timber management at an average cut of 145 acres annually.

This level of timber management activity would not be as effective in creating the most productive timber stands. An annual timber harvest of some 400 thousand board feet would be forgone if this alternative is compared to Alternative 2. Timber harvests under Alternative 7 would be designed and scheduled to provide optimum wildlife cover and forage relationships.

Timber management under Alternative 7 would result in construction of a total of 152 miles of roads during the next 100 years. These roads would be closed as needed to provide wildlife security at critical times.

Hyalite-Porcupine-Buffalo Horn

Wilderness Allocation By Alternative

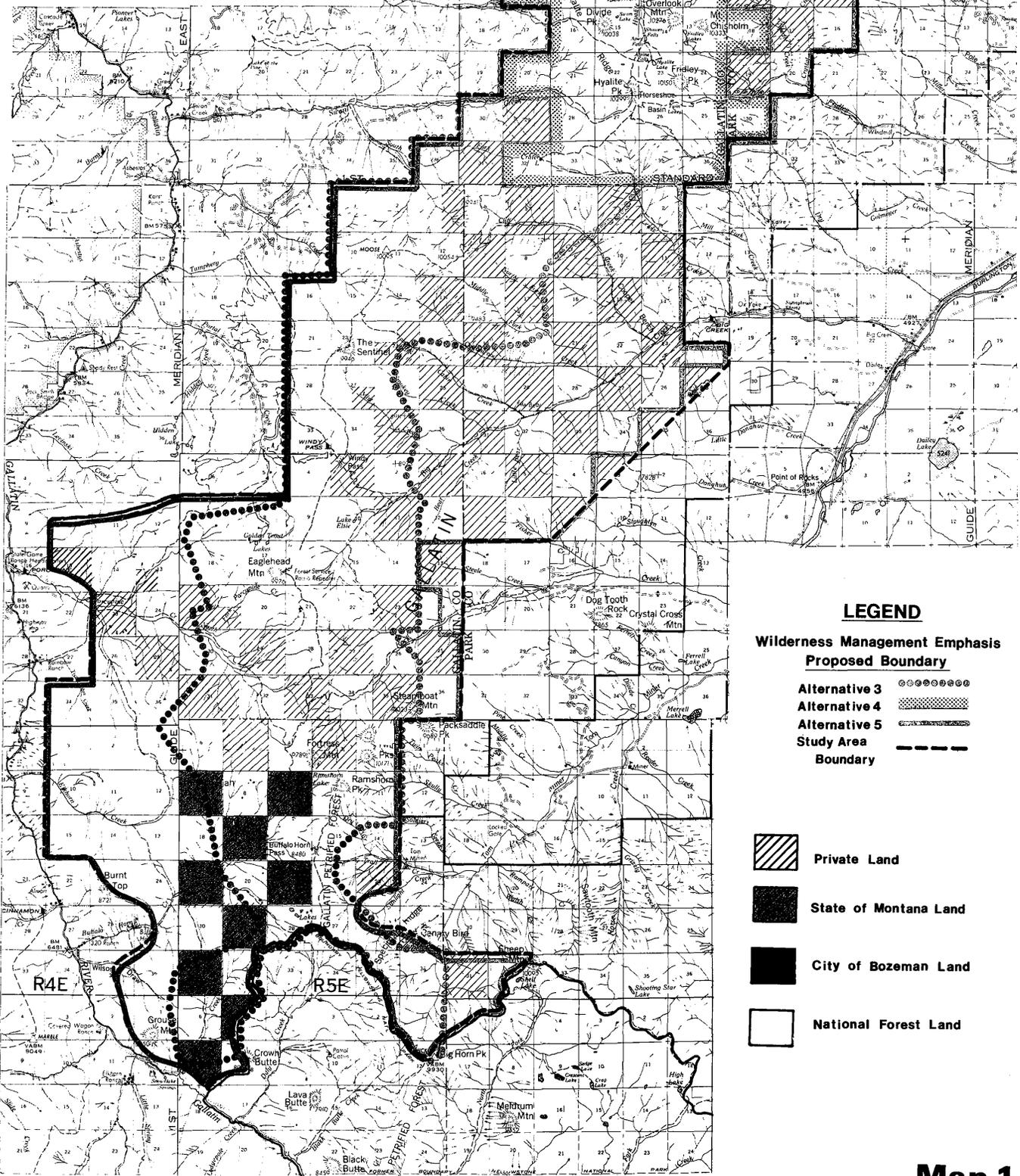
Montana

Scale 1/2" = 1 mile



T 4 S
T 5 S
T 6 S
T 7 S
T 8 S
T 9 S

T 4 S
T 5 S
T 6 S
T 7 S
T 8 S
T 9 S



LEGEND

Wilderness Management Emphasis Proposed Boundary

- Alternative 3
- Alternative 4
- Alternative 5
- Study Area Boundary

- Private Land
- State of Montana Land
- City of Bozeman Land
- National Forest Land

GALLATIN NATIONAL FOREST

Hyalite-Porcupine-Buffalo Horn

Management Areas
Proposed Action

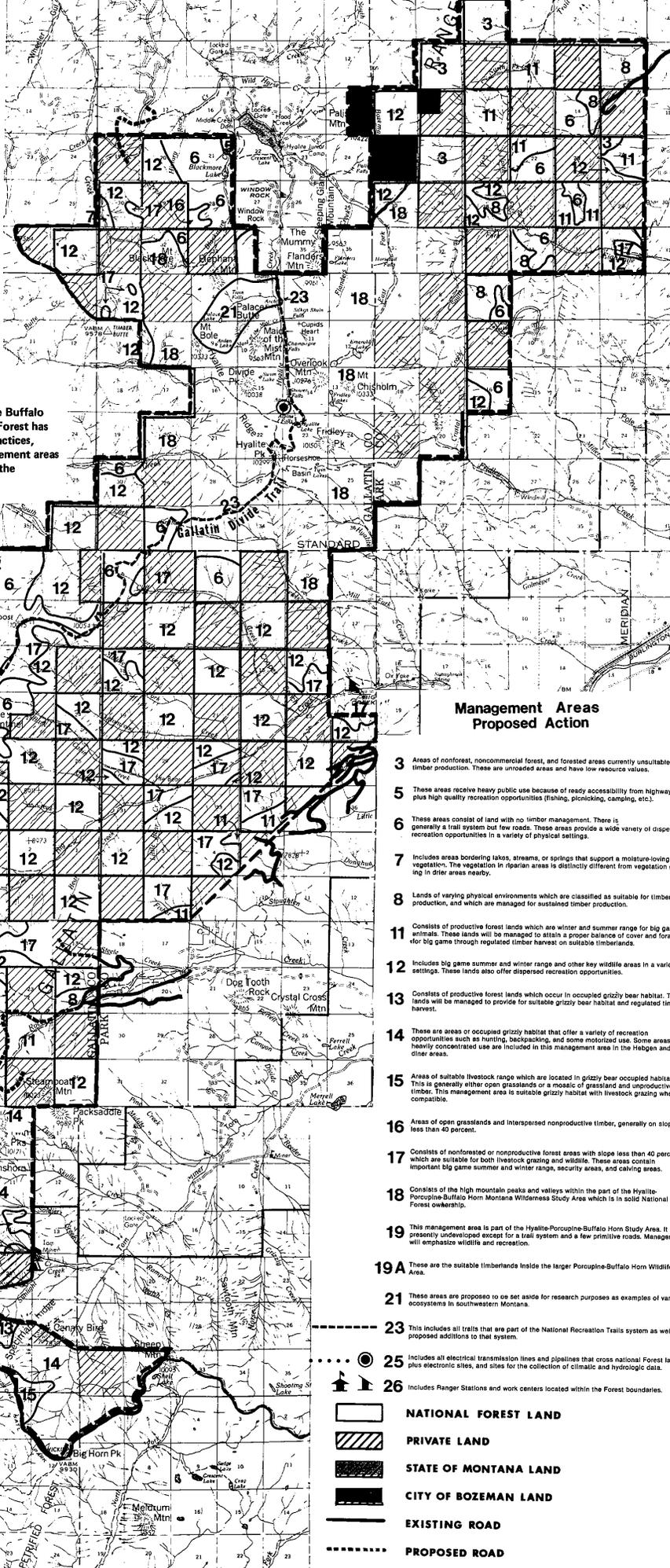
Montana

Scale 1/2"=1 mile



MANAGEMENT AREAS

These 19 management areas are found within the Hyalite-Porcupine Buffalo Horn study area. Each management area on the Gallatin National Forest has a multiple use prescription which consists of goals, management practices, standards, and guidelines for that area. A description of the management areas follows. The prescriptions for the areas are found in Chapter III of the Proposed Forest Plan.



Management Areas
Proposed Action

- 3 Areas of nonforest, noncommercial forest, and forested areas currently unsuitable for timber production. These are unroaded areas and have low resource values.
- 5 These areas receive heavy public use because of ready accessibility from highways plus high quality recreation opportunities (fishing, picnicking, camping, etc).
- 6 These areas consist of land with no timber management. There is generally a trail system but few roads. These areas provide a wide variety of dispersed recreation opportunities in a variety of physical settings.
- 7 Includes areas bordering lakes, streams, or springs that support a moisture-loving vegetation. The vegetation in riparian areas is distinctly different from vegetation growing in drier areas nearby.
- 8 Lands of varying physical environments which are classified as suitable for timber production, and which are managed for sustained timber production.
- 11 Consists of productive forest lands which are winter and summer range for big game animals. These lands will be managed to attain a proper balance of cover and forage for big game through regulated timber harvest on suitable timberlands.
- 12 Includes big game summer and winter range and other key wildlife areas in a variety of settings. These lands also offer dispersed recreation opportunities.
- 13 Consists of productive forest lands which occur in occupied grizzly bear habitat. These lands will be managed to provide for suitable grizzly bear habitat and regulated timber harvest.
- 14 These areas are occupied grizzly habitat that offer a variety of recreation opportunities such as hunting, backpacking, and some motorized use. Some areas of heavily concentrated use are included in this management area in the Hayden and Gardner areas.
- 15 Areas of suitable livestock range which are located in grizzly bear occupied habitat. This is generally either open grasslands or a mosaic of grasslands and nonproductive timber. This management area is suitable grizzly habitat with livestock grazing where compatible.
- 16 Areas of open grasslands and interspersed nonproductive timber, generally on slopes less than 40 percent.
- 17 Consists of nonforested or nonproductive forest areas with slope less than 40 percent which are suitable for both livestock grazing and wildlife. These areas contain important big game summer and winter range, security areas, and calving areas.
- 18 Consists of the high mountain peaks and valleys within the part of the Hyalite-Porcupine-Buffalo Horn Montana Wilderness Study Area which is in solid National Forest ownership.
- 19 This management area is part of the Hyalite-Porcupine-Buffalo Horn Study Area. It is presently undeveloped except for a trail system and a few primitive roads. Management will emphasize wildlife and recreation.
- 19A These are the suitable timberlands inside the larger Porcupine-Buffalo Horn Wildlife Area.
- 21 These areas are proposed to be set aside for research purposes as examples of various ecosystems in southwestern Montana.
- 23 This includes all trails that are part of the National Recreation Trails system as well as proposed additions to that system.
- 25 Includes all electrical transmission lines and pipelines that cross national Forest land, plus electronic sites, and sites for the collection of climatic and hydrologic data.
- 26 Includes Ranger Stations and work centers located within the Forest boundaries.

- NATIONAL FOREST LAND
- PRIVATE LAND
- STATE OF MONTANA LAND
- CITY OF BOZEMAN LAND
- EXISTING ROAD
- PROPOSED ROAD
- WILDERNESS STUDY BOUNDARY
- PETRIIFIED FOREST BOUNDARY

F. Comparison of Alternatives

This section shows a comparison of the resource outputs and activities for the alternatives considered in detail. The comparisons here are a summary of the effects and consequences which are developed in Chapter IV, Environmental Consequences.

Table II-2 shows the outputs and activities for the alternatives. The values are shown as average annual outputs. In addition, Table II-3 provides a summary of land allocations by alternatives. These tables are located at the end of the chapter.

1. Recreation

Three types of dispersed recreation could occur in the HPBH Study Area: nonmotorized, motorized, and primitive recreation. Motorized and nonmotorized recreation in this analysis is dispersed recreation outside wilderness areas by foot or snowmobiling, trailbike riding, and automobile driving. Primitive recreation occurs in a remote area where there is little evidence of human activities and a high probability of experiencing solitude. Generally, motorized and nonprimitive recreation opportunities are increased by road construction, whereas primitive recreation opportunities are diminished. Thus, alternatives 1, 2, 4, and 7 present the greatest opportunities for motorized and nonmotorized dispersed recreation and the least opportunity for primitive recreation. Alternatives 3 and 5, represent the greatest opportunity for primitive recreation and the least opportunity for motorized and nonmotorized dispersed recreation. Alternative 7 is estimated to have the highest output of dispersed recreation of all the alternatives.

Table II-4 following shows the estimated output of dispersed recreation from the study area.

Table II-4. Dispersed Recreation Levels by Alternative (Average Annual MRVD's)

	Alternatives					
	1	2	3	4	5	7
Motorized						
Decade 1	7.0	7.0	6.2	6.9	0	7.5
Decade 5	13.6	13.6	12.0	13.4	0	14.6
Nonmotorized						
Decade 1	35.2	35.2	15.5	26.1	0	37.8
Decade 5	59.1	59.1	26.1	43.8	0	63.6
Primitive						
Decade 1	4.0	4.0	19.1	12.6	37.0	4.3
Decade 5	6.7	6.7	32.0	21.2	62.1	7.2
TOTAL						
Decade 1	46.2	46.2	40.8	45.6	37.0	49.6
Decade 2	79.4	79.4	70.1	78.4	62.1	85.4

There are no developed recreation outputs attributed to the HPBH Study Area in any of the alternatives.

2. Visual Quality

Comparing the visual quality objectives assigned to the land allocations for each alternative gives a measurement of the overall scenic quality to expect for the study area. Table II-5 compares the five visual quality objectives. These are explained below in order of their restrictiveness to forest management activities.

1. Preservation.--Only ecological changes permitted.
2. Retention.--Management activities are not visually evident.
3. Partial Retention.--Management activities in foreground and middleground are dominant, but appear natural.
4. Modification.--Management activities in foreground and middleground are dominant, but appear natural.
5. Maximum Modification.--Management activities are dominant, but appear natural when seen as background.

For the purposes of this analysis, retention and partial retention classes are combined, as are modification and maximum modification. Following is a summary of the visual quality objectives based on the land allocations of the study area by alternative.

Table II-5. Visual Quality by Alternative (Acres)

Alternative	Preservation	Retention		Modification Maximum Modification
		Partial	Retention	
1	0		78,630	27,031
2	0		78,924	26,737
3	80,300		37,542	3,896
4	22,100		66,663	16,898
5	145,900		0	0
7	23,102		64,409	18,150

From this analysis, alternative 5 has the most restrictive visual quality objective, and alternatives 1 and 2 have the least restrictive.

3. Wilderness

The Forest Plan alternatives allocate a wide range of land in the HPBH Study Area for wilderness. Alternative 5 allocates the entire study area to wilderness, whereas alternatives 1, 2, and 7 allocate none of the study area as wilderness. Alternatives 3 and 4 allocate portions of the area to wilderness.

a. Nearby Wilderness

The issues gathered at the MWSA workshops in 1979 identified the availability of wilderness in the surrounding areas as relevant to evaluation of the MWSA areas for wilderness (see Chapter 1). Several areas either designated wilderness or recommended for wilderness are near the HPBH Study Area. These are shown in Table II-6.

TABLE II-6. Areas Designated or Recommended for Wilderness in HPBH Vicinity

<u>Area</u>	<u>Agency</u>	<u>Acres</u>	<u>Status</u>
Absaroka-Beartooth	Forest Service	944,127	Wilderness
Lee Metcalf	Forest Service and BLM	259,000	Wilderness
Lionhead and North Absaroka	Forest Service	23,290	Adm. Endorsed
Red Rock Lakes	US Fish - Wildlife Service	32,350	Wilderness
Yellowstone National Park	National Park Service	2,032,721	Adm. Endorsed
	Total Wilderness	1,235,477	
	Administratively Endorsed	2,056,011	
	TOTAL	3,291,488	

b. Wilderness Characteristics

The wilderness characteristics of natural integrity, natural appearance, opportunity for solitude and an element of challenge or risk area present in the study area. Under all alternatives a large portion of these characteristics would remain intact. This is especially true for alternatives which recommend wilderness, but is also true for alternatives which would maintain much of the area in a nonroaded condition.

Impacts to the wilderness characteristics will be limited to portions of the study area that would be developed or directly influenced by that development such as road construction, timber harvest, and roaded recreation. Alternatives 1 and 2, which have the most developed activities, would have the most impact on the existing wilderness characteristics.

The wilderness areas which would result under alternatives 3, 4, and 5 differ somewhat in their characteristics (see Map 2). All of the wilderness alternatives would include the Hyalite Peaks area. This portion of the study area has high scenic values, high rugged peaks, and a number of high mountain lakes with good to fair fisheries. The Hyalite Peaks area presently attracts the highest dispersed recreational use of any portion of the study area.

Alternatives 3 and 5 would also include the high country along the Gallatin Divide, extending from the Hyalite Peaks area southward to the border with Yellowstone Park. This high country also has scenic value, although perhaps not so spectacular as the more northern group of peaks. Because of less access and greater distance from population centers, the southern reaches of the Gallatin Range offer more opportunity for solitude.

Alternative 5 would maintain the natural appearance and integrity of the entire area. It would increase the opportunity for solitude because of the restriction on motorized use.

4. Roadless Resource

Except for minor incursions on the periphery of the study area, there are no roads. Because of the resources and topography of the land, none of the alternatives would allocate a very large portion of the area to roaded management. In fact, Alternative 2, which is the most developmentally oriented alternative, would keep 67% of the area in a nonroaded condition. Alternative 5, because it recommends all wilderness, would keep 100% of the area nonroaded. The following table shows how much of the area would remain roadless in the future for each alternative:

	<u>Alt 1</u>	<u>Alt 2</u>	<u>Alt 3</u>	<u>Alt 4</u>	<u>Alt 5</u>	<u>Alt 7</u>
% Roadless	74	67	97	84	100	83

5. Wildlife and Fish

Four wildlife species have been used in the HPBH analysis as management indicators. The potential effects of management on an indicator species may also be taken as a measurement of the effects on several species with similar habitat needs. Elk, grizzly bear, goshawk, and cutthroat trout are the four management indicator species.

a. Elk Habitat

Our analysis of elk habitat capability was based on: (1) amount of cover modification on winter range, and (2) amount of forage allocated to elk on winter range.

The Hyalite-Porcupine-Buffalo Horn Study Area presently provides winter range for an estimated 240 elk on 17,300 acres of National Forest winter range. Many of these elk migrate from Yellowstone Park to winter range within the National Forest. The State and private lands in the study area have winter range capacity for another 90 elk. Winter range is considered to be a critical limiting factor for elk populations. There is adequate summer range to support the resident elk herd.

The carrying capacity of winter range can be increased through habitat improvement and, conversely, can be decreased by resource uses that compete with big game use. Moreover, winter range managed as wilderness is not appropriate for big game emphasis. An area managed for wilderness resources precludes manipulation of vegetation to increase wildlife carrying capacity.

With these considerations in mind, Alternatives 1 and 2 have the lowest carrying capacity for elk because of lack of investment for wildlife habitat management and competing uses on winter range (e.g., livestock grazing). Alternative 5 represents a middle ground since all winter range is within wilderness--not appropriate for expenditures on habitat improvement but not subject to competing uses. Alternatives 3, 4, and 7 attain the highest carrying capacity for winter range by providing management emphasis and funding for habitat improvement to benefit big game.

Elk capacity by alternatives for the HPBH study area in the fifth decade as shown in Table II-2.

Alternative	1	2	3	4	5	7
Elk Capacity	240	200	710	670	440	630

b. Recreational Hunting Opportunity

The Montana Department of Fish, Wildlife, and Parks has developed a process to measure recreational hunting opportunity. The Department's objectives for a quality elk hunt are to provide a long season with a high percentage of mature bulls in the total kill and a lower bull harvest the first week of the season. Their standards for a quality hunt are:

- A five-week long rifle season.
- Mature bulls making up 50 percent of the total harvest.
- Less than 40 percent of the bull harvest in the first week.
- Their optimum being 20 percent of the harvest in the first week.

The components of the model used to arrive at the Recreational Hunting Opportunity Index (RHOI) are open road density, and habitat security based on cover/forage ratio.

Table II-7 shows the RHOI by alternatives for the study area:

Table II-7. Recreational Hunting Opportunity Index for HPBH Study Area (10-Decade Average)

Alternative	1	2	3	4	5	7
Recreational Hunting Opportunity Index	.76	.74	.90	.90	.90	.82
Percent Bull Harvest In First Week	32	33	25	29	25	29

The level for the period 1978 to 1981 for the three hunting districts of the study area indicate a first week bull harvest of 29.7 percent. From this standpoint, alternatives 3 and 5 show an improved condition from the present. Alternatives 4 and 7 indicate essentially no change in RHOI and Alternatives 1 and 2 have a lower index than the present.

c. Goshawk

The goshawk has been selected as an indicator species for wildlife species requiring late forest successional stages (mature forest and old growth) because of their large space needs, nesting requirements, and foraging habitat requirements. The goshawk requires a minimum of 10 percent of its home range in mature to old growth timber. All alternatives provide more than 10 percent old growth component.

d. Fisheries

Approximately 49 miles of streams capable of supporting trout exist within the study area. Total number of fish in these streams is estimated to be 8,820. No appreciable reduction from this number is expected in any of the alternatives. A maximum change of 5 percent fewer fish has been predicted for Alternatives 1 and 2. In addition, lake fisheries are not expected to be altered by the various alternatives.

e. Threatened and Endangered Species

The HPBH Wilderness Study Area contains approximately 35,300 acres of occupied grizzly bear habitat on National Forest land. In addition, there are 13,300 acres of occupied grizzly habitat on State and privately owned land within the study area. Forest Service management of the bear focuses on the relative security within these occupied areas. The alternatives all provide for habitat security in Management Situation 1 areas.

6. Range

Current permitted domestic livestock grazing in the study area is 294 animal unit months (AUMs). Our analysis has shown it would be possible to achieve a maximum of 5,400 AUMs in Alternative 2 on permanent range.

Estimated livestock stocking levels for the study area for each alternative are as follows:

<u>Alternatives</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>7</u>
Estimated Stocking (AUM's) at Decade 2	290	5,420	60	3,840	290	1,840

7. Timber

The HPBH Study Area has 30,900 acres of commercial forest land capable and available for timber management. Most of this commercial forest land--22,554 acres--can produce 50 to 89 cubic feet per acre per year. A lesser amount of commercial timberland--8410 acres--can produce 20 to 49 cubic feet per acre per year.

a. Timber Harvest Schedule

The number of acres allocated to timber management varies by each alternative, based on the objective of the specific alternative. The acres allocated to timber management under each alternative are the acres considered as suitable for timber management in that alternative. This allocation is based on the capability of a specific area to produce trees balanced against the other resource values the area possesses, and the relative importance of each resource in meeting the economic and environmental goals of the alternative. The suitable timberland available for timber management under each alternative follows:

<u>Alternative</u>	<u>Acres Suitable for Timber Management</u>
1	17,760
2	21,350
3	0
4	16,000
5	0
7	14,560

The timber harvest schedule within the study area is displayed in Table II-9.

Table II-9. Average Annual Timber Harvest Schedule from HPBH Study Area in millions of board feet (MMBF).

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
Decade 1	0	1.4	0	0	0	1.0
Decade 2	2.7	3.0	0	1.5	0	0.3
Decade 3	3.5	2.5	0	1.5	0	2.7
Decade 4	0.5	0.8	0	0.5	0	3.2
Decade 5	3.5	5.0	0	3.1	0	0
100 Year Avg.	1.8	1.8	0	1.6	0	1.4

b. Insects and Disease

The mountain pine beetle epidemic on the Gallatin National Forest has heavily impacted many of the timber stands within the HPBH Study Area. It is expected that about 40 percent of the scheduled harvest in the first decade for the various alternatives will be dead volume.

8. Water Quality/Quantity

It is expected that there will be no significant adverse effects upon water quality or quantity in any of the alternatives.

9. Minerals

Tables II-10 and II-11 display the comparative availability of minerals under the various alternatives. The availability levels are represented by four categories:

Category A is the area withdrawn from mineral entry and the inventoried important cultural and historic sites. Also included are wilderness and recommended wilderness areas which will not be available for further mineral entry and mineral leasing.

Category B includes threatened and endangered species habitat, and riparian areas.

Category C is the area of dispersed roadless recreation management and the area designated for intensive wildlife management prescriptions. Special recreation management areas such as the Hyalite Peaks Scenic Area in Alternative 7 are also in this category. Adjustment is made to this acreage to provide for riparian acres previously accounted for in Category B.

Table II-10. Locatable/Common Variety Mineral Availability and Potential
(Thousands of Acres)

Availability Category	Potential	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
A. Withdrawal - Cultural Sites and Research Natural Areas	1-Low	0	0	0	0	1.2	17.8
	2-Medium	0	0	0	0	0	3.2
	3-High	0	0	0	0	0	0
	4-Very High	0	0	0	0	0	0
Wilderness and Recommended Wilderness Areas ^{1/}	1	0	0	61.0	18.1	96.8	0
	2	0	0	3.2	3.2	7.7	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
B. Threatened and Endangered Species Habitat (Outside of Wilderness)	1	32.4	32.4	17.1	32.4	0	32.4
	2	4.5	4.5	4.1	4.1	0	4.5
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
C. Riparian Areas (excluding T&E habitat, scenic, and wilderness areas)	1	9.8	9.8	3.7	7.8	0	7.8
	2	.8	.8	.4	.4	0	.4
	3	0	0	0	0	0	0
Roadless Dispersed Recreation Management	1	0	0	0	0	0	13.7
	2	0	0	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
Wildlife Winter Range (Excluding Grizzly Bear)	1	0	0	0	0	0	0
	2	0	0	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
D. Areas of Minimum to Moderate Physical and Biological Sensitivity	1	55.8	55.8	16.2	39.7	0	26.3
	2	2.4	2.4	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0

^{1/} The numbers displayed here only include lands owned by the Forest Service. Those lands congressionally designated as wilderness will be withdrawn effective January 1, 1984.

Table II-11. Oil and Gas Availability and Potential (Thousands of Acres)

Availability Category	Potential/1	Alternatives					
		1	2	3	4	5	7
A. Withdrawal - Cultural Sites and Research	1	0	0	0	0	0	0
	2	0	0	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
Wilderness and Recommended	1	0	0	49.8	18.3	64.1	17.8
Wilderness Areas and Scenic	2	0	0	14.4	3.8	41.6	3.2
Areas <u>2/</u>	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
B. Threatened and Endangered Species Habitat (Outside of Wilderness)	1	7.0	7.0	5.4	7.0	0	7.0
	2	26.3	26.3	11.7	26.3	0	26.3
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
C. Riparian Areas (excl. T-E habitat, scenic, & wilderness)	1	6.4	6.4	1.4	4.5	0	4.5
	2	4.2	4.2	2.7	3.7	0	3.7
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
Roadless Dispersed Recreation Management	1	0	0	0	0	0	9.6
	2	0	0	0	0	0	4.1
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
Wildlife Winter Range (Excluding Grizzly Bear)	1	0	0	0	0	0	0
	2	0	0	0	0	0	0
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0
D. Areas of Minimum to Moderate Physical and Biological Sensitivity	1	50.7	50.7	7.5	34.3	0	25.2
	2	11.1	11.1	12.8	7.8	0	4.3
	3	0	0	0	0	0	0
	4	0	0	0	0	0	0

1/ 1 = Low; 2 = Moderate; 3 = High; 4 = Very High.

2/ The numbers displayed here only include lands owned by the Forest Service. Those lands congressionally designated as wilderness will be withdrawn effective January 1, 1984.

Category D is the total of the roaded timber management, range management, roaded dispersed recreation areas, and minerals development areas.

Alternative 2 places the greatest emphasis on commodity production and provides the best opportunity for minerals and energy development. Alternatives 1 and 4 are slightly more restrictive to minerals and energy development than Alternative 2. Alternatives 3 and 5 are most restrictive to minerals development since those alternatives place a greater emphasis on recreation and wilderness uses. Alternative 7 represents the mid-range.

10. Facilities

Table II-12 shows the miles of roads projected for the different alternatives within the study area. The collector road system would be completed within the next 30 years. Money would be allocated for the system's maintenance and reconstruction. Generally, collector roads would remain open.

Local roads would be constructed on lands where timber harvest takes place. The local road system would be completed by the end of the seventh period and only reconstruction would occur following that. For analysis purposes, it was assumed that 70 percent of local roads would be closed following harvest.

Table II-12. Projected Total Road Network (Miles).

	Alternatives					
	1	2	3	4	5	7
Total Constructed						
-Collector roads	4	4	0	3	0	2
-Local roads	181	181	0	172	0	142
-To Remain Open	58	58	0	55	0	45

G. Economic Comparisons

1. Employment and Income

The effects on employment and total income for the four-county area affected are shown in Table II-13. These data reflect the expected change from current condition to decade 5 for each alternative.

Table II-13. Average Annual Employment and Income - Changes from Current Situation.

	Decade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
Employment (Person Years)	1	0	3	-2	1	-1	7
	2	26	34	4	21	3	16
	3	53	50	11	37	8	49
	4	30	40	16	48	14	67
	5	80	108	19	74	20	31
Income (Thousands of Dollars)	1	0	49	-15	12	-12	70
	2	285	357	35	200	25	128
	5	925	1,267	149	823	154	243

2. Present Net Value, Opportunity Costs, and Net Public Benefits

As discussed earlier in this chapter, the concepts of net public benefit, opportunity cost, and present net value are interrelated:

Net public benefit of forest management is the overall benefit to the Nation of all benefits minus all costs, regardless of whether the costs and benefits are expressed in priced (dollar) or nonpriced terms.

Present net value (PNV) represents the priceable component of net public benefit. PNV is a measure of economic efficiency. It is equal to the discounted value of benefits minus the discounted value of costs, where benefits and costs are expressed as dollar values.

Opportunity cost as used here represents the marginal reduction in PNV which occurs: a) when nonpriceable goals are sought--that is, goals not expressed in dollar values; and b) when valued goals are set above or below the level which maximizes efficiency.

Table II-14 displays the PNV and opportunity cost for each alternative. Opportunity cost is represented as the reduction in PNV from Alternative 4, which has the highest PNV.

Table II-14. Present Net Value and Opportunity Cost. (Thousand Dollars)

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
PNV	11,286	11,321	10,012	12,970	9,212	12,062
Opportunity Cost	1,685	1,649	2,958	0	3,758	908

3. Comparison of Nonpriced Public Net Benefits

The nonpriced components of public net benefit used in the development of alternatives are described earlier in this chapter. Each alternative produced differing amounts of most of these benefits. In this section, a comparison is made of the nonpriced benefits of each alternative. Some of these do not change between alternatives and will not be discussed in detail. They have been addressed the same way in all alternatives.

a. Benefits That Do Not Change

These are:

1. Hunting Opportunity - the recreation hunting opportunity index changes only slightly between alternatives.
2. Water Quality / Water Quantity - very small differences between alternatives are expected.
3. Local Life styles - because of the relatively small area and low impact on the locale, there is no appreciable difference in life styles between the alternatives.

b. Recreation Experiences and Diversity

In all alternatives, recreational experiences will involve less solitude and more human contact after two or three decades. This will occur because increases in numbers of people using the HPBH area will tend to outpace the Forest Service's ability to disperse users or minimize conflicts. Alternatives such as 3 or 7 which provide for more trails and trailhead construction will be able to disperse users the best. All alternatives would be capable of minimizing conflicts between different users by applying control and restriction. However, as more control and restriction become necessary, recreation experiences may involve less personal freedom.

(1) Free or Low Lost Goods

The availability of firewood, poles, game meat, and fish is as dependent on the users' access to the National Forest as on the amount of these goods. Alternatives 1, 2, 4, and 7 would provide for the most firewood and poles because of higher timber harvest volumes and more road construction. The dead timber from the mountain pine beetle epidemic would be more available to people in these alternatives because more roads are constructed. Alternatives 3 and 5 which have less road construction and access fewer new areas, would provide lesser amounts of firewood and poles.

Game meat would be more available in those alternatives which produce the largest big game numbers like Alternatives 3, 4, and 7. Alternative 4 would also produce more access to the animals because of road construction.

The measurement of hunting opportunity that was used in the analysis, the hunting opportunity index, should change very little between alternatives. Other qualitative factors of a hunting experience, such as bringing home game

meat, or not having to spend several days getting a deer or elk, are benefits to some which might be provided by Alternatives 2, 4, or 7.

Alternative 5 would have the highest visual quality objectives, followed by Alternative 3 and Alternative 4. Alternatives 1 and 2 would have the lowest visual quality objectives and Alternative 7 would be intermediate.

(2) Threatened and Endangered species

Refer to Table II-7, to compare how the alternatives provide different amounts of grizzly bear emphasis and potential population capacity. Alternative 5 provides the most emphasis and capacity and Alternatives 1 and 2 provide the least.

(3) Minerals, Oil and Gas

Alternatives with the highest benefits for minerals, oil, or gas have two characteristics: (1) the least restrictive land allocations for road construction and surface occupancy, and (2) the most road constructed that could be used for exploration and development.

Alternative 2 would be most available followed by Alternative 1. Alternative 4 would have slightly less land available for exploration and development. Alternative 7 is intermediate and Alternatives 3 and 5 the most restrictive.

(4) Protection

Protection of the Forest resources from insects, disease, and fire over the long term can best be achieved by having an even distribution of timber age classes. This pattern of ages would be different than exists today, mostly in lodgepole pine where there are now large stands of mature or over-mature trees susceptible to insect attack and fire. Alternatives which harvest the largest volume of timber on the largest land base would achieve the greatest degree of protection. Alternative 2 harvests the most volume on the largest land base. Alternatives 5 and 3, with the most wilderness, would have the least amount of age class distribution. Table II-9 shows the planned harvest volume. Some age class distribution could be allowed in wilderness areas by controlled use of fire.

(5) Cooperation With Landowners

Alternatives 3 and 5 would require the largest amount of landownership adjustment, and therefore will have the largest impact on landowners. Alternatives 1, 2, and 7 would provide the most opportunity for land use coordination under existing ownership patterns.

(6) Amount of Change

"No change" is generally not possible or even desirable, given the dynamics of Forest resources and Forest management, and existing legislative requirements. Earlier in this chapter there were some identified changes which are needed to correct existing problems or to react to new and changing situations. There is value for many people, however, in minimizing change, so in the paragraph that follows the alternatives are compared for their overall amount of change from the current direction.

All alternatives change the status of the wilderness study area and make a recommendation for its allocation. Alternative 7 would change the study area little from the current direction. Alternatives 2, 3 and 5 would represent the largest changes from current direction. Alternative 2 would increase emphasis on the production of timber; the development of minerals, oil and gas; and on livestock grazing. Alternative 3 would decrease emphasis on these resources and increase emphasis on wildlife and wilderness, and Alternative 5 would increase emphasis on wilderness. Alternative 4 would change current uses very little for the first 3 decades. After that, it would begin to increase timber and range outputs. Alternative 1 would cause more moderate degrees of change.

Table II-2: Comparison of Alternatives for HPBH Study Area

Resource Item or Result	Unit of Measure	Decade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
WILDERNESS								
Recommended to Congress	Acres	1	0	0	80,300	22,100	145,900	0
RECREATION								
Nonmotorized Dispersed	MRVD ^{1/}	1	35.2	15.5	26.1	26.1	0	37.8
		2	45.8	20.2	33.9	33.9	0	49.2
		3	57.0	57.0	25.2	42.2	0	61.3
		4	59.8	59.8	26.4	44.3	0	64.3
		5	59.1	59.1	26.1	43.8	0	63.6
Primitive Dispersed		1	4.0	4.0	19.1	12.6	37.0	4.3
		2	4.6	4.6	21.9	14.5	42.5	4.9
		3	5.2	5.2	25.0	16.5	48.4	5.6
		4	6.0	6.0	28.4	18.8	55.1	6.4
		5	6.7	6.7	32.0	21.2	62.1	7.2
Motorized Dispersed		1	7.0	7.0	6.2	6.9	0	7.5
		2	8.8	8.8	7.7	8.6	0	9.4
		3	10.4	10.4	9.2	10.3	0	11.2
		4	12.0	12.0	10.6	11.9	0	12.9
		5	13.6	13.6	12.0	13.4	0	14.6
Total Dispersed		1	46.2	46.2	40.8	45.6	37.0	49.6
		2	59.1	59.1	49.0	57.0	42.5	63.5
		3	72.7	72.7	59.4	69.0	48.4	78.1
		4	77.8	77.8	65.5	75.0	55.1	83.7
		5	79.4	79.4	70.1	78.4	62.1	85.4
VISUAL RESOURCE MANAGEMENT								
Preservation VQO ^{2/}	Acres	1			80,300	22,106	145,900	23,102
Retention/Partial Retention VQO	Acres	1	78,630	78,924	37,542	65,657		64,409
Modification/Max. Mod VQO	Acres	1	27,031	26,737	3,896	16,898		18,150
Total Acres of Preservation Retention, and Partial Reten. VQO	Acres	1	78,630	78,924	117,842	87,763	145,900	87,511
WILDLIFE								
Elk Winter Range Capacity	Number of Elk	5	240	200	710	670	440	630
RANGE								
Programmed Stocking Level	AIM	2	290	5,420	60	3,840	290	1,840

^{1/} MRVD is Thousand Recreation Visitor Days
^{2/} VQO is Visual Quality Objective

Table II-2: Comparison of Alternatives for HPBH Study Area (cont'd)

Resource Item or Result	Unit of Measure	Decade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
<u>MINERALS</u>								
Available for Occupancy Lease	Acres	1	105,661	105,661	41,438	82,555	0	82,559
<u>TIMBER</u>								
Timber Harvest	MMBF	1	0	1.4	0	0	0	1.0
		2	2.7	3.0	0	1.5	0	0.3
		3	3.5	2.5	0	1.5	0	2.7
		4	0.5	0.8	0	1.4	0	3.2
		5	3.3	5.0	0	3.1	0	0
Average Annual Harvest (Over 50 year period)	MMBF	1-5	2.0	2.5	0	1.5	0	1.4
(Over 100 year period)	MMBF	1-10	1.8	1.8	0	1.7	0	1.4
Land Suitable for Timber Management	Acres	1	17,760	21,350	0	16,000	0	14,560
<u>FACILITIES</u>								
Road Construction and Reconstruction	Miles/Year	1	0	1.5	0	0	0	1.2
		2	3.1	3.4	0	1.5	0	0.2
		3	3.6	2.3	0	1.6	0	2.1
		4	0	1.4	0	1.2	0	2.8
		5	3.7	4.1	0	2.4	0	0
Total Roads Eventually Constructed (Collector and Locals)	Miles	1-10	185	185	0	175	0	144
Miles of Road to Remain Open	Miles	7	58	58	0	54	0	45
<u>ECONOMIC COMPARISONS</u>								
Change of Employment from Alt. 1, Decade 1 <u>1/</u>	Person Years	1	0	3	-2	1	-1	7
		2	26	34	4	21	3	16
		3	53	50	11	37	8	49
		4	30	40	16	48	14	67
		5	80	108	19	74	20	31
Personal Income change from Alt. 1, Decade 1) <u>1/</u>	Thousand Dollars	1	0	49	-15	12	-12	70
		2	285	357	35	200	25	128
		3	593	510	91	365	64	506
		4	264	365	124	486	108	725
		5	925	1,267	149	828	154	243

1/ Employment and income impact have been expressed here in terms of change from the current situation. All other values are expressed in totals.

Table II-2: Comparison of Alternatives for HPBH Study Area (cont'd)

Resource Item or Result	Unit of Measure	Decade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
ECONOMIC COMPARISONS (cont.)								
Returns to U.S. Treasury	Thousand	1	0	29	0	0	0	23
	Dollars	2	71	137	0	23	0	9
		3	242	175	0	118	0	169
		4	24	84	0	155	0	278
		5	486	605	0	336	0	3
Present Value Returns @ 4 percent	Thousand							
	Dollars	present	3,077	4,160	0	2,657	0	2,526
Returns to State	Thousand	1	0	7	0	0	0	5
	Dollars	2	17	34	0	5	0	2
		3	60	43	0	29	0	42
		4	6	21	0	38	0	69
		5	121	151	0	84	0	0
Purchaser Credit Roads Investment	Thousand	1	0	10	0	0	0	8
	Dollars	2	23	23	0	10	0	0
		3	25	16	0	11	0	15
		4	0	9	0	8	0	19
		5	26	29	0	17	0	0
Appropriated Road Investment	Thousand	1	0	25	0	0	0	18
	Dollars	2	49	55	0	23	0	1
		3	55	36	0	24	0	32
		4	0	19	0	17	0	38
		5	54	56	0	37	0	0
Other Capital Investment	Thousand	1	27	95	31	26	38	96
	Dollars	2	183	247	28	103	33	38
		3	197	186	28	99	33	137
		4	31	138	28	84	33	146
		5	198	302	28	138	33	36
Operaration and Maintenance	Thousand	1	154	213	178	152	219	217
	Dollars	2	317	285	161	238	187	211
		3	329	267	161	229	187	375
		4	213	190	161	294	187	345
		5	320	381	161	272	187	204
Total Cost	Thousand	1	181	343	209	178	257	367
	Dollars	2	500	532	189	341	229	249
		3	526	453	189	328	220	512
		4	244	328	189	378	220	491
		5	519	683	189	410	220	240

Table II-2: Comparison of Alternatives for HPBH Study Area (cont'd)

Resource Item or Result	Unit of Measure	Decade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 7
ECONOMIC COMPARISONS (Cont.)								
Budget to Implement	Thousand	1	181	333	209	178	257	359
	Dollars	2	477	509	189	331	220	249
		3	501	437	189	317	220	497
		4	244	319	189	370	220	472
		5	492	654	189	393	220	240
Federal Receipts	Thousand	1	0	29	0	0	0	23
	Dollars	2	71	137	0	23	0	9
		3	242	175	0	118	0	169
		4	24	84	0	155	0	278
		5	486	605	0	336	0	3
Present Value Benefits at 4%	Thousand Dollars	present	19,026	20,793	14,287	19,214	14,303	20,034
Present Value Benefits at 4% (Excluding Federal Receipts)	Thousand Dollars	present	15,949	16,633	14,287	16,557	14,303	17,508
Present Value Timber Benefits at 4%	Thousand Dollars	present	3,078	4,008	0	2,551	0	2,472
Present Value Range Benefits at 4%	Thousand Dollars	present	65	902	30	645	73	317
Present Value Costs at 4%	Thousand Dollars	present	7,740	9,472	4,275	6,244	5,091	7,972
Present Net Value at 4%	Thousand Dollars	present	11,286	11,321	10,012	12,970	9,212	12,062

Table II-3: Allocation Acreage Summary of HPBH ALTERNATIVES

ALTERNATIVE ALLOCATION	Alternative 1 (Current Direction)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 7 (Proposed Action)
Dispersed Recreation (Nonroaded)		0	0	0	0	13,103
Wildlife and Recreation	13,201	961	21,555	13,136	0	42,803
Scenic Area	0	0	0	0	0	23,102
Wilderness	0	0	80,300	22,108	145,900	0
Big Game with Timber Management	0	0	0	927	0	1,774
Livestock Range	9,268	5,383	3,896	899	0	3,591
Timber Management	17,763	21,354	0	15,072	0	12,785
Near Natural	65,429	69,314	16,010	53,519	0	8,503
TOTAL	105,661	105,661	121,761	105,661	145,900	105,661

CHAPTER III. AFFECTED ENVIRONMENT

A. Introduction

This chapter discusses physical, biological, social, and economic aspects of the environment within the boundaries of the Hyalite- Porcupine-Buffalo Horn (HPBH) Wilderness Study Area.

B. Physical Environment

The HPBH study area is located on the Gallatin National Forest in south-central Montana. The area includes 155,000 acres of the Gallatin Range and lies between the Gallatin and Yellowstone rivers. It extends generally from the rugged Hyalite Peaks area along the Gallatin Range to the northwestern corner of Yellowstone National Park. The study area is about 36 miles in length and varies from 4 to 12 miles in width.

Most of the study area has a checkerboard ownership pattern which consists of alternate sections of federal and nonfederal lands. The study area ownership is as follows:

<u>Ownership</u>	<u>Acres</u>
National Forest	105,700
Burlington Northern	36,000
Other Private	6,700
State of Montana	5,550
City of Bozeman	1,100
Total	155,000

Approximately 19,200 acres of the Gallatin Petrified Forest are within the southern portion of the study area.

1. Topography

The topography of the study area is highly variable. The northern portion of the area contains jagged peaks, U-shaped valleys, and cirque basins. A more subdued and moderately rolling topography is found in the remaining portion. Elevations range from about 5,500 feet to over 10,300 feet. Some of the more prominent peaks include Mount Blackmore, Mount Bole, Hyalite Peak, Eaglehead and Fortress mountains. Major streams include the headwaters of Hyalite, Bozeman, Trail, Eightmile, Big, Rock, Tom Miner, Buffalo Horn, Porcupine, Portal, Moose, Swan, Squaw, and South Cottonwood creeks.

2. Soils

Soils vary from the relatively coarse-textured volcanics found in the more rugged peaks to the soft, sedimentary, and more erosive soils in the rolling areas. The more sensitive sedimentary soils are susceptible to mass failures and soil movement if disturbed through poorly conducted surface activities.

3. Watershed

The HPBH study area provides about 126,000 acre-feet of water to the Gallatin and Yellowstone rivers. The quality of the water from the area is high; watersheds in the study area comprise headwaters of the Yellowstone and Gallatin Rivers, which are Blue Ribbon trout streams. Several streams have relatively high natural sediment yields. These include Porcupine, Twin Cabin, Buffalo Horn, and Tepee creeks. Many of the lakes in the study area sustain prime cold-water fisheries.

The City of Bozeman is dependent on the Bozeman and Hyalite drainages for its municipal water. The headwaters of these two watersheds are partially within the study area. The study area is also a very important source of water for irrigation in the Gallatin and Yellowstone drainages.

4. Minerals and Energy

A mineral survey of the study area was conducted by the U. S. Geological Survey in 1978 and 1979. Their report indicates the area has low to moderate potential for hard-rock mineral development. The petrified wood found in the area has little commercial value due to its fractured, leached, and discolored properties.

The southern portion of the area is close to known geothermal resources, and potential heat sources are indicated at depth. The U. S. Geological Survey has classified lands north of Yellowstone National Park ". . . as being valuable prospectively for geothermal steam and associated geothermal resources" (Muffler, 1978).

Approximately 34,000 acres of the study area are under application for oil and gas leases. None of the area has been leased. The likelihood of finding oil or gas is unknown.

5. Visual Quality

For the most part, the visual resource within the area has not been altered by man's activities. The area contains a variety of visual characteristics ranging from the spectacular and rugged Hyalite Peaks with their cirque basins, waterfalls, and clear lakes to the more moderate slopes found in the southern portion of the area.

The natural-appearing landscapes could be changed by man's activities such as road construction, timber harvest, or minerals development.

6. Facilities

Parts of the HPBH study area contain man-made structures and developments. These include roads, timber harvest areas on private lands, a trail network, electronic facilities for communications on Eaglehead Mountain and Twin Peaks, Forest Service cabins at Windy Pass and in Buffalo Horn Creek, a private cabin in Upper Eightmile Creek, and four snow survey stations, one of which is equipped with electronic telemetry.

Approximately 21 miles of roads within the study area have been proposed or constructed by private landowners for access to their lands. It is expected that additional roads will be planned in the future. Existing plans for roads include access within the Rock, Steele, Porcupine, Pine, Big, Donahue, and Fox Creek drainages. The proposed and existing road locations are shown on the "Management Area Map".

The trails in the study area are presently used by hikers, bikers, snowmobilers, and horsepackers. The Big Sky Snowmobile Trail passes through the area. Much of the existing trail network is in need of repair or relocation to provide improved distribution of recreationists.

C. The Biological Environment

The biological environment of the study area is made up of inter-relationships between species within the Area's plant and animal communities. The vegetation, wildlife, and domestic livestock that could interact in the study area will be discussed here:

1. Vegetation

The HPBH study area supports a diverse pattern of vegetation communities. The various types are zoned in a generalized elevational distribution. The area supports grasslands at the lowest elevations, which generally graduate into Douglas-fir and/or limber pine; then into lodgepole pine, spruce, or subalpine forests. The higher elevations contain whitebark pine which continues to timberline and, finally, to alpine tundra or alpine turf.

Approximately 82,000 acres of the 105,661 acres of National Forest ownership within the study area are forested. Of these forested areas, about 31,000 acres of the National Forest land are classified as tentatively suitable for timber management activities. The productive forest land is most commonly located below 8,000 feet in elevation. Map 3 on the following page shows the commercial and noncommercial timber areas. The amount of timbered land available for harvest varies by alternative.

Most of the lodgepole pine sites would regenerate primarily through natural means following timber harvest and slash disposal. The Douglas-fir stands would be difficult to regenerate without planting because of marginal climatic and seed source conditions.

Most of the productive forest areas contain overmature timber which has been or is being killed by mountain pine beetle and dwarf mistletoe in lodgepole and whitebark pine, and by spruce budworm in Douglas-fir, subalpine fir, and Engelmann spruce.

Bunchgrass, forbs, and related species of flora comprise the more valuable forage within the study area. Cattle grazing takes place primarily on the eastern slopes of the area and at the lower elevations of rangelands. Opportunities exist to allocate some higher elevation range to domestic livestock with little effect on elk.

2. Riparian Vegetation

Riparian areas border streams and other bodies of water. They support wetland vegetation influenced by high soil moisture. These productive areas are important to wildlife and domestic livestock. The vegetation also protects streambanks and reduces the amount of sediment reaching streams. Riparian areas also reduce flood flows and aid in sustaining stream flows during dry periods of the year.

3. Wildlife and Fish

The study area provides habitat for a wide variety of wildlife species. The more important species include elk, grizzly bear, moose, deer, mountain sheep, grayling, and trout.

(1) Threatened or Endangered Species

Several endangered bald eagles winter along the Yellowstone and Gallatin rivers near the study area. There are no known bald eagle nesting sites within the study area.

The southern portion of the study area is occupied by the threatened grizzly bear. Management of this area is guided by the Greater Yellowstone Grizzly Bear Recovery Plan (USDI, 1982) which has been supplemented by the Gallatin National Forest's Grizzly Bear Standards and Guidelines which is available at the Supervisor's Office and is also found in the Forest Plan as Appendix G. This document provides direction for grizzly bear management on the Gallatin Forest to achieve recovery of the grizzly population.

The occupied grizzly bear habitat in the study area is estimated to be 48,600 acres. Table III-1 shows the ownership involved.

cutthroat and grayling have been classified by the State of Montana as "Species of Special Concern." There are no anadromous or threatened/endangered fish in the area.

The cold and clean waters discharged from the area's streams are important to the Blue Ribbon fisheries of the Yellowstone and Gallatin Rivers.

(5) Domestic Livestock

At present, there are seven active allotments within the study area. Opportunities exist to create more livestock grazing through improved management on existing allotments and the allocation of additional suitable grazing in new areas.

D. Other Resources

1. Recreation

The area presently attracts about 45,000 RVDs of recreational use annually. This includes hiking, camping, snowmobiling, fishing, hunting, trailbike riding, horseback riding, and cross country skiing. The petrified forest attracts specimen collectors. Recreation use is unevenly distributed due to access problems to portions of the area.

The harvest recreational use during the summer occurs in the Hyalite Peaks where several trails give access to scenic lake basins and waterfalls. The Big Sky Snowmobile Trail traverses part of the area and its use is becoming more popular.

Big game hunting is also very popular in the area. The native and migratory elk herds provide good hunting opportunities. Rocky Mountain bighorn sheep hunting also takes place in a more limited amount. Fishing for cutthroat and golden trout plus grayling is popular in the area.

2. Wilderness

Most of the area is suitable for wilderness consideration. Impacts to the area's natural integrity and natural appearance tend to be at the area's periphery. Natural appearance of the area will be affected in a few places by sights or sounds from outside the boundaries, but these disturbances would probably affect less than 5 percent of the area.

The presence of rugged mountain peaks and occupied grizzly bear habitat within the area could add an element of challenge and risk to some recreational experiences.

Natural integrity of the area has been affected in a number of places, mostly on the area's periphery. Four-sections of private land within the boundary have been clearcut and logged south of Big Creek. About 1.5 miles of road has been built within the boundaries on the east side near Steamboat Mountain, and a Forest Service permit has been issued to extend the road about 2 more miles. About 5 miles of road are planned by Burlington Northern in Porcupine Creek, and a Forest Service permit has been issued for this road. Both the Rock Creek and Pocupine roading are intended to access

timber on private section of checkerboard. Impacts of the Porcupine Road and related timber harvest may be avoided if a proposed land exchange is implemented for this area.

The Forest Service has granted Burlington Northern a permanent easement to access the Fox Creek drainage for timber harvest.

The Pine Creek Road enters the Eightmile Creek area crossing about 1/4 mile of National Forest in Section 12 and about 1/2 mile of private land in Section 13. At the end of this road in Section 13 is a tumbled down sawmill with rusting machinery. Section 13 was extensively logged about 20 years ago and has several partially regenerated clearcuts. Besides this development, a new road has recently been built up to the MWSA boundary at the northeast corner of Section 13; it appears that the private owners will use this new road to conduct additional harvest activities in Section 13, and possibly in other of the private inholdings.

The instances of roading and logging within the area's boundaries, described in the previous paragraphs, have resulted in 2,500 acres being rendered unsuited to wilderness. Concerning this development, 2,100 acres of private land have been affected and 400 acres of National Forest.

Additional evidence of humans includes a Forest Service cabin at Windy Pass and private cabin near Mud Lake in the Eightmile drainage. Developed base camps used by outfitters and guides are found in Steele Creek and Bark Cabin Creek. There are also 3 electronic sites on Twin, Packsaddle, and Eaglehead Peaks. The Twin Peaks electronic site is conspicuous and can be seen from most high points in the area. The Packsaddle and Eaglehead sites are less visually obtrusive.

The chief impediment to manageability of the area is the private, checkerboard inholdings. The area contains 42,724 acres of private land. As mentioned earlier, as private property owners exercise their right to access and use their land. It is possible that land exchange could eliminate need for some of this roading, and a land exchange is presently being pursued in the Porcupine Creek drainage.

However, exchanges would be difficult where the private sections are owned by a number of different persons or organizations; this is the case in the eastern part of area. The amount and scattered distribution of the inholdings would make the ownership problem difficult or impossible to entirely resolve.

3. Visual Resource

The study area has had a visual resource inventory completed for it, which included assessment of variety class, existing visual condition (EVC), visual absorption capacity (VAC), sensitivity level and distance zone. From these inventories, visual quality objectives were derived. Objectives are measures of alteration of the existing natural landscape by management activity.

Existing visual condition (EVC) is useful to measure the study area's natural integrity. This inventory system assigns six levels of visual condition to an area, from level 1 (untouched, natural landscape) to level 6 (drastically modified landscape). The HPBH area is nearly all within EVC level 1, although local intrusions exist in the vicinity of structures. The area has an essentially unmodified natural landscape, and the evidence of human influence is slight in most areas. Exceptions include the Twin Peaks area where radio towers are highly evident and dominate the skyline, and the logging activities, mostly on private land, on the eastern margin of the area. Other structures such as fences, cabins, SCS snow measurement structures, and electronic installations, are not visually evident beyond the immediate area. Many of the trails in the study area do not intrude on the landscape; campsites are variable in terms of degree of impact, but in all cases they are minor visual intrusions and inoffensive to most visitors.

The scenic quality of the HPBH is unimpaired, and natural appearances enhanced by distant views to the Absaroka Range across the Yellowstone Valley and the Lee Metcalf Wilderness. A measure of scenic quality commonly used in visual resource inventory is variety class, which is a qualitative assessment of the variation and interest in a landscape. The study area is about evenly divided between variety classes A (outstanding, distinctive visual resource) and B (commonly seen in the general area).

E. The Social and Economic Environment

Many people see the study area as being very important to their lives. The area is a focal point of controversy between individuals and interest groups. At issue is the wide array of resources and the many possible ways they can be managed. Of particular interest are the traditional uses of the area, wilderness potential, and opportunities to develop the timber, grazing, mineral, and recreation resources.

Concern has also been expressed for the area's wildlife--especially the elk and grizzly bear.

Big game hunting is a significant activity in much of the area as are hiking, snowmobiling, and motorbiking. The unroaded nature of the area supports an active outfitter, guiding, and dude ranching industry.

Some of the private landowners within the area have accessed their inholdings and harvested timber. Burlington Northern plans the largest amount of road developments to manage their lands in the Porcupine and Rock Creek drainages.

Individuals and interest groups have expressed very different points of view as to how the study area should be managed. Some of these include:

1. Hunting / fishing groups - They want continued quality hunting and fishing with activities which would protect these resources. Hunters would like more access to the study area.

2. Wildlife organizations - They are concerned with the maintenance of good habitat for all wildlife. Often they define good habitat as being those lands which are undeveloped or managed in near natural conditions.
3. Hiking / cross-country skiing - People in this group want a quality experience when they go into the area. For them, this means good trails and enough access points to disperse people. A quality experience for some is being in an area which is undeveloped.
4. Landowners - This group incorporates the use of the National Forest lands into the use of their own adjacent or intermingled land. They want compatible use which means, for some, management of National Forest lands with the same objectives they have for their land. For others it means eliminating the effects of National Forest management by keeping roads and trails from crossing their land.
5. Snowmobilers/ORVs - Their main desire is to keep areas of the Forest from being restricted against their use.
6. Wilderness groups - They want major portions of the area either designated as wilderness or managed in a near natural condition.
7. Timber industry - Want the productive timber lands available for harvest with the Forest Service responding to the local industry needs. They do not like to see what they consider unnecessary restrictions placed on timber harvest.
8. Grazing industry - They would like to see more National Forest lands available for livestock grazing. They are concerned that grazing not be restricted because of possible conflict with other users and resources such as wildlife and recreation.
9. Resort and tourism industry - They want to see the qualities which now attract tourist and recreationists protected. Forest management which emphasizes recreation uses is desired.
10. Outfitting industry - They are concerned with restrictions which limit their use of the area. Decisions which change the management of the area to a more developed state would adversely affect them.
11. Mining, oil and gas industry - They are concerned with land allocations and management which would put restrictions on or increase the costs of exploration and development of minerals or oil and gas.
12. Gatherers of Forest products - Firewood cutters, berry pickers, Christmas tree cutters, etc., want more access to areas which have these products.

Economic effects are measured for each alternative in terms of the area's contribution to employment (number of jobs) and income generated within the local economy. The alternatives which provide the roads, timber harvest, and increased livestock grazing in the study area provide the greatest increase in employment and income. They also lessen the uncertainty for these industries. Alternatives which keep the status quo for the area produce either no growth or only slight growth in employment and income.

The alternatives which provide for an increase in big game populations in an undeveloped environment better ensure the continuance of the outfitter and guide industry. These alternatives also lessen fears of people who favor the protection of the area in a near natural state.

The study area is most economically important to those people involved in industries that now utilize this area or adjacent lands. These include principally outfitters and guides, timber interests, and livestock interests. Additionally, there are secondary impacts on numerous service-related industries.

A more detailed display of the effects of each alternative on the social and economic environment is found in Chapter IV.

CHAPTER IV: ENVIRONMENTAL CONSEQUENCES

A. Introduction

This chapter describes the major environmental consequences of implementing the Proposed Action and the other alternatives. It is the scientific and analytic basis for comparison of the alternatives. Environmental consequences are the result of activities scheduled to implement each particular alternative. The intensity of a particular set of environmental consequences will vary with the extent of that activity within each alternative.

The Hyalite-Porcupine-Buffalo Horn Study Area is part of the Gallatin National Forest and not an isolated entity unto itself. Management of the HPBH is inseparable from management of the Forest as a whole. This tends to dilute the sensitivity and importance of some of the consequences of the HPBH alternatives, which should be considered in the wider context of the Forest Plan alternatives.

This chapter is a summary comparison by resource area of the consequences of all the alternatives.

B. Comparison of Effects

The following section details the environmental effects of the alternatives discussed in Chapter II.

1. Recreation

Developed recreation is not significantly affected by any of the alternatives. None of the alternatives have any developed recreation outputs from the study area.

The various alternatives are expected to have significantly different levels and types of dispersed recreation. The alternatives which propose high levels of wilderness will have greater outputs of primitive recreation. The alternatives which call for the most road construction would supply more motorized and nonmotorized dispersed recreation, but less primitive dispersed recreation.

The ID Team estimated the output of recreation visitor days (RVD's). These are displayed in Table IV-1.

Table IV-1. Estimated Dispersed Recreation Output by Alternatives.
(Average Annual--Thousand RVD)

<u>Recreation Type</u>	<u>Alt. 1</u>	<u>Alt. 2</u>	<u>Alt. 3</u>	<u>Alt. 4</u>	<u>Alt. 5</u>	<u>Alt. 7</u>
Nonmotorized						
Decade 1	35.2	35.2	15.5	26.1	0	37.8
Decade 5	59.1	59.1	26.1	43.8	0	63.6
Primitive						
Decade 1	4.0	4.0	19.1	12.6	37.0	4.3
Decade 5	6.7	6.7	32.0	21.2	62.1	7.2
Motorized						
Decade 1	7.0	7.0	6.2	6.9	0	7.5
Decade 5	13.6	13.6	12.0	13.4	0	14.6
TOTAL						
Decade 1	46.2	46.2	40.8	45.6	37.0	49.6
Decade 5	79.4	79.4	70.1	78.4	62.1	85.4

Planning Records, 1982

This analysis indicates that Alternative 7 would produce the highest total output of dispersed recreation. Alternative 7 would also produce the most RVD's of nonmotorized and motorized types of dispersed recreation; Alternative 5 would produce the most primitive recreation.

Alternative 3 would include 15,400 acres of the Gallatin Petrified Forest within areas proposed for wilderness, and Alternative 5 would include 19,200 acres. Gathering of petrified wood would not be permitted from those areas under Alternatives 3 and 5. Gathering petrified wood would continue to be permitted from the area under Alternatives 1, 4, and 7. Permits would likewise continue to be issued for gathering loose specimens in the 6,000 acres of the Gallatin Petrified Forest outside the boundaries of the HPBH Study Area under all alternatives.

The Big Sky Snowmobile Trail traverses part of the study area in Porcupine and Buffalo Horn creeks for approximately 12 miles. Alternative 5 would close this portion of the trail to snowmobile travel. In the other alternatives, it would remain open.

With the exception of the Elk Horn Trail and the Big Creek Trail, which are now closed to motorized use, the trails in the study area are currently open to all forms of travel. The alternatives proposing wilderness would preclude motorized recreation use on those portions of the study area recommended for wilderness.

Under Alternative 7, a national recreational trail would be established along the crest of the Gallatin Range from the end of the Hyalite Creek

Road to Windy Pass. The National Recreation Trail would be open to all forms of travel. Access to the southern end of the trail at Windy Pass would be provided at Portal Creek on the Gallatin side and Big Creek on the Yellowstone side.

The national recreation trail would not be extended south of Windy Pass to avoid increasing human activities in occupied grizzly bear habitat.

2. Wilderness

a. Wilderness Suitability

Most of the study area is suitable for wilderness consideration. Impacts to the area's natural integrity and appearance tend to be limited in extent -- most occur at the periphery. Most "evidence of man" could be removed by boundary adjustments. Natural appearance of the area will be affected in a few places by sights or sounds from outside the boundaries, but these disturbances would affect a very small portion of the area. The contiguous area easily meets the size requirements for wilderness consideration.

Natural integrity of the Hyalite area is unimpaired for the most part. The area contains three monitored snow courses, one of them equipped with an electronic transmitter. Some impact to naturalness has occurred from heavy recreation use. Impacts stemming from overuse might be corrected through management policy aimed at rehabilitation of sites. The area contains no buildings, roads, or other major impacts.

Natural integrity of the Gallatin Divide has been affected in a number of places, mostly on the area's periphery. Four sections of private land within the boundary have been clearcut and logged south of Big Creek. About 1.5 miles of road has been built within the boundaries on the east side near Steamboat Mountain, and a Forest Service permit has been issued to extend the road about 2 more miles. About 5 miles of road are planned by Burlington Northern, Inc. in Porcupine Creek, and a Forest Service permit has been issued for this road. Both the Rock Creek and Porcupine roading are intended to access timber on private sections of checkboard. Impacts of the Porcupine Road and related timber harvest may be avoided if a land exchange is implemented for this area. A possible land exchange is being considered by Congress and the Forest Service but has not yet been finalized.

The Forest Service has granted Burlington Northern, Inc. a permanent easement to access the Fox Creek drainage for timber harvest. This includes the northwest corner of Mt. Blackmore segment.

The Pine Creek Road enters the Eightmile segment of the study area on the northeast, crossing about 1/4 mile of National Forest and about 1/2 mile of private land. A section of private land within the Eightmile segment was extensively logged about 20 years ago and has several partially regenerated clearcuts. Besides this development, a new road has recently been built up to the MWSA boundary on the east side of the Eightmile segment.

Additional evidence of man's activities in the study area includes a Forest Service cabin at Windy Pass and private cabin near Mud Lake in the Eightmile segment. Developed base camps used by outfitters and guides are found in

Steele Creek, Porcupine Creek, and Bark Cabin Creek. There are also 3 electronics sites on Twin, Packsaddle, and Eaglehead Peaks.

Natural appearance of the Hyalite area does not show the work of man's hand in any permanent way. Presently, motorbikes are allowed on all trails in the area, creating some noise impacts, but would not be allowed there if the area became wilderness. Natural appearance of the rest of the area is affected in places by the structures, roads, and timber harvest already mentioned, and also by clearcutting immediately outside the area's borders. This would include sites near the upper part of the Hyalite Canyon Road, sites in the Tom Miner area, near Rock Creek, and in the basin by Mystic Lake.

Most of the recreation taking place in the Hyalite portion of the area at present is semiprimitive nonmotorized because of limited motorized use on the trail system. If the trails were closed to motorized use, all of the recreation would be primitive recreation. If the Gallatin Divide portion were designated wilderness, about 85 percent of total recreational use could be classified as primitive. The Big Sky Snowmobile Trail and adjacent play areas would be closed to use with a wilderness recommendation.

The experience of solitude is difficult to achieve on major trails or the most popular campsites during the warm months because of the popularity of the area. Solitude can be achieved by seeking out less frequented areas. The rugged character of the area contributes to topographical screening and enhances opportunities for solitude. Opportunity for solitude is high in most of the Gallatin Range except in frequented areas like trail junctions, popular camping sites, or the better fishing lakes.

b. Proximity to Other Wilderness Areas

The Hyalite-Porcupine-Buffalo Horn Wilderness Study Area is contiguous to or near a number of presently classified or recommended wilderness areas.

Below is a summary of these areas:

<u>0</u>	<u>Area</u>	<u>Agency</u>	<u>Acres</u>	<u>Status</u>
	Absaroka-Beartooth	Forest Service	944,127	Wilderness
	Lee Metcalf	Forest Service and BLM	259,000	Wildenenss
	Lionhead	Forest Service	22,811	Adm. Endorsed
	North Absaroka	Forest Service	351,104	Wilderness
	Red Rock Lakes	Fish and Wildlife Service	32,350	Wilderness
	Yellowstone National Park	National Park Service	2,032,721	Adm. Endorsed
	Total Wilderness		1,585,581	acres
	Administratively Endorsed		2,055,532	acres
			3,642,113	acres

3. Visual Quality

Visual quality of the Forest landscape has an effect on recreational experience. Visual quality is measured by the number of acres managed under certain visual quality objectives. The following is a comparison of the acres included under the different visual quality objectives for each alternative:

<u>Alternative</u>	<u>Preservation</u>	<u>Retention Partial Retention</u>	<u>Modification and Maximum Modification</u>
1	0	78,630	27,031
2	0	78,924	26,737
3	80,300	37,542	3,896
4	22,100	66,663	16,898
5	145,900	0	0
7	23,102	64,409	18,150

4. Wildlife and Fish

a. Big Game Capacity

Elk winter range is considered to be the most limiting factor with regard to the capability of an area to support an elk herd. The HPBH Study Area includes 22,880 acres of elk winter range. This total includes 17,320 acres on National Forest, 2,880 acres on Burlington Northern property, and 2,680 acres of State land. It is estimated the National Forest winter range in the study area presently supports about 240 elk.

With intensive wildlife management, it is estimated that forage production on this winter range could be increased to where it could support about 710 elk. Corresponding increases in the forage capacity could be realized on the state and private lands with intensive habitat management. The estimated elk capacity of the National Forest winter range, in numbers of elk supported during the fifth decade, is as follows:

Alternative	1	2	3	4	5	7
Elk capacity on winter range	240	200	710	670	440	630

b. Bighorn Sheep

Approximately 140 Rocky Mountain bighorn sheep are presently found along the high ridges of the Gallatin Range throughout the study area. Rocky Mountain bighorn sheep numbers will be affected by the various levels of livestock grazing within the bighorn range. The following table shows the estimated bighorn populations within the study area by alternatives.

	-----Alternatives-----					
	1	2	3	4	5	7
Estimated bighorn capacity	210	140	300	220	210	220

No reduction in bighorn sheep is expected under any of the alternatives. However, a potential of the bighorn herds to increase present levels is present. Alternative 2 would limit future increase in the bighorn herds due to stress induced by coexistence with domestic sheep. Under stress the wild sheep become more susceptible to parasites and diseases which are present naturally in the environment. Forage competition or shortages of forage on winter and summer ranges would not be a factor. This is because any grazing allocations for sheep in the Gallatin range would be limited to forage in excess of the needs of the wild sheep.

c. Hunting Opportunity

The recreational hunting opportunity index as modeled by the State Department of Fish, Wildlife, and Parks is based on open road density and cover/forage ratios on summer-fall range. In developing this index, the following conditions were deemed to be desirable: the objective of a long hunting seasons (5 weeks), 50 percent of mature bulls in the harvest, and a low percentage (20 to 40 percent) of the bull harvest occurring in the first week of the season. As seen from Table IV-2, Alternatives 3 and 5 offer the highest elk hunting opportunity index, and Alternatives 1 and 2 the lowest. Alternatives 4, 5, and 7 are in the midrange.

Table IV-2. Elk Recreational Hunting Opportunity Index in the HPBH Study Area

	Alternatives					
	1	2	3	4	5	7
Recreational hunting opportunity index	.76	.74	.90	.81	.90	.82
Percent of Bull harvest in first week of season	32	33	25	29	25	29

d. Trout

Approximately 49 miles of streams in the study area are capable of supporting trout. These streams produce an estimated 8,800 catchable trout annually. Changes in numbers of trout by alternative are estimated based on sedimentation changes due to different levels of road construction. Trout populations are expected to fluctuate as levels of road construction fluctuate. The effects are short-term and trout populations will recover following periods of road construction activity.

Table IV-3. Expected Trout Numbers by Alternative.

Decade	Alternative					
	1	2	3	4	5	7
1	8,820	8,690	8,820	8,820	8,820	8,565
2	8,335	8,440	8,820	8,600	8,820	8,280
3	8,440	8,565	8,820	8,690	8,820	8,670
4	8,820	8,690	8,820	8,715	8,820	8,555
5	8,440	8,335	8,820	8,580	8,820	8,820

e. "Selected Species"

Certain species have been selected to be monitored either because of their high importance or because habitat conditions that are important to them are also important to other species on the Forest. The species selected for monitoring in the Gallatin Forest Plan are as follows:

<u>Species</u>	<u>Rationale</u>
Grizzly Bear	Threatened and environmentally sensitive.
Bald Eagle	Endangered and environmentally sensitive.
Elk	Economically important, sensitive to forest and range management, indicator of species requiring early forest successional stages.

Cutthroat Trout	Restrictive habitat requirements, sensitive to water quality and riparian habitat management, indicator of stream trout populations generally.
Goshawk	Indicator of species requiring old growth or late forest successional stages.

From this list, the grizzly bear, elk, cutthroat trout, and goshawk are relevant to the HPBH Study Area as indicator species. Bald eagles do not nest in the study area and appear to be only occasional visitors.

Elk and cutthroat trout have just been discussed in the preceding paragraphs, and the alternatives compared relative to their populations.

The habitat conditions for grizzly bear are evaluated for the alternatives. Under all alternatives, the emphasis in management Situation 1 area is placed on managing the habitat for the recovering of the species. All alternatives would meet this goal by following specific guidelines for any management activities in the area. These guidelines are detailed in appendix G of the proposed Forest Plan.

f. Species Requiring Old Growth Habitat

The habitat conditions by alternative for the goshawk and other species needing late forest successional stages are compared by listing the total National Forest acres expected to be managed as old growth forest within the study area as follows:

<u>Alternative</u>	<u>Old Growth Commercial Forest</u>	<u>Old Growth Noncommercial Forest</u>	<u>Total Old Growth</u>	<u>Percent of Acres Managed as Old Growth</u>
1	13,240	50,600	63,840	41.2
2	9,650	50,600	60,550	39.0
3	31,000	50,600	81,600	52.6
4	15,000	50,600	65,600	42.3
5	31,000	50,600	81,600	52.6
7	16,440	50,600	67,040	43.2

To help appraise these effects, consider that there are presently 81,600 forested areas under National Forest ownership in the study area, of which 31,000 acres are commercial forest.

The habitat conditions for the goshawk and other species favoring late forest successional states are amply met under all alternatives. The goshawk requires a minimum of 10 percent of its home range in mature to old growth timber. All alternatives provide more than 10 percent old-growth component. The range is from 39 to 53 percent old growth for the total study area, depending on which alternative is considered.

5. Range

The HPBH Study Area includes parts of seven grazing allotments. The stocking level currently being allowed in the study area is 294 animal unit months (AUMs). Range specialists on the Gallatin National Forest estimate

that there is suitable range for a total of 5,900 AUMs within the study area.

The following is a listing of the estimated livestock stocking levels for the study area for each alternative:

	-----Alternatives-----					
	1	2	3	4	5	7
Programed Livestock Grazing at Decade 2 (Average Annual AUMs)	290	5,420	60	3,840	290	1,840

These estimates are based on the capability of the area modified by consideration for the other resource values and the objectives of each alternative.

The estimates assume that before implementation under any alternative, a detailed allotment management plan would be prepared. This plan would include inventories of soils, forage, water, and wildlife resources.

a. Big Game

The wildlife values are an important consideration in assessing grazing effects. Livestock and big game feed on many of the same types of forage.

In some management situations, big game and livestock may not be compatible. However, in other management situations, there may be no element of competition. Wildlife such as elk and bighorn sheep are able to utilize ranges that are unsuitable for livestock grazing. They are able to traverse steeper and rougher terrain to find forage, whereas domestic cattle and sheep are controlled by fencing and herding on areas where they can be monitored.

The major conflicts between livestock and big game are on wildlife winter range. Such areas are essential to big game because these areas often provide the only forage available to maintain the big game animals in the winter. Much of this winter range acreage is included in a special wildlife management area under Alternative 7.

Alternatives 2, 4, and 7 anticipate some domestic sheep grazing within the range utilized by Rocky Mountain bighorn sheep. If domestic sheep are permitted to graze the areas that are essential to sustain the wild sheep during the winter, the effect could be a reduction in the bighorn populations. This is partly because domestic sheep grazing on the bighorn sheep range could cause stress, resulting in increased mortality due to diseases and parasites in the bighorn sheep population. Introduction of domestic sheep grazing is not expected to result in any shortage of forage for wild sheep.

b. Threatened and Endangered Species

The threatened grizzly bear could be affected by domestic sheep grazing proposed in alternatives 2 and 4, because of possible increased bear/man confrontation in occupied grizzly habitat. Alternatives 1, and 7 provide for continued grazing by cattle within and adjacent to occupied grizzly habitat. Grazing within occupied and adjacent unoccupied grizzly habitat would be managed under all alternatives to reduce the probability of grizzly bear mortality.

Before stocking new allotments, a biological review of the effects of the proposed livestock grazing on grizzly bear security will be prepared. The effect of grazing in occupied grizzly bear habitat is to increase the risk of human/grizzly bear confrontation, with increased risk of grizzly bear mortality.

6. Timber

Within the HPBH Study Area are 81,600 acres of forested lands under National Forest ownership. Of this total, 31,000 acres are considered as commercial Forest lands. Portions of these acres are allocated to timber management prescriptions in various degrees depending on the objectives of each alternative. The areas where timber management activities will be applied are termed "suitable" timber lands. These totals include land managed for a recreation or wildlife emphasis where some timber cutting would be done to accomplish the primary purpose of the prescription.

The following shows the programmed timber harvest by alternative for the HPBH and the acres of commercial timberland from which that harvest would be taken.

Activity	Units	Alternatives					
		1	2	3	4	5	7
Timber Harvest (Average Annual)							
Decade 1	MMBF	0	1.4	0	0	0	1.0
Decade 2	MMBF	2.7	3.0	0	1.5	0	0.3
Decade 3	MMBF	3.5	2.5	0	1.5	0	2.7
Decade 4	MMBF	0.6	0.8	0	1.4	0	3.2
Decade 5	MMBF	3.3	5.0	0	3.1	0	0
Average Harvest over 100 years	MMBF	1.8	1.8	0	1.7	0	1.4
Land Suitable for Timber Management	Acres	17,760	21,350	0	16,000	0	14,560

Timber harvest improves the productivity of a timber stand by removing the mature and overmature trees which have essentially stopped growing. These overmature stands are also losing timber volume to insects, disease, and mortality. After harvest of such stands, the area regenerates with young, vigorous trees. A mosaic pattern of various age-class timber stands is more resistant to insect and disease epidemics than an extensive, even-aged timber stand.

How effectively each alternative accomplishes this age-class diversity is shown in two ways: (1) By the acreage of commercial forest land allocated to timber management prescriptions, and (2) by how well the alternative redistributes the acreage to different age classes.

Alternatives 1, 2, 4, and 7 provide the best opportunity for distribution of age classes. These alternatives would also best reduce long-term losses of lodgepole pine to mountain pine beetle.

Timber management and production, including the associated road construction, generally removes an area from any consideration for wilderness. In addition, timber harvest and road construction on lands adjacent to a wilderness can produce sights and sounds which can detract from a wilderness experience.

Alternative 5 would probably experience the least amount of detractive sights and sounds because of its larger size and greater width. The compact shape of the wilderness proposed in Alternative 4, along with differences in topography, would limit the detractive sights and sounds, although not as much as the larger wilderness proposed in Alternative 5. Alternative 3 would not be affected because timber harvest is not proposed.

a. Effects on Wildlife

Timber harvest can reduce hiding and thermal cover, primarily impacting animals on fall and winter range. At the same time, timber harvest is an important tool to improve big game ranges. In this sense, timber harvest provides wildlife forage and habitat diversity by creating different age classes of trees. Care must be exercised in designing timber harvesting on important big game ranges to provide a proper mixture of security and thermal cover with forage areas. Road management using road closures is also an effective means to provide greater elk security.

Alternatives 3, 4, and 7 are intended to manage timber stands on the important wildlife ranges so as to provide maximum benefit to wildlife rather than to maximize timber production. These alternatives are judged to be more favorable for wildlife than the other alternatives. Alternative 5 has no timber harvest and thus does not afford the opportunity to maintain the most favorable cover/forage ratios. Alternatives 1 and 2, harvest timber with the objective of maximizing timber production rather than to favor wildlife values.

b. Effects on Threatened and Endangered Species

Timber management activities can directly affect the grizzly populations because of the habitat changes incurred. These changes result from vegetation manipulation such as timber harvesting or site preparation, and from increased human encounters because of increased road construction.

Timber management activities if well coordinated can produce more desirable forage for grizzlies through timber harvest and site preparation practices such as small clearcuts and broadcast burning. If road closures are instituted in a timely manner, human/bear encounters can be kept to a minimum. To minimize stress to the grizzly population, silvicultural treatments must be carefully scheduled during seasons when the bears are not dependent upon the specific area where the activity is planned.

Alternatives 1, 2, 4, and 7 project timber management activities within occupied grizzly bear habitat.

c. Effects on Recreation

Timber management activities with their associated road construction directly affect dispersed recreation opportunities. Primitive recreation opportunities are reduced and other recreation opportunities are increased. As unroaded areas become roaded, opportunities for snowmobiling and cross country skiing can be enhanced because of easier access to the higher elevations.

Timber management activities and road construction have a significant effect on visual quality. Although the impacts of timber management are generally short-term, the immediate change to the existing landscape is undesirable to many Forest visitors. The establishment of visual quality objectives (VQOs) provides the method for carrying out timber management while protecting the visual resource. A comparison of the VQO class for each alternative was displayed earlier in this chapter.

7. Facilities

The Wilderness Act conveys the right of adequate access to privately owned lands within the wilderness.

Private land owners have been granted permits to construct roads to some of their lands within the study area. All alternatives except alternative 5 would result in some road construction into private lands. The table following shows the estimated road mileage needed to implement the alternatives for activities on National Forest lands only. Approximately 70 percent of these roads would be closed following timber harvest.

Table IV-4. Miles of Road Constructed in HPBH Study Area
by Alternatives (in miles/year)

Decade	-----Alternatives-----					
	1	2	3	4	5	7
1	0	1.5	0	0	0	1.2
2	3.1	3.4	0	1.5	0	.2
3	3.6	2.3	0	1.6	0	2.1
4	0	1.4	0	1.2	0	2.8
5	3.7	4.1	0	2.4	0	0

Alternative 5 would not permit road construction, assuming the private land is successfully acquired for wilderness. Alternative 3 would have no road construction for National Forest activities but would allow roads to be constructed to private lands within the study area. No estimate is made of the amount of road needed to serve the private land activities.

The area is presently served by a trail system. Alternative 7 proposes establishment of a National Recreation Trail from the north end of the study area at Hyalite Creek to Windy Pass. This trail would be some 22 miles long. It would be established along an existing Forest Service trail.

a. Effects on Wilderness

Road construction is not in keeping with wilderness character. Roads to access private land in Alternatives 3 and 5 diminish the wilderness resource.

Roads near a wilderness can enhance primitive recreation use within the wilderness by providing access to the wilderness area. Access points are an effective means of dispersing wilderness users to provide better opportunity for solitude. End-of-road facilities enhance the wilderness experience by providing parking areas.

b. Effects on Wildlife

As previously discussed, the presence or absence of open roads affects elk security. This in turn affects the overall quality of elk habitat and the distribution of the elk population.

8. Electronic Sites and Transmission Corridors

The study area contains two electronic communications sites and one automated snow measurement telemetry station. These installations are within the proposed wilderness areas of Alternatives 3 and 5. Such installations are normally not permitted in wilderness areas. Where these installations exist under valid permits prior to the time the unit is incorporated into the National Wilderness Preservation System, they may be maintained if, in the opinion of the Regional Forester, their continued use in wilderness is in the public interest. Each such installation must be periodically reviewed for compatibility and public need. Efforts must be made to find suitable alternative locations for the installations outside wilderness (FSM 2320.3).

Bonneville Power Administration in 1977 made a study of possible corridors for transmission of electrical energy from the coal fields of eastern Montana and Wyoming to the population centers of the Pacific Northwest. The study identified a potential corridor through the HPBH Study Area at Buffalo Horn Pass between Tom Miner and Buffalo Horn creeks. This was not a specific project proposal but only an identification of potential corridors or "windows" where such facilities could be constructed. Alternatives 3 and 5 would exclude future consideration of this potential corridor. The potential for use as an energy corridor would not be affected by the other alternatives (BPA, 1977).

9. Water and Soils

Timber harvest can increase water yield in a watershed for about 60 years. The size of the increase depends on the percentage of the area treated, the silvicultural system used, topography, soil conditions, and precipitation. The water yield increases resulting from timber harvest activities in the alternatives are very small relative to the 126,000 acre-feet of water presently flowing from the National Forest portion of the study area.

The following table shows the average annual water yield increases above 126,000 acre-feet base by decade for the alternatives.

Table IV-5. Annual Water Yield Increases in acre feet by Decade In Excess of the Base Flow (126,000 Acre-feet).

Decade	Alternatives					
	1	2	3	4	5	7
1	0	12	0	0	0	10
2	55	98	0	13	0	8
3	134	117	0	51	0	66
4	93	96	0	66	0	115
5	142	169	0	112	0	80

The effects of these increases are expected to be negligible. Indeed they may be overshadowed by water yield increases due to natural disasters such as the current mountain pine beetle epidemic or fire. No accelerated streambank erosion is projected nor are any measurable changes expected in peak or late summer streamflows.

Sediment increases for all alternatives will have little adverse impact on water quality. Such levels would be virtually undetectable. Natural variations in sedimentation often exceed 100 percent and sometimes exceed 1,000 percent.

10. Minerals, Oil/Gas

There are 33,900 acres of oil and gas lease applications in the HPBH Study Area. There appears to be little potential for discovery of locatable minerals in the Study Area. During the RARE II study, Forest Service geologists gave the HPBH Study Area a rating of zero on a zero-to-100 scale for hard rock mineral potential. For oil and gas potential, the geologists rated the area 78 on a zero-to-100 scale.

Established wilderness areas are not open for oil and gas leasing and locatable mineral entry. Under the Wilderness Act of 1964, wilderness areas were closed to new mineral appropriations after December 31, 1983.

a. Effects on Minerals

Under Alternative 7, the Hyalite Peaks Scenic Area would be recommended for withdrawal from mineral entry and surface occupancy oil and gas leases would not be issued. This would preclude such things as roads or drill pads within the area.

b. Effects on Wilderness

Mineral and oil and gas exploration and development can not occur within wilderness.

c. Effects on Wildlife/Fish, Including T-E Species

Many wildlife species are sensitive to and avoid human disturbance. Intrusion by humans into the security areas of these animals can cause stress which may be critical during certain seasons. Stipulations are included in mineral leases and operating plans to restrict activities to seasons when the areas are not critical to wildlife.

d. Availability for Minerals

Tables II-10 and II-11, found in Chapter II, show the relative availability of the area to mineral development under the various alternatives.

11. Lands

Included within the boundaries of the Hyalite-Porcupine Buffalo Horn Wilderness Study Area are 49,305 acres on non-Federal land. This total includes 36,007 acres of Burlington Northern Railroad Co. (BNRC), 6,717 acres of other private ownership, 5,466 acres of Montana State lands, and 1,115 acres belonging to the City of Bozeman.

a. Effects on Wilderness

By definition, wilderness is limited to Federal lands. In cases where State, city, or privately owned land is completely surrounded by wilderness, the Wilderness Act assures the landowners "adequate" access to their lands, or the state owned or privately owned land may be exchanged for Federally owned land of equal value.

"Adequate access" to private land may include roads which could detract from wilderness management of the Forest Service lands. In cases where the landowner plans to harvest timber on his land, the noise and the visual effects would detract from wilderness management on the adjacent Federal lands. Permits for roads across National Forest land within the study area to access privately owned lands have been issued, and new applications for access are being considered.

Management of the 5,400 acres of State land and 1,115 acres of Bozeman city land would probably not detract from wilderness management of the Federal land.

Under the Wilderness Act, acquisition of intermingled private land may be by purchase from a willing seller, exchange for Federal land outside the area or by Congressional action. Condemnation action by the Forest Service is not a permissible means of land acquisition for wilderness.

The following table shows the land ownership within the alternative wilderness proposals.

Table IV-6. Land Ownership Within Proposed Wilderness Boundaries.

<u>Owner(s)</u>	<u>Alt. 3</u>	<u>Alt. 4</u>	<u>Alt. 5</u>
National Forest	64,223	22,100	105,261
BNTI	16,092	0	34,400
State of Montana	3,744	0	5,466
Other Private	0	0	5,200
City of Bozeman	0	0	1,115
TOTAL	84,059	22,100	151,442

In Alternatives 3 and 5, National Forest land capable of supporting timber harvest would be included within the lands recommended for wilderness. In the entire study area, there are 31,000 acres of National Forest land capable of harvest. These would not be managed for timber in Alternative 5. In Alternative 3, approximately 9,900 acres of capable land would be included within the wilderness recommendation. There would be no timber management on these lands.

National Forest lands capable of timber harvest would be traded away in other parts of the Forest for the private land within the study area. The Forest would give up about 12,000 capable timber acres in Alternative 3, while in Alternative 5 it would give up about 27,600 acres of capable land. The timber lands which would not be harvested in the recommended wilderness plus those traded away represent a reduction in the present Forest timber base of 5 percent in Alternative 3 and 12 percent in Alternative 5.

Based upon a comparison with the Proposed Action (Alternative 7), the timber volume forgone from National Forest land in the recommended wilderness would be 0.38 MMBF/year for Alternative 3 and 1.4 MMBF/year for Alternative 5. There would also be harvest forgone from the private lands acquired in these two alternatives. The capable timber lands on these private lands are estimated to be 5,280 acres in Alternative 3 and 15,280 acres in Alternative 5. The timber volumes forgone from these private lands are estimated at 1.3 MMBF/year for alternative 3 and 3.0 MMBF/year for alternative 5.

The timber volume that would be expected in the Proposed Action from those National Forest lands traded away in Alternatives 3 and 5 would be about 1.3 MMBF/year and 3.0 MMBF/year respectively. The timber land traded away would likely continue to be managed for harvest and would still contribute to the local economy. However, timber from these lands would not necessarily be available for competitive sale to local sawmills. Table IV-7 summarizes these acreages and volumes.

Table IV-7. Effects on Timber Land and Volume

<u>Timber Land (Acres)</u>	<u>Alternative 3</u>		<u>Alternative 5</u>	
	<u>Capable</u>	<u>Suitable 1/</u>	<u>Capable</u>	<u>Suitable 1/</u>
N.F. Timber in Wilderness	9,940	2,596	30,964	14,500
Private Land in Wilderness	5,280		15,280	
N.F. Land Traded to Private	12,000	8,160	27,600	18,770
Reduction in N.F. Timber base	21,940 (5%)	10,756 (4%)	53,360 (12%)	33,270 (10.5%)

Volume from National Forest (MMBF/year)

50 year average

Forgone in Wilderness	0.9	0.38	3.6	1.4
From Private in wilderness	0.9		2.5	
From Lands traded to Private	2.0	1.3	4.6	3.0
Reduction in N.F. Volume	2.9	1.7	8.0	4.4
	(4%)	(7%)	(12%)	(19%)

1/ Suitable lands and suitable volumes are based on a comparison with the proposed action (Alternative 7).

C. Social and Economic Consequences

The communities most directly affected by the decision regarding the HPBH are the upper Gallatin and the west side of the Yellowstone River. Much of the upper Gallatin is made up of guest ranches, outfitters, guides, motel owners, and other recreation-oriented family businesses. The west side of the Yellowstone River is primarily made up of working ranches.

The major social effects of a wilderness recommendation on the upper Gallatin community would be a continuation of the Forest land base being managed essentially as it has been in the past with the exception of elimination of motorized recreation within the study area. Most of the people in this community believe that it is this unchanging land base with its scenic, wildlife, and recreation resources which will allow them to continue their businesses and their way of life. Many feel that developing this land would begin to erode their way of life.

The social effects of a wilderness recommendation on the ranchers who own land along the west side of the Yellowstone River would be different. They are not generally involved with recreation as a business. Many of them own intermingled land within the Forest boundary. Some own land within the study area boundary. In Alternative 5, those private lands within the study area would be attempted to be acquired. Local acquisition would be through trade. A land trade here would cause a change in the traditional ownership pattern. The ranchers have grazed and logged their lands and sometimes built roads according to the public/private ownership pattern. Some ranchers who own land within the study area may benefit from a land exchange, but such an exchange may not benefit other ranchers and would probably be resisted by them.

Social factors to consider in wilderness decisions are people's values, beliefs, and attitudes. These are formed by people's perceptions of the resources and by the way they think the resources should be used and managed.

People outside the immediate communities mentioned above will be affected. A decision to recommend wilderness or nonwilderness for the area will coincide with some people's values and beliefs and will be counter to

others. The social consequences of a wilderness or nonwilderness decision may be interpreted as a rejection of the values of one group or another.

Table IV-8 displays the estimated changes in income and total employment for the four-county impact area. As shown, the changes over the first 10 to 20 years are quite small. Later decades would result in somewhat larger changes although none of the alternatives appear to create significant impacts on the four-county area as a whole. In addition, no individual employment sector is expected to be severely impacted.

Table IV-8. Changes in annual employment and Income Resulting From the Alternatives 1/

	Decade	Alternatives					
		1	2	3	4	5	7
Total Annual Employment							
(Person Years)	1	0	3	-2	1	-1	7
	2	26	34	4	21	3	16
	3	53	50	11	37	8	49
	4	30	40	16	48	14	67
	5	80	108	19	74	20	31
Total annual							
Income Change	1	0	49	-15	12	-12	70
(Thousands of	2	285	357	35	200	25	128
Dollars)	3	593	510	91	365	64	506
	4	264	365	124	486	108	725
	5	926	1267	149	823	154	243

1/ This table reflects changes in direct, indirect, and induced impacts from the present (Alternative 1, Decade 1) for Gallatin, Madison, Park, and Sweet Grass Counties.

D. Summary of Short-Term Use and Long Term Productivity

Short-term uses include activities that generally occur on a yearly basis on some part of the Forest. Timber harvest, habitat improvement, and recreational use are examples. Maintaining productivity (the capacity of the land to provide resource outputs) is the primary long term concern. Soil and water are the primary factors of productivity. The objective of the Proposed Action is to manage the study area to yield benefits in the short-term while assuring that long-term productivity of the soil and water is not impaired.

Grazing, timber harvest, and road building have the greatest potential to affect long-term productivity and these require careful scheduling, control, and monitoring. Timber management on productive and suitable timber-growing sites will increase the timber yields over time without reducing land productivity.

Some practices, including timber harvest and prescribed burning, have a short-term adverse effect on the visual resource. In general, however, the long-term effect is positive because of the development of a healthy, youthful, diverse and productive area. To achieve visual compatibility in all forest management practices and activities, the principles of landscape management will be used in the design and implementation of projects.

E. Summary of Irreversible and Irretrievable Commitment of Resources

"Irreversible commitment" of resources refers to resources that are renewable only after a long period of time, such as soil productivity, or to nonrenewable resources such as cultural or minerals. Alternatives were formulated with the understanding that maintenance of future options is an important consideration. Forestwide standards incorporate measures to protect resources which could be irreversibly affected by other resource uses.

Because of the long time needed for a road to revert to natural conditions, the construction of collector roads to provide access to National Forest land in the study area is considered an irretrievable action. Alternative 2, with the highest resource output levels, has the greatest irreversible commitment of resources. Alternative 5 has the fewest irreversible actions within the HPBH Study Area and protects future options the most.

Production of minerals and energy resources is a vital concern in the United States, but sometimes results in irreversible or irretrievable commitments of resources related to the minerals or necessary roading. The role of the Forest Service is to manage surface resources to minimize adverse environmental impacts while encouraging the exploration and development of mineral resources.

"Irretrievable commitment" is resource production or use of a renewable resource that is lost because of allocation decisions made. This represents opportunities forgone for the period of time that the resource cannot be used. Timber on steep slopes that is not economically accessible may represent an irretrievable commitment of resources since mortality is not salvageable. The commitment is irretrievable rather than irreversible because future technological advances could make harvest of these areas feasible. Another example of irretrievable commitment of resources is wilderness designation.

The difference between alternative output levels and the higher levels that could be produced also represents an irretrievable commitment of resources. For example, a low level of forage for domestic livestock grazing or a low level of water yield could be increased in the future by applying different management prescriptions; however, the outputs between now and then would be "lost" or not available for use. Therefore, the maintenance of future options and the current ability to utilize the resources to the fullest tend to conflict with one another. The purpose of forest planning is to provide a mix of use now, and for future time periods, that balance the needs of both the current population and future generations.

F. Summary Environmental Effects That Cannot Be Avoided

Implementation of any of the alternatives or the Proposed Action will result in some adverse environmental effects that cannot be avoided. However, the forestwide standards are intended to limit the extent and duration of these effects.

Management direction is designed to provide outputs, goods, and services within the constraint of maintaining the sustained yield of recreation, water, timber, forage, and wildlife, and without impairing the long-term productivity of the land.

The alternative formulation process considered a wide range of alternatives. Many of the alternatives were eliminated from detailed study because they would result in unavoidable major adverse environmental effects. Thus, the six alternatives considered in detail represent a broad range of resource outputs, but also represent a reduction of the adverse environmental effects that cannot be avoided.

However, some adverse effects could not be avoided with the Proposed Action and the alternatives given detailed study. These effects include:

- A slight increase in sedimentation and water yield resulting from soil disturbance.
- A short-term adverse effect on scenic quality because of vegetation management and road construction.
- Forgone timber volumes where harvest is restricted
- Short-term reduced air quality because of dust, smoke, and automobile emissions resulting from increased use and vegetative management practices.
- Forgone wilderness options on unroaded lands scheduled for development.

G. Mitigation Measures

The possible effects of timber harvesting, prescribed burning, and road construction on visual quality will be mitigated by following visual management guidelines.

Forgone timber volumes because of insect activity will be mitigated by salvage where scheduled.

The effects of potential mineral exploration can be mitigated under the 1872 Mining Law Use Regulations and by instituting special stipulations in oil and gas leases.

Wilderness options are retained on the Hyalite Peaks Scenic Area (23,100 acres) and the acres managed for roadless recreation (13,100 acres).

CHAPTER V. PEOPLE PRIMARILY INVOLVED IN THE PREPARATION OF THE PLAN

Robert E. Brazeale -- Forest Supervisor; B.S. Forest Hydrology, M.S. Fisheries Biology.

Nineteen years experience with the Forest Service as a Hydrologist, Fire Management Officer, Forest Planner, and District Ranger. Most recently he was in the Washington, DC office as a Resource Information Specialist.

Responsible Official with overall responsibility for the preparation and implementation of the Forest Plan.

John T. Drake -- Forest Supervisor; B.S. Forest Management, M.S. Natural Resource Administration.

Twenty years' experience with the Forest Service in three regions and Washington Office. Nine years' experience in various administrative positions (District Ranger, Deputy Forest Supervisor, Forest Supervisor). Program management responsibilities in a variety of resource areas. Three years' experience as legislative assistant in Washington Office.

John D. Sandmeyer -- Planning Staff Officer; B.S. Forest Management.

Thirty years with the Forest Service; fourteen years with responsibilities in timber, recreation, land use, and fire management; sixteen years in land use planning.

Forest Planner, responsible for environmental analysis and Forest planning. Wrote tiered Hyalite-Porcupine-Buffalo Horn EIS for Plan package.

James Devitt -- Team Leader (6/82 and after); Social Scientist, M.A. Anthropology.

Responsible for social impact assessment of coal development in eastern Montana and Wyoming (1973-75); helped prepare the land management plan for the Umpqua National Forest (1975-78); helped write several unit plans and environmental documents on the Gallatin National Forest, (1978-present).

Served as interdisciplinary team member before 6/82, and team leader thereafter; leader in public involvement activities for the Forest plan; responsible for social assessment and economic analysis for the planning effort. Coordinated and contributed to the writing of the Forest Plan and the accompanying EIS.

Philip C. Cowan -- Energy Coordinator; B.S. Forestry/Forest Management.

Twelve years of experience as an assistant district ranger; district ranger from 1958 to 1967. Environmental coordinator for the Libby Dam and BPA powerline projects from 1970 to 1976 on the Kootenai; energy coordinator on the Gallatin National Forest from 1977 to the present.

Member of the interdisciplinary team from June 1979 to March 1980, and again from August 1980 to the present; as leader of the energy taskforce, helped develop concerns, opportunities, and prescriptions for energy. Wrote portions of the Forest Plan and EIS.

Randall W. Gay -- Zone Timber Planner; B.S. Forestry.

Eight years of experience in timber sales preparation on the Lolo National Forest. Served as environmental coordinator for construction of Interstate 90 and BPA powerline across National Forest lands from 1971 to 1972. Zone timber management planner from 1975 to the present on the Gallatin and Custer National Forests.

Member of the interdisciplinary team; member of the timber taskforce, provided information and expertise for development of management concerns and opportunities, prescriptions, and FORPLAN input-output data for timber. Wrote parts of the Forest Plan and EIS.

Steve Glasser -- Hydrologist; M.S. Hydrology.

Extensive experience since 1974 on interdisciplinary planning teams on three different National Forests. Seven years' experience as a Forest Service Hydrologist.

Member of the interdisciplinary team. As leader of the water/soils taskforce, helped develop issues and concerns, management opportunities, prescriptions and FORPLAN input-output data for timber management. Submitted water and riparian data for Forest Plan data base. Wrote parts of the Forest Plan and EIS.

Michael Shaw -- Operations Research Analyst; B.S. Forest Management.

Three years graduate studies in Forest Economics including applied research in data management and analytical systems used in NFMA planning. Five years in planning-related Forest Service work.

Responsible for operations research and economic analysis needed to implement NFMA regulations. Additionally responsible for coordinating and processing biophysical data. Wrote parts of the Forest Plan and EIS.

Candace Bogart -- Cartographer; M.A. in Geography and Natural Resource Management.

Three years' experience in Supervisor's Office of Gallatin National Forest in cartography and photogrammetry. Formerly, cartographer with Bureau of Land Management. Experience with private archeology firm as cartographer and interdisciplinary team member.

Responsible for preparation of maps and graphics materials for Forest Planning documentation.

Patrick Callahan -- Writer/Editor; Ph.D. English.

Nine years of experience as a Forest Service communications specialist. Five years' experience in the Gallatin National Forest planning office as writer/editor.

Documentor and editor of Forest Plan materials, including the Forest Plan and EIS. Wrote parts of the planning documents. Assisted with the public involvement effort.

Robert Dennee -- Forester; R-1 Certified Silviculturist (C.E.F.E.S.).

Three years of graduate studies and research work in forest economics and planning (U. of Minn.). Five years of Forest Service district level resource work with responsibilities in timber management and silviculture on National Forests.

Member of timber taskforce. Helped to develop issues and concerns, management opportunities, prescriptions, and FORPLAN input for timber management.

Kenneth A. Gallik -- Deputy Forest Supervisor; B.S. Civil Engineering.

Twenty-two years' professional experience in private industry and Forest Service in the following areas: Civil engineering, engineering management, resource management. Registered professional civil engineer and land surveyor in State of Montana.

Member of the management team. Team leader for developing grizzly recovery policy.

Alfred S. Gilbert -- Forest Silviculturist; R-1 Certified Silviculturalist (C.E.F.E.S.).

Sixteen years of Forest Service timber work with responsibilities in timber sale preparation, timber sale administration, and silviculture; certified as R-1 silviculturist.

Leader of the timber taskforce; helped develop concerns, opportunities, prescriptions, and FORPLAN input for timber. Helped prepare prescriptions for submission to the taskforces.

Jerome T. Light -- Forest Wildlife Biologist; B.S. Forestry (Wildlife).

Fifteen years experience as a professional wildlife biologist; three years as a range conservationist, and three years as a forester, all with the U.S. Forest Service.

Taskforce leader for fish and wildlife; led in developing management concerns and opportunities, prescriptions, and FORPLAN input-output data for fish and wildlife. Supplied information to the Forest Plan data base for wildlife, fisheries (with Lloyd), and range (with Howarth).

James Lloyd -- Zone Fisheries Biologist; M.S. Fish Biology.

District fisheries biologist for 2½ years with the Bureau of Land Management. Also worked 2½ years as Zone Fisheries Biologist in developing the fisheries section of the land use plans for six National Forests.

As member of the fish and wildlife taskforce, helped develop concerns, prescriptions, and cost/yield FORPLAN data. Developed fisheries data inputs for Forest Planning and supervised the implementation of the fisheries program as it pertains to Forest Planning.

Ross MacPherson -- Forester; B.S. Forest Management.

Twenty years of Forest Service work with responsibilities in recreation, timber, and public information. Seven years as District Ranger. Presently serving as Public Information Officer and Recreation Director.

Member of management team; member of wilderness taskforce. Provided recreation and wilderness information. Responsible together with Devitt for public participation aspects of Forest planning.

Richard A. Miller -- Transportation Planner; B.S. Civil Engineering.

Six years of professional experience with the Forest Service in timber sale location, survey, design, and other phases of engineering.

Joined the Gallatin staff in October of 1980. Member of the timber taskforce. Provided information on the forest transportation system and its development, and on roading costs for timber.

Sherm Sollid -- Geologist; B.S., M.S. Geology.

Two years as minerals specialist with Bureau of Land Management. Three years as Engineering Geologist with Soil Conservation Service. Four years as geologist with Forest Service.

Served on the minerals taskforce; also, provided geologic and minerals information for the Forest Planning data base.

James M. Williams -- Lands Forester; B.S. Forest Management.

Total of nine years experience as professional forester with Forest Service. Seven years in lands-related positions with responsibilities in valuation, exchanges, fee and partial interest acquisitions, land adjustment planning, special uses, and status and claims. Currently Lands Officer for the Gallatin.

Provided status and land adjustment information for Forest Planning data base. Provided ID team with specific lands-related management practices for area prescriptions.

CHAPTER VI. LIST OF AGENCIES, ORGANIZATIONS, ELECTED OFFICIALS AND OTHER PARTIES TO WHOM COPIES ARE SENT

Senator Max Baucus
Senator Office Building
U. S. Senate
Washington, D.C. 20510

Congressman Ron Marlenee
U. S. House of Representatives
Washington, D.C. 20510

Senator John Melcher
Senate Office Building
U. S. Senate
Washington, D.C. 20510

Congressman Pat Williams
U. S. House of Representatives
Washington, D. C. 20510

Honorable Ted Schwinden
Governor of Montana
State Capital
Helena, MT 59601

Leo Lane
Box 562
Three Forks, MT 59752

Paul F. Boylan
Montana State Senator
3747 South 19th Road
Bozeman, MT 59715

Dorothy Eck
Montana State Senator
10 West Garfield
Bozeman, MT 59715

Robert A. Ellerd
Montana State Representative
2206 Bridger Drive
Bozeman, MT 59715

Orville S. Ellison
Montana State Representative
West Boulder Route
McLeod, MT 59052

Harrison Fagg
Montana State Representative
1414 Mystic Drive
Billings, MT 59102

Jack Galt
Montana State Senator
Martinsdale, MT 59053

Frank W. Hazelbaker
Montana State Senator
P.O. Box 430
Dillon, MT 59723

Kerry R. Keyser
Montana State Representative
P.O. Box 126
Ennis, MT 59729

Francis Koehnke
Montana State Representative
Box 692
Townsend, MT 59644

Dorothy Bradley
Montana State Representative
919 W. Lamme
Bozeman, MT 59715

Walter Sales
Montana State Representative
R. R. 1, Box 25
Manhattan, MT 59741

John C. Vincent
Montana State Representative
209 East Lamme
Bozeman, MT 59715

Dan Yardley
Montana State Representative
P.O. Box 482
Livingston, MT 59047

American Wilderness Alliance
Suite B
4260 East Evans Avenue
Denver, CO 80222

Beak Environmental Specialists
50 East Loucks, Suite 215
Sheridan, WY 82801

Big Sky of Montana
P.O. Box 1044
Livingston, MT 59047

Big Timber Rod and Gun Club
Big Timber Lions Club
Big Timber, MT 59011

Billings Motorcycle Club
P.O. Box 20421
Billings, MT 59102

Billings Rough Riders
P.O. Box 884
Billings, MT 59103

Larry Binfet, Mayor
City of West Yellowstone
West Yellowstone, MT 83501

Blue Ribbons of the Big Sky
Country APO
c/o Jim Ellison, President
McLeod, MT 59052

Bozeman Chamber of Commerce
P.O. Box B
Bozeman, MT 59715

Bozeman, City of
City Hall
411 East Main
Bozeman, MT 59715

Bozeman City Library
220 East Lamme
Bozeman, MT 59715

Bozeman City & County Planning
Box 640
Bozeman, MT 59715

Bozeman Environmental Center
c/o Jan Strout, Programming Services
of On-Campus Living
Hedges Complex-MSU
Bozeman, MT 59717

Bozeman Mountaineers
80880 Gallatin Road
Bozeman, MT 59715

Brackett Creek Grazing Assoc.
c/o Phil Brug
8459 Huffine Lane
Bozeman, MT 59715

Brand S Lumber
Box 1033
Livingston, MT 59047

Bridger Bowl
P.O. Box 846
Bozeman, MT 59715

Bridger Canyon Property Owners
c/o Monte Eliason
6788 Jackson Creek Road
Bozeman, MT 59715

Burlington Northern Snowmobile Club
c/o Jim Gales
211 South I
Livingston, MT 59047

Burlington Northern Timberlands, Inc.
Bill Parson, Resident Forester
4310 Durston Road
Bozeman, MT 59715

Burlington Northern Timberlands, Inc.
Jack D. Duke, Assistant President
176 E. 5th Street
St. Paul, MN 55101

Carnegie Library
Box 846
Big Timber, MT 59011

Chevron Oil Company
Box 599
Denver, CO 80201

City County Planning
(South Park County)
City-County Complex
Livingston, MT 59047

Dept. of Intergovernmental Agencies
Capitol Station
Helena, MT 59601

Dude Ranchers Association
Ron Hymas
107 Hemlock
Manhattan, MT 59741

Environmental Information Center
107 West Lawrence
Helena, MT 59601

Environmental Protection Agency
Region 8
1860 Lincoln Street
Denver, CO 80203

Environmental Protection Agency
301 South Park
Federal Bldg. - Drawer 10096
Helena, MT 59601

Flying D Ranch
P.O. Box 158
Gallatin Gateway, MT 59730

Gallatin Beef Producers
Bob Brownell, President
9433 Dry Creek Road
Belgrade, MT 59714

Gallatin County Commissioners
Gallatin County Courthouse
Bozeman, MT 59715

Gallatin County Saddle Club
Al Lien, Secretary
Box 1264
Bozeman, MT 59715

Gallatin Valley Snowmobile Assoc.
Dorine Christopherson
Public Lands
1871 4th Street, Rainbow Subdivision
Bozeman, MT 59715

Gallatin Valley Snowmobile Assoc.
P.O. Box 755
Bozeman, MT 59715

Gallatin Wildlife Association
c/o John Parker
1113 South 5th
Bozeman, MT 59715

Gardiner Chamber of Commerce
P.O. Box 81
Gardiner, MT 59030

Inland Forest Resource Council
Howard G. McDowell
320 Savings Center Building
Missoula, MT 59801

Livingston Chamber of Commerce
P.O. Box 660
Livingston, MT 59047

Livingston City-County Planning Board
City-County Complex
Livingston, MT 59047

Madison County Commissioners
County Courthouse
Virginia City, MT 59755

Madison-Gallatin Alliance
Box 875
Bozeman, MT 59715

May Petroleum, Inc.
One Energy Square, Suite 1000
4925 Greenville Drive
Dallas, TX 75206

Meagher County Commissioners
County Courthouse
White Sulphur Springs, MT 59645

Montana Bureau of Mines - Geology
Montana College of Mineral Science
- Technology
ATTN: S. L. Groff
Butte, MT 59701

Montana Energy Office
Room 310, Power Block
7 West 6th, Helena, MT 59601

Montana Farm Bureau Federation
P.O. Box 1027
Bozeman, MT 59715

Montana 4x4 Assoc., RVP, R-6
c/o Art Keene
209 South 9th
Bozeman, MT 59715

Montana Outfitters's Council
Dept of Fish, Wildlife & Parks
ATTN: Ralph Holman
Helena, MT 59601

Montana Outfitters-Guides Assn.
Joe Heimer, Committee Chairman
P.O. Box 311
Emigrant, MT 59027

Montana Outfitters-Guides Assn.
c/o Duane Neal
Pray, MT 59065

Montana Petroleum Association
Mr. Don L. Allen
Executive Director
1801 11th Avenue
Helena, Mt 59601

Montana Power Company
40 E. Broadway
Butte, MT 59701

Montana Snowmobile Association
Nina Smith
410 North 18th Street
Bozeman, MT 59715

Montana Sportmen's Association
c/o J. L. Lawellin
P.O. Box 637
Livingston, MT 59047

Montana State Clearing House
Dept. of Intergovernmental
Relations
Planning - Economic
Development Division
Helena, MT 59601

Montana Stockgrowers Association
Mons L. Tiegan
P.O. Box 1697
Helena, MT 59601

Montana Dept. of Natural
Resources - Environmental
Sciences
Cogswell Building
Helena, MT 59601

Montana Dept. of Natural
Resources - Conservation
ATTN: Director
32 South Ewing
Helena, MT 59601

Montana Dept. of Natural Resources
- Conservation
Division of Forestry, State Forester
8001 North Montana Avenue
Helena, MT 59601

Montana Department of State Lands
1625 11th Avenue
Helena, MT 59601

Montana Division of Forestry
Bozeman Unit Forester
Box 1343
Bozeman, MT 59715

Montana State Fish, Wildlife
- Parks Department
1420 East 6th Avenue
Helena, MT 59601

Montana Fish, Wildlife - Parks Dept.
Coordinator, Region 5
1125 Lake Elmo Drive
Billings, MT 59101

Montana Fish, Wildlife - Parks Dept.
Coordinator, Region 3
8695 Huffine Lane
Bozeman, MT 59715

Montana State University
ATTN: Dr. Robert Chadwick
Dept. of Earth Sciences
Bozeman, MT 59717

Montana State University
Documents Library
Bozeman, MT 59717
Jim Riebhoff (Motorized Recreation)
211 South 20th Avenue
Bozeman, MT 59715

Montana Wilderness Association
Box 635
Helena, MT 59601

Montana Wildlife Federation
Rich Day
13161 Cottonwood Drive
Bozeman, MT 59715

Montana Woolgrowers Association
Bob Gilbert, Secretary
P.O. Box 1693
Helena, MT 59601

National Audubon Society
c/o John Fisher
113 Sourdough Ridge Road
Bozeman, MT 59715

Nature Conservancy
P.O. Box 258
Helena, MT 59601

Nature Conservancy
214-215 Radio Central Bldg.
127 East Main
Missoula, MT 59801

Nine Quarter Circle Ranch
Gallatin Gateway, MT 59730

Northern Plains Resource Council
c/o Mark Ledbetter
419 Stapleton Building
Billings, MT 59101

Park County Commissioners
County Courthouse
215 East Lewis
Livingston, MT 59047

Park County Rod and Gun Club
c/o G. F. Rediske
P.O. Box 315
Livingston, MT 59047

Stillwater PGM Resources
P.O. Box 8673
Big Timber, MT 59011

Rocky Mountain Oil - Gas Assoc.
P.O. Box 1398
Billings, MT 59103

Rural Areas Development Committee
Torlief S. Aasheim
517 West Koch
Bozeman, MT 59715

Rural Electrification Administration
ATTN: Director, Environmental -
Energy Requirements Division
Washington, D. C. 20250

Sacajawea Audubon Society
P.O. Box 1711
Bozeman, MT 59715

Sierra Club
Box 7315
Missoula, MT 59801

Sierra Club
c/o Bruce Hamilton
P.O. Box 1078
Lander, WY 82520

Sierra Club, Northern Rockies Chap.
Ralph Maughan, Chairman
P.O. Box 1173
Pocatello, ID 83201

Ski Yellowstone Incorporated
c/o Joe Sabol
225 East Mendenhall
Bozeman, MT 59715

Society of American Foresters
c/o Chairman, Eastern Chapter
6412 Greenmeadow Drive
Helena, MT 59601

Southeastern Sportsmen Assoc.
P.O. Box 33
Billings, MT 59103

USDA Forest Service
Custer National Forest
Box 2556
Billings, MT 59103

Sweetgrass County Commissioners
County Courthouse
Big Timber, MT 59011

Sweetgrass County Planning Board
Box 6
Big Timber, MT 59011

Sweetgrass County Recreation Assoc.
Big Timber, MT 59011

Dr. Richard Tenney
308 South Bozeman
Bozeman, MT 59715

Texas Oil - Gas Corp.
c/o James H. Sherrard
Environmental Administrator
Fidelity Union Tower
Dallas, TX 75201

320 Ranch
Gallatin Gateway, MT 59730

Trout Unlimited
c/o Robert Foukal, Apt. #1
2020 South Rouse
Bozeman, MT 59715

Trout Unlimited
c/o Neil M. Travis
411 South E
Livingston, MT 59047

USDA Forest Service
Beaverhead National Forest
Box 1258
Dillon, MT 5972

USDA Forest Service
Bitterroot National Forest
316 North 3rd Street
Hamilton, MT 59840

USDA Forest Service
Clearwater National Forest
Highway 12 - 126 Street
Orofino, ID 83544

USDA Forest Service
Targhee National Forest
420 North Bridge Street
St. Anthony, ID 83445

Deerlodge National Forest
Box 400
Butte, MT 59703

USDA Forest Service
Flathead National Forest
Box 147
Kalispell, MT 59901

USDA Forest Service
Helena National Forest
Drawer 10014
Helena, MT 59626

USDA Forest Service
Idaho Panhandle National Forest
1201 Ironwood Drive
Coeur d'Alene, ID 83814

USDA Forest Service
Kootenai National Forest
Box A5
Libby, MT 59923

USDA Forest Service
Lewis - Clark National Forest
Box 871
Great Falls, MT 59403

USDA Forest Service
Lolo National Forest
Building 24
Ft. Missoula
Missoula, MT 59801

USDA Forest Service
Nezperce National Forest
319 East Main
Grangeville, ID 83530

USDA Forest Service
Northern Region
R-1, PP - B
Box 7669
Missoula, MT 59807

Upper Yellowstone Snowmobile Club
c/o Hoosier's Motel
Cooke City, MT 59020

USDA Soil Conservation Service
P.O. Box 970
Bozeman, MT 59715

USDI Bureau of Land Management
Montana State Office
P.O. Box 30157
Billings, MT 59107

USDI Fish Cultural Development
Center
4050 Bridger Canyon Road
Bozeman, MT 59715

USDI Fish - Wildlife Service
1125 Lake Elmo Drive
Billings, MT 59101

USDI Missouri Basin Region
Building 67
Denver Federal Center
Denver, CO 80225

USDI Yellowstone National Park
Superintendent's Office
Box 168
Mammoth Hot Springs, WY 82190

United States Ski Association
Northern Division
1732 Clark Avenue
Billings, MT 59102

University of Montana
Student Environmental Research Center
758 Eddy Street
Missoula, MT 59801

Upper Gallatin Planning Assoc.
c/o Vic Benson
Canyon Route, Box 224
Gallatin Gateway, MT 59730

Upper Yellowstone Rod - Gun Club
P.O. Box 427
Gardiner, MT 59030

Valley Motorcycle Club
c/o Dick Milledge
1414 South 4th Street
Bozeman, MT 59715

Van Cleve Company
Big Timber, MT 59011

West Yellowstone Chamber of Commerce
123 Yellowstone
West Yellowstone, MT 59758

Western Environmental Trade Assoc.
Peter Jackson, Executive Director
1804 11th Avenue
Helena, MT 59601

Wilderness Society
c/o Bill Cunningham
P.O. Box 1184
Helena, MT 59601

Wilderness Studies Group
University of Montana
Missoula, MT 59801

Wildlife Management Institute
William B. Morse
Western Representative
1617 N. E. Brazee Street
Portland, OR 97212

Yellowstone Nordic Ski Assoc.
30 Madison Avenue
West Yellowstone, MT 59758

Yellowstone Pine Company
P.O. Box 325
Belgrade, MT 59714

VII. GLOSSARY

A

ACCESS	See public access.
AFFECTED ENVIRONMENT	The biological and physical environment that will or may be changed by actions proposed and the relationship of people to that environment.
ALLOCATION	The assignment of multiple-use management prescriptions to particular land areas to achieve the goals and objectives of the alternative.
ALLOTMENT	See range allotment.
ALTERNATIVE	One of several policies, plans, or projects proposed for decisionmaking.
ANALYSIS AREA	A delineated area of land subject to analysis of (1) responses to proposed management practices in the production, enhancement, or maintenance of forest and rangeland outputs and environmental quality objectives, and (2) economic and social impacts.
ANALYSIS OF THE MANAGEMENT SITUATION	A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services.
ANIMAL UNIT MONTH (AUM)	The quantity of forage required by one mature cow (1,000 lbs.) or the equivalent for one month.
AVAILABLE FOREST LAND	Land that has not been legislatively or administratively withdrawn from timber production by the Secretary of Agriculture or Forest Service Chief.

B

BENCHMARK	Reference points that define the bounds within which feasible management alternatives can be developed. Benchmarks may be defined by resource output or economic measures.
BENEFIT (VALUE)	Inclusive terms to quantify the results of a proposed activity, project or program expressed in monetary or nonmonetary terms.

BIG GAME Those species of large mammals normally managed as a sport hunting resource.

BIG GAME WINTER RANGE The area available to and used by big game through the winter season.

BOARD FOOT A unit of measurement represented by a board one foot square and one inch thick.

BROWSE Twigs, leaves, and young shoots of trees and shrubs on which animals feed; in particular, those shrubs which are utilized by big game animals for food.

C

CAPABLE FOREST LAND Land with a biological growth potential which is equal to or exceeds the minimum standard for timber production (an average annual growth rate of at least 20 cu. ft. per acre of wood fiber).

CFR Code of Federal Regulations.

CLEARCUTTING Harvesting of all trees in one cut. It prepares the area for a new, even-aged stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded as separate age class in planning. Regeneration is obtained through natural seeding, or through planting or direct seeding.

COEFFICIENT (COST, VALUE, YIELD) These are the costs for producing various Forest resources, the value of products or use, and the outputs from the Forest used in the FORPLAN computer model.

COLLECTOR ROADS Roads constructed to serve two or more elements but which do not fit into the other two road categories (arterial or local). Construction costs of these facilities are prorated to the respective element served. These roads serve smaller land areas and are usually connected to a Forest arterial or public highway. They collect traffic from local Forest roads or terminal facilities. The location and standard are influenced by both long term multi-resource service needs and travel efficiency. Forest collector roads are operated for constant or intermittent service, depending on land use and resource management objectives for the area served by the facility.

COMMERICAL FOREST LAND (SUITABLE TIMBER LAND)	Land that is producing, or is capable of producing, crops of industrial wood and (1) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (2) land where existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions; and (3) land where existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be obtained within years after final harvesting.
	TM Staff recommends the above definition to also define the term "Suitable timber land." Suitable timber land includes both roaded and unroaded lands.
COMMUNITY STABILITY	The capacity of a community to absorb and cope with change without major hardship to institutions or groups within the community.
CONCERN	See management concern.
CONSTRAINT	A confinement or restriction on the range of permissible choices.
CORRIDOR (UTILITY CORRIDOR)	A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries.
COST	The negative (adverse) effects. Costs may be monetary, social, physical or environmental in nature.
COST EFFECTIVE	Achieving specified outputs or objectives under given conditions for the least cost.
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 specific 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.
CULTURAL RESOURCES	The physical remains of human activity (artifacts, ruins, burial mounts, petroglyphs, etc.) and conceptual content or context (as a setting for legendary, historic, or prehistoric events as a sacred area of native peoples, etc.) of an area.

D

- DEMAND** The amount of output that users are willing to take at a specific price, time period, and condition of sale.
- DEPARTURE** A schedule which deviates from the principle of nondeclining flow by exhibiting a planned decrease in the timber sale and harvest schedule at any time in the future.
- 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.
- DIVERSITY** The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

E

- ECONOMICS** The study of how resources, goods, and services are allocated among competing uses.
- ECOSYSTEM** A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed, or a lake.)
- EFFECTS** Results expected to be achieved or actually achieved related to physical, biological, and social (cultural and economic) factors resulting from the achievement of outputs. Examples of effects are tons of sediment, pounds of forage, person-years of employment, and income. There are direct effects, indirect effects, and cumulative effects.
- EFFICIENCY,
ECONOMIC** See Cost Efficiency.
- ENDANGERED
SPECIES** Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.
- ENVIRONMENTAL
ANALYSIS** An analysis of alternative actions and their predictable short and long-term environmental effects which include physical, biological, economic, social, and environmental design factors and their interactions.

ENVIRONMENTAL ASSESSMENT	The concise public document required by the regulations for implementing the procedural requirements of NEPA (40 CFR 1508.9).
ENVIRONMENTAL IMPACT STATEMENT, DRAFT	The concise public document required by the regulations for implementing the procedural requirements of NEPA for major Federal actions, released to the public for comment and review prior to development of a final public document.
ENVIRONMENTAL IMPACT STATEMENT FINAL	The final version of the public document required by NEPA (see above).

F

FORAGE	All browse and nonwoody plants available to livestock or wildlife for feed.
FOREST AND RANGELAND RENEWABLE RESOURCE PLANNING ACT OF 1974	An act of Congress requiring the preparation of a program for the management of the National Forest's renewable resources and of land and resource management plans for units of the National Forest System. It also requires a continuing inventory of all National Forest System lands and renewable resources.
FORPLAN	A linear programming system used for developing and analyzing Forest planning alternatives.
FSH	Forest Service Handbook.
FSM	Forest Service Manual

G

GOAL	A concise statement that describes a desired condition to be achieved. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed.
GUIDELINE	An indication or outline of policy or conduct.

H

HABITAT TYPE An aggregation of all land areas potentially capable of producing similar plant communities at climax.

I

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

INTENSIVE GRAZING Grazing management that controls distribution of cattle and duration of use on the range, usually by fences, so parts of the range are rested during the growing season.

INTER-DISCIPLINARY TEAM (ID TEAM) A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view to bear on the problem.

ISSUE See Public Issue.

K

KEY WINTER and/or RANGE The portion of the yearlong range where big game find food cover during severe winter weather.

L

LAND EXCHANGE The conveyance of non-Federal Land or interests to the United States in exchange for National Forest System land or interests in land.

LONG-TERM SUSTAINED YIELD CAPACITY (LTSY) 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

M

M	Thousand
MM	Million
MAUM	Thousand Animal Unit Months.
MBF	Thousand Board Feet
MMBF	Million Board feet
MMCF	Million Cubic feet
MANAGEMENT ACTION	Any activity undertaken as part of the administration of the Forest.
MANAGEMENT AREA	An area with similar management objectives and a common management prescription.
MANAGEMENT CONCERN	An issue, problem, or a condition which constrains the range of management practices identified by the Forest Service in the planning process.
MANAGEMENT DIRECTION	A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them.
MANAGEMENT EMPHASIS	A management practice or combination of management practices designed to stress production of a particular type of output or mix of outputs.
MANAGEMENT INTENSITY	The management practices or combination of management practices and associated costs designed to obtain different levels of goods and services.
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.
MANAGEMENT STANDARDS	See Standards and Guidelines.
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.

**MINERALS,
LEASABLE** Coal, oil, gas, phosphate, sodium, potassium, oil shale, sulphur (in Louisiana and New Mexico), and geothermal steam.

**MINERALS,
LOCATABLE** Those hardrock minerals which are mined and processed for the recovery of the minerals, often metallic. May include certain nonmetallic minerals and uncommon varieties of mineral materials such as valuable and distinctive deposits of limestone and silica. May include any solid, natural inorganic substance occurring in the crust of the earth, except for the common varieties of mineral materials and leasable minerals.

**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 (see 36 CFR 219.27).

MITIGATION 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.

**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 95-1950).

**MOUNTAIN PINE
BEETLE** A tiny black insect, ranging in size from 1/8 to 3/4 inch, that bores its way into the tree's cambium and cuts off its supply of food, thus killing the tree.

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

N

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)	An act which encourages productive and enjoyable harmony between man and his environment; promotes efforts to prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; enriches the understanding of the ecological systems and natural resources important to the Nation; and establishes a Council on Environmental Quality.
NATIONAL FOREST MANAGEMENT ACT (NFMA)	A law passed in 1976 as amendments to the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest plans and the preparation of regulations to guide that development.
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. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.
NO ACTION ALTERNATIVE	The most likely condition expected to exist in the future if the current plan would continue unchanged.
NONDECLINING EVEN FLOW	The quantity of timber which can be sold from each National Forest equal to or less than a quantity which can be removed from such Forest annually in perpetuity on a sustained yield basis, greater than or equal to the volume offered for sale in the preceding decade. Nondeclining even flow is calculated and scheduled in the FORPLAN model on the basis of cubic foot volume.
NONGAME	Species of animals which are not managed as a sport hunting resource.

O

OBJECTIVE	A concise time-specific statement of measurable planned results that respond to preestablished goals. An objective forms the basis for further planning, to define the precise steps to be taken and the resources to be used in achieving identified goals.
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OBJECTIVE FUNCTION A term used in linear programming describing the criteria to be optimized. Examples of objective functions are: maximize present net value, minimize cost or maximize timber.

OLD GROWTH TIMBER A stand of trees that is past full maturity and showing decadence; the last stage in Forest succession.

OPPORTUNITY COST An opportunity cost is value forgone. 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. Opportunity costs may be only a partial measure of forgone PNV or present net benefits.

OPTIMUM A level of production that is consistent with other resource requirements as constrained by environmental, social, and economically sound conditions.

OUTPUT A good, service, or on-site use that is produced from forest and rangeland resources. Definitions of Forest and rangeland output definitions, codes and units measure are contained in the Management Information Handbook (FSH 1309.11). Examples are: X06-Softwood Sawtimber Production - MBF; X80-Increased Water Yield - Acre Feet; W01-Primitive Recreation Use - RVD's.

P

PLANNING CRITERIA	Standards, tests, rules, and guidelines by which the planning process is conducted and upon which judgments and decisions are based.
PLANNING RECORDS	Documents and files that contain detailed information and decisions made in developing the Forest Plan. Available at the Forest Supervisor's Office.
PNV	See Present Net Value.
POLICY	A guiding principle upon which is based a specific decision or set of decisions.
POTENTIALLY (TENTATIVELY) SUITABLE LAND	Forest land (as defined in CFR 219.3) for which technology is available that ensures timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is reasonable assurance that such lands can be restocked (CFR 219.14); and which is available for timber management.
PRESCRIPTION	See Management Prescription.
PRESENT NET VALUE (PNV)	The difference between the discounted value (benefits) of all outputs to which monetary value or established market prices are assigned and the total discounted costs of managing the planning area.
PRICED OUTPUTS	Resource outputs that have marked or assigned dollar values.
PROPOSED ACTION	In terms of the National Environmental Policy Act, the project, activity, or action that a Federal agency intends to implement or undertake and which is the subject of an environmental assessment.
PUBLIC ACCESS	Usually refers to a road or trail route over which a public agency claims a right-of-way available for public use.
PUBLIC INVOLVEMENT	A Forest Service process designed to broaden the information base upon which agency decisions are made by (1) Informing the public about Forest Service activities, plans, and decisions, and (2) Encouraging public understanding about and participation in the planning processes which lead to final decision making.
PUBLIC ISSUE	A subject or question of widespread public interest identified through public participation relating to management of National Forest System lands.

R

RANGE ALLOTMENT A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

RARE II See Roadless Area Review and Evaluation II.

RECREATION OPPORTUNITY SPECTRUM (ROS) A system for planning and managing recreation resources that recognizes recreation activity opportunity, recreation setting opportunity, and recreation experience opportunity along a spectrum or continuum.

RECREATION TYPES Developed Recreation - The type of recreation that occurs where modifications (improvements) enhance recreation opportunities and accommodate intensive recreation activities in a defined area.

Dispersed Recreation - That type of recreation use related to and in conjunction with roads and trails that requires few if any improvements and may occur over a wide area. Activities tend to be day-use oriented and include hunting, fishing, berrypicking, off-road vehicle use, hiking, horseback riding, picnicking, camping, viewing scenery, snowmobiling, and many others.

RECREATION VISITOR DAY (RVD) One visitor day equals 12 hours (one person for 12 hours, or 12 people for 1 hour, or any combination thereof).

RESEARCH NATURAL AREA An area in as near a natural condition as possible, which exemplifies 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.

RIGHT-OF-WAY Land authorized to be used or occupied for the construction, operation, maintenance, and termination of a project facility passing over, upon, under, or through such land.

RIPARIAN AREAS An area with distinctive resource values and characteristics that is comprised of an aquatic ecosystem, a riparian ecosystem, and adjacent upland areas that have direct effects on the riparian and aquatic ecosystems. This includes floodplains, wetlands, and all areas within a horizontal distance of approximately 100 feet from the normal high water line of a stream channel, or from the shoreline of a standing body of water.

ROADLESS AREA Undeveloped Federal land within which there are no improved roads or roads maintained for travel by means of motorized vehicles intended for highway use.

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 such assessment which was documented in the final environmental impact statement of the Roadless Area Review and Evaluation, January 1979.

RPA See Forest and Rangeland Renewable Resources Planning Act.

S

SEDIMENT Solid material, both mineral and organic, that is in suspension, being transported, or has been moved from its site of origin by air, water, gravity, or ice.

STAND An aggregation of trees or other vegetative growth occupying a specific area and sufficiently uniform in composition (species), age arrangement, and conditions as to be distinguishable from the other growth on adjoining lands.

STANDARD A principle requiring a specific level of attainment; a rule to measure against.

STIPULATIONS The requirements or clauses of a minimal lease.

STOCKING A measure of timber stand density or the number of trees per acre.

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 forgone. A unit of land may be suitable for a variety of individual or combined management practices.

SUITABLE FOREST LAND Forest land (as defined in CFR 219.3) for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is reasonable assurance that such lands can be adequately restocked (as provided in CFR 219.14); and for which there is management direction that indicates that timber production is an appropriate use of that area.

SYSTEM ROADS Roads that are part of the Forest development transportation system, which includes all existing and planned roads, as well as other special and terminal facilities designated as Forest development transportation facilities.

T

TEMPORARY ROAD A road that will be physically obliterated and seeded after its primary use is completed (i.e., spur road for logging); it will not be used again.

THERMAL COVER Cover used by animals to ameliorate effects of weather; for elk, a stand of coniferous trees 40 feet or taller with an average crown closure of 70 percent or more.

THREATENED OR 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. Threatened species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

TIMBER BASE The lands within the Forest capable, available, and suitable for timber production.

TIMBER HARVEST SCHEDULE The quantity of timber planned for sale and harvest, by time period, from the area of land covered by the Forest Plan. The first period, usually a decade, of the selected harvest schedule provides the allowable sale quantity. Future periods are shown to establish that sustained yield will be achieved and maintained.

TRANSITORY RANGE Land that is suitable for grazing use of a nonending nature over a period of time. For example, on particular disturbed lands, grass may cover the area for a period of time before being replaced by trees or shrubs not suitable for forage.

U

**UNSUITABLE
TIMBER LAND**

Lands not selected for timber production in the Forest Plan alternative due to (1) the multiple-use objectives for the alternative preclude timber production, (2) other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met and (3) the lands are not cost-efficient over the planning horizon in meeting forest objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the preferred alternative and Forest Plan.

V

**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 QUALITY
OBJECTIVE (VQO)**

A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

Preservation: In general, human activities are not detectable to the visitor.

Retention: Human activities are not evident to the casual Forest visitor.

Partial Retention: Human activities may be evident, but must remain subordinate to the characteristic landscape.

Modification: Human 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 middle-ground or background.

Maximum Modification: Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

Enhancement: A short-term management alternative which is done with the express purpose of increasing positive visual variety where little variety now exists.

W

- WILDERNESS** Federal land retaining its primeval character and influence without permanent improvements or human habitation as defined under the 1964 Wilderness Act. It is protected and managed so as to preserve its natural conditions which (1) generally appear to have been affected primarily by forces of nature with the imprint of man's activity substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and confined type of recreation; (3) has at least 5,000 acres or is of sufficient size to make practical its preservation, enjoyment, and use in an unimpaired condition, and (4) may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.
- WILDERNESS STUDY** An analysis to determine an area's appropriateness, cost, and benefits for addition to the National Wilderness Preservation System.
- WITHDRAWAL** An order removing specific land areas from availability for certain uses.

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