DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR THE

KOOTENAI NATIONAL FOREST PLAN

# CHAPTER IV

# ENVIRONMENTAL CONSEQUENCES

This chapter describes the activities which the Forest Service would undertake to implement each of the alternatives and how these activities affect the environment.

# IV. ENVIRONMENTAL CONSEQUENCES

## Significant changes From Draft to Final EIS

The effects of implementing the alternatives remain the same in the Final EIS except where technical errors are corrected. The Final Plan (Alternative JF) is added to the displays and discussion throughout this chapter.

## A. Introduction

This chapter forms the scientific and analytical basis for comparison of the alternatives, including the proposed action, (Alt.J) and the Final Plan (Alt. JF) described in Chapter II. Environmental consequences are the expected effects of activities scheduled to implement an alternative on the ground. The applicable effects of all the major activities and resource programs are discussed. The order of discussion begins with those activities which have the greatest effect on the physical and biological components of the environment and ends with those that have the least effects. Economic and social effects are discussed where applicable.

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

Mitigation was an important consideration in the formulation of standards and guidelines, prescriptions, and minimum management requirements associated with each of the alternatives. These items are discussed in other parts of this document or in special sections of the appendices and will not be repeated here.

This chapter will be presented in a way which attempts to avoid redundancy. For instance, the specific activities generated to enhance fish habitat are limited to a few acres on the Forest. However, the efforts to maintain or enhance fish habitat are inherent in several other activities (e.g. timber harvest or road building). The discussion for specific activities associated with fish habitat improvement is short, but effects on fish habitat are discussed in sections related to other activities or resources. To assist the reader in locating all material associated with a particular resource, use or activity, the following index was developed for this chapter. The main index at the end of this document repeats these references as well as references from elsewhere in this EIS.

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## B. ACTIVITIES AND THEIR EFFECTS

### 1. Timber Harvest

#### a. Introduction

Timber harvests have a significant effect on the physical and biological environment of the Forest. The extent of these impacts depends on (1) the amount of area where timber is harvested, (2) the rate at which it is cut, and (3) methods of treatment.

Timber management consists of a series of activities prescribed to regulate growing, harvesting, and regeneration of wood crops on suitable sites. Timber harvest is just one step in the process of overall timber management.

The amount of suitable timber acreage and the volume harvested vary by alternative due to emphasis placed on other resources (such as roadless, wilderness, wildlife, visual quality) and the type and timing of special timber stand improvement activities (such as thinnings and conversion of stagnated lodgepole pine stands). Table IV-1 shows the acreage where timber management will take place (suitable timberland) and the relative intensity of that management over the long term (long-term sustained yield).

The amount of timber harvested per decade is usually closely correlated to the amount of suitable timberland available and the long-term sustained yield, if non-declining sustained yield is an objective. If a departure from non-declining sustained yield is the objective, a higher rate of harvest can occur in some decades, usually the earlier decades, with a corresponding decline in a later decade or decades.

Regulated timber yield for the first five decades for each of the alternatives is shown in Table IV-2. Note that "non-declining" yield is based upon cubic foot measure. The relationship between cubic foot measure and board foot measure varies by the size and species mix of the trees expected to be harvested. For this reason a "non-declining" yield schedule may appear to be a "departure" sequence when expressed in board feet as in Table IV-2. Most of the alternatives appear to be departure sequences, but only Alternatives D, K, M and N are true departure alternatives and Alt. D does not decline (in cubic feet) until the 6th decade. See (Table II-3) for cubic foot schedules.

TABLE IV-1

ACREAGE OF SUITABLE TIMBERLAND
AND
LONG-TERM SUSTAINED YIELD (LTSY)
(Thousands of Acres, Millions of Cubic Feet)

| Alternative | Suitable Timberland (Thousands of Acres) | LTSY (MMCF) |
|---|---|---|
| A | 1470 | 84 |
| B | 1464 | 84 |
| C | 1466 | 83 |
| D | 1595 | 90 |
| E | 1425 | 82 |
| F | 1132 | 56 |
| G | 1386 | 80 |
| H | 1361 | 78 |
| I (CD) | 1422 | 74 |
| J (PA) | 1386 | 72 |
| JF (FP) | 1263 | 63 |
| K | 1386 | 72 |
| L | 1788 | 102 |
| M | 1484 | 84 |
| N | 1481 | 84 |
| O | 1389 | 83 |

TABLE IV-2

AVERAGE ANNUAL TIMBER YIELD BY DECADE
(Millions of Board Feet - Live Green Volume Only)

| | Alternative | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | CD | PA | FP | | | | | |
| DEC | A | B | C | D | E | F | G | H | I | J | JF | K | L | M | N | O |
| 1 | 226 | 223 | 225 | 227 | 218 | 164 | 213 | 208 | 150 | 202 | 227* | 230 | 255 | 262 | 247 | 215 |
| 2 | 253 | 250 | 253 | 248 | 241 | 191 | 234 | 222 | 152 | 233 | 230 | 241 | 245 | 224 | 240 | 247 |
| 3 | 249 | 247 | 250 | 285 | 238 | 190 | 231 | 223 | 157 | 224 | 227 | 216 | 264 | 274 | 283 | 263 |
| 4 | 304 | 302 | 300 | 320 | 294 | 185 | 283 | 273 | 143 | 256 | 213 | 251 | 316 | 326 | 322 | 301 |
| 5 | 336 | 333 | 331 | 344 | 323 | 198 | 309 | 294 | 162 | 277 | 234 | 271 | 345 | 437 | 329 | 320 |

* Includes 25 MMbf of Non-interchangeable Volume in addition to 202 MMbf live green.

It is apparent from the two preceding tables that the difference in the amount of suitable timber acreage by alternative and a departure from non-declining sustained yield or other scheduling change can affect the volume of timber harvest in any decade. For example, Alternative F has a low acreage of suitable timberland because of greater emphasis on fish and wildlife objectives and thus a low level of harvest and the lowest LTSY. In contrast, Alternative L has the highest acreage of suitable timberland

and the highest LTSY because of its emphasis on timber production and the more intensive prescriptions applied on the suitable timberlands.

Alternatives D, K, M, and N are departure alternatives and have higher harvests in the first one or two decades compared to their suitable timberland acreage and LTSY. The alternatives showing the highest amount of annual harvest per decade, the highest suitable timberland acreage and LTSY indicate the greater amount of silvicultural activity.

The Final Plan (Alt. JF) has a lower suitable timber base, LTSY, and lower harvest volumes in the later decades than does the Proposed Action (Alt. J) for three reasons: (1) the suitable timber land base is smaller primarily because the old-growth timber habitats have been removed. This would tend to lower timber volumes in all decades. (2) the first decade timber volume is maximized subject to non-declining yield. With the given smaller suitable timber land base and the high first decade cut level, the harvests in later years can not rise as high as the Proposed Action. (3) the intensity of management has been reduced by lowering the anticipated amount of commercial thinning.

The 1980 Resources Planning Act (RPA) Revised Statement of Policy (Forest Service Manual 1920, R-1 Supplement No. 5, October 1982) requires a comparison of the long-term sustained yield (LTSY) for timber with the projected growth rate of timber by the year 2030 under the Final Plan. The aim is toward reaching 90 percent of the potential annual growth rate by the fifth decade. The LTSY for the Final Plan (Alternative JF) is 63 million cubic feet per year in 200 years. The predicted growth rate in 50 years for that alternative is 39 million cubic feet per year, indicating that the Kootenai would achieve 62 percent of the potential growth by the fifth decade if managed under the Final Plan. Table IV-3 displays this projected growth rate and the decade in which the growth rate first reaches 90 percent of maximum for each alternative.

None of the Alternatives meet the RPA timber growth goal due to several factors:

(1) Non-declining even-flow and minimum management requirements do not allow quick conversion of mature stands to more rapidly-growing, younger stands in the early decades.

(2) Stands that are costly to manage for timber (particularly stagnated lodgepole pine stands) are not converted early, which could add growth by the fifth decade.

(3) Growth is coming from existing stands that have not had stocking control and are not achieving their potential.

The growth situation could be improved in the Final Plan by additional investments in timber management (stocking control). However, this increase in growth potential would result in a total cost increase and a decline in PNV.

TABLE IV-3

ANNUAL LONG-TERM SUSTAINED YIELD (LTSY)
AND
GROWTH BY ALTERNATIVE
(Millions of Cubic Feet)

| Alternative | LTSY | Growth Dec 5 | Growth as % of LTSY | Decade When Growth Reaches 90% of LTSY |
|---|---|---|---|---|
| A | 84 | 48 | 57 | 7 |
| B | 84 | 48 | 57 | 7 |
| C | 83 | 48 | 58 | 7 |
| D | 90 | 60 | 67 | 7 |
| E | 82 | 44 | 54 | 7 |
| F | 56 | 35 | 63 | 8 |
| G | 80 | 42 | 53 | 7 |
| H | 78 | 40 | 51 | 7 |
| I (CD) | 74 | 43 | 58 | after 20 |
| J (PA) | 72 | 45 | 63 | 7 |
| JF (FP) | 63 | 39 | 62 | 7 |
| K | 72 | 47 | 65 | 7 |
| L | 102 | 66 | 65 | 8 |
| M | 84 | 50 | 60 | 7 |
| N | 84 | 47 | 56 | 7 |
| O | 83 | 54 | 65 | 7 |

Alternatives with the largest acreages of suitable timber have the potential to provide the greatest benefit to the timber resource. These benefits include:

- Improved age class and size class distribution (discussed below).
- Maintenance of healthy, vigorous stands by removing diseased trees and trees subject to insect attack and by planting.
- reduced threat of insects, disease, and wildfire through improved tree health and by removal of potential fuels.
- Better utilization of growth potential of timber-growing sites by insuring that stagnated or slow-growing stands are harvested and regenerated first to allow younger, faster-growing stands to get started earlier.
- Production of higher volumes of timber harvest.
- Better geographic or spatial distribution of the harvest. With more land base to work in, certain impacts can be mitigated by careful scheduling of activities.

In a regulated Forest, it is desirable to have approximately equal amounts of each productivity class stocked with each major age class. This equality provides a more predictable situation:

- Harvest volumes are at or near optimal, and can be anticipated well in advance.
- Other activities such as thinning, planting, site preparation, etc. are at stable and predictable levels.

- Suitable habitats exist for all types of wildlife.
- Workforce and investment levels are established and generally predictable.

In general, the age classes are:

- Age Class 0-40 (seedlings, saplings, and small poles) are the younger stands which require reforestation, release, and pre-commercial thinnings to obtain desirable stocking and growth characteristics.

- Age class 40-80 are the pole-sized stands in which the first commercial thinnings can be made.

- Age Class 80-120 are the sawtimber stands where commercial thinnings and final harvests are undertaken.

Table IV-4 shows the distribution of timber age classes found in suitable forest land by the fifth decade for each alternative.

TABLE IV-4

AGE CLASS DISTRIBUTION AT END OF FIFTH DECADE
(% of Suitable Acres)

| AGE CLASS | Alternative | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | CD I | PA J | FP : JF | K | L | M | N | O |
| 0-40 | 48 | 48 | 48 | 51 | 48 | 42 | 48 | 46 | 38 | 48 | : 48 | : 47 | 44 | 52 | 49 | 48 |
| 40-80 | 14 | 14 | 14 | 13 | 13 | 16 | 13 | 24 | 11 | 15 | : 18 | : 16 | 16 | 16 | 14 | 14 |
| 80-120 | 25 | 25 | 25 | 24 | 24 | 23 | 24 | 18 | 22 | 23 | : 26 | : 24 | 24 | 20 | 25 | 29 |
| 120-160 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | : 1 | : 1 | 1 | 1 | 1 | 1 |
| 160+ | 12 | 12 | 12 | 11 | 13 | 18 | 14 | 11 | 27 | 13 | : 7 | : 12 | 15 | 11 | 11 | 8 |

The differences between alternatives are primarily due to the age classes available for harvest on the suitable acres and the rate of harvest allowed by the goal of the alternatives. Examples of Alternative Goals are: high timber yields (Alts. L, N and D), low budget constraints (Alt. I), large roadless or wilderness acreage recommended (Alts. G and H), emphasis on big game (Alt. F), emphasis on visual quality (Alt. O).

Alternative O provides the best distribution of age classes across the forest from a timber management perspective. This is because of the low percentage of timber in age class 160+ and the higher percentage in the 80-120 age class. This indicates a quicker conversion of the older age class while still providing enough old-growth timber to meet the minimum management requirements. Alternative O also provides for a quicker replacement in the future of the 160+ age class trees with the 120-160 age class. Thus, a more even volume of timber is reaching a ±120 year rotation each decade than the other alternatives. It is important to note that there is additional acreage of timber in the older age classes which is not shown in the above table because those acres are outside of the suitable timber base. Alternative JF has a small percentage of older

acres simply because most of the land in the 160+ age class was removed from the regulated timber base for old-growth habitat preservation.

b. Harvest Systems

There are two general categories of silvicultural systems associated with timber harvest: even-age and uneven-age.

Uneven-age harvest, or selection harvest, is used rarely on the Kootenai (less than one percent of all acres logged) because it requires frequent entries (typically every 10 to 30 years) and is thus very costly and repetitively disruptive to wildlife including the threatened grizzly bear. Uneven-age harvest also favors shade tolerant species for which management is limited here. In addition, the prediction of yields is very difficult and diameter class distribution is hard to achieve on-the-ground

The experience on the Kootenai National Forest with repeated salvage harvests, that parallel an uneven-age management scheme, indicates that alder and brush are often stimulated thus preventing regeneration. In other cases cedar, grand fir, hemlock and alpine fir (shade tolerant species) regenerate and the value of the stand declines dramatically. These stands tend to be of lower quality than other naturally-occurring stands because these species are susceptible to mechanical damage (and subsequent rot problems) during harvest. The repeated entries of uneven-age management increase the risk of such damage. Stands developed in this way are likely to be suppressed because of the remaining overstory. Long term yields are difficult to predict for this type of management, but they are likely to be quite low and low valued. The existing stands on the Kootenai National Forest are valuable because they arose in an even-age manner as a result of fire. The even-age management generally called for in the Forest Plan duplicates this natural process without the risks and costs of wildfire.

Use of uneven-age management on the Kootenai is thus limited to those few isolated areas where shade-tolerant species are preferred, or where a visual quality objective cannot be achieved in any other way, or where an area needs special consideration. Uneven-age systems are generally not appropriate for riparian areas because of the amount of disturbance to streamsides resulting from frequent entries.

There is very little information beyond experiences as described above which either supports or discredits uneven-age management. For this reason uneven-age management has been identified as a research need in the Forest Plan.

Because even-age harvest systems are used on the Kootenai Forest most of the time, they are discussed in depth here.

Two basic methods are used: clearcut and shelterwood. In clearcutting, all trees are removed from the area in a single cut. (A variation of clearcutting, called seed-tree cutting, is when most of the trees are removed from the site in a single cut. For the purpose of this discussion

clearcutting and seed-tree cutting are considered as similar when considering environmental effects to soil and water.) In shelterwood cutting, trees are left in the area to provide favorable site (climate) conditions until seedlings have become established. Of the even-age silvicultural methods, clearcutting (including seed-tree cutting) was determined to be the optimal method on many sites and tree stands because of good success with natural regeneration (approximately 2/3 of all areas are successfully regenerated with natural seedings). Also, many existing stands do not have desirable tree species composition or the necessary vigor needed to successfully apply other methods. Residual trees subject to windthrow, and the need to produce openings for wildlife forage are also considerations which often result in clearcutting being the optimum method. The acres of clearcutting by alternative which includes seed-tree cutting, is the amount projected that will be needed to achieve alternative objectives and respond to physical and biological limitations. Additional analysis considering site-specific data is done in project level environmental analysis. Individual stand prescriptions are prepared by certified silviculturists to determine the optimal treatments to actually be applied on-the-ground. See the Forest Plan document, Appendix 2, Vegetative Management Practices for the criteria pertinent to clearcutting, seed-tree cutting, and shelterwood cutting.

Clearcutting and seed-tree cutting have the potential for adverse environmental effects because all (or most) of the large trees are removed from the area in a short period of time, which creates large openings that exposes soil to erosional forces (Bethlahmy, 1967; Megahan and Kidd, 1972). The percentage of total timber harvest to be cut by the two systems (clearcut/seedtree and shelterwood) over a 50-year period is shown in Table IV-5.

Only Alternative O, which emphasizes visual quality, utilizes shelterwood methods to any significant extent. Alternatives J, K and JF use shelterwood to a lesser extent (7% to 8% of all acres). Alternative JF (Final Plan) clearcuts and shelterwood cuts more acreage than Alternative J (Proposed Action) to achieve the same first decade harvest levels because of the elimination of commercial thinning as a common silvicultural practice. The percentage of clearcutting and shelterwood cutting is essentially the same as the Proposed Action.

TABLE IV-5

TIMBER HARVESTED BY CLEARCUTTING AND SHELTERWOOD
(Thousand Acres and Percent of Total)

CLEARCUT/SEEDTREE SYSTEM — Alternative

| Decade | A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 137 | 137 | 138 | 136 | 132 | 97 | 129 | 125 | 88 | 117 | 135 | 135 | 159 | 166 | 151 | 106 |
| 2 | 147 | 164 | 148 | 194 | 149 | 94 | 149 | 155 | 128 | 126 | 141 | 145 | 189 | 122 | 137 | 62 |
| 3 | 163 | 163 | 162 | 175 | 169 | 95 | 174 | 175 | 108 | 152 | 150 | 133 | 203 | 167 | 168 | 76 |
| 4 | 185 | 185 | 185 | 198 | 181 | 112 | 177 | 172 | 116 | 166 | 143 | 161 | 178 | 200 | 199 | 135 |
| 5 | 143 | 145 | 147 | 144 | 146 | 97 | 142 | 140 | 128 | 167 | 128 | 163 | 177 | 186 | 135 | 98 |
| (% of Total) | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 93 | 92 | 93 | 100 | 100 | 100 | 40 |

SHELTERWOOD SYSTEM: — Alternative

| Decade | A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 20 | 22 | 20 | 0 | 0 | 0 | 37 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 27 | 26 | 28 | 0 | 0 | 0 | 148 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 11 | 8 | 12 | 0 | 0 | 0 | 217 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 3 | 0 | 0 | 0 | 162 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 148 |
| (% of Total) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 8 | 7 | 0 | 0 | 0 | 60 |

Even-age harvest affects most resources. These are discussed below.

The Visual Resource: Even-age management has varying effects on the visual resource, depending on the emphasis given to that resource in a particular alternative. The greatest visual impact would occur in the high timber harvest alternatives in which large areas are assigned to "modification" or "maximum modification" visual quality objectives (Table IV-6). In alternatives with high timber production, only the lands that are unsuitable for timber production would be assigned a "Retention" or "Partial Retention" visual quality objective. The following table shows the relative acres of each visual quality objective.

TABLE IV-6

AREA BY VISUAL QUALITY OBJECTIVES
(Thousands of Acres and Percent of Forest)

| VISUAL QUALITY OBJECT | Alternative | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
| Preservation/Retention | | | | | | | | | | | | | | | | |
| MAcres | 398 | 420 | 419 | 410 | 492 | 402 | 534 | 590 | 529 | 545 | 545 | 545 | 349 | 390 | 393 | 676 |
| Percent | 18 | 19 | 19 | 19 | 22 | 18 | 24 | 26 | 24 | 24 | 24 | 24 | 16 | 17 | 17 | 30 |
| Partial Retention | | | | | | | | | | | | | | | | |
| MAcres | 710 | 694 | 701 | 636 | 645 | 1063 | 623 | 609 | 711 | 766 | 766 | 766 | 627 | 702 | 709 | 706 |
| Percent | 32 | 32 | 32 | 29 | 29 | 48 | 28 | 28 | 32 | 35 | 35 | 35 | 28 | 32 | 32 | 32 |
| Modification | | | | | | | | | | | | | | | | |
| MAcres | 306 | 300 | 302 | 275 | 278 | 460 | 269 | 263 | 388 | 412 | 412 | 412 | 271 | 303 | 307 | 729 |
| Percent | 14 | 14 | 14 | 11 | 13 | 21 | 12 | 12 | 17 | 19 | 19 | 19 | 12 | 14 | 14 | 33 |
| Maximum Modification | | | | | | | | | | | | | | | | |
| MAcres | 788 | 788 | 779 | 882 | 793 | 278 | 777 | 747 | 580 | 486 | 486 | 486 | 957 | 808 | 791 | 93 |
| Percent | 36 | 35 | 35 | 41 | 36 | 13 | 36 | 34 | 23 | 22 | 22 | 22 | 44 | 37 | 37 | 5 |

Prior to the development of these alternatives, the Forest landscape architects determined how many acres were most sensitive to change, that is, how many could be viewed from roadsides or from population centers and therefore would benefit most from protection. They found that 434,000 acres fit this category; a "retention" or "no change" visual quality objective would be the ideal objective. They also found that an additional 909,000 acres could benefit from some protection from change, but not as much as those in the "retention" category. A "partial retention" visual quality objective was therefore deemed ideal. The table above portrays the tradeoffs by alternative. As expected, in alternatives with high timber values, such as Alternatives D and L, the number of acres given protection are relatively few. In alternatives, such as O, which favors other values such as visual quality and roadless areas, the acreage is larger.

Recreation: Even-age management can adversely affect the recreation experience by disrupting trail systems or creating unnatural openings. The experience may be enhanced by careful placement of openings to create vistas.

Watershed: Even-age harvest has a bearing on water yield because the entire mature canopy is removed, thus reducing evapo-transpiration and interception losses. The accumulation of snow and the rate of melt in these cutover areas are often increased during peak runoff periods in the spring (Rice, 1980). More recent research indicates that the portion of an area involved in roads, skid trails, or other compacted surfaces is even more important in determining water yield impacts from timber harvest (Christner and Harr, 1982; Harr, 1975, 1979). The effects of road interception and redirection have also been evaluated as significant

(Megahan, 1972; Rice, 1980). In extreme cases, this can lead to slumps, the slipping of soil and rock on steep slopes and clay soils (Dryness, 1967; Fredriksen, 1970; Megahan, 1972), or, more frequently, channel damage. Mass failure hazards are generally insignificant on the Forest, but the potential for large scale channel damage is moderate to high on the western half of the Forest due to a typically transient snowpack and a history of mid-winter rain-on-snow events (Harr, 1981; Harr and Berris, 1983).

Water yield increases from timber harvest tend to occur during the peak flow periods. Instead of slowly but steadily melting during the winter months, much of the moisture within openings is retained until the entire snowpack reaches a density of about 40%. At this time it runs off rapidly. The water situation for an area harvested by even-age methods will generally recover to preharvest conditions within 20 to 50 years after harvest, assuming regeneration occurs promptly (Tolle, Rost, Park, and Collett, 1976).

Alternatives that increase the amount of timber harvest and road building will increase water yield which can increase sedimentation, and can cause effects downstream from the activity, such as fish loss.

Even-age management of riparian areas affects stream environments if trees are removed from the streambanks. Bank stability is reduced and debris which could provide fish habitat and organic energy (the base of the biotic food chain) is removed. (Most of the pools in low-gradient Forest streams have been formed by woody debris. In time the debris rots, so future maintenance of satisfactory pool-riffle ratios depends on trees periodically falling into streams.) In the short-term, fish populations are not affected, but in 40 years there will be a reduction in fish if woody debris is not added.

As stated above, water yield increases on the Forest are primarily a function of the total area harvested and the silvicultural system used. The magnitude and duration of these increases generally occur during spring peak-runoff periods and could affect the stability and integrity of stream channels. If harvesting is concentrated in a drainage or confined to a given aspect and/or elevation, the chances of channel damage increase.

The following table displays the projected water yield increases by alternative by decade for the next 50 years. They range from approximately 3% (Alt. I) to 5% (Alt. L) in the first decade to approximately 4% (Alt. JF) to 7% (Alts. L and M) in the fifth decade. The modeling process for water yield volumes is very crude due to lack of field data to verify model adjustments for the Kootenai National Forest. This means that field measurements may differ significantly from the volumes estimated in the following Table. A research need to address this problem has been identified in the Forest Plan. The State Water Quality Standards are the key item of concern here because increased water yield is usually associated with increased sediment delivery to streams and reduced water quality. In order to insure no violation of State Water Quality Standards, the monitoring standards in the Forest Plan have been made stronger. Thus, regardless of the estimated water yields, the State

Water Quality Standards will not be violated. All of the alternatives include provisions for limiting the amount of harvest activity in drainages so that stream channel damage will not occur.

As stated above, the main reason for the increased water yield is the amount of acres harvested, climatic pattern where harvesting occurs (i.e., elevation and location on Forest) and topography (i.e., steepness of slope and aspect). The Final Plan involves harvest on fewer total acres, but more acres are clearcut compared to the Proposed Action because commercial thinning is not used. The net result is that the water yield increase is larger for the Final Plan than the Proposed action, but the percent increase above baseline is essentially the same.

TABLE IV-7

INCREASED WATER YIELD OVER BASELINE CONDITION
(Thousand Acre-Feet/Year
and Percent Increase Over Baseline Conditions)*

| DEC-ADE | Alternative A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 171 | 157 | 159 | 162 | 161 | 162 | 162 | 159 | 143 | 161 | 186 | 172 | 206 | 180 | 176 | 167 |
| | +4% | +4% | +4% | +4% | +4% | +4% | +4% | +4% | +3% | +4% | +4% | +4% | +5% | +4% | +4% | +4% |
| 2 | 207 | 206 | 208 | 240 | 204 | 181 | 200 | 194 | 171 | 198 | 222 | 212 | 268 | 210 | 213 | 213 |
| | +5% | +5% | +5% | +6% | +5% | +4% | +5% | +5% | +4% | +5% | +5% | +5% | +7% | +5% | +5% | +5% |
| 3 | 258 | 255 | 257 | 290 | 239 | 194 | 236 | 224 | 177 | 220 | 217 | 226 | 295 | 267 | 273 | 224 |
| | +6% | +6% | +6% | +7% | +6% | +5% | +6% | +5% | +4% | +5% | +5% | +6% | +7% | +6% | +7% | +5% |
| 4 | 255 | 252 | 251 | 299 | 241 | 206 | 230 | 217 | 162 | 217 | 187 | 217 | 293 | 265 | 268 | 222 |
| | +6% | +6% | +6% | +7% | +6% | +5% | +6% | +5% | +4% | +5% | +4% | +5% | +7% | +6% | +7% | +5% |
| 5 | 245 | 242 | 240 | 284 | 231 | 215 | 220 | 206 | 190 | 233 | 179 | 229 | 283 | 290 | 258 | 222 |
| | +6% | +6% | +6% | +7% | +6% | +5% | -5% | -5% | +5% | +6% | +4% | +6% | +7% | +7% | +6% | +5% |

*For comparison purposes only, the baseline water yield Forest-wide is 4,109,000 acre-feet/year.

Fisheries: Timber harvest in riparian areas has the potential to adversely affect fisheries habitat. Removal of trees along streamsides can reduce the amount of instream debris recruitment. Woody debris in streams produces pool habitat, cover, diversity of habitat, and organic energy. Also, timber harvest along streamsides removes canopy cover that can result in higher summer temperatures and anchor-ice problems in winter.

As the area scheduled for harvest increases in size, the percent of riparian area involved also increases. Those alternatives with the most

acres of timber to be cut have the greatest potential to create conflict in riparian areas.

The primary impact of timber harvesting on fisheries comes from the roads constructed in conjunction with timber harvest. The actual removal of timber generates levels of sediment that are significantly less than those from road construction. In fact, Megahan and Kidd (1972) state that roads probably cause more than 80 to 90 percent of the erosion and sedimentation problems.

There is an inverse relationship between road construction and fisheries production. The amount of sediment in a stream above the natural rate is directly related to fish loss. The road systems needed for timber harvest often produce sediment above the transport capacity of local streams and the resulting deposits of sediment adversely affect fish reproduction potential.

Forest standards have been developed to mitigate the negative impacts harvesting might have in riparian areas. Sediment production and mitigation measures are dealt with in the Roads Management section of this chapter.

Fuels Reduction: Even-age harvest systems provide the best opportunity for reduction of fire hazard. In clearcuts, there are no living trees to be protected from slash disposal methods. Disposal of slash in shelterwood harvests is more difficult and costly because the standing trees must be protected.

Big Game: Timber harvest alters big-game habitat by changing the kind, size, degree, and interspersion of cover and foraging sites. Those species which feed primarily on vegetation found in the early successional stages (e.g., grasses, shrubs) will benefit from the openings created by timber harvest. Examples are elk winter-ranges, bear spring-ranges, and bighorn sheep ranges. However, a balanced amount of cover and forage is necessary for animals to benefit from habitat changes. Animals which prefer forested areas, such as whitetail deer and moose, may be negatively affected by timber harvest. In all cases, (1) the degree of harvest, (2) the relationship with other harvested sites and cover, (3) the frequency of harvest, and (4) the amount of future human activity in the area will dictate whether timber harvest benefits or reduces big-game habitat effectiveness. High market or timber alternatives (Alts. A, L, M, and N) tend to create abundant forage along with reductions in cover and less big game. Alternative F, which maximizes elk habitat potential, includes a timber harvest schedule at about 60 to 70 percent of the maximum (Alternative L).

Habitat is also affected by the distribution and scheduling of timber management activities. If poorly managed (no form of road closure, logging during periods of high use by elk, etc.), the disturbance may cause the elk herd to leave an area and move elsewhere if that is possible. Controlling the timing of harvest and road building activities is therefore essential to minimizing the impact to the herd. Providing an adequate, secure area for elk to migrate to, during periods of activity,

is another important mitigating measure. The Road Management section deals with this concern as well.

Early in the planning process, elk were identified as an indicator species for big game--essentially a barometer to measure habitat change. A wealth of recent research data on elk exists, making it somewhat easier to determine habitat needs and relationships and to compare their needs with other big game species. Specific timber prescriptions were developed which optimize elk habitat needs and timber harvesting. These prescriptions, however, have enough latitude that on a site-specific basis other species can be favored if need be.

Timber harvest which directly benefits big game habitat is predominantly related to winter ranges. In these situations, removal of the timber canopy and the subsequent increase in grasses and forbs can significantly improve winter range forage quantity and quality. In summer range situations, however, forage is generally not a limiting factor and timber harvest does not significantly improve elk range through forage production. It is true that harvesting on summer range increases forage availability, but elk use of the range will be dictated more by the remaining cover, protection of special habitat features (e.g., wallows) and control of vehicle disturbance. Therefore, timber harvest on summer ranges must be more sensitive to disturbance, provision of displacement areas, seasons of operation and scheduling of activities.

Grizzly Habitat: Timber management activities can directly affect the grizzly population through habitat changes incurred as a result of vegetation manipulation such as timber harvesting, site preparation, etc., and in increased human encounters because of increased road access (Aune, 1983). Timber management activities, if well coordinated, can produce positive benefits by producing more desirable forage for grizzlies through certain timber harvest and site preparation practices such as small clearcuts and broadcast burning of slash instead of tractor-piling (Ruediger & Mealey, 1978). If road closures are instituted in a timely manner, human/bear encounters can be kept to a minimum.

Chapter II of this document displays the acres of timber harvest by decade for both grizzly ecosystems represented on the Kootenai. Harvest is also broken out by management situations 1 and 2 (based on the "Inter-Agency Guidelines") which define various forms of grizzly habitat. Alternative JF, the Final Plan, projects more harvest in the first decade in most management situations within the Cabinet-Yaak and Northern Continental Divide Ecosystems compared to the Current Direction (Alt. I), but is still less than most of the other alternatives.

Cavity-dependent species: Even-age timber harvest results in reductions in habitat for cavity-dependent species unless special precautions are taken. Even then, cavity habitat is reduced through cutting, disposal and site preparation. Specific silvicultural prescription direction and special contract language can mitigate the loss of cavity habitat by protecting existing snags and making provision for replacement trees.

Old Growth Timber: Harvest under an even-age system removes all elements of old-growth timber from a given stand, thus eliminating that habitat at that site.

Natural old-growth timber consists of existing stands located in areas where development is not permitted, such as in areas designated for wilderness, primitive recreation, or old-growth retention. These stands will go through natural changes and will not be manipulated, with the possible exception of protection from fire. The Proposed Action included special old-growth management on a 250-year rotation. Several commentors suggested that this Management Area (MA 13) be removed from the regulated timber base. The analysis displayed in Appendix B shows that removal of this Management Area from the regulated timber base had little effect upon other outputs and generally reduced the risk that the public saw in attempting to manage these stands. Management Area 13 has been removed from the regulated timber base in the Final Plan and will be managed without harvest.

In all alternatives, at least 8-10 percent of the suitable timberland must be in old-growth forest at all times to satisfy the needs of wildlife species dependent on old growth habitat (McClelland, 1977). The goal was exceeded in most alternatives because other constraints or allocations were even more limiting (Table IV-8). Lands not selected for timber production (including existing wilderness) have the potential to produce old-growth stands unless catastrophic fire, insects or diseases kill the trees. The Final Plan (Alt. JF) retains 10 percent of Forest land base, below 5,500 feet in elevation, in old-growth habitats. This is over 90 percent of the existing old-growth which fits the biological definition of "old-growth". (Note that elevations above 5,500 feet do not generally provide the necessary habitat components for old-growth dependent wildlife species.)

Table IV-8 in the DEIS showed old-growth acreage as the total acres on the Forest that are projected to have stands of 160 years or older by decade ten. The percentages shown were calculated by dividing these acres by the acres available for scheduled timber harvest. This was not meaningful because the old stands would occur in locations both inside and outside the regulated timber base. The following table shows the percentage of overmature stand acreage of the total forest acreage. This includes areas both inside and outside Management Area 13 and includes acres that may not be considered "old-growth timber" in the biological sense because certain habitat components are missing.

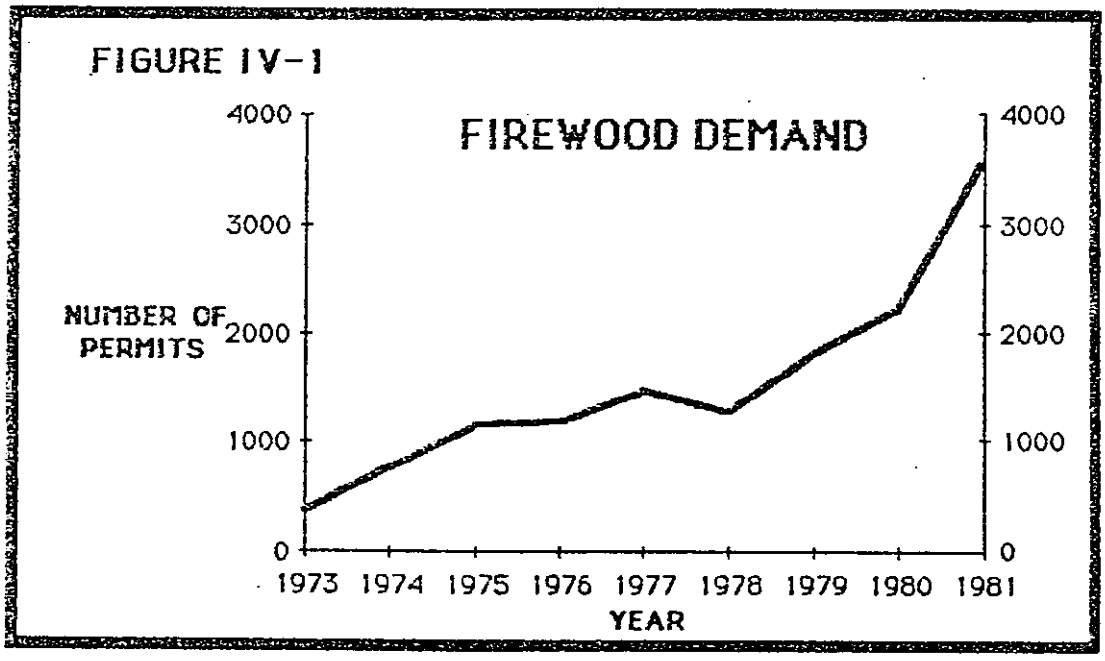
Table IV-8

OVERMATURE TIMBERLAND IN THE YEAR 2080
(Thousands of Acres)

| Alternative | Timber Age 160+ | Percent of Forest |
|---|---|---|
| A | 204 | 9% |
| B | 203 | 9% |
| C | 204 | 9% |
| D | 186 | 8% |
| E | 206 | 9% |
| F | 344 | 15% |
| G | 218 | 10% |
| H | 230 | 10% |
| I (CD) | 537 | 24% |
| J (PA) | 255 | 11% |
| JF (Final) | 311 | 14% |
| K | 255 | 11% |
| L | 168 | 7% |
| M | 191 | 9% |
| N | 196 | 9% |
| O | 232 | 10% |

Firewood Gathering: Timber harvest activity provides an abundant supply of firewood. Figure IV-1 displays the estimated number of permits issued to people for firewood between 1973 and 1981. Although some of the permits are for other products, such as posts, it is estimated that at least 90% were for firewood. No data is available from 1981 to 1985 as permits were not required. In 1985 a policy was instituted which required payment for a firewood permit. During Fiscal Year 1986, 1550 permits were issued under this program. A total of $17,415 in returns to the Treasury were generated. This figure of 1,550 permits is not comparable to the figures displayed in Figure IV-1 because, with the addition of a charge for the permit, actual use patterns may have changed. For example more people may have picked up free permits than eventually used them. No data is available on actual use patterns.

FIGURE IV-1




Road restrictions often follow completion of timber sales to protect recreation and wildlife values and to reduce maintenance costs. As roads are restricted, access to certain areas for firewood gathering may become limited. Some of the temporary restrictions occur in the fall at a time when individuals are gathering firewood for the coming winter. The Proposed Action (Alt. J) proposes more miles of road restrictions than any other alternative, because it combines a relatively high timber harvest and road construction program with mitigation to support a relatively strong wildlife program. The reader is referred to the road management section of this chapter for further discussion of this subject.

Insects and disease: Even-age harvest systems provide the best opportunity for control of insects and disease because all diseased or susceptible trees are removed and replaced by a young, vigorous stand. Clearcutting may be the only system which provides this control if all trees are unhealthy. In some cases where shade is necessary for seedling survival, a shelterwood cut is appropriate, provided the remaining overstory is removed before the young trees can be infected.

Minerals: Minerals and oil/gas exploration activities are generally compatible with timber management because of the need for roads to carry out most of the work.

Local economy: Timber harvest significantly affects the local economy because it contributes to the timber-based industry that is a dominant factor in the local economy.

Any alternative that changes the amount of regulated timber to be harvested from the current level (1974-83 average harvest) of approximately 148 million board feet (mmbf) has the potential to change the economy and the lifestyle of the local communities. Harvest schedules were constrained so that timber harvests could drop by no more than 25 percent from one decade to the next in order to minimize any changes in community lifestyles and stability. With the exception of Alternatives K, L and JF, initial (first decade) harvest levels were not constrained upward to meet or exceed current levels, yet no alternative fell below the historic harvest levels.

The level of timber harvest is important not only in providing jobs in the timber industry, but in other areas as well. Table IV-9 shows the significance of a timber harvest program of 100 mmbf on the local economy.

The Final Plan impacts the local economy in the same way as the Proposed Action. A further analysis was completed, in response to public comment, to estimate future changes in timber supplies in all ownerships in the area. This analysis is summarized in Appendix B and in Chapter III. The Final Plan had first decade timber harvest levels constrained upward to the maximum possible under non-declining yield constraints (202 MMBF per year regulated volume) to minimize social disruption associated with expected supply reductions from private lands in the area.

Cost: Clearcutting is the least costly method of harvesting trees because high volumes per acre are removed. Shelterwood cutting is more costly because a second harvest of the remaining overstory is required. Costs vary by species harvested, land slope, yarding distance, and other factors, but the removal of all trees from a site is cheaper per unit volume than removal of only a portion of the overstory. These lessor costs include the fact that even-age management cutting units are easier to lay out and mark than other harvest units, so less manpower and time are required.

TABLE IV-9

IMPACTS OF A 100-MMBF TIMBER PROGRAM ON THE LOCAL ECONOMY*

| SECTOR | TOTAL INCOME (MM $) | EMPLOYMENT (NO. JOBS) |
|---|---|---|
| Agriculture | 0.52 | 34.2 |
| Meat Animals/Other Livestock | 0.02 | 0.9 |
| Metal Mining | 0.00 | 0 |
| Other Mining | 0.00 | 0 |
| New Construction | 0.00 | 0 |
| Maintenance and Repair | 0.06 | 2.3 |
| Misc. Manufacturing | 0.04 | 1.7 |
| Food Products | 0.01 | 0.3 |
| Logging/Sawmills | 5.22 | 193.9 |
| Other Wood Products | 3.08 | 205.6 |
| Trans./Comm./Util. | 0.56 | 19.4 |
| Wholesale/Retail Trade | 0.54 | 51.8 |
| Finan./Insur./Real Estate | 0.74 | 8.3 |
| Hotels and Lodging | 0.02 | 2.8 |
| Misc. Services | 0.47 | 44.2 |
| Eating/Drinking Places | 0.16 | 26.5 |
| Govt. Enterprises | 0.06 | 1.6 |
| TOTAL | 11.50 | 593.5 |

* Local economy is defined as private-sector activity in Lincoln and Sanders Counties. Only the jobs and income associated with the portion of the 100 mmbf program expected to be processed in the two-county area (53%) are included in Table IV-9.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - From a timber production standpoint even-age harvest systems provide the best chance to improve the long-term productivity. To a large extent, insects and diseases are controlled, young and vigorously growing trees replace slow growing, old trees, fire hazards are reduced, and the proper mix of tree species can be introduced. However, with these systems, the visual quality and dispersed recreation opportunities change.

Timber growth rates for the Forest as a whole will remain below the potential levels because of fishery/water quality constraints on roading, which ultimately control the rate of converting overmature stands to regenerated stands. Some soil is lost and peak flows of water are increased. Habitat for wildlife species which prefer closed canopies is reduced but habitat for those species preferring openings is increased.

Irreversible and Irretrievable Commitment of Resources - Most areas previously harvested are irreversibly committed to timber harvest in the future. The wildlife habitat changed by the harvest and the dispersed recreation opportunities lost or drastically changed are irretrievable.

Adverse Effects Which Cannot be Avoided - Visual quality may be lowered by even-age harvest. Some soil will be eroded and water quality may be lowered. Wildlife habitat will decrease for species preferring dense canopies. Fish habitat could be changed by harvest occurring in riparian areas through increased sedimentation, loss of debris recruitment, and decreases in canopy cover. Semi-primitive recreation opportunities will be lost.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - Since most of the timber on the Forest will be harvested by even-age harvest systems, most of the energy required will be directly associated with these systems. The total energy requirements for harvest operations during the first decade are shown in Table IV-10.

TABLE IV-10

ENERGY CONSUMPTION REQUIRED FOR TIMBER HARVEST IN THE FIRST DECADE
(Billion B.T.U.'s)

| | Alternative | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SYSTEM | A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
| Logging | 48 | 48 | 48 | 48 | 46 | 35 | 42 | 44 | 34 | 42 | 42 | 48 | 57 | 55 | 52 | 45 |
| Hauling | 50 | 50 | 50 | 51 | 49 | 37 | 47 | 46 | 33 | 45 | 45 | 51 | 57 | 58 | 55 | 48 |
| Stand Exam | 1 | 1 | 1 | 1 | 1 | .8 | 1 | 1 | .8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

c. Logging Methods

The choice of a logging method depends largely on topography and soil sensitivity. On slopes under 40 percent, tractor yarding is generally appropriate. On 40 to 60 percent slopes, tractor operation becomes quite dangerous and cable or skyline systems are most often used. Helicopter or other aerial methods are generally prescribed on areas of sensitive soils, on slopes over 60 percent, and on areas where roads cannot be constructed. The combination of logging systems prescribed for various sites is described in the Forest Plan. Each of the systems is discussed below.

1. Tractor Logging

Tractor yarding involves dragging the logs or trees behind a skidding machine from the stump to the landing where the logs are loaded onto trucks to be hauled to the mill. Skidding downhill is usually the most efficient. Tractor yarding distances will vary according to topography and costs. Average skidding distances on the Kootenai are up to 800

feet, with maximum skidding distances up to 1200 feet. Logs or trees may be skidded with the leading ends suspended above the ground or with the entire length of the logs/trees dragging. Table IV-11 displays the acreage and percent of the total suitable timberland base that is expected to be logged using tractors, and provides a comparative view of the total impact of this logging system. The lower the acreage which will be eventually logged using this method, the lower the magnitude of the environmental impacts associated with the system.

TABLE IV-11

TRACTOR LOGGING BY ALTERNATIVE

| ALTERNATIVE | THOUSAND ACRES | PERCENT OF SUITABLE LAND |
|---|---|---|
| A | 779 | 53 |
| B | 776 | 53 |
| C | 777 | 53 |
| D | 845 | 53 |
| E | 784 | 55 |
| F | 555 | 49 |
| G | 776 | 56 |
| H | 762 | 56 |
| I (CD) | 811 | 57 |
| J (PA) | 790 | 57 |
| JF (FP) | 715 | 57 |
| K | 790 | 57 |
| L | 894 | 50 |
| M | 772 | 52 |
| N | 770 | 52 |
| O | 778 | 56 |

The impacts associated with a logging system also vary by the schedule of application of that system. If all the acreage noted in the above table were harvested in one decade, the impacts would be much greater than if that harvest were spread out over several decades. Table IV-12 displays the acreage expected to be harvested with tractors in each of the first five decades for each alternative. It also displays the percentage of the five decade total that is logged in each decade. An alternative with 20 percent in each decade has an even level of harvest over time and lower impacts than an alternative which has extreme levels of harvest in some decade. Also shown for each alternative is the standard deviation from the mean of the five decades of percentages. A small standard deviation indicates a more even level of activity over time whereas a large standard deviation indicates variations in activity which would cause more extreme impacts in peak decades and lesser impacts in other decades. The percentages are used for the basis of this standard deviation in order to remove differences caused by the relative scale of the programs which is represented in Table IV-11 above.

TABLE IV-12

TRACTOR LOGGING OVER TIME
(Average Annual Acres)

| ALT. | UNITS | Decade 1 | Decade 2 | Decade 3 | Decade 4 | Decade 5 | STD DEV |
|---|---|---|---|---|---|---|---|
| A | Acres | 22,800 | 12,000 | 9,100 | 14,000 | 12,100 | |
| | Percent: | 33 | 17 | 13 | 20 | 17 | 7.68 |
| B | Acres | 22,600 | 12,400 | 8,800 | 14,300 | 12,400 | |
| | Percent: | 32 | 18 | 12 | 20 | 18 | 7.35 |
| C | Acres | 22,700 | 12,100 | 8,500 | 14,200 | 12,000 | |
| | Percent: | 33 | 18 | 12 | 20 | 17 | 7.84 |
| D | Acres | 20,500 | 13,100 | 18,400 | 13,800 | 13,800 | |
| | Percent: | 26 | 17 | 23 | 17 | 17 | 4.24 |
| E | Acres | 22,400 | 11,700 | 9,300 | 14,100 | 11,900 | |
| | Percent: | 32 | 17 | 14 | 20 | 17 | 7.04 |
| F | Acres | 10,700 | 7,000 | 3,200 | 8,100 | 5,600 | |
| | Percent: | 31 | 20 | 9 | 24 | 16 | 8.28 |
| G | Acres | 22,000 | 11,200 | 9,300 | 13,400 | 12,300 | |
| | Percent: | 32 | 16 | 14 | 20 | 18 | 7.07 |
| H | Acres | 21,400 | 11,400 | 9,000 | 12,700 | 10,800 | |
| | Percent: | 33 | 18 | 14 | 19 | 16 | 7.52 |
| I (CD) | Acres | 11,900 | 9,100 | 10,100 | 8,100 | 7,800 | |
| | Percent: | 25 | 19 | 22 | 17 | 17 | 3.46 |
| J (PA) | Acres | 19,700 | 12,100 | 13,700 | 11,200 | 13,200 | |
| | Percent: | 28 | 17 | 20 | 16 | 19 | 4.74 |
| JF (FP) | Acres | 12,300 | 7,300 | 8,900 | 10,400 | 8,200 | |
| | Percent: | 26 | 15 | 19 | 22 | 17 | 4.32 |
| K | Acres | 21,600 | 12,900 | 11,800 | 10,800 | 13,000 | |
| | Percent: | 31 | 18 | 17 | 16 | 18 | 6.20 |
| L | Acres | 22,900 | 14,800 | 11,600 | 14,900 | 9,600 | |
| | Percent: | 31 | 20 | 16 | 20 | 13 | 6.82 |
| M | Acres | 25,100 | 9,600 | 9,000 | 16,100 | 15,800 | |
| | Percent: | 33 | 13 | 12 | 21 | 21 | 8.43 |
| N | Acres | 24,700 | 10,700 | 9,000 | 14,200 | 12,300 | |
| | Percent: | 35 | 15 | 13 | 20 | 17 | 8.77 |
| O | Acres | 24,700 | 21,500 | 18,700 | 21,500 | 15,900 | |
| | Percent: | 24 | 21 | 18 | 21 | 16 | 3.08 |

Alternative F has a smaller timber program and, consequently, less tractor logging than the other alternatives. Even though the schedule of tractor logging for Alternative F is not well- distributed over time, the program is small enough that it does not exceed any other alternative in any one decade. Alternative L has the greatest amount of land subject to tractor logging and the logging is not well-distributed over time. Alternative L generates the largest impacts due to tractor logging of any alternative.

The Final Plan has fewer impacts caused by tractor logging than does the Proposed Action. Because commercial thinning does not occur, more volume per acre is harvested and fewer acres need to be logged to produce a given volume of timber. The reduced acres of tractor logging are also more evenly distributed over time (as indicated by the standard deviation). This reduces impacts still farther.

Most of the soil disturbance associated with logging is due to removal of the timber from the site. Logging with tractors causes soil disturbance on about 21 percent of the area (Megahan, 1980). If the soils are light-colored, the redistribution of surface layers can be seen from long distances, reducing the visual quality.

Tractor yarding has the potential to cause soil compaction, soil disturbance and loss of soil productivity (Froelich et al., 1980; Rice et al., 1972 ). Soil compaction is a problem on the Kootenai because of the loose, very friable soils present as a surface layer over much of the area, the glacial tills with very uniform particle sizes (mostly silts and very fine sands) and the wet soils. Compaction increases bulk density that reduces or eliminates soil macropore porosity which: (1) reduces soil aeration necessary for plant roots to exchange gasses, (2) reduces soil infiltration rates, (3) reduces permeability of the soil, (4) alters or destroys soil structure, (5) modifies water supply to roots, and (6) increases mechanical impedance of soils to root development. These factors affect plants by causing roots to be short, stubby, deformed and shallow, increasing susceptibility to disease and blow-down potential and reducing seedling establishment. Compaction can be minimized by limiting tractor use to the dry season, requiring a cushion of snow, or operating equipment on frozen soils. Skid trails can be located away from problem areas but, even with restrictions, some soil disturbance inevitably occurs when tractors are maneuvered in a logging unit.

Exposure of mineral soil is necessary for seedling establishment and tractor logging does expose mineral soil on a significant portion of the area. However, most topsoils are thin, and if topsoil is removed by the tractor operation, the productivity of the site is decreased (Froelich, 1979a and 1979b). Displacement or mixing of the topsoil can also change the fertility of bared areas.

The organic layers are very important because of the high amount of nutrients they can store and the influence they have on modifying overland flow (Harvey et al., 1980 and 1981). The potential for overland flow is very high during rain-on-snow events and warm spring

days. When the organic layers are removed, site productivity is reduced and rills and gullies can form from overland flow.

Skid trails developed during tractor logging can intercept slope water, concentrating flows which potentially become very erosive. Proper and timely erosion control measures must be applied. On especially sensitive soils, the number of skid trails can be limited or another logging system can be required.

Adverse effects on streams and fish populations result from soil disturbance and erosion (Platts, 1980). An increased sediment load in streams causes the gravel beds to become plugged, causing fish eggs to smother from lack of circulating water. Insect populations, important food sources, are also reduced in numbers and diversity. Tractors operating in streams can have a severe impact on the stream channel and cause excessive sedimentation for miles downstream as well as substrate compaction and disturbance. For this reason it is standard practice to prohibit tractors from operating parallel to or in streams. Any crossings or other in-stream work are carefully planned; consideration is given to the use of temporary culverts and logs, and to the rescheduling of activities (winter crossings, for example).

Tractor logging requires road development. Roads increase access to big-game summer range and in doing so reduce security for elk and other big-game species. On the other hand, tractor logging can be a benefit to big game because of the diversity possible in shaping cutting units (e.g., feathered edges). Forage growth can be stimulated by the ground scarification caused by tractors.

Tractor logging is the least expensive method available for getting logs to the loading area. This can mean a greater return to the U. S. Treasury if this system can be used in lieu of the more expensive systems.

Noise of logging operations can degrade the recreation experience in an area over the short-term. In alternatives with low timber harvest levels, the disturbance will be minimal because only a few timber sales will be active at any one time and these are likely to be scattered throughout the suitable timberland. In alternatives with high timber harvest levels, there will be numerous sales and the recreation value of large segments of the Forest will be disturbed.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Some tractor logging may occur on soils that are wetter than desirable. In these cases, soil compaction will occur and affect future productivity. Impacts on the area can be minimized by using dedicated skid trails and/or logging on snow. In all cases, some soil will be displaced which may affect the long-term productivity and this soil movement can lower the water quality and fish habitat of the streams. These water quality effects, however, are generally of short duration.

Irreversible and Irretrievable Commitment of Resources - Tractor logging the current stand of trees does not irreversibly commit the area to tractor logging in the next generation. However, if the road system is

designed to accommodate tractor logging, there is a strong possibility that tractors will be used in the future. The soil lost or unduly disturbed by the tractors constitute an irretrievable loss to the site.

Adverse Effects Which Cannot be Avoided - Tractor logging can leave skid trails which may be unsightly to Forest visitors. These trails will eventually revegetate or be screened from view. During the logging operation, considerable noise and dust are generated by the tractors and soils are disturbed. Soil disturbance is followed by a loss in water quality and some loss in fish productivity. Some fish habitat may be disturbed or destroyed.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - The energy used is expended by the tractor used in this logging method.

2. Cable Logging

Cable logging involves dragging the logs along the ground and is rarely used in areas located more than 800 feet from the initial landing site. Because the logs are dragged along the ground, cable logging has effects similar to tractor logging but the effect is not as severe because the weight and track of the tractor are absent. However, skid trails can be obvious and about 15 percent of the soils are disturbed (Dyrness, 1967). Because of soil sensitivity, cable logging is used about 15 percent of the time on slopes under 40 percent and is used about 70 percent of the time on the less sensitive soils on slopes between 40 and 60 percent. Table IV-13 displays the acreage and percent of the total suitable timberland base that is expected to be cable logged and provides a comparative view of the total impact of this logging system. The lower the acreage which will be eventually logged using this method, the lower the magnitude of the environmental impacts associated with the system.

TABLE IV-13

CABLE LOGGING BY ALTERNATIVE

| ALTERNATIVE | THOUSAND ACRES | PERCENT OF SUITABLE LANDS |
|---|---|---|
| A | 500 | 34 |
| B | 498 | 34 |
| C | 498 | 34 |
| D | 542 | 34 |
| E | 470 | 33 |
| F | 419 | 37 |
| G | 444 | 32 |
| H | 436 | 32 |
| I (CD) | 455 | 32 |
| J (PA) | 430 | 31 |
| JF (FP) | 419 | 32 |
| K | 430 | 31 |
| L | 644 | 36 |
| M | 519 | 35 |
| N | 518 | 35 |
| O | 458 | 33 |

The percentage of suitable base remains essentially the same from the Proposed Action to the Final Plan. The acreage declines by six percent because the suitable base is smaller in the Final Plan due to the enlargement of MA 13 and its removal from the suitable timber base.

The impacts associated with a logging system also vary by the schedule of application of that system. If all the acreage noted in the above table were harvested in one decade, the impacts would be much greater than if that harvest were spread out over several decades. Table IV-14 displays the acreage expected to be cable logged in each of the first five decades for each alternative. It also displays the percentage of the five decade total that is logged in each decade. An alternative with 20 percent in each decade has an even level of harvest over time and lower impacts than an alternative which has extreme levels of harvest in some decades. Also shown for each alternative is the standard deviation from the mean of the five decades of percentages. A small standard deviation indicates a more even level of activity over time whereas a large standard deviation indicates variations in activity which would cause more extreme impacts in peak decades and lesser impacts in other decades. The percentages are used for the basis of this standard deviation in order to remove differences caused by the relative scale of the programs which is represented in Table IV-13 above.

TABLE IV-14

CABLE LOGGING OVER TIME
(Average Annual Acres)

| ALT. | UNITS | Decade 1 | Decade 2 | Decade 3 | Decade 4 | Decade 5 | STD DEV |
|---|---|---|---|---|---|---|---|
| A | Acres | 6,600 | 7,300 | 10,100 | 5,400 | 6,500 | |
| | Percent: | 19 | 20 | 28 | 15 | 18 | 4.85 |
| B | Acres | 3,500 | 7,200 | 10,200 | 5,200 | 6,700 | |
| | Percent: | 11 | 22 | 31 | 16 | 20 | 7.45 |
| C | Acres | 6,700 | 7,400 | 10,300 | 5,200 | 6,700 | |
| | Percent: | 19 | 20 | 28 | 14 | 19 | 5.05 |
| D | Acres | 5,300 | 11,200 | 14,800 | 6,000 | 8,200 | |
| | Percent: | 12 | 25 | 32 | 13 | 18 | 8.46 |
| E | Acres | 6,000 | 7,700 | 9,500 | 4,800 | 6,400 | |
| | Percent: | 17 | 22 | 28 | 14 | 19 | 5.34 |
| F | Acres | 2,400 | 2,800 | 6,100 | 4,200 | 5,200 | |
| | Percent: | 12 | 13 | 30 | 20 | 25 | 7.71 |
| G | Acres | 5,700 | 7,700 | 8,900 | 4,700 | 6,300 | |
| | Percent: | 17 | 23 | 27 | 14 | 19 | 5.10 |
| H | Acres | 5,300 | 7,900 | 8,400 | 4,400 | 6,200 | |
| | Percent: | 17 | 24 | 26 | 14 | 19 | 4.95 |
| I (CD) | Acres | 4,000 | 5,300 | 7,900 | 2,300 | 8,000 | |
| | Percent: | 15 | 19 | 29 | 8 | 29 | 9.11 |
| J (PA) | Acres | 5,000 | 7,000 | 8,600 | 4,800 | 7,300 | |
| | Percent: | 15 | 22 | 26 | 15 | 22 | 4.85 |
| JF (FP) | Acres | 2,800 | 7,700 | 6,300 | 3,300 | 3,500 | |
| | Percent: | 12 | 33 | 27 | 14 | 14 | 9.41 |
| K | Acres | 5,400 | 7,800 | 8,400 | 4,700 | 7,100 | |
| | Percent: | 16 | 24 | 25 | 14 | 21 | 4.85 |
| L | Acres | 9,900 | 8,100 | 13,800 | 6,700 | 8,700 | |
| | Percent: | 21 | 17 | 29 | 14 | 19 | 5.66 |
| M | Acres | 6,100 | 7,900 | 11,300 | 5,200 | 9,800 | |
| | Percent: | 15 | 20 | 28 | 13 | 24 | 6.20 |
| N | Acres | 7,400 | 6,700 | 11,700 | 6,100 | 5,800 | |
| | Percent: | 20 | 18 | 31 | 16 | 15 | 6.44 |
| O | Acres | 7,000 | 10,900 | 10,700 | 9,400 | 11,400 | |
| | Percent: | 14 | 22 | 22 | 19 | 23 | 3.67 |

Alternative F has a smaller timber program and, consequently, less total cable logging than the other alternatives. Even though the schedule of cable logging for Alternative F is not well-distributed over time, the program is small enough that it does not exceed any other alternative in any decade except Alternative I in the fourth decade. Alternative L has greatest amount of land subject to cable logging and the logging is not well-distributed over time. Alternative L generates the largest impacts due to cable logging of any alternative even though some alternatives are expected to have more cable logging in certain decades.

The Final Plan has fewer impacts caused by cable logging than does the Proposed Action with the exception of decade 2 which has slightly larger impacts.

Because the heavy tractor is not used, cable logging does not cause severe soil compaction. Because the logs are dragged uphill, soil erosion and overland flow are dissipated instead of concentrated as happens when tractor logging is done.

Cable logging can lead to a reduction of cavity-dependent species habitat because of the need to remove existing snags in the pathway of the logs. Due to the physical operation of the system, cable logging does not permit much opportunity to modify shapes of cutting units.

Except for intensity, the effects of cable logging are the same as those for tractor logging. The major difference between the methods, other than cable being less severe on the specific site, is that cable logging generally requires more miles of road than tractor logging per acre harvested.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Cable logging affects long-term productivity less than tractor logging because the effect of compaction is not as severe. There is less soil disturbance and less loss of soil. As with tractor logging, cable logging in itself does nothing to enhance soil productivity.

Irreversible and Irretrievable Commitment of Resources - The fact that an area is cable logged does not commit the area to be logged in the future. However, because the road system is in place and considerable money will be spent in generating a new stand of trees, it is likely that the area will be logged and that a cable system will again be used. The soil lost by the use of the system is irretrievable.

Adverse Effects Which Cannot be Avoided - Considerable noise and dust are created by cable logging although it may be less than with tractor logging. Soils will be disturbed and some may erode into streams causing a loss of water quality and fish habitat. The visual quality will be lowered until vegetation grows and hides the view of skid trails.

Conflicts With Objectives of Other Land Management Plans, Policies and Controls - None identified.

Energy Requirements - The energy used is expended by the machinery used in this logging method.

### 3. Skyline Logging

Approximately 10 percent of suitable land will be skyline logged. Skyline logging lifts at least one end of the log clear of the ground and is typically used at a distance of up to 1200 feet. The system is used on about 20 percent of the slopes between 40 and 60 percent and on about 25 percent of the logged area on slopes exceeding 60 percent. Its use on slopes of less than 60 percent is generally restricted to soils that are very sensitive to disturbance. Use of this system is functionally limited by topography which must have certain characteristics for the machine and cables to operate effectively. Since these systems (both running skylines and live skylines) tend to be cheaper (Olsen, 1980) and less environmentally damaging than cable logging, efforts are being made to identify more areas where this system can be used instead of the cable system. Table IV-15 displays the acreage and percent of the total suitable timberland base that is expected to be skyline logged and provides a comparative view of the total impact of this logging system. The lower the acreage which will be eventually logged using this method, the lower the magnitude of the environmental impacts associated with the system.

TABLE IV-15

SKYLINE LOGGING BY ALTERNATIVE

| ALTERNATIVE | THOUSAND ACRES | PERCENT OF SUITABLE LANDS |
|---|---|---|
| A | 162 | 11 |
| B | 146 | 10 |
| C | 161 | 11 |
| D | 175 | 11 |
| E | 142 | 10 |
| F | 136 | 12 |
| G | 139 | 10 |
| H | 136 | 10 |
| I (CD) | 142 | 10 |
| J (PA) | 139 | 10 |
| JF (FP) | 124 | 10 |
| K | 139 | 10 |
| L | 197 | 11 |
| M | 163 | 11 |
| N | 163 | 11 |
| O | 139 | 10 |

The impacts associated with a logging system also vary by the schedule of application of that system. If all the acreage noted in the above table were harvested in one decade, the impacts would be much greater than if that harvest were spread out over several decades. Table IV-16 displays the acreage expected to be skyline logged in each of the first five decades for each alternative. It also displays the percentage of the five decade total that is logged in each decade. An alternative with 20 percent in each decade has an even level of harvest over time and lower impacts than an alternative which has extreme levels of harvest in some decades.

Also shown for each alternative is the standard deviation from the mean of the five decades of percentages. A small standard deviation indicates a more even level of activity over time whereas a large standard deviation indicates variations in activity which would cause more extreme impacts in peak decades and lesser impacts in other decades. The percentages are used for the basis of this standard deviation in order to remove differences caused by the relative scale of the programs which is represented in Table IV-15 above.

TABLE IV-16

SKYLINE LOGGING OVER TIME
(Average Annual Acres)

| ALT. | UNITS | Decade 1 | Decade 2 | Decade 3 | Decade 4 | Decade 5 | STD DEV |
|---|---|---|---|---|---|---|---|
| A | Acres | 2,100 | 2,200 | 3,000 | 1,700 | 2,000 | |
| | Percent: | 19 | 20 | 27 | 16 | 18 | 4.18 |
| B | Acres | 2,100 | 2,200 | 3,000 | 1,600 | 2,000 | |
| | Percent: | 19 | 20 | 28 | 15 | 18 | 4.85 |
| C | Acres | 2,100 | 2,200 | 3,100 | 1,600 | 2,000 | |
| | Percent: | 19 | 20 | 28 | 15 | 18 | 4.85 |
| D | Acres | 1,700 | 3,400 | 4,600 | 1,900 | 2,600 | |
| | Percent: | 12 | 24 | 33 | 13 | 18 | 8.69 |
| E | Acres | 1,900 | 2,300 | 2,900 | 1,500 | 1,900 | |
| | Percent: | 18 | 22 | 28 | 14 | 18 | 5.29 |
| F | Acres | 800 | 900 | 1,800 | 1,300 | 1,600 | |
| | Percent: | 13 | 14 | 28 | 20 | 25 | 6.60 |
| G | Acres | 1,800 | 2,300 | 2,700 | 1,500 | 1,900 | |
| | Percent: | 18 | 22 | 26 | 15 | 19 | 4.18 |
| H | Acres | 1,700 | 2,400 | 2,600 | 1,400 | 1,900 | |
| | Percent: | 17 | 24 | 26 | 14 | 19 | 4.95 |
| I (CD) | Acres | 1,200 | 1,600 | 2,400 | 700 | 2,400 | |
| | Percent: | 15 | 19 | 29 | 8 | 29 | 9.11 |
| J (PA) | Acres | 1,600 | 2,100 | 2,600 | 1,500 | 2,200 | |
| | Percent: | 16 | 21 | 26 | 15 | 22 | 4.53 |
| JF (FP) | Acres | 900 | 2,300 | 2,000 | 1,000 | 1,100 | |
| | Percent: | 12 | 32 | 27 | 14 | 14 | 8.92 |
| K | Acres | 1,700 | 2,300 | 2,600 | 1,400 | 2,200 | |
| | Percent: | 17 | 22 | 25 | 14 | 22 | 4.42 |
| L | Acres | 3,100 | 2,500 | 4,200 | 2,100 | 2,700 | |
| | Percent: | 21 | 17 | 29 | 14 | 19 | 5.66 |
| M | Acres | 2,000 | 2,400 | 3,500 | 1,600 | 3,000 | |
| | Percent: | 16 | 19 | 28 | 13 | 24 | 6.04 |
| N | Acres | 2,300 | 2,000 | 3,600 | 1,900 | 1,800 | |
| | Percent: | 20 | 17 | 31 | 16 | 16 | 6.36 |
| O | Acres | 2,200 | 3,300 | 3,200 | 2,000 | 3,500 | |
| | Percent: | 16 | 23 | 22 | 14 | 25 | 4.74 |

Alternative F has a smaller timber program and, consequently, less total skyline logging than the other alternatives. Alternative H maximizes wilderness recommendations thus removing some of the steeper ground from the suitable timber base. This steep ground would have been skyline logged so its removal lowers the total skyline acreage to the level of alternative F. The schedule for skyline logging for alternative H is more evenly distributed over the first five decades than for Alternative F so the impact of this logging system will be least for Alternative H. Alternative L has the greatest amount of land subject to skyline logging and the logging is not well-distributed over time. Alternative L generates the largest impacts due to skyline logging of any alternative even though some alternatives are expected to have more skyline logging in certain decades.

The Final Plan has fewer impacts caused by skyline logging than does the Proposed Action with the exception of decade 2 which has slightly larger impacts. Because commercial thinning does not occur, more volume per acre is removed in the Final Plan and fewer acres need to be harvested to produce a given volume of timber. The reduced acres of skyline logging are not as evenly distributed over time (as indicated by the standard deviation) as in the Proposed Action. This less even distribution is related to the larger impacts of skyline logging in decade 2.

Skyline logging has minimal effect on the visual resource because logs are yarded with one end lifted off the ground. Therefore, the major disturbance to the soil is at the upper and lower ends of the skyline cable system. Edges of skyline units can be blended into the uncut forest with greater ease than with either tractor or cable systems. Fewer roads are necessary because yarding distances can be greater than for tractor or cable systems. Since roads have the longest and most permanent effect on the visual resource, the logging system which requires the least miles of road is the most desirable from a visual resource standpoint.

Skyline systems have a low potential for damage to soils except in cable corridors where some dragging of logs is typical. This dragging of logs has effects similar to those of cable logging, but is less severe or intensive. This means that the system has a lower potential for adverse effects on water quality or fish habitat. Skyline systems which cross streams must have the logs suspended to avoid, to the extent possible, disturbance to the stream.

The topography associated with skyline systems creates problems for the disposal of slash. Hand piling is effective, but expensive. Because of the lack of other machinery, firelines are difficult to build and broadcast burning is difficult to control on the usually steep slopes without a good fireline. Since soil disturbance is minimal in skyline yarded sites, fire is often necessary to bare the soil for planting. The slash must be burned in such a way so that a balance can be maintained between exposing mineral soil and loss of control.

Skyline logging is similar to cable logging in requiring the removal of all snags from the pathway of the logs, resulting in a reduction of

habitat for cavity-dependent species. Still, skyline logging requires the least miles of road on steep ground, and thus offers greater security to wildlife because of limited access to big-game ranges. The system itself has little effect on forage or cover. Soil disturbance occurs on only about five percent of the area which means that forage species receive little stimulation from scarification (Dryness, 1967). The silvicultural system and post-logging slash disposal has more effect on forage and cover than skyline logging.

A well-stocked understory of trees can usually be saved as the next generation by applying a skyline system. In other cases, since little soil is disturbed, regeneration of tree seedlings is a problem unless fire can be used to bare soil. If this occurs, productivity of the site will be reduced by the amount of time it takes for regeneration to be established.

Skyline logging is more expensive than tractor yarding, but less expensive than cable logging (Olsen, 1980).
Any logging operation disrupts recreation traffic on the roads within the active timber sale area. Interruptions of traffic may be longer for skyline operations than cable or tractor logging. Equipment is difficult to move and can block the roads for several hours at a time.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Since skyline logging causes less severe environmental consequences than tractor or cable logging systems, soil productivity is less affected. Although there is some soil disturbance with skyline logging, less is eroded and water quality is seldom severely lowered. Because of the lack of heavy equipment in the area, the low-growing vegetation is not destroyed. Due to the difficulty in disposing of slash, there can be some effect on regeneration, reflected by lower volume production in the next generation.

Irreversible and Irretrievable Commitment of Resources - Just because the current stand of trees is logged by the skyline system does not mean the next generation will be logged in the same way. However, the roads are designed to preclude use of conventional systems. Hence, if harvest is assumed for the future generations, some sort of skyline logging, or an equivalent system, will likely be used. The irretrievable commitments of resources are the potential lower volume production if regeneration is delayed or reduced because of less site scarification.

Adverse Effects Which Cannot be Avoided - Despite the fact that skyline systems produce fewer environmental consequences than the more conventional systems, some soil will be lost or displaced, and some water quality degradation may occur. Slash control will be more difficult because of the problems with construction of firelines and piling slash. Since most skyline operations are on steep slopes, any visual degradation is readily seen and, is some instances, may be seen for long distances. Recreation opportunities will be degraded while the harvest is occurring because of noise, dust and equipment in the roads.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - The energy used is expended by the machinery used in this logging system.

4. Aerial Logging

Approximately 2 percent of suitable lands will be logged by aerial methods. On the Kootenai Forest, the only aerial system proven practical is the helicopter. As with skyline logging, helicopter-logged cutting units blend easily into the uncut forest. Few roads are needed because external yarding distances are much greater than for conventional systems (up to 5000 feet), including skyline logging. Helicopter logging leaves the soil surface virtually undisturbed, affecting overall less than one percent of the entire logging area (Dryness, 1972). Landings, however, are disturbed and require rehabilitation on the one, to two-acre sites following completion of the project (Megahan, 1980). Table IV-17 displays the acreage and percent of the total suitable timber base that is expected to be aerial logged and provides a comparative view of the total impact of this logging system. The lower the acreage which will be eventually logged using this method, the lower the magnitude of the environmental impacts associated with the system.

TABLE IV-17

AERIAL LOGGING BY ALTERNATIVE

| ALTERNATIVE | THOUSAND ACRES | PERCENT OF SUITABLE LANDS |
|---|---|---|
| A | 29 | 2 |
| B | 29 | 2 |
| C | 29 | 2 |
| D | 32 | 2 |
| E | 28 | 2 |
| F | 23 | 2 |
| G | 28 | 2 |
| H | 27 | 2 |
| I (CD) | 28 | 2 |
| J (PA) | 28 | 2 |
| JF (FP) | 21 | 2 |
| K | 28 | 2 |
| L | 36 | 2 |
| M | 30 | 2 |
| N | 30 | 2 |
| O | 28 | 2 |

The percentage of the suitable base remains unchanged from the Proposed Action to the Final Plan. The acreage declines by 25% because of the generally smaller regulated timber base caused by the enlargement of Management Area 13 and its removal from the regulated timber base.

The impacts associated with a logging system also vary by the schedule of application of that system. If all the acreage noted in the above table were harvested in one decade, the impacts would be much greater than if that harvest were spread out over several decades. Table IV-18 displays the acreage projected to be aerial logged in each of the first five decades for each alternative. It also displays the percentage of the five decade total that is expected to be logged in each decade. An alternative with 20 percent in each decade has an even level of harvest over time and lower impacts than an alternative which has extreme levels of harvest in some decades. Also shown for each alternative is the standard deviation from the mean of the five decades of percentages. A small standard deviation indicates a more even level of activity over time whereas a large standard deviation indicates variations in activity which would cause more extreme impacts in peak decades and lesser impacts in other decades. The percentages are used for the basis of this standard deviation in order to remove differences caused by the relative scale of the programs which is represented in Table IV-17 above.

TABLE IV-18

AERIAL LOGGING OVER TIME
(Average Annual Acres)

| ALT. | UNITS | Decade 1 | Decade 2 | Decade 3 | Decade 4 | Decade 5 | STD DEV |
|---|---|---|---|---|---|---|---|
| A | Acres | 170 | 370 | 640 | 200 | 310 | |
| | Percent | 10 | 22 | 38 | 12 | 18 | 11.14 |
| B | Acres | 180 | 360 | 660 | 180 | 320 | |
| | Percent | 11 | 21 | 39 | 11 | 18 | 11.49 |
| C | Acres | 170 | 370 | 690 | 180 | 320 | |
| | Percent | 10 | 21 | 40 | 10 | 19 | 12.27 |
| D | Acres | 100 | 700 | 970 | 300 | 490 | |
| | Percent | 4 | 27 | 38 | 12 | 19 | 13.17 |
| E | Acres | 130 | 400 | 600 | 160 | 300 | |
| | Percent | 8 | 25 | 38 | 10 | 19 | 12.19 |
| F | Acres | 27 | 110 | 430 | 240 | 360 | |
| | Percent | 2 | 9 | 37 | 21 | 31 | 14.63 |
| G | Acres | 110 | 400 | 560 | 160 | 290 | |
| | Percent | 7 | 26 | 37 | 11 | 19 | 12.00 |
| H | Acres | 90 | 420 | 540 | 150 | 300 | |
| | Percent | 6 | 28 | 36 | 10 | 20 | 12.41 |
| I (CD) | Acres | 120 | 280 | 490 | 70 | 550 | |
| | Percent | 8 | 19 | 32 | 5 | 36 | 13.87 |
| J (PA) | Acres | 100 | 340 | 450 | 190 | 380 | |
| | Percent | 7 | 23 | 31 | 13 | 26 | 9.80 |
| JF (FP) | Acres | 40 | 490 | 405 | 100 | 140 | |
| | Percent | 3 | 42 | 34 | 9 | 12 | 16.99 |
| K | Acres | 100 | 390 | 500 | 200 | 360 | |
| | Percent | 7 | 25 | 32 | 13 | 23 | 9.95 |
| L | Acres | 420 | 450 | 990 | 320 | 580 | |
| | Percent | 15 | 16 | 36 | 12 | 21 | 9.51 |
| M | Acres | 100 | 440 | 840 | 160 | 540 | |
| | Percent | 5 | 21 | 40 | 8 | 26 | 14.20 |
| N | Acres | 200 | 340 | 890 | 250 | 260 | |
| | Percent | 10 | 18 | 46 | 13 | 13 | 14.82 |
| O | Acres | 170 | 500 | 540 | 180 | 650 | |
| | Percent | 8 | 25 | 26 | 9 | 32 | 10.84 |

Alternative F has a smaller timber program and, consequently, less acreage available for aerial logging than the other alternatives. The aerial logging schedule for Alternative F is not very evenly distributed over time so several other alternatives have larger acreages of aerial logging in decades four and five. Since Alternative F logs fewer acres than any other alternative in three of five decades, it generates the least overall impact due to aerial logging.

Alternative L has the greatest amount of land subject to aerial logging and the logging is not very evenly distributed over time. Alternative L generates the largest impacts due to aerial logging of any alternative even though Alternatives D and O are expected to have more aerial logging in certain decades.

The Final Plan has fewer impacts associated with aerial logging than does the Proposed Action except in the second decade when slightly larger impacts are expected to occur. Because commercial thinning does not occur, more volume per acre is removed and fewer acres are logged to produce a given volume of timber in the Final Plan. The reduced acres of aerial logging in the Final Plan are not as evenly distributed over time (as indicated by the standard deviation) as the Proposed Action. This less even distribution is related to the larger impacts of aerial logging in decade 2.

Helicopter logging is the most expensive of all the available systems and can be twice as expensive as cable logging (Olsen, 1980). Helicopters can not operate safely when less than 40% of the crown cover is removed, thus light thinnings are not practical with this system.

Slash disposal on helicopter logged areas is hard to accomplish. No heavy equipment is available to pile the slash or to construct firelines. Hand piling can be applied but this is quite expensive. As with skyline logging, the lack of or expense of slash control and lack of mineral soil exposure can have significant effect on regeneration (Smith, 1982) and increase the probability of unwanted fire.

Helicopter logging can be viewed as the best system for wildlife because few roads are required, providing maximum security for big-game species. At the same time, this kind of logging requires that all snags be felled within the cutting units for safety purposes, thus removing important cavity habitat.

There is considerable noise generated by the helicopters. This can have an undesirable effect on recreationists in the area and may affect the distribution of wildlife in the area.

The greatest effect of helicopter logging is the volume of traffic produced on the road away from the landing. Logs are moved very rapidly from the woods to the landing and trucks are usually loaded immediately. Twenty or more truck loads may be hauled from one landing in a day.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Helicopter logging has little effect on long-term soil productivity due to the fact that little soil is displaced. Problems with slash control and regeneration may lengthen the next rotation, but the soil productivity of the site will be maintained. Since helicopter logging takes place on steep slopes, openings can be seen from long distances but recovery is rapid since there are no roads.

Irreversible and Irretrievable Commitment of Resources - Since few roads are built into the area, there is little irreversible commitment of the site to harvest in the future. However, since considerable time and effort are likely to be spent producing another generation of trees, the site has a high probability of being logged in the future. Because most helicopter logging operations take place where roads would cause significant, undesirable effects, helicopters or other aerial systems are the sole means of harvest. If aerial systems were not used, the timber grown on these sites would be irretrievably lost to the market.

Adverse Effects Which Cannot be Avoided - Because of the steep slopes, the logging operation is hard to screen and openings are usually visible for long distances. A high level of noise is generated during helicopter logging operations. Slash control is difficult or expensive. Regeneration may be delayed because of lack of slash control and mineral soil exposure.

Conflicts With Objectives of Other Land Management Plans, Policies and Controls - None identified.

Energy Requirements - Helicopter logging uses considerable energy per unit.

### d. *Slash Control Including Prescribed Burning*

Unusable limbs, tops, and cull logs usually must be removed from a timber harvest unit before regeneration can take place. The most common method of disposal is to burn the slash on site, but in some cases large amounts are hauled away to be used as firewood. The objective of slash control and fuel management is to maintain fuel loading within acceptable limits for prevention and control of wildfire. Burning also helps prepare sites for regeneration and eliminates barriers to animal movement (Smith, 1962).

Slash may be tractor-piled and burned on gentle slopes, and handpiled and burned or broadcast-burned, regardless of slope. In some situations where slash is not evenly distributed and a mature overstory has been left, underburning of concentrations of slash is the only effective method of slash disposal. Slash disposal activity varies directly with timber harvest level. Alternatives which generate the highest timber harvest also generate the highest level of slash control.

Slash disposal can cause short-term degradation of foreground viewing. In broadcast burning units, all residual vegetation is usually burned and the unit looks scorched and black. Visual degradation usually lasts only until the first growing season because forbs, grasses, and shrubs resprout

or seed and grow rapidly after fire. Burned dozer piles leave scars that are readily visible on site and, in some cases, from several miles away. Burned handpiles are virtually invisible to the casual observer after a short period of time. Hot underburns can cause scorch marks on trunks of remaining overstory and can kill lower branches, and even entire trees occasionally. These visual effects will last until red needles fall and the scorched bark is replaced.

Air quality can be degraded by prescribed fire. Prescribed burning will be concentrated in times when fuels are dry enough to burn and weather conditions are favorable for controlling the fire. Suitable conditions occur for only a short time in the spring and fall. Fire weather conditions must be carefully monitored and burning allowed only when smoke will be rapidly dispersed. The higher the timber harvest level, the greater the air quality conflict because more slash will have to be burned in the short time available.

Slash is either piled for burning or a fireline is built around the unit for broadcast burning. On gentle slopes, tractors are used to pile slash in windrows. This activity has a high potential for degrading the soil resource (Glassy and Svalberg, 1981). If care is not taken, topsoil, litter, and duff can be pushed into the piles. Excessive mineral soil is then exposed to erosion between the windrows. The windrows will not burn as well because the soil smothers the fire. If windrows and the soil beneath them are too dry when burned, the topsoil may be baked, become sterile and impervious to wetting (Glassy & Svalberg, 1981). The soil structure may be severely altered. Little or no vegetation will grow to protect the soil from erosion during the several years necessary for recovery.

Unlike dozer piling, handpiling and burning will have no noticeable effect on the soil. Small areas under the piles may be scorched, but handpiles are usually small and burn cool enough to cause little damage. Bennett (1982) describes methods of controlling burn intensities to reduce risk of soil degradation and erosion. Soil losses caused by burning will be no greater than natural rates if fires are properly managed (Glassy and Svalberg, 1982).

Firelines around broadcast burn units may be a source of sediment if proper erosion control measures are not taken. Mineral soil must be exposed so fire will not creep over the line. The soil surface is then exposed to overland flow and subsequent erosion is likely. Ditches to divert water from the fireline into adjacent undisturbed areas are required in these circumstances and will solve the problem.

Water quantity is affected more by removal of trees than by slash disposal. The only measurable effect on water yield would occur where large areas of mineral soil were exposed and overland flow was increased by a decrease in infiltration rate. Water quality can be affected through the erosional processes associated with overland flow. Overland flow could increase sediment delivery to the streams if a sufficient strip of undisturbed vegetation is not present between the burned unit and the stream.

Slash disposal has an effect on fisheries and streams if water quality or quantity is affected. The removal of large woody material from streams or streambanks will affect the formation of pools by removing existing or potential debris necessary for pool creation. Overland flow from burned units may carry high amounts of sediment which will negatively alter fish spawning.

Slash disposal has an effect on big-game cover when small conifers that remain after logging must be burned in order to dispose of the slash. Forage may be temporarily reduced by slash disposal activities. However, the reduced competition from trees and the increase in nutrients rapidly released by fire result in a flush of shrub, grass, and forb growth in the subsequent growing season.

A totally clean forest floor is lacking cover for a wide variety of small animals, many of which depend on insects for food. The disposal of all dead, down, and decaying-logs removes a whole segment of the forest ecosystem. Some harmful insects and animals are eliminated, but beneficial ones also die or move. The objective of slash disposal should include provisions for leaving sufficient woody material to support the full complement of organisms present in the forest ecosystem.

Bark beetles, with the exception of the mountain pine beetle, and fungi can build up in slash and spread to living trees. Elimination of slash destroys the habitat for these insects and diseases and controls their spread. Dozer-piling in a partial cut can result in mechanical damage to residual trees and make them subject to insect or disease attack.

Costs of slash disposal vary by fuel treatment method, size of unit, and slope. Handpiling is more expensive than machine piling, small units cost more per acre than larger units, and units on steep slopes are more expensive to treat than those on gentle slopes. Fuel treatment cost per acre is independent of Forest Plan alternative, but the higher the timber output, the higher the total slash disposal costs. Slash disposal is a necessary cost to the production of timber and, as such, has an effect on the calculation of PNV. How much slash disposal is required depends on the acres of timber harvested each year. Some slash control will be required on practically every acre. Average number of acres requiring fuel treatment are shown in Table IV-19.

TABLE IV-19

AVERAGE ANNUAL FUEL TREATMENT
(Thousands of Acres)

| DECADE | Alternative A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.7 | 14.6 | 14.7 | 14.8 | 14.3 | 11.5 | 14.1 | 13.8 | 10.8 | 13.5 | 13.5 | 14.9 | 14.7 | 16.6 | 15.8 | 14.2 |
| 3 | 15.9 | 15.8 | 16.0 | 17.8 | 15.4 | 12.9 | 15.0 | 14.6 | 11.2 | 14.6 | 14.8 | 14.2 | 16.7 | 17.2 | 17.7 | 16.6 |
| 5 | 20.4 | 20.2 | 20.1 | 20.8 | 19.7 | 13.3 | 19.0 | 18.2 | 11.4 | 17.4 | 15.2 | 17.1 | 20.9 | 25.6 | 20.0 | 19.6 |

The primary reason for the variation in acres between alternatives is the amount of timber harvest, i.e., more timber harvest creates more slash which requires more fuel treatment. Slash disposal through prescribed fire affects recreation by creating smoke which may degrade air quality enough to cause local short-term problems. Units harvested but unburned may be nearly impassable to big game if slash loads are high. The problem is greater in high timber output alternatives and when poor weather for burning causes a time lag between harvest and slash disposal.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - Slash control, if properly done, maintains or increases long-term productivity. Productivity is adversely affected if slash is not treated or if slash is treated in a poor manner. There is always a chance during machine-piling and windrowing for excess soil to be displaced and erosion to occur. Soil compaction may also result. Fertility is lost and the next generation of trees suffers. Burning at the wrong time and allowing the fire to become too hot generally has the same effect. Most other effects of slash control are short-term and have little influence on productivity.

Irreversible and Irretrievable Commitment of Resources - Control of slash on a harvest site does not irreversibly commit this area to slash control in the future. The purpose of slash control is to provide a suitable site for establishment and protection of another generation of trees. Considering the time and effort expended in slash control, it is likely this future generation of trees will be harvested and that slash created by that harvest will also be treated. The soil inevitably lost or displaced in slash control efforts is irretrievable.

Adverse Effects Which Cannot Be Avoided - The most obvious adverse effect is the smoke put into the atmosphere by prescribed burning. Though this effect is short-lived, the more timber harvested, the more smoke. Other adverse effects include the short-term scorched and blackened vistas and the displacement of wildlife and possible erosion of soils.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - If a lot of slash is treated by prescribed fire at any one time and not properly coordinated, the Forest slashburning program could conflict with the clear air standards set by the State and Federal governments.

Energy Requirements - Some energy is required in slash control. If machinery is used, the energy required for a particular site can be significant. A small amount of energy is used in torches to light fires. Handpiling or slash requires little energy outside the muscular activity of those persons doing the piling.

e. Site Preparation and Reforestation (Tree Planting)

The objective of site preparation is to create areas where tree seedlings have a good chance for survival. Site preparation requires the removal of competing vegetation and exposure of mineral soils. The seeds and

seedlings of most tree species that are planted in organic matter, or duff, dry out and fail to survive.

Site preparation is usually associated with logging and slash disposal activities. When dozers are used to skid logs and pile slash, the result is enough mineral soil exposed to provide planting sites. Cable logging displaces some topsoil and broadcast burning or burning handpiles results in some spots where mineral topsoil is exposed. In units where insufficient mineral soil is exposed or competing vegetation has had time to regenerate, the soil surface must be scarified or the competing vegetation must be removed before planting. Scarification can be done by dozers or other machines on gentle slopes, but must be done by hand on steeper slopes. The amount of soil disturbance associated with site preparation can occur on upwards of 70% of the area. The percent will vary depending on the amount of slash present on the site and how complete the site preparation is to be.

In areas identified as important grizzly feeding sites where huckleberries are predominant, site preparation through scarification has a negative influence because it disrupts plant rhizomes and severely reduces berry production. In these areas, broadcast burning is favored over machine scarification.

Site preparation has the same effect on the visual resource, soils, water quality and quantity, and fish as the soil-disturbing portion of slash disposal.

Handscalping of the individual tree planting sites is the least costly method of site preparation and handpiling and burning are the most expensive. Handscalping is also least effective because not all competing vegetation is removed and seedling failure is high. Machine scarification, piling, and burning, on the other hand, are most effective because enough mineral soil is exposed and most competing vegetation is removed. It is also possible to "overscarify" and cause damage to the soil and water resource.

Environmental effects of site preparation vary by many factors, but, as a rule, the higher the timber output, the greater the potential for environmental degradation because more site work is required. The following table shows the amount of site preparation for reforestation that is expected over the next five decades.

TABLE IV-20

AVERAGE ANNUAL SITE PREPARATION AND REFORESTATION OVER FIVE DECADES
(Thousands of Acres)

| DECADE | Alternative A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.4 | 14.4 | 14.6 | 14.5 | 13.8 | 11.3 | 13.3 | 12.5 | 9.9 | 12.1 | 14.1 | 14.1 | 21.1 | 17.4 | 16.0 | 10.6 |
| 3 | 19.6 | 19.3 | 19.2 | 21.1 | 18.9 | 11.4 | 18.4 | 17.5 | 12.0 | 16.0 | 16.4 | 14.2 | 17.7 | 20.7 | 21.4 | 9.0 |
| 5 | 15.6 | 15.6 | 15.5 | 17.0 | 15.2 | 12.3 | 14.5 | 14.1 | 14.9 | 18.0 | 12.9 | 17.6 | 17.0 | 21.2 | 15.1 | 10.7 |

The different acres shown by alternative by decade are the direct result of different acreages being harvested. The acres are closely correlated to the total volume harvested although it can vary somewhat because the different productivity classes have different volumes per acre on-site when they are harvested. For example; lodgepole pine has a lower volume per acre than mixed conifer, so more acres of lodgepole need to be harvested to attain the same volume that could be produced on fewer acres of mixed-conifer lands. The Final Plan clearcuts more acreage in the first decade than does the Proposed Action because the same volume of timber is produced without commercial thinning. Acres needing reforestation are those that are clearcut so the reforestation needs are higher for the Final Plan in the first decade. Beyond the third decade, the Final Plan produces less timber and therefore requires less reforestation than the Proposed Action.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - Timber productivity of sites depends in part on how quickly trees are established after harvest. Adequate site preparation is necessary to ensure seedling survival and give them a good start for competition with other vegetation. Care must be taken in site preparation work that the topsoils are not removed, because they represent the necessary ingredient for the maintenance of productivity.

Irreversible and Irretrievable Commitment of Resources - Since considerable money and effort are expended in preparing the site for a new generation of trees, it is highly probable that the next generation of trees on the site will be harvested. Soils displaced by site preparation activities are irretrievably lost.

Adverse Effects Which Cannot be Avoided - The temporary unsightly appearance of piled slash and disturbed soil on sites that have been prepared for regeneration is unavoidable and will remain until vegetation grows and mitigates the effects. Soils can be eroded or displaced. If burning is used, smoke is generated. The noise and scars of site preparation can affect recreation use for a short time.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - Energy requirements for site preparation are very similar to those for slash control (see above).

Tree planting (reforestation) occurs after harvest, slash disposal, and site preparation unless natural regeneration is prescribed and accomplished. The proportion of harvest areas to be planted varies by harvest method, land type, and prescription. Roughly one-third of all sites must be planted. The remainder are expected to regenerate naturally which has been the experience on the Kootenai Forest.

Tree planting is also scheduled to occur in harvest units where planting failures have occurred, in burned-over areas, and in selection or shelterwood areas where the remaining trees are heavily infested with dwarf mistletoe. In the high timber output alternatives, most of the nonstocked areas are scheduled for planting. In the low timber output

alternatives, fewer nonstocked acres are scheduled to be planted because of the high cost of site preparation and because planting these sites yield a lower return. Average annual acres regenerated both naturally and by planting over five decades is shown in Table IV-20.

The primary environmental effect of planting is the quicker regeneration of trees. This results in a more rapid recovery of the visual character of the landscape; shortened return to pre-harvest levels of water yield, water quality, and time of peak flow; and a more prompt protection of the soil from erosion. Regeneration causes forage to decrease because of shading and competition of the growing trees, but speeds the process of recovery of big-game hiding and thermal cover.

Planting of certain species can benefit wildlife. The presence of the more fire-resistant species, such as ponderosa pine and douglas fir, on a site improves the chances of a successful prescribed burn on big-game winter range. These same species provide excellent thermal cover and snow intercept. Also, planting of larch and ponderosa pine will provide cavity habitat for wildlife at some time in the future.

Insect and disease problems can be minimized by the establishment of a young, vigorous stand of trees. Often, the problems can further be minimized by planting a different species than was harvested or by planting a mixture of tree species. These different species may also enhance the value of the next generation of trees. However, care must be taken to assure that the trees introduced are compatible with the sites on which they are planted.

Planting is labor-intensive and costs are high. It is more expensive to plant on slopes of over 40 percent; on thin, rocky soils, and in clearcuts because more seedlings are planted per acre. Most of the planting will be done by contract which will directly benefit the local economy.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - Planting can have a definite effect on productivity of the next generation of trees. The stand is quickly established and begins to grow instead of waiting for natural regeneration. This shortens the time for the next harvest. Other species or a mix of species can be introduced on the site, if compatible, and lessen the loss to insects and diseases in addition to producing more wood fiber. These activities should not affect the productivity of the site and will give quicker protection to the soils by producing an overstory more quickly. Though this more rapid growth of timber will reduce the forage available to livestock or big game, it will also provide the hiding cover and protection from cold needed by the big game.

Irreversible and Irretrievable Commitment of Resources - Because of the expense of planting, it is reasonable to assume that the next generation of trees will be harvested. For all practical purposes, this is an irreversible commitment. The only irretrievable commitment associated with planting would be in cases where the planting fails. The fiber lost during this period of time could not be recovered.

Adverse Effects Which Cannot be Avoided - A certain percentage of the plantings on the Forest will fail. This expense is difficult to recover.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - Some energy will be required in transportation of tree planting crews to the field. This is a small portion of the total energy use on the Forest.

f. Timber Stand Improvement

Precommercial and commercial thinning are the two activities associated with timber stand improvement. Precommercial thinning occurs when the regenerated stand is about 20 to 30 years old (too small for commercial products). Commercial thinning occurs from 40-80 years when a commercial product, such as poles, can be harvested. The objective of thinning is to reduce competition among crop trees so maximum growth per tree is realized. The resulting trees are fewer but larger and are more valuable at time of harvest.

Thinning can have an adverse effect on viewing from the foreground until the slash decays or is otherwise disposed of. The more open aspect of the thinned stands is not likely to be noticed by the casual observer.

The slash created by thinning is a fire hazard that is difficult to manage. Broadcast burning or underburning is not possible without damage to the remaining trees and burning handpiles can cause considerable damage also. Fortunately, the relatively fine fuels are packed down by snow and decay within one or two years, so the risk of losing the thinned stand to fire is low.

Thinned stands produce slightly more forage for a short time after thinning, but this advantage is soon lost by the rapidly expanding canopy of the remaining trees. Hiding cover for big game may be reduced by thinning but recovers rapidly as the remaining trees occupy the available space. A more or less diverse stand can result from thinning, depending upon the objectives for the species designated to remain as crop trees. If a mix of species is desired, thinning to emphasize one species would be a detriment to diversity and could affect the habitat of certain small animals, birds, and insects. The removal of insect-infested, diseased, and slow-growing trees will result in a healthy, vigorous stand, but will also reduce actual and potential feeding and nesting sites for cavity-dependent species.

The most effective silvicultural treatment to accelerate the growth in regenerated stands on the Kootenai is to precommercially thin prior to age 30. All alternatives provide the opportunity for this practice.

TABLE IV-21

AVERAGE ANNUAL PRE-COMMERCIAL THINNING
(Thousands of Acres)

| DECADE | Alternative A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.8 | 1.9 | 1.8 | 0.2 | 1.8 | 1.4 | 1.8 | 1.7 | 2.3 | 1.8 | 1.7 | 1.8 | 2.7 | 2.1 | 1.9 | 2.7 |
| 3 | 9.9 | 10.4 | 10.4 | 11.2 | 9.0 | 3.5 | 8.1 | 7.8 | 3.7 | 9.9 | 8.5 | 11.1 | 15.4 | 13.3 | 9.5 | 11.1 |
| 5 | 8.9 | 8.9 | 8.7 | 11.9 | 10.1 | 4.4 | 10.3 | 9.8 | 7.0 | 4.7 | 5.5 | 4.6 | 10.0 | 9.7 | 9.5 | 10.5 |

The preceding table shows that a substantial thinning program will be underway by the end of the third decade, with some tapering off by the fifth decade for half of the alternatives. Alternative F, which favors big game habitat management produces low timber harvest levels and shows less thinning by the end of Decade 5. Alternatives which provide for high timber yields (Alt. L) or high present net value (Alt. M) recommend the greatest amount of precommercial thinning. Alternative J, the Proposed Action, provides for a moderate amount of precommercial thinning in keeping with its intent to provide for a combination of wildlife and timber management designations. Alternative JF, the Final Plan, is similar to the Proposed Action.

The following table shows the amount of commercial thinning scheduled for decades one, three, and five in all alternatives.

TABLE IV-22

AVERAGE ANNUAL COMMERCIAL THINNING
(Thousands of Acres)

| DECADE | Alternative A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 17.4 | 17.2 | 17.1 | 13.1 | 16.6 | 2.8 | 16.5 | 16.0 | 15.2 | 12.6 | 0.0 | 12.9 | 15.5 | 15.8 | 18.6 | 19.3 |
| 3 | 3.4 | 3.4 | 3.3 | 17.6 | 3.4 | 1.3 | 3.1 | 3.0 | 8.1 | 7.8 | 0.0 | 7.7 | 12.9 | 4.0 | 3.8 | 3.9 |
| 5 | 5.3 | 5.9 | 5.5 | 8.1 | 5.3 | 4.4 | 6.3 | 5.0 | 3.3 | 4.8 | 0.0 | 4.8 | 4.6 | 7.9 | 5.0 | 6.3 |

The preceding table indicates that commercial thinning will be predominant in the first decade under all alternatives except Alternatives F and JF. The predominance of commercial thinning in the first decade is to prepare the large inventory of pole-sized timber on the Kootenai for future increased timber yields. Alternatives D and L continue into the third decade with high levels of commercial thinning to obtain the timber yields desired for those alternatives. The other alternatives do not make these investments. Commercial Thinning was not required in the Final Plan because of the anticipated difficulty (negative economics) in actually

carrying out a significant program, although it will still be permitted on a case-by-case basis.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - Thinning increases the size and potential value of wood fiber thus enhancing productivity.

Irreversible and Irretrievable Commitment of Resources - Thinning a stand makes a reasonable commitment to harvest the remaining trees in the stand. In unique situations, final harvest would not need to occur and the land could still be available for other uses if desired.

Adverse Effects Which Cannot be Avoided - Some of the slash created by thinning may not be treated. This will present a fire hazard for a few years after thinning. Temporary losses of hiding cover and protection from cold will affect big game use of the areas. The visual resource can be adversely affected for a short period of time.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - Most of the energy used in precommercial thinning will be used in transportation of crews to the sites. This is a small portion of the total Forest use. Energy used in commercial thinning is a part of the energy used in regular timber harvest, as discussed earlier.

2. Road Management

The transportation system is integral to the successful management of every other resource program on the Forest. Even the use of the Cabinet Mountains Wilderness depends in part on the road system which provides access to trailheads.

The term "road management" refers to all road-related activities, i.e., construction, reconstruction, maintenance work, and control of road use through restrictions such as closures, both temporary and permanent. Note that use-restictions usually apply only to motorized vehicles. There are generally no restrictions on foot travel and very few on horse travel.

Road management has a greater influence on Forest resources than any other activity. Effects are both positive and negative: Roads are essential for managing the timber resource in an economically sound way, to the development and use of recreation areas, to fighting wildfire and to extracting valuable minerals as well as reaching potential oil and gas deposits. Roads also create or introduce problems not present when an area was roadless. Soil is displaced by the construction and reconstruction of the roads which can lead to degradation of water quality and fisheries habitat, big game habitat effectiveness can be reduced, and visual quality can be impaired. Roadless areas lose their value for wilderness consideration and primitive recreation after roads are constructed through them.

To allow for maximum public use of the road system and yet to protect other resources and control the degree of disturbance to them, road use is frequently restricted to non-motorized travel after project work is over. Restrictions can be seasonal or year-long, depending upon the reasons for them. Major reasons include protection of wildlife habitat, water quality and soils, maintenance cost reduction, public safety, conflict of use, and legal mandates, such as those protecting wilderness areas.

When roads are open to motorized access, they provide increased opportunities for recreation activities such as berry picking and fishing, driving for pleasure, snowmobiling, motorcycling, hunting, and camping. Roads allow the handicapped, elderly, families with young children, and visitors interested in short trips into the Forest to enjoy outdoor recreation. During the part of the year that roaded areas are closed to motorized access, these opportunities are foregone, but the area then offers the chance to hunt on foot or on horseback in a roaded but traffic-free setting, to cross-country ski or to hike.

Of the 6,200 miles of road on the Kootenai in 1986, 993 miles have been closed year-long; to protect recreation, wildlife values, and unstable soils as well as to reduce maintenance costs and accomplish other goals described above and, 676 miles are closed on a seasonal basis for many of the same reasons. This is a total of 1,669 miles restricted or approximately 27% of the existing road system. Table IV-23 displays the miles of projected road restrictions (both yearlong and seasonal) by alternative.

TABLE IV-23

TOTAL MILES OF ROAD RESTRICTED SEASONALLY OR YEAR-LONG BY THE FIFTH DECADE

| Alternative | Year-long or Permanent Closure | Temporary or Seasonal Closure | Total With Use Restrictions | % of Total Projected Road Miles |
|---|---|---|---|---|
| A | 3889 | 1221 | 5110 | 45 |
| B | 3846 | 1264 | 5110 | 46 |
| C | 3860 | 1260 | 5120 | 46 |
| D | 3665 | 1105 | 4770 | 41 |
| E | 3554 | 1326 | 4880 | 45 |
| F | 3795 | 1165 | 4960 | 50 |
| G | 3560 | 1220 | 4780 | 44 |
| H | 3649 | 1081 | 4730 | 45 |
| I (CD) | 2280 | 2310 | 4590 | 47 |
| J (PA) | 3632 | 2448 | 6080 | 57 |
| JF (FP) | 3423 | 2307 | 5730 | 57 |
| K | 3632 | 2448 | 6080 | 57 |
| L | 4400 | 1290 | 5690 | 46 |
| M | 3560 | 1540 | 5100 | 45 |
| N | 3875 | 1255 | 5130 | 46 |
| O | 2615 | 685 | 4300 | 40 |

In general, the amount of road restrictions is in direct proportion to the amount of total roads needed to manage the suitable timberland and the emphasis given to big-game habitat management. This means that the more miles built, the more miles of restrictions needed because of certain minimum requirements such as grizzly bear recovery goals, big-game management goals, water quality protection, etc. Alternatives J, JF, and K reflect the common goal of big-game (elk) production and recreation management. Alternative JF (Final Plan) has fewer miles of road with use restrictions than Alternative J (Proposed Action) because it has fewer total miles. This, in turn, is due to its smaller suitable timber land base.

Table IV-24 and Table IV-25 portray the number of miles of road to be constructed over five decades under each alternative. (Arterial roads are the main roads on the system, such as the Pipe Creek Road or the Forest Development Road on the west side of Lake Koocanusa. Collector roads lead off of arterials and locals take off of collector roads. The design standard of arterial roads is higher than that of collector roads. The local road has the lowest design standard of the three and is often closed when a project, such as a timber sale, is completed.)

It is important to note in interpreting the following tables that the Kootenai National Forest is in the midst of the first road building decade at this time. Approximately 1,400 miles of roads needed to complete the system under the Current Direction have already been constructed since the base year of 1978. 1978 was the base year used in the FORPLAN model and all projections were made from that date when the Forest road system totaled approximately 4,800 miles. As of January 1, 1986 the Forest road system totaled approximately 6,200 miles. To compute the total number of miles of new road remaining to be built on the Forest under each alternative, 1,400 miles must be subtracted from the total shown. The miles remaining to be constructed and the total miles anticipated to be needed for each alternative are shown in Table IV-26.

TABLE IV-24 TOTAL COLLECTOR ROADS TO BE CONSTRUCTED BY DECADE (1978 Base Year - Miles)

| ALTERNATIVE | DECADE 1 | DECADE 2 | DECADE 3 | DECADE 4 | DECADE 5 |
|---|---|---|---|---|---|
| A | 63 | 63 | 63 | 2 | 0 |
| B | 62 | 62 | 62 | 5 | 0 |
| C | 63 | 63 | 63 | 2 | 0 |
| D | 62 | 62 | 67 | 0 | 0 |
| E | 60 | 60 | 60 | 11 | 0 |
| F | 44 | 44 | 44 | 47 | 12 |
| G | 58 | 58 | 58 | 17 | 0 |
| H | 56 | 56 | 56 | 23 | 0 |
| I (CD) | 41 | 41 | 41 | 41 | 27 |
| J (PA) | 56 | 56 | 56 | 23 | 0 |
| JF (FP) | 55 | 55 | 55 | 26 | 0 |
| K | 64 | 59 | 53 | 15 | 0 |
| L | 66 | 66 | 59 | 0 | 0 |
| M | 73 | 55 | 63 | 0 | 0 |
| N | 60 | 59 | 63 | 0 | 0 |
| O | 62 | 62 | 62 | 5 | 0 |

TABLE IV-25 TOTAL LOCAL ROADS TO BE CONSTRUCTED BY DECADE (1978 Base Year - Miles)

| ALTERNATIVE | DECADE 1 | DECADE 2 | DECADE 3 | DECADE 4 | DECADE 5 |
|---|---|---|---|---|---|
| A | 2629 | 2489 | 1163 | 0 | 0 |
| B | 2595 | 2428 | 1189 | 0 | 0 |
| C | 2614 | 2491 | 1057 | 0 | 0 |
| D | 2607 | 2496 | 1593 | 0 | 0 |
| E | 2567 | 2344 | 1049 | 0 | 0 |
| F | 1976 | 1899 | 981 | 0 | 0 |
| G | 2450 | 2274 | 1033 | 0 | 0 |
| H | 2423 | 2126 | 1051 | 0 | 0 |
| I (CD) | 1806 | 1532 | 1334 | 174 | 0 |
| J (PA) | 2380 | 2408 | 913 | 0 | 0 |
| JF (FP) | 2317 | 2434 | 310 | 0 | 0 |
| K | 2699 | 2490 | 545 | 0 | 0 |
| L | 3031 | 2527 | 1814 | 0 | 0 |
| M | 3079 | 2179 | 979 | 0 | 0 |
| N | 2833 | 2420 | 1023 | 0 | 0 |
| O | 2497 | 2341 | 865 | 0 | 0 |

TABLE IV-26 TOTAL ROAD SYSTEM

| Alternative | Miles to be Constructed After 1/1/78 | Miles to be Constructed After 1/1/84 | Miles to be Constructed After 1/1/86 | Total Road System Needed Now & Future |
|---|---|---|---|---|
| A | 6472 | 5272 | 5072 | 11272 |
| B | 6403 | 5203 | 5003 | 11203 |
| C | 6353 | 5153 | 4995 | 11153 |
| D | 6887 | 5687 | 5487 | 11687 |
| E | 6151 | 4951 | 4751 | 10951 |
| F | 5047 | 3847 | 3647 | 9847 |
| G | 5948 | 4748 | 4548 | 10748 |
| H | 5791 | 4591 | 4391 | 10591 |
| I-CD | 5037 | 3837 | 3637 | 9837 |
| J-PA | 5892 | 4692 | 4492 | 10692 |
| JF-FP | 5252 | 4052 | 3852 | 10052 |
| K | 5925 | 4725 | 4525 | 10725 |
| L | 7563 | 6363 | 6163 | 12363 |
| M | 6428 | 5228 | 5028 | 11228 |
| N | 6467 | 5267 | 5067 | 11267 |
| O | 5885 | 4685 | 4485 | 10685 |

Under alternatives F and I, about 3,650 miles of new roads are needed to complete the transportation system. Alternatives H and O are conservative in the amount of road construction, and prescribe no roads for any inventoried roadless area. At the other end of the spectrum is Alternative L which requires 6,160 miles of road to access all land suitable for timber outside current wilderness boundaries. In all of the alternatives, most of the roads would be built by the end of the third decade.

Road construction is directly tied to the amount of projected timber harvest. In Alternative M, timber harvest is emphasized thus, even though the road system is built quickly, the net contribution to PNV is relatively large. In Alternatives F and I, timber harvest is constrained so, even though road building progresses slowly, the contribution to PNV is lower.

The smaller suitable timber land base of the Final Plan is estimated to require 640 fewer miles of road to access than the Proposed Action. It is important to note here that the estimated road construction mileages described above are not goals. In fact it is a Forest goal, as described in the Forest Plan, to construct the minimum number of roads necessary to permit efficient management of the Forest. The above mileages are estimates of the number of miles that will be needed. Continuing transportation planning activities are intended to identify specific ways of reducing the needed mileages.

In the discussion below, the effects of roads on resources are treated in some depth. Mitigation efforts are also described.

Inventoried Roadless Areas: There is strong public feeling about the fate of inventoried roadless areas, a problem that Congress debated during the final days of its session in 1984. Should a particular area be granted wilderness designation or should it be allocated for some other use? What values other than roadlessness does it have? In a discussion of road management it is important to point out that for all practical purposes, once a road is constructed in an inventoried roadless area, the quality that made that area unique from a roadless or wilderness potential standpoint is gone.

Recreation: Roads are essential to developed recreation and to reaching trailheads and other dispersed recreation sites. There are 28 campgrounds, seven picnic grounds, 18 boat sites, a winter sports area (Turner Mountain) and 1,300 miles of trail on the Forest, all tied in one way or another to the road system. One form of recreation, driving for pleasure, is totally dependent on roads.

As beneficial as roads are in providing access to various points on the Forest, they tend to concentrate people in certain areas, leading at times to overuse at the most popular sites. Soil compaction and erosion and an increased incidence of vandalism can follow. When these occur, roads to the sites can be closed to allow areas to recover physically and to discourage further abuse. Generally speaking, alternatives favoring roadlessness including wilderness, such as Alternatives E, G, H, J, K, and O, favor recreation in most of its forms. The exception is roaded recreation, opportunities which will continue to increase as road construction increases. (Roads to developed sites often serve purposes other than recreation.) The effects of recreation on the forest environment are dealt with in the recreation section of this chapter.

Fire Control: Roads built into roadless areas result in increased access which leads to a greater potential for man-caused fires. However, this same access makes fire suppression easier by quick delivery of firefighters to the scene and by the fact that the road now may serve as a fuel break. There is little variation among the alternatives with regard to fire control.

Visual Resource: Road construction can affect the visual character of the land by changing its color, texture, or line. Roads across open areas on steep slopes are highly visible for many miles. Cuts and fills are often visible even through a screen of vegetation. Where the visual resource is important, the visual impact can be reduced by leaving vegetative screens, seeding, or treating cut and fill slopes with a darkening agent.

Because roads and timber harvest activities are so closely intertwined, the relationship of the viewing resource to just one or the other is difficult to analyze. For that reason the viewing resource is treated in the timber section of this chapter. Tradeoffs by alternatives are explained in Table IV-6. With the exception of Alternative O, which is designed to provide significant protection for roadless areas and the visual resource, the Proposed Action (Alternative J) recommends the fewest number of acres for "maximum modification". With the exception of Alternatives G and H, which favor wilderness values, the Proposed Action recommends the greatest number of acres for "preservation/retention".

Cultural Resources: Road construction could destroy cultural resources if a road were planned through the middle of an area having cultural importance. Before a major project is undertaken, however, the site is routinely examined by Forest archeologists to determine if it has any cultural resource value. Very few conflicts between archeological sites and land management activities have occurred in the past. Roads close to an archeological site can be a benefit by improving public access to it for viewing and pleasure, but that same road makes the area vulnerable to vandalism. Such problems must be dealt with on a case-by-case basis and through public education and law enforcement. There is no significant difference among alternatives with regard to protecting the cultural resources. There is, however, an increased risk of damage to cultural resources associated with those alternatives which involve more miles of road construction.

Wildlife: Roads, and their subsequent use by vehicles, impact wildlife habitat, particularly big game habitat, more than any other Forest management activity. The primary effect is increased vehicle access that results in loss of animal security areas, displacement of animals, increased competition among animals for more limited resources and increased vulnerability of animals to both legal and illegal harvest. Studies have shown that grizzly bear (Aune, 1983), caribou (Johnson, 1977), and elk (Lyons, 1984) are directly affected by open roads. Elk habitat effectiveness drops by almost 90% as open road density increases from 0-4 miles/square mile. Human activities and encounters with wildlife can disturb elk calving areas, summer and winter ranges, animal migration sites, dens, forage areas, and security areas. Alternatives which minimize wildlife disturbance , such as F and I, have the fewest total miles of road. Other alternatives which would provide more disturbance include J (Proposed Action), E, G, H, K, and O. Alternatives recommending the most miles of road will produce the greatest disturbance.

The most obvious effect of open roads is to provide easy access into the animals' habitats. Animals are more easily killed by legal hunting or poaching. This is of particular concern where grizzly habitat occurs, as man-caused mortalities are an important management concern. To avoid over-harvest and to support the State's goals for big game management (a relatively long season with a harvest within reasonable limits), the Forest has a program of road restrictions, some seasonal, some year-long, following timber harvest. Restricting road use to non-motorized travel can restore important security to areas historically used by big game to acceptable levels even though the road still provides a travelway for horseback riders and hikers. Table IV-27 displays the miles of road affected by closures, either temporary or permanent, by the fifth decade. Table IV-23 displays the type of restriction, i.e., temporary or yearlong.

TABLE IV-27

ROADS WITH NO RESTRICTIONS BY THE FIFTH DECADE
(miles)

| ALTERNATIVE | Total Road Miles By Decade 5 | Road Miles With Restrictions | ROAD MILES WITHOUT RESTRICTIONS |
|---|---|---|---|
| A | 11,272 | 5,110 | 6,162 |
| B | 11,203 | 5,110 | 6,093 |
| C | 11,153 | 5,120 | 6,033 |
| D | 11,687 | 4,770 | 6,917 |
| E | 10,951 | 4,880 | 6,071 |
| F | 9,847 | 4,960 | 4,887 |
| G | 10,748 | 4,780 | 5,968 |
| H | 10,591 | 4,730 | 5,861 |
| I (CD) | 9,837 | 4,590 | 5,247 |
| J (PA) | 10,692 | 6,080 | 4,612 |
| JF (FP) | 10,052 | 5,730 | 4,322 |
| K | 10,725 | 6,080 | 4,645 |
| L | 12,363 | 5,690 | 6,673 |
| M | 11,228 | 5,100 | 6,128 |
| N | 11,267 | 5,130 | 6,137 |
| O | 10,685 | 4,300 | 6,385 |

Alternative JF (Final Plan) will offer the greatest security to wildlife, the grizzly bear, and other threatened or endangered species. Other alternatives favoring wildlife are J, K, F, I (the Current Direction alternative), G and H. Alternatives D and L emphasize timber and thus road building, and would create the greatest threat to security for wildlife and for threatened and endangered species, such as the grizzly. Overall public access would not be diminished over what is available now. Miles of road currently open total 4,400 compared to 4,322 proposed for decade 5 in Alternative JF. Additional road closures would primarily affect roads constructed between now and decade 5.

New roads may cross game trails and change animal movement patterns. Narrow roads built to follow the terrain with minimum cuts and fills reduce these impacts. Road use restrictions are also effective in encouraging big game to return to the area where they may take advantage of foraging opportunities created by timber harvesting, burning, or seeding.

Road construction on big game winter range may cause few problems to the animals if construction activity occurs when few or no animals are present. Roads may be a benefit in these situations by improving access for habitat improvement on winter ranges.

Road construction activity on big-game summer range displaces the animals, a situation that will continue as long as heavy traffic is allowed. If road building is scheduled to avoid activity in adjacent drainages, elk will have

a secure area to move into. However, displacement of one population segment into another area could result in increased competition for space and forage if the displacement areas are limited.

Many potential wildlife impacts are mitigated through road design and location. This involves providing access to game trails at regular intervals for game passage, reducing cuts and fills on major ridge crossings, and avoiding meadows, wallows, ridges and saddles, regularly used by big game. Additional mitigation measures are applied through road closures and timber sale scheduling.

Parts of the habitat for some small animals will be destroyed by road construction but other habitat may be created for those animals who exist along the edge of the forest.

Soil, Water, and the Fisheries Resource: Road construction and maintenance produce the greatest impacts of any activity on soil, water and fisheries through erosion and sedimentation. Sediment can fill the spaces between gravels, smothering fish eggs, small fish, and fish food. Fry and fingerlings lose hiding cover and are more vulnerable to predators. In addition, roads tend to concentrate water runoff, further increasing surface erosion and sediment buildup in streams. Roads can behave like first order drainages. They can intercept flow and can be efficient in carrying water to a stream channel thus increasing peak flows. Roads with deep cuts through the soil mantle can interrupt the sub-surface flow of water and increase the mass failure hazard in unstable soil types or increase peak flow levels of runoff.

Since roads probably cause more than 80 to 90 percent of the erosion and sedimentation of an area (Megahan and Kidd, 1972), roads that are constructed through or adjacent to riparian areas can adversely affect stream channel stability, water quality, and fishery habitat. For this reason, in all alternatives, road building and timber harvest activities are constrained to minimize effects on the stream environment. Culvert placement and bridge building, for example, can not take place at those times when fish are spawning or when the redds are vulnerable to sediment increases.

Roads also can expose selected stream reaches to overfishing due to additional public access. Stream crossings can interrupt fish migration if crossings are improperly designed or installed.

Table IV-28 displays the anticipated sediment yield entering third order streams by the fifth decade. High (H), Medium (M), and Low (L) values have been assigned to express sedimentation rate increases above the natural background sediment. There is a close correlation between these ratings and the amount of road construction by alternative. These ratings do not include impacts from temporary roads that will be closed and reclaimed after use. Mass wasting is not reflected because road-related mass failures are not significant on the Forest.

TABLE IV-28

POTENTIAL FOR SIGNIFICANT SEDIMENT IMPACTS ON THIRD ORDER STREAMS BY THE FIFTH DECADE (High, Medium, or Low)

| | Alternative | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
| Potential Sediment | M | M | M | H | M | L | M | M | M | M | M | M | H | H | M | M |

The fisheries/water quality objectives are the primary control on road construction in the first three decades of all alternatives. The greatest amount of sediment is produced by road and timber activities in Alternatives D, L, and M which propose a larger road system than the others. In all alternatives, road building and timber harvest are designed to mitigate effects on stream environments through proper road location, road construction and design, and road maintenance practices.

These mitigation practices include: (1) location of roads out of the riparian zone; (2) dewatering channels during culvert installations; (3) minimizing stream crossings; (4) providing minimum widths, cuts, and fills; (5) slope stabilization by seeding, fertilizing, and the use of right-of-way slash at the toe of critical fill slopes; (6) maintaining road prism for adequate drainage; (7) installing sediment traps at critical stream crossings; and (8) imposing travel restrictions during the wet season to reduce the need for further road work. These measures will not eliminate sediment from new roads, but will significantly reduce the amount delivered to stream channels.

Sediment in streams has an adverse impact on trout populations. The combination of sediment and the location of the areas designated for road construction and timber harvest affect trout population the most. All alternatives project declines of approximately 4% to 7% in the existing total trout population (See Table II-24 in Volume I of the Final EIS). Decline in the migratory fish population is estimated from 8% to 12%. Alternatives D and H will have the greatest effect on the total fish population and Alternatives D and I produce the greatest decline in migratory fish numbers. These declines will level off and stabilize in approximately 30-40 years, and begin to slowly improve but never regain their original levels. The exceptions are Alternatives D, K, and L. These alternatives continue at their reduced levels with no anticipated improvement.

Timber: Roads provide access to timber so that it can be managed. Logging systems and transportation systems are planned concurrently to insure that the most cost-effective harvesting system is implemented, while at the same time giving recognition to other resources, such as wildlife habitat.

Roads remove some timberland from production. For every mile of road built, roughly four to eight acres of land are involved, extending from the top of the cut to the bottom of the fill slope. This roadbed acreage cannot

be managed for wood in the future. Natural regeneration may occur along cut and fill slopes, but it is unlikely that merchantable timber will be produced.

Cost: As road standards increase, mitigation measures for sediment reduction also increase because of additional exposed soil surface areas. Mitigation costs are included in the total road costs and can reduce returns to the U.S. Treasury. The increased mitigation costs do not affect the return payments to the states and counties because road costs are included as a gross receipt to the U.S. Treasury in the form of a capital asset or investment value.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - Construction of roads has a long-term effect on timber productivity by allowing access for silvicultural treatments. The acreage required for the roadbed itself will be removed permanently from the timberland base of the area as long as the road remains active. Rehabilitation of an old roadbed is not always successful because of the poor quality of the subsurface soil exposed at the time of road building.

Roads remove the habitat of small animals and birds even though the edges of roads may create habitat for others. Roads change the type of recreation experience available in the area. Actively traveled roads can have an adverse effect on the movement of big game animals. Roads can also have an impact on the visual quality of the area. Even after construction, roads continue to produce sediment which can reduce water quality and fisheries habitat over the long term.

Irreversible and Irretrievable Commitment of Resources - Road construction is an irreversible commitment of resources since roads are essentially permanent features of the landscape. If roads are not built, timber cannot be economically harvested and an irretrievable loss of a particular use of the timber resource occurs. If roads are built, future options are foregone for wilderness reconsideration, and semiprimitive recreation and roadless wildlife habitat are irretrievably lost.

Adverse Effects Which Cannot Be Avoided - Roads have an adverse effect on the visual resource. Wildlife habitat and wildlife movement patterns can be disrupted. Roadless recreation opportunities are lost. Future wilderness consideration and roadless area management potentials are foregone. Road construction and maintenance cause soil disturbance and erosion. Water quality of streams is lowered by road building and fish habitat quality is reduced.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls - None identified. The Forest works closely with other landowners to efficiently develop access required to manage the land.

Energy Requirements - Road construction and maintenance require the largest amount of energy use of any activity on the Forest. This is displayed in Table IV-29.

TABLE IV-29
ENERGY REQUIRED FOR ROAD CONSTRUCTION AND MAINTENANCE
DURING THE FIRST DECADE
(Billion B.T.U.s

| Alternative ..... | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | CD | PA | FP: | | | | |
| A | B | C | D | E | F | G | H | I | J | JF: | K | L | M | N | O |
| 923 | 910 | 917 | 914 | 901 | 720 | 866 | 858 | 575 | 845 | 823: | 943 | 1074 | 1059 | 984 | 882 |

3. WILDLIFE AND FISH HABITAT IMPROVEMENT

a. Big Game

The objective of wildlife habitat improvement is to maintain productivity of winter range forage areas primarily by spring burning on grassland or mixed-grass and shrubland. Most burns are planned to be of low heat intensity, "cool", and vegetation is expected to resprout rapidly. The soil surface will be exposed for a short time and there is a risk of some accelerated erosion. Air quality degradation is similar to that experienced with fires from timber harvest slash control and managed fire. Burning can cause short-term degradation of foreground viewing. Since the vegetation (grass and shrubs) is burned, the area will look scorched and black until the next growing season when these plants resprout and begin to green up the area.

Shrub, grass and forb seeding or planting is more opportunistic than planned. These activities are generally pursued on relatively small areas where some disturbance has eliminated or reduced the natural ground cover. Effects of these activities are mostly positive in that soils are protected, forage is produced and the visual aspect is improved. Effects of these activities will be more fully explored by individual analyses as projects are proposed.

The primary foods on big game winter ranges are grasses and shrubs. These plants respond very rapidly when seeded, planted, or pruned and many are already present due to past vegetative manipulation (timber harvest) or wildfire. Availability of forage can be deliberately increased by cutting, prescribed fire, and plant manipulation, with the animal carrying capacity increasing significantly. Table IV-30 displays by alternative the acreage scheduled for these activities.

TABLE IV-30
WILDLIFE HABITAT IMPROVEMENT
(Thousands of Acres/Year in decade one)

| Alternative ..... | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | CD | PA | FP: | | | | |
| A | B | C | D | E | F | G | H | I | J | JF: | K | L | M | N | O |
| 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.3 | 0.4 | 0.1 | 3.8 | 5.6 | 5.6: | 5.6 | 0.6 | 0.6 | 0.6 | 0.6 |

The acres treated in each alternative are linked almost directly to the total acres allocated to big game winter range (MA 10) under each alternative because approximately 75% of wildlife habitat burning is done on winter range. Also, a schedule of treating the acreages to improve forage production, consistent between alternatives, establishes the amount to be treated in each decade. Basically, a 20-year rotation was established so that each year about 5% of the MA 10 acres would be treated to improve forage production. Each acre would then be treated about once in every two decades to maintain forage levels and to cycle through all MA 10 acres on a 20-year basis.

Other activities which improve or degrade wildlife habitat are associated with timber harvest, road construction and management, and livestock grazing. The effects of these other activities on wildlife are discussed in the appropriate sections of this Chapter.

Because the amount and carrying capacity of winter ranges can be significantly modified by weather and varying management practices, it is difficult to base a population figure on the winter range situation. In the Kootenai Plan, elk population numbers were calculated on the basis of summer range acres and the density of elk that can occur. On summer ranges, factors other than weather or food availability (most importantly, cover and security) dictate the carrying capacity and are therefore more indicative of population. It was estimated in 1983 that the Kootenai habitat supports a population of 5,500 elk. The amount of winter range acres and the potential forage that could be produced were then examined to determine if sufficient winter range was available to support the population that could be raised on the summer range. This analysis demonstrated that winter range acres could provide sufficient forage for elk herd increases under any alternative, if they were manipulated to increase forage. In addition, significant acreages of winter range are found on private lands, particularly in the Fisher River drainage, and these acres are in addition to those used in the winter range carrying capacity analysis.

A wide variety of non-game wildlife dependent on a variety of habitats occurs on the Forest. Minor programs in non-game and waterfowl habitat improvement are also carried out on the Kootenai, including construction of waterfowl nest structures and protection and creation of snags.

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

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

The productivity of areas that are burned may be changed. If trees are occupying these sites, some or all may be killed. This is especially true of tree seedlings. Burning is implemented to maintain or enhance the production of suitable wildlife forage.

Prescribed burning retains the vegetation in an early stage of plant succession as well as enhancing palatability and availability. The relationship between artificially maintaining an area in an early stage of plant succession for extended time periods and its effect on long-term

productivity is speculative at this time. We can guess that the practice may eventually alter soil and waterflow and thus may eventually affect long-term productivity of the soil.

The productivity of acres that are burned is not decreased unless soil loss occurs or waterflow is altered. This does not normally occur with prescribed fires because of their relatively small size and controlled intensity. On-site vegetation can be killed or fire-scarred. However, burning releases nutrients on site and can increase productivity for a few years, resulting in vigorous new growth of established species. In addition, some trees and shrubs require heat for seed germination; fire can result in their germination and growth.

On those lands where elk habitat is managed to achieve close to full potential use, timber sales and entry schedules are likely to be affected in order to provide security areas.

Irreversible and Irretrievable Commitment of Resources - The act of burning or planting does not constitute an irreversible commitment of the areas to this activity. Different areas will be scheduled for treatment each year. Vegetation consumed by fire is a loss, but natural plant succession returns burned sites to more vigorous native vegetation in a relatively short time. Many present-day sites owe their vegetative makeup to past fires and since fire is a natural force that has a long history on the Kootenai, its prescribed application does not pose an irreversible commitment of the land.

Adverse Effects Which Cannot be Avoided - The soil surface will be exposed by burning for a few days or weeks and there is a risk of accelerated erosion. Air quality degradation is similar to that experienced from timber harvest slash control. The blackened areas from burning will be noticeable for short periods of time, especially along frequently traveled roadways. Some short-term surface soil erosion may result from constructed fire control lines.

Conflicts with Objectives of Other Land Management Plans, Policies and Controls - Prior to initiation of any wildlife project, it is subjected to analysis under procedures defined by the National Environmental Policy Act, and effects are identified at that stage as well as any conflicts between agency goals. Generally no conflicts exist, because the goal of the Forest and those of other State and Federal agencies are to maintain and protect the wildlife resource.

The State Department of Fish, Wildlife, and Parks is responsible for management of wildlife, the U.S. Forest Service for management of wildlife habitat on National Forest land. It is difficult to separate one from the other; the welfare of wildlife is directly dependent on the quality of the habitat that supports it. For this reason, close cooperation between the two agencies is essential. These efforts result in an exchange of ideas and recommendations concerning land management activities, such as timber harvest and road management.

Energy Requirements - Energy will be required for prescribed fires designed to enhance wildlife habitat. Because of the small acreage

involved, this energy use will amount to only a small percentage of the total energy used on the Forest.

b. Threatened and Endangered Species

The Kootenai provides habitat for four species which are listed as threatened or endangered. These include the endangered bald eagle, peregrine falcon, and gray wolf, and the threatened grizzly bear. (For more information about the Endangered Species Act, the reader is referred to the section on this subject in Chapter 3 and Appendix D.)

Bald eagles occur predominantly as winter migrants along major waterways throughout the Forest. Up to 35 bald eagles can be seen during winter months in various locations. This number is extremely fluid as individual birds come and go depending on weather patterns and season. Only two active nests are known to occur within the Forest boundary, one is on private corporate timberland.

To date, no conflicts have occurred between nesting bald eagle adults and forest management activities. Under any alternative, potential conflicts should be reconcilable. A routine effort is made to monitor wintering and nesting eagles in conjunction with the national mid-winter eagle surveys and through the efforts of a local volunteer. As a result, important perch and roost areas have been identified. It is possible that management of bald eagle habitat may have some effect on site-specific Forest activities. However, projected Forest management activities will be minimally affected overall by bald eagle habitat management.

Gray wolf habitat on the Kootenai is found in the northeast corner of the Forest in the Whitefish Mountains. This area is recognized as a possible extension of occupied wolf habitat lying to the north and east in Canada. Several relatively routine observations of wolf tracks are verified in the area annually. Currently, researchers feel that wolves are only transients in the area and that no resident individuals or packs occur within the boundary of the Kootenai.

The area delineated as wolf habitat is also recognized as grizzly habitat and important big game habitat. Since elements of managing for grizzlies and big game are consistent with wolf habitat management and since all alternatives meet grizzly recovery goals, we can assume that all alternatives likewise support gray wolf habitat needs. The management of grizzly habitat benefits many other wildlife species as well.

All proposed alternatives are aimed at achieving recovery of the grizzly bear population on the Kootenai. Grizzly habitat on the Kootenai is contained in two different grizzly ecosystems, the Cabinet-Yaak Ecosystem (CYE) and the Northern Continental Divide Ecosystem (NCDE). Of the grizzly habitat on the Kootenai, 15 percent is in the NCDE and 85 percent in the CYE. Grizzlies in the NCDE are felt to be relatively abundant in number and an annual controlled harvest is allowed by the State. Conversely, grizzlies in the CYE are felt to be extremely low in number and have been protected from harvest for the past decade. On the

Kootenai, the two ecosystems are separated by major water features, highway developments and communities, and distances of up to about 25 miles.

Grazing by domestic livestock in grizzly habitat has occurred to date without incident, although grazing in grizzly bear spring range may have to be modified in the future to avoid conflict. Special mitigation clauses are contained in permits and no changes to those clauses are anticipated because of the Proposed Forest Plan. Livestock grazing on the Kootenai is a small program and site-specific modifications to protect habitat of threatened or endangered species will have a minimal effect on the overall program.

Peregrine falcons are seasonal migrants on the Kootenai. Very infrequent observations are made during either spring or fall migration periods. Only two confirmed sightings have been recorded within the last several years, and those occurred during migration. No special habitat or status for peregrines is currently included in Forest programs.

Mountain caribou have recently been recognized as a sensitive species in Montana. ("Sensitive" status signifies that a species is not numerous and that efforts will be made to protect the species and its habitat from further degradation until further knowledge of its status can be gained. This short-term classification can lead either to upgrading or downlisting of the mountain caribou in Montana.) The Whitefish Range in the northeast corner of the Kootenai is felt to represent the best potential habitat. Verified track observations were recorded there in 1983 and 1984. Because the area is located in identified grizzly bear and wolf habitat where development, if any, is minimal, management for caribou needs should have minimal effect on other Forest programs. Many of the prime spruce basins remaining in the area are in the Ten Lakes Montana Wilderness Study Area and the protected status is highly compatible with caribou. Given that the Whitefish Range is all "grizzly situation 1" (Interagency Guidelines) and that portions are proposed for nondevelopment, caribou should not be adversely affected by any alternative.

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

Decisions made regarding the management of bald eagles, gray wolves, and grizzly bears could result in lower levels of outputs of other resources. The timing and level of activities permissible for timber management in grizzly habitat will mean that opportunities to manage stands for maximum growth will be reduced.

Some decisions regarding minerals have resulted in limitations on the timing, duration, and location of exploration and development activities. This has occurred mainly in relation to grizzly habitat but it is possible that similar limitations could be related to bald eagle nesting or wolf activity. Generally, long-term mineral goals have been accomplished since those non-renewable resources are not dependent on being gathered at a particular time, as is timber. Because minerals are "where you find them", it is possible that a set of mutually exclusive circumstances between a listed species and an ore deposit could develop. To date, no such irreconcilable occurrences have happened.

Dispersed recreation opportunities may be limited in some areas. Snowmobile use in important denning or wintering sites could be restricted. However, restrictions of this nature are usually a redirection of those activities into areas where they are acceptable, not an elimination of that opportunity on the Forest.

By definition, dispersed recreation implies low densities of people. However, occasional concentrations of recreationists can occur in areas with special attractions. Efforts to reduce these concentrations is consistent with quality recreation experiences and land management direction, particularly in wilderness areas, as well as desirable for grizzly habitat management. Generally, low density dispersed recreation is not a measurable conflict with grizzly or wolf habitat management.

Because bald eagle nesting sites are selected by the birds for specific attributes, protection of those nesting territories will limit the kinds of management that can occur. The basic vegetational features of the area must be retained, which can limit timber management. However, only two nests are known to occur on the Forest and one is on private land. Generally, nests are found in riparian habitats, within which management limitations already occur. Therefore, the protection of bald eagle nesting territories will result in very minimal effect on Forest programs.

Irreversible and Irretrievable Commitment of Resources - Protection and maintenance of threatened or endangered species habitat will have an effect on the extraction of some resources. A decision to protect listed species habitat may result in reduced timber output; trees ready for harvest at a certain time may not be available because of protective measures. With respect to the timber market, such losses are irretrievable, but with respect to the biotic community, there will be no irretrievable loss.

Decisions to protect a listed species habitat are based on the Endangered Species Act and, as such, are subject to change as the law is changed. No change in law is anticipated in the foreseeable future, so the commitment to manage habitat for listed species is assumed to be irreversible.

Adverse Effects Which Cannot be Avoided - The management of habitat for listed species is not anticipated to result in any adverse effects to soils, watersheds, or the basic productivity of managed sites. Generally, management for the listed species is that which perpetuates the natural character of the Forest. This may involve a more ambitious prescribed fire program which includes reduced suppression of naturally-ignited fires. Since this is an attempt to let natural forces continue their role in a forested ecosystem, it is not viewed as an adverse effect.

Conflicts with Objectives of Other Land Management Plans, Policies and Controls - Actions identified in the proposed plan with regard to management of listed species habitat are consistent with approved recovery plans (grizzly bear) and responsive to guidelines and plans generally accepted to represent state-of-the-art management (bald eagles, wolves). The Final Forest Plan itself supersedes existing land use plans for the Kootenai and, therefore, represents the current management posture. Similar plans are in existence for adjacent National Forests and the

management strategy for listed species has been coordinated with these Forests. Since the listing for threatened and endangered species applies only to the United States, no similar comparisons can be made with adjacent British Columbia. However, it is not anticipated that management for listed species on the Kootenai will be in conflict with any stated goals for those species in British Columbia.

Energy Requirements - No special energy requirements are associated with the management of threatened or endangered species habitats.

c. Watershed and Fisheries Improvement

Forest management activities directly affect the quality and quantity of water entering the Columbia River Basin. Quality is characterized as generally excellent. Water yield from the Forest is estimated to be 4.1 million acre feet per year. For purposes of land allocation, the Forest is delineated into 112 drainages, having channel stability ratings ranging from "fair" to "good". Drainages can generally withstand up to 14 percent increase in peak flow, without significant channel damage.

Sixteen species of game fish are found in the streams and lakes of the Kootenai National Forest. Six of the species are trout, the most popular of which are the westslope cutthroat and rainbow. The Kootenai River, the second largest stream in Montana, provides some of the best fishing for trout and whitefish in the state (Konizeski, 1982). Trout can attain a large size in the river because of the rich environment. Fishing in Lake Koocanusa above Libby Dam is becoming more popular each year. Trout, both rainbow and westslope cutthroat, are plentiful and kokanee salmon, introduced a number of years ago, are increasing in numbers. Smaller streams on the Forest provide challenging fishing. Species are listed in Chapter 3.

Changes in water quality and fish habitat are affected primarily by road construction and, to a lesser degree, timber harvest. Sediment introduced into streams from these activities can have a significant adverse effect on both spawning and rearing of fish. The sediment can reduce available space for rearing, and, by degrading spawning gravel, decrease egg-to-fry survival. In general, the more sediment produced by an alternative, the greater the reduction in fish habitat potential. Watershed analysis will be a part of all analyses for road construction and timber harvest to assure the channel stability and sediment levels in streams are within acceptable levels. Maintenance of fisheries by controlling excessive sedimentation from roads and timber harvest is discussed in the Roads Management and Timber Harvest sections of this chapter.

Projects designed to improve water quality will usually benefit fish. Typical activities include channel stabilization, debris alteration, and revegetation of problem areas. Streambanks weakened by grazing livestock can recover by installing fencing and placing cattleguards at critical junctions (see Range Management section). Although each project usually only covers a few acres, the work is usually very important to recovery on that site and to improving water quality and fish habitat downstream.

Application of these techniques will generally prevent significant impacts upon fisheries downstream from the Forest boundary.

Table IV-31 shows the average annual acreage involved in water quality improvement projects by alternative by decade.

Past placer mining activities have degraded a significant amount of fish habitat on the Forest. Dredging of streams tends to artificially straighten channels, remove large boulders and woody debris, and eliminate riparian vegetation. All these elements are important fish habitat components, adding the necessary structure and diversity to a stream. The Forest is involved in an extensive habitat improvement effort in these areas.

TABLE IV-31

AVERAGE ANNUAL ACREAGE OF WATERSHED IMPROVEMENT AND/OR MAINTENANCE BY ALTERNATIVE (Acres/Year)

| ALTERNATIVE | DECADE 1 | DECADE 2 | DECADE 3 | DECADE 4 | DECADE 5 |
|---|---|---|---|---|---|
| A | 93 | 104 | 102 | 129 | 138 |
| B | 92 | 103 | 103 | 124 | 137 |
| C | 93 | 104 | 103 | 123 | 136 |
| D | 93 | 102 | 117 | 132 | 141 |
| E | 90 | 99 | 98 | 121 | 133 |
| F | 67 | 79 | 78 | 76 | 81 |
| G | 88 | 96 | 95 | 116 | 127 |
| H | 86 | 91 | 92 | 112 | 121 |
| I (CD) | 62 | 62 | 65 | 59 | 67 |
| J (PA) | 83 | 96 | 92 | 105 | 114 |
| JF (FP) | 83 | 96 | 92 | 105 | 114 |
| K | 95 | 99 | 89 | 103 | 111 |
| L | 105 | 101 | 109 | 130 | 142 |
| M | 108 | 92 | 113 | 134 | 180 |
| N | 102 | 99 | 116 | 132 | 135 |
| O | 88 | 102 | 108 | 124 | 132 |

All fish habitat improvement measures are designed to increase production of wild stocks of fish. Few measures are considered which deal with fish stocking, which is the responsibility of the Montana Department of Fish, Wildlife, and Parks. The Forest's responsibility is to maintain habitat for natural production, important both for total fish yields and for future hatchery stocks. Fish habitat improvement projects, averaging between 30-50 per year on the Kootenai, include replacing or retrofitting the bridges and culverts that were not designed for fish passage in the past, modification of debris jams that are barriers to fish passage, revegetation of streambanks, adding debris where lacking, and construction of plunge pools and overhead cover. The newly created pool in a previously straight, smooth-flowing stream is used by fish for rest, cover, and for wintering-over, reducing the number of fish that die each year from effects of anchor-ice. The material displaced by the pool creates new gravel beds upstream and downstream for spawning and checks the stream's flow during high water. This reduces damage to streambanks and channels from flooding.

These acres include both P&M and KV dollar investments. KV funding, which provides most of the money for habitat improvement, is directly related to the magnitude of timber sales.

Table IV-32 shows the average annual acres of fish habitat improvement by decade for each alternative.

TABLE IV-32
AVERAGE ANNUAL ACRES OF FISH HABITAT IMPROVEMENT BY ALTERNATIVE AND DECADE

| ALTERNATIVE | DECADE 1 | DECADE 2 | DECADE 3 | DECADE 4 | DECADE 5 |
|---|---|---|---|---|---|
| A | 120 | 130 | 130 | 160 | 170 |
| B | 120 | 130 | 130 | 150 | 160 |
| C | 120 | 130 | 130 | 150 | 160 |
| D | 120 | 130 | 150 | 160 | 170 |
| E | 120 | 130 | 130 | 150 | 160 |
| F | 100 | 110 | 110 | 110 | 110 |
| G | 120 | 130 | 130 | 150 | 160 |
| H | 120 | 120 | 120 | 140 | 150 |
| I (CD) | 100 | 100 | 100 | 90 | 100 |
| J (PA) | 120 | 130 | 120 | 140 | 140 |
| JF (FP) | 120 | 130 | 120 | 140 | 140 |
| K | 120 | 130 | 120 | 130 | 140 |
| L | 130 | 130 | 140 | 160 | 170 |
| M | 140 | 120 | 140 | 160 | 200 |
| N | 130 | 130 | 150 | 160 | 160 |
| O | 120 | 130 | 140 | 150 | 160 |

Trout from Lake Koocanusa depend upon the streams feeding into the Lake for spawning. The same kinds of habitat improvement projects planned for other streams will be carried out here to increase the fisheries resource. The State Department of Fish, Wildlife & Parks has legal responsibility for the fish and operates the Murray Springs Hatchery (near Eureka, Montana) for stocking the reservoir and other areas with westslope cutthroat. Presently, the Department is planting vegetation at the upper end (within the U.S. boundary) to encourage an increase in the red-sided shiner, an important food-base for rainbow trout.

Important to water quality and the fisheries resource is the timing of other resource activities, especially during spawning in spring and fall. Mitigation measures include scheduling these activities at times when impacts will have minimal effects on spawning. For example, after fertilized eggs are deposited in the gravel beds, they begin to absorb water and become "water hardened". Following this stage the eggs become more sensitive to any type of disturbance, such as seismic vibrations during mineral exploration. Following this critical period, the eggs soon become "eyed" and are fairly insensitive to shock, although consideration must be given to the fact that these time frames are dependent on water temperature and type of fish.

Water quality is an important issue on the Forest because of the municipal watersheds; Flower Creek, supplying the town of Libby, and O'Brien Creek, supplying Troy, Montana. Management activities are coordinated through

the Water Quality Bureau of the State Department of Health and Environmental Sciences. Road building and stream-crossing construction projects within these drainages must receive State approval. Of major concern is preventing excessive water yield and sedimentation. The Forest Service and the State have a cooperative agreement to implement the "208 Program" on the National Forests in the State of Montana. In this agreement the State Department of Health and Environmental Sciences agrees to recommend the Forest Service as the management agency for the water resources on National Forests in Montana, but the Forest Service agrees to coordinate projects with the Department that have the potential to adversely impact water quality.

When the landownership pattern of a drainage is mixed, there is little the Forest can do about what occurs on portions of streams located on private land. Debris jams, sediment from overgrazing or over-harvest, pollution from fertilizers, mining, or from other wastes are problems beyond the jurisdiction of the agency. However, the Kootenai Forest can recognize those off-site impacts in its own planning and can avoid adding to an existing problem by placing limits on its own management options.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
The projects associated with improving water quality and increasing fish passage and migration are designed to maintain or enhance the productivity of existing populations of game fish by protecting their habitat and opening up areas previously closed because of blockages, etc. The timing of activities close to the stream and in-stream is critical to reducing impacts to the fish.

There may be short-term lowering of water quality and removal of streambank vegetation while equipment works near or in the stream. Gabions may be used on some projects that will reduce the natural look until revegetation occurs. There will be some sedimentation during the rock placement of riprap or gabion filling of a short duration. Much of these impacts may be mitigated by working the projects during periods of minimum streamflow.

Irreversible and Irretrievable Commitment of Resources - There are few irreversible or irretrievable commitments of resources associated with watershed or fish habitat improvement projects because of the limited area that is involved.

Adverse Effects Which Cannot be Avoided - The stream bottom will be disturbed and water quality will deteriorate for a short period of time when people are working in streams to stabilize channels and manipulate debris.

Conflicts with Objectives of Other Land Management Plans, Policies and Controls - Prior to initiation of any project, it is subjected to analysis under procedures defined by the National Environmental Policy Act. Effects are identified at that stage as well as any conflicts between agency goals. Generally no conflicts exist, because the goals of the Forest and those of other State and Federal agencies are to improve water quality and protect the fisheries resource.

The State Department of Fish, Wildlife, and Parks is responsible for management of the fisheries resource, the U.S. Forest Service for management of the fisheries habitat within National Forest boundaries. It is difficult to separate one from the other; the welfare of fish is directly dependent on water quality. For this reason, close cooperation between the two agencies is essential. A Memorandum of Understanding exists, supporting this cooperation. These efforts result in an exchange of ideas and recommendations concerning land management activities, such as timber harvest and road management.

The Northwest Power Planning Council, funded by the Bonneville Power Administration to develop regional plans designed to offset adverse impacts to fisheries from past dam construction, works through the State Department of Fish, Wildlife, and Parks on mitigation projects. No conflicts exist between the goals of the Forest and the Council. It is possible that some funding will come to the Kootenai for fishery mitigation projects.

Energy Requirements - Energy will be required to complete the projects and to monitor watershed conditions on the Forest, but this will be a small portion of the total Forest use.

4. Recreation

a. Developed Recreation

Fifty-four developed recreation sites are located on the Forest. The sites include 28 campgrounds, 7 developed picnic grounds, one winter sports area, and 18 boating sites, some with swimming beaches. These sites occupy 2,320 acres and have little or no effect on management of other resources because of their protected status. All developed sites, for example, have been withdrawn from mineral entry. Vegetation is managed solely for the purposes of retaining adequate ground cover and providing desirable recreation settings.

Several developed sites on the Kootenai are heavily used. Those being used at or near capacity include Little and Big Therriault Lakes, Tobacco River, Peck Gulch, Dorr Skeels and North Dickey Lake. Sites on the shores of Lake Koocanusa have seen increasing use levels. These sites and others often serve as a base of operation for dispersed recreation activities. Campers will take off from these bases with backpack or trailbike to visit other parts of the Forest.

The use of pavement in these campgrounds, necessary to prevent soil and water problems from excessive trampling, increases overland flow because of removal of vegetation. Other environmental degradation takes place because of increased sewage, garbage, water pollution, and vandalism.

Developed recreation sites attract people to the area from other regions. This increased population, although transient, benefits the local economy.

Although the demand for developed recreation is expected to steadily increase, the Forest will be able to comfortably meet that demand without

expansion of facilities for at least two decades. More intensive management can help the existing sites service more people and satisfy demand for as long as 10 decades if use were evenly distributed. Certain sites are more attractive than others, thus demand can not be expected to be equal for all sites. The increasing recreational importance of the Kokanee salmon fishery in Lake Koocanusa is drawing increased use to that area while other, less attractive, areas are under-used. Some expansion of existing facilities and possible creation of new ones along with closure of unused facilites are being considered now to meet growing demand for sites in the more attractive areas.

TABLE IV-33
PROJECTED DEMAND FOR DEVELOPED RECREATION
(RVD's)

| Decade | Demand |
|---|---|
| 1 | 296,000 |
| 2 | 325,000 |
| 3 | 354,000 |
| 4 | 385,000 |
| 5 | 417,000 |

Developed recreation sites are high-cost-per-acre facilities because of construction, maintenance, cleanup, monitoring and policing. In recent years, some of these responsibilities have been shouldered by volunteers who work for the Forest for a nominal fee as Campground Hosts. Their presence is believed to be a major deterrent to vandalism at the developed sites.

Use fees, which cover only part of administrative costs, are becoming accepted by the public as appropriate and necessary as long as they are tied directly to the kinds of facilities provided, i.e., the more highly developed, the greater the charge. These fees have little effect on the PNV of the Forest, although at some heavily used sites, such as Rexford Bench, the fees are almost covering administrative costs.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Developed sites are important to the public's overall recreation experiences. Sites are typically committed to long-term use. The effects of roading and use could be expected to be obvious for a long period of time even if the sites were abandoned. Efforts to restore an abandoned site to previous vegetative productivity would be costly.

Acreage committed to developed recreation is available for only limited timber production (generally to remove hazardous trees or to maintain the attractiveness of the site). Because of the concentrated use of the area, the vegetation is often suppressed.

Irreversible and Irretrievable Commitment of Resources - Once established, these sites are likely to be maintained as recreation sites and become an irreversible, long-time commitment to that resource. The amount of wood

fiber and forage which would have been produced on the sites are irretrievably reduced.

Adverse Effects Which Cannot be Avoided - Some of the vegetation on these sites will be lost or suppressed. Dust and noise will be produced from the concentration of campers. The opportunity for vandalism will be present due to the numerous and costly facilities concentrated in one place. Some of the wildlife habitat in the area will be destroyed or vacated. Riparian areas and their associated resources (water, soils, vegetation) can be negatively impacted.

Because developed sites are often located in riparian zones, they are sometimes located on or near significant archeological and historical sites. Risk of damage to those sites exists, but care is taken to prevent development activities from adversely affecting cultural resources.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls - Non-fee or low-fee Forest Service campgrounds situated near private "pay" campgrounds can provide unfair competition for the private operation. One remedy is to charge more for use of the Forest Service site. Facilities provided by private campgrounds tend to be more extensive than those provided by the Forest Service thus the product is different enough from the user's perspective so that differentiation based only on price is generally limited.

Energy Requirements - Energy is needed to cleanup and maintain these sites. Most campgrounds will require garbage removal on a regular basis and yearly maintenance of the facilities will be energy-intensive. Users will consume energy proportionate to the distance they travel and time spent in use of the areas. Over the planning period, such requirements would generally increase proportionally with use levels.

b. Dispersed Recreation

Dispersed recreation can take place on land or water and involves activities that do not depend on developed sites. Generally speaking, people are dispersed throughout an area rather than concentrated, as they would be at a campground. Management for dispersed recreation sometimes includes construction and maintenance of facilities such as toilets, hitching racks and parking areas, or of systems such as trails. The purpose of these efforts is to enhance the recreation experience of the Forest visitor and to protect other resources.

The effects of these activities on soils, water, and vegetation are similar to those discussed for developed recreation sites; the difference in environmental degradation is a matter of degree, with dispersed recreation producing fewer problem areas that require rehabilitation.

Occasionally a dispersed site becomes very popular and begins to receive concentrated use that can, in time, pose soil and sanitation problems. Close monitoring of the site is essential to keep impacts to a minimum. Some change in management, such as conversion of the site to a developed one, may become necessary to protect the basic resources.

Some areas prove to be more vulnerable than others, such as riparian or streamside ecosystems where campsites and trails are often located. Although effects for the most part are localized to these small areas, soil compaction, overland flow, erosion, and degraded water quality can occur and have effects downstream (Cole and Schreiner, 1981; Pacha, 1980). If it appears that an area is not going to be able to recover sufficiently for the next season of use, the area can be closed and detours designed to divert traffic away from the site.

Off-road vehicles can also adversely impact soil, vegetation, and water in heavy-use areas or those that are highly erosive. The impact of horse and foot traffic in wet or sensitive areas is even more common. Trails and campsites show significant resource damage when use becomes concentrated and visitors fail to properly dispose of wastes or fail to bring sufficient food for livestock. Bacterial contamination of streams and lakes by such organisms as Giardia lamblia can result from these abuses as well as from natural causes. Unless a visitor knows how to obtain water that is potable, he may be subject to physical distress. Temporary closure of an area may be the only solution to full recovery of the vegetation. Signing of the area can help to educate the public passing by to understand the reasons for the closure and the need to disperse people to other sites.

Dispersed recreation occurs in two settings: roaded and roadless. The amount of each is directly related to the amount of timber harvest and roading allowed under each alternative (see the sections on timber harvest and road management in this chapter). Many forms of dispersed recreation are a byproduct of timber harvest. Activities enhanced by roads include wood-gathering, sightseeing, snowmobiling, motorcycling, hunting and camping. Roads closed seasonally to protect wildlife and other resources still provide ready access to hunters and others who are traveling on foot or horseback.

Primitive (wilderness) and semi-primitive non-motorized recreation requires a roadless setting. Activities occurring here can include horseback riding, hiking, hunting and fishing, and cross-country skiing.

Semi-primitive motorized recreation requires a predominantly natural-appearing setting with access primarily by trails and primitive roads. Activities occurring here include trail biking, snowmobiling, four-wheel driving, and motor boating.

With the exception of acreage set aside for wilderness and for roadless recreation, most forms of dispersed roaded recreation can occur anywhere on the Forest wherever roads are open and where there are no site-specific restrictions.

The following table displays the acreage available to meet the demand for all forms of recreation other than developed. For ease of discussion, the term "dispersed recreation" is used.

TABLE IV-34
ACREAGE AVAILABLE FOR DISPERSED RECREATION
(Thousands of Acres)

| Alternative | Roadless Recreation | Roaded Recreation | Wilderness Recreation |
|---|---|---|---|
| A | 304 | 1,848 | 94 |
| B | 262 | 1,818 | 158 |
| C | 244 | 1,827 | 176 |
| D | 252 | 1,836 | 158 |
| E | 196 | 1,770 | 281 |
| F | 307 | 1,845 | 94 |
| G | 135 | 1,712 | 399 |
| H | 88 | 1,663 | 498 |
| I-CD | 284 | 1,805 | 158 |
| J-PA | 358 | 1,728 | 160 |
| JF-FP | 348 | 1,724 | 173 |
| K | 358 | 1,728 | 160 |
| L | 255 | 1,897 | 94 |
| M | 295 | 1,857 | 94 |
| N | 299 | 1,853 | 94 |
| O | 399 | 1,672 | 176 |

The "roadless" category includes the acres identified by the roadless inventory, the Ten Lakes Montana Wilderness Study Area, as well as smaller pieces scattered throughout the Forest. (If a roadless area was under 5,000 acres in size, it could not be counted as part of the official inventory. These non-inventoried roadless lands total approximately 60,000 acres.) The "wilderness" category includes both existing and recommended wilderness. Most of the alternatives mix roadless and wilderness acres in a way that reflects their individual emphases. For example, Alternative H maximized wilderness. It included wilderness designation for all inventoried roadless acres and thus recommended "roadless" allocation for very few other acres.

The "roaded" category of recreation constitutes the majority of the recreation opportunity because most of the Kootenai Forest is roaded (74%) to some extent. In contrast, the "unroaded" category (wilderness and roadless) totals approximately 26% of the Forest. The range of alternatives for the "unroaded" category runs from a high of 26% (Alts. H and O) to a low of 16%. This represents a high of 586,000 acres (Alt. H) and a low of 349,000 acres (Alt. L) or a difference of 237,000 acres. The difference between the high and low ends of the "unroaded" category is the result of different amounts of land being recommended for timber management. Acres to be logged require the construction of roads. When the roading occurs, the "unroaded" recreation category ceases to exist.

Table IV-35 displays the expected demand for dispersed recreation, both roaded and unroaded, over the next fifty years. This demand will be met

through designation of a portion of the Forest's 404,000 inventoried roadless acres as well as through designation of some of those smaller scattered parcels that could not be counted as part of the roadless inventory. Roaded recreation, particularly driving for pleasure, will be easily satisfied through the existing and proposed road system (see the section on road management in this chapter for miles of road proposed under each alternative). The reader is also referred to the sections in this chapter on roadless areas and wilderness.

TABLE IV-35
PROJECTED DEMAND FOR DISPERSED RECREATION
(Thousands of Recreation Visitors Days [RVDs])

| Recreation - Type | DECADE 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Roaded | 436 | 478 | 521 | 566 | 615 |
| Roadless | 123 | 135 | 147 | 160 | 173 |
| Wilderness | 18 | 20 | 22 | 23 | 25 |

"Roadless" refers to both "semi-primitive non-motorized" and "semi-primitive motorized recreation", as described in Chapter 3 in the section on the recreation resource. The Table above shows an increased demand for all forms of recreation over the next 50-year period. "Demand", as used here, assumes that the cost to the public to recreate will remain constant over time. A diversity of settings, both roaded and unroaded, are needed to satisfy predicted use.

Analysis has shown that the Kootenai has the capacity to meet expected demands for all forms of dispersed recreation for the next six decades. Beyond the sixth decade, however, the demand for semi-primitive motorized recreation opportunities is expected to exceed capacity based upon demand projections (see Chapter II, Table II-7).

In general, when projected recreation use approaches capacity, the quality of the experience is degraded if use is not limited. Excessive use can cause erosion, soil compaction, and loss of vegetation along main trails and roads, and at the more desirable campsites. These are minor effects if the total Forest is being considered, but are important esthetically to those people using the trails, roads, and campsites.

Management of the Forest for a balance of diverse recreation settings will affect the local economy. Those businesses and people dependent on recreation and tourism will benefit from a recreation program that provides for a wide range of settings and opportunities. There will be effects on the wood products industry as some timber-producing areas are removed from the timber base. The magnitude of these impacts are covered in Chapter II.

Direct revenue from dispersed recreation is insignificant under current national policies, but because values have been assigned to recreation visitor days, dispersed recreation has a value and a positive effect on the present net value of the Forest. The relationships between income and jobs in the timber industry (manufacturing) are different from those in the recreation (services) sector. As discussed in Chapter II and Appendix B, increases in recreation opportunity which are formed by removal of land from the suitable timber base cause a net decrease in jobs and income because fewer, lower paid service sector jobs supplant more numerous, higher paid manufacturing (lumber) jobs.

Dispersed recreation opportunities are important to maintaining traditional lifestyles in the local and regional area.

The costs per acre for maintaining dispersed recreation sites are generally less than those for developed sites.

Hunting is considered in this section because it is viewed by most people as sport or recreation. To a small population of outfitters and guides, it is also a major source of income. The northwest corner of Montana is becoming increasingly popular for hunting because of the number, quality and diversity of big game species found here.

Regulation of big game numbers is the responsibility of the Montana State Department of Fish, Wildlife, and Parks; management of big game habitat is the responsibility of the Kootenai Forest. The number of acres made available for both summer and winter ranges will ultimately have a bearing on the numbers of big game available for hunting. (The reader is referred to the section in this chapter on big game management that describes measures to improve and increase big game habitat.)

Elk are used as an indicator species for big game. In all alternatives, the size of the elk herd is increased over time by increasing the number of acres of both summer and winter range. (Current habitat supports an estimated population of 5,500 elk: the potential exists to support a population of about 10,000 elk.) Table IV-36 displays the increased hunting potential resulting from that action, by alternative, over a 50-year period. Included are both elk and other big game hunting.

Larger big game populations have the potential to increase recreation use and generate a greater number of hunting license fees for the State and to affect the local economy in a positive way. Game populations respond slowly to changes in land management as envisioned in the Proposed Action and the other alternatives. For this reason the populations are essentially the same in all alternatives in the first decade and then begin to diverge in future decades. Hunter recreation is expected to follow suit.

TABLE IV-36
POTENTIAL HUNTER RECREATIONAL VISITOR DAYS
(Thousands per Year)

| Alternative | Decade 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| A | 65 | 109 | 174 | 216 | 268 |
| B | 65 | 110 | 176 | 217 | 269 |
| C | 65 | 110 | 175 | 217 | 270 |
| D | 65 | 105 | 166 | 203 | 256 |
| E | 65 | 109 | 174 | 216 | 268 |
| F | 65 | 119 | 204 | 250 | 317 |
| G | 65 | 109 | 176 | 217 | 270 |
| H | 65 | 110 | 177 | 219 | 273 |
| I (Curr. Dir.) | 65 | 100 | 150 | 184 | 231 |
| J (Prop. Act.) | 65 | 105 | 164 | 202 | 248 |
| JF (Final Plan) | 65 | 103 | 164 | 202 | 254 |
| K | 65 | 106 | 164 | 202 | 248 |
| L | 65 | 109 | 175 | 214 | 269 |
| M | 65 | 108 | 171 | 212 | 262 |
| N | 65 | 109 | 173 | 214 | 266 |
| O | 65 | 110 | 176 | 217 | 273 |

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
The short-term use (construction and maintenance) of trailhead facilities, toilets, hitchracks, stock ramps, and loading areas will produce long-term effects on productivity of the sites similar to those experienced at developed recreation sites, but over smaller areas. Although trails can be abandoned and may eventually return to near-original condition, this is not likely to happen as long as the demand for dispersed recreation remains high.

Irreversible and Irretrievable Commitment of Resources - Once facilities and trails are constructed, they are likely to be maintained into the foreseeable future. The vegetation displaced by these facilities constitutes an irretrievable loss of that resource.

Adverse Effects Which Cannot be Avoided - The loss of vegetation because of the construction and maintenance of the facilities and trails cannot be avoided. Facilities and trails will tend to concentrate use in certain areas and along certain routes which can, in turn, lead to soil erosion and water diversion. Mitigation can include site-specific closures and use restrictions until the area recovers. Adverse effects of roadless management would be the same as those discussed in wilderness and roadless areas.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - Dispersed recreation may conflict with other resource uses such as timber harvest and mineral exploration and development. Timber harvest can eliminate segments of existing trails if prescriptions do not allow

for their protection. Also, development of adjacent private lands may limit access to trails and other sites located on Forest Service land.

Energy Requirements - Less energy is required for the maintenance of dispersed recreation facilities than for maintenance of developed sites. Some energy is required to clear and maintain trails but this is small compared to total energy use on the Forest. In the past few years, energy expended for trail maintenance has shifted from the government to the private sector as organizations such as the Backcountry Horsemen become active in maintaining trails on the Kootenai.

The major use of energy associated with dispersed recreation is that used by the public in getting to the recreation areas. Generally, the more remote the area, the more energy required to get there.

5. Mining and Oil and Gas Exploration and Development

Mineral activity on the Kootenai Forest involves (1) locatable minerals, (2) oil and gas, and (3) common variety materials such as sand and gravel. Increases in exploration and/or production efforts are expected for all three categories. It is important to note that, unlike many resources the Forest manages, mineral activity levels and locations are generated by specific actions on the part of the minerals industry rather than a program established by the Forest Service. Further, these actions are the result of exploration processes aimed at discovery and evaluation of resources not previously known. For these reasons, accurate projections regarding when and where specific activities will take place are difficult to make.

The following section includes reference to some impacts on other resources caused by mineral activity. It is also important to note the impacts which Forest management of other resources can have on mineral activities. The most severe limitations occur in areas being managed for wilderness which now are only available for mineral activity if mineral rights had been established prior to the area being withdrawn from mineral entry.

Additional limitations occur in some areas being managed for certain wildlife and recreation resources. The timing and location of exploration activities are strictly regulated by considerations for such things as key wildlife habitats, areas being managed for semi-primitive recreation, and developed recreation sites. The net effect of these various management practices on mineral activities has been to substantially reduce the area and time available to conduct work. These practices have also greatly increased the cost and complexity of conducting mineral operations on Forest lands.

The principal interactions of mineral development with other resources are generally similar to those described for road building and timber harvests. Some key interactions that differ from other Forest activities are cited below.

a. Locatable Minerals and Common Variety Materials.

Locatable minerals are those for which mining claims can be staked; common variety materials include such things as sand and gravel.

Activity related to locatable minerals is high on portions of the Forest. This reflects a combination of sustained demand for the commodities involved and the high mineral potential on these particular areas (See Chapter III for more discussion).

Locatable mineral activity is expected to increase regardless of the alternative selected. There are more than 7,500 mining claims on the Forest but only a small portion of them result in surface-disturbing activity in any given year. Most of the activities on these claims are exploratory efforts such as geologic mapping, geochemical and geophysical prospecting, and core drilling. Currently, there are two major mines in operation within the Forest boundary; one of these produces silver and copper (ASARCO) while the other produces vermiculite (W.R. Grace). Another large scale silver-copper mine has been proposed by ASARCO at the south end of the Cabinet Mountains. Underground portions of this proposed mine would extend within the Cabinet Mountains Wilderness area itself, but access to the deposit would be gained by tunnelling in from outside the wilderness.

Several companies have been exploring for additional locatable mineral deposits on the Forest in recent years. Most of the exploration has taken place in the southwestern quarter of the Forest, much of it directed toward silver-copper deposits such as the one currently being mined at Troy. Other commodities actively being sought on the Forest include gold, lead, and zinc.

Surface protection requirements incorporated in exploration plans are designed to protect such resources as wildlife and fisheries, air and water quality, archeological sites, recreation and scenic values. These requirements result from a variety of federal and state laws and regulations. Site reclamation measures are an integral part of these requirements. Compliance inspections by Forest personnel carried out during the operations assure that the surface protection requirements are met.

Discovery and development of large mineral deposits can affect the physical, biological, social and economic environments. Vegetation, water quantity, soils at mine sites, and visual resources are most directly affected while water quality, wildlife and local communities receive less direct effects. A key direct effect which could occur is sediment discharge into streams from ruptured tailings pipelines or settling impoundments; proper design and maintenance can generally reduce this risk. The potential adverse effects on the physical and biological environments can be largely avoided or mitigated through surface protection measures.

The indirect effects on grizzly bears is a particularly important consideration on the Kootenai. Grizzlies receive special protection under the Threatened and Endangered Species Act. This protection imposes

limitations on how activities may be conducted in grizzly bear habitat. Conflicts between mineral activity and grizzlies are routine on the Kootenai since much of the area known to have high mineral potential falls within grizzly habitat.

In general, the effects on social and economic environments caused by mineral development are not under the influence of the Forest Service. Should an influx of people come into the area as the result of the development of a large mineral deposit, a mix of positive and negative effects on local services, organizations and facilities could occur. Perceptions as to what constitutes a positive or negative change can be expected to vary. The effects of an influx of people can sometimes be lessened or avoided by hiring local people, as was done when the Troy mine was opened.

Activity associated with extracting common variety material is modest but widespread on the Forest. Most of the activity involves the creation of numerous small borrow pits from which material is taken for road building and road maintenance. A few areas on the Forest have produced building stone. Demand for each of these materials is expected to increase slightly in the next few years; traditional source areas will be able to satisfy the bulk of this demand.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Contemporary locatable mineral exploration methods are likely to have only nominal long-term effects on the productivity of specific sites. Development of mineral deposits, on the other hand, consistently involves long-term effects on site productivity where roads, tailing ponds, and millsites are involved. These long-term effects are typically quite local, (e.g., the ASARCO mine at Mt. Vernon occupies approximately 300 acres).

Activity related to common variety materials tends to influence long-term productivity in that the sites are typically used intermittently over long periods of time but receive only modest reclamation measures during the life of production. This is largely offset by the small size of the areas typically involved. Also, many of the materials are common enough that when new source areas are needed it is often possible to select one involving a minimal surface resource trade-off.

Irreversible and Irretrievable Commitment of Resources -- If locatable mineral development takes place, commitment to removal of the mineral resource becomes irreversible unless economics dictate otherwise. Disturbed sites may be rehabilitated and, although the vegetation lost while the development was in place is not retrievable, the site preparation could actually maintain or improve future productivity. Similar considerations apply to common variety activities but to a lesser extent.

Adverse Effects Which Cannot Be Avoided -- If mineral exploration and development occur, soil will be disturbed, erosion may occur, and water quality and quantity may be lowered. Visual resources are mainly affected by the development phase. Wildlife and fish habitat may be impacted; some impacts can be mitigated by regulating periods of activity or by providing

compensation for lost habitat. The wildlife habitat considerations on the Kootenai may be particularly important in that much of the area identified as having high mineral potential is also identified as being grizzly bear habitat. Similar considerations apply to common variety materials but on a smaller scale.

Conflicts with Objectives of Other Management Plans, Policies and Controls
Mineral activities on the Forest will not conflict with any other land management plans. Due to applicable laws and regulations, locatable minerals may take precedence over other activities and resources; therefore, conflicts with other policies and controls are likely. The situation where this will most likely occur is where statutory rights to explore for and mine mineral deposits (Mining Act of 1872) conflict with the agency's statutory obligation to protect threatened and endangered wildlife species (Endangered Species Act). For example, locatable mineral activity can and does take place in areas where the Forest is trying to limit other human activity in order to help protect grizzly bears. This type of conflict is not expected to occur in extracting common variety materials because of existing controls and availability of these materials.

Energy Requirements -- Energy requirements should continue to be a small portion of the total Forest need. Some energy will be used in monitoring exploration, mine development, and mineral production activities. The energy consumed by the private sector in actually developing a mine can be quite large.

b. Oil and Gas

Although the potential for oil and gas production on the Forest is unproven, demand for oil and gas leases is expected to remain high for the next few years at a minimum. If production potential is proven, the demand for leases and exploration and production permits would probably increase rapidly and remain high for several decades in the affected areas.

As of October 1984, more than 1.5 million acres of the Forest had been leased for oil and gas. Applications to lease another half million acres were being processed at that time. The Forest's role in processing these applications is to determine whether or not a lease should be issued and, if so, what stipulations need be attached to the lease to protect surface resources and uses. These findings are then forwarded in the form of recommendations to the Bureau of Land Management which has the actual authority for issuing or denying oil and gas leases. Leases for virtually all the remaining available acres are being processed. When existing leases expire, new leases will be based on further environmental analysis.

Oil and gas exploration activity on the Forest has been modest thus far and has consisted mainly of geologic mapping and a variety of reconnaissance level geophysical surveys. Exploratory drilling took place along the eastern boundary of the Forest in 1983-84; further drilling projects may determine whether or not subsequent drilling takes place further west on the Forest.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Leasing, in and of itself, does not affect vegetative productivity. Preliminary exploration such as seismic work should not alter productivity either because of the regulatory controls available. Exploratory drilling would have short-term effects on surface resource productivity in the immediate vicinity of the project. Site reclamation at abandoned wells should lead to restoration of vegetative productivity for most of the area over the long-term. Successful exploratory wells and the field development that may follow could have a marked influence on the surface resource of large areas over the long-term. Perhaps the single most influential aspect would be the road system used to develop and maintain an oil or gas field. Because development of an oil or gas field typically involves a large area rather than a particular spot (such as a mine involves), and because the prospects in this area may be large, the potential for widespread effects on site productivity may be greater for oil and gas exploration and development than that for locatable minerals. Conversely, the effects in any one area may be less intense.

Irreversible and Irretrievable Commitment of Resources -- Leasing for oil and gas does not constitute an irreversible commitment of resources. If field production takes place, however, such a commitment will occur.

Adverse Effects Which Cannot Be Avoided -- Considerations here are similar to those identified for hardrock mineral exploration and development. Differences include the demand that could exist for water during the drilling of deep wells, and the effects on wildlife, water quality, recreation, and visual resources that could result from the road network and traffic associated with a producing field. Here again, there are numerous management options available to avoid, mitigate, or compensate for these potential adverse effects. The Forest Service retains considerably more discretionary authority with oil and gas activities than it does with locatable minerals activity; therefore, the opportunities to exercise various management options are actually greater than those for locatable minerals.

Conflicts with Objectives of Other Management Plans, Policies and Controls
Some areas which would generally be managed for uses not dependent on roads could, in fact, be roaded for oil and gas purposes.

Energy Requirements -- Energy requirements should continue to represent a very small portion of the total Forest needs for the next few years. Some energy will be used in monitoring geophysical exploration and possible drilling projects during that period. Should discoveries of economic volumes of oil and gas be discovered, the energy requirements could increase considerably. Because of the large areas that could be involved, the number of individual operation locations, and the number of different operators conducting the work, the energy requirements could be much greater than those associated with the production of locatable minerals.

## 6. Wilderness Management

The Kootenai Forest manages the 94,400-acre Cabinet Mountains Wilderness, which has the capacity to support 47,000 Recreation Visitor Days a year.

The amount of use reported in 1984 was 18,000 RVDs, with the major recreation use areas sustaining increased degradation from loss of vegetation and soil.

Future wilderness use on the Forest is predicted to reach 25,000 RVDs by the fifth decade. If this use were evenly distributed, the Cabinet Mountain Wilderness could accommodate it. Since use tends to concentrate in a few popular areas, management problems can be expected to intensify.

The Forest has approximately 438,000 acres of potential wilderness, including the 404,000 acres of inventoried roadless area plus the 34,000-acre Ten Lakes Montana Wilderness Study Area (MWSA). In the wilderness alternative (Alt. H), all of the potential wilderness was assigned to that purpose, resulting in a 219,000 RVD capacity. This potential capacity plus the existing wilderness provides a total capacity of 266,000 RVDs, roughly ten times what the demand is expected to be by the fifth decade.

The amount of wilderness in each alternative is dependent on the goals and objectives for that particular alternative.

TABLE IV-37

WILDERNESS ACREAGE (ESTABLISHED AND RECOMMENDED) BY ALTERNATIVE
(Thousands of Acres)

| ALTERNATIVE | ESTABLISHED | RECOMMENDED | TOTAL | 10 LAKES MWSA STUDY AREA |
|---|---|---|---|---|
| A | 94.4 | 0 | 94.4 | 34.0 |
| B | 94.4 | 63.9 | 158.3 | 34.0 |
| C | 94.4 | 81.3 | 175.7 | 34.0 |
| D | 94.4 | 63.9 | 158.3 | 34.0 |
| E | 94.4 | 186.6 | 281.0 | 34.0 |
| F | 94.4 | 0 | 94.4 | 34.0 |
| G | 94.4 | 304.9 | 399.3 | 34.0 |
| H | 94.4 | 403.7 | 498.1 | 34.0 |
| I - CD | 94.4 | 62.9 | 157.3 | 34.0 |
| J - PA | 94.4 | 66.5 | 160.9 | 34.0 |
| JF - FP | 94.4 | 78.5 | 172.9 | 34.0 |
| K | 94.4 | 66.5 | 160.9 | 34.0 |
| L | 94.4 | 0 | 94.4 | 34.0 |
| M | 94.4 | 0 | 94.4 | 34.0 |
| N | 94.4 | 0 | 94.4 | 34.0 |
| O | 94.4 | 81.3 | 175.7 | 34.0 |

All of the alternatives exceed the acres required to meet the future demand for wilderness of 25,000 RVDs (50,000 acres). Alternative F gives greatest emphasis to big game habitat improvement and does not recommend any further allocations to wilderness. Alternative I (Current Direction) and Alternative J (Proposed Action) are quite similar in the amount of total acreage proposed, but differ in the locations recommended.

The Proposed Action (Alt. J) recommends additional wilderness on 67,000 acres: Scotchman Peak (24,000 acres), land adjoining the Cabinet Mountains Wilderness (36,000 acres), and land adjoining the Ten Lakes Montana Wilderness Study Area (7,000 acres). The Proposed Action also recommends 26,000 acres within the Ten Lakes MWSA for wilderness. However, because this area has been designated as a "wilderness study area" by Congress, its acreage is not included in the inventoried roadless area totals and is discussed separately. It is not, for example, reflected in the totals in the above table. (For more detail on this area, see the Ten Lakes Report and Proposal when available.)

The Proposed Action (Alt. J) provides wilderness recreation opportunity in excess of the expected demand for wilderness recreation. It recommends that an additional 202,000 acres or 50% of the inventoried roadless area be managed in a roadless condition. This, together with the wilderness proposal of 67,000 acres, the Ten Lakes MWSA proposal of 26,000 acres, and the existing Cabinet Mountains Wilderness (94,400 acres), provides more than enough acreage to support anticipated demand for wilderness recreation well into the future. Highlighting the opportunities available in these additional areas by designation as Wilderness may provide additional dispersion of users and reduce the area specific impacts mentioned above.

The Final Plan (Alternative JF) is the same as the Proposed Action except that an additional 12,000 acres of Wilderness is recommended in the Pellick Ridge portion of the Proposed Scotchman Peaks Wilderness. This area had been designated for other unroaded uses in the Proposed Action because mineral values on a portion of the area were thought to be high. More recent information from exploratory work in the area indicates that the mineral values are moderate.

There are few activities associated with wilderness areas other than maintenance of trails and dispersed camp sites (discussed in the recreation section of this chapter), although the establishment of these areas will, of itself, have effects on other resources and uses. Any activity not in keeping with the intent of the Wilderness Act of 1964 will be prohibited. Timber will not be cut, roads will not be built, and minerals will not be mined unless there already exists a valid mining claim. And after designation as wilderness, the area will be closed to further mineral entry. Few of the areas recommended for wilderness by Alternative J contain such claims.

Because natural fires have been suppressed in past decades, and because much of the Cabinets is in a high precipitation zone with long fire intervals, outbreaks of insect and disease infestations can be expected to occur. Allowing fire to play a more natural role will lessen the frequency and intensity of these infestations. As visitor use increases, there may be an increase in frequency of person-caused fires within the wilderness, particularly if people expand into new camp sites with dense vegetation. The fire action plan for the Cabinet Mountains Wilderness calls for suppression of all person-caused fires.

An increase in wilderness classification is an increase in acres designated to recreation, which can have a positive effect on the local economy by attracting tourists to the area. Where potentially commercial forestland is removed from the regulated timber base, economic activity in the timber sector can be expected to decline.

Wilderness classification benefits cavity-dependent species and threatened and endangered species. In the case of the former, old growth habitat remains undisturbed, although it is possible in time that large areas will be destroyed by fire because of fuel accumulations. The habitat of threatened and endangered species will be enhanced because of the relative lack of disturbance to be expected in a setting that remains roadless.

Wilderness classification can affect PNV either positively or negatively, depending on the value of the commercial timberland within the wilderness. If the timber values on a piece of land are insufficient to offset the cost of harvest and this land is in wilderness, then the effect on PNV can be positive (less costly to manage as wilderness than to harvest). On lands where the timber values are greater than the cost of harvest and are said to have a positive PNV, the effect on PNV would be negative if these lands were placed in wilderness and unavailable for harvest. Generally, assigned wilderness values are insufficient to offset timber values if any positive return can be attained by timber management.

About 245,000 acres of commercial timberland are in the inventoried roadless areas. Of that, about 17% (41,000 acres) is of marginal value (a negative PNV), borne out by the fact that the maximum PNV alternative (Alt. M) allocates about 204,000 acres to timber harvest (indicating that these acres help contribute to increased PNV when designated for timber harvest and the remaining 41,000 acres do not.)

The following table shows the amount of commercial timberland located in proposed wilderness for each alternative. This analysis did not include any timber within the existing Cabinet Mountains Wilderness.

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

The establishment of wilderness has some effect on long-term productivity. Although native productivity of resources is maintained and gene pools are protected at maximum levels under wilderness, opportunities to increase productivity through management of timber and wildlife habitat resources are foregone because vegetative manipulation such as timber harvest and wildlife habitat burning are not permitted. Primitive recreation opportunities are maximized as well as maximum protection being given to old-growth timber and its associated wildlife habitat. Threatened or endangered plant and animal species are protected but little can be done to improve their habitat if needed. Natural-appearing landscapes are preserved although buildup of natural fuels may increase risks of wildfire.

TABLE IV-38

COMMERCIAL TIMBERLAND IN PROPOSED WILDERNESS

| ALTERNATIVE | ACRES |
|---|---|
| A | 0 |
| B | 30,400 |
| C | 38,700 |
| D | 30,400 |
| E | 106,700 |
| F | 0 |
| G | 172,700 |
| H | 245,100 |
| I - CD | 30,400 |
| J - PA | 27,900 |
| JF - FP | 34,300 |
| K | 27,900 |
| L | 0 |
| M | 0 |
| N | 0 |
| O | 38,700 |

Irreversible and Irretrievable Commitment of Resources - Establishment of wilderness areas effectively commits those areas to wilderness management, although it is possible for Congress to revoke wilderness classification. This event is probably unlikely except under unusual circumstances such as a national emergency. The classification will usually result in an irretrievable loss of the opportunity to manage timber. It also restricts the exploration for and removal of mineral resources unless prior rights were established.

Adverse Effects Which Cannot be Avoided - Management activities permissible in wilderness, when authorized by the 1964 Wilderness Act or wilderness management plans, can cost more than activities in areas without the restrictions. Restrictions apply primarily to mode of transportation, use of mechanized equipment such as chainsaws and removing signs of any intrusion after project completion. When permitted, activities such as mineral exploration, disease and pest control, and fire suppression would be conducted while protecting the wilderness values. Activities such as these in a wilderness setting usually require more time, adherence to more stringent requirements, and more money. The exception is fire suppression, which can be far less costly because of the policy to allow fire to play a more natural role in the wilderness ecosystem.

Conflicts With Objectives of Other Land Management Plans - Wilderness classification can conflict with air quality plans for surrounding areas because of the high quality air standards required in wilderness.

Energy Requirements - Of all areas on the Forest, wilderness makes the least demand on energy use. It is possible that wilderness users will expend

considerable energy in travel to and from wilderness areas, but little additional energy will be used within the area itself.

## 7. Management of Roadless Areas

The amount of designated roadless area in each alternative is dependent on the goals and objectives of that alternative. There are few activities, other than trail maintenance, associated with unroaded management. Other activities undertaken in roadless areas are discussed elsewhere in this chapter, such as in the section on "recreation" which deals with hunting, fishing, berry picking, etc. Appendix C discusses individual roadless areas.

There are 404,000 inventoried roadless acres on the Forest. (This does not include the 34,000 acres contained within the Ten Lakes Montana Wilderness Study Area-MWSA). In addition, there are approximately 60,000 acres that did not qualify for inclusion in the roadless inventory because individually the parcels were under 5,000 acres in size. Total inventoried roadless acres designated to be retained in a roadless condition (excluding the recommended wilderness) under each alternative are shown in the following table. Similar acres that were not a part of the official inventory are labeled "Other".

TABLE IV-39

DESIGNATED (NON-WILDERNESS) ROADLESS AREAS BY ALTERNATIVE
(Thousands of Acres)

| ALTERNATIVE | INVENTORY | OTHER | TOTAL |
|---|---|---|---|
| A | 211.2 | 60.0 | 271.2 |
| B | 164.4 | 63.4 | 227.8 |
| C | 150.8 | 59.0 | 209.8 |
| D | 155.4 | 63.0 | 218.4 |
| E | 98.9 | 63.0 | 161.9 |
| F | 209.0 | 64.0 | 273.0 |
| G | 53.1 | 48.0 | 101.0 |
| H | 0 | 54.0 | 54.0 |
| I - CD | 174.2 | 76.0 | 250.2 |
| J - PA | 202.1 | 122.0 | 324.1 |
| JF - FP | 192.1 | 122.0 | 313.2 |
| K | 202.1 | 122.0 | 324.1 |
| L | 158.6 | 62.0 | 220.6 |
| M | 199.6 | 61.0 | 260.6 |
| N | 204.7 | 60.0 | 264.7 |
| O | 322.4 | 42.0 | 364.4 |

Alternative O designates the greatest number of total acres to roadless management followed by Alternatives J and K. It should be noted that although Alternative H designated few acres to roadless management, it does propose the maximum amount of wilderness. The Final Plan has fewer acres in "roadless" management because it has more acres in Proposed Wilderness than the Proposed Action.

Another perspective is to look at the inventoried roadless resource and calculate the percentage of the inventoried roadless area that will remain unroaded under each alternative. This perspective includes the recommended wilderness and is shown in Table IV-40.

Alternatives H and O retain the greatest percentage of the inventoried roadless acres in an unroaded state because of their respective emphasis on wilderness and roadless management, Alternative L retains the least percentage because of its' emphasis on timber production.

TABLE IV-40

INVENTORIED ROADLESS AREAS WHICH REMAIN ROADLESS
(Thousands of Acres)

| ALTERNATIVE | DESIGNATED ROADLESS | RECOMMENDED WILDERNESS | TOTAL | PERCENT OF INV. RDLS AC. |
|---|---|---|---|---|
| A | 211 | 0 | 211 | 52 |
| B | 164 | 64 | 228 | 56 |
| C | 151 | 81 | 232 | 57 |
| D | 155 | 64 | 219 | 54 |
| E | 99 | 187 | 286 | 71 |
| F | 209 | 0 | 209 | 52 |
| G | 53 | 305 | 358 | 89 |
| H | 0 | 404 | 404 | 100 |
| I - CD | 174 | 63 | 237 | 59 |
| J - PA | 202 | 67 | 269 | 67 |
| JF - FP | 192 | 78 | 270 | 67 |
| K | 202 | 67 | 269 | 67 |
| L | 159 | 0 | 159 | 39 |
| M | 200 | 0 | 200 | 50 |
| N | 205 | 0 | 205 | 51 |
| O | 323 | 81 | 404 | 100 |

About 245,000 acres of commercial timberland are located within inventoried roadless areas. Of that, 17% or 41,000 acres are of marginal value. These marginal acres are designated for roadless use in most alternatives except D and L. Further discussion of commercial timberland within roadless areas is given in the wilderness portion of this chapter.

Designation of roadless areas to provide for semi-primitive recreation can reduce PNV and have negative effects on the local economy by the Forest if timber harvest is precluded. Businesses and individuals dependent on recreation for income will benefit since this proposed land use would increase

some recreation opportunities. Future options are preserved for wilderness and if the land is productive, timber management options are also retained.

Short-term Use vs. Maintenance and Enhancement of Long-Term Productivity - Designations to unroaded management has some effect on long-term productivity, mainly in terms of opportunities foregone for managing timber and wildlife. The opportunity for semi-primitive recreation is maintained as is old-growth habitat for wildlife needs. Natural-appearing landscapes are preserved, although the risk of wildfire is increased by the build-up of fuels.

Irreversible and Irretrievable Commitment of Resources - The designation of acreage to unroaded management is not irreversible but once the designation is made, a change to a developmental designation must be subjected to an intensive analysis. Such analysis may occur each time the Forest Plan is revised (at least every 15 years). Roadless designation results in an irretrievable loss of the timber resource that is produced but not harvested.

Adverse Effects Which Cannot be Avoided - Roadless designations generally preclude timber harvest. They also limit mineral exploration and development because of access difficulty. Like wilderness, roadless designations require strict requirements for conducting activities, requirements that are designed to protect the qualities inherent in a roadless designation. Restrictions on access and mode of travel are major limitations for conducting activities, often making the activity more expensive to accomplish. Such activities can include wildlife and fish habitat improvements, mineral, oil and gas exploration/development, insect and disease control, and wildfire suppression.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - Resource conflicts can include timber management and mineral exploration and development. Because the allocation results primarily from the desires of the public, there are few, if any, conflicts with local or regional planning efforts outside the Forest. The exception is powerline transmission corridors which are discussed in the next section.

Energy Requirements - Roadless recreation involves few demands for energy. Some energy may be used to maintain recreation facilities (primarily trails).

## 8. LANDOWNERSHIP, USES, AND AGREEMENTS

### a. Landownership and Adjustment

The Forest Landownership Adjustment Plan identifies National Forest and other lands that could be acquired or disposed of through exchange in order to achieve resource objectives or to improve the administration of National Forest lands (Landownership Adjustment Plan, 1979). The reader is also referred to Chapter 3, the section on lands that describes major landholders within Kootenai Forest boundaries and land ownership patterns that need adjustment. Other important references include The Northern Regional Guide (reflecting the 6/10/83 Record of Decision), which provides guidelines on determining which lands should be exchanged, and the Pacific Northwest Long Range East-West Energy Corridor Study, Phase I, Part A - Rocky Mountains (draft, Bonneville Power Administration, 12/77) which

describes "windows" or areas on the Kootenai Forest where corridors could conceivably be created.

The primary method of acquiring land is through an exchange or trade of National Forest lands identified by the agency as desirable for disposition. The adjustment plan is an "ideal" ownership pattern, from the Forest Service standpoint, that may or may not be achieved. Even if the adjustments were to be made in their entirety, they would probably occur over a 20 to 30-year period.

It is important to remember that lands are exchanged, or traded for equal value, not equal acreage.

Reasons for acquiring land can include, among other things:

a. Protecting and/or enhancing wildlife values including threatened and endangered species.

b. Protecting and/or enhancing recreation values including wilderness values.

Reasons for disposing of public lands can include:

a. Disposing of lands no longer in character with typical National Forest holdings, such as acreage bordering urban areas.

b. Eradicating management problem areas, such as those where National Forest and private land management objectives conflict.

c. Removing isolated National Forest lands from surrounding private lands for more efficient land management.

About 94,000 acres of private and State land have been identified by the Kootenai as being desirable to acquire, while about 70,000 acres of National Forest land have been identified as being suitable for disposal. The effects of this land adjustment plan, if fully achieved, would occur over a long period of time. The ultimate effect of exchange would be:

a. Enhanced wildlife habitat, including big game summer and winter ranges, bald eagle and grizzly habitat as well as fisheries and waterfowl habitat.

b. Enhanced recreation sites and better access to lake fronts and shorelines.

c. More land coming into private ownership within the urban areas of the Forest (areas A, B, C, and D on the landownership adjustment area map displayed in Chapter 2, Figure II-55). This would result in new lands being made available for local housing or industry, and as new sources of local tax revenues.

d. The easing of land management conflicts that can occur between National Forest, State, and private corporations.

e. The elimination of costly court cases and other legal problems related to trespass, encroachments, and title claims.

f. Improved and more efficient National Forest, State, and private administration of lands by consolidating ownerships and lessening the need for cost-share and rights-of-way agreements. Consolidation of private lands would occur primarily in the Wolf Creek and Pleasant Valley area while National Forest consolidation would occur primarily in the Upper Fisher-Vermilion-McGinnis area (areas E and F, respectively, on the land ownership adjustment map).

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - Lands which enter private ownership following exchange will be managed as the new owner desires. Lands obtained by the Forest Service through exchange will be managed to maintain or enhance productivity.

Irreversible and Irretrievable Commitment of Resources - Lands entering private ownership through exchange are committed to whatever use the new owner desires. Lands obtained by the Forest Service will be committed to uses defined by the land management plan in effect at the time.

Adverse Effects Which Cannot be Avoided - Individuals who were accustomed to hunting or recreating on National Forest lands that later change to private ownership may not find the same privileges extended to them by the private landowners.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirement - Little or no energy is used in land exchange.

b. Special Uses

The Kootenai administers about 470 special use permits which allow non-Forest activities to take place on Forest land. Most of them (86%) are for roads, water-associated activities, and utilities and communication lines. Others are related to recreation, agricultural, and industrial uses. The large number of permits is due to the fragmented landownership patterns on portions of the Forest and to the sizeable ownership of land by the Kootenai Forest in Lincoln County (73%) and in part of Sanders County. Over time, the number of permits could drop as Forest ownership is consolidated through land exchange.

Special uses produce benefits to whole communities. The Kootenai Forest administers permits for a park and playground just north of Libby, used every day during the summer months for sports events (83 acres); one for the Libby Airport (52 acres); one for a non-profit corporation that operates Turner Mountain ski area (410 acres); another permit for a marina and resort on Lake Koocanusa (65 acres), a school (10 acres), an education center (42 acres), a sanitary landfill (40 acres), and a cemetery (5 acres). Individuals profitting from Forest resources also require special use permits to operate; outfitters and guides and people gathering firewood fall into this category. Special interest groups may also apply

to use federal land. One such permit has been issued for a target range (32 acres).

About 10,500 acres and 750 miles of road are affected by these permits. The effects are often the same as those produced by similar facilities or systems under administration of the Forest. For example, special use roads produce the same kinds of effects as other Forest roads: Timber must be removed, putting the roadbed area out of timber production, at least for the life of the road; soil compaction can occur which could increase runoff potential. Runoff, in turn, can produce sediment in streams, adversely affecting the spawning and rearing of fish unless special measures are taken. The permittee is responsible for keeping these impacts to a minimum during construction and maintenance of roads.

Usually the impacts of these special uses on site are dramatic although they are limited to a very small acreage overall (less than half of one percent of all Forest land). In all cases, the permittee is obligated to work within the constraints of federal, state and local laws. Permit applications are routinely subjected to an environmental analysis prior to issue. Obligations of the permittee are put in writing at the time of issuance and each site is periodically visited to assure compliance.

There are no special use permits for hydropower projects at this time, although there are several proposals being analyzed. Small hydropower projects have the potential of impacting essential habitat for wintering bald eagles and for causing barriers to movement of big game animals and other large mammals. Dams, ditches, and penstocks may result in soil movement and displacement. Since ditches and penstocks remove water from stream channels, lower water levels can reduce or eliminate fish populations, affect riparian vegetation, and create stream channel instability. Vegetation behind dams and in ditch bottoms can be destroyed. If several small hydropower projects were constructed in a general area, they could affect the fisheries resource throughout a drainage. These considerations are important in assessing proposals.

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

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity - The vegetation on specific sites can be destroyed or suppressed, depending on the use to which the area is put. This effect will last as long as the facility remains there. Diversion of water can lead to changes in the types of vegetation growing in a particular site.

Irreversible and Irretrievable Commitment of Resource - Ditches, roads and other special uses will probably be maintained into the foreseeable future. The vegetation lost because of them is irretrievable.

Adverse Effects which Cannot be Avoided - Construction of ditches and roads will cause removal of vegetation, soil disturbance and accelerated erosion. Some projects may cause an adverse effect on visual quality and wildlife habitat and movement.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls - None are identified.

Energy Requirements - Some energy will be used by the Forest in monitoring special uses but this will be a minor portion of total Forest use. Construction of new roads or buildings will require considerable expenditure of energy by the permittee.

A large percentage of the acreage involved in land use grants is used for the sole purpose of transporting energy in various forms.

c. Rights-of-Way and Cost-Share Agreements

Road and trail rights-of-way are acquired by the Forest from private or other owners, generally in connection with the Forest's timber program.

Cost-share agreements provide the same opportunity for development of both National Forest and private lands (located within National Forest boundaries) at a reduced cost for both parties by a sharing of construction and maintenance costs and a reduction of road duplication. A total of 186.5 miles of road were constructed in 1984 through right-of-way and cost-share agreements.

Short-term Use vs. Maintenance and Enhancement of Long-term productivity - Although road construction causes impacts, only a relatively small number of acres are affected compared to the number of acres opened up for management through the rights-of-way and cost-share programs. This land would otherwise be generally unavailable for management activities due to high costs involved in alternative access routes. Productivity of the lands can thus be maintained or improved.

Cost-share agreements allow both private landowners and the Forest Service to access lands for timber harvest or for reaching other resources. Costs of roading to both parties is reduced.

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

Irreversible and Irretrievable Commitment of Resources - Rights-of-way and cost-share agreements can be cancelled although this is unlikely to happen in the foreseeable future. The resulting roads imply an irreversible use and the vegetation removed by the road construction and maintenance constitute an irretrievable loss of that resource.

Adverse Effects Which Cannot be Avoided - Adverse effects of the resulting roads are discussed in the road management section.

Conflicts With Objectives of Other Land Management Plans, Policies, and Conflicts - Rights-of-way acquisition is normally undertaken in support of land management plans, and not in conflict with them.

Energy Requirements - Only minor energy use is involved in the access acquisition program. Substantial amounts of energy are expended in the construction of roads on the acquired rights-of-way.

d. Buildings and Other Facilities

The Kootenai Forest maintains seven Ranger Stations, five work centers (administrative sites usually not in use full-time), 38 lookouts, 47 housing units, 132 storage and service buildings, and 21 administrative buildings. Approximately 920 acres have been withdrawn from mineral entry for these sites.

The Forest also leases some buildings for administrative purposes: The Supervisor's Office in Libby, and the Zone III Engineering Office in Troy, respectively. These leased buildings are some of the newer ones to be used by Forest personnel and house the offices for over half of the permanent employees.

Sixty-five buildings were built before 1940. Nineteen are made of log and one building on Squaw Peak is made of stone. All of these structures result in the removal of vegetation and alteration of a natural-appearing landscape. Paving requires the same kind of modification and also tends to concentrate water flow, leading to erosion and possible introduction of sediment into streams.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity -Maintenance of these structures has only minor effect on the physical and biological environments. These effects are also short-lived. The effect that all of these buildings have on all other resources Forest-wide is also minor because of the small acreage involved. Vegetative productivity will be lost during the life of the facilities.

Irreversible and Irretrievable Commitment of Resources - The vegetation lost represents an irretrievable commitment for the life of the facilities.

Adverse Effects That Cannot Be Avoided - Although efforts are made to landscape building sites, the presence of the facilities permanently affects the appearance of what was once a natural, undeveloped setting.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - The energy required for heat and light of the administrative sites is insignificant in relation to the total energy required to implement the land use management alternatives. The amount of energy does not vary among the alternatives.

e. Powerline Corridors

There are eleven electric transmission lines on the Kootenai; an additional one is in the proposal stage. Based on definitions established

by the Utility-Transportation Corridor Study For Montana (November 1981) and the Pacific Northwest Long Range East-West Energy Corridor Study cited above and on guidance provided by Region One (1990 Special Plans and Studies, 10/7/82), areas have been identified where corridors will be excluded. These "Exclusion Areas" are land areas determined to be unavailable for corridor allocation or facility siting because of legal mandates, such as wilderness designation or proposals for the same. The 94,000-acre Cabinet Mountains Wilderness is an exclusion area in all alternatives. The remainder depend on the amount of proposed wilderness under each alternative. The following chart displays the amount of excluded area by alternative.

TABLE IV-41

AREAS EXCLUDED FROM CORRIDOR PLACEMENT

| Alternative | Thousands of Acres |
|---|---|
| A | 94 |
| B | 158 |
| C | 176 |
| D | 158 |
| E | 281 |
| F | 94 |
| G | 399 |
| H | 498 |
| I (CD) | 157 |
| J (PA) | 161 |
| JF (FP) | 172 |
| K | 161 |
| L | 94 |
| M | 94 |
| N | 94 |
| O | 176 |

Areas have also been identified where potential corridors should be avoided. "Avoidance Areas" are those that pose particular land use or environmental problems which would be difficult or impossible to mitigate either because of a conflict with land management objectives or because the area has some special or unique value. The following table displays categories which are considered avoidance areas for utility corridors. The acres for each category by alternative are shown.

TABLE IV-42

AVOIDANCE AREAS
(Thousands of Acres)

| ALTER-NATIVE | WILDERNESS STUDY AREA | DESIGNATED ROADLESS | RANGER STATIONS, CAMPGROUNDS ETC. | SPECIAL INTEREST | SENSITIVE VIEWING | TOTAL AVOIDANCE |
|---|---|---|---|---|---|---|
| A | 34 | 270 | 3 | 0 | 0 | 307 |
| B | 34 | 228 | 3 | 0 | 0 | 265 |
| C | 34 | 210 | 3 | 0 | 0 | 247 |
| D | 34 | 218 | 3 | 0 | 0 | 255 |
| E | 34 | 177 | 3 | 0 | 0 | 214 |
| F | 34 | 272 | 3 | 0 | 0 | 311 |
| G | 34 | 101 | 3 | 0 | 0 | 138 |
| H | 34 | 62 | 3 | 0 | 0 | 99 |
| I-CD | 34 | 249 | 3 | 6 | 83 | 375 |
| J-PA | 34 | 326 | 3 | 9 | 21 | 393 |
| JF-FP | 34 | 326 | 3 | 9 | 21 | 393 |
| K | 34 | 326 | 3 | 9 | 21 | 393 |
| L | 34 | 220 | 3 | 0 | 0 | 257 |
| M | 34 | 261 | 3 | 0 | 0 | 298 |
| N | 34 | 265 | 3 | 0 | 0 | 302 |
| O | 34 | 365 | 3 | 0 | 102 | 504 |

TABLE IV-43

TOTAL AVOIDANCE AND EXCLUDED AREAS BY ALTERNATIVE
(Thousands of Acres)

| Alternative | Total Excluded Areas | Total Avoidance Areas | Total Avoidance and Excluded Areas | % of Total Forest |
|---|---|---|---|---|
| A | 94 | 307 | 401 | 18 |
| B | 158 | 265 | 423 | 19 |
| C | 176 | 247 | 423 | 19 |
| D | 158 | 255 | 413 | 18 |
| E | 281 | 214 | 495 | 22 |
| F | 94 | 311 | 405 | 18 |
| G | 399 | 138 | 537 | 24 |
| H | 498 | 99 | 597 | 27 |
| I(CD) | 157 | 375 | 532 | 24 |
| J(PA) | 161 | 393 | 554 | 25 |
| JF(FP) | 172 | 393 | 565 | 25 |
| K | 161 | 393 | 554 | 25 |
| L | 94 | 257 | 351 | 16 |
| M | 94 | 298 | 392 | 17 |
| N | 94 | 302 | 396 | 18 |
| O | 176 | 504 | 680 | 30 |

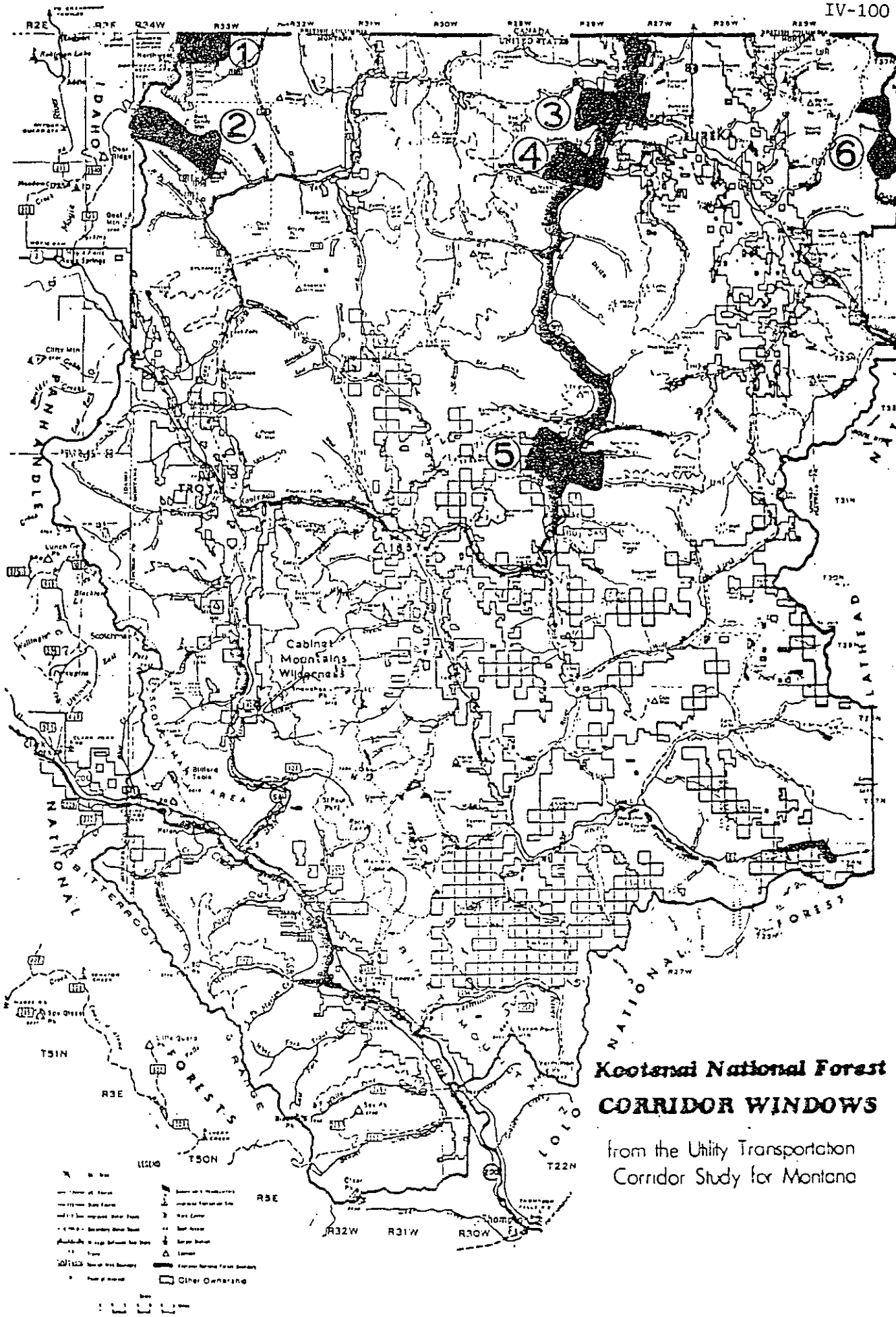
As can be seen in the display, Alternative O would result in the largest amount of land withdrawn from use for utility corridors. Alternative L would result in the least amount. The Final Plan would result in an increased amount of excluded and avoidance acres compared to the current direction.

Utility corridors are proposed upon need and have points of beginning and end. At the time of proposal, exclusion and avoidance areas will be included in any analysis. Prior to approval of additional new utility transportation corridors, an appropriate analysis will be required to determine the effects of the facility and the supporting road system, and, if approved, a final location for the facility.

The Pacific Northwest Long Range East-West Energy Corridor Study, Phase I, Part A - Rocky Mountains (draft, BPA, December 1977) also identified potential corridor windows. "Windows" are usually short, narrow passageways through constrained areas which are the most feasible locations for linear facilities, considering engineering and/or environmental factors. These engineering factors can be physical or topographic limitations, such as saddles or river crossings, and the environmental factors can include the restrictive allocations associated with the avoidance areas mentioned above, such as allocation for primitive recreation, etc. In the BPA document, six transmission windows were delineated on the Kootenai and are displayed on the accompanying map.

FIGURE IV-2




1
2
3
4
5
6
Cabinet Mountains Wilderness
Kootenai National Forest
CORRIDOR WINDOWS
from the Utility Transportation Corridor Study for Montana

The effects of each alternative on the six windows are discussed below:

Window #1 (BPA #R-10, crosses northern foothills of Northwest Peak by following the Canadian border)

Alternatives G and H recommend wilderness for a portion of this window located in the Northwest Peaks Scenic Area. Alternative JF, the Final Plan, recommends that roughly two-thirds of the area be allocated to roadless recreation. The remaining alternatives do likewise, but for a slightly smaller area. The area is located within grizzly management situation 1 (an area containing grizzlies that also has habitat components necessary for grizzly survival). Those portions of the window within recommended wilderness would be excluded in Alternatives G and H. Other alternatives where roadless management is designated create an avoidance situation.

Window #2 (BPA #R-9, follows Spread Creek to its summit then into the Canuck Creek drainage)

As with Window #1, Alternatives G and H recommend a portion of this area for wilderness. Every other alternative contains portions of roadless recreation management, generally in the western end and along the southern edge of the window. In addition, the area is located within grizzly management situation 1. The effects on the window would be the same as those for Window #1.

Window #3 (BPA #R-6, crossing of Lake Koocanusa near Pinkham Creek)

The Rexford Bench Campground is located within the window on the eastern shore of Koocanusa Reservoir, and occurs in each alternative. Visual resource management considerations along the reservoir are also present in each alternative. In addition, Alternatives B, D, F, H, L, and M recommend that a small portion along the eastern shore of the reservoir be allocated to roadless recreation, although Alternative JF (the Final Plan) does not. Every alternative, through designations to visual and/or roadless management, and because of the nearness of Rexford Bench Campground, creates an avoidance situation.

Window #4 (BPA #R-7, crossing of Lake Koocanusa near Pinkham Creek)

This window is also located along Koocanusa Reservoir. As with Window #3, each alternative contains some form of visual resource management. Every alternative except I, J, and K recommends roadless recreation along the eastern edge of Lake Koocanusa. The effects would be similar to those for Window #3.

Window #5 (BPA #R-8, crossing of Lake Koocanusa near Barren Creek)

Koocanusa Marina and McGillivray Campground are located within this window on the east and west shores, respectively, of Koocanusa Reservoir. With the exception of Alternatives I, J, JF, and K, all alternatives recommend a small area for roadless recreation located on the east side of the

Reservoir on the eastern edge of the window. This indicates that all alternatives create an avoidance situation.

Window #6 (BPA #R-5, adjoins Flathead National Forest at the north end of the Whitefish Mountain Range close to Canada)

All but two alternatives recommend 90-95% of the area for roadless recreation. The exceptions are Alternative H which recommends it for wilderness, and Alternative I (Current Direction) which doesn't place any restrictions on the acreage. The area is located within grizzly management situation 1. This indicates that all alternatives create either an avoidance or exclusion situation. This is more restrictive than the Current Direction.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Corridors are kept clear of overgrown vegetation for safety and ease of maintenance of the lines. Trees can and do grow within the corridor right-of-way and are harvested as Christmas trees.

Irreversible and Irretrievable Commitment of Resources - When a corridor is authorized and in place, it is expected to remain so and is, for all practical purposes, an irreversible commitment. Commercial timber production on these sites is irretrievably lost for the life of the corridor. Also, roads and clearing for powerline purposes within a previous roadless area preclude portions of the area for further wilderness and roadless management.

Adverse Effects Which Cannot be Avoided - Corridors pose an impact on the viewing resource because of the straight, uniform line that appears on an otherwise varied landscape. Impacts that occur during construction of the corridor relate to timber removal and road construction and are addressed under those sections.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified except those previously stated for the BPA long range study.

Energy Requirements - Some energy is required to clear the corridor and to keep it free of vegetation. The latter responsibility is that of the company or agency owning or operating the electric transmission lines.

## 9. RESOURCE PROTECTION

### a. Wildfire Suppression

Fire occurrence on the Kootenai Forest over the past 15 years shows a dramatic drop for both person-caused and lightning-caused fires.

TABLE IV-44

FIRE ORIGIN
Annual Average Number of Fires

| | 1970-1974 | 1975-1979 | 1980-1984 |
|---|---|---|---|
| Lightning-caused | 107 | 65 | 59 |
| Person-caused | 63 | 53 | 30 |

The acreage burned shows a similar decline over time with two exceptions. In 1979, the person-caused Granite Creek fire burned 3,341 acres, more than the amount burned in any other year between 1975 and 1984. In 1984 the Houghton Creek fire burned a total of about 12,800 acres. Only 2100 acres of that was on Kootenai National Forest land and is included in the data shown here.

TABLE IV-45

ACREAGE BURNED
Annual Average

| | 1970-1974 | 1975-1979 | 1980-1984 |
|---|---|---|---|
| Lightning-caused | 911 | 32 | 16 |
| Person-caused | 535 | 788 | 517 |

A study of the fire history over the past 20 years shows that serious fire seasons have occurred every six years, most recently in 1967, 1973, and 1979. This trend is similar to that of other Forests in the area, such as the Idaho Panhandle, and reflects the close relationship of fire incidence to general weather patterns. When there is little or no rain over a long period of time, the incidence of fire goes up. As precipitation increases, the risk of fire drops. This trend does not help land managers to "predict" busy seasons, but it can help to "anticipate" them. Long-range fire forecasting, like long-range weather forecasting, is an inexact science.

The purpose of fire suppression is to minimize damage to valuable resources by controlling and extinguishing fires. Because the extent of fire suppression activities depends on fire starts and weather, there are no differences among alternatives in this regard. Some alternatives can lead to an increased risk of fire, however. Those favoring recreation and timber harvest, for example, create more situations where man-caused fires

can begin because of increased number of people and equipment in the woods.

A fire can be either beneficial or detrimental to an area, depending on the management objectives assigned to it. For example, high intensity fires in areas managed for timber production kill trees and reduce the value of the site. High intensity fires in old-growth timber will eliminate important habitat components for certain species. Although it may remove cover for big game, in the process it may improve food supplies for the same species.

Successful suppression has a favorable short-term effect in areas where timber management is prescribed because it protects the stands from burning. Suppression may also result in the establishment of old-growth forests. Old-growth dependent animals are favored and thermal cover is provided to many wildlife species even though forage is eliminated or suppressed by competition with the conifers.

Fire suppression activities affect fire sites. Fireline construction with handtools or heavy equipment can increase potential for soil erosion. The potential for soil movement is increased by use of heavy equipment on steep slopes or on soils susceptible to erosion. Trees are often cut during fire suppression, increasing soil disturbance and overland flow. In some cases, roads built into remote fires result in "permanent" trails or roads. Fire retardant dropped from air tankers can contaminate small lakes or streams for a short time. Red dyes used in retardants can be seen for a year or two after the fire. Camps developed for large fires can have long-term impacts on the sites unless rehabilitation efforts are undertaken.

Fire exclusion can result in fuel accumulations above natural levels which can lead in time to larger, more destructive fires. Fires in dense, dry fuels consume litter and duff which can affect soil productivity and stability. Stream sedimentation is likely to occur after a hot, litter-and- humus-consuming, fire. Large fires on some types of soil and slopes can result in soil movement and stream siltation. If retardant is used in suppression and happens to fall into streams, water quality is affected. Loss of timber to insects and disease is likely to increase because sources of infestation are not burned.

Fire prevention also includes educational activities and enforcement of fire prevention laws and regulations. The Smokey Bear Fire Prevention Program has helped people, especially children, to become aware of the destructiveness of fire as well as its benefits when used as a management tool. Alternatives favoring increased timber sale volume will require greater fire protection levels to assure that the trees reach rotation age. Conversely, alternatives which produce less timber than the current program require a smaller fire protection expenditure.

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

Fire protection activities, in the short-term, will minimize damage to resources such as timber. However, the long-term change in vegetative composition and density may reduce timber productivity unless accompanied by other activities such as timber harvest.

Irreversible and Irretrievable Commitment of Resources - Since the fire suppression program could be curtailed at any time, there is no irreversible commitment of resources, except for funds already budgeted.

Adverse Effects Which Cannot be Avoided - Loss of soil due to construction of firelines will occur despite preventive measures. Buildup of fuels will continue in areas protected by fire suppression.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - Smoke emission due to fire may at times exceed State clean air standards, but the suppression activity itself attempts to reduce this problem.

Energy Requirements - Energy required in the fire suppression program is dependent on the number and kind of fires. In extreme fire years, this use can be a substantial portion of the total energy expended by the Forest.

b. Prescribed (Managed) Fires

Prescribed fires are those which will be managed in accordance with a predetermined set of conditions. Prescribed fires can be either planned or unplanned (such as one caused by lightning), but must achieve some predetermined resource objective.

Prescribed burns are fires set deliberately to meet some management objective. Prescribed fire can be used to burn underbrush in thinned stands as well as slash from logging operations. The reader is also referred to the discussion of slash control in the timber section of this chapter. Some burning is done to prepare sites for planting and to enhance wildlife habitat. Between 1979 and 1983, for example, an average of 11569 acres were burned annually by prescription. Of that, 2366 acres (or 20%) were burned annually to benefit wildlife.

Two fire action plans are in effect on the Kootenai, one for the Cabinet Mountains Wilderness and one for the Troy Ranger District. The action plan for the wilderness calls for suppression of all person-caused fires. Lightning-caused fires will be allowed to burn under certain conditions "as a means of returning fire to the wilderness ecosystem". (Cabinet Mountains Wilderness Fire Management Plan, 1980). The plan for the Troy Ranger District is similar to the wilderness plan in that it considers the important role of fire in the forest ecosystem. Under predetermined conditions, fire may be allowed to function as a natural ecologic agent, responsive to land and resource management objectives. Such objectives may include enhancement of wildlife habitat, maintenance of wilderness characteristics and conditions for primitive recreation, promotion of plant and animal diversity, and creation of a variety of views. An additional benefit of allowing certain fires to burn is the saving of money by not suppressing fires that are achieving desired results and are not endangering life, property, and resources.

The effect of the managed fire program will depend on factors such as the amount of fuel (vegetative material) available for burning, proximity of the fuel to valuable resources, and current weather conditions. The time, intensity, and size of managed fires will also vary greatly, depending on the desired results.

Clearcutting creates the heaviest amount of slash and therefore has the potential for the greatest negative effect on the environment if fire intensity becomes too high, leading to nutrient loss and other soil damage. Low intensity fires are preferred and can produce significant beneficial effects such as nutrient cycling, plant stimulation through basal and rhizomatous sprouting, and seedbed preparation. Although selective harvests create slash conditions difficult to treat, the amount of fuel is usually less than that following clearcutting, reducing the risk of long-term negative effects.

Water quality is affected by fuel treatment through exposure of mineral soil to erosion. Through overland flow and mass movement, sediment is introduced into streams. Untreated fuels introduced into stream channels also compromise water quality as they decay and reduce the amount of oxygen available to aquatic life. Water temperature is also increased with removal of streambank vegetation, affecting fish habitat.

Prescribed fire affects wildlife habitat by changing vegetative types. Vegetation is removed and for a short time forage is reduced as are obstructions to movement. New growth follows quickly, providing increased forage for big game. Hiding and thermal cover can be reduced as well, but the amount can be controlled by the harvesting method used.

Prescribed fire creates short-term visual impacts, with foreground viewing experiencing the greatest impact. Visual scars will remain until new growth appears, a period ranging from one to five years.

Air quality can be affected by prescribed burns which add suspended particulates to the air. Burning results in smoke concentrations in local valleys during stable atmospheric conditions. The Kootenai Forest works closely with the State Airshed Group and the Montana Cooperative Smoke Management Plan in scheduling burns so that smoke produced can be easily dispersed into the atmosphere. The federal Clean Air Act established wildernesses as Class I air quality areas. Protection of air quality is therefore a major consideration in fuels management programs adjacent to the Cabinet Mountains Wilderness.

The reader is referred to the timber section of this chapter and the discussion displaying the amount of acres scheduled for burning over a 50-year period by alternative.

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

The act of allowing a fire to burn can have a long term effect on the kind of vegetation and animals occupying the area. A future generation of the overstory (trees or shrubs) may be entirely destroyed. Some of the present overstory, especially shrubs, is completely removed. The native productivity is not destroyed and, in fact, may be temporarily enhanced by the availability of the minerals in the ash.

Productivity of a site can be substantially reduced if there is a large loss of surface soils due to wind or water erosion following fire. On some soil types, burning can produce water repellant soils, resulting in a loss of site productivity.

Irreversible and Irretrievable Commitment of Resources - If the fire is allowed to burn, the consumed material is irretrievable.

Adverse Effects Which Cannot be Avoided - The aftermath of the fire will remain visible for a short time. Soil is bared and water quality may be reduced by the accelerated erosion. Smoke will be generated into the atmosphere.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls - None identified. The Kootenai Forest works closely with the State to assure compliance with its clean air standards and with those of the Clean Air Act.

Energy Requirements - Some energy will be consumed in monitoring the planned fire. This will be a minor amount compared to the energy needed to suppress such fires and a minor portion of the total Forest use.

c. Insect and Disease

The mountain pine beetle has infested lodgepole pine stands throughout the Kootenai Forest. About 120,000 acres of infestation were surveyed in 1982, and the infestation has been increasing in size each year. This, coupled with the large amount of high-risk lodgepole pine (2,000 MMBF), represents a significant potential for timber volume loss. The assumption is that all of this timber will be affected by the beetle within the first decade of the Forest Plan. About half of this volume will not be salvageable, representing an average annual loss of approximately 109 MMBF. For details on the extent of the infestation refer to Chapter III.

Timber harvest is the primary means of removing the beetle-infested trees and controlling the spread of the insect. (There are no plans for use of pesticides on the Forest under any alternative.) The relatively low market value of lodgepole pine often requires that capital investment roads be built in order to harvest the dead and dying trees. The amount of lodgepole projected to be harvested varies by alternative according to the intent of the alternative and the budget required for implementation.

TABLE IV-46

PROJECTED ANNUAL TIMBER HARVEST OF LODGEPOLE PINE WITHIN THE FIRST DECADE

| Alternative | Millions of Board Feet |
|---|---|
| A | 69 |
| B | 70 |
| C | 72 |
| D | 67 |
| E | 64 |
| F | 56 |
| G | 59 |
| H | 51 |
| I-CD | 77 |
| J-PA | 75 |
| JF-FP | 78 |
| K | 79 |
| L | 32 |
| M | 93 |
| N | 85 |
| O | 75 |

Alternatives M, and N had high lodgepole pine yields in the first decade because they permit large timber harvest programs and high budgets. Alternative L harvested considerably less lodgepole pine in decade one because its goal involved harvesting the high producing acres (mixed conifers) as early as possible in order to regenerate to faster growing stands; harvest of lodgepole pine is thus delayed until a later period.

Alternative H did not allow any harvesting in inventoried roadless areas, some of which contain lodgepole pine. Alternative F had a goal of providing for big game (elk), so it only called for the harvest of lodgepole that contributed to that goal. Alternatives I, J, JF, K, and O had visual quality goals which reduced the per acre harvest levels in some areas, making the lower volume per acre lodgepole competitive. The remaining alternatives reflect a combination of factors, primarily related to availability and economics.

Water yields may increase in those watersheds where significant mortality occurs. In some cases, increased water yields could restrict harvesting activities in unaffected portions of the drainage in order to minimize the effects of the insect-caused mortality on stream channel stability and downstream water uses. Water yield will decline as new stands are established and begin to grow. The time it takes to establish new stands will vary from ten to thirty years or more, depending on actions taken to establish them.

Tree loss in streamside areas could affect fisheries by blocking fish passage, increasing water temperature and reducing stream channel stability.

Epidemic insect infestations create openings in the forest canopy that affect big game species. In areas where there are large acreages of closed canopy, a mosaic of openings will improve available forage. However, in areas where sufficient forage is available or excessive amounts of openings are created, cover will decrease below desired management levels for big game.

Fuels build-up is greatly increased in insect-infested areas. The risk of wildfire increases proportionally in these areas, particularly where the infestation area is large. This increased risk persists for several decades unless measures such as prescribed burning are initiated to break up the fuel concentration.

Control actions for insect and disease problems frequently involve silvicultural treatments to develop timber stand conditions that are unfavorable to the pest. Such treatments can include planting tree species resistant to a particular pest or favoring such species in intermediate thinnings. Another method is to maintain high stand vigor throughout the stand's growing cycle by maintaining stocking levels where individual tree growth rates are high.

In the case of the mountain pine beetle, it may be possible to slow the insects' spread by harvesting high risk stands prior to beetle invasion. The activities and effects of harvesting are discussed in the timber and road sections of this chapter. Another option is to thin moderate or low risk stands to increase tree vigor and alter site conditions within the stand, making trees less susceptible to attacks for a time. All of these options require roads. The rate at which these stands can be treated silviculturally is dependent largely on the fishery/water quality objectives of each alternative.

Recent developments in control involve the use of artificial pheromones which disrupt the insects' reproductive cycle. In the case of mountain pine beetles, certain trees are baited with an artificial pheromone that attracts large numbers of beetles from the surrounding area. At the proper time, the trees are harvested and removed while the beetles are still in them. Traps, baited with the pheromones, can also be used to collect and dispose of insects without harvesting any trees. These actions do not eliminate the risk of infestations, but reduce the risk to specific areas for a period of time.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
The application of appropriate silvicultural methods to control insects and disease increases the long-term productivity of the Forest from the standpoint of recoverable resources.

Irreversible and Irretrievable Commitment of Resources - Timber killed by insects and not harvested represents an irretrievable loss of that resource. The loss of other resources such as fisheries habitat is also considered foregone until such time as vegetation recovers along

streamsides. Effects of roads required to harvest the lodgepole are discussed under the roads section.

Adverse Effects Which Cannot be Avoided - Insects and diseases will continue to play a significant role in the Forest ecosystem. Effects of management to reduce the risks of fire and continued timber loss are the same as those associated with timber harvest.

Conflicts With Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - The pest management activities require no energy above that required in a normal timber sale program, except that needed to place pheremones in timber stands as a control measure.

10. Cultural Resources

The major purpose of the Forest's cultural resource management program is to locate and protect cultural resources in keeping with the intent of various Federal and State laws. The Forest consults with the State Historic Preservation Office and the federally-sponsored Advisory Council for Historic Preservation routinely in assessing historic finds and ways in which to protect them.

There are many historic and prehistoric sites within the Kootenai Forest boundaries, and it is likely that many more sites will be discovered as inventories are completed for areas previously unexamined. An example of a prehistoric site is the Kootenai Falls area which has both archeological and religious significance to the Confederated Kootenai-Salish Tribe. Other prehistoric sites can take the form of camps, trails, rock art, cambium-peeled trees, quarries, burial grounds, etc.

Among historic sites; mining, logging, and public resource administrative sites are the most abundant. They include sites of hardrock and placer mining and ore processing, logging camps, railroads and log chutes, lookouts and guard stations. Transportation and homesteading are represented by remnants of early highways, railroad beds, bridges, and trails. Abandoned dwellings, homestead survey monuments, graves, cemeteries, and irrigation systems reflect the homesteading era. The early fur trade is most often represented by the remains of trade goods, such as glass beads. Evidence of later fur trapping and trade includes trappers' cabins, caches, and trap sets. Missionary activities are most obvious from written accounts of those who passed through the Kootenai region than by any physical evidence.

Since 1972, the Forest has been systematically inventorying the cultural resources on the Forest. To date, over 400 prehistoric and historic sites have been located. One site on the Forest, the Kootenai Falls Cultural Resource District, has been listed on the National Register of Historic Places. The Libby-Jennings Cultural Resource District and the Yahk Historic Mining District have been determined eligible for nomination. (If a number of sites are associated thematically or physically in a given area, they can be treated as a single unit or "District" for purposes of nomination to the National Register.)

In conjunction with construction of Libby Dam, an extensive archeological survey was done along the reservoir. Since that time the U.S. Corps of Engineers has developed a management plan for mitigation, involving some excavation and some preservation of mostly prehistoric sites. The Forest Service and The Corps are presently negotiating over future management of these sites and the responsibility of each agency for them.

Numerous other sites have been deemed potentially eligible including several old lookouts. If any of these sites become affected by Forest projects, a determination of eligibility and recommendation for mitigation are made with the assistance of the State Historic Preservation Office and the Advisory Council on Historic Preservation.

Vandalism is, and probably will continue to be, an increasing problem on the Kootenai, highlighting the need to protect these sites and any other new sites discovered. Public information efforts and cooperative law enforcement actions will be used to counteract this problem.

There are no differences among alternatives with regard to satisfying laws concerning archeological sites because the laws will be obeyed in all alternatives. The alternatives with larger timber outputs and roading programs will however generate a higher risk of losing some cultural resources simply because more ground is disturbed. It is less risky to avoid ground disturbance than to mitigate the effects of such disturbance. In addition, protection of the cultural resource will have little effect on the PNV of the Forest since so few acres are involved. Some timber may not be harvested near identified cultural sites but this volume will be insignificant. Maintaining inventoried cultural sites is very important for preserving historical and religious ties with the past, and is considered an important component of net public benefits.

In all alternatives, an inventory of sites where ground-disturbing activities are planned will be required. If a site is found before or during this activity, it will be documented and evaluated for possible preservation. The Kootenai/Salish Tribe will be consulted if a site appears to have religious or historical significance.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
Even though cultural surveys will be made prior to ground-disturbing activities, these surveys may not always be successful in finding a cultural resource prior to the time the activities are scheduled to begin. Should an inadvertent discovery happen, the ground-disturbing activity will be delayed while the area is re-inventoried and mapped. Results of the re-inventory may show that the activity should be diverted away from the site or that appropriate mitigation should be done prior to resuming the activity. This can cause delay of the project and, if the area is determined to be significant and to warrant complete preservation, the long-term vegetative productivity of the site will be affected. The effect on the total timber resource, however, will be minor.

Irreversible and Irretrievable Commitment of Resources - Since the commitment to protect cultural resources is irreversible in the foreseeable

future, the harvestable vegetation growing on protected sites represents an irretrievable loss of that resource.

Adverse Effects Which Cannot be Avoided - Some ground-disturbing activities could inadvertently enter and disturb some cultural resource sites despite the care and intensity of surveys prior to the beginning of these activities. Adverse effects will be mitigated in compliance with FSM 2360.1 and 36 CFR 800.

Conflicts with Objectives of Other Land Management Plans, Policies, and Control - The Kootenai Forest works cooperatively with the State Historic Preservation Office and the Kootenai-Salish Tribe; no conflicts exist between the agencies. In compliance with the American Indian Religious Freedom Act, the Kootenai Forest and Tribe have also entered into a formal agreement concerned with communication about and protection of possible religious sites.

The management of the cultural resource should have little effect on other planning efforts within Kootenai Forest boundaries.

Energy Requirements - Managing the cultural resource will require little energy expenditure. Some travel will be necessary in the surveys and some energy may be used in protecting sites that are discovered.

11. Human and Community Development

With roughly 73% of the land in Lincoln County in federal ownership, it is not surprising that activities of the Kootenai Forest play a significant role in the economy of the area. In 1981 the manufacturing (mostly timber) and Federal Government (mostly Forest Service) sectors accounted for 1,969 jobs in Lincoln County. Using an economic base multiplier of 2.41 (Haugen, 1983) indicates that these sectors were linked to 4,745 of the 6,643 total jobs in the county in 1981. This relationship has not changed much since 1981. Thus it can be said that over 70% of the jobs in Lincoln County directly or indirectly exist because of the wood products industry. Sanders County is in a similar situation.

In 1984, in keeping with executive branch direction to reduce the number of government employees to help trim the federal deficit, the Forest Service cut back on employment. The Kootenai Forest developed an objective to reduce its permanent workforce by 20%. To minimize the impact on the local communities, the agency was given two years to reach that level. The reduction has been accomplished.

A number of people work for the Kootenai Forest who are paid by other agencies or authorities. The largest is the volunteers program, authorized by the Volunteers in the National Forests Act. In 1984, 85 people including campground hosts worked for the Kootenai Forest under this authority. Fifty-two other people worked for the Forest in 1984 under other authorities, such as the Youth Conservation Corps, the Senior Community Service Employment Program, and the State-sponsored Adult Work Experience and Youth Employment Program. More discussion on this point is provided in Chapter III.

These special programs and the regular employment program benefit the local economy, but of themselves have little effect on the biological environment of the Forest.

The timber section of this chapter and Chapter III discusses the economy of Lincoln and Sanders Counties.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
The goal of all Kootenai Forest personnel is to maintain the Forest's long-term productivity within the constraints defined by law and agency policy.

Irreversible and Irretrievable Commitment of Resources - None identified.

Adverse Effects Which Cannot Be Avoided- Reduction in the workforce means reduction in some of the services to the public. This loss can be compensated for in part by lengthening the time frame needed to accomplish certain projects, contracting out some of the work traditionally done by employees, training more volunteers, and eliminating from long-range plans some of the projects previously scheduled.

Conflicts with Objectives of Other Land Management Plans, Policies, and Controls - None identified.

Energy Requirements - Energy use by this group was not estimated because it is such a small portion of the total energy consumed on the Forest.

12. Range Management

Livestock grazing on the Kootenai is limited by the nature of available range (transitory), the lack of over-wintering facilities, the remoteness of the available range, and the expense of providing adequate water and range developments.

Although grazing is a relatively small program on the Kootenai, it is important to the individual rancher. Local ranches usually turn cows out on public lands from mid-May to mid-October, over-wintering them on private lands in the valley bottoms or marketing them prior to winter.

Riparian areas are usually grazed first because they provide shade and escape from flies in addition to providing water and forage. Where excessive grazing occurs, vegetation is reduced, leading to soil compaction, overland flow, and soil erosion. In time, streambanks break down,(Platts, 1978), affecting the fisheries resource, creating streambottom disturbance and increasing turbidity.

Seeded roadsides are also favorite grazing areas. Cows will follow the road system into timber harvest units unless some barrier discourages them. Through their wanderings knapweed is spread. The Kootenai Forest is working with the County Extension Service to reduce the amount of knapweed.

Livestock use around recreation areas can lead to conflicts, resulting from increased numbers of flies and manure on trails or around campsites. Fences to control livestock movements may also limit movement of wildlife and people traveling through the area.

Range management to control these effects in riparian areas and elsewhere takes various forms. Structures on the Forest placed to control grazing include 51 cattleguards (useful in keeping cattle away from high elevation areas where elk are grazing and in keeping cows out of areas where young trees are taking hold), 37.2 miles of range fence, and 73 water developments such as stock ponds, constructed to draw cows away from streamsides and decrease their impact on riparian zones.

The following table displays the amount of potential livestock forage by alternative. Because livestock use on the Kootenai is not expected to significantly exceed the current level of about 13,000 AUM's, the supply appears to more than adequately meet the demand over the long-term. (Although grass may be available in abundant quantity, in many cases it may not be available in the locale where cows can be cheaply herded or left to fend for themselves. If a rancher has to truck cows a long distance several times over the course of a summer, the benefits of a grazing allotment are diminished.)

TABLE IV-47

POTENTIAL LIVESTOCK FORAGE
(Thousands of AUM's per Year)

| Decade | Alternative A | B | C | D | E | F | G | H | CD I | PA J | FP JF | K | L | M | N | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 20 | 20 | 19 | 18 | 19 | 15 | 19 | 19 | 19 | 18 | 18 | 18 | 21 | 19 | 20 | 20 |
| 3 | 30 | 30 | 30 | 37 | 29 | 21 | 28 | 27 | 27 | 29 | 29 | 31 | 41 | 30 | 30 | 32 |
| 5 | 43 | 43 | 42 | 48 | 41 | 29 | 39 | 37 | 30 | 38 | 38 | 38 | 50 | 46 | 45 | 40 |

The level of AUMs by decade is directly related to the creation of transitory range through timber harvest. As the number of acres treated vary, so do the AUMs.

No significant competition between cattle and elk is expected to occur at the 13,000 AUMs per year level.

The grazing program adds to the PNV of the Forest. However, total contribution to PNV is less than one percent under any alternative. The average annual budget on the Kootenai Forest for range improvements from 1979 - 1984 averaged $8,000, mainly for materials. Ranchers assist by providing labor on some improvement efforts. This figure is not expected to change appreciably because of anticipated constant levels of AUM use.

Short-term Use vs. Maintenance and Enhancement of Long-term Productivity
The grazing of livestock on the Forest will have little effect on long-term productivity. A few areas near watering places and sources of salt will continue to be overused, affecting the vegetative pattern of the immediate area. Trampling or feeding on conifer seedlings occurs in a few localized areas, but is insignificant Forest-wide.

Irreversible and Irretrievable Commitment of Resources - Forage grazed by livestock is a commitment of that resource as well as the space allocated to livestock grazing, but is not irretrievable or irreversible.

Adverse Effects Which Cannot be Avoided - Conflicts will remain where heavy livestock use occurs in regenerated stands, riparian zones, along trails, and around campsites. However, many of the adverse effects of cattle grazing can be reduced or eliminated through proper allotment management.

Conflicts with Other Land Management Plans, Policies, and Controls - None identified.

Energy Required - Energy required by the Forest in livestock management is not great. Some is needed to monitor the resource and to maintain facilities. This will not be a significant portion of total energy use on the Forest. Permittees will also use energy in transporting and managing livestock.

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FINAL ENVIRONMENTAL IMPACT STATEMENT

FOR THE

KOOTENAI NATIONAL FOREST PLAN

# CHAPTER V

# LIST OF PREPARERS

This Chapter outlines the personnel that were involved in the preparation of the Environmental Impact Statement and the Forest Plan document.

## V. LIST OF PREPARERS

The following list includes all the individuals who contributed to the preparation of this Environmental Impact Statement and to the development of the Kootenai National Forest Plan. An asterisk (*) following a name indicates that the individual no longer holds the noted position.

Abbreviations: BA - Bachelor of Arts; BS - Bachelor of Science; MA - Master of Arts; MS - Master of Science; MF - Master of Forestry

### INTERDISCIPLINARY PLANNING TEAM

| Name | Job Title | Degree | Years of Experience |
|---|---|---|---|
| Alan Christensen * | Wildlife Biologist | MS | 9 |
| Mary Collins * | Archaeologist | BA | 11 |
| Al Corda | Silviculturist | BS | 21 |
| Gloria Flora * | Landscape Architect | BA | 9 |
| Gary Hathaway | Landscape Architect | MA | 30 |
| Jerry Haugen | Operations Research | MS | 13 |
| Steve Johnson | Hydrologist | MS | 10 |
| Rich Kimberlin | Fire Staff Officer | BS | 20 |
| Lou Kuennen | Soil Scientist | MS | 20 |
| Paul Leimbach | Planner/Core Team Leader | BS | 25 |
| John Lloyd * | Fisheries Biologist | MS | 12 |
| Steve Marshall * | Geologist | BA | 8 |
| Larry Meshew * | Hydrologist | MF | 11 |
| Les Miller * | Economist | MS | 6 |
| Tim O'Gorman * | Writer/Editor | MA | 8 |
| Jerry Park * | Silviculturist | BS | 20 |
| Roberta Ryan * | Writer/Editor | MA | 9 |
| Jim Shadle | Planning Staff Officer | BS | 25 |
| Bob Summerfield | Wildlife Biologist | MS | 12 |
| Bob Thompson | Geologist | BA | 8 |
| Becky Timmons | Archaeologist | MA | 8 |
| Carl Wolf * | Lands Officer | BS | 23 |

## ADMINISTRATION

| | |
|---|---|
| Chuck Brooks | Resource Staff Officer |
| Drew Bellon | Rexford District Ranger |
| Bill Boetcher | Fortine District Ranger |
| Ken Briggeman | Timber Staff Officer |
| Larry Cron | Lands, Minerals, Recreation Staff Officer |
| John DeYoung | Administrative Staff Officer |
| Dave Erwin | Zone II Engineer |
| Larry Hudson • | Troy District Ranger |
| Jim Mershon | Cabinet District Ranger |
| Bill Perry * | Forest Engineer |
| Gary Rahm | Libby District Ranger |
| Jim Rathbun | Forest Supervisor |
| John Righter | Yaak District Ranger |
| Jim Spaulding | Zone III Engineer |
| Ken Strauss | Fisher River District Ranger |

## TECHNICAL SUPPORT

| | |
|---|---|
| Eileen Berger * | Computer Specialist Trainee |
| Karen Bree | Computer Clerk |
| Joe Campbell * | Supervisory Computer Specialist |
| Casey Cassidy | Computer Assistant |
| Mary Ann Jones * | Supervisory Office Automations Assistant |
| Patricia Johnson * | Cartographic Technician |
| Erma Kaeding | Cartographic Technician |
| June Kreitler | Computer Assistant |
| Frank Lamb | Computer Assistant |
| Glenda Larson | Offset Press Operator |
| Linda Nelson | Computer Specialist |
| Michele Nuss | Cartographic Technician |
| Carol Rowberry | Offset Press Operator |
| Bobbi Russell | Supervisory Computer Programmer |
| Lance Schelvan • | Visual Information Specialist |
| Sally Suk * | Computer Assistant |

# FINAL ENVIRONMENTAL IMPACT STATEMENT

# FOR THE

# KOOTENAI NATIONAL FOREST PLAN

## CHAPTER VI

## CONSULTATION WITH OTHERS

This chapter describes the process that was used to involve the public in the resolution of the Issues that were presented in Chapter I, and how their involvement helped to determine the Final Forest Plan.

# VI. Consultation with Others

## A. Introduction

This chapter describes how public comment was solicited and analyzed for use in the resolution of the Issues presented in Chapter I. It also discusses the type, amount, origin and intensity of the public comment received. The chapter is organized as an addendum to Appendix A of the Draft EIS, and discusses the public involvement and consultation that has occurred since then. Appendix A, of the Draft EIS, discusses the Public Consultation that occurred up to then.

Copies of all the actual comments received from the public during the review period, and the Forest response, are included in Appendix E.

## B. Consultation between the Draft and Final EIS

The Draft EIS was distributed to the public and the Environmental Protection Agency on July 3, 1985. Notice of the Availability of the Draft EIS was published in the Federal Register on July 19, 1985. As requested by several letters, the public comment period was extended from October 15, to November 1, 1985 to allow for additional review time. During the period, July 3 to November 1, public meetings were held in Libby, Noxon and Kalispell, Montana, to answer questions and clarify any misunderstandings. Meetings were also held, upon request, with various interested organizations and involved government agencies.

As a result of the public review, 290 responses were received; most of which were in written form. These responses were stratified, using the Content Analysis process, and are summarized in this document.

The most repeated concerns were brought forward and identified as "Public Review Issues." They are presented in this document along with the proposals for their resolution. In addition, other comments which were considered important and substantive are also displayed.

### 1. Summary of What the Public Said

A large segment of the responding public was unhappy with the Proposed Forest Plan as presented in the DEIS. This segment was polarized into two general groups: (1) those that felt that the Proposed Action was biased on the side of development; such as timber harvesting and road construction at the expense of wilderness, water quality, old-growth timber, and fisheries, and (2) those that felt that the Proposed Plan favored wilderness, roadless areas and wildlife (including the grizzly bear) at the expense of people, timber harvest and jobs, and minerals and oil/gas.

Within this general polarized situation was some common ground. There was general agreement that the timber harvest levels experienced over the last decade are acceptable and/or should not be reduced (173 mmbf/yr). General concern was also expressed about the "realism" involved in the Proposed Plan's budget requirement (a projected 22% increase) and what will be "sacrificed" if a budget shortfall occurs.

Common ground was also observed in the area of water quality and fisheries. The public asked us to insure that these resources receive adequate protection.

An important challenge to the timber-yield tables used in the Forest Forplan model was also received which required an in-depth review to insure that the model represents reasonably expected timber yields.

## C. Perspective on the Public Input

The input received can be characterized as "normal" in terms of the types of inputs, locations of respondents and the types of respondents. There were 290 inputs received and these carried 303 signatures. There were no petitions or form letters received.

### 1. Organized Input

One interest group (Montana Wilderness Association) provided its members with pre-addressed post cards and encouraged them to respond favoring a variety of additional wilderness and roadless areas and other preferred resource positions. 108 of these post cards were received.

Another interest group (Montana Women in Timber) provided pre-addressed response forms and a sheet of suggested comments. Their members were encouraged to select from the list of comments, write them on the response form and submit the form. Concerns suggested generally favored increased levels of timber harvest and opposed any additional Wilderness designations. 45 of these forms were received.

### 2. Geographical Distribution

The major geographical sources of comments were as follows:

| | | | |
|---|---|---|---|
| Libby | - 25% | Kalispell | - 25% |
| Missoula | - 8% | Heron | - 4% |
| Columbia Falls | - 4% | Troy | - 3% |
| All Others | - 31% (less than 2% in each location) | | |

The sources of comments by State are as follows:

| | | | |
|---|---|---|---|
| Montana | - 87% | Idaho | - 3% |
| Washington | - 3% | Colorado | - 2% |
| All Others | - 5% (1% or less in each location) | | |

From this distribution it was determined that there was no great interest or organized input drives except among people who are likely to work or recreate in the Forest. In general, the people commenting on the Draft Plan are those most likely to be directly affected by it.

### 3. Type of Input

As already noted, there were no form letters or petitions received. About 98% of the inputs came in the form of individual letters (including post cards and response forms). There were five inputs received at the open house held in the Supervisor's Office and two telephoned inputs.

The investment of time that an input requires is often an indicator of the interest level of the commentor. Petitions require almost no time investment and a form letter requires very little. A thoughtful letter requires the largest investment and indicates a relatively high interest level. There were 12 individual letters that expressed more than 10 comments. There were 37 individual letters that expressed only one comment. This demonstrated that the level of interest of the commentors was quite high. Even among those who used a pre-addressed postcard or suggested comments, most elected to express several comments.

### 4. Issues Raised

The major issue categories which were addressed in the input are displayed in the following Table VI-1. Percentages do not total to 100% because most commentors addressed more than one issue.

Table VI-1

Kootenai National Forest

Major Issue Categories as expressed by the Public during the Draft EIS Review Period

| ISSUE | INPUTS | % of All Inputs |
|---|---|---|
| Wilderness and Roadless | 204 | 70% |
| Timber Harvest | 147 | 51% |
| Miles of Roads (Road Building) | 126 | 43% |
| Wildlife (including Old-Growth) | 108 | 37% |
| Soil and Water | 97 | 33% |
| Plan and DEIS Concerns | 61 | 21% |
| Economics | 59 | 20% |
| Threatened & Endangered Species | 40 | 14% |
| Road Closures | 30 | 10% |
| Monitoring & Evaluation | 26 | 9% |
| Fisheries | 19 | 7% |
| Minerals, Oil & Gas | 19 | 7% |
| Recreation | 16 | 6% |
| Viewing | 13 | 4% |
| Land Ownership | 9 | 3% |
| Fire | 5 | 2% |
| Insects & Disease | 5 | 2% |
| Grazing | 4 | 1% |
| Unique Areas of Special Interest | 4 | 1% |
| Plant and Animal Diversity | 2 | 1% |
| Cultural Resources | 1 | <1% |

## D. Intensity and Direction of the Public Input

The following paragraphs will discuss each of the major issue categories and their sub-issues, in turn, and will provide details as to the intensity of public comment with regard to each point. The indicator of intensity will be the number of inputs (cards, letters, phone calls etc.) that contained the comment. Since there were very few inputs with more than one signature, the intensity in terms of signatures would be essentially the same. The number of inputs is not additive in any category because most inputs addressed several facets of individual issues as well several issues.

### 1. Wilderness and Roadless Areas

The Wilderness and roadless area issues generated the most public interest with 204 inputs (70%) dealing with the issue. All of the cards sent in by members of the Montana Wilderness Association involved this issue. Even when the impact of this organized campaign is removed the issue drew 96 inputs which amounts to 53% of the remaining inputs, and resulted in the most intense of all the Public Issues.

a. Site Specific Proposals (Pro-Wilderness)

About 116 of the inputs included site specific proposals for additional Wilderness or support for proposals included in the Draft Forest Plan. The following proposals are listed in order of their public popularity:

- Pellick Ridge, Napoleon, Star and Hamilton Gulch additions to the Scotchman Peaks proposal (102 inputs)
- Trout Creek (88 inputs)
- Ten Lakes including Mt. Wam (76 inputs)
- Support of Cabinet Mountain Additions (70 inputs)
- Kootenai side of Tuchuck and Thompson-Seton (59 inputs)

In addition the following proposals were mentioned in three or fewer inputs: Entire Grave Creek drainage, South end of East Cabinet Front, Berray Mountain, McKay Creek, Green Mountain, Government Mountain, Chippewa, Rock Creek, Galena, Willard- Lake Estelle, Cube Iron, Deep Creek (in Thompson-Seton)

b. Site Specific Proposals (Anti-Wilderness)

There were seven inputs that opposed specific Wilderness or roadless area proposals contained in the Draft Forest Plan. Two inputs opposed the Ten Lakes proposal and two opposed the additions on the East Cabinets. Other proposals that were opposed include the following: the area between Leigh Creek and Treasure Mountain, upper Rock Creek, area just east of Bull Lake, the roadless areas along Rock Creek, Scotchman, Pellick Ridge, and Trout Creek.

c. Generally in Favor of More Wilderness

There were 65 inputs containing general statements in favor of Wilderness. The key words and phrases associated with these inputs are: "strengthen, protect, preserve", "keep Montana wildlands wild", "Montana can prosper from Wilderness by attracting tourism, hunting, fishing etc.", "KNF only has 4% Wilderness", "can provide a healthy volume of timber and conserve wild resources", "keep Montana special", "enough land is designated for logging", "preserve for future generations".

"Preserve for future generations" was a thought expressed in 24 inputs. About 18 inputs said there simply wasn't enough Wilderness and that the system should be expanded. Ten inputs made a blanket statement in support of the MWA position and seven sought to preserve all of Montana's roadless areas.

d. Generally Opposed to Wilderness

There were 47 inputs expressing general opposition to Wilderness. Key words and phrases were: "we don't need any more", "will restrict timber supply", "too few people use Wilderness", "no tax values", "waste of trees", "unfair to handicapped", "reduces FS flexibility", "multiple-use

is best". Concerns related to restrictions in timber supplies were expressed in 20 inputs. Eleven inputs favored Alternative N because it included no additional Wilderness. The Western Environmental Trade Association (WETA) feels that an aggressive management program rather than additional set-asides will provide a balanced use of the land.

e. Roadless Areas

There were 11 inputs that generally favored the roadless area concept for additional areas on the Forest. There was no general opposition to this idea. There were 49 inputs supporting site specific roadless designations. About 45 of these supported roadless designation for Roderick Mountain, Northwest Peaks, Robinson Mountain, Canyon Peak (Galena) and an upgrade to MA 29 for Cataract. Other areas mentioned were, additions to Trout Creek, Grizzly Peak, Gold Hill, LeBeau, Lower Fire Lakes, Smokey Lake, the western flank of Ketowke Mountain, Elk Mountain from Brush Creek to Bowen Lake, Leigh Creek to West Fork Fisher (upgraded to MA 29), and Allen Peak. Those generally opposed to the Wilderness concept did not express opposition to roadless area management or to specific roadless area proposals except as noted in the paragraph "Site Specific Proposals (Anti-Wilderness)" above.

f. Other Comments about Wilderness and Roadless Areas

There were 9 inputs proposing some alterations in designations:

- Boyd Hill Cemetery area removed from timber management
- Trap Trees on flanks of Mt. Wam could be MA 2
- Northwest Peaks should continue as a Scenic Area
- Several areas should be changed from MA 2 to MA 29 (Upper Vermillion, West side of Government Mtn., Dry Bench area on the Bull River, Mt. Vernon, entire east side of the Cabinets, Mt. Pend Oreille)
- Trout Creek roadless but not Wilderness
- Thompson-Seton should be MA 2, if not Wilderness
- Big Creek needs protection

There were also eight inputs suggesting changes in management direction. Some inputs suggested that mining interests need not be accommodated in the Scotchman or Cabinet Mountain areas or any other Wilderness. The Cabinet Wilderness direction was said to be too vague and subject to changes by individual rangers. One input expressed concern about the distribution of visitors in Wilderness areas and another was concerned about continued encouragement of snowmobile use in the Ten Lakes Area.

## 2. Timber Harvest

Concerns about timber harvest were expressed in 147 inputs (51%) making this issue the second most intense based upon public feedback. Commentors were fairly evenly split between those who favored no increase in harvest (45 inputs) and those who did (40 inputs). A major block of inputs (53 inputs) requested further analysis of a situation calling for historic sale levels (173 MMBF) coupled with 15 MMBF of salvage and a budget of $20,000,000.

### a. Opposed to Increased Timber Harvest

The comments in this category are listed below in order from most to least intense:

- 217 MMBF is too high (11 inputs)
- Excessive emphasis on timber without consideration of the forest as a whole (7 inputs)
- Do not increase harvest, much timber offered is not sold (6 inputs)
- Sales should be greatly reduced (4 inputs)
- Less or no clearcutting; Plan is a sellout to timber interests; What is lost can not be regained (3 inputs each)
- 35% increase in harvest is unacceptable; timber is important, but Kootenai should not have a high quota to offset diminishing supplies elsewhere (2 inputs each)

Other comments in this category were generally opposed to logging or the way in which the Forest Service handles the timber resource.

### b. Favors Continued or Increased Timber Harvest

One major comment in this category (11 inputs) expressed the belief that Wilderness proposals were decreasing timber volumes by removing lands from the suitable base thus timber harvesting could be increased if less Wilderness were proposed. Another comment (11 inputs) supported the notion that the Kootenai should increase harvest levels to offset declines on adjacent Forests. Other comments in order by intensity are:

- Timber industry is important for jobs/taxes/schools (7 inputs)
- Maximize the suitable acres and manage them intensively (6 inputs)
- Meet the needs of industry and maintain historic position in the region (4 inputs)
- Timber volumes too low, RPA goals not met; make 300 MMBF available; Proposed Action is biased toward non-timber interests; departure may be necessary for LPP (3 inputs each)
- Get back to raising timber; Can easily get 239 or 248 MMBF; maintain if not increase volume; industry should not have to give up their base supply (2 inputs each)

The remainder of these comments generally encouraged more harvest (251 MMBF with 109 MMBF LPP and 250 MMBF were mentioned) apparently linked to concerns of local economic stability.

c. Other Comments about Timber

There were many other comments related to management practices, none of which involved more than 5 inputs each. In general these comments addressed the following points: salvage more LPP, be more careful in sale implementation (soil/water perspective), more selective cutting, timber values in the plan are too high, longer rotation age, protect small planting contractors, focus sales in areas of existing roads, shorter rotations (especially LPP), free wood permits, no chemicals, more shelterwood cuts, leave seed trees for snags, harvest sawlogs and chips concurrently, etc.

3. Miles of Roads (Road Building)

Road mileages called for in the Plan were mentioned in 126 inputs, making it the third most intense issue. For the most part road building is opposed due to its negative impacts upon other resources. There were 115 inputs expressing opposition to road building. There were 99 inputs that simply asserted that there was too much road building. Sediment caused by roads and attendant degradation in water quality were addressed in 13 inputs. Nine inputs asserted that roads should not be built where profits from the timber sale do not cover the cost. Six inputs opposed degradation of the roadless resource and three inputs noted that roads don't help wildlife. One commentor wondered how snags could be preserved with roads everywhere.

The 5 inputs favoring road construction noted management uses, recreation uses and access to private lands.

There were 15 inputs containing specific comments about roads. Seven inputs spoke to road standards and maintenance while five mentioned specific road construction plans. There were a couple of other inputs addressing site-specific road concerns.

4. Wildlife (Including Old-Growth Timber)

The major issue here was concern about old growth timber stands and their associated wildlife species. There were 96 inputs favoring more old growth and one opposed to old growth. Three inputs noted that the Draft Plan sufficiently handled old growth and one suggested a worst-case analysis of old-growth management.

Other wildlife concerns involved a perceived need for more consideration for wolf, caribou, sheep and goats (5 inputs) and concern about roads disturbing wildlife (5 inputs). One input wanted additional elk security (refer to the road closure issue below) and another wanted less elk security. There were 11 inputs with proposed changes in management direction or land designations.

## 5. Soil and Water

The soil and water issue was the next most intense with 97 inputs expressing various concerns. Overall 86 inputs included comments indicating a need for more water quality protection and 15 inputs had specific suggestions. The largest concern was for protection of riparian and streamside habitats (71 inputs). Nineteen inputs were concerned about the EPA rating and the legal requirements for water quality. Fourteen inputs expressed concern about fish and wildlife impacts and 12 were generally concerned about sedimentation of streams.

## 6. Plan and DEIS Concerns

This category was for comments related to the actual documents themselves and the planning process in general. With 61 related inputs it became the sixth most intense issue category. In general these are procedural comments related to the commentor's perceived need for an additional fact or figure on some specific page in the document. In addition this category includes 25 inputs which opposed the Proposed Action for a number of reasons: general principles (9 inputs), prefers other alternatives (4 inputs), rerun the Proposed Action with different values (4 inputs), all alternatives increase timber and budget (3 inputs), etc.

The most critical comments in this category in terms of their substance (not intensity) are the following:

- Inadequate range of alternatives
  - no alternative for maximizing both wilderness and fish/wildlife
  - 15 alternatives all with timber above the 10 year average
  - No high amenity alternative
  - Alternatives should include a variety of levels of new road construction and development
  - All alternatives call for significant budget increases
  - Alternatives fail to examine timber sales levels above 262 MMBF
  - No alternatives used shorter rotations explored in the benchmarks
  - No uneven-aged management alternative
- Forestwide standards are too general
- Commercial thinning is not always practical
  - doubt that the Kootenai has the expertise to log 1/3 of the commercial thinning proposed
- Plans to increase the cut from 175 MMBF ignores the current state of the timber industry
- Projected timber supply is based upon proposed utilization standards which are not currently feasible (economically)
- Timber yield tables over-estimate harvestable volumes
- Over-estimated timber values had a major effect upon FORPLAN

## 7. Economics

The comments in this category are concerned first with economic impact (jobs and community stability) and second with efficiency (timber values, budget levels etc.). There were 29 inputs expressing concern about loss of jobs

caused by added Wilderness and/or reductions in timber harvest. There were 18 inputs concerned about economic stability including suggestions for diversification (tourism, computer schools, industry, oil/gas development etc.). Two inputs asked that the Forest service explore ways of making timber associated contracts more available to small local contractors. One input suggested guaranteed profits and cost-plus contracts for timber purchasers.

On the efficiency side there were 10 inputs expressing concern about the values used in the plan. Five inputs suggested that returns to the government and jobs created were exaggerated. Five inputs asked for consideration of the consequences of budgets lower than those displayed in the plan.

There were 9 inputs promoting the notion that the Forest should generate a profit through timber sales by avoiding below cost sales.

## 8. Threatened and Endangered Species

There were 40 inputs expressing comments on threatened and endangered species. All related to grizzly bear. Twenty inputs favored managing for grizzly bear and generally expressed concern about various aspects of the Forest Plan that appeared to conflict with this viewpoint. The conflicting activities that were mentioned included the following: timber harvest, roading, removal of cover, ORV use and road use. The US Fish and Wildlife Service found that the proposed plan is not likely to jeopardize the grizzly bear.

There were 14 inputs generally opposed to grizzly bear management. Nine inputs suggested that grizzly management is excessive, bears should not affect other uses and the State (FW&P) should manage the bears. Most of the remaining inputs simply indicated that bears are undesirable or they involved no conflict with other uses and should not be any problem. Plum Creek Timber Company, Inc. noted that they were not interested in granting grizzly bear easements and suggested that certain MA 14's be eliminated.

There were 11 inputs providing specific suggestions for land designation or management changes.

## 9. Road Closures

There were 30 inputs with comments on road closures. Fifteen favored road closures and four opposed road closures. Ten were concerned about the methods of road closures with six opposed to gates and four suggesting that more funding was needed for enforcement. Five inputs included specific recommendations regarding road closures.

## 10. Monitoring and Evaluation

There were 26 inputs addressing the monitoring and evaluation portion of the Plan. About 23 of these inputs noted that funding was insufficient and the activities were not adequately described. Areas of concern were water quality, grizzly, other wildlife, fisheries and timber. Other area of monitoring that were mentioned as being needed were conflicts between livestock and wildlife and affects upon adjacent landowners. One commentor wondered who was going to monitor the districts to be sure the plan was being followed.

One commentor suggested that the plan include an education program to increase public awareness of rules and regulations. Another commentor doubted that monitoring water quality in MA 18 would be necessary.

## 11. Fisheries

There were 19 inputs on the fish issue and all of them indicated a concern for potential damage to fisheries. Twelve inputs noted that the plan shows little regard for fisheries and is probably illegal. Eight were concerned about roads damaging streams. Four were concerned about the cutthroat fishery. One indicated that the decline in trout fishing is due to too many fishermen. One commentor had specific comments on fish management in the Wilderness.

## 12. Other Issues

The other issues listed in the previous section on "Perspective on the Public Issues" (VI.C.) displayed relatively low intensities of public interest. Some of the more substantive comments in these other areas are as follows:

- Inadequate analysis of mineral, oil and gas potential (8 inputs)
- Noxious weeds should be addressed (2 inputs)
- The Nature Conservancy identified three plants and five animals on the Forest which should be given some consideration (1 input)
- The State Historical Preservation Officer suggested broader consideration of cultural resources in several areas of the plan (1 input)

13. Summary of the Intensity and Direction of the Public Input

The new DEIS, released in July, 1985, presented six Major Issue Groups which were considered to be the greatest public concern. These public concerns were the result of the Public Response Analysis of the original DEIS issued in November, 1982.

Those six Issue Groups were:

- Timber Production and the Associated Road Construction, including the Harvesting of Mountain Pine Beetle-Infested Lodgepole Pine and the Effect on Water Quality and Fisheries.
- Wilderness and Roadless Management, including the Effect on Minerals, and Oil/Gas Exploration.
- Wildlife and Fish Production, including the Recovery of the Grizzly Bear, Old-Growth Timber-Dependent Species, and Riparian Areas.
- Local Economic Effects, including providing for more Economic Diversity such as Recreation Tourism.
- Visual Quality Protection and the Effect on Timber Harvest.
- Minerals and Oil/Gas Exploration and Development, including the Question of Access as a Result of Roadless or Wilderness Designation.

Other Issues were:

- Landownership Adjustments, especially in Identified Grizzly Bear Habitat and Roadless Areas.

The results of the latest Public Response Analysis, verify most of the above Issue Groups and add several more. The new Public Issues are:

- The Adequacy of the Monitoring And Evaluation Plan.
- Concern for the Economic Values in the Plan, especially the Timber Values and a potential Budget Shortfall.

## E. Synopsis of the Forest Plan Major Public Review Issues

The following are the major issues identified during the Public Review period, in order of the times the issue was expressed. They were determined to be the most important items to resolve in the Final Forest Plan and were the basis for formulating a final resolution strategy which is described in Section F, next.

### 1. Wilderness

Wilderness should be designated in the Scotchman Peak, Trout Creek, Ten Lakes, Cabinet Additions, Tuchuck and Thompson-Seton Roadless Areas. Pellick Ridge should be added to the KNF wilderness proposal for Scotchman Peak. Conversely, there should be no more wilderness designated on the KNF to insure an adequate timber supply and provide for jobs and Mineral, Oil/Gas exploration.

2. Timber Harvest Levels

The total timber harvest levels projected are too high in comparison with the historical harvest levels and will require too many roads at the expense of Water Quality, Roadless Areas, Fisheries, and Wildlife, including the Grizzly Bear. The projected harvest levels are out of proportion with such recently observed events as the "Timber Buy Back", the local and regional changes in sawmilling capacity, imported lumber from Canada, and anticipated Budgets as the result of Federal Deficit Reduction Programs currently evolving. Conversely, the projected timber harvest level is a reduction in recently experienced Sell levels and timber supplies will be inadequate by the end of the first decade because of declining supplies on the adjacent National Forests (Lolo, Flathead and Idaho Panhandle) and on adjoining private timberlands.

3. Road Construction

The Plan projects too much road construction which will have serious effects on water quality, fisheries, wildlife and roadless areas.

4. Old-Growth Timber

Old-Growth Timber has only been designated to provide for a minimum viable population and does not insure against natural hazards, such as fire, windthrow, etc.

5. Water Quality

The projected increase in the miles of roads will have a significant adverse effect on water quality because of potential increased sediment delivery to streams. This water quality degradation will effect fisheries, recreation use, the quality of life, and will probably be "illegal" (according to some of the public).

6. Economics, Part I - Effects on the Local Economy

Jobs may be lost because of a decline in timber harvest due to an increased emphasis on wildlife, including the grizzly bear, and additional wilderness and roadless areas. A more diversified economy is desired which includes more tourism, timber-related manufacturing, mining, and oil and gas development.

7. Economics, Part II - Unrealistic Economic Values and Budgets

The economic values used in the Proposed Plan are not realistic (too optimistic), especially the timber values in relation to other values such as recreation and wildlife. Also, the budget necessary to carry out the Proposed Plan is too optimistic in relation to recent economic events, such as the "Timber Buy-Back", Federal Deficit Reduction Programs, and Canadian imports.

8. Grizzly Bear Recovery

It's important to manage for the recovery of the grizzly bear because it has as much right to live in peace as the rest of us, and it can be a barometer to indicate how well we are managing for all the resources. Conversely, People and bears do not mix, and managing for the recovery of the bear is excessive and will effect other uses such as mining, logging and recreation.

9. Road Closures

Road closures are needed to insure security for big game, including the grizzly bear, and for recreation solitude. The funding is inadequate to enforce the necessary road closures. Conversely, more road closures are not needed because it restricts peoples use of the forest. People need to be able to get out and get wood, pick berries, hunt or just go for a Sunday drive. The roads are built with public funds and should be left open for public use. No more Gates!

10. Monitoring and Evaluation

The Monitoring and Evaluation (M&E) Plan is vague and the projected funding for M&E is not adequate to insure that the Plan's objectives will be reached.

11. Fisheries

The amount of new roads will undoubtedly contribute to sediment levels and reduced water quality which will impact the fish habitat and cause a decline in the fishery resource. The Plan does not display an adequate emphasis on the fish resource and may be illegal.

## F. Proposed Resolution of the Major Public Issues

This section displays the major public issues as interpreted by the Kootenai National Forest and the approach taken to try to resolve them.

### 1. Wilderness

#### a. Issue

Whether or not to add any more wilderness, and if so, where and how much? This is the most polarized of all the Issues and the most intense. The areas mentioned the most are: Scotchman Peak and Trout Creek.

#### b. Background

The opponents of wilderness fear loss of jobs because of potential resource opportunities foregone. The wilderness that has been recommended in the DEIS has not, to the best of our knowledge to date, precluded any significant timber, or known minerals or oil/gas resources. This has been the decision criteria used to date. The KNF wilderness recommendations are similar to the Governors recommendation except for Pellick Ridge in the Scotchman Peak Roadless Area.

#### c. Decision Space

The Pellick Ridge portion of Scotchman Peak is the key to consensus on any additional wilderness on the Kootenai. Its history of public support is well documented in both Rare I and II and in the public comment on the Proposed Plan.

The KNF eliminated Pellick Ridge because of a combination of timber and mineral resources, and to provide a more manageable topographic boundary. The majority of Pellick Ridge was designated to roadless or non-developmental resource uses because of economic and/or environmental constraints.

The Governor's Task Force used a similar resource criteria on Pellick Ridge but compromised on the topographic boundary criteria in order to recommend as large a wilderness as possible. The Montana Congressional Delegation in June, 1984, recommended a proposal similar to the Governor's recommendation.

d. Discussion

Reanalyze the information on mineral potential in the Star Gulch area to ensure that the values are still significant enough to offset the potential wilderness value. If the mineral information appears less favorable, be willing to accept a less manageable boundary to achieve as large an addition as possible to the Wilderness System without other resource conflicts.

e. Resolution

Add 12,000 acres of wilderness on Pellick Ridge, in the Scotchman Peak Roadless Area, at the expense of having to manage a less desirable wilderness boundary. The mineral potential in the Star Gulch area was found to be less than previously thought based on more recent drilling information. This addition would be consistent with our previous criteria of not precluding significant resource options and would be an administrative inconvenience and not a resource tradeoff. This proposal would be consistent with the recommendations of the Governor and the Congressional Delegation. It would also coincide to a greater extent with the Montana Wilderness Association recommendation. No other wilderness additions (or deletions) are considered necessary to resolve the Wilderness Issue on the Kootenai Forest.

The Trout Creek area was re-examined but the high potential for elk management plus some mineral potential led to the decision to retain a designation which would permit management of the elk habitat while also providing mineral exploration opportunities. This is consistent with the Governor's recommendation.

2. Timber Harvest Levels

a. Issue

Whether or not to increase the potential timber harvest over the historical level and, if so, how much? This is the second-most polarized Issue on the Kootenai and is similar to the Wilderness Issue in it's intensity.

b. Background

The Issue revolves around the proposed timber sell and potential harvest level. One side fears that the proposed sell (and possible harvest) is too high, both budgetarily and environmentally; while the other side fears that timber jobs may be jeopardized in the future when the economic outlook for timber may improve. The timber Issue is also closely linked to the Road Construction, Water Quality, Fisheries, Old-Growth Timber and Economics Issues. These other issues are results of the level of timber harvest.

c. Decision Space

The actual timber sell level has averaged about 198 mmbf/yr (1973-1984), compared to an actual harvest level of 173 mmbf/yr for the same period. These figures include salvage volumes and are on the existing Utilization Standards (the sell level was calculated prior to the Timber Buy-Back program). The volume of timber presently under contract (after Timber Buy-Back) is about 613 mmbf or about three years sell. The average actual budget for the 1980-1982 fiscal years was $24.6 million/yr. The actual road construction mileage for the same period was 155 miles/yr.

The above combination of factors is presently calculated as causing a reduction in the catchable fish populations of the streams on the Kootenai.

The Proposed Action, in the Forest Plan document of the Draft EIS, projected a 16% increase in the historic timber sell level to 233 mmbf/yr, including salvage. This would require a budget increase of 22% and a road construction increase of 62%. Projected fish losses would increase 2% but these figures are rough estimates.

d. Discussion

Because of the existing calculated fish losses that are presently occurring and the amount of timber volume under contract, it would be prudent to consider a reduction in the historic timber sell levels; especially when future budget levels appear to be on a decline. But, because of the high dependency of the local communities on timber-related employment, a reduction could have significant local effects. In contrast, an increase in the actual timber harvest level is calculated to aggravate a potentially undesirable fish resource situation. It appears then, that a compromise is warranted and a continuation of the present course of action is recommended. This would result in an Allowable Sale Quantity close to the historic sell level of 198 mmbf/yr, which is 202 mmbf/yr, similar to the Proposed Plan (Alt.J).

In order to offset any potential fish losses, the Monitoring and Evaluation Plan will be strengthened to ensure that water quality is not degraded and fish habitat is protected. This also includes reducing the total miles of road needed, reducing the number of miles built per year, and reducing the road standard (road widths and amount of excavation).

e. Resolution

The Allowable Sale Quantity will be maintained in the first decade, similar to the DEIS. The rate of projected fish loss will not improve, but the roughness of the fish-loss calculations warrant the risk-taking in this resource area rather than in the local economy factor. The unknowns relating to the amount of actual timber harvest that may occur in the next decade could result in a smaller calculated fish loss.

## 3. Road Construction

### a. Issue

How to build fewer miles of new road and reduce the impacts of road construction while providing access for resource management and use. This is the third-most intense issue and has been the most consistent issue since the beginning of the Forest Planning process in April, 1979.

### b. Background

The public has expressed a desire for a lower total road mileage and a slower rate of road construction. The fear of damage to a variety of resources such as, roadless, soil, water, fisheries, wildlife, etc., leads to the opposition to roads.

### c. Decision Space

Part of this issue was addressed by an I.D. Team (Resolution Committee) after the original DEIS in November, 1983. Given a regulated timber base acreage to be accessed, the committee concluded that the current and anticipated match of logging equipment, timber, and topography eliminated the possibility of substantial reductions in road mileage. This leaves reduction of the regulated (or suitable) timber acreage as the only direct way to reduce total road mileage projections.

Removal of the 40,000 acres in the timber base that are over 60% slope would reduce the estimated road needs by less than 100 miles. To effect a reduction in road miles in the order of 1000 miles would require removal of all 60%+ slopes and about 103,000 acres in the slope zones between 40 and 60%. This is about 10% of the total regulated base. Removal of MA 13 from the regulated base would reduce the base by 92,500 acres and significantly reduce anticipated road needs (500 to 800 miles).

Recent developments in National budgeting policies strongly indicate that reduced capital investment budgets can be expected in the future. A constrained capital investment budget and recent pressure to reduce the number of below-cost sales may have the effect of spreading the schedule of road construction out over several decades beyond that predicted in the DEIS, and reduce the immediate impacts of roading on all resources. Recent evidence has indicated that the effort to reduce road costs and road mileage appears to be producing results. The miles of road construction per million board feet of timber harvested has been declining. If this trend continues, the amount of roads actually built at the 5-year Forest Plan review period will be less than projected in the Final EIS.

d. Discussion

Attempt to reduce the regulated timber base with the least amount of effect on timber harvest and the maximum effect on road construction. For example, remove steep lands and lower productivity lands from the regulated base by designating to other uses such as winter range, roadless, etc. (Most of the steep and lower productivity lands were removed from the regulated base after the previous public comment period). Analyze the effect of removing the Old-Growth Timber designation (MA 13) from the regulated base. Use timber scheduling to spread out the rate of road building by forcing lower budget levels, especially in the first decade.

e. Resolution

The reduction in the timber base needed to resolve the Old-Growth Timber issue will reduce the total miles of road needed (See the Old-Growth Timber Issue). Thus the objections of the public can be, at least partly satisfied. Limited budgets and adjusted harvest schedules may spread the construction out to the fourth or fifth decade and reduce immediate impacts, another area of expressed concern. The result of limited budgets may reduce the amount of Mountain Pine Beetle-infested Lodgepole Pine that will be scheduled in the first decade.

4. Old-Growth Timber

a. Issue

The primary issue is the amount and management of old growth timber stands.

b. Background

The Proposed Forest Plan (Alt. J) called for a minimum of 8% of the Forest's acreage below 5,500 feet to be in an Old-Growth condition at all times. This was accomplished in the Plan through designation of about 92,000 acres in MA 13, which was in the regulated base, 40,000 acres in other non-harvest designations, and via constraints which delayed harvest of other lands so that sufficient acreage will have stands at least 250 years old.

The public generally wanted more old-growth timber, citing the following: (1) our contention that 8% was sufficient for a minimum viable population of dependent species and pointing out that there is considerable risk in keeping these species at the brink of extinction in this area, (2) a lack of faith in the Forest Service's ability to manage old growth as regulated timber on a 250-year rotation.

Suggestions involved increasing the percentage of old growth to 10, 12, 15 or 20% or more to reduce the risk of error in what a minimum requirement is, and moving MA 13 out of the regulated base.

c. Decision Space

The decision space for this issue is closely linked to the timber and road construction issues. Removing MA 13 from the regulated base would reduce road miles on the order of 500 to 800 miles. Adding acres to MA 13 and making it unregulated would decrease the amount of roads needed, plus reducing first decade timber harvest levels proportional to the decrease in the suitable timber base.

Increasing the percentage of old growth in the regulated base would delay the harvest of these "high net return" stands and reduce harvest levels similar to the example stated above. It would also do nothing for the concern people have about extremely long-term management of these stands.

The total amount of old-growth timber presently available that meets the wildlife criteria for timber-dependent species is 11% of the Forest land base below 5,500 feet elevation.

d. Discussion

Attempt to resolve this issue with the least effect on timber volume and the most effect on total road mileage. First, remove the existing MA 13 acres from the regulated base. If road mileages and budgets still appear too high, add additional old-growth timber acres. Attempt to achieve a minimum of 10% of the Forest total acres below 5,500 feet elevation to reduce the Public's concern for "minimum acres."

e. Resolution

The amount of MA 13 was increased to insure that 10% of the Forest land below 5,500 feet elevation will have old-growth characteristics and was also removed from the suitable (regulated) timber base. The effect of implementing this resolution will be a reduction in total road construction needs on the order of 500 miles and improved assurance that sufficient old growth will be available to maintain populations of dependent wildlife species. This is consistent with the stated purpose of the Proposed Action and the Final Plan to retain options for the future.

5. Water Quality

a. Issue

The issue is degradation of water quality by road construction and logging and its effect on fisheries.

b. Background

The EPA cited potential damage to water quality as a major problem with the Proposed Forest plan. The public input on this issue was unanimous in asking for protecting water quality. The indicator of water quality used in the Draft EIS was calculated fish numbers. The fishery issue is directly related to the water quality issue. Since ground disturbance caused by road construction and logging is the primary controllable cause of water quality reduction, this issue is also linked to the timber and road construction issues.

Recent court decisions have declared that use of best management practices (BMP's) does not by itself satisfy the Clean Water Act. Rather, the judgement of whether the requirements of the act are met is based upon the resulting quality of the water. Thus, the monitoring and evaluation issue becomes linked to the Water Quality issue.

c. Decision Space

Any reductions in the timber harvest and/or road construction levels will help resolve this issue. The estimating procedures used to project fish numbers are rough. Thus it is difficult to predict impacts of changes in management direction with much accuracy. The actual decision space for this issue is limited by the fact that water quality must meet applicable standards. The flexibility lies in the way in which this is accomplished.

Reductions in actual road construction and timber harvest levels would help protect water quality. Specification of best management practices and careful monitoring of those practices, as well as resulting water quality can help meet the requirements of the Act.

d. Discussion

Attempt to reduce the total amount of road construction and timber harvest. In order to be sure that water quality standards are met it will be necessary to specify additional monitoring of water quality as well as processes to prevent degradation from occurring and to stop it when it is found.

Definition of best management practices and their inclusion in the Plan and sale contracts will go a long way toward preventing damage from occurring if monitoring processes insure that these BMP's are actually carried out on-the-ground. As the court has stated, BMP's do not solve the problem. Thus direct monitoring of water quality and provisions to stop offending activities and rehab any damage will be necessary.

e. Resolution

Add requirements to the Monitoring and Evaluation Plan to insure that water quality standards are not violated and be prepared to alter or stop activities found to be seriously degrade water quality. The commenting public probably will not be satisfied fully until actual implementation of these activities are seen to work on-the-ground.

6. Economics, Part I - Effects on the Local Economy

a. Issue

What level and mix of resource opportunities should be provided to ensure a minimum of disruption in local historic job categories, and to provide for future economic diversity?

b. Background

The Issue revolves around the natural concern for jobs and community stability. Lincoln and Sanders Counties are resource- dependent areas which have unemployment levels that consistently exceed the State Unemployment Average. The recent recession has been particularly difficult in the timber-dependent job categories, and recent industry reorganizations and plant modernizations have further reduced job opportunities. Approximately 50% of the timber harvested on the Kootenai is transported to sawmills in Flathead County or Boundary County, Idaho. Recently, local community efforts have been started to help diversify the timber-related dependency. Recreation Tourism has been one of the resource areas explored. Minerals exploration has also been encouraged.

c. Decision Space

The historic timber harvest level on the Kootenai has been about 173 mmbf/yr. Maximum allowable timber harvest levels in the first decade have been calculated at about 262 mmbf/yr. This increased harvest level would require a 45% budget increase, and a road construction increase of 103% over the last ten-year average. Serious concerns have been raised by the EPA on the potential water quality effects of our recent Proposed Plan which projected timber harvest and road construction levels of plus 36% and plus 57%, respectively. Existing timber volume under contract is about 613 mmbf which is about a three-year sell.

Recent mineral exploration has resulted in discoveries that are currently evolving toward two mine developments which could provide employment for about 15-30 years for 650-700 people. Exploration is still occurring and several locations rate high to very high for future economic discoveries. Potential withdrawals from mineral entry could range from a 26% decline to a 133% increase, depending on the amount of wilderness recommendation. The Proposed Plan recommended a 1% increase in potential mineral withdrawal.

The big-game animals on the Kootenai include all the huntable species except Antelope. The elk population could expand 40-100%, depending on the emphasis and expenditure given to its management. Trophy-hunting exists and the potential for its expansion is good.

Currently, about 26% of the Kootenai is roadless and undeveloped and the least possible amount to remain roadless is 16%. The Proposed Plan projects 23% to remain roadless and undeveloped including existing and proposed wilderness.

d. Discussion

Provide for as many options for economic development and diversity as possible, both in the historic resource-dependent categories of timber and minerals, and in the recreation-tourism categories such as hunting, outfitting, fishing, camping, etc.

Achieve this by, (1) providing a timber sale level that provides for a continuation of the historic sale levels, and (2) by providing mineral exploration opportunities wherever the potential is determined to be high. Keep potential mineral withdrawals as low as possible.

Give emphasis to big-game management that provides for a complete spectrum of hunting opportunities. This includes everything from trophy animals to meat hunting; to provide a basis for a recreation industry, including outfitting, campgrounds, retail sales of hunting supplies and equipment, etc.

Give emphasis to maintaining and improving the existing and potential stream and lake fisheries to provide for recreational and commercial fishing opportunities.

Retain the highest possible amount of roadless and undeveloped land, consistent with the above-mentioned timber and mineral objectives, to provide for wilderness and roadless recreation opportunities which could contribute to the recreation industry similar to that stated above for big-game hunting.

e. Resolution

Retain the timber program defined in the Proposed Plan which allows for the historic sell level of the last ten years. This will provide for historic timber harvest levels which should provide stability in timber-dependent jobs. If the recent declining trends continue in the miles of road built per million board feet, this will reduce the effect on water quality and fisheries and help maintain recreational attractions.

An increase of about 12,000 acres of recommended wilderness on the Scotchman Peak Roadless Area to provide for as large a wilderness as possible, while still providing for timber and mineral options. This will provide for a large wilderness in Northwest Montana and Northeast Idaho which desires additional recreational business opportunities.

No additional mineral withdrawals where the potential is high, allowing for future mineral exploration and potential development.

7. Economics, Part II - Unrealistic Economic Values and Budgets

a. Issue

How to accommodate more recent and up-to-date economic information in a Final Proposed Plan.

b. Background

The economic values, such as timber revenues, were derived from a period that were more favorable then those presently being experienced. This raised anxieties about "bias" favoring timber.

In addition, no alternatives were constrained to meet any pre-determined Budget Level, except the Current Direction (or Current Program). Anxiety was expressed about what would be "sacrificed" in the event that a budget shortfall was experienced.

c. Decision Space

The reason for the unconstrained budget levels was to evaluate the resource potentials, including the necessary budgets to produce those potentials. Because of the high resource capability and potential on the Kootenai, budget increases of 20% to 69% were calculated and presented. These large increases produced anxieties about the realism of expecting budget increases of these magnitudes, especially in light of the recent developments occurring regarding Federal Deficit Reductions.

d. Discussion

Utilize more recent Timber Price information supplied by the Regional Office (PP&B) to obtain a more up-to-date revenue picture. In addition, run the Final Forest Plan with a constrained budget level that is about 5% to 10% above what we used for the Current Program.

e. Resolution

The Final Forest Plan was developed using the same Economic data as the Proposed Plan. A new set of Economic information including lower base timber prices, slower rates of real price increases, and lower road costs, were tested and found to have a small effect upon the resolution of the other issues. The elimination of commercial thinning as a regular practice reduced first decade budget needs.

8. Grizzly Bear Recovery

a. Issue

How to recover the Grizzly Bear and still meet needs for jobs and recreation.

b. Background

The previous DEIS, in November, 1982, received a Jeopardy Opinion from the U.S. Fish & Wildlife Service. Since then, replanning has lead to a Non-Jeopardy Opinion, received in June, 1985. The replanning includes the principle that every acre of identified grizzly habitat will be managed to provide maintenance and support for the grizzly bear. In the case of Situation 1 Grizzly Habitat, management direction clearly gives preference to the bear in the event of any conflict with a proposed development.

c. Decision Space

The law is clear that the Kootenai must manage for the recovery of the grizzly. What is not so clear, is where conflicts between basic laws arise. For example; conflicts between the T & E Act and the 1872 Mining Law.

d. Discussion

Continue to promote, and co-operate in, all possible activities that may lead to the rapid recovery of the bear. This includes studies that may reveal information on the habitat needs of the bear and augmentation studies.

Continue to promote and utilize the Cumulative Effects Analysis Process to insure adequate protection of the bear while allowing legitimate, environmentally sound, resource development proposals to proceed.

Continue to work with other Agencies (such as the State Dept. of Fish, Wildlife & Parks) to keep the Public informed and involved on all new changes in grizzly bear strategy and management practices.

e. Resolution

Manage all identified habitat acres supportive of and compatible with the grizzly bear. No one can predict for sure when or if the bear will be recovered. It is anticipated that the recovery of the bear will be controversial, at least until local economic conditions change for the better.

9. Road Closures

a. Issue

How to achieve more road closures with fewer people, less money and a sometimes hostile public.

b. Background

This issue primarily concerns recreation use and is intense with some sectors of the public because of the restrictions on lifestyle and recreation opportunity. Examples are: Older folks, not as physically capable as others, and motorized recreationists (trail bikers, 4-wheelers, snowmobilers, etc.). Others support additional road closures because of the positive effects they perceive, such as wildlife security and recreation solitude. Examples are: hikers, horseback riders, cross-country skiers, etc. Hunters can be found on both sides of the issue.

c. Decision Space

The Proposed Plan required a significant increase (57%) in the miles of road needing road closures. Most of the road closures are the method for managing for a particular end result such as grizzly bear recovery, elk, or roadless recreation. Some road closures are for public safety (washouts) or resource protection (fire closures).

Some options are available to provide for a range of recreational opportunities; some motorized - some nonmotorized. This would be consistent with the goal of providing for local recreational-economic opportunities. For example, suggestions have been received from the Backcountry Horsemen on roads that could be closed to provide readily-accessible horseback riding trails for groups. Suggestions have also been received from the Libby Sno-Cats, a snowmobile club, for areas that could be improved for snowmobile use. This could attract snowmobile groups.

d. Discussion

Analyze all land designations for options to improve recreational opportunities consistent with the basic management area prescription. Use all available methods, including yearlong closures, seasonal closures or

no closures except during breakup, emergencies, etc. Utilize the expertise and manpower of interested groups to help reduce costs of planning and enforcement.

e. Resolution

Roads will be closed gradually, over time, to maintain public access at about the current level. As new roads are built they will be closed after the timber sale is completed. Gates or other movable barriers will normally be used on roads requiring seasonal closures to reduce the cost of opening and closing. Priorities for road management will be in grizzly bear habitat, big-game winter range, domestic watersheds, and riparian areas when manpower and funding is limited.

10. Fisheries

a. Issue

How to reduce the projected decline in the Stream-Fishery without impacting the local economy.

b. Background

The projected rate of decline in the stream-fishery is estimated at about 3% in the first decade and worsening to 7% by the third decade. This rate of decline correlates to the historical timber harvest and road construction levels of 173 mmbf/yr and 155 miles/yr, respectively, for the last ten years. Natural causes such as flooding are also contributory to the decline.

c. Decision Space

Preliminary straight-line projections indicate that a timber harvest level of 125 mmbf/yr and a road building rate of 110 miles/yr would reduce the rate of fish decline to zero. This would be a reduction of about 28% for timber and 30% for road construction, respectively, compared to the average for the last ten years. The Proposed Forest Plan estimated 217 mmbf/yr timber harvest and 244 mile/yr of road building. These are increases of 25% and 62%, respectively. (The road building projections were based on a 5-year period of active road construction. Recent experience indicates that this road-building rate is declining. See item 2. in this section). Existing timber volume under contract is 613 mmbf.

Strong Public Concern has been expressed for the protection of water quality, and the EPA and Governors Task Force have expressed serious reservations about the increased level of road construction and timber harvest proposed in the DEIS.

d. Discussion

Because of the projected decline in stream fisheries it would appear to be prudent to attempt a reduced timber sell level during the life of the plan, especially when viewed in light of the amount of timber under contract. But, because of the local timber-dependent economies, any reductions below historic levels would be considered an economic hardship. It is proposed that an Allowable Sale Quantity no lower than the historic sell level be provided. (The historic sell level for the 10-year period of 1974-1983 is 198 mmbf/yr.)

In addition, increased emphasis be given to the Monitoring and Evaluation Plan to ensure that timber sale activities meet State Water Quality standards. Emphasis also needs to be given to the maintenance and improvement of the stream fishery habitat. This should provide an insurance against any further declines in fish numbers as well as provide for possible improvement in the future.

e. Resolution

Timber sale offerings will remain as described in the Proposed Plan to provide for economic stability while providing no increase in the calculated rate of decline of the stream fisheries. This should provide for an annual timber harvest rate that at least meets historic harvest levels. (The historic harvest level for the 10-year period of 1973-1984 is 173 mmbf/yr)

11. Monitoring and Evaluation Plan

a. Issue

How to ensure that Forest activities are carried out in a manner that meets the intent of the Forest Plan.

b. Background

The public comment indicated very little faith that the Monitoring and Evaluation (M&E) Plan would be adequately funded to accomplish the work outlined (which they also thought was already too vague to begin with). Serious reservations were expressed, especially in the case of water quality and fisheries, and old-growth timber. It appears that some of the concern may have emerged from insufficient footnoting to explain that the funding expressed in the Proposed M&E Plan was only that needed IN ADDITION to what was already being spent on similar work, e.g. stream channel stability investigations, etc. Reservations were also expressed about the degree of latitude or variance that could occur before any corrective action would be considered necessary.

c. Decision Space

The Monitoring and Evaluation Plan is a management control tool that is used to insure that intended actions achieve intended results. It can be designed and structured to be as flexible or inflexible as desired. It is also a highly visible portion of the Forest Plan document which can be pinpointed by the public.

d. Discussion

Reanalyze the Monitoring and Evaluation Plan to achieve a practical control vehicle that is cost effective and builds public confidence. Focus in on the indicators that will yield the most useful and timely information to insure that undesirable effects do not occur before effective action can be taken.

e. Resolution

The Monitoring and Evaluation Plan was reanalyzed and critiqued to insure that a practical control tool would be the result. See the M & E Plan in the Final Forest Plan document.

12. Direction for Development of a Final Forest Plan as Determined by a Review of the Public Input Analysis.

The basic strategy used in resolving the above-mentioned public issues is outlined below. Details on the actual final analysis and results can be found in the Addendum to Chapter II and the Addendum to Appendix B in this document package.

(1) Reassure that the Forest FORPLAN model does represent reasonably expected timber yields. This was done to ensure that the FORPLAN model is not biased.

(2) Reanalyze the wilderness issue on Pellick Ridge, in the Scotchman Peak roadless area, to ensure that the latest known mineral information is considered for any final wilderness recommendation.

(3) Reanalyze the amount of old-growth timber that can be provided for wildlife diversity. This was done with the intention of reducing the overall need for roads to also help resolve that issue as well as help resolve the water quality and fisheries issues.

(4) Reanalyze the amount of timber harvest that can reasonably be expected. This involved a reduction in the amount of commercial thinning that can be reasonably expected during the life of the Forest Plan. (Commercial thinning is proving to be an uncommon practice on-the-ground.)

(5) Analyze attempts to reduce the projected budget level. This was done to help resolve the concern about possible inadequate budgets in the future.

(6) Reanalyze the Monitoring and Evaluation Plan to strengthen the Water Quality monitoring standards. This was done to ensure that it was a practical management control tool to ensure that water quality will meet State standards.

The goal during all the above-mentioned analysis was to maintain timber harvest levels similar to those presented in the Proposed Plan (Alt. J) to ensure local economic stability.

These analyses indicated the "real" decision space available on the KNF for resolving the Issues raised during the public review period. Other on-the-ground land designation changes were also analyzed, such as roadless and timber designations, but they were localized and had a minor economic effect on the total Forest Value, although they were important concerns to some of the public. The premise was that if all of the above issues could be reasonably resolved, then the net public benefit would be the highest possible of all the alternatives presented in the Draft EIS.

# GLOSSARY

ACRE EQUIVALENT: A unit of habitat related to fish or wildlife habitat improvement projects. Acre equivalents are based on the acres of habitat that are influenced by an acre of habitat actually modified by the project.

ACRE-FOOT: A measure of water or sediment volume equal to the amount which would cover an area of 1 acre to a depth of 1 foot (325,851 gallons or 43,560 cubic feet).

ACTIVITY: A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and range land outputs or achieve administrative or environmental quality objectives.

ADMINISTRATIVE FACILITIES: Those facilities, such as Ranger Stations, work centers and cabins, which are used by the Forest Service in the management of the National Forest.

AIRSHED: Basic geographic units in which air quality is managed.

AIR QUALITY: Refers to standards for various classes of land as designated by the clean air act, P.L. 88-206: Jan. 1978.

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| Class I Lands: | Wilderness |
| Class II Lands: | National Monuments, Primitive areas, Preserves, Recreation areas, Wildlife refuges, Lakeshores, Seashores |
| Class III Lands: | All other lands |

AFFECTED ENVIRONMENT: The biological and physical environment that will or may be changed by actions proposed and the relationship of people to that environment.

ALLOWABLE SALE QUANTITY: The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

ALTERNATIVE: A combination of management prescriptions applied in specific amounts and locations to achieve a desired management emphasis as expressed in goals and objectives. One of several policies, plans, or projects proposed for decisionmaking. An alternative need not substitute for another in all respects.

AMENITY VALUES: Resource use for which market values (or proxy values) are not or cannot be established.

ANALYSIS AREA: One or more capability areas combined for the purpose of analysis in formulating alternatives and estimating various impacts and effects.

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 the equivalent of a 1,000 pound mature cow for one month.

ANNUAL FOREST PROGRAM: The summary or aggregation of all projects for a given year that, for a given level of funding, make up an integrated (multi-functional) course of action on a Forest planning area.

APPROPRIATE SUPPRESSION RESPONSE: The planned strategy for suppression action (in terms of kind, amount, and timing) on a wildfire which most efficiently meets fire management direction under current and expected burning conditions. The response may range from a strategy of prompt control to one of containment or confinement.

AQUATIC ECOSYSTEM: A stream channel, lake or estuary bed, the water itself, and the biotic communities that occur therein.

ARTERIAL ROADS: Roads comprising the basic access network for National Forest System administrative and management activities. These roads serve all resources to a substantial extent, and maintenance is not normally determined by the activities of any one resource. They provide service to large land areas and usually connect with public highways or other Forest arterial roads to form an integrated network of primary travel routes. The location and standards are often determined by a demand for maximum mobility and travel efficiency rather than by a specific resource management service. Usually they are developed and operated for long-term land and resource management purposes and constant service.

AUM: See Animal-Unit Month.

AVERAGE ANNUAL CUT: The volume of timber harvested in a decade, divided by 10.

BASE SALE SCHEDULE: A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity.

BENEFIT-COST RATIO: Measure of economic efficiency, computed by dividing total discounted primary benefits by total discounted economic costs.

BEST MANAGEMENT PRACTICES (BMP'S): The set of practices in the Forest Plan which, when applied during implementation of a project, ensures that water related beneficial uses are protected and that State water quality standards are met. BMP's can take several forms. Some are defined by State regulation or memoranda of understanding between the Forest Service and the States. Others are defined by the Forest interdisciplinary planning team for application Forest-wide. Both of these kinds of BMP's are included in the Forest Plan as Forest-wide standards. A third kind are identified by the interdisciplinary team for application to specific management areas; these are included as Management Area standards in the appropriate management areas. A fourth kind, project-level BMP's are based on site-specific evaluation, and represent the most effective and practicable means of accomplishing the water quality and other goals of the specific area involved in the project. These project-level BMP's are outlined in the Soil and Water Conservation Practices Handbook (FSM 2509.22) and are required.

BIG GAME: Those species of large mammals normally managed as a sport hunting resource.

BIG GAME SUMMER RANGE: Land used by big game during the summer and fall months.

BIOLOGICAL GROWTH POTENTIAL: The average net growth attainable in a fully stocked natural forest stand.

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.

BROADCAST BURN: Allowing a controlled fire to burn over a designated area within well-defined boundaries, for reduction of fuel hazard, as a silvicultural treatment, or both.

BOARD FOOT/CUBIC FOOT CONVERSION: The mathematical ratio of the board feet contained in one cubic foot of timber. This ratio varies with tree species, diameter, height and form factors.

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.

CANOPY: The more or less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

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

CAPABILITY AREA: A geographic delineation used to describe characteristics of the land and resources in integrated Forest planning. Capability areas may be synonymous with ecological land units, ecosystems or land response units.

CAPITAL INVESTMENT: Investment in facilities such as roads and structures with specially-appropriated funds.

CARRYING CAPACITY: The limit of an ecosystem's ability to sustain use:
Recreation - the amount of recreation use an area can sustain without deterioration of site quality.
Wildlife - the maximum number of animals an area can support during a given period of the year.
Range - the maximum stocking rate possible without damaging the vegetation or related resources. Carrying capacity may vary from year-to-year on the same area due to fluctuating forage production.

CAVITY: A hollow in a tree that is used by birds or mammals for roosting and reproduction.

CAVITY-DEPENDENT SPECIES: Those species of wildlife which rely on dead or unsound wood in which to develop holes for nesting, resting, or other important life functions. Included in this group are those species which do not develop holes or cavities themselves, but that use holes or cavities abandoned by other species.

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 a separate age class in planning. Regeneration is obtained through natural seeding, or through planting or direct seeding.

CLIMAX PLANT: The final or stable biotic community in a developmental series.

CMAI: See Culmination of Mean Annual Increment.

COEFFICIENT (COST, VALUE, YIELD): The numeric units used to include costs, values, and outputs in the analysis model used in the formulation of the Forest Plan.

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.

COMMERCIAL TIMBER SALES: The selling of timber from National Forest lands for the economic gain of the party removing and marketing the trees.

COMMODITIES: Resources with commercial value; all resource products which are articles of commerce, such as timber, range forage and minerals.

COMMON MATERIALS: See Minerals, Common Variety

COMPENSATION: In the context of a threatened or endangered species, this relates to replacement in kind for habitat elements that may be temporarily or permanently removed from that species use.

CONFINE: To limit fire spread within a predetermined area principally by use of natural or preconstructed barriers or environmental conditions. Suppression action may be minimal and limited to surveillance under appropriate conditions.

CONSTRAINT: A confinement or restriction on the range of permissible choices.

CONTAIN: To surround a fire, and any spot fires therefrom, with control lines as needed, which can reasonably be expected to check the fire's spread under prevailing and predicted conditions.

CONTROL: To complete the control line around a fire, any spot fires therefrom, and any interior islands to be saved; burn out any unburned area adjacent to the fire side of the control line; and cool down all hot spots that are immediate threats to the control line, until the line can reasonably be expected to hold under foreseeable conditions.

CORD: A unit of gross volume measurement for stacked roundwood based on external dimensions; generally implying a stack measuring four feet by four feet vertical cross-section and eight feet long, containing 128 stacked cubic feet of wood.

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 or adverse effects or expenditures resulting from an action. Costs may be monetary, social, physical or environmental in nature.

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.

COST-SHARE: Refers to the process of cooperating in the joint development of a road system. The document executed through this process, called "Road Right-of-Way Construction and Use Agreement," specifies the terms of developing the transportation system for a specified land area.

COVER/FORAGE RATIO: The ratio of tree cover (usually conifer types) to foraging areas (natural openings, clearcuts, etc.)

CRITICAL FIRE SEASON: See Fire Season

CRITICAL HABITAT: Specific areas within the geographical area occupied by the species on which are found those physical and biological features: (1) essential to the conservation of the species, and (2) which may require special management considerations or protection. Critical habitat shall not include the entire geographic area which can be occupied by the threatened and endangered species.

CUBIC FOOT: The amount of wood volume equivalent to a cube 1 foot by 1 foot by 1 foot.

CULMINATION OF MEAN ANNUAL INCREMENT (CMAI): The point at which the volume increment for a tree or stand of trees has achieved it's highest mean value. Mean annual increment is based on expected growth according to the management intensities and utilization standards assumed in the Forest Plan. The CMAI is calculated by dividing the attained growth (volume) by it's corresponding age.

CULTURAL RESOURCES: The physical remains of human activity (artifacts, ruins, burial mounds, 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 of prehistoric or historic occupation.

CUTTING CYCLE: For a crop or stand, the planned interval of time between the beginning of one cutting period and the beginning of the succeeding cutting period.

DEMAND: The amount of output that users are willing to take at a specific price, time period, and conditions of sale.

DEVELOPED RECREATION: Recreation that occurs where improvements enhance recreation opportunities and accommodate intensive recreation activities in a defined area.

DEVELOPED RECREATION SITES: Relatively small, distinctly defined area where facilities are provided for concentrated public use, i.e., campgrounds, picnic areas and swimming areas.

DISPERSED RECREATION: That portion of outdoor recreation use which occurred outside of developed sites in the unroaded and roaded Forest environment i.e., hunting, backpacking and berry picking.

DIVERSITY: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

ECONOMICS: The study of how limited 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.)

EDAPHIC: The influence of soils on living organisms, particularly plants, including man's use of the land for plant growth.

EFFECTS: Physical, biological, social and economic results (expected or experienced) resulting from achievement of outputs. Effects can be direct, indirect and cumulative.

EFFICIENCY (ECONOMIC): The usefulness of inputs (costs) to produce outputs effects when all costs and benefits that can be identified and valued are included in the computations. Economic efficiency is usually measured using present net value, though use of benefit-cost ratios and rates-of-return may sometimes be appropriate.

ELK HIDING COVER: Vegetation, primarily trees, capable of hiding 90 percent of an elk seen from a distance of 200 feet or less.

ELK SECURITY COVER (EFFECTIVE ELK SECURITY COVER): Elk hiding cover modified by open roads. The greater the density of open roads within an area, the less effective is the hiding cover in providing security for elk.

ENDANGERED SPECIES: Any species, plant or animal, which is in danger of extinction throughout all or a significant portion of its' range. Endangered species are identified by the Secretary of the Interior 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: A concise public document for which a Federal agency is responsible that serves to: (1) Briefly provide sufficient evidence and analysis for determining whether to prepare and environmental impact statement or a finding of no significant impact; (2) Aid an agency's compliance with the National Environmental Policy Act when no environmental impact statement is necessary; (3) Facilitate preparation of an environmental impact statement when one is necessary.

ENVIRONMENTAL IMPACT STATEMENT, DRAFT (DEIS): A detailed written statement as required by Sec. 102(2)(C) of the National Environmental Policy Act (NEPA).

ENVIRONMENTAL IMPACT STATEMENT, FINAL (FEIS): The final version of the public document required by NEPA (see above).

EPHEMERAL STREAMS: Streams that flow only as a direct response to rainfall or snowmelt events. They have no baseflow.

EROSION: The group of processes whereby earthy or rocky material is worn away by natural sources such as wind, water or ice and removed from any part of the earth's surface.

EVEN-AGED MANAGEMENT: The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged Forests are characterized by a distribution of the stands of varying ages (and, therefore, tree sizes) throughout the Forest area. The difference in age between trees forming the main canopy level of the stand does not usually exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

EXTRACTIVE USE: Use of natural resources that removes them from their natural setting.

FIRE MANAGEMENT DIRECTION: Fire management standards, guidelines, and practices based upon land and resource management objectives. Fire management direction is used to define the kind, level, and timing of fire protection and use activities, including the appropriate suppression strategies, which efficiently meet management objectives for each management area for the range of expected fire behavior conditions.

FIRE SEASON: Critical Fire Season is when the Energy Release Component (ERC) exceeds 39 for the past four days and the Burning Index (BI) is is 30 or greater, or the 1,000 hour time lag fuel moisture is below 16 percent. Noncritical Fire Season is when the ERC is less than 39 for the past four days and the BI is less than 30, and the 1,000 hour time lag fuel moisture is equal to or greater than 16 percent.

FLOOD PLAIN: The lowland and relatively flat area adjoining inland waters, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

FORAGE: All browse and nonwoody plants available to livestock or wildlife for feed.

FOREST LAND: Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-forest use include areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, and adjoining road clearing and powerline clearing of any width. The term "occupied" when used to define forest land, will be measured by canopy cover of live forest trees at maturity. The minimum area for classification of forest land will be 1 acre or greater. Unimproved roads, trails, stream and clearings in forest areas are classified as forest if they are less than 120 feet in width.

FOREST SUPERVISOR: The official responsible for administering the National Forest System lands in a Forest Service Administrative unit, which may consist of one or more National Forests or all the Forests within a State.

FOREST SYSTEM ROAD: A road wholly or partly within or adjacent to and serving the National Forest System and which is necessary for the protection, administration and utilization of the National Forest System and the use and development of it's resources.

FOREST-WIDE MANAGEMENT GUIDELINES: An indication or outline of policy or conduct dealing with the basic management of the Forest. Forest-wide management guidelines apply to all areas of the Forest regardless of the other management prescriptions applied.

FSH: Forest Service Handbook.

FSM: Forest Service Manual.

FUELS: Include both living plants; dead, woody vegetative materials; and other vegetative materials which are capable of burning.

FUELS MANAGEMENT: Manipulation or reduction of fuels to meet Forest protection and management objectives while preserving and enhancing environmental quality.

FUELS TREATMENT: The rearrangement or disposal of natural or activity fuels to reduce the fire hazard.

GAME SPECIES: Any species of wildlife or fish for which seasons and bag limits have been prescribed, and which are normally harvested by hunters, trappers, and fisherman under State or Federal laws, codes, and regulations.

GOAL: A concise statement that describes a desired condition to be achieved sometime in the future. 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.

GOODS AND SERVICES: The various outputs, including on-site uses, produced by forest and rangeland resources.

HABITAT TYPE: An aggregation of all land areas potentially capable of producing similar plant communities at climax.

HIDING COVER: Trees of sufficient size and density to conceal animals from view at 300 feet.

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.

INDIRECT EFFECTS: Secondary effects which occur in locations other than the initial action or significantly later in time.

INSTREAM FLOWS: The minimum water volume (cubic feet per second) in each stream necessary to meet seasonal streamflow requirements for maintaining aquatic ecosystems, visual quality, recreational opportunities and other uses.

INTEGRATED PEST MANAGEMENT: A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed. The information considered in selecting appropriate strategies includes the impact of the unregulated pest population on various resource values, alternative regulatory tactics and strategies, and benefit/cost estimates for these alternative strategies. Regulatory strategies are based on sound silvicultural practices and ecology of the pest-host system and consist of a combination of tactics such as timber stand improvement plus selective use of pesticides. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable.

INTERDISCIPLINARY (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.

INTERAGENCY GUIDELINES: A document which was developed in the Yellowstone grizzly bear ecosystem and which identifies important, specific management measures regarding the conduct of multiple use activities in grizzly bear habitat and parameters for identifying the sensitivity of grizzly bear habitat to human activities. Previously known as the "Yellowstone Guidelines".

INTERMEDIATE HARVEST: Any removal of trees from a stand between the time of its formation and the regeneration cut. Most commonly applied intermediate cuttings are release, thinning, improvement, and salvage.

INTERMITTENT STREAM: A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

INVENTORY DATA: Recorded measurements, facts, evidence, or observations on Forest resources such as soil, water, timber, wildlife, range, geology, minerals, and recreation which was used to determine the capability and opportunity of the Forest to be managed for those resources.

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.

LANDTYPE: An inventory map unit with relatively uniform potential for a defined set of land uses. Properties of soils, landform, natural vegetation and bedrock are commonly components of landtype delineation used to evaluate potentials and limitations for land use.

LANDTYPE GROUP: A logical grouping of landtypes that facilitate planning.

LEASABLE MINERALS: See Minerals, Leasable.

LISTED SPECIES: This refers to species recognized as threatened or endangered under the Federal Endangered Species Act of 1973.

LOCAL ROADS: Roads constructed and maintained for, and frequented by, the activities of a given resource element. Some uses may be made by other element activities, but normally maintenance is not affected by such use. These roads connect terminal facilities with Forest collector or Forest arterial roads or public highways. The location and standard, usually are determined by the requirement of a specific resource activity rather than by travel efficiency. Forest local roads may be developed and operated for constant or intermittent service, depending on land use and resource management objectives for the area served by the facility.

LOCATABLE MINERALS: See Minerals, Locatable.

LONG-TERM SUSTAINED-YIELD TIMBER CAPACITY: The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives.

M: Thousand

MA: See Management Area

MAUM: Thousand Animal Unit Months.

MBF: Thousand Board Feet

MM: Million

MMBF: Million Board feet

MMCF: Million Cubic feet

MANAGEMENT ACTION: Any activity undertaken as part of the administration of the Forest.

MANAGEMENT AREA (MA): An aggregation of capability areas which have common management direction and may be noncontiguous in the Forest. Consists of a grouping of capability areas selected through evaluation procedures and used to locate decisions and resolve issues and concerns.

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 INTENSITY: A management practice 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.

MATURE TIMBER: Individual trees or stands of trees that in general are at their maximum rate in terms of the physiological processes expressed as height, diameter, and volume growth.

MAXIMUM MODIFICATION: A visual quality objective that permits human activity to dominate the landscape. Such activity, however, should appear as a natural occurrence when viewed as background.

MEAN ANNUAL INCREMENT (MAI): The total volume increase in a tree or stand of trees up to a given age, divided by that age.

MINERAL ENTRY: The filing of a mining claim on Federal land to obtain the right to mine any locatable minerals it may contain. Also the filing for a mill site on Federal land for the purpose of processing off-site locatable minerals.

MINERAL WITHDRAWAL: A formal designation by the Secretary of Interior which precludes entry or disposal of mineral commodities under the mining and/or mineral leasing laws.

MINERAL EXPLORATION: The search for valuable minerals.

MINERAL PRODUCTION: The extraction of mineral deposits.

MINERALS, COMMON VARIETY: Deposits of sand, stone, gravel, etc. of widespread occurrence and not having distinct or special value. These deposits are used generally for construction and decorative purposes and are disposed of under the Materials Act of 1947.

MINERALS, LEASABLE: Those minerals which are disposed of under authority of the various mineral leasing acts. Minerals include coal, oil, gas, phosphate, sodium, potassium, oil shale,sulfur (in Louisiana and New Mexico), and geothermal steam.

MINERALS, LOCATABLE: Those minerals which are disposed of under the general mining laws. Included are minerals such as gold, silver, lead, zinc and copper which are not classed as leasable or salable.

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).

MINING CLAIMS: A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit. Includes lode claims, placer claims, mill sites and tunnel sites.

MITIGATE: To lessen the severity.

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.

MODIFICATION (VQO): See Visual Quality Objective (VQO).

MONITORING AND EVALUATION: The periodic evaluation on a sample basis of Forest Plan management practices to determine how well objectives have been met and how closely management standards have been applied.

MOUNTAIN PINE BEETLE: A species of Bark Beetle that spends the major portion of their life cycle in a tree's cambium layer. Through a combination of the insect feeding on the cambium layer and the introduction of fungi which stop the resin flow, the tree is girdled and killed.

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.

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 the management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

NET VALUE CHANGE (Also Net Resource Value Change.): The sum of the changes in resource values on a land area that results from increases (benefits) and decreases (damages) in resource outputs as a consequence of fire.

NONCRITICAL FIRE SEASON: See Fire Season.

NON-INTERCHANGEABLE VOLUME: Older dead timber harvested from suitable timberland.

NONSTOCKED: A stand of trees or aggregation of stands that have a stocking level below the minimum specified for meeting the prescribed management objectives.

NO-SURFACE OCCUPANCY (NSO) STIPULATION: A mineral lease clause which, if attached to a mineral lease, prohibits the lessee from constructing roads, well pads or otherwise occupying the land surface unless, upon site-specific review, it is determined by the authorized officer that the requirements of the stipulation can be modified if other less stringent mitigation is determined to be sufficient to protect the other resources.

OBJECTIVE: A concise, time-specific statement of measurable planned results that respond to pre-established 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.

OFF-ROAD VEHICLE: Any vehicle capable of being operated off an established road or trail such as motorbikes, 4-wheel drives, and snowmobiles.

OLD-GROWTH TIMBER: A distinct successional stage in the development of a timber stand that has special significance for wildlife, generally characterized by: (1) large diameter trees (often exceeding 20" dbh) with a relatively dense, often multilayer canopy, (2) the presence of large, standing, dead or dying trees, (3) down and dead trees, (4) stand decadence associated with the presence of various fungi and heartrots, (5) an average age often in excess of 200 years and (6) a basal area ranging from 150 to 400 square feet per acre.

OPTIMUM: The greatest 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.

OVERMATURE TIMBER: Individual trees or stands of trees that in general are past their maximum rate in terms of the physiological processes expressed as height, diameter and volume growth.

OVERSTORY: That uppermost canopy of the forest when there is more than one level of vegetation.

OVERTHRUST BELT: A complex geologic feature, extending from Alaska to Mexico which resulted from compressional stresses within the earth, and which is characterized by abundant thrust faults. This zone passes through and includes all of western Montana.

PARTIAL RETENTION (VQO): See Visual Quality Objective (VQO).

PATENTED MINING CLAIMS: A patent is a document which conveys title to land. When patented, a mining claim becomes private property and is land over which the United States has no property rights, except as may be reserved in the patent. After a mining claim is patented, the owner does not have to comply with requirements of the General Mining Law or implementing regulations.

PERENNIAL STREAMS: Streams that flow continuously throughout most most.

PLAN OF OPERATIONS: A written plan describing mining and mineral processing activities that will likely cause a significant surface disturbance. The plan is prepared by those engaged in activities, such as prospecting, exploration or mining, in the National Forest. This plan must be approved by a Forest Officer.

PLANNED IGNITIONS: Fires started by a scheduled, deliberate management action.

PLANNING AREA: The area of the National Forest System covered by a Regional Guide or Forest Plan.

PLANNING CRITERIA: Standards, tests, rules, and guidelines by which the planning process is conducted and upon which judgments and decisions are based.

PLANNING HORIZON: The overall time period considered in the planning process that spans all activities covered in the analysis or plan and all future conditions and effects of proposed actions which would influence the planning decisions.

PLANNING PERIOD: One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

PLANNING RECORDS: Documents and files that contain detailed information and decisions made in developing the Forest Plan. Available at the Forest Supervisor's Office.

POLETIMBER TREES: Live trees of commercial species at least five inches in diameter at breast height but smaller than sawtimber size, and of good form and vigor.

POLICY: A guiding principle upon which is based a specific decision or set of decisions.

PRECOMMERCIAL THINNING: The selective felling, deadening, or removal of trees in a young stand primarily to accelerate diameter increment on the remaining stems, maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain.

PRESCRIBED BURNING: The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (i.e., silviculture, wildlife management, etc.).

PRESCRIBED FIRE: A wildland fire burning under preplanned specified conditions to accomplish specific planned objectives. It may result from either a planned or unplanned ignition.

PRESENT NET VALUE (PNV): The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area.

PRESERVATION (VQO): See Visual Quality Objectives (VQO).

PRIMITIVE RECREATION SETTING: A classification of the recreation opportunity spectrum that characterizes an essentially unmodified natural environment of a size or remoteness that provide significant opportunity for isolation from the signs and sounds of man and a feeling of vastness of scale. Visitors have opportunity to be part of the natural environment, encounter a high degree of challenge and use a maximum of outdoor skills but have minimum opportunity for social interaction.

PRIMITIVE ROADS: Roads that came into existence with little regard for grade or drainage control, or were abandoned facilities from some prior use. They are sometimes created merely by repeated driving over an area. Such roads are rarely, if ever, maintained and then only by users. These roads are single lane, usually with native surfacing, and sometimes passable with four-wheel drive vehicles only, especially in wet weather.

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 ISSUE: A subject or question of widespread public interest relating to management of the National Forest System.

RANGER DISTRICT: Administrative subdivision of the Forest supervised by a District Ranger.

REAL DOLLAR VALUE: A monetary value which compensates for the effects of inflation.

RECEIPTS: Money collected from timber stumpage, livestock grazing, campgrounds, special use permits, and oil and gas lease rentals and royalties, and returned to the federal treasury.

RECEIPT SHARES: The portion of receipts derived from Forest Service resource management that is distributed to State and county governments, such as the Forest Service 25 percent fund payments.

RECREATION CAPACITY: The number of people that can take advantage of a recreation opportunity at any one time without substantially diminishing the quality of the experience sought after.

RECREATION EXPERIENCE LEVEL: A concept used in recreation management to delineate the range of opportunities for satisfying basic recreation needs of people. A scale of five experience levels ranging from "primitive" to "highly developed" is planned for the National Forest System.

RECREATION OPPORTUNITIES: The combination of recreation settings, activities, and experiences provided by the Forest.

RECREATION OPPORTUNITY SPECTRUM: A system for planning and managing recreation resources that recognizes recreation activity opportunities, recreation settings, and recreation experiences along a spectrum or continuum.

RESPONSIBLE LINE OFFICER: The Forest Service employee who has the authority to select and/or carry out a specific planning action.

ROS CLASSES: Recreation Opportunity Spectrums which are identified as follows: Primitive (PRIM) - Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other area users is minimal. The area is managed to be essentially free from evidence of man-induced restrictions and controls. Motorized use within the area is not permitted.

Semi-Primitive Non-Motorized (SPNM) - Area is characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is not permitted.

Semi-Primitive Motorized (SPM) - Area is characterized by a predominantly natural or natural-appearing environment of moderate-large size. Concentration of users is low, but there is often evidence of other area users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is permitted.

Roaded Natural Appearing (RNA) - Area is characterized by predominantly natural appearing environment with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in the construction standards and design of facilities.

Rural (R) - Area is characterized by substantially modified natural environment. Resource modification and utilization practices are primarily to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of man are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.

RECREATION TYPES: The different recreation types identified as follows: 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 DAY (RVD): One visitor day equals 12 hours (one person for 12 hours, or 12 people for 1 hour, or any combination thereof).

REFORESTATION: The renewal of forest cover by seeding, planting, and natural means.

REGENERATION: The renewal of a tree crop, whether by natural or artificial means. This term may also refer to the crop itself.

REGIONAL FORESTER REGULATIONS: The official responsible for administering a single Region of the Forest Service. Refers to the Code of Federal Regulations for implementing the National Forest Management Act, 36 CFR, Part 219.

RESOURCE ELEMENT: A collection of activities from the various operating programs required to accomplish the Forest Service mission and which fulfill statutory or Executive requirements. There are seven resource elements: Recreation, Wilderness, Wildlife and Fish, Range, Timber, Water, and Minerals.

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.

RETENTION (VQO): See Visual Quality Objectives (VQO).

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: Areas with distinctive resource values and characteristics that are comprised of an aquatic ecosystem and adjacent upland areas that have direct relationships with the aquatic system. 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.

RIPARIAN ECOSYSTEM: A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetative communities that require free or unbounded water.

ROAD MAINTENANCE LEVELS: Road maintenance levels are as follows:
Level 1 - Basic custodial care as required to protect the road investment and to see that damage to adjacent land and resources is held to a minimum. The road is not normally open to traffic.

Level 2 - Same basic maintenance as Level 1 plus logging out, brushing out, and restoring the road prism as necessary to provide passage. Route markers and regulation signs are in place and useable. Road is open for limited passage of traffic, which is usually administrative use, permitted use, and/or specialized traffic.
Level 3 - Road is maintained for safe and moderately convenient travel suitable for passenger cars. Road is open for public travel, but has low traffic volumes except during short periods of time (e.g. hunting season).
Level 4 - At this level, more consideration is given to the comfort of the user. Road is usually surfaced with aggregate or is paved and is open for public travel.
Level 5 - Safety and comfort are important considerations for these roads which are open to public traffic and generally receive fairly heavy use (100 Average Daily Traffic or more). Roads have an aggregate surface or are paved.

ROADED-NATURAL APPEARING RECREATION SETTING: A classification on the recreation opportunity spectrum where timber harvest or other surface use practices are evident. Motorized vehicles are permitted on all or parts of the road system.

ROADLESS AREA REVIEW AND EVALUATION (RARE) II: A comprehensive process, instituted in June 1977, to identify roadless and undeveloped land areas in the National Forest System and to develop alternatives for both wilderness and other resource management.

ROTATION: The planned number of years between the formation or generation of trees and their harvest at a specified stage of maturity.

RURAL RECREATION SETTING: A classification on the recreation opportunity spectrum that is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.

SALE SCHEDULE: The quantity of timber planned for sale by time period from an area of suitable land covered by a forest plan. The first period, usually a decade, of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained.

SALVAGE HARVEST: The cutting of trees that are dead, dying, or deteriorating (e.g., because they are overmature or materially damaged by fire, wind, insects, fungi, or other injurious agencies) before they lose their commercial value as sawtimber.

SAWTIMBER: Trees containing at least one 8-foot piece with a 5.6 inch diameter, inside bark, at the small end and meeting regional specifications for freedom from defect. Softwood trees must be at least 8 inches in diameter at breast height (DBH) for all species except Lodgepole Pine which is 7 inches DBH

SCENIC EASEMENT: A legal interest in the land of another which allows the easement holder specified uses or rights without actual ownership of the land; in this case, control of the use of land adjacent to public highways, parks, and rivers. It may provide something attractive to look at within the easement

area, an open area to look through to see something attractive beyond the easement itself, or a screen to block out an unsightly view beyond the easement area.

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.

SEED-TREE CUTTING: The removal in one cut of most of the mature trees from an area, leaving only a small number of desirable trees to provide seed for regeneration.

SEEDLING/SAPLING: A size category for forest stands in which trees less than 5 inches in diameter are the predominant vegetation.

SELECTION CUTTING: The annual or periodic removal of trees as part of an uneven-age silvicultural system. Cutting can involve individual trees or small groups of trees to meet a predetermined goal of size and species composition in the remaining stand.

SEMI-PRIMITIVE RECREATION SETTING: A classification on the recreation opportunity spectrum that characterizes a predominately natural or natural appearing environment of a moderate to large size. Concentration of users is low, but there is often evidence of other area users. The area is managed in such a way that minimum onsite controls and restrictions may be present, but are subtle.

SENSITIVE SPECIES: Those plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations.

SERAL: A biotic community which is developmental; a transitory stage in an ecologic succession.

SHELTERWOOD CUTTING: The removal of a stand of trees through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.

SILVICULTURAL SYSTEM: A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of Forest thereby produced.

SITE PREPARATION: A general term for a variety of activities that remove competing vegetation, slash, and other debris that may inhibit the reforestation effort.

SLASH: The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning of trees.

SNAG: A standing dead tree usually greater than 5 feet in height and 6 inches in diameter at breast height.

SPECIAL USE PERMIT: A permit issued under established laws and regulations to an individual, organization, or company for occupancy or use of National Forest land for some special purpose.

STAGNATION: A condition where plant growth is markedly reduced or even arrested through, e.g., competition, state of the soil, or disease.

STAND: A community of trees or other vegetative growth occupying a specific area and sufficiently uniform in composition (species), age, spatial arrangement, and conditions as to be distinguishable from the other growth on adjoining lands, so forming a silvicultural or management entity.

STIPULATIONS: Requirements that are part of the terms of a mineral lease. Some stipulations are standard on all Federal leases. Other stipulations may be applied to the lease at the discretion of the surface management agency to protect valuable surface resources and uses.

STOCKING: A measure of timber stand density as it relates to the optimum or desired density to achieve a given management objective.

STREAM ORDER: A measure of the position of a stream in the hierarchy of tributaries. (Stream as referenced here refers to perennial streams.)
First-order streams - are unbranched streams, that is they have no tributaries.
Second-order streams - are formed by the confluence of two or more first-order streams. They are considered second-order until they join another second-order or larger stream.
Third-order streams - are formed by the confluence of two or more second-order streams. They are considered third-order until they join another third-order or larger stream.

SUCCESSIONAL STAGE: A phase in the gradual supplanting of one community of plants by another.

SUITABILITY: The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

SUITABLE FOREST LAND: Forest land (as defined in CFR 219.3 and 219.14) 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.

SUPPLY: The amount of an output that producers are willing to provide at a specific price, time period, and conditions of sale.

SUPPRESSION (FIRE SUPPRESSION): Any act taken to slow, stop, or extinguish a fire. Examples of activities include fireline construction, backfiring, and application of water or chemical fire retardants.

SUSTAINED-YIELD OF PRODUCTS AND SERVICES: The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land.

SYSTEM ROADS: See Forest System Road.

TARGET: A quantifiable output assigned to the Forest.

TEMPORARY ROADS: Those roads needed only for the purchaser or permittee's use. The Forest Service and the purchaser or permittee must agree to the location and clearing widths. Temporary roads are used for a single, short-term use, e.g to haul timber from landings to Forest development roads, access to build water developments, etc.

THERMAL COVER: Cover used by animals to ameliorate chilling 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 AND ENDANGERED SPECIES (T & E): Any species, plant of animal, which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its' range. Threatened species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

TIMBER: A general term for the major woody growth of vegetation in a forest area.

TIMBER BASE: The lands within the Forest that are suitable for timber production.

TIMBER PRODUCTION: The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use.

TIMBER STAND IMPROVEMENT (TSI): All noncommercial intermediate cuttings and other treatments to improve composition, condition, and growth of a timberstand.

TRAILHEAD: The parking, signing, and other facilities available at the terminus of a trail.

TRANSITORY RANGE: Land that is suitable for grazing use for 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.

TREE OPENING: An opening in the Forest cover created by the application of even-aged silvicultural practices. The Northern Regional Guide established size limitations and guidelines to determine when cut areas are no longer considered openings.

UNDERSTORY: The trees and other woody species which grow under a more or less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth.

UNEVEN-AGED MANAGEMENT: The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are described as follows:
Individual Tree Selection Cutting - The removal of selected trees from specified size and age classes over the entire stand area in order to meet a predetermined goal of size or age distribution and species composition in the remaining stand.
Group Selection Cutting - The removal of small groups of trees to meet a predetermined goal of size distribution and species in the remaining stand.

UNPLANNED IGNITION: A fire started at random by either natural or human causes, or a deliberate incendiary fire.

UNREGULATED HARVEST: This harvest is not charged against the allowable sale quantity. It includes occasional volumes removed that were not recognized in calculations of the allowable sale quantity, such as cull or dead material and noncommercial species and products. It also includes all volume removed from unsuitable areas. Harvests from unsuitable areas will be programmed as needed to meet multiple use objectives other than timber production and for improvement of administrative sites.

UNSUITABLE TIMBER LAND: Lands not selected for timber production in Step II and III of the suitability analysis during the development of the Forest Plan 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 Forest Plan.

UTILIZATION STANDARDS: Standards guiding the use and removal of timber. They are measured in terms of diameter at breast height (d.b.h.) and top of the tree inside the bark (top d.i.b.) and the percentages of "soundness" of the wood.

VIEWING SIGNIFICANCE: Areas of visual quality described as follows:
High Viewing Significance - Includes those forest lands that are easily viewed from primary through-highways (year-long), and primary recreation areas including high-use water bodies, vista points, communities, permanent residential areas, summer homes, and major trail corridors.
Moderate Viewing Significance - Includes those forest lands readily visible from major secondary roads, trails, streams, water bodies, secondary recreation areas, and other areas of public use.
Low Viewing Significance - Lands that have a high visual absorption capability, or lands that are viewed from local and collector roads.

VISUAL QUALITY OBJECTIVE (VQO): A desired (inventoried) level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape described as follows:

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.

WALLOW: A depression, pool of water, or wet area produced or utilized by elk or moose during the breeding season.

WATERSHED BASIN: Land area which collects and discharges its surface water through one outlet.

WATER YIELD: The measured output of the Forest's streams.

WATER YIELD INCREASE: Additional water released to the Forest streams as a result of Forest management activities.

WET AREAS: Sites, often occurring at the heads of drainages, such as wet sedge meadows, bogs, or seeps. They are often referred to as "moist sites" and are very important components of elk summer range. Sites near water are important because the forage they produce is highly nutritious and heavily utilized by elk.

WETLANDS: Those areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands include marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs.

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.

WILDFIRE: Any wildland fire not designated and managed as a prescribed fire within an approved prescription.

**WINDOW:** A term used to describe an area of land, usually short and narrow, that might be suitable as a transmission line corridor if constraints are not too limiting. Constraints may be physical, such as a river crossing, or environmental, such as designation of the area for primitive recreation. Six such windows were identified on the Kootenai Forest by the Bonneville Power Administration.

**WITHDRAWAL:** An order removing specific land areas from availability for certain uses.

**YARDING:** The operation of hauling timber from the stump to a collecting point.

# FINAL ENVIRONMENTAL IMPACT STATEMENT

# FOR THE

# KOOTENAI NATIONAL FOREST

## INDEX

Items listed in Chapters I and II are located in Volume 1

Items listed in Chapters III thru VI are located in Volume 2

# FEIS INDEX