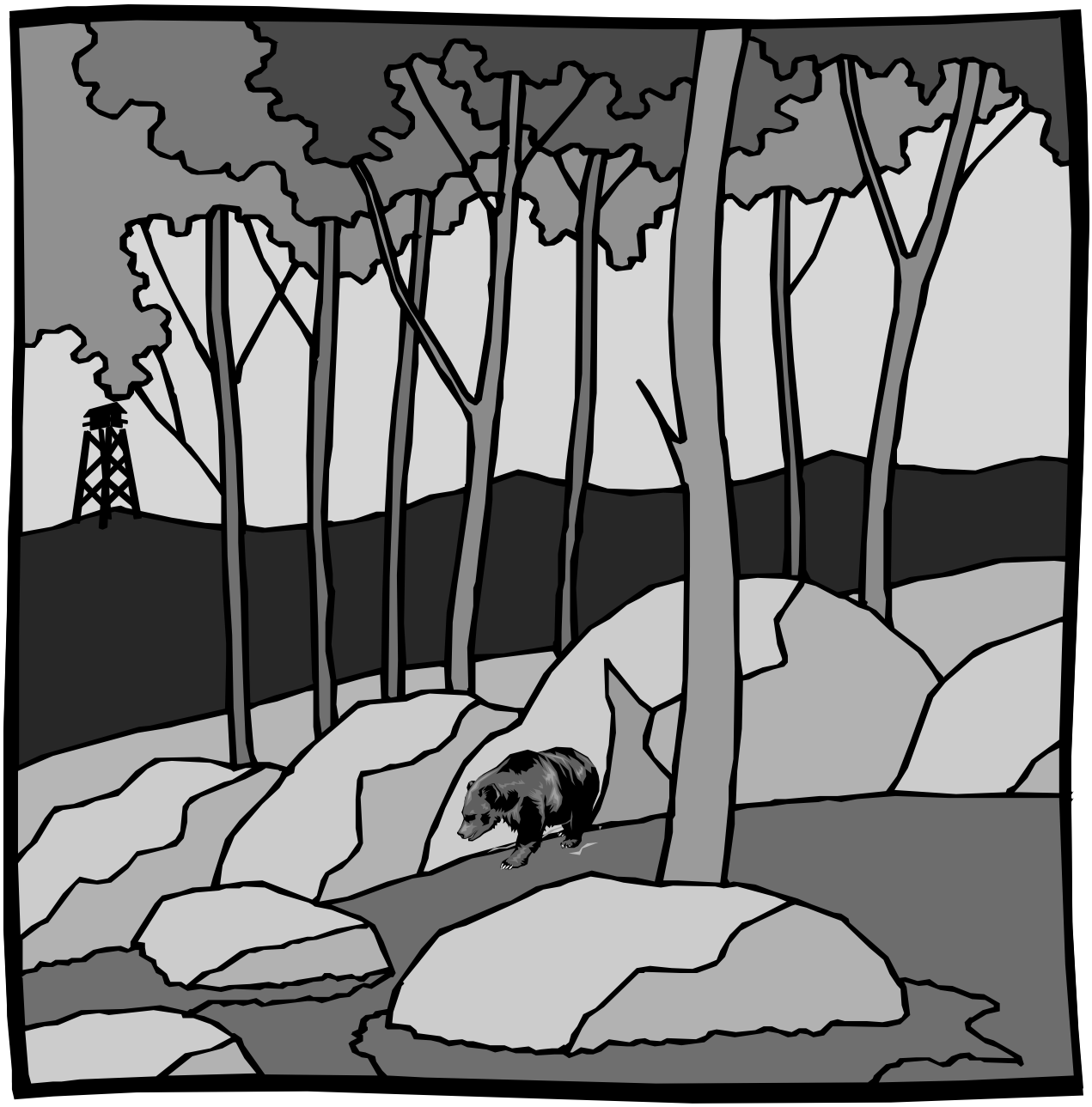
GARVER

DRAFT ENVIRONMENTAL IMPACT STATEMENT

Three Rivers Ranger District
Kootenai National Forest
October 2002



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G A R V E R

D R A F T E N V I R O N M E N T A L I M P A C T S T A T E M E N T

Kootenai National Forest
Three Rivers Ranger District
Lincoln County, Montana

October 2002

Responsible Agency:	**USDA Forest Service**
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Abstract: This Draft Environment Impact Statement (DEIS) documents the detailed analysis of four alternatives, including the no action alternative, that were developed for the Garver project. The alternatives respond differently to the major issues. The major issues identified include regeneration harvest and old growth. Alternative A is the no action alternative. Alternative B the Proposed Action and includes timber harvest, natural fuels reduction treatments, non-commercial thinning, and increase in grizzly bear core habitat. Alternative C includes the activities in Alternative B, but addresses the regeneration harvest issue and includes minor changes in unit size and shapes based on ground verification. Alternative D incudes the activities in Alternative C, but in addition addresses the old growth issue. Alternative D is the agency's Preferred Alternative.

Reviewers should provide the Forest Service with their comments during the review period of the DEIS. This will enable the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decisionmaking process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewer's position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. City of Angoon v. Hodel (9th Circuit, 1986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 9E.D. Wis. 1980). Comments on the DEIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

Comments on this DEIS should be sent to **Michael L. Balboni, District Ranger, Three Rivers Ranger District, 1437 N. Highway 2, Troy, Montana 59935**. The comment deadline is 45 days after the Notice of Availability for this DEIS is published in the Federal Register. Comments received in response to this solicitation, including names and addresses of those who comment, will be considered part of the public record on this proposed action and will be available for public inspection. Comments submitted only anonymously will be accepted and considered; however, those who submit anonymous comments may not have standing to appeal the subsequent decision under 36 CFR Part 215.

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GARVER PROJECT

Summary

INTRODUCTION

This project is located on the Three Rivers Ranger District of the Kootenai National Forest within the Northwest Yaak planning subunit. The objective of this planning effort is to move the Garver project area toward the desired condition as explained in the Purpose and Need below.

Four alternatives were evaluated in detail and are presented in this Draft Environmental Impact Statement (DEIS). This section is a general summary of the DEIS. The project area, purpose and need, major issues, and alternatives analyzed in detail are briefly described. Additional information is presented in the remaining chapters of this DEIS and in the project file (located at the Three Rivers Ranger District Office). The maps referred to are located at the back of the document.

PROJECT AREA DESCRIPTION

The Garver project area is approximately 43,096 acres and includes the West Fork Yaak River, Pete Creek, Lap Creek, Waper Creek, and Mud Creek, as well as several small drainages that are tributaries to the Yaak River (see Vicinity Map, M-1). The Canadian border forms the northern boundary of this project; the eastern boundary of Pete Creek watershed forms the western edge, Yaak River the southern, and Northeast Yaak subunit the eastern boundary. The West Fork Yaak Inventoried Roadless Area (IRA #694) is located along the north and western border of this project area.

PURPOSE AND NEED FOR ACTION

A number of specific resource and vegetative conditions not meeting long-term management objectives were identified in a broad scale assessment of the Northwest Yaak planning subunit. The Purpose and Need for the activities proposed in the Garver project is to:

- **Manage for vegetative conditions that are more suitable to a fire-dependent ecosystem.**

  1) There is a need to address some undesirable trends in the current forest dynamics and manage for vegetative conditions that are more suitable to a fire-dependent ecosystem and, in the long term, encourage more resilient and sustainable forest conditions. In some cases this means thinning trees to reduce forest, promote a trend toward a more open-grown forest structure with a greater proportion of large fire-adapted species, and reduce vulnerability to uncharacteristic fires and Douglas-fir bark beetle. In other cases, portions of stands would be replaced where the long-term health is questionable due to conditions created by exclusion of fire-maintained processes, uncharacteristic levels of dwarf mistletoe and/or blister rust fungal disease, and generally poor tree health.

2) Re-introduce fire to promote ecosystem maintenance, reduce fuels, and promote healthy forest conditions. In some cases, mechanical fuels treatment would be the first step in reducing fuels, with prescribed burning being done in subsequent years.

- **Improve and maintain winter range conditions.**

There is a need to improve the winter range forage base for big game species such as deer, elk, and moose. The existing cover:forage ratio is 88:12. The recommended numbers are 30:70 for elk and 70:30 for white-tailed deer. It is expected that reductions in crown cover through intermediate harvest and small openings created by regeneration harvest will create more favorable growing space for understory vegetation. It is also desirable to create habitat conditions that include a varied stand structure capable of providing snow-intercept functions during winter months.

- **Improve conditions in old growth habitat.**

Some of the drier habitat sites which have been designated as old growth (MA-13) have not experienced wildfire for many years due to fire suppression. There is a need to reduce fuels and periodically underburn these areas to maintain the old growth character.

- **Reduce Fuels in the Urban Interface.**

In the wildland/urban interface there is a need to maintain an environment which provides for protection of private lands and firefighter and public safety. Many of these sites would also have historically received frequent low-intensity underburns. By thinning, piling, and/or burning vegetation, the risk of crown fire in these areas can be reduced, allowing for safer protection of private lands. The community of Yaak, Montana, is listed in the *Urban Wildland Interface Communities within the Vicinity of Federal Lands that are at High Risk from Wildfire*, Federal Register, August 17, 2001.

- **Improve growing conditions and long-term management of overstocked sapling/pole stands.**

There is a need to thin young, overstocked stands created by past regeneration harvest and wildfires in order to improve growing conditions, maintain species and structural diversity, and improve forest health. These stands can provide varied management options in the future as stand characteristics are maintained or enhanced to promote specific habitat or resource objectives.

- **Improve quality and quantity of grizzly bear habitat.**

Based on new information in the FEIS Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones, 2002, and the U.S. Fish and Wildlife Service (Kasworm, et. al., 2002), the Three Rivers Ranger District has a unique opportunity to improve and increase the quality and quantity of core habitat for grizzly bears. The FEIS recommends that core area be increased in Bear Management Unit (BMU) 15. This BMU currently has a core habitat of 47%. BMU 15 includes the Yaak River Highway from Pete Creek to Blacktail Creek, thus the BMU includes the private land along the river and the highway. Some of the modeled core habitat is adjacent to private land. This situation increases the risk of bears becoming nuisances around subdivisions and individual homes, and ultimately increases mortality risk. The quality of habitat for bears in this area has been preliminarily determined to be low, based on the

mortality risk associated with its location (Kasworm personal communication 2002). In the northernmost part of the BMU there is a balance of spring, summer, and fall high quality habitat. There is a need to adjust core habitat boundaries to improve the quality of core habitat and reduce the possibility of conflicts between bears and humans.

- **Contribute forest products to the economy.**

There is a need to supply forest products to contribute to the support of that segment of the local and regional economy dependant on timber products.

MAJOR ISSUES

Internal and external comments revealed issues representing unresolved conflict with the Proposed Action (Alternative B). The following major issues were used to develop alternatives to the Proposed Action.

Issue #1 – Regeneration Harvest: Public commentors expressed concerns with the size, location and/or appropriateness of some proposed regeneration harvest units. Many of these commentors felt that areas proposed for regeneration harvest are in a healthy condition and stand replacement is not warranted. There were also concerns that regeneration harvest in wet habitat conditions could adversely affect water quality, water yield, and beneficial uses.

Issue #2 – Old Growth: There are two components to this issue:

1) Commentors pointed out that the habitat in Unit 54 could provide higher quality replacement old growth than what is presently designated in the Hensley Face area. Members of the Garver ID team agreed that a redelineation of the MA-13 in Compartment 17 (Hensley Hill) could provide better quality habitat for replacement old growth designation.

2) Under the Proposed Action the habitat in Units 11, 12, and part of 17 meet the Forest's criteria for old growth. This area has not been designated as old growth since this compartment (Compartment 22, Lick Mountain), has enough old growth to meet Forest Plan Standards (see Old Growth Analysis Areas map M-11 for compartment locations). However, these stands have been identified as habitat that could have potential for old growth management designation, if needed in the event of any losses in the currently designated old growth management areas from natural events, such as stand replacing wildfires. Also, there is a shortage of actual old growth elsewhere within the project area (notably within Compartments 17 and 18) therefore it would be prudent to retain this forest condition in Compartment 22 at this time. The desire for retention of old growth habitat has been expressed in public comments.

ALTERNATIVES CONSIDERED IN DETAIL

ALTERNATIVE A - NO ACTION

The National Environmental Policy Act (NEPA) requires that an EIS include a "no action" alternative to serve as a baseline to compare action alternatives. The no action alternative is based on the premise that ecosystems change, even in the absence of active management. It is essentially a "status quo" strategy that allows current activities and policies, such as recreation administration, road maintenance and fire suppression to continue. It proposes no actions that are contained in the action alternatives described below. This alternative provides a baseline for comparison of environmental consequences of the other alternatives to the existing condition (36 CFR 1502.14) and is a management option that could be selected by the Responsible Official.

ALTERNATIVE B – PROPOSED ACTION

Intent: Alternative B was designed to meet the purpose and need for this project.

Alternative B would implement the following activities (see map M-4):

- Intermediate tree harvest treatments on approximately 2,065 acres to create a more open forest structure, promote fire-adapted species, retain large overstory structure, reduce fuels in the urban interface, and reduce vulnerability to uncharacteristic fires, insects, and disease. Stand replacement harvest, followed by conifer or shrub planting in some areas, would occur on approximately 632 acres with high insect and disease levels or where it is desirable to promote a more diverse species mix. This harvest would contribute approximately 17.3 MMBF (42,129 CCF) of wood products to the economy. Activity fuels would be treated primarily with excavator piling and yarding tops. Best Management Practices would be applied to haul roads in the West Fork Yaak River watershed. Roads used for haul in other watersheds may also receive BMP work, depending on the amount of funds generated from the timber sales. Less than 1 mile of temporary road would be built to access units and recontoured after use.
- Approximately 310 acres of mechanical fuels reduction treatments in the wildland/urban interface.
- Approximately 874 acres of maintenance burning to reintroduce fire to the ecosystem, promote healthy conifer and shrub growth, reduce fuels, and in some areas promote old growth characteristics. The 234-acre Dusty Peak maintenance burn is located in the West Fork Yaak IRA #694.
- Non-commercial thinning of approximately 900 acres to improve conditions for selected trees.
- An increase in Grizzly Bear Core security area in BMU 15 from 47% to 53% by earth berming several road segments that are currently restricted with a gate.
- Design features and mitigations to protect resource values, including access management changes to provide for wildlife security (see Table 2-2). For instance use of road system #5879 (Rausch Point) by the public would be restricted during the project due to the importance of the area for big game security.

ALTERNATIVE C

Intent: Alternative C was designed to address Issue #1, Regeneration Harvest.

This alternative was designed to address Issue #1 regarding public concerns with regeneration harvest, particularly in wet habitat areas. Also, the size, shape, and silvicultural treatment is adjusted for many units in this alternative based on further field verification of logging system feasibility and treatment goals.

Alternative C would implement the activities in Alternative B, with the following changes in acreages and volumes (see map M-5).

- Intermediate tree harvest treatments on approximately 1,828 acres. Stand replacement harvest, followed by conifer or shrub planting in some areas, would occur on approximately 454 acres. This harvest would contribute approximately 14.4 MMBF (35,021 CCF) of wood products to the economy.
- Approximately 318 acres of mechanical fuels reduction treatments in the wildland/urban interface.
- Approximately 883 acres of maintenance burning would occur.

ALTERNATIVE D - THE PREFERRED ALTERNATIVE

Intent: Alternative D shares the intent and many of the specific features of Alternative C, but in addition was developed to address Major Issue #2, Old Growth.

Alternative D would implement the activities in Alternatives B and C, with the following changes in acreages and volumes (see map M-6).

- This alternative improves the quality of designated replacement old growth in the Hensley Face area. Also, approximately 122 acres of habitat with the potential for old growth management designation is dropped from the proposed harvest treatment. Intermediate tree harvest treatments on approximately 1,829 acres would occur. Stand replacement harvest, followed by conifer or shrub planting in some areas, would occur on approximately 317 acres. This harvest would contribute approximately 13.8 MMBF (33,721 CCF) of wood products to the economy.
- Approximately 328 acres of mechanical fuels reduction treatments in the wildland/urban interface would be implemented.
- Approximately 818 acres of maintenance burning would occur to reintroduce fire to the ecosystem, promote healthy conifer and shrub growth, reduce fuels, and in some areas promote old growth characteristics.

COMPARISON OF ALTERNATIVES

This section displays a tabular comparison of the alternatives considered in detail and the environmental effects of each expressed by the units of measure. This information, along with a detailed discussion of the environmental consequences presented in Chapter 3, provides the basis for comparing alternatives.

TABLE S-1. COMPARISON OF PURPOSE AND NEED OBJECTIVES BY ALTERNATIVE

Manage for Vegetative Conditions that are More Suitable to a Fire-Dependent Ecosystem	**A**	**B**	**C**	**D**
Acres thinned to create a more open forest structure, promote fire-adapted species, retain large overstory structure, reduce fuels in the urban interface, and reduce vulnerability to uncharacteristic fires, and insects and disease levels.	0	2,065	1,828	1,829
Replacement of stands at high insect and disease levels or to restore western larch/white pine cover type utilizing regeneration harvest methods	0	632	454	317
Total Acres Treated with Timber Harvest to Meet Project Objectives	0	2,697	2,282	2,146
Reduce natural fuels and reintroduce fire				
Mechanical fuels reduction	0	310	318	328
Maintenance burning over next 10 years	0	874	883	818
Improve and Maintain Winter Range Conditions				
Winter Range Cover/Forage Ratios	88:12	86:14	86:14	87:13
Acres of Winter Range Maintenance and Improvement	0	1,529	1,407	1,230
Improve Conditions in Old Growth Habitat				
Acres of fuels reduction and underburning in designated old growth	0	303	303	228
Reduce Fuels in the Urban Interface				
Acres of fuel reduction in the urban interface	0	742	691	692
Improve Growing Conditions and Long-Term Management of Overstocked Sapling/Pole Stands				
Acres of non-commercial thinning	0	900	900	900
Improve Quality and Quantity of Grizzly Bear Habitat				
Percent of BMU 15 in Core Grizzly Bear Habitat post project	47	53	53	53
Contribute Forest Products to the Economy				
Timber Sale Volumes (CCF/MMBF)	0	42,129/ 17.3	35,021/ 14.4	33,721/ 13.8

TABLE S-2. COMPARISON OF ISSUE INDICATORS BY ALTERNATIVE

INDICATOR	**ALT A**	**ALT B**	**ALT C**	**ALT D**
Issue #1 – REGENERATION HARVEST				
Acres of regeneration harvest	0	632	454	317
ECAs within drainages with regeneration harvest concerns				
French Cr.	20	23	22	22
WFYaak River Trib #2	22	34	30	30
Mud Cr.	14	31	29	22
Sink Cr.	20	33	24	24
RHCAs protected? (Y/N)	N/A	Y	Y	Y
Beneficial uses protected (Y/N)	N/A	Y	Y	Y
Issue #2 – OLD GROWTH				
Alternative improves the quality of designated replacement old growth (MA-13)? (Y/N)	N	N	N	Y
Acres of habitat with potential for old growth management designation dropped from proposed treatment.	N/A	0	0	122

CHAPTER ONE

Purpose And Need

INTRODUCTION

This chapter identifies the implementation area, the Proposed Action, the purpose and need for action, the relationship to the Forest Plan, the scope of the analysis, and the decisions to be made. All referenced maps are located at the back of this document.

The proposals in this project were developed from a broad scale assessment of the Northwest Yaak Subunit (Garver Ecosystem Assessment at the Watershed Scale, January 2002). The district prioritized recommendations made in that assessment, based on the need for action, to formulate this project. The Garver landscape assessment and other documents referred to in this DEIS are located in the Garver project file and available upon request.

Following the assessment and prior to finalization of the Proposed Action, many areas were dropped from treatment to protect resources or because treatment is not needed at this time (see Initial Screening map, M-2). The following areas were not considered further for treatment:

- The west half of the Northwest Yaak subunit was deferred from treatment due to vegetative conditions that have limited forest health concerns and/or are currently providing important wildlife security, including grizzly bear Core Area.
- With the exception of the proposed Dusty Peak burn, vegetative treatment was not proposed in IRAs.
- The harvest and fuels treatment proposals avoid the Slim Cr., most of Lap Cr., and the Hensley Cr. drainage because these areas are not considered to have recovered sufficiently hydrologically (measured in Equivalent Clearcut Acres or ECAs) to enter at this time. This is a result of past harvest in lodgepole pine stands impacted by bark beetles.
- Areas designated as “unsuitable” for timber harvest in the Forest Plan, including designated old growth, were also not considered for commercial harvest treatments in the initial design of the proposed action.

PROJECT AREA DESCRIPTION

The Garver project area is approximately 43,096 acres and includes the West Fork Yaak River, Pete Creek, Lap Creek, Waper Creek, and Mud Creek, as well as several small drainages that are tributaries to the Yaak River. The Canadian border forms the northern boundary of this project; the eastern boundary of Pete Creek watershed forms the western edge, Yaak River the southern, and Northeast Yaak subunit the eastern boundary. The West Fork Yaak Inventoried Roadless Area (IRA #694) is located along the north and western border of this project area.

This is a very diverse setting that was entirely covered by glaciers in the last ice age. Wetlands and meadows are a significant remnant feature where glacial retreat created many depressional areas. This area has a favorable climate and very good

site conditions for forest vegetation. The average annual precipitation ranges from 25 to 45 inches, more than half as snow. Natural slope failures are rare.

Wildfire historically played a role in interrupting forest succession and creating much of the vegetative diversity of this area. Since the early 1900s, a policy of wildfire suppression on National Forest lands has interrupted this characteristic disturbance. As a result, many forested areas have a higher stocking level, than occurred historically, and a much greater proportion of trees less adapted to a fire maintained ecosystem. This situation can create undesirable forest health conditions, increased risk of crown fires, diminished wildlife browse potential, and loss of key conifer species.

Once a common feature of the area, western white pine has diminished in scope due to an introduced blister rust fungus, the cause of high amounts of tree mortality. Western larch is also less prevalent in some areas due to high dwarf mistletoe infection, loss of tree vigor, and the lack of fire-induced site preparation that enables larch to sustain itself while providing some control of dwarf mistletoe.

Many sites within the assessment area have received active timber management. Much of this began around the 1950s when harvest focused on the salvage of beetle-killed spruce. Subsequent entries focused on reducing economic losses in lodgepole pine stands killed or at high risk to mountain pine beetle infestation. This active management is largely responsible for the landscape appearance, stand structure and species composition that you see today. While a fairly balanced age class distribution occurs across the project area, the emphasis on regeneration harvest in many areas has created an abundance of young stands. Many of these stands have been planted and are fully stocked with mixed conifers species that provide wildlife forage, hiding cover and, in some areas, thermal cover. Past management and the development of a transportation system has provided an opportunity to reduce fuels loadings in treatment areas, while providing greater access for fire suppression.

The analysis area is a popular recreation area, offering a variety of opportunities in diverse settings. Activities include snowmobiling, cross country skiing, hunting, fishing, hiking, horseback riding, scenic viewing, wildlife viewing, camping and gathering forest products. The district rents the Garver Mountain Lookout for summer enjoyment by the public. West Fork Falls is a popular scenic area and has a developed trail and viewing platform. Hensley Hill is a popular viewing point and offers outstanding views of the entire valley. The West Yaak IRA #694 is within this project area.

This area is a part of the Cabinet-Yaak ecosystem that supports a relatively stable array of wildlife species and habitats. Grizzly bear, gray wolf, lynx, and bald eagle, protected under the Endangered Species Act, utilize this area. A stronghold for westslope cutthroat trout exists in the West Fork Yaak River and its tributaries. Westslope cutthroat trout above the upper falls in the West Fork Yaak River are genetically pure. Unlike, other areas on the Three Rivers Ranger District, there are no introduced species in this drainage. Genetically pure westslope cutthroat trout also inhabit the headwaters of Pete Creek which flows into the mainstem Yaak River.

The Yaak River valley bottom has become more populated with individual homeowners during the last 10 years since Champion International sold its timberlands in the area. See the Vicinity Map, M-1 for a display of private lands (non-federal land) in the project area. These private lands are adjacent to National Forest lands, forming the wildland/urban interface discussed in this document.

PROPOSED ACTION

To meet the purpose and need for action, the Proposed Action would implement the following activities (see Chapter 2, Alternatives Considered in Detail section for detailed information on the proposed activities):

- Intermediate tree harvest treatments to create a more open forest structure, promote fire-adapted species, retain large overstory structure, reduce fuels in the urban interface, and reduce vulnerability to uncharacteristic fires, insects, and disease. Stand replacement harvest would occur in areas with high insect and disease levels or where it is desirable to promote a more diverse species mix. This harvest would contribute wood products to the economy. Activity fuels would be treated primarily with excavator piling and yarding tops. Best Management Practices would be applied to haul roads in the West Fork Yaak River watershed. Roads used for haul in other watersheds may also receive BMP work, depending on the amount of funds generated from the timber sales.
- Mechanical fuels reduction treatments in the wildland/urban interface.
- Maintenance burning to reintroduce fire to the ecosystem, promote healthy conifer and shrub growth, reduce fuels, and in some areas promote old growth characteristics.
- Non-commercial thinning to improve conditions for selected trees.
- An increase in Grizzly Bear Core security area in BMU 15 from 47% to 53% by earth berming several road segments that are currently restricted with a gate.
- Design features and mitigations to protect resource values, including access management changes to provide for wildlife security. For instance use of road system #5879 (Rausch Point) by the public would be restricted during the project due to the importance of the area for big game security.

PURPOSE AND NEED FOR ACTION

A number of specific resource and vegetative conditions not meeting long-term management objectives were identified in a broad scale assessment of the Northwest Yaak planning subunit. These opportunities were developed through a comparison of past and present project-area forest conditions with that which is considered necessary to maintain sustainable forest conditions. The assessment was based on direction in the Kootenai Forest Plan, the National Fire Plan, findings in the Northern Region Overview, and trends observed by interdisciplinary specialists conducting the landscape assessment.

The Purpose and Need for the activities proposed in the Garver project is to:

- **Manage for vegetative conditions that are more suitable to a fire-dependent ecosystem;**
- **Improve and maintain winter range conditions;**
- **Improve conditions in old growth habitat;**
- **Reduce Fuels in the Urban Interface;**
- **Improve growing conditions and long-term management of overstocked sapling/pole stands;**
- **Improve quality and quantity of grizzly bear habitat; and**
- **Contribute forest products to the economy.**

These purpose and need statements are described in more detail on the following pages.

Manage for Vegetative Conditions that are More Suitable to a Fire-Dependent Ecosystem

There is a need to address some undesirable trends in the current forest dynamics and manage for vegetative conditions that are more suitable to a fire-dependent ecosystem and, in the long term, encourage more resilient and sustainable forest conditions:

This includes the need to:

1) Thin trees where forest density and structure is becoming uncharacteristic (see Photo 1) to maintain growth in desired species and crown class, promote a trend toward a more open-grown forest structure with a greater proportion of large fire-adapted species, and reduce vulnerability to uncharacteristic fires and Douglas-fir bark beetle. This treatment is proposed in a variety of vegetative types and forest conditions, on drier habitat types and the moist, more biologically productive settings. In a number of cases, this treatment has the added emphasis and expectation of enhancing the potential of some stands to develop old forest characteristics.

Photo 1- Example of Condition where Stand Improvement is Planned with Fuels Treatment

Photo 2- Example of Condition where Regeneration Harvest is Proposed

2) Replace portions of stands where the long term health is questionable due to conditions created by exclusion of fire-maintained processes, uncharacteristic levels of dwarf mistletoe and/or blister rust fungal disease, and generally poor tree health (Photo 2). Regeneration harvest in these areas includes the restoration of western larch and western white pine as an emphasis in these situations as natural regeneration is not occurring and this relic forest type has diminished. This treatment is proposed primarily in the wetter habitat types. It should be noted that past, selective harvest of large, fire-adapted species has not occurred in proposed regeneration harvest units. Additional information on the rationale for this restorative treatment can be found in the findings of the Garver landscape assessment.

3) Re-introduce fire to promote ecosystem maintenance, reduce fuels, and promote healthy forest conditions. In some cases, mechanical fuels treatment would be the first step in reducing fuels, with prescribed burning being done in subsequent years.

The Forest Plan includes several goals and objectives that relate to improving forest health by: (1) maintaining diverse age classes of vegetation for viable populations of all existing native, vertebrate, wildlife species; (2) using prescribed fire to simulate natural ecological process; and (3) controlling insect and disease to historic endemic levels. (Forest Plan, Volume 1, pp II-1 through II-4).

The National Fire Plan also provides direction for management of National Forest management. One of the key points of the National Fire Plan is:

> rehabilitation and restoration of landscapes--restore healthy, diverse, and resilient ecological systems to minimize uncharacteristically intense fires on a priority watershed basis. Methods will include removal of excessive vegetation and dead fuels through thinning, prescribed fire, and other treatment methods.

The Northern Region Overview (USDA April, 1998) explores conditions associated with ecosystem health, recreation, and community health and identifies forest types and watersheds at risk and in need of restoration. This report notes that indicators of a properly functioning condition include: a diverse distribution of seral stages, with composition, structure, and pattern consistent with those resulting from historical fire regimes, and endemic insect and disease. It also identifies factors that are components of risk to the properly functioning condition: 1) loss in areal extent of species composition at the cover type level; 2) landscape fragmentation; and 3) stand level structure (i.e.: density, size class distribution). This report, and the Garver Landscape Assessment, both describe the changes in vegetation that are contributing to the Purpose and Need with emphasis on restoration of conifer species considered at risk. For example, due to the interaction of mountain pine beetle, blister rust, and associated salvage much of the *white pine* forest has changed to grand fir, Douglas-fir, western redcedar, and western hemlock. The overview points out that natural regeneration alone is ineffective in achieving restoration objectives due to the limited time native population of white pine have had to develop adequate blister rust resistance. In addition, the lack of low intensity and mixed severity fires with the shift towards stand replacing wildfire has diminished the areal extent of *western larch*. In many areas where a mixed severity fire regime helped maintain a more diverse landscape structure with large trees, currently there are more multi-layered stands, composed largely of middle-aged intermediate size trees, with few large overstory trees. Similar trends and concerns are applicable to *ponderosa pine*, a species very dependant on frequent, low intensity fires and very susceptible to drought stress compounded by increased density and ingrowth of understory trees.

Improve and Maintain Winter Range Conditions

There is a need to improve the winter range forage base for big game species such as deer, elk, and moose. The existing cover:forage ratio is 88:12. The recommended numbers are 30:70 for elk and 70:30 for white-tailed deer. It is expected that reductions in crown cover through intermediate harvest and small openings created by regeneration harvest will create more favorable growing space for understory vegetation. It is also desirable to create habitat conditions that include a varied stand structure capable of providing snow-intercept functions during winter months.

Many of the Proposed Action activities are within Management Areas 11 and 12 which are designated in the Forest Plan as Big Game Winter and Summer Range. Timber harvest and prescribed burning are considered acceptable tools to enhance big game habitat in those areas (Forest Plan pgs. III-44, III-46, III-49, and III-51).

Improve Conditions in Old Growth Habitat

Some of the drier habitat sites which have been designated as old growth (MA-13) have not experienced wildfire for many years due to fire suppression. Historically these sites would have received frequent low-intensity underburns, and conditions are now outside this historic range of variability. There is a need to reduce fuels and periodically underburn these areas to maintain the old growth character. The Forest Plan allows for planned ignitions in designated old growth (MA-13) to maintain old growth characteristics (Forest Plan pg. III-56).

Reduce Fuels in the Urban Interface

In the wildland/urban interface there is a need to maintain an environment which provides for protection of private lands and firefighter and public safety. Many of these sites would also have historically received frequent low-intensity underburns. By thinning, piling, and/or burning vegetation, the risk of crown fire in these areas can be reduced, allowing for safer protection of private lands. The community of Yaak, Montana, is listed in the *Urban Wildland Interface Communities within the Vicinity of Federal Lands that are at High Risk from Wildfire*, Federal Register, August 17, 2001.

Forest Plan Goal #17 calls for using prescribed fire to simulate natural ecological processes, prevent excessive natural and activity fuel buildups, create habitat diversity for wildlife, reduce suppression costs, and maintain ecosystems.

The National Fire Plan also provides direction for urban interface treatments. One of the key points of the National Fire Plan is:

> hazardous fuel reduction--assign highest priority for hazardous fuels reduction to communities at risk, readily accessible municipal watersheds, threatened and endangered species habitat, and other important local features, where conditions favor uncharacteristically intense fires.

Improve Growing Conditions and Long-Term Management of Overstocked Sapling/Pole Stands

There is a need to thin young, overstocked stands created by past regeneration harvest and wildfires in order to improve growing conditions, maintain species and structural diversity, and improve forest health. These stands can provide varied management options in the future as stand characteristics are maintained or enhanced to promote specific habitat or resource objectives. The Northern Region Overview recommends that thinning in western larch and ponderosa pine stands be considered a high priority in the future (Northern Region Overview Detailed Report; USDA October, 1998, pages. 24, 26).

Improve Quality and Quantity of Grizzly Bear Habitat

Based on new information in the FEIS Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones, 2002, and the U.S. Fish and Wildlife Service (Kasworm, et. al., 2002), the Three Rivers Ranger District has a unique opportunity to improve and increase the quality and quantity of core habitat for grizzly bears. The FEIS recommends that core area be increased in Bear Management Unit (BMU) 15. This BMU currently has a core habitat of 47%. BMU 15 includes the Yaak River Highway from Pete Creek to Blacktail Creek, thus the BMU includes the private land along the river and the highway. Some of the modeled core habitat is adjacent to private land. This situation increases the risk of bears becoming nuisances around subdivisions and individual homes, and ultimately increases mortality risk. The quality of habitat for bears in this area has been preliminarily determined to be low, based on the mortality risk associated with its location (Kasworm personal communication 2002). In the northernmost part of the BMU there is a balance of spring, summer, and fall high quality habitat. There is a need to adjust core habitat boundaries to improve the quality of core habitat and reduce the possibility of conflicts between bears and humans.

Contribute Forest Products to the Economy

There is a need to supply forest products to contribute to the support of that segment of the local and regional economy dependant on timber products.

One of the objectives of the Kootenai Forest Plan is to provide a sustained yield of timber volume responsive to national and regional needs, scheduled to encourage a stable base of economic growth in the growth in the dependent geographical area. Forest Plan Management Area goals also call for a programmed yield of timber (Forest Plan, Volume 1). The Northern Region Overview (USDA April, 1999) finds that the Northwest Zone, including the Kootenai National Forest, "holds the greatest opportunity for vegetation treatments and restoration with timber sales. From a social and economic standpoint, using timber harvest for ecological restoration would be of benefit to the many communities which still have a strong economic dependency, more so than other zones in the region."

One of the purposes provided by Congress for the management of National Forest System Land is to "furnish a continuous supply of timber for the use and necessities of the citizens of the United States" (Organic Act, 16 USC 475).

RELATIONSHIP TO THE FOREST PLAN

National forest planning takes place at several levels: national, regional, forest, and project levels. The Garver EIS is a project-level analysis; its scope is confined to addressing the major issues and possible environmental consequences of the project. It does not attempt to address decisions made at higher levels. It does, however, implement direction provided at those higher levels.

The Forest Plan embodies the provisions of the National Forest Management Act, its implementing regulations, and other guiding documents. The Forest Plan sets forth in detail the direction for managing the land and resources of the Kootenai National

Forest. Where appropriate, the Garver EIS tiers to the Forest Plan FEIS, as encouraged by 40 CFR 1502.20.

The Forest Plan uses management areas to guide management of the national forest lands within the Kootenai Forest. Each management area provides for a unique combination of activities, practices and uses. The Garver project area includes 15 management areas. Goals, objectives and desired future conditions of each are included or summarized below, and their locations are shown in Management Areas map, M-3. The Forest Plan (Chapter III) contains a detailed description of each management area.

TABLE 1-1. FOREST PLAN MANAGEMENT AREA DESCRIPTIONS FOR PROPOSED HARVESTAREAS

Garver Proposals*				MANAGEMENT AREA DESCRIPTION
H	M	B	T	
		X		**MA-2: Semi-Primitive Non-Motorized Recreation** (Unsuitable - Forest Plan Vol. 1, pp. III-2-7) ***Description:*** Characterized by a natural-appearing environment generally associated with ridgetop experiences. This MA offers roadless recreation opportunities. Vegetation varies from full timber cover to open meadows. ***Goals:*** To provide for the protection and enhancement of areas for roadless recreation use and to provide for wildlife management where specific wildlife values are high. Within grizzly bear management situations 1 and 2, it is the goal of this MA to provide habitat that will contribute to the recovery of the grizzly bear. Prescribed fire is acceptable for fuels management & wildlife habitat enhancement.
X	X		X	**MA-11: Big Game Winter Range** (Suitable - Forest Plan Vol. 1, pp. III-43-47) ***Description:*** Used by most species of big game for winter range. Found at lower elevations in most major drainages and the topography ranges from steep moderate and rolling topography. Some parcels of this MA are visible from major travel corridors, and there are 46,000 acres of Interagency Grizzly Situations 1 and 2. Timber productivity is moderate to high. ***Goals:*** To maintain or enhance winter-range for big-game species while producing a programmed yield of timber and maintaining the viewing resource in areas of high visual significance.
X			X	**MA-12: Big Game Summer Range** (Suitable - Forest Plan Vol. 1, pp. III-48-53) ***Description:*** Land used by most species of big-game during periods of late spring through late fall. Generally located at or above 4,000-foot elevation. ***Goals:*** Maintain or enhance non-winter big-game habitat & produce a programmed yield of timber.
X				**MA-14: Grizzly Habitat Management** (Suitable - Forest Plan Vol. 1, pp. III-58-63) MA-14: Grizzly Habitat Management (Suitable - Forest Plan Vol. 1, pp. III-58-63) ***Description:*** Consists of identified Interagency Grizzly Situations 1 and 2 that are in conjunction with suitable timber land. ***Goals:*** Maintain or enhance grizzly bear habitat, reduce grizzly/human conflicts, assist in the recovery of the grizzly bear, realize a programmed level of timber production, and provide for the maintenance or enhancement of other wildlife, especially big game.
		X		**MA-13: Designated Old-Growth** (Unsuitable - Forest Plan Vol. 1, pp. III-54-57) ***Description*:** Consists of scattered parcels of existing old-growth or mature timber stands which contain components of old-growth. This MA usually occurs below the 5500 foot elevation. The lodgepole pine timber type is not included. ***Goals***: Provide special habitat necessary for old growth-dependent wildlife on a minimum of 10% of each major drainage on the Forest. Planned ignitions are acceptable to maintain old growth characteristics.
X			X	**MA-15: Timber Production** (Suitable - Forest Plan Vol. 1, pp. III-64-68) ***Description:*** Consists of Forest lands identified as medium to highly productive in their ability to produce timber volumes. These are lands which do not require special management techniques to meet wildlife population goals and have not been identified as habitat for threatened or endangered species. ***Goals:*** This MA focuses upon timber production while providing for other resource values. Planned ignitions are permitted.
X	X		X	**MA-17: Viewing with Timber** (Suitable - Forest Plan Vol. 1, pp. III-74-78) ***Description:*** Located near, and viewed from major travel corridors. Most wildlife species occur in this MA but it is not critical to their existence or population goals. ***Goals:*** To maintain or enhance a natural appearing landscape, produce a programmed volume of timber and manage the habitat to provide for viable populations of existing native wildlife species.

*H=Timber Harvest
M=Mechanical Fuels Treatment
B=Maintenance Burning
T=Non-commercial Thinning

PROJECT SCOPE

Section 40 CFR 1508.25 of the NEPA implementing regulations provides guidance in determining the proper scope of an EIS.

Geographic Scope

The Three Rivers Ranger District is preparing this EIS to document the analysis and disclose the environmental effects of a proposed vegetation treatment project on National Forest System lands in the Garver project area

Temporal Scope

The action alternatives would result in timber sales and fuels treatment projects which would be planned for bid in 2003. These activities are expected to be completed by 2006, with slash disposal and reforestation activities completed by 2009. Typically, BMP work on haul roads would be accomplished prior to haul of timber products. Non-commercial thinning activities would be accomplished by 2013. Adjustment of Core boundaries would be complete once post harvest activities are accomplished. These dates are tentative, based upon anticipated budgets, work force, weather and other considerations. Actual dates and timing of implementation and accomplishment could vary.

Administrative Scope

Alternatives to the proposed action were developed. The No Action Alternative is also analyzed, and reflects the current status and administrative activities within the project area.

The Proposed Action includes those activities necessary to fulfill the identified purpose and need, as well as all connected actions as described in Chapter 2. Actions necessary to meet the purpose and need include tree removal, prescribed burning, and access management decisions. Connected actions include temporary road construction, road work on existing roads, slash burning, and all management requirements, Best Management Practices, and design features described in Chapter 2.

Three types of effects are considered in the analysis, pursuant to 40 CFR 1508.7 and 40 CFR 1508.8: direct, indirect, and cumulative effects. These effects are disclosed in Chapter 3.

DECISIONS TO BE MADE:

1. Whether to implement timber management activities (silvicultural prescriptions, logging methods, slash treatment, reforestation), including mitigation measures and design features to protect resources, and if so, the site-specific location of these activities and practices.
2. Whether to implement natural fuels reduction practices, including mitigation measures and design features to protect resources, and if so, the selection and site-specific location of activities and practices.
3. Whether to implement non-commercial thinning activities, and if so, the selection and site-specific location of these activities
4. Whether road access restrictions or other actions are necessary to meet resource objectives, and if so, to what extent.
5. What, if any, specific project monitoring requirements are needed to assure mitigation measures and design features are implemented and effective, or to evaluate success of project objectives.

CHAPTER TWO

Alternatives

INTRODUCTION

This chapter describes the alternative development process, including how public comments help formulate the alternatives; the alternatives considered but eliminated from detailed study; and the alternatives considered in detail. In this project, three action alternatives are carried forward and analyzed in detail in Chapter 3, along with the no action alternative. Tables 2-12 and 2-13 at the end this chapter display a comparison of the purpose and need and major issues by alternative.

ALTERNATIVE DEVELOPMENT PROCESS

PUBLIC INVOLVEMENT

Proposed Action Development

In August of 2001 the Three Rivers Ranger District evaluated the Northwest Yaak Subunit for potential management opportunities. This landscape assessment characterized the human, terrestrial, and aquatic features as well as the vegetative conditions and ecological processes within the watershed. The ID team requested input during the assessment phase from persons interested in the area, such as those who commented on a previous Northwest Yaak analysis and those asking to be notified of projects in the upper Yaak valley. A display ad soliciting information was published in the Libby *Western News*. Twenty comment letters were received. Public comments varied and included recommendations to:

- Maintain recreational opportunities and access
- Actively manage overcrowded forest conditions
- Salvage dead and dying trees
- Treat noxious weeds
- Protect water quality
- Improve wildlife habitat

Comments from the 1998 Northwest Yaak assessment were also reviewed and reflected similar desires for management. (See landscape assessment section of the project file for more information.) Those opportunities that were feasible to implement within the next 10 years and required a new environmental analysis and decision were brought forward into the Proposed Action for the Garver project (see pg. 1-1).

Proposed Action Scoping

Following the subunit assessment, the district developed a Proposed Action for the project area. Site-specific public comments on the proposal were requested in April of 2002 through publication in the *Federal Register* and public scoping notices in the Kalispell, Montana, *Daily Interlake*; and the Libby, Montana, *Western News*. A notice was also mailed to those who responded to the landscape assessment

inquiry and those on the district mailing list for planning projects in the upper Yaak valley area (209 recipients); twenty comment letters were received.

The district held an open house to explain the status of the project on June 20, 2002, at the Upper Yaak Work Center. Twelve people attended. No new issues surfaced.

On July 18, 2002, the district conducted a field trip to the West Fork Yaak River area at the request of the U.S. Environmental Protection Agency (EPA) and the Yaak Valley Forest Council to discuss water quality concerns in that area. (See project file for EPA field trip notes.)

On August 29, 2002, the district visited representative units with members at the request of the Yaak Valley Forest Council to discuss treatments and concerns with noxious weeds and soil disturbance.

The concerns of the Kootenai and Salish tribes were solicited through project scoping. In addition, the Confederated Salish and Kootenai Tribe has provided a tribal liaison to work in partnership with the Kootenai National Forest to review project proposals and provide tribal input. No concerns regarding this project were expressed by tribal governments.

Wayne Kasworm, with the U. S. Fish and Wildlife Service, and Jerry Brown and Mike Hensler with the Montana Department of Fish, Wildlife and Parks, were also consulted on this project.

ISSUE IDENTIFICATION

The scoping comments were reviewed by the ID Team and categorized. Some concerns were determined to be outside the scope of this project or are addressed in the Forest Plan process, other issues are addressed through mitigation and design features described in this chapter, or by displaying the effects of the no action vs. the action alternatives.

Issues representing an unresolved conflict with the Proposed Action have been brought forward as "Major Issues" and were used to help formulate alternatives to the Proposed Action. Documentation of the issue identification process is contained in the project file located at the Three Rivers Ranger District office.

Major Issues

Internal and external comments revealed issues representing unresolved conflict with the Proposed Action (Alternative B). The following major issues were used to develop alternatives to the Proposed Action.

Issue #1 – Regeneration Harvest: Several commentors expressed concerns with the size, location and/or appropriateness of some proposed regeneration harvest units. Many of these commentors felt that areas proposed for regeneration harvest are in a healthy condition and stand replacement is not warranted. There were also concerns that regeneration harvest in wet habitat conditions could adversely affect water quality, water yield, and beneficial uses. (See project file scoping comments #1, 2, 9, 11, 14)

Indicator:
- Acres of regeneration harvest.
- Equivalent Clearcut Acres (ECAs) by watershed.
- Riparian Habitat Conservation Areas (RHCAs) protected? (Y/N)
- Beneficial uses protected? (Y/N)

Issue #2 – Old Growth: There are two components to this issue:

1) One scoping letter pointed out that the habitat in Unit 54 could provide higher quality replacement old growth than what is presently designated in the Hensley Face area. Members of the Garver ID team agreed that a redelineation of the MA-13 in Compartment 17 (Hensley Hill) could provide better quality habitat for replacement old growth designation. (See project file scoping comment letters #11.)

Indicator:
- Alternative improves the quality of designated replacement old growth (yes/no)?

2) Under the Proposed Action the habitat in Units 11, 12, and part of 17 meet the Forest's criteria for old growth. This area has not been designated as old growth since this compartment (Compartment 22, Lick Mountain), has enough old growth to meet Forest Plan Standards. However, these stands have been identified as habitat that could have potential for old growth management designation, if needed in the event of any losses in the currently designated old growth management areas from natural events, such as stand replacing wildfires. Also, there is a shortage of actual old growth elsewhere within the project area (notably within Compartments 17 and 18) therefore it would be prudent to retain this forest condition in Compartment 22 at this time. The desire for retention of old growth habitat has been expressed in public comments (see project file scoping comment letter #17).

Indicator:
- Acres of habitat with potential for old growth management designation dropped from proposed treatment.

Other Concerns

Other concerns that helped frame the scope of the analysis were also evaluated by the team during the scoping process. These concerns were not considered major issues because they were resolved through project design and, therefore, were not used to develop alternatives analyzed in detail. These concerns are addressed within the effects analysis by resource in Chapter 3 of this DEIS.

Small Sales for Local Operators: Several commentors asked that this project be designed to provide opportunities for small-scale operators to help sustain the local economy. Several of the tractor harvest areas are along open roads are expected to be offered under separate sales to provide an opportunity for small operators to competitively bid. The mechanical fuels treatments and non-commercial thinning portions of this project would also provide opportunities for small operators. (See Chapter 3 Economics section.

Water Quality and Fisheries in West Fork Yaak: A concern was expressed during public scoping that since the West Fork Yaak is listed by the State as a Water Quality Limited Segment, land management activities should be proposed to improve the condition in this stream (see project file scoping letter #11). The Proposed Action is designed to avoid any degradation to this stream by primarily utilizing intermediate methods of harvest, applying BMPs to roads used for timber haul and buffering riparian areas from activities. (See Soil and Water section of Table 2-2, and road work and BMP activity description on pg. 2-8; and the Chapter 3 Watershed Resources and Fisheries analysis).

Noxious Weeds: The presence and risk of noxious weed spread was expressed as a concern during the subunit assessment, Proposed Action scoping, and field trips. Design features are included in this project to treat noxious weeds, including herbicide treatment of adjacent infestations at risk of spreading to proposed regeneration treatment areas, treatment of haul roads, and a requirement that all off-road equipment be washed prior to entry into the project area (see the noxious weeds section of Table 2-2, Appendix D, and the Chapter 3 Noxious Weeds analysis). (Herbicide treatment is covered by the Kootenai National Forest Herbicide Weed Control Plan Decision Notice, 1/97). Approximately 40% of the proposed harvest would utilize helicopter yarding, and winter harvest of Units 31, 32, 38, 38a, 42, 42a, 44, 45, 46 is included in this proposal. These methods reduce soil disturbance. Approximately 75% of the proposed harvest is through intermediate stand treatments which retain shade and are less likely to promote weed introduction. The No Action alternative presents the effects of not implementing harvest proposals.

RANGE OF ALTERNATIVES

Section 102(2)(e) of National Environmental Policy Act (NEPA) states that all Federal agencies shall "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflict concerning alternative uses of available resources."

An Environmental Assessment must also "rigorously explore and objectively evaluate all reasonable alternatives" [40 CFR 1502.14(a)]. The courts have established that this direction does not mean that every conceivable alternative must be considered, but that selection and discussion of alternatives must permit a reasoned choice and foster informed decision making and informed public participation.

The range of alternatives may extend beyond the limits set by the Forest Plan goals and objectives under the NEPA; however, the National Forest Management Act (NFMA) requires that the selected alternative fully comply with the Forest Plan unless the plan is amended in accordance with 36 CFR 219.10(f).

The range of alternatives presented in this chapter was determined by evaluating public and internal comments and the Purpose and Need for the project. This project is intended to move the landscape toward long-term ecosystem sustainability, reduce fuels in the urban interface, and provide goods and services to support the local and regional economy. Other influences included Forest Plan goals, objectives, desired condition, and standards and guidelines; federal laws, regulations, and policies, and economic viability. Within these parameters, the alternatives developed by the ID Team display a reasonable range of outputs, treatments, costs, management requirements, mitigation measures, and effects on resources.

In addition to the alternatives considered in detail, the ID Team examined a number of other alternatives during the analysis process. Although these alternatives contributed to the reasonable range, they were eliminated from further consideration for the reasons listed below.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Mechanical Treatments in Wet or Rocky Areas: In the original Proposed Action, which was scoped with the public in April 2001, Units E, 37, 38, and 39 were proposed for fuels or harvest treatment. Adjacent landowners and other residents pointed out that all or portions of these areas were very wet and that they were concerned about soil and other impacts from mechanical treatment of these areas.

During field reconnaissance of the proposed action, the ID Team confirmed that much or all of these units were within areas that would have been avoided as Riparian Habitat Conservation Area (RHCA) buffers or were too steep and rocky to treat. Therefore, Units E, 37, 39, and a portion of Unit 38 were dropped from treatment consideration in all action alternatives.

Alternative Roads Bermed to Create Core: During public scoping, the Waper Ridge Road (Rd. 5873), the Koo Koo Road (Rd. 757), as well as the Lick Mtn. Road (Rd. 5835) were presented as possible options for improving grizzly bear core area. The amount of core area created by berming each of these roads was similar and would be an improvement above the existing condition of 47%. In a review of the few site-specific public comments received on these roads, there was no consensus on which road to berm. After a review of the comments and the resource effects, it was decided that the Waper Ridge Road and the Koo Koo Road would be dropped from further consideration as roads to be bermed to create grizzly bear core. As compared to the other two roads, the Lick Mtn. Road has been closed to public travel the longest so berming would have the least impact on public use. Although there is an ongoing need for vegetation management in the area, it has the least total area of noxious weeds, the least amount of road surface investment, and the least number of stream crossings with potential for watershed problems to develop as compared to the Waper Ridge and Koo Koo roads.

Watershed Restoration Alternative: One organization requested a water quality alternative that would bring forward recommendations from the aquatics portion of the landscape assessment such as: 1) working with state and local groups to preserve and enhance fish populations through activities such as stocking programs and fishing regulation changes, 2) fish sampling, 3) establishing monitoring stations, 4) working with Canada to improve conditions in that portion of the West Fork Yaak River, and 5) replacing the Lap Cr. culvert on the Yaak 92 highway which is under county jurisdiction (see project file scoping comment letter #11). While the district intends to develop these working relationships and projects, these activities can be implemented without the level of environmental analysis required in an environmental impact statement so were not brought forward as part of this project proposal. The assessment phase did not reveal a critical need for watershed rehabilitation projects in the Garver project, so watershed rehabilitation was not brought forward as a purpose and need for action at this time.

Another organization requested an alternative that “precludes all road construction and logging and instead focuses on watershed restoration via road obliteration and sediment source reduction on remaining roads.” (See project file scoping comment letter #17.) Such an alternative which does not include harvest would not meet the purpose and need to reduce fuels in the urban interface, restore vegetative conditions suitable to a fire-dependent ecosystem, improve conditions in old growth and big game habitat, reduce tree densities, implement Best Management Practices (BMP) work funded through timber sale receipts, or provide timber for the wood products market. The harvest treatments designed to improve forage for wildlife would not occur. Also, as explained in the previous paragraph, the assessment phase did not reveal a critical need for road obliteration projects in this area at this time. For these reasons, a proposal of this type was not given detailed study.

Tractor Harvest in Unit 52: An alternative was suggested that Unit 52 be tractor logged rather than harvested by helicopter as proposed (see project file scoping comment letter #2). While the slopes are conducive to tractor logging, access would need to be obtained through agreement with private property owners. Since this approval was not obtained at the time of this documentation, the unit was analyzed for helicopter harvest. If the purchaser is able to negotiate access, the ID team will review the unit for effects from tractor harvest.

No Harvest in Units between Mud Creek and Sink Creek to Protect the Grizzly Bear: In public scoping comments a concern was noted that the roads in that area, including #5838 and #5839 are growing over and haven't been used for motorized access in a long time and the area appears to provide good forage and security (see public scoping comment letter #11). This alternative was not brought forward with detailed analysis for the following reasons: Road 5838 would not be opened for this project. Units 21 and 22 in this area are dropped in Alternatives C and D. The harvest in this area would be by helicopter; Road 5839 would be opened to access a landing and would be earth bermed following activities to create grizzly bear core area (see Appendix E). Core is being adjusted in this project during and post project to provide better habitat for grizzly bears. Existing project core is 47%. During project core would be 50%, and post project core would be 53%. While there may be some short-term displacement in this area during harvest, the harvest between Mud Cr and Sink Cr. (Units 13-21) would produce more open growing conditions encouraging increased berry and forage production which would benefit the bear once post project core is established (see Chapter 3, Wildlife, grizzly bear analysis).

ALTERNATIVES CONSIDERED IN DETAIL

ALTERNATIVE A - NO ACTION

The National Environmental Policy Act (NEPA) requires that an EIS include a "no action" alternative to serve as a baseline to compare action alternatives. The no action alternative is based on the premise that ecosystems change, even in the absence of active management. It is essentially a "status quo" strategy that allows current activities and policies, such as recreation administration, road maintenance and fire suppression to continue. It proposes no actions that are contained in the action alternatives described below. This alternative provides a baseline for comparison of environmental consequences of the other alternatives to the existing condition (36 CFR 1502.14) and is a management option that could be selected by the Responsible Official.

ACTIVITIES COMMON TO THE ACTION ALTERNATIVES

Timber Harvest, Access, Slash Treatment, And Tree Planting

Timber Harvest:

The timber harvest and fuels treatments proposed in this alternative are designed to meet one or more of the following objectives for vegetation management (see Appendix A for a detailed description of treatments, objectives, and harvest methods by unit). All harvest is on lands identified as suitable for timber production in the Forest Plan.

- Reduce uncharacteristic tree densities and risk of crown fire;
- Promote and maintain fire adapted vegetation;
- Enhance the potential of some stands to develop as old forest habitat;
- Reduce susceptibility of forest conditions to bark beetles;
- Replace stands with generally high levels of insect or disease-caused conditions with particular emphasis on restoration of western larch and white pine;
- Reduce fuels in the urban interface while improving conditions for future use of prescribed maintenance burning.
- Improve browse for wildlife;
- Contribute timber products to the economy.

Various harvest methods are prescribed depending on individual stand conditions. Examples of the expected outcomes of implementing some of these methods are displayed as photographs in the Appendix B. Note: a full description of many associated terms is located in the Glossary (Appendix G).

Intermediate Stand Treatments are being proposed to modify existing forest conditions in order to enhance growth, quality, vigor, and composition of a forest stand and in some cases to reduce fuels in the wildland/urban interface. This treatment generally occurs prior to stand maturity and is not intended to promote regeneration of the stand. In some areas of the project this treatment is expected to promote or enhance future old forest habitat conditions that otherwise might not incur due to stand density and fire exclusion. The following descriptions are examples of intermediate treatments proposed with this project. These treatments are designed to leave a stand that is sufficiently stocked to follow a normal development pattern until other treatments are considered appropriate.

Stand improvement cutting (ranges from 74% to 83% of total harvest) is being prescribed to improve the composition and quality of specific forested areas by reducing the density of the trees to an average basal area of 80-100 sq.ft. per acre and promoting a more open stand structure. To accomplish these objectives, this treatment would focus on removing excess and/or poor quality trees, lodgepole pine that is mature, dead, or considered at short term risk to continued bark beetle-caused impacts, and smaller diameter trees that are less fire-adapted. The results are intended to produce a more resilient stand condition with a greater representation of fire tolerant trees species and reduced ladder fuels. This situation retains approximately 60-70% of the existing canopy cover and would have the added benefit of maintaining trees with functional snow intercept values in winter range, creating small canopy gaps for browse, and retaining forest conditions that support continuing options for future management.

Commercial thinning (approximately 3% of total harvest) is proposed as a silvicultural treatment in which the stand density of commercial size trees is being reduced to an average density of 70-90 sq.ft. of basal area per acre in order improve growth of the remaining trees, to enhance forest health, and to recover potential mortality. In the project area, this treatment occurs in very uniform, dense stands with trees of a much smaller diameter than those planned for improvement cutting. In this treatment somewhat less emphasis is placed on changing the species composition as with other intermediate cuts. It is also being proposed in some lodgepole pine stands to reduce bark beetle susceptibility while maintaining future options. Approximately 70% of the existing canopy cover would be retained.

Regeneration Harvest is intended to replace a forest stand when modification treatments (i.e.: intermediate harvest) are not feasible due to inadequate stand conditions and would otherwise not meet management objectives. In this project regeneration is proposed in some stands because the majority of the stand is dead, dying, or diseased, or because the growth of the stand has culminated and the desired condition indicates the need for an area that is open to sunlight to encourage the growth of shrubs and other plants used by wildlife species for forage. Additionally, in some proposed treatment areas it is desirable to replace some single-aged, uniform lodgepole pine stands with a more diverse species mix that will develop with desired structural qualities and offer more options for future management. Within proposed harvest units there would be both live and dead trees that are designated for reserve. The number of trees left and the associated stand structure is described by the varying regeneration harvest methods proposed:

Seed Tree with Reserves (ranges from 10% to 22% of total harvest) initiates the establishment of a new stand beneath the partial shade of a reserved overstory. An

average of 8-10 trees per acre are being left for their seed-producing qualities, and generally have desired structural attributes that are a part of the desired target stand or landscape. In this project, approximately 20 to 30% of the existing canopy cover would be designated to leave in a mix of large diameter ponderosa pine, western larch and Douglas-fir, with lesser amounts of western redcedar, western white pine and Engelmann spruce. These reserve trees are being left singly and in small groups.

Shelterwood Seedcut with reserves (approximately 1% of total harvest) has a similar purpose as a seedtree cut except that an average of 15-25 overstory trees per acre would be left with the primary purpose of sheltering the developing stand from the elements. In the one unit proposed for this treatment, an estimated 30-35% of the existing canopy cover would be left, primarily in the dominant western larch and Douglas-fir.

Clearcut With Reserves (ranges from 0% to 3% of total harvest.) is a method of regenerating an even-aged stand in which new seedlings become established in full sunlight after removal of most of the existing trees. In this project, an estimated 10 to 20% of the existing canopy cover would be retained in an average of 5-7 trees per acre of large, mature western larch and Douglas-fir with lesser amounts of western redcedar, western white pine and Engelmann spruce. These preferred reserve trees are left singly or in groups with the intent that these older trees and snags would continue to provide nesting and perching habitat and remain as part of the new stand.

Approximately 60% of the proposed harvest units would be harvested utilizing ground-based systems (tractor yarding), 38% with a helicopter due to steep slopes or lack of access roads; and approximately 2% with a skyline system due to steep slopes (see specific descriptions by alternative below and Appendix A).

Access (Road Work and Temporary Road Construction):

Harvest units would be accessed from existing roads in most cases. Based on field reconnaissance, it is estimated that five temporary roads would likely be needed for this project:

Unit 51 access: .28 miles
Unit 33 access: .28 miles
Unit 45 access: .18 miles
Helicopter landing access off 5886B rd.: .17 miles
Helicopter landing access for Unit 52: .06 miles

These roads would be recontoured upon completion of activities.

Road maintenance work would be implemented on approximately 50 miles of haul roads in the project area to allow for safe timber transport.

Best Management Practices (BMP) work would be applied to these roads according to the following prioritization based on potential benefit to fisheries (see map M-13):

1) The Forest Service commits to applying BMPs to all haul roads in the West Fork Yaak watershed for this project
2) BMP work in other watersheds would be dependent on timber sale receipts and would be prioritized as follows: a) Pete Creek and Lap Creek; b) Unnamed face drainages to the Yaak River.

Reducing sediment delivery at stream crossings would be the highest priority BMP work in any of these watersheds. Potential culvert replacements with this project would not affect fish-bearing streams.

Road work may include replacement and installation of drain dips and culverts, constructing or cleaning catchbasins, blading, dust abatement, buttressing cutslopes and fillslopes, and resurfacing. Many of these activities are BMPs designed to reduce long-term sediment delivery.

Slash Treatment/Site Preparation:

The following slash treatments are prescribed in this project:

Excavator Piling (ranges from 51% to 54% of total slash treatment): To facilitate fuel reduction while protecting remaining trees, woody debris would be gathered and piled mechanically using an excavator. The piles would be ignited in the late fall during periods of optimum smoke dispersal. The piles would be placed at least 25 feet away from the unit boundaries, leave trees, or leave islands to protect them from possible ignition. In narrow work areas, piles would be located as far from leave trees/islands as possible.

Yarding Tops (ranges from 34% to 36% of total slash treatment): The tops of trees comprising some of the foliage and smaller branches are removed from the site and deposited in landing piles, where they are burned. The foliage and small branches are fuels which are most likely to ignite should a source of ignition occur in the unit. These fuels add substantially to the fire intensity on the site and the resistance to control of a wildfire. If the site is underburned, yarding tops lessens the intensity of fire on the site.

Lop and Scatter (ranges from 5% to 7% of total slash treatment): This method of slash treatment entails lopping and scattering slash to reduce fuel concentrations and slash depth. The lopped limbs are more subject to compression by snow loads. This proximity to the ground increases the rate at which the slash sheds its needles.

Underburning (7% of total slash treatment): Underburning is a type of burn treatment designed to reduce fuel accumulations beneath an overstory tree canopy and prepare the site to meet varying resource objectives, including forage production, reforestation, and to improve general ecosystem health.

Reforestation:

Where regeneration harvest is proposed, planting would supplement the natural regeneration anticipated and restore tree species that are presently not sustainable due to fire exclusion, inadequate seed source, etc. Planted conifer seedlings would enhance species diversity, assure timely reforestation, and contribute towards long-term desired habitat conditions. Reforestation of harvested areas would be designed to achieve a mixture of native tree species appropriate to the specific site. Where deer browsing of seedlings is anticipated, netting would be used to minimize animal damage.

Wildlife Browse Planting:

All action alternatives would incorporate approximately 100 acres of shrub planting in the Hensley Hill and Rausch Point winter range units to improve big game forage habitat. Shrubs (red stem ceoanothus, serviceberry, willow) would be planted in small groupings and in accordance with the appropriate habitat type. Netting and protective plastic tubing may be utilized to increase the chance for survival of these plants while they are young.

Natural Fuels Reduction Activities

Mechanical Fuels Reduction:

A variety of mechanical fuels treatments would be used in the wildland/urban interface in units to reduce fuels which have accumulated in recent years (see Appendix C for unit specifics and alternative maps M-4 – M6 for locations). Trees removed in units proposed for natural fuels reduction would generally be of non-commercial size. (The wildland/urban interface is defined in the National Fire Plan as: "The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.) These activities are dependent on available funding.

These treatments would be specific to the unit proposed and the site-specific objectives. In general, the objective is to reduce the ground fuel loading and associated ladder fuels to a level that a fire in the prescribed area can be managed by firefighter handcrews (i.e. the fuels will not support a fire with a flame length larger than 4 feet).

In order to meet this objective, a variety of treatment options are available including: mechanical thinning of understory trees (using a clipper), hand slashing of the understory, excavator piling, and understory burning (in units where the associated slashing would not produce fuel loads that require piling). The unit-specific treatment discussed in Appendix C was developed based on the size and number of trees to be slashed, crown ratio of trees slashed, and associated ground fuels and understory shrubs present in the unit. It is also a function of the trees left on site and their ability to withstand a low intensity ground fire. When equipment is used it may become necessary to remove certain trees of commercial size but this would be limited to trees that present a hazard to the operator of the equipment. In all fuels units, the focus would be to remove the excess trees under 7" dbh and no trees over 10" would be cut. Trails would be marked in such a way as to avoid the large diameter trees if they are present.

Maintenance Burning:

Maintenance burning treatments are proposed where hand slashing followed by underburning is appropriate. The purpose of this burning is to reintroduce fire to the ecosystem, promoting healthy conifer and shrub growth, and reduce fuels. This activity would occur in the spring or early summer, as weather conditions permit, utilizing helicopter ignition and/or hand crews with drip torches. There would be no ignition in riparian areas. Some slashing of smaller trees may be necessary to reduce ladder fuels. The Dusty Peak Burn (Burn A) is designed to replicate natural processes and located within the West Yaak Inventoried Area (IRA #694).

Also, four areas designated as old growth (MA-13) in the Hensley area (Burn Units I, K, L, and O) are proposed for burning to maintain old growth characteristics. These prescribed burn projects are needed to maintain the natural historic condition in stands with old growth habitat that historically experienced frequent low intensity wildfire events (see the Chapter 3, Forest Vegetation section for more information). Low intensity wildfire events reduced the fuel loadings, and eliminated the buildup of ladder fuels, as well as created scattered large snags for wildlife. Portions of burn unit O contain mixed conifer species that could experience detrimental effects from burning and create more open conditions than are desired; therefore these microsites would be excluded from the actual burn units during the layout and burn prep portion of the project.

Approximately 103 acres have been identified within proposed harvest units 46, 53 and 60 that would be considered for maintenance burning within the next five years. These units are being treated with this proposal through a combination of harvest and excavator piling. Within approximately five years following harvest and slash treatment, these areas would also be underburned in order to maintain ecosystem processes and promote forage for wildlife benefit.

Depending on the alternative, approximately 214 to 233 acres within Units F, G, H, J, M and N (and P in Alternatives C and D) would be mechanically treated as described in the previous section, but after 5 years would be burned to stimulate browse and maintain more open conditions.

These activities are dependent on available funding.

Grizzly Bear Core Security

To increase grizzly bear Core habitat in BMU 15 to 53% post project and to improve the quality of this Core area by adjusting it away from the Yaak Highway corridor where conflicts with humans are more likely to occur, the district would implement access management changes. These access management changes are detailed on the Access Management Plan and Map in Appendix E. (See also the Chapter 3, Wildlife, Grizzly Bear analysis for more information.)

Non-Commercial Thinning

For all action alternatives, approximately 900 acres of thinning is proposed in overstocked sapling-size trees that have been initiated with the past 15 to 25 years. This treatment is intended to reduce tree density and improve the growing conditions of the selected trees by reducing competition for light and nutrients. This treatment would also improve species composition, address potential insect and disease concerns, and generally improve stand health. Please refer to the alternative maps (M-4 – M-6) for locations.

TABLE 2-1. NON-COMMERCIAL THINNING STANDS COMMON TO ALL ACTION ALTERNATIVES

UNIT #	MA	ACRES	UNIT	MA	ACRES
NC Thin A	12	26	NC Thin L	12	40
NC Thin B	11, 12	119	NC Thin M	12, 17	81
NC Thin C	11	35	NC Thin N	17	14
NC Thin D	11	9	NC Thin O	11, 12	93
NC Thin E	11, 12	48	NC Thin P	11, 12, 17	91
NC Thin F	15	15	NC Thin Q	11, 12, 17	39
NC Thin G	15	45	NC Thin R	11	81
NC Thin H	15	8	NC Thin S	11	2
NC Thin I	11, 15	29	NC Thin T	11	16
NC Thin J	15	40	NC Thin U	12	6
NC Thin K	15	60	NC Thin V	12	2
			Total		**899**

Monitoring

Monitoring and evaluation compares the end results being achieved to those projected in the KNF Forest Plan. Monitoring is conducted on a sample basis to evaluate the overall progress in implementing the Forest Plan, the assumptions on which the Forest Plan is based, and to provide a feedback loop for determining effectiveness of project and mitigation implementation (USDA Forest Service, 1987). For this project, monitoring and evaluation would be conducted as described in

Appendix F. Those monitoring components not specifically discussed in this appendix tier to the monitoring described in the Forest Plan.

Design Features and Mitigation Measures Common To The Action Alternatives

Table 2-2 describes the design features and mitigation measures applied to this project to protect resources.

TABLE 2-2. GARVER PROJECT DESIGN FEATURES AND MITIGATION MEASURES

Trails and Roads: Timber Sale Standard Provision BT6.22, Protection of Improvements, would be included in any timber sale contract. It would require the purchaser to protect specified improvements, such as trails, roads and fences.

> **Unit Specific Feature to Protect Trails:** Timber Sale purchaser would protect the trail tread on a portion of Trail #318, which runs through Unit 5, and clear the trail upon completion of harvest activities

Inventoried Roadless Areas: Harvest units are located outside Inventoried Roadless Areas to preserve options for future management pending revision of the Kootenai Forest Plan. The proposed prescribed burning within the IRA is designed to replicate natural processes.

Soil, Water, Fisheries: Harvest, burning and road work activities would be designed to meet objectives in the Soil and Water Conservation Practices Handbook 2509.22 (USDA Forest Service, 1988), which comply with Montana State water quality regulations. Montana State Best Management Practices (BMPs) would be applied to this project. These BMPs are incorporated into clauses in the timber sale contract. BMP implementation is monitored by the timber sale administrators and the engineering representatives. Monitoring results are included in the annual Forest Plan Monitoring and Evaluation Reports.

Best Management Practices (BMP) work would be applied according to a prioritization based on potential benefit to fisheries:

- The Forest Service commits to applying BMPs to all haul roads in the West Fork Yaak watershed for this project (See map M-13).
- BMP work in other watersheds would be dependent on timber sale receipts and would be prioritized as follows: 1) Pete Creek and Lap Creek; 2) Unnamed face drainages to the Yaak River.

Timber harvest, road maintenance and BMP work, landing construction, and prescribed burning would meet Kootenai Forest Plan standards and guidelines as revised by the Inland Native Fish Strategy (INFS) Decision Notice (1995). Protected areas, which are called Riparian Habitat Conservation Areas (RHCAs), include all intermittent and perennial streams, wetlands, and landslide prone areas. All alternatives would implement the default RHCA widths specified by INFS. RHCAs would be identified on the sale area map in the timber sale contract. No timber harvest would occur in RHCAs designated along streams or wetlands. If springs and small streams are found within cutting units during layout, RHCA widths would be implemented, and all dead and live trees within the RHCA would be retained. During prescribed burning, no ignition would take place in an RHCA.

> **Unit Specific Feature to Provide RHCA Protection:** Equipment may cross RHCAs at designated locations in Units 5, 24, 32b, and 34 if suitable sites can be found that adequately protect water and soil resources. An alternative practice permit from the Department of Natural Resources and Conservation may be required prior to equipment use within these streamside riparian areas.

A spill control prevention plan would be required by the timber sale contract for helicopter fuel storage.

Areas of recent or historic landslides, slumping, and debris torrents are considered landslide-prone RHCAs. Harvest design has avoided known sites. However, small areas of instability may be found during layout of the units. These sites would be designated as landslide-prone RHCAs, and harvest of live trees would be avoided**.** Unit specific soil concerns would be documented in the timber sale layout notes. In order to minimize soil compaction, the maximum size class of excavator would be specified in the timber sale and slash disposal contracts.

Burning prescriptions would be prepared for fuel reduction activities. These prescriptions would determine the limits of weather conditions and fuel moistures to control fire intensity.

The State of Montana Stream Management Zone (SMZ) Law prohibits broadcast burning in SMZs. During broadcast or underburning, no ignition would take place in an SMZ, however some fire may back into the SMZ. The cooler, moister conditions in the SMZ normally extinguish burning with a minimum impact to the riparian forest.

Contract specifications for weed spraying would comply with the 1997 KNF Herbicide Weed Control EA/Decision Notice.

Forest soil monitoring has shown that current logging practices followed on the Kootenai National Forest result in substantially less soil disturbance than allowed under Forest Service guidelines (USDA FS 1998, KNF 1999).

Long-term soil productivity would be protected by leaving sufficient levels of wood on site. Silvicultural and burning prescriptions would be developed to retain sufficient levels of coarse woody debris on site after slash disposal.

> **Site Specific Design Feature to maintain long term soil productivity and provide large woody material for small mammals and other wildlife species:** Within harvest units 41, 42b, 44, 46, 47, 49a, 49, 50, 50a, 50b, 50c, 51, 52, 52a, 53, 54, 56, 56a, 59, 60 leave 5 to 9 tons per acre of coarse woody debris (CWD) on site after harvest and/or fuels treatment.
>
> Wiithin harvest units 4, 8, 12, 15, 31, 33a, 33b, 34, 45, 60 leave 10-15 tons per acre of CWD on site after harvest and/or fuels treatment.
>
> Within harvest units 1, 3, 7, 11, 14, 15a, 17, 18, 27, 32, 33 leave 15-30 tons per acre of CWD on site after harvest and/or fuels treatment.
>
> CWD should be left scattered across the unit, not concentrated. Piece size should exceed 5” in diameter but preference is for larger material where possible. This material originates from unutilized portions of designated trees, cull materials, broken tops, etc.

There are no new permanent roads proposed with this project. Temporary roads would be fully recontoured after use. There are no streams within 300 feet of these roads, and no sediment delivery to live water would occur.

In tractor units the sale administrator would approve the skidding plans that minimize the total detrimental disturbance. In general this means plans that minimize the total area dedicated to skid trails, temporary roads and landings. Excavated skid trails constructed as part of this project would be completely recontoured. All skid trails would be waterbarred and seeded. Permanently dedicated landing areas, such as helicopter landings, would be deep ripped, seeded, and fertilized. These requirements would be in the timber sale contract.

> **Site-Specific Feature to Protect Soils**: Mechanized harvest, skidding, and/or slash piling activities in Units 33, 33a, 33b, and 34 would be limited to August 1 to September 30 unless otherwise agreed to by the district hydrologist.

Reconditioning of existing roads needed for hauling would be held to the minimum necessary to protect and maintain the road surface and drainage structures, and provide for public safety. Scarification of ditches and catch basins would be done only where necessary to provide for adequate function. More extensive road work would be implemented where work would benefit the watershed condition.

Culvert replacement would not affect fish-bearing streams with this project. Construction work in live streams, including culvert removals and replacements, must be reviewed and permitted by the Montana Department of Fish, Wildlife and Parks. The amount of sediment input as a result of culvert removals would be minimized by dewatering the streams while the culverts are being removed.

Forest Vegetation:

> A number of treatment areas, including units 33, 34, 35, and 36, have a relatively high proportion of thin-barked species (ie: spruce, cedar) marked for leave. During the spring these trees are particularly vulnerable to mechanical damage to the cambium, as the trees come out of dormancy. Operations during this period should be avoided.

Endangered, Threatened, Proposed and Sensitive Plants and Wildlife: Legal and biological requirements for the conservation of Endangered, Threatened, Proposed and Sensitive plants and animals would be met. These species have been identified in cooperation with other agencies such as the USFWS and MDFWP. Plant surveys would be completed prior to any ground-disturbing activities. Emphasis for surveys would be placed on areas with moderate-to-high potential to provide rare plant habitat. These surveys would be conducted by the District Botanist or a qualified biological technician. If any of these plant or animal species are located prior to or during implementation of any management activities, the activity would be altered so that proper protection measures could be taken. Timber sale contract clause B6.25, Protection of Habitat of Endangered Species, would be included in any subsequent timber sale contract. If necessary, additional modifications would occur through creation of special treatment zones or by relocating unit boundaries to avoid negative impacts. Disturbance to any sensitive plant populations or unique animal sites observed during sale activity would be avoided through cooperation between sale administrators and sale purchaser.

Site Specific Feature to Provide for Grizzly Bear Core Area and Grizzly Bear Habitat Effectiveness: Access management changes detailed in Appendix E would be implemented to provide for grizzly bear Core area and habitat effectiveness. Also, to provide habitat effectiveness, Units 31, 32, 37, 38, 38a, 41, 42, 42a, 44, 45, and 46 would be required winter harvest.

Site Specific Feature to Provide for Grizzly Bear Spring Bear Habitat Protection: All proposed timber harvest activities that take place in spring bear range would avoid the spring bear use period (4/1-6/15); this applies to Units 1-26, 29-32, 38-60 (all units **except**: Units 27, 33, 34, 35, 36, and 37).

Site Specific Feature to Provide for Grizzly Bear Total Motorized Access Route Density (TMARD): The potential increase in TMARD from temporary road construction would be balanced by obscuring the entrance of Roads 5857C (French Garver C Spur) and 5857L (French Garver L Spur).

Big Game: Treatment units located within MA-11 (Big Game Winter Range/Timber management emphasis) are designed to retain some areas of heavier understory tree density to maintain adequate snow intercept cover. Thicker cover would be provided in riparian areas and those areas where treatment would not occur, as well as areas within treatment units where aspect, slope and fuels conditions allow low-intensity fire that would retain understory trees.

Site-Specific Feature to Provide Elk Security: Use of road system #5879 (Rausch Point) would be restricted during the project due to the importance of the area for big game security. Logging activity on units 41, 42, 42a, 44 and 45 would be allowed from Dec. 1 to March 31 only; and the road system would be restricted to project activity traffic only (no public motorized use would be allowed).

Wildlife Habitat Connectivity: The maintenance of landscape-level connectivity and minimization of fragmentation was incorporated into the design of all harvest alternatives. Travel cover along ridges and saddles were identified and considered in terms of connectivity before proposing harvest or burning near such areas. All alternatives would maintain RHCAs along all streams, and would avoid creation of barriers to the movement of species expected to use such areas.

Old Growth Habitat: No harvest of designated MA-13 (or other old growth management areas) stands in the project area would occur. No roads would be constructed through old growth stands.

Site-Specific Features to Protect Old Growth During Burning: In burn units I, K, L, and O, any microsites that may experience detrimental effects from fire within the old growth maintenance burn units would be identified and excluded during the layout portion of this project. Snags within these old growth maintenance burn units would be protected through careful ignition and timing of the burn.

Cavity Habitat/Coarse Woody Material: All harvest units were designed to retain adequate levels of snags, replacement snags and coarse woody material to provide for cavity-associated wildlife species and long-term soil productivity. The timber sale contract would specify that snags would not be cut unless they are identified as a safety hazard. Safety hazard snags could be cut but must be left within the unit. Larger stems would be preferred to provide habitat for those wildlife species that require large diameter trees and for long-term structural diversity. Replacement trees would be scattered throughout harvest units to the extent possible. Coarse woody material levels were developed specifically for the forest types in the project area (see soils Features above). Silvicultural and burning prescriptions would be prepared with the goal of protecting large diameter snags, and retaining recommended levels and distribution of coarse woody material during site preparation and fuels treatment.

Fire/Air Quality: In order to reduce the risk of wildfire starting from timber sale activity, purchaser operations would be suspended when critical fire danger exists, by order of the Regional Forester or Forest Supervisor.

Burning prescriptions would be prepared for all fuel reduction activities using prescribed fire. These prescriptions would determine the limits of weather conditions and fuel moistures which would achieve desired fuels reductions, while protecting desired leave trees and retaining desired levels and distribution of coarse woody debris. Fire intensities would be kept low enough so that most desired leave trees would survive and soil damage would not occur. All burning operations would be conducted only when the specific conditions met those outlined in the burning prescriptions. All burning operations would be scheduled in accordance with the Memorandum of Understanding for air quality protection between the State of Montana Air Quality Bureau and the Forest Service, which allows burning only when adequate smoke dispersal would occur (see Chapter 3, Air Quality for additional features).

Excavator piles would be kept at 15 feet or less in diameter and 10 feet in height, and would be burned during the fall or winter when soil moisture is high. This would reduce the intensity and duration of heat near the soil surface, and reduce the risk of potential soil damage.

Noxious Weeds: A number of preventative measures would be taken to reduce the risk of noxious weed introduction and spread in accordance with the Herbicide Weed Control EA and Decision Notice (Kootenai National Forest, 1997a). 1) Prior to, during, and for at least 5 years after the timber sale closure, Forest Service crews would periodically patrol and spray weeds within 300 feet of proposed regeneration harvest units located adjacent to existing infestations. During the repeat visits, any weeds found in these newly harvested areas would also be sprayed. 2) Prior to harvest, haul roads would be sprayed by the timber sale purchaser. 3) Timber sale contracts would contain Special Provision C6.351, which requires all off-road vehicles associated with harvest operations to be cleaned prior to entering the sale area. All equipment used in fuels reduction activities must also be washed of all dirt and plant parts prior to entering National Forest lands. Measures outlined in Appendix D would also be applied.

Cultural Resources: Cultural resource surveys were completed on many treatment units in high and moderate probability areas, and would be completed in the remaining treatment units in high and moderate probability areas prior to finalizing any subsequent projects. The action alternatives were designed to protect known cultural sites, provide for protection of sites discovered during implementation, and protect treaty rights. These concerns would be addressed through ongoing consultation with tribal representatives. Timber Sale Contract Special Provision B6.24#, Protection of Cultural Resources, would be included in any timber sale contract. It specifies that the Forest Service may modify or cancel the contract to protect cultural resources, regardless of when they were identified.

Scenic Resources: The action alternatives were designed to minimize effects to scenic conditions to the extent practical. Unit boundaries were designed to reduce straight lines and emulate natural features where possible. The intent was to provide a diversity of structural components to increase visual variety in the foreground. This would occur where species composition, slope, aspect and fuels accumulations would make accomplishment of this goal achievable. There are areas where this goal would not be achievable. In addition some residual small diameter trees would be retained within view of roadways to break up and soften the view of the harvest and fuel treatment activities. Landings would be located off of roads and within harvest units where practical to reduce their visual impact.

> **Unit Specific Feature to Protect Scenic Values**: Within Unit 26 the landings would be kept to the backs of the units away from the highway. A strip approximately 50-100 feet wide along the highway would have the included timber felled back into the unit, and then pulled into the unit, to avoid skid trails near the road. Within Units 46 and 47 keep landings small and away from the Yaak Highway. No skidding would be allowed along the road. Within Unit 40 minimize the number of skid trails, ie. pull cable, landings should be located at the lower side of the unit away from the highway, remove tops with last log and winter harvest to reduce ground disturbance.

Public Motorized Access/Access Management: Some roads that are currently restricted would be opened to accommodate harvest operations, and public travel would be permitted on these roads unless not feasible due to safety concerns (see Appendix E map for a display of proposed access management activities). Public use of some roads, such as road system #5879 (Rausch Point) would be restricted during the project due to the importance of the area for big game security

ACTIVITIES SPECIFIC TO THE ACTION ALTERNATIVES

Features unique to each alternative are described below. Maps displaying each alternative are found at the end of this document (M-4 – M-6).

ALTERNATIVE B – PROPOSED ACTION

Intent: Alternative B was designed to meet the purpose and need for this project.

This alternative was designed to implement some of the findings and recommendations that resulted from the Garver Landscape Assessment and needs identified by the public during that analysis. The location of the treatment areas and their specific locations were conceptually designed and based on initial field reconnaissance. This proposed action was scoped with the public in April 2002 and is brought forward as Alternative B, with the exception of minor changes:

1) A mechanical fuels treatment unit and two harvest units located in Secs. 7 and 18, T36N, R31W, were dropped from detailed analysis in the action alternatives based on public concerns with wet areas and feasibility of implementation.
2) Burn Unit I is located in designated old-growth (MA-13) so would receive a maintenance burn treatment rather than mechanical fuels treatment.

Alternative B contains the elements of the Activities Common to the Action Alternatives and Design Features Common to the Action Alternatives described previously. The non-commercial thinning and Grizzly Bear Core activities are the same for all action alternatives.

Timber Harvest, Slash Treatment, And Tree Planting

Timber harvest activities vary amongst the action alternatives. Table 2-3 shows the acres associated with harvest activities for comparison purposes. A more detailed description of the silvicultural prescription, fuels treatments, and objectives for each unit can be found in Appendix A.

TABLE 2-3. SUMMARY OF TIMBER HARVEST AND ASSOCIATED ACTIVITIES ALTERNATIVE B

Timber Harvest Treatments	
Intermediate Harvest	***2,065 acres***
Stand Improvement	1,989 acres
Commercial Thin	76 acres
Regeneration Harvest	***632 acres***
Seedtree with Reserves	606 acres
Clearcut with Reserves	0 acres
Shelterwood Seedcut with Reserves	26 acres
Total Harvest	***2,697 acres***
Slash Treatment	
Excavator Pile/Burn Piles	1,376 acres
Yard Tops/Burn Landing Piles	935 acres
Lop and Scatter	206 acres
Underburning	180 acres
Road Construction/Maintenance	
Temporary Road Construction	.91 miles
Road Maintenance	50 miles
Planting	
Consider for Conifer Planting	632 acres
Wildlife Browse Planting	100 acres

Natural Fuels Reduction Treatment

Mechanical fuel reduction and maintenance burning also varies amongst the action alternatives. Tables 2-4 and 2-5 show the acres associated with natural fuel reduction activities for comparison purposes. A more detailed description of the treatment prescriptions and objectives for each unit can be found in Appendix C.

TABLE 2-4. MECHANICAL FUEL REDUCTION UNITS ALTERNATIVE B

UNIT #	MA	ACRES
B	11	74
C	11	10
D	11	12
F	17	29
G	17	28
H	11	49
J	11	26
M	11	34
N	11	48
Total	--	310

TABLE 2-5. MAINTENANCE BURN UNITS ALTERNATIVE B

UNIT #	MA	ACRES
BURNING TO OCCUR WITHIN NEXT 5 YEARS		
A*	2	234
I	13	35
K	13	114
L	13	76
O	13	78
Subtotal		537
46**	11	31
53**	11	68
60**	11	24
Subtotal		123
Total	--	660
BURNING TO OCCUR 5-10 YEARS FROM NOW		
F	17	29
G	17	28
H	11	49
J	11	26
M	11	34
N	11	48
Total	--	214

*Dusty Peak Burn, located in West Fork Yaak IRA
**Maintenance burning would be considered for these areas after harvest and slash treatment.

ALTERNATIVE C

Intent: Alternative C was designed to address Issue #1, Regeneration Harvest.

This alternative was designed to address Issue #1 regarding public concerns with regeneration harvest, particularly in wet habitat areas.

Also, the size, shape, and silvicultural treatment is adjusted for many units in this alternative based on further field verification of logging system feasibility and treatment goals.

Timber Harvest, Slash Treatment, And Tree Planting

Alternative C shares many of the elements of the activities and design features of Alternative B described above; however, to address public concerns associated with Major Issue #1, Regeneration Harvest, this alternative:

- Reduces the size and shape of Unit 14, a regeneration unit, from 135 mapped acres to 41 acres.
- Reduces the size, shape, and treatment of Unit 33 in the French Cr. drainage, from a mapped 102-acre regeneration unit to three separate units: Two intermediate harvest units which total 20 acres, and 1 regeneration unit of 21 acres.
- Drops treatment of Unit 37 (13 acres of regeneration harvest) due to concerns with regeneration harvest.
- Drops treatment of Unit 9 (17 acres) and modifies treatment in Unit 10 (27 acres) from a regeneration harvest to intermediate harvest due to watershed concerns regarding equivalent clearcut acres (ECA) in the West Fork Yaak Trib. #2 drainage.
- In addition, ground verification and changes in unit size, shape, and treatment resulted in dropping approximately 320 acres of intermediate harvest treatment under this alternative. Further scrutiny of forest vegetation conditions also identified regeneration treatment needs in areas originally proposed for intermediate harvest (Units 13a--10 acres, 15a--9 acres, 52a--6 acres, and 56a--24 acres).

TABLE 2-6. SUMMARY OF TIMBER HARVEST AND ASSOCIATED ACTIVITIES ALTERNATIVE C

Timber Harvest Treatments	
Intermediate Harvest	***1,828 acres***
Stand Improvement	1,788 acres
Commercial Thin	40 acres
Regeneration Harvest	***454 acres***
Seedtree with Reserves	368 acres
Clearcut with Reserves	60 acres
Shelterwood Seedcut with Reserves	26 acres
Total Harvest	***2,282 acres***
Slash Treatment	
Excavator Pile/Burn Piles	1,237 acres
Yard Tops/Burn Landing Piles	770 acres
Lop and Scatter	109 acres
Underburning	166 acres
Road Construction/Maintenance	
Temporary Road Construction	.56 miles
Road Maintenance	50 miles
Planting	
Consider for Conifer Planting	454 acres
Wildlife Browse Planting	100 acres

Natural Fuels Reduction Treatment

Natural Fuels Reduction treatments were also modified in Alternative C based on ground verification of units:

- Unit 48 was changed from intermediate harvest to a mechanical fuels treatment area (Unit P).
- Units G and J were reduced in size.

Tables 2-7 and 2-8 display natural fuels reduction treatment acreages for Alternative C.

TABLE 2-7. MECHANICAL FUEL REDUCTION UNITS ALTERNATIVE C

UNIT #	MA	ACRES
B	11	74
C	11	10
D	11	12
F	17	29
G	17	9
H	11	49
J	11	25
M	11	34
N	11	48
P	11	28
Total	--	318

TABLE 2-8. MAINTENANCE BURN UNITS ALTERNATIVE C

UNIT #	MA	ACRES
BURNING TO OCCUR WITHIN NEXT 5 YEARS		
A*	2	234
I	13	35
K	13	114
L	13	76
O	13	78
Subtotal		537
46**	11	31
53**	11	68
60**	11	24
Subtotal		123
Total	--	660
BURNING TO OCCUR 5-10 YEARS FROM NOW		
F	17	29
G	17	9
H	11	49
J	11	26
M	11	34
N	11	48
P	11	28
Total	--	223

*Dusty Peak Burn, located in West Fork Yaak IRA
**Maintenance burning would be considered for these areas after harvest and slash treatment.

ALTERNATIVE D - THE PREFERRED ALTERNATIVE

Intent: Alternative D shares the intent and many of the specific features of Alternative C, but in addition was developed to address Major Issue #2, Old Growth.

Alternative D was initiated and developed based on public comments regarding old growth. The Yaak Valley Forest Council pointed out that the habitat in Unit 54 could provide higher quality replacement old growth than replacement old growth presently designated in the Hensley Face area. Members of the Garver ID team agreed that a redelineation of the MA-13 in Compartment 17 (Hensley Hill) could provide better quality habitat for potential replacement old growth designation. Therefore, under Alternative D the specific features described in the timber harvest and natural fuels reduction sections below would occur to protect old growth habitat conditions (see Alternative C and D maps, M-5 and M-6, to compare the difference in these alternatives.)

Timber Harvest, Slash Treatment, And Tree Planting

- Under Alternative D, Unit 54 would not be treated, but would be designated as old growth (MA-13).
- Units 50a, 50b, 50c, and 60 would be re-designated as suitable timberland and treated with intermediate harvest.
- Units 11, 12, and a portion of Unit 17 contain habitat with potential for allocation into old growth management areas, and would be removed from this proposal for treatment.

The Alternative D timber harvest activities are summarized in the table below:

TABLE 2-9. SUMMARY OF TIMBER HARVEST AND ASSOCIATED ACTIVITIES ALTERNATIVE D

Timber Harvest Treatments	
Intermediate Harvest	***1,829 acres***
Stand Improvement	1,789 acres
Commercial Thin	40 acres
Regeneration Harvest	***317 acres***
Seedtree with Reserves	231 acres
Clearcut with Reserves	60 acres
Shelterwood Seedcut with Reserves	26 acres
Total Harvest	***2,146 acres***
Slash Treatment	
Excavator Pile/Burn Piles	1,101 acres
Yard Tops/Burn Landing Piles	770 acres
Lop and Scatter	109 acres
Underburning	166 acres
Road Construction/Maintenance	
Temporary Road Construction	.56 miles
Road Maintenance	50 miles
Planting	
Consider for Conifer Planting	317 acres
Wildlife Browse Planting	100 acres

Natural Fuels Reduction Treatment

Under Alternative D, maintenance burn units K, L and O and mechanical fuels unit N are adjusted to conform to the proposed changes in old growth designations to improve the quality of designated old growth in the Hensley Hill Compartment (Compartment 17):

- A portion of burn unit L would be incorporated into burn unit K under Alternative D.
- The portion of burn unit O that is not included in the proposed MA 13 designations would be added to mechanical fuels unit N.

Tables 2-10 and 2-11 display natural fuels reduction treatment acreages for Alternative D.

TABLE 2-10. MECHANICAL FUEL REDUCTION UNITS ALTERNATIVE D

UNIT #	MA	ACRES
B	11	74
C	11	10
D	11	12
F	17	29
G	17	9
H	11	49
J	11	25
M	11	34
N	11	58
P	11	28
Total	--	328

TABLE 2-11. MAINTENANCE BURN UNITS ALTERNATIVE D

UNIT #	MA	ACRES
BURNING TO OCCUR WITHIN NEXT 5 YEARS		
A*	2	234
I	13	35
K	13	124
L	13	0
O	13	69
Subtotal		462
46**	11	31
53**	11	68
60**	11	24
Subtotal		123
Total	--	585
BURNING TO OCCUR 5-10 YEARS FROM NOW		
F	17	29
G	17	9
H	11	49
J	11	26
M	11	34
N	11	58
P	11	28
Total	--	233

*Dusty Peak Burn, located in West Fork Yaak IRA
**Maintenance burning would be considered for these areas after harvest and slash treatment.

COMPARISON OF ALTERNATIVES

This section displays a tabular comparison of the alternatives considered in detail and the environmental effects of each expressed by the units of measure. This information, along with a detailed discussion of the environmental consequences presented in Chapter 3, provides the basis for comparing alternatives.

TABLE 2-12 COMPARISON OF PURPOSE AND NEED OBJECTIVES BY ALTERNATIVE

Manage for Vegetative Conditions that are More Suitable to a Fire-Dependent Ecosystem	**A**	**B**	**C**	**D**
Acres thinned to create a more open forest structure, promote fire-adapted species, retain large overstory structure, reduce fuels in the urban interface, and reduce vulnerability to uncharacteristic fires, and insects and disease levels.	0	2,065	1,828	1,829
Replacement of stands at high insect and disease levels or to restore western larch/white pine cover type utilizing regeneration harvest methods	0	632	454	317
Total Acres Treated with Timber Harvest to Meet Project Objectives	0	2,697	2,282	2,146
Reduce natural fuels and reintroduce fire				
Mechanical fuels reduction	0	310	318	328
Maintenance burning over next 10 years	0	874	883	818
Improve and Maintain Winter Range Conditions				
Winter Range Cover/Forage Ratios	88:12	86:14	86:14	87:13
Acres of Winter Range Maintenance and Improvement	0	1,529	1,407	1,230
Improve Conditions in Old Growth Habitat				
Acres of fuels reduction and underburning in designated old growth	0	303	303	228
Reduce Fuels in the Urban Interface				
Acres of fuel reduction in the urban interface	0	742	691	692
Improve Growing Conditions and Long-Term Management of Overstocked Sapling/Pole Stands				
Acres of non-commercial thinning	0	900	900	900
Improve Quality and Quantity of Grizzly Bear Habitat				
Percent of BMU 15 in Core Grizzly Bear Habitat post project	47	53	53	53
Contribute Forest Products to the Economy				
Timber Sale Volumes (CCF/MMBF)	0	42,129/ 17.3	35,021/ 14.4	33,721/ 13.8

TABLE 2-13. COMPARISON OF ISSUE INDICATORS BY ALTERNATIVE

INDICATOR	**ALT A**	**ALT B**	**ALT C**	**ALT D**
Issue #1 – REGENERATION HARVEST				
Acres of regeneration harvest	0	632	454	317
ECAs within drainages with regeneration harvest concerns				
French Cr.	20	23	22	22
WFYaak River Trib #2	22	34	30	30
Mud Cr.	14	31	29	22
Sink Cr.	20	33	24	24
RHCAs protected? (Y/N)	N/A	Y	Y	Y
Beneficial uses protected (Y/N)	N/A	Y	Y	Y
Issue #2 – OLD GROWTH				
Alternative improves the quality of designated replacement old growth (MA-13)? (Y/N)	N	N	N	Y
Acres of habitat with potential for old growth management designation dropped from proposed treatment.	N/A	0	0	122

CHAPTER THREE

Affected Environment & Environmental Consequences

INTRODUCTION

Chapter 3 describes the environment (including its human elements) in and around the project area and discusses the environmental consequences by resource that may result from implementation of each of the alternatives. It provides the scientific and analytic basis for the comparison of alternatives presented in Chapter 2. Maps referred to in the analysis are located at the end of this document.

The Council on Environmental Quality Regulations (CEQ) recognizes three types of effects:

- **Direct effects** are caused by an action and occur at the same time and place.
- **Indirect effects** are caused by an action but occur later in time or farther removed in distance.
- **Cumulative effects** result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions (40 CFR 1508.7 and .8).

CURRENT AND FORESEEABLE ACTIONS

Analysis of cumulative effects presented in this chapter considered past, present, proposed, and reasonably foreseeable activities that could affect the issues pertinent to this analysis.

The effects of past actions such as timber harvest, road construction, and wildfire suppression were considered in the affected environment and cumulative effects analysis as applicable for each resource. The Harvest History map (M-9) displays past timber harvest in the project area.

Reasonably foreseeable actions include those management activities that are on-going or scheduled to occur within the next five years. These activities may occur regardless of which alternative is selected for implementation. The following list identifies those current and foreseeable actions that the ID Team determined were appropriate for inclusion in the analysis of environmental effects.

Yaak 92 Paving Project: The Yaak Highway is currently being repaved from Section 7, T36 N, R31W, northward. This project is expected to be complete in October of 2003.

Yaak Community Hall Project: Based on a request from members of the Upper Yaak Community Association, the Three Rivers Ranger District is analyzing the

effects of a project to reduce fuels and hazard trees around the Yaak Community Hall (Section 30, T36N, R31W). This would include piling and burning ground and ladder fuels and removing large spruce trees from a 4-acre area around the Hall. The project would be implemented in 2002 or 2003.

Small Sales: Sales sold under the 150" Salvage Timber Sale Decision Memo: The Kootenai National Forest has the authority to sell "150 inch" products. At this time, no sales have been identified. Sales sold under the Blowdown Salvage Sales: Blowdown salvage sales which meet the criteria of the Forestwide Blowdown Salvage Decision Notice signed March 24, 1998 may be identified and sold in the future. If a sale of this nature were identified, then the criteria outlined in the Blowdown Decision Notice would be followed. Also, small fuels reduction projects may be authorized in the project area through a separate decision.

Data Gathering Activities: Field surveys to gather resource data are likely to occur within the project area within the next five years. Types of data collection may include vegetation surveys, fire history sampling, cultural resource surveys, ecodata plots, wildlife habitat surveys, noxious weeds surveys, stream surveys, road maintenance surveys, and fuels surveys.

Road Activities: Routine road maintenance is likely to occur as needed on existing roads in the project area. The roads most likely to receive maintenance are those open to vehicle traffic.

Fire Suppression Activities: If conditions are such that there are fire starts within the project area, efforts will be made to suppress any and all fires.

Weed Control: Spraying to control weeds is ongoing within the project area under the Kootenai National Forest Herbicide Weed Control Plan Environmental Assessment and associated Decision Notice and Finding of No Significant Effect, 1/97.

Public Activities Likely to Occur: Firewood cutting is likely to continue to occur along open roads. Recreation use will continue; this includes driving open roads, snowmobiling, hunting, hiking, berry picking, and other activities.

Actions on Private Lands: Throughout the Yaak valley continued development of private land is expected. Development is expected to include commercial timber harvest, land clearing, home construction, road construction, septic field installation, water well drilling, livestock grazing, and riprap of migrating streambanks.

Canadian Land Management: 36% of the West Fork Yaak watershed is in Canada and is primarily Crown land managed by the British Columbia Forest Service. Timber harvest, road construction and grazing are major activities in the Canadian portion of this watershed. 1998 aerial photos show large recent clearcut units, including riparian harvest along the main West Fork stream channel

FOREST VEGETATION

Introduction

This section addresses the purpose and need for vegetation treatment and Major Issues: (1) Regeneration Harvest in Moist Habitat Types and (2) Old Growth Habitat.

This section will review the vegetation of the analysis area, its ecological niches and plant associations, and its natural and human-caused disturbances. The richness of the area's habitat diversity is a product of the interrelationships of landscape position, climate, topography, geology, fire ecology, and soils. The information presented begins with a perspective of reference (or historic) conditions in the context of disturbance processes that have naturally evolved. A discussion on the affected environment (existing vegetative condition) then provides insights into the human-caused disturbances that have begun influencing the areas vegetation. Maps are included to display the spatial distribution of various attributes of the vegetative resource.

Analysis Area

The analysis area for the Forest Vegetation resource is the Garver project area and is within the east half of the Northwest Yaak planning subunit (See Vicinity Map, M-1).

Analysis Methods

Based on ecological findings from an Ecosystem Assessment at the Watershed Scale (EAWS) conducted for the entire Northwest Yaak Planning Subunit, opportunities were identified that would trend certain uncharacteristic existing conditions towards a more desired condition based, in part, upon what is known about past vegetative conditions. During this environmental assessment, the opportunities were refined to fit the resource objectives of this analysis area. In addition, the district vegetation database (TSMRS) was utilized to generate information on forest vegetation attributes such as forest cover type, stand size class, as well as the vegetation response unit (VRU) classification. These analysis tools were used to identify site-specific treatment needs that frame the purpose and need for management in the project area. All stands considered for vegetation treatment were field visited.

Reference Conditions

Fire, wind, insects, and disease are important disturbance processes, which create a dynamic mosaic of forest conditions. These natural events can occur in small, localized areas or can impose change over broad areas of the landscape. The natural successional processes that followed these conditions ordinarily vary little, with differences reflecting the unique timing and intensity of the disturbance. The species composition, habitat diversity, age class distribution, and stand structure in the analysis area are the direct result of such natural disturbances, as well as previous harvest. It is generally accepted that the current climate and range of native tree species has existed for about 2,500 years.

Fire Ecology and Forest Succession

The intensity and frequency of historic fires and the resulting patch size and vegetative succession response are predictable based on the biological, physical, and climatic factors of the landscape. Forest vegetation adapted to these

disturbance processes. For example, western larch, ponderosa pine and Douglas-fir, within the analysis area, have evolved with unique traits and can withstand frequent fires of higher intensity more effectively than species with thin bark and shallow roots such as grand fir, Engelmann spruce, and subalpine fir. Historically, stand-replacing fires often left these fire-adaptive species as single standing trees or groups with an open canopy (Smith and Fischer, 1997). These stands would then reproduce under the open canopy, thereby perpetuating the seral fire-adaptive species.

Some settings within the analysis area (ie: riparian areas) were less impacted by fire due to their cool, moist environment and the difficulty of fire spreading significantly through the deep, wet duff. Under the right conditions, these wet valley bottoms were impacted by lethal, stand-replacement fires originating in adjacent, upland areas. Fires occurring at elevations above the bottomlands were generally more frequent and left varying sized canopy gaps and patch sizes, depending on the intensity. When stand-replacement fires burned into the riparian areas their severity would generally have changed to more of a mixed severity type.

Throughout the analysis area, we know that some sites were slow to reforest. Generally, these areas were prone to have scattered or variable stocking due to shallow soils, short growing season, brush competition, or lack of a seed source. The resiliency of the landscape was improved where seed reservoirs occurred. Denser stocking did occur on the wetter, more productive portions of these sites where moderate topography and better soil development prevailed. The availability of seed from lodgepole pine with serotinous cones meant rapid restocking of burned sites. Persistent, large diameter fire survivors of larch and Douglas-fir helped to maintain a mix of species.

Data available on recorded large fires in the analysis area, prior to the period of effective fire suppression, shows that from 1850 to 1933 (at least 77 percent of the area (33,156 acres) has been affected by lightning-caused lethal, stand-replacing fires (See Fire History map, M-10). The two major fire events were 1889 (25,471 ac) and 1931 (6,484 ac). This record equates to about *400 acres of disturbance per year*. The wildfires resulted in the regeneration of relatively pure lodgepole pine stands under scattered overstory western larch on cool, moist sites as well as stand dominated by Douglas-fir, western larch with some ponderosa pine on warmer, drier sites. While not included in the record, mixed-severity fires occurred in a large portion of the area, resulting in a mix of conifer species and lodgepole pine, as well as a wide range of age classes and stocking conditions. Frequent, light-intensity underburns were also an occurrence, particularly on drier, lower elevation sites. The nature of this type of burning maintained fairly open stands dominated by uneven-aged overstory western larch and ponderosa pine.

Other Disturbance Agents

Disease, drought, fire, insects, and wind have been some of the most pervasive causes of disturbance affecting terrestrial ecosystems in the analysis area. They exist in most ecosystems, but not with equal frequency, occurring as individual events or in concert with other disturbances. For example, insect outbreaks are often associated with drought, which can exacerbate the adverse effects of insect activity. Drought also can enhance the ignitability of fuel and increase the potential for fire. Root disease can predispose trees to attack by insects such as bark beetles, which can than lead to outbreak levels triggered by other disturbance agents. Historically, root diseases were also significant factors in reducing competition from Douglas-fir and grand fir to maintain western white pine, western larch, and in some cases, ponderosa pine. These species have a high level of resistance and were able to capitalize on this reduced competition. Fire exclusion

and the loss of these species through selective harvest and white pine blister rust have reduced the opportunity for early seral species to become established in root disease areas.

It is thought that because of the wide range of age and size classes in the lodgepole pine type of earlier forests, that individual mountain pine beetle outbreaks may not have been as expansive as experienced today. Rather, there were probably more and smaller outbreaks scattered throughout western North America (Campbell, et al, 1994). Lodgepole pine adapted to a fire-dependant ecosystem largely by producing closed cones, which contain seed ready for dispersal following major fire events. As viewed in many portions of the analysis area, it was not uncommon for lodgepole pine stands to become dense and overstocked following a fire when other seed sources were absent. Mortality of lodgepole pine that followed infestation by the mountain pine beetle has significantly added to the fuel loading and increased the potential for wildfire. In time, these areas would generate a great amount of deadfall at an immature or younger age and become prime candidates to reburn. Reburns commonly resulted in vegetative conditions that endured for some time, and are apparent in many stands within the analysis area.

Human Influences

Prehistoric inhabitance of the Kootenai valley has been recorded to more than 7000 years BC. The occupants of this area were ancestors of the American Indian and utilized the food and other resources in a hunting and gathering mode. By historical account and evidence provided through fire scar sampling of trees and pollen/charcoal profiles, fire was intentionally used by native people, particularly in low elevation areas. This practice was conducted for a variety of reasons: the maintenance of open stands to enable travel, improve hunting conditions by stimulating growth of vegetation and to drive or surround game, enhancement of medicinal plants, communication; etc (Barrett and Arno, 1982). This practice was undoubtedly important to the ecology of the forest and certainly augmented fires caused by lightning.

Beginning in 1910 fire suppression, mining and lumbering would affect the analysis area landscape for the rest of this century. Fire suppression policies were a direct result of the extensive fires in Idaho and Montana at that time and were further heightened during the two world wars as demand for resources increased and protection of available forest resources were paramount. Due to this strict fire suppression policy, there has been only one large fire recorded in this area since 1933. A human caused fire in 1940 burned 81 acres along the Yaak River. Fire records over the last 45 years show that only 38 acres have burned in wildfires that varied from less than one acre to 14 acres. Because of effective fire suppression, this record equates to *less than one-half acre of disturbance per year.*

Effective fire exclusion efforts have resulted in a much less frequent occurrence of wildfire (less than one-half acre/year) as compared with what occurred during the period prior to 1933 (approx. 400 acres/year). During this fire exclusion period, only 38 percent of the area has been influenced by human-caused disturbance (38 percent from timber harvests, < 1 percent from fire).

The continued establishment of area sawmills was partially related to the salvage of trees killed in the1910 wildfire, trees killed in the late 1940s and early 1950s by a major blowdown event and subsequent spruce beetle epidemic, and finally by extensive salvage of mountain pine beetle-killed lodgepole pine during the 1970s and 1980s.

Forest Structure

The size and distribution of trees is generally referred to as forest structure. This habitat element changes as forests age and is considered an important indicator of landscape diversity. Since plants and animals have adapted to habitat and disturbance conditions that have been evolving for some time, it is desirable to manage towards a range of structural conditions, representative of historic conditions. These are not desired conditions considered at a point in time but a baseline to evaluate how existing conditions deviate from situations that resulted largely from sustainable, natural processes.

The amount of forest in early, middle, or late vegetative succession that occurred prior to Euro-American settlement is not precisely known. However, research (Losensky, 1994) in the Douglas-fir forest type depicting pre-1900 forest conditions for a large geographic settting, that includes the analysis area (see Table 3-2), shows an average range of 15-25 percent of the forested lands were composed of trees averaging 1-40 years old, 10-15 percent in trees averaging 41-100 years old, 10-15 percent averaging 101-150 years old and an old forest condition that ranged from an average of 2 percent in the lodgepole pine type to as much as 64 percent in ponderosa pine cover type. Nonstocked openings varied with the forest cover type but averaged 15 percent of the landscape.

While the historic patch size has not been precisely determined, it is known to vary due to the nature and intensity of past disturbances. Interpretation from 1940s aerial photos and review of fire history studies indicate that on moderately dry sites impacted by wildfire, areas of similar origin and composition (patches) were irregular in shape and pattern, averaging 20-200 acres with small openings within. Fires occurring in the lower elevation, cooler, moist types created non-uniform yet extensive stands, averaging 100-300 acres, much larger where insects and disease, fuels or weather were a stronger influence. Within characteristic, large stand replacement fires in the mid elevation cool moist sites and the higher elevation cool and moderately sites large uniform patches of 5,000 to 100,000 acres were not unusual. Much smaller non-uniform patches occurred within some of these patterns.

The referenced forest conditions were not static and essentially shifted across the landscape, in these relative proportions in response to disturbance processes. For example, young forests and old growth had a different structure and composition in low elevation, dry, south aspects as compared to that of high elevation, cool, northerly aspects. The intensity and frequency of fire was also different across the landscape.

Affected Environment

The existing vegetative patterns of the analysis area are typical of the broad, surrounding landscape and are characterized by plant communities influenced by both cool, Canadian air masses and the inland maritime weather systems. The latter weather systems moderate the cold winter temperatures, otherwise typical of a montane environment, and produce the type of climate necessary for the survival of coastal species, such as western hemlock and western redcedar. Average annual precipitation ranges from 25 to 45 inches. At higher elevations, most of the precipitation falls as snow. This climate is moderately influenced by rain-on-snow events. The area has a favorable climate and good site conditions for forest vegetation.

As described in the section on Reference Conditions, the cumulative influence of natural and human-caused disturbances define the species composition, forest structure and health of the area landscape. Wildfire historically played a role

interrupting forest succession and creating much of the existing vegetative diversity. The information in Table 3-1 validates the diversity in forest types apparent in the analysis area as a result of the good site conditions for forest vegetation and the associated disturbance pattern.

Species Composition

Dominated by the western larch forest cover type (See Table 3-1 and Forest Cover Types map, M-8), the analysis area is a unique combination of forest vegetation that initiated following wildfires known to have occurred during the years 1889 and 1931 as well as fires that occurred prior to when records were kept. These fire-influenced landscape patterns are discernable on 1947-1949 and 1997 aerial photos as well as from any vantage point currently visible in the analysis area. These stands are generally located throughout the analysis area in settings that vary from riparian areas to the warm, dry southerly slopes.

The *lower, southerly aspects* are characterized by fairly open-grown ponderosa pine and Douglas-fir, as well as some mixed conifer stands dominated by Douglas-fir and western larch. The *upper southerly aspects* are composed of many pure to mostly pure stands of lodgepole pine and multistoried western larch/Douglas-fir. This composition transitions to subalpine fir, occasional stands of western redcedar and graminoid parks. The *lower northerly aspects* are characterized by western redcedar and western hemlocks stands, multistoried western larch and Douglas-fir, and scattered western white pine. The *upper northerly aspects* are composed mostly of western larch, Douglas-fir, subalpine fir, Engelmann spruce, and lodgepole pine. The latter composition is seen mostly in moist basins. *High alpine settings* support farily open-grown stands of subalpine fir, whitebark pine, and subalpine larch. Where mixed severity fires occurred, the results are more variable. Trees that survived these cooler, less severe fires, provided a seed source to restock a second age class of western larch, lodgepole pine and Douglas-fir beneath it.

TABLE 3-1. DISTRIBUTION OF EXISTING FOREST COVER TYPES

COVER TYPE	AMOUNT (%)
Western larch	44
Lodgepole pine	29
Subalpine fir	13
Douglas-fir	11
Western redcedar	9
Ponderosa pine	1
Non-forested	1
Grand fir	<1
Western hemlock	<1
Western white pine	<1

In addition to coniferous trees, understory vegetation of various shrubs, forbs, and grasses are present. Understory representatives in the *moist habitat types* are: fool's huckleberry, serviceberry, pachistima, Sitka alder, thimbleberry, spirea, common snowberry, blue huckleberry, twinflower, creeping Oregon grape, mountain arnica, round-leaved violet, beargrass, coolwort foamflower, ninebark, mountain sweet cicely, trail plant, queen cup beadlily, sweet scented bedstraw, alpine pyrola, one-sided wintergreen and starry Solomon-seal. Common occurring grasses are pinegrass and elk sedge. Understory vegetation in the *drier habitat types* consists of ninebark, oceanspray, Rocky Mountain maple, common snowberry, grouse whortleberry, common juniper, spirea, kinnikinnick, and creeping Oregon grape. Common grasses occurring in the understory are elk sedge, pinegrass and occasionally bluebunch wheatgrass.

Forest Structure

The height, diameter and crown arrangement of trees as well as the understory plants and downed woody material are the basic components of forest structure. Structural diversity within the analysis area varies from large patches of single-storied, uniform stands of lodgepole pine with scattered overstory western larch and Douglas-fir to non-uniform, multistoried stands of mixed species and variable patch size. Existing size classes of conifers range from seedlings to old growth. Variable stand ages and sizes are a reflection of its natural and human-influenced disturbance history. The variation in structural attributes can best be explained with respect to the mosaic of natural disturbance that has occurred, past harvest, and the resultant character of the habitat and its components. Many of the multi-storied stands result from decades of fire suppression, which has enabled further development of the understory trees into the general forest canopy. Areas that may have formerly been composed of merely grasses, forbs, and shrubs have begin to fill in with conifers, as well.

TABLE 3-2. AGE CLASS DISTRIBUTION COMPARISON

AGE CLASS	Historical Reference Conditions	Existing Conditions Garver Analysis Area	Existing Conditions NW Yaak Planning Subunit
Early Seral (1-40 years)	15-25%	28%	24%
Mid-Seral (41-100 years)	10-15%	17%	25%
Mature (101-150 years)	10-15%	20%	21%
Old Forest (151+ years)	2-64%	34%	29%

Table 3-2 displays the existing age class distribution in comparison to the age class distribution that is thought to have occurred historically. The current distribution of age classes is based on stand data and year of origin. The occurrences of nonstocked openings are minimal and not displayed here. Distribution of age classes for the entire Northwest Yaak planning area is shown as this was referenced in the landscape assessment and useful at a broader scale of reference. However, the existing age class distribution in the analysis area is the benchmark for this assessment.

The categories of age class are based on the seral or successional stage of the plant community. *Early seral* is a condition in which plants are present soon after a disturbance or at the beginning of a new successional process (seedling or saplings in a forest). Grass, herbs or brush are abundant, diversity is high. A *mid-seral stage* is characterized in a forest setting has almost full crown closure in pole to medium-sized trees. Understory vegetation is less due to tree shading, less overall, species diversity. A *late seral stage* is a condition with mature trees, often of old forest character, where tree growth is slowed or culminated and mortality has increased. Stand structure varies from single to multistoried, understory is sparse with vegetation due to canopy closure, and scattered relic overstory structure is ordinarily present where it has survived periodic moderate to high intensity fires. Wildlife values associated with this stand condition include breeding, feeding and nesting habitat for small mammals, furbearers, big game and avian species. Thermal, hiding and escape cover for big game animals is high, herbage and browse production low, animal diversity high and woody debris low. Due to its relative importance, this stage is broken out into two categories for this analysis: Mature and Old Forest.

From the comparison table it is evident that the early and mid seral age classes are above but relatively close to historic reference conditions, the mature age class is above estimates of historic levels, and the old forest condition is well within the reference levels for most forest types founds in the analysis area. Active vegetation management of the analysis area is largely responsible for maintaining a fairly balanced age distribution. The relatively high level of young stands reflects the past emphasis on regeneration harvest in lodgepole pine stands impacted by bark

beetles during the past few decades. The trend towards a relatively higher than characteristic level in mid seral and mature stands reflects many factors including protection of unroaded areas, old growth habitat reserves, fire exclusion and the continued ingrowths of 'middle-aged' trees. The early and mid seral age classes will continue to develop into successive stages and contribute to the advancement of the mature and old forest condition.

Vegetation Response Units

Utilizing habitat type groups, soils, landtypes and aspect as a base, the land within the project area was mapped based on its expected response to disturbances (see Vegetation Response Units , M-8). A Vegetation Response Unit (VRU) is an aggregation of lands with similar patterns in potential vegetation, soils, climate, topography, and natural processes (USDA, 1997). The use of VRUs is an important link to understanding the existing condition and the potential for management activity in this area (Gautreaux, 1999). These areas typically follow somewhat predictable and repeatable patterns and have similar capabilities and potentials for management. The relative distribution of the most common VRUs occurring within the project area are displayed in Table 3-3 and are characterized in the subsequent description. Although no treatment areas are proposed in VRU 7 and 9, at this time, it is important to describe and understand the existing vegetative conditions in these settings. The VRU map, M-7, displays the location and distribution of all VRUs in the analysis area. More details are available in the project file for the Garver Landscape Assessment.

TABLE 3-3. VEGETATION RESPONSE UNIT ACRES

BIOPHYSICAL SETTING	VRU	ACRES	% OF PROJECT AREA
Moderately Cool and Moist	VRU 5	29,428	69
Cool and Moist	VRU 7	5,356	12
Moderately Warm and Dry	VRU 2	4,760	11
Moderately Warm and Moderately Dry	VRU 3	2012	5
Cool and Moderately Dry	VRU 9	1,166	3

Moderately Warm and Dry Setting (VRU 2)

Occurring primarily on south and westerly slopes (i.e.: Hensley Hill, Dusty Peak, West Fork Yaak), these dry, lower elevation open ridges are composed of mixed Douglas-fir and ponderosa pine in well-stocked and fairly open grown conditions. Moist, upland sites and dense draws also include western larch and lodgepole pine, with lesser amounts of ponderosa pine. Under natural conditions, tree regeneration occurs in patches and is largely absent in the understory due to frequency of fire. These sites can have low-to-moderate site productivity due to a general lack of soil moisture and the minimal presence of volcanic ash-influenced soils.

Prior to intensive fire suppression, fire was an important agent in controlling density and species composition in this VRU. According to fire history research in Western Montana/Northern Idaho low-to-moderate intensity fires on a frequency of 15 to 45 years were the predominant disturbance, playing a major role in maintaining the seral community of conifers. While limited in scope, reliable evidence from fire scar sampling in this area suggest a fire return interval ranging from 12-70 years with the average being 33 years.

These low-intensity fires would burn non-uniformly consuming the litter and undergrowth. This usually left an open overstory of western larch, ponderosa pine and Douglas-fir largely intact and created small canopy gaps. Average stand basal area was 60-100 and structural diversity remained high under these mosaic conditions.

TABLE 3-4. AGE CLASS DISTRIBUTION COMPARISON - VRU 2

AGE CLASS	HISTORICAL AGE CLASS DISTRIBUTION	EXISTING AGE CLASS DISTRIBUTION
Early Seral (1-40 years)	15-25%	28%
Mid-Seral (41-100 years)	15-35%	13%
Mature (101-150 years)	10-30%	24%
Overmature (151+ years)	20-50%	30%

Departure from Reference Conditions: At the landscape level, the current distribution of age classes is balanced and relatively close to referenced conditions. Where departures occur at the stand level, it is largely due to 60 plus years of fire suppression and lodgepole pine harvest that have essentially replaced frequent, low-intensity underburns as the determining disturbance pattern. This had resulted in a higher stand density of trees in over 55% of this setting, the general absence of ponderosa pine regeneration, a general change in stand structure, and a slightly high than characteristic level of young stands. Many of the area stands have a more uniform structure and a closed canopy. Patch size and pattern are currently more homogenous and there are fewer open, park-like stands. In the near future, the slight deficit in the middle-aged stands will be made up as young tree plantations continue to develop.

Some areas are experiencing greater tree mortality and fuel loadings due to continued bark beetle impacts in lodgepole pine. Winter/snow-damaged trees are more abundant due to higher stand densities. Also, the uncharacteristically high whitetail deer numbers have put browsing pressure on managed plantations in winter range areas, making some area difficult to revegetate. Non-native plants are more common in big game winter range areas than historically occurred.

Moderately Warm and Moderately Dry Setttings (VRU 3)

This is a transitional setting that occurs between the drier, warmer Douglas-fir sites of VRU 2 and the warmer and more moist sites featuring western redcedar and hemlock in VRU 5. In the analysis area they occur on moderately slopes on south and easterly aspects in some sites above the Yaak highway below Rausch Point. These lower to midslope sites have a species composition shaped by low to moderate severity fires favoring western larch and ponderosa pine over Douglas-fir. On rare occasions, severe stand replacement fires occurred, favoring the development of single species stands, especially lodgepole pine. This VRU is near the climatic (cold) limit of ponderosa pine. Grand fir occurs in some areas where moisture is sufficient and/or where there has been site disturbance

As with similar settings, prior to intensive fire suppression, fire was an important agent in controlling density and species composition in this VRU. According to fire history research in Western Montana/Northern Idaho non-lethal low severity fires on a frequency of 15 to 45 years were the predominant disturbance on the south slopes, playing a major role in maintaining the seral community of conifers. Non-uniform, mixed severity fires occurring within a range of 70-250 year frequency were more characteristic on the northerly, cool and moist sites. Average stand basal area was 80-120 in even aged single storied patches and multiaged stands, both single and multistoried.

TABLE 3-5. AGE CLASS DISTRIBUTION COMPARISON - VRU 3

AGE CLASS	HISTORICAL AGE CLASS DISTRIBUTION	EXISTING AGE CLASS DISTRIBUTION
Early Seral (1-40 years)	15-25%	21%
Mid-Seral (41-100 years)	20-40%	12%
Mature (101-150 years)	15-35%	5%
Overmature (151+ years)	15-40%	62%

Departure from Historic Reference Conditions: In general, fire exclusion and some forms of vegetation management have resulted in a general shift from primarily conifer species that are tolerant of a fire-maintained ecosystem to a greater proportion of less fire-tolerant species. Stands are also generally stocked with more trees (ie: 56% of the stands in this VRU have a density exceeding 120 basal area) and more homogenous fuels conditions in many areas than is characteristic. Some insect and disease problems are showing up as a result of this trend. The absence of mixed lethal fires in recent decades is partially responsible for the persistence of lodgepole pine and the continued bark beetle-caused mortality in these overmature stands. The current age class distribution shows some departures from reference conditions in most categories. This condition is expected to improve as managed plantations further develop and as middle-aged stands are thinned to promote tree growth, improved vigor and trend towards mature forest characteristics.

Moderately Cool and Moist Settings (VRU 5)

This vegetation response unit has some of the highest biological productivity on the district and occurs commonly along benches, stream bottoms, and many of the midslope settings in the analysis areas. The common occurrence of loess deposits largely contributes to these sites having good nutrient availability and high moisture carrying capacity. Conifer species noted in these low to mid elevation settings include Engelmann spruce, western hemlock, western white pine, western larch, western redcedar, and lodgepole pine at densities that averaged 150-200 basal area in upland areas, and over 200 in valley bottoms.

Due to its proximity to riparian areas along with moist and humid site conditions, fire frequency is relatively infrequent. However, the occasional periods of summer drought can create some conditions very conducive to severe fires that can become extensive. Quite often the origin of a fire, in these moist settings, is wind-carrying fire from adjacent forest stands.

In general, fires in this VRU can be characterized as non-uniform with infrequent but often extensive stand replacing fires on an average frequency greater than 200 years. On drier sites, this fire regime is periodically interspersed with mixed severity fires on an average frequency of 75 years and, to a lesser extent, low-severity underburns. These mixed severity fires can be quite variable, ranging from low-intensity, creeping fires that kill primarily shade-tolerant trees to severe stand-replacing fires that create favorable conditions for tree growth and regeneration of seral species.

The more exposed upper slope ridges and the more protected riparian areas, north slopes, toe slopes and benches are the areas with the highest likelihood of avoiding lethal fires (Zack, 1994). The rapid drying of exposed sites increases the probability of more frequent, understory fires. In contrast, moist sites experienced patchy lower severity underburns, during upland lethal fire events, and long interval lethal fires.

TABLE 3-6. AGE CLASS DISTRIBUTION COMPARISON - VRU 5

AGE CLASS	HISTORICAL AGE CLASS DISTRIBUTION	EXISTING AGE CLASS DISTRIBUTION
Early Seral (1-40 years)	10-20%	30%
Mid-Seral (41-100 years)	15-35%	13%
Mature (101-150 years)	10-30%	21%
Overmature (151+ years)	25-55%	35%

Departure from Reference Conditions: Fire exclusion has reduced the scope of mixed severity fires but to this point, it has had less impact on occurrence of stand replacement fires. This partially explains the minimal departure in age class distribution from reference conditions with respect to the mature and overmature classes. The relatively high number of stands in the early seral stage reflects past district emphasis on salvage and restoration efforts in mid-elevation lodgepole pine stands. Many of these managed plantations will be moving into the mid seral stage soon and contributing to a more balanced age class distribution. While this setting is productive and historically well stocked, about 32% of the stands have a density over 200 basal area, which is considered above reference conditions.

The western white pine cover type has been reduced due to the blister rust fungus, and, to a lesser degree, the lack of stand replacement fires. The lack of mixed severity fires has reduced the abundance of western larch, due to competition from species not requiring disturbance for establishment and a general increase in dwarf mistletoe. The increased composition of western hemlock, grand fir and Douglas-fir has increased the occurrence of root disease in some areas. To a large extent, harvest has replaced fire as the disturbance agent since the 1950's in this area. However, harvest does not replicate the larger patch size of natural fire disturbance and often fire-adapted trees were removed in the operations. Fire suppression has impacted the role of smaller mixed lethal fires as an agent of disturbance creating more heterogeneous stands. Current patch size is smaller, more isolated, with more uniformity in size and age class. Fire exclusion has also extended the occupation time and distribution of species such as lodgepole pine and western redcedar in many areas.

Cool and Moist Settings (VRU 7)

This vegetation response unit occurs in the moist lower subalpine forest setting and is common on northwest to east facing slopes, stream floodplains, and poorly drained subalpine sites, and moist frost pockets (i.e.:Garver Mtn., Mount Obermayer). This landscape is typically bordered by warmer sites (VRU 5) and cool, drier subalpine sites (VRU 9) and includes characteristics of each. Vegetative productivity is moderate to high as a result of the high moisture-holding capacity and nutrient productivity of loess deposits, adequate precipitation, and a good growing season. The predominant conifer species are subalpine fir, lodgepole pine, Engelmann spruce, with scattered white pine and western larch. Historic references indicate an average stand basal area of 80-120.

Moisture and temperature gradients create a complex influence on the fire ecology and the vegetation response in VRU 7. Fires in this vegetation response unit generally burn non-uniformly and are more intense but less frequent than that of VRU 9. Research demonstrates that infrequent stand replacement fires on a 100+ year fire return interval (Arno and Davis, 1980) were the most common, occurring within a mosaic of nonlethal and mixed lethal burning. Well-drained upland sites experienced a higher percentage of stand replacement fires.

Cool and moist conditions, coupled with broken topography and lush understories, undoubtedly limit fire spread and create non-uniform conditions. With fuels drying out slowly, under most conditions fires either burn very small areas or burn large areas in a patchy pattern (Smith and Fisher, 1997). However, because much of this

VRU is relatively narrow and is often flanked by riparian areas this fire regime is strongly influenced by that of neighboring landscapes.

Although lightening strikes may be frequent in this fire group, few large fires apparently originated in these stands (Barrett, 1982). Most large fires probably moved in from drier sites during severe fire weather.

TABLE 3-7. AGE CLASS DISTRIBUTION COMPARISON – VRU 7

AGE CLASS	HISTORICAL AGE CLASS DISTRIBUTION	EXISTING AGE CLASS DISTRIBUTION
Early Seral (1-40 years)	15-25%	21%
Mid-Seral (41-100 years)	20-40%	42%
Mature (101-150 years)	15-30%	9%
Overmature (151+ years)	15-45%	26%

Departure from Reference Conditions: The percentage of early seral and overmature is in line with reference conditions. The abundance of middle-aged stands is due to exclusion of mixed severity fires that have allowed a greater proportion of trees to advance in age, as well as the development of managed plantations harvested many years ago. In general, there is a loss of seral species due to high stand densities (i.e.: over 55% of stands have basal area over 120) and the lack of mixed severity fires. Also, white pine and lodgepole pine mortality coupled with fire suppression has increased the ingrowths of subalpine fir and Engelmann spruce. The exception is in upper subalpine basins where there is actually a much-reduced spruce component. In portions of the analysis area, stand structure is more uniform and less storied, and there is less shrubfield development due to fire exclusion. Some stands have fewer of the large, old overstory trees due to insects, disease and salvage harvest. When stand replacement fires do occur now, they tend to be of higher intensity. At the landscape scale, there is generally more homogeneity as the patch sizes tends to be smaller and more isolated, with more uniformity in size and stand age classes. There is also presently a much higher level of white pine mortality due to blister rust fungus.

Cool and Moderately Dry Settings (VRU 9)

These sites are generally found on rolling ridges and upper reaches of mountain slopes generally above 5400 feet in elevation (i.e.: Garver Mtn., Benefield Cr.). The climate is characterized by a short growing season with early summer frosts. Due to generally shallow soils (low water holding capacity), slope position, and aspect, soil moisture is often limited during late summer months. These settings are very suitable to lodgepole pine and subalpine fir, the most common conifers, with scattered Douglas-fir and larch.

Historically, fire was the predominant disturbance type in these fire regimes and played a major role by regularly interrupting succession and perpetuating the presence of lodgepole pine. This is especially true following large scale; stand replacing fires that generally occurred on the moist lodgepole pine sites. Losensky's research (1994) shows that 80 percent of these areas had lethal non-uniform burns every 113 years and 20 percent had a mixed, non-uniform burn every 50-71 years. The severe fires may have been extensive due to extreme weather conditions such as high winds. It would not be uncommon for the risk of reburn to be high during early successional stand development due to the amount of available fuels. In contrast, the nature of moderate intensity fires resulted in some areas underburned, leaving the forest structure intact, while other mixed severity fires set back succession to a forbs or shrub stage. Historic references indicate an average stand basal area of 80-120.

TABLE 3-8. AGE CLASS DISTRIBUTION COMPARISON - VRU 9

AGE CLASS	HISTORICAL AGE CLASS DISTRIBUTION	EXISTING AGE CLASS DISTRIBUTION
Early Seral (1-40 years)	20-40%	3%
Mid-Seral (41-100 years)	40-60%	47%
Mature (101-150 years)	15-20%	39%
Overmature (151+ years)	5-10%	8%

Departures from Reference Conditions: The current proportion of mid-seral and overmature stands is characteristic in this VRU. There is a low percent of early seral stands due to the minimal extent of stand replacement and mixed severity fires since 1933, and the focus of lodgepole pine salvage and stand replacement in the lower subalpine areas. The deferral of vegetation management in Old Growth coupled with fire exclusion have protected many acres of mature forest than is thought to be characteristic for this VRU. Also, where site disturbance (i.e. roads, landings) has occurred, non-native plants have developed a foothold. In many areas, there is less natural regeneration of western larch, lodgepole pine due to fire exclusion favoring Douglas-fir, subalpine fir, and spruce. In general, there are fewer natural openings. The presence of whitebark pine is less due to blister rust and subalpine fir encroachment. In many overstocked stands there is also lesser-developed understory vegetation due to canopy closure. Currently, stand structure is becoming more storied and denser (i.e.: over 75% of stands have basal area over 120), where subalpine fir ingrowths follows lodgepole pine mortality. Patches are becoming smaller yet more isolated. Overall, expansive even-aged lodgepole pine stands are currently less homogenous due to active management, more contrasts.

Forest Health

As described in the discussion of historic vegetative conditions, the long-term health of ecosystems is linked to disturbance. Recurrence of disturbance and recovery within ecosystems is an important mechanism for energy flow, maintenance of habitat diversity, vegetative succession, canopy reduction, etc. In most sustainable forest ecosystems, insects and pathogens are the major nutrient recyclers and often are the most evident disturbance.

For this project, the major insects and diseases affecting species composition, stand structure, and fuel loads within the analysis area are described below within the framework of forest health. There are a number of other active insects and diseases associated with the ecosystem of the analysis area; however, their occurrence is minimal and not considered as threatening to species composition or stand structure. Many of these agents are found in young trees and, while affecting species composition, are considered within the "normal range" of a natural process. Our consideration of forest health emphasizes prevention as opposed to suppression as a management strategy for insects, pathogens and natural disturbances that are considered detrimental to resource production. This emphasis is made with recognition of their beneficial role with regard to resources and ecosystem functions.

Table 3-9 depicts general insect and disease conditions in areas that have received stand examinations. These figures only portray the conditions where these agents occur at moderate to high levels (see project file for details of the criteria).

TABLE 3-9. GENERAL INSECT AND DISEASE CONDITIONS

CAUSAL AGENT	AFFECTED ACRES and % OF PROJECT AREA
Dwarf Mistletoe	5,192 ac. 58 %
Stem Decays	2,383 ac. 26 %
Bark Beetles	767 ac. 9 %
Root Disease	621 ac. 7%
Stem Rusts	45 ac. <1%
	Total 9,008 acres

Dwarf Mistletoe

Dwarf mistletoe is a native parasitic plant that survives off water and nutrients extracted from living host trees such as western larch, Douglas-fir, and lodgepole pine. The mistletoe plant causes brooms, stem cankers, and branch or stem swelling on infected trees. Although the primary impact is loss of height and diameter growth, reduction in seed and cone crops, and direct mortality or predisposition to other pathogens or insects can occur. The typically long life cycle of this parasite results in a fairly slow population build-up. The occurrence of dwarf mistletoe in the analysis area is at low to moderate endemic levels and occurs primarily in scattered old western larch overstory trees. Areas such as French Creek and Mud Creek exhibit a much higher level of mistletoe-infected trees, likely due to tree age and fire exclusion.

Historically, wildfire has been the most important single factor governing the distribution and abundance of dwarf mistletoes (Alexander and Hawksworth, 1975). Also, several species of insects and fungi attack and kill shoots or fruits. Fires that kill the host trees will reduce the population of dwarf mistletoe in the short term. Where infected residual overstory survives the fire, a ready source of seeds for the infection of young regenerating trees becomes a concern. Where western larch is planned as a major component of the reforestation effort, dwarf mistletoe in reserved seed trees is a concern. Some bird species are reported to eat the seeds of this plant, and its shoots can be an important food source for grouse, squirrels, and porcupines.

Stem Diseases and Decays

The most commonly noted decays in the analysis area are Indian paint fungus and white pocket rot. The pouch fungus also occurs and is a major cause of saprot. This fungus is particularly noticeable in Douglas-fir that has been recently attacked by bark beetles. While not extensive, the most common stem disease in the analysis area is undoubtedly the fungal disease white pine blister rust. Introduced into western North America from Europe in 1910, this disease has caused as much as 90 percent mortality in what were once vigorous, well-stocked stands of white pine. Blister rust is particularly pervasive in some areas near Hensley Hill, Mud Creek and French Creek. The selective harvest of dead white pine and the continuing tree mortality has led to the increase in Douglas-fir, grand fir, and hemlock.

Bark Beetle

The mountain pine beetle is currently one of the most common and visible disturbance agents in the analysis area, occurring within most forest cover types and across all elevations. Stands at greatest risk continue to be those composed primarily of mature lodgepole pine (<80 yrs old) and greater than seven inches in diameter. Where outbreaks have occurred, active management since the late 1970s has been successful in modifying stand conditions to those less conducive to insect outbreaks.

Other areas have been salvage logged and some stands have been converted to an early successional stage of mixed conifer trees. In 1978 some areas in the Benefield

drainage were part of a study area designed to commercially thin healthy, middle-aged lodgepole pine to increase tree vigor and reduce susceptibility to mountain pine beetle. In general, the mountain pine beetle infestation in the Yaak drainage peaked around 1984 in stands generally of the same age class. It is expected that infestation in the analysis area will likely continue for a few years as stands of susceptible lodgepole pine come of age. Lodgepole pine stands still at risk will either be harvested, burned by wildfire, or left to die and fall over, to be overgrown by regeneration of shade-tolerant conifers and shrubs. While at moderate to high levels in areas near Troy, the Douglas-fir beetle is considered at endemic levels in the analysis area. Mature trees over 14" in diameter in overstocked stands composed of predominately Douglas-fir are very susceptible to infestation.

Root Disease

Although they are less obvious, conifer root diseases are generally the most impactive group of tree diseases. Where root disease is present, stand development is likely to remain in early succession and advance to climax stages is not expected. Despite the occurrence of periodic fire, root pathogens stay in the stand and tree mortality continues where regeneration occurs in these patches. These pathogens create openings in otherwise closed canopies, providing a stand structure that is unique and not created any other way.

The incidence of root disease in the analysis area is considered to be low and within endemic levels. Generally evident in small patches**,** some of the Douglas-fir and true fir display signs of Brown cubical root and butt rot as well as shoestring root rot. This seems to be occurring on droughty sites where these host species tend to be less vigorous. In some cases, bark beetle mortality has occurred in these root disease pockets, largely due to the accompanying stress on the trees by the root pathogens.

Windthrow, Snow, Ice and Animal Damage

Within the analysis area a number of landtypes contain characteristics making the area susceptible to windthrow. Factors that contribute to windthrow are shallow soils, soils with high water tables, and soils that have layers that are restrictive to tree roots. Topographic position of the stand also affects the stands susceptibility to windthrow.

Windthrow can affect stand structure and species composition subtly as individual trees or clumps or more obviously as patches. Windstorms may flatten natural stands or expand harvest areas. Examples of both can be found in the analysis area, some of which are the result of several wind events that occurred in the last five years. In particular, wind, snow and ice damage from the winter of 1996-1997 has impacted a number of the very densely stocked Douglas-fir stands. In some areas, the older dead lodgepole pine trees have also come down as a result of these storms.

The number of animals causing important injuries to trees is relatively small. However, damage to trees from deer, black bear, porcupine, rabbits, mice, squirrels, gophers and occasionally birds, does occur in the analysis area and can be significant on a local basis. In particular, mechanical injuries from black bear girdling of western larch and lodgepole pine trees is probably the most noticeable. This damage tends to occur in young, vigorous trees during the early part of the growing season as bears are seeking out the sugars found in the cambial layer of the tree.

Site Potential

The habitat type groups characterizing the analysis area contain relatively productive tree growing sites that are not limited by soil moisture or length of

growing season. The exceptions to this are some inclusions of non-forested land and small rock outcroppings that have shallow rocky soils, a short growing season, and/or a tendency to experience frost heaving. Due to severe limitations for reforestation, these areas are not typically entered for habitat manipulation unless they are to benefit non-timber resources. Further details concerning reforestation potential within the analysis area, and the Three Rivers District, can be found in Table 3-13.

Vegetative Conditions Related to Past Harvest

The analysis area has received a moderate to high level of harvest over the last five decades (See Table 3-10 and Harvest History map, M-9). These activities include a variety of management practices, ranging from machine trampling of very dense pole size trees and intermediate harvests (i.e.salvage, commercial thinning) to regeneration harvests (i.e. clearcuts, seedtree seedcuts, etc.). Regeneration harvest has taken place across 26 percent of the analysis area. Intermediate harvest has taken place across 14 percent of the analysis area. Harvest entries began in the 1950s, within the lower subalpine basins following an extensive blowdown event, which primarily affected large, mature Engelmann spruce. Salvage of these trees continued for a number of years as bark beetles infested downed trees making harvest a high priority for economic recovery and to reduce the site conditions that favor continued beetle attack. Beginning with sightings in the 1970s, the mountain pine beetle epidemic led to an aggressive district effort to recover value in dead, dying and high risk lodgepole pine. This effort also included an extensive effort to replant these areas with a wider variety of conifer species than what was present.

In recent years, the harvest and conversion of mature mixed conifer stands including salvage of dead white pine has been the focus of silvicultural entries. In areas where shade tolerant species were the predominant type harvested, both artificial (planting) and natural reforestation has been used to increase the abundance of seral species, which have a greater adaptiveness to fire. In some cases, mechanical scarification was used to reduce grass competition and create sites for newly planted seedlings.

Most of the young, managed stands have vegetatively recovered and provide wildlife hiding cover, and, in some cases, thermal cover. Please refer to the project file for the quantity and type of post-harvest treatments that have occurred and their spatial relationship to the analysis area. Some portions of the analysis area have little active management history due to private lands, old growth habitat protection, inclusion within inventoried roadless areas and inaccessibility.

TABLE 3-10. HARVEST HISTORY

DECADE OF HARVEST	Regeneration Harvest	Intermediate Harvest
1950-1959	206	230
1960-1969	2,158	1,159
1970-1979	3,046	1,795
1980-1989	5,438	2,565
1990-present	553	383
	Total: 11,401 acres	**Total: 6,132 acres**

Environmental Consequences

This section will summarize the changes in species composition, stand structure and forest successional conditions that are likely to occur as the result of implementing the alternatives described in Chapter 2. The successional conditions predicted represent the most logical pathways given the existing conditions of stands in the analysis area. Where the effects of the proposed treatments are very similar, the

disclosures are combined. This section will also display how each alternative addresses the purpose and need of the project and the major issues identified.

The basis for this analysis is the stand-specific silvicultural diagnosis and the field review of the areas proposed for treatment. Existing stand conditions and proposed treatment options were site-specifically identified and reviewed. Additional information can be found in the stand summaries and stand diagnosis records in the project files as well as Appendix A.

The removal of vegetation during harvest and fuels treatment processes, and the regeneration to conifers, are considered under the action alternatives. These effects and the resulting change in the vegetation will vary with the timing, size, number, and spatial arrangement of harvest units and associated road systems. These effects will be different from those expected to occur under a no action alternative.

The changes to vegetation expected to result from the proposed treatments have many direct and indirect effects on other resources. Specific resources affected would include wildlife, scenery, soils, water and fish, recreation, and fire. The detailed effects on these individual resources are disclosed in the respective sections in this chapter.

EFFECTS COMMON TO ALL ALTERNATIVES

Fire Ecology

The forests in the analysis area have developed in close relationship with wildfire (see discussion on Reference Conditions). Many of the plants and animals found rely on fire to change the structure, composition, and pattern of vegetation. Fire is important for maintaining seral species, creating openings in the forest, reducing tree competition, regeneration of lodgepole pine, and recycling nutrients to the soil.The exclusion of fire in the landscape since the early 1900s has had a strong influence on these fire-dependent ecosystems.The natural fire regimes in the analysis area are being altered by controlling low to moderate intensity fires and creating an environment conducive to high-intensity stand replacement fire. In fact, district records indicate that since 1933 less than half of one percent of the project area has burned as compared with 77 percent from1850-1933. This trend is expected to continue in the short term. However, as eluded to previously, uncharacteristic fire severities are very likely in the future. This assumes that fire suppression will continue and that active forest management continues its current trend (refer to Table 3-10).

Forest Health

The mountain pine beetle has been active in many portions of the analysis area for a number of years. As previously described, mortality in lodgepole pine likely peaked around 1984 but more recent site-specific outbreaks have resulted in mortality levels in lodgepole pine stands that vary from 20-90 percent. Whether or not management actions are taken, insects and pathogens will continue to play their role in modifying the forest vegetation. Mortality in lodgepole pine as a result of ongoing bark beetle infestation will continue, particularly in the maturing trees that are less vigorous. However, the overall number of acres affected by bark beetles would likely remain the same for the next five to seven years. The Douglas-fir beetle is expected to periodically kill mature overstory trees in areas of uncharacteristic densities and susceptible stand structure.

Large areas of standing dead or down trees can provide a fuel matrix for the rapid spread of wildfires, as was the case with numerous fires, which burned in 1994 and

2000 throughout the Three Rivers District. In particularly dry years, insect infestations and mortality could increase dramatically. Bark beetles have the ability and the tendency to affect management options. Where these effects are considered negative, it may be necessary to respond in an appropriate and timely manner.

EFFECTS BY ALTERNATIVE

ALTERNATIVE A - NO ACTION
Direct And Indirect Effects

No prescribed burning, tree harvest, non-commercial thinning, fuels reduction, grizzly bear core habitat improvement, or winter range improvement would take place with this alternative. Only natural processes would occur within these stands and continue to affect forest succession and health. The condition of untreated forest areas would change over time, with continuing mortality, declining growth and wood decay as a result of insect mortality in high-risk stands. For some species, this will create available growing space and increased growth. In many areas this change will continue a trend whereby shade-tolerant species, that are more prone to insects and disease and are less fire-adapted, replace shade-intolerant species that have adapted to the influences of fire and are generally less susceptible to insects and diseases. The no action alternative would not contribute to the purpose and need of improving forage in wildlife winter range, creating stand conditions more suitable to a fire-maintained ecosystem, restoring conifer species at risk, reducing fuel loading and the potential for large scale fire on private and National Forest lands. Also this alternative would not meet the purpose and need to provide wood fiber to support the local and regional economies.

No action would not enable management of forests that encourage more resilient and sustainable forest conditions. While management of MA-13 (designated old growth) would continue, there would be a missed opportunity to ‘cultivate’ future old growth replacement in areas that are suitable for stand improvement thinning designed to improve growth in dominant trees and diversify the stand structural attributes to trend towards old forest conditions.

Fire Ecology and Forest Health

With continued fire suppression and without prescribed fire, understory trees would continue to grow into the general canopy as well as expand in scope. This condition as well as continued encroachment of fire-intolerant species will contribute to a greater severity of fire when it does occur. Wildlife forage, abundance and quality would continue to decline.

Of the more than 9,000 acres in the analysis area with moderate to high levels of forest health concerns (see Table 3-10) none would be treated at this time. The 761 acres of trees currently impacted by bark beetles, would not be treated in this alternative and options to recover economic value and increase species diversity would be deferred. Root disease on 621 acres would not be considered for treatments to enhance non-host species. None of the stands affected by white pine blister rust would be entered for restoration, nor would the 5,192 acres of dwarf mistletoe-affected western larch stands. Of the numerous western larch and western white pine stands that require some type of restoration treatment to be maintained in the landscape, none would be initiated. None of the approximately 900 acres of planned non-commercial thinning would take place. Overstocked sapling-size stands would not benefit from stocking control and future management options would be reduced, as poor quality and excess trees are not removed and shade intolerant species continue to be impacted by high stand densities.

Forest Structure and Succession

The following discussion highlights the change in forest succession that is expected to occur, without the proposed silvicultural treatments, within the analysis area. The description of successional pathways outlines stand development that would ordinarily follow natural disturbance processes that include wildfire, insect and disease impacts, blowdown, etc. The descriptions recognize the existence of mosaic or patchy conditions that represent variation in species composition, forest types, and stocking levels. Assuming that traditional fire suppression would continue, the successional development that is described for the no action alternative may not be consistent with ecological processes and may not create long-term, sustainable forest conditions. Although no treatment areas are proposed in VRU 7 and 9, at this time, it is important to describe and understand the existing vegetative conditions expected to result from no action in these settings.

Moderately Warm and Dry Habitat (VRU 2 and 3)

These forest settings have historically experienced fairly frequent, low intensity and mixed severity fires as a predominant natural disturbance. Since we know that disturbance drives the development of forest structure, there are noticeable trends which can influence ecosystem health and landscape patterns. If vegetation development continues without a disturbance event (i.e.: harvest, wildfire) these stands would continue their trend towards a higher representation of grand fir and Douglas-fir, at the expense of ponderosa pine and western larch, which requires disturbance to maintain its presence. In areas such as Hensley Hill, Dusty Peak and West Fork Yaak this trend would continue to reduce the forage potential for wildlife, would not promote the maintenance of ponderosa pine and western larch, and would not move towards a more open stand structure that is better suited to the re-introduction of fire as an ecosystem process. As the current distribution of age classes is relatively close to referenced conditions in VRU 2, no action would not change this condition in the short term. In contrast, the current age class distribution in VRU 3 shows some significant departures from reference conditions in most categories. This condition is expected to improve as managed plantations further develop and as middle-aged stands are thinned to promote tree growth, improved vigor and trend towards mature forest characteristics.

While not a widespread problem at this time, stands with a significant Douglas-fir component are already developing the physical characteristics that are attractive to bark beetles. This situation is often the result of stagnated and overstocked conditions and can also create heavy fuel loadings and significant threat of stand replacement, in the event a fire occurs. Without fires or associated management action that disturb portions of the landscape, the extent and intensity of insects and pathogens will undoubtedly increase and result in a community that is less resilient. These consequences may lead to a reduction in site quality and continued shift in species composition.

As this setting and these conditions border private landowners and important wildlife winter ranges, the importance of assessing the risks of no action becomes all the more relevant. A decision not to take action in these specific conditions would not enable the natural process of fire to be re-introduced onto the landscape and habitat diversity will not be enhanced, resulting in more continuous forest patches with less horizontal diversity. No action will also eliminate the opportunity, at this time, to maintain the MA-13 (Old Growth) stands on Hensley Hill with ecosystem burning.

The no action alternative, coupled with continued fire exclusion, would increase the numbers of wildlife snags due to continued natural decadence. However, since

most of these snags would be Douglas-fir, as opposed to ponderosa pine which is preferred for its longevity and suitablity, this snag benefit is short term.

Moderately Cool and Moist Habitat (VRU 5)

In comparison with many of the other habitat settings, the influence of no action and continued fire exclusion on vegetation in many moist landscapes is less evident, in the short term, due to the inherently long fire-free interval. Moist sites such as this are characterized as having mixed severity and infrequent stand-replacement fires within a range that is similar to recent, historic levels. However, based on fire history research and recent wildfire experiences on this district in 1994 and 2000, it is expected that no action and continued suppression of ecologically important mixed severity fire would eventually promote larger stand-replacing fires than typical, particularly as forest homogeneity increases and higher stand densities persist. The influence of no action on age class distribution in minimal in the short term. The relatively high number of stands in the early seral stage reflects past management and are expected to advance into the mid seral stage soon and contributing to a more balanced age class distribution.

No action and continued fire suppression would continue to move species diversity towards a greater proportion of mid-tolerant and shade-tolerant species, which are not as adaptable to fire. Many of these sites with long interval fire cycles are approaching a point of being fairly decadent and becoming overmature. Insect and disease problems can become more significant as forest conditions age, particularly with dwarf mistletoe, blister rust, and/or bark beetle. In specific areas of the West Fork Yaak, this is particularly evident in the relic western larch and western white pine overstory that are very old, are not producing reliable cone crops and don't have the resiliency to sustain this important species mix under the current situation. No action in this area will not provide the opportunity to restore these species to characteristic levels that are considered more resilient, better adapted to fire, and with a great degree of tolerance to root disease and bark beetle. Relative to watershed and forest health, as these stands continue to decline in vigor and sustainability, future canopy closure can be affected by as much as 35 percent (Gibson, 1998).

Where more frequent fire occurs, the presence of insects and disease appears to be lessened. In the near future the stands at risk will likely be those currently in overstocked conditions where tree vigor is typically low. As a result, overall landscape diversity could be reduced for some time due to less age class diversity and more fuels continuity. Dwarf mistletoe in western larch has become more significant in some areas with the absence of fire and the overmature age of these trees. These trends would continue and without restoration these important cover types are at considerable risk.

With no action and continued fire exclusion, snag habitat and downed woody debris will increase in most mature stands, as decadence occurs and older age classes develop. Historically, multi-storied old growth forests were located in these moist settings and maintained by succession and disturbance regimes. No management in this VRU foregoes an opportunity to promote growth and provide a more suitable condition for providing future old growth replacement in site specific areas. Without the thinning mechanism of fire or selective harvest, many stands will not achieve the structural attributes or trend towards old forest conditions.

Cool and Moist Habitat (VRU 7)

As previously stated, in general, vegetative trends in these wetter settings do not appear as rapidly as other dry forest types due to the infrequent nature of disturbances. As a result, the effects of no action and continued fire exclusion on the structure and composition of this setting would be gradual. The general landscape is expected to become less uniform with more connectivity between and within late seral stands, especially in riparian areas. No action and continued fire suppression would tend to minimize the extent of mixed severity fires. This would likely contribute to a decline in the variety of stand structures and a trend towards species of mixed fire tolerance to a greater proportion of fire-intolerant species. The abundance of middle-aged stands will continue to be uncharacteristic due to exclusion of mixed severity fires that have allowed a greater proportion of trees to advance in age. Light-to-moderate intensity surface fires can act as a thinning agent in these dense pole size stands, converting overstocked stands to a more open condition with fire-adapted species. Intermediate sized western larch, Douglas-fir and some white pine are usually favored in these circumstances. Lodgepole pine, subalpine fir and spruce may be significantly reduced or eliminated if they in are densely stocked conditions. These occasional maintenance fires reduce understory competition and rejuvenate browse and forage plants.

Continued interruption of the natural fire cycle, particularly of mixed severity type, would result in higher stand densities and more continuous, heavy fuel conditions across most of this setting. While not readily apparent, this condition would lead to more intense stand-replacement fires. In particular, heavily stocked, pole-sized stands have a high crown fire potential (Arno and Davis. 1980). A high-intensity fire will kill almost all trees in this mid-seral development stage. This could result in a shift back to the herb/shrub phase or facilitate the development of dog-hair lodgepole pine stands from serotinous cones. If an area experiences a double burn within a relatively short interval, the site may revert to a brushfield, particularly habitat types such as Abla/Mefe. Neither western larch nor lodgepole pine will likely survive high severity fires in the pole stage.

A gradual shift in species composition and higher stocking levels could result in insect and disease problems due to low tree vigor**.** On sites where fire-resistant species are being replaced by shallow-rooted, thin-barked species there is the potential for a loss of shallow fine roots following a surface fire. This increases the susceptibility to stress and direct entry of root and stem pathogens. Fire-resistant species have lower susceptibility to long-term soil damage from fire as roots are deep and bark is thick. As a portion of this setting includes a lodgepole pine component of uniform age class, mountain pine beetle mortality will continue and could be partially attributed to the reduction in mixed lethal fires. Root disease is expected to continue being a cause of mortality in Douglas-fir overstory. Blowdown is more prevalent in the root disease-affected areas and in spruce stands.

Cool and Moderately Dry Habitat (VRU 9)

In the project area, most of the habitat types within this response unit are even aged lodgepole stands without a significant component of other species. Historically, mixed severity and lethal fires were the predominant disturbance type playing a major role in regularly interrupting succession and perpetuating the presence of lodgepole pine. There is a low percent of early seral stands Due to the minimal extent of stand replacement and mixed severity fires since 1933, and the focus of lodgepole pine salvage and stand replacement in the lower subalpine areas

Under the no action alternative, shifts in vegetative patterns, increased fuel loadings, and changes in species composition would continue to occur. The

uncharacteristically low percentage of young stands will continue in the short term, under no action. If a wildfire occurs in this forest type, it may likely convert mature stands to early seral. Lodgepole pine stands would continue to experience considerable bark beetle-caused mortality. Mature lodgepole pine trees are an optimum food source for the bark beetle. Where management objectives do not include the maintenance of stand vigor, conditions that are very conducive to bark beetle outbreaks are a general result. This condition would greatly increase the probability of a stand replacement fire, as fuel loadings would be significant. Between significant fire events, lodgepole pine would be replaced by subalpine fir and Engelmann spruce that fill into open growing space. Where it is not frost stunted, some low elevation sites will occasionally have Douglas-fir persist as a seral dominant. The succession to climax dominated by subalpine fir is often very slow either because of lack of seed source or apparent low vigor. With time, surviving lodgepole pine increase in growth and become susceptible again to bark beetle attack. It would not be uncommon for the risk of reburn to be high during early successional stand development due to the amount of available fuels.

The amount and severity of dwarf mistletoe could generally increase as multistoried conditions become more common. As the effect of dwarf mistletoe infection on an individual tree is fairly gradual, this trend may only be detectable across a long temporal scale at a landscape level.

Cumulative Effects

Past, present, proposed, and reasonably foreseeable activities were reviewed to determine cumulative effects to forest vegetation. Beginning in the 1950's, previous regeneration harvest has occurred on approximately 11,403 acres. These managed stands are fully stocked with a mixed species composition, provide wildlife hiding and thermal cover, and contribute to the mosaic of vegetative diversity that occurs in the analysis area. Most of these managed stands have been thinned at one time. No action would defer the opportunity to thin additional sapling size stands that would have contributed to this habitat diversity and maintained tree health and vigor. The more recently harvested stands are stocked with a variety of young trees and understory vegetation, providing varying degrees of wildlife hiding cover, and forage for many animal species. These conditions would not be influenced in the short term by no action. No action would not allow for restoration of western larch, ponderosa pine, and western white pine. The continued loss of these important species would vary by specific location, but would occur. Accumulation of fuels from existing and expected dead treefall would likely increase the intensity of a fire in the future. No action would add some degree of degradation where poor forest health is a present concern.

Forest Plan Consistency

A decision not to provide silvicultural treatment wouldn't contribute to the sustainability of the forests within the analysis area, nor would it meet the purpose and need of this project. High stand densities of fire intolerant species and increasing ladder fuels have some potential negative considerations. Without fuel abatement through harvest, excessive natural fuels accumulate and would likely lead to higher long-term fire suppression costs. Without prescribed fire, the Forest Plan goal of simulating natural ecological processes, creating habitat diversity for wildlife, and maintaining ecosystems would not be realized. Additionally, the maintenance of diverse age classes would be limited to that which presently exists. The no action alternative would not acknowledge direction from 36 CFR 219.26 which requires forest planning to provide for diversity of plant and animal communities and tree species consistent with the overall multiple use objectives of the planning area.

A loss in economic value would occur as the dead, dying or mature lodgepole pine is left. Without stand improvement activities or removal of high-risk host tree species, additional mortality from bark beetles is likely to occur. The no action alternative would not move the existing forest conditions within insect-killed areas towards the desired conditions identified by the ID Team. Stand productivity would be below optimum following a natural successional pattern. Ingrowths of shade-tolerant species would continue to occur and reduce our ability to manage for seral, fire-adapted species. Restoration of white pine and western larch on moist cover types would not occur. Without the creation of openings or brush fields, forage areas for wildlife would not be created or enhanced by browse planting**.**

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Forest Health

The proposed alternatives would improve forest health to varying degrees depending on the acres treated; however, the effects to forest vegetation are generally the same. Table 3-11 provides a comparison of the acres of each proposed harvest treatment.

TABLE 3-11. HARVEST SUMMARY BY ALTERNATIVE

ALT	REGENERATION HARVEST				INTERMEDIATE HARVEST			TOTAL ACRES	% OF PROJECT ACREA
	SW	ST	CC	Total	SI	CT	Total		
A	0	0	0	0	0	0	0	0	0
B	26	606	0	632	1,989	76	2,065	2,697	6
C	26	368	60	454	1,788	40	1,828	2,282	5
D	26	231	60	317	1,789	40	1,829	2,146	5

ST= Seed Tree Seedcut with Reserves SI= Stand Improvement
CC= Clearcut with Reserves CT= Commercial Thin
SW= Shelterwood Seedcut

The proposed activities address the major issues identified with this project and execute the objectives of the purpose and need to varying degrees (see Table 3-12), depending on the number of acres treated and the silvicultural system applied.

TABLE 3- 12. SUMMARY VEGETATION OBJECTIVES AND MAJOR ISSUE INDICATORS BY ALTERNATIVE

OBJECTIVES*	ALT A	ALT B	ALT C	ALT D
Reduce stand density to promote fire-adapted species, improve tree health and vigor	0	2,065	1,828	1,829
Promote trend towards old forest character	0	228	270	270
Replacement of stands with high insect and disease levels and/or need to restore the western larch/western white pine cover type	0	632	454	317
Urban Interface Fuels Reduction	0	742	691	692
Winter Range Maintenance and Improvement	0	1,529	1,407	1,230
Maintenance Burning and Fuels Reduction in Designated Old Growth	0	303	303	228
Acres of Regeneration Harvest Proposed in Moist Habitat Types	0	534	348	211
Alternative improves the quality of designated replacement old growth (yes/no)?	NO	NO	NO	YES
Acres of habitat with potential for old growth management designation dropped from proposed treatment	0	0	0	123

Note: Treatment acres by objective do not equal total harvest acres as many units have multiple objectives.
Note: Slashing of small trees and ecosystem maintenance burning would be the only activities occurring in designated old growth.
Note: Acres of urban interface fuels reduction includes harvest, prescribed burning, and mechanical fuels treatment

Concerns for forest health and ecosystem sustainability are addressed by improving species and structural diversity in a variety of forest settings. Even-aged stands with a significant component of uniform, maturing lodgepole pine and increasing fuel loadings would be replaced as would stands with moderate to high levels of insects or disease. Following harvest, restoration planting would provide an opportunity to increase the amount and distribution of fire-adapted and species at risk (i.e. larch, white pine, ponderosa pine) due to absence of fire-created growing conditions and/or lack of seed source. These treatments would contribute to the overall goal of maintaining historic vegetative patterns through retention of most large, overstory trees, especially western larch, ponderosa pine, Douglas-fir, healthy western white pine, and western redcedar. These forest health concerns are also addressed through proposed treatment of Douglas-fir stands that are either currently impacted by bark beetles or are candidates for treatment to reduce their susceptibility. Proposed activities are not intended or expected to reduce beetle populations. Most Douglas-fir trees to be removed are dead and bark beetles will have emerged from these trees prior to logging activities.

Additionally, silvicultural treatments are expected to improve forest conditions that have resulted from the interruption of a natural fire cycle. Other areas will be managed to reduce stand density, improve tree growth, and promote a more open stand structure that is conducive to the potential, future use of prescribed fire. These stands are generally located in key wildlife winter range areas that historically have relied upon disturbance to maintain habitat functions and specific forest structure.

Harvest of trees would create economic opportunities and meet some of the social needs for wood fiber and employment (see Chapter 3, Economics).

Effects on Forest Succession

Implementation of the proposed clear-cut, seedtree or shelterwood regeneration harvests would further initiate change in forest conditions by converting treatment areas from either a single storied, even aged condition or a multi-storied unevenaged mature developmental stage to a fairly uniform seedling stage with reserve overstory. As displayed in Table 3-12, most regeneration harvest occurs on moist habitat types in stands that have declining health conditions, generally poor growth, loss of seral species, undesirable forest structural trends and demonstrate a need for restoration. This emphasis varies from 67% in Alternative D, 77% in Alternative C, to 84% in Alternative B. These sites have high productivity due to favorable aspect, generally deeper soils with an ash cap, and adequate precipitation. Also, reforestation potential is very high and suitability for this type of treatment is excellent. Created openings would be reforested through a mix of conifer planting and natural regeneration. Following any proposed underburning, browse is expected to be rejuvenated and is expected to expand in coverage and nutritional value.

While natural seeding of conifers is expected to occur in regenerated areas, the timing, distribution and species are not assured. Therefore, the year following harvest and/or fuels treatment, western larch and ponderosa pine would be planted on the moderately warm, dry habitat types where prescribed. Western larch, Engelmann spruce, and white pine would be planted on the moderately cool and moist habitat types. Post-harvest monitoring exams would provide feedback on whether or not planned reforestation efforts are needed to the extent prescribed.

In addition to the planted conifers, it is expected that at least 10 percent of the moderately cool and moist sites will naturally restock with western hemlock and western redcedar. Incidental white pine and western larch will likely seed in skid

trails and created openings, if scarification and sunlight is adequate. Warm, dry sites are expected to fill in with up to 5 percent Douglas-fir, larch, and lodgepole pine.

In regenerated areas, those plants associated with the early successional stages would be reestablished. Populations of plants favoring sunlight are poorly represented. These plant communities would become reestablished in response to daylighting, decreased competition, and seedbed preparation. Anticipated understory species on the warm, moist sites include Sitka alder, redstem ceanothus, shinyleaf ceanothus, sticky currant, fireweed, bracken fern, aspen, serviceberry, thimbleberry, bunchberry dogwood, rocky mountain maple and Scouler willow. The coniferous trees described above are expected to become established within 5 years of harvest completion, with crown closure anticipated by year 20. From a wildlife standpoint, functional hiding cover occurs anywhere from 5 to 15 years following harvest and establishment of vegetation.

Anticipated understory species on the cool moist sites include Sitka alder, rusty menziesia, huckleberries, sticky currant, fireweed, bracken fern, aspen, rocky mountain maple and Scouler willow. The coniferous trees described above would become established within five years of harvest completion, with crown closure anticipated by year 25. The warm and drier sites will have less canopy cover removed and will modify the present understory composition to a much lesser extent. Nonetheless, vegetation expected to regenerate within created openings include ninebark, oceanspray, mountain maple, snowberry, serviceberry, spirea, kinnickinnick, Oregon grape, pinegrass, and elk sedge.

Where stand improvement harvest is proposed, plant species associated with early successional stages are not expected to become as widely established as with regeneration harvest. With these types of harvests, crown removal is considerably less and growing space for new establishment of vegetation is less suitable. It is expected that following treatment the existing understory vegetation will continue to dominate these sites and will likely benefit from any associated underburning that is planned. Mechanical fuels treatment (ie: excavator piling) could have some short term effects on plant re-establishment but no adverse effects in the long run. In some cases, underburning may stress some trees, making them more susceptible to insect and disease.

Units planned for non-commercial thinning would increase sunlight to the forest floor and stimulate growth of existing vegetation. Since no mechanized ground-based equipment is utilized, there is no soil scarification and establishment of new vegetation is not anticipated.

In all action alternatives, some level of maintenance burning is proposed as a means to restore and maintain ecosystem processes. Stands that are currently dominated by shrubs, grasses and/or forbs with a few scattered large trees would be maintained in this structural stage by killing invading trees in the smaller size classes and rejuvenating new growth that is beneficial as browse to wildlife. Other stands planned for underburning have a denser forest canopy but are still open enough to provide for the growth of shrubs, grasses and forbs. Underburning would maintain these more open forested conditions by killing invading shade tolerant species, to the benefit of the remaining fire-tolerant species. An additional benefit may be to provide a seed bed for regeneration and establishment of some early seral tree species. Non-forested shrub/grasslands and open-canopy ponderosa pine/Douglas-fir stands are important elements in the ecosystem that are currently below the reference levels. Some areas (i.e. designated old growth stands on Hensley Hill) would have saplings cut beneath the large diameter overstory. This is designed to reduce ladder fuels and promote the maintenance of this older age class of trees. The felled saplings will be limbed, lopped and scattered to reduce fuel

concentrations and depth while increasing the rate at which this material decomposes on the site. This treatment will also have the long-term benefit of increasing the likelihood that overstory trees can sustain the effects of an underburn when that occurs and would promote the resprouting of browse species for wildlife benefit.

Effects on Reserve Trees and Special Habitat

All silvicultural prescriptions for harvest emphasize the retention and development of trees to function as big game hiding cover, seed reservoirs, relic overstory and future snag recruitment. The specific number and distribution of trees will vary with the existing stand composition, logging systems prescribed, safety considerations, and site-specific resource objectives. In addition to providing long-term vertical diversity, these efforts would particularly benefit snag-dependent wildlife species and associated interior habitat dwellers that require security in the form of cover.

Residual trees within harvest units will be susceptible to damage from normal logging operations. The extent of this damage is dependent upon the number and distribution of the reserve trees, topography, species selection, and logging system. For example, cable logging on steep slopes in a stand of subalpine fir and spruce is likely to incur more scarring and introduction of diseases than tractor logging on moderate slopes in a mixed conifer stand comprised of mostly Douglas-fir and western larch. Where helicopter logging is planned a reduction in the stand-level distribution of snags may occur in the short-term due to safety considerations.

Some reserve trees are expected to die or blow down and provide additional snag and down woody debris habitat. While this does occur naturally, management activities can increase this risk within treatment areas and adjacent to them. Openings created through harvest of trees can affect windthrow: however, the location and timing cannot be predicted. The windthrow hazard on the predominant landtypes within proposed treatment areas is low to moderate.

All harvest units would retain downed woody material, at recommended levels (Graham, 1994), in order to provide habitat for small mammals, invertebrates, and to enhance soil productivity. The volume and distribution of material will be specified in the silvicultural prescription and incorporated into the timber sale contract (see also Table 2-2 in Chapter 2).

The effect on the stands not selected for treatment in the action alternatives would be the same as in Alternative A.

Effects of Grizzly Bear Core Road Closures on Forest Vegetation and Management

Any roads proposed for closure following all post treatment activities would eventually provide forest cover, although they would likely go through a prolonged period of grass, forbs and/or shrub dominance. Closure of some roads would restrict access to some areas, making fire suppression and stand-tending operations such as non-commercial thinning more difficult.

Cumulative Effects

Implementation of regeneration harvest activities would affect the distribution and composition of successional stages (i.e. age classes) of vegetation in the analysis area to varying degrees depending on acres treated. This action would contribute cumulatively to a combined total of approximately 11,401 acres of previous

regeneration harvest units. (See Regeneration Harvest History by Decade, Table 3-10). Most of these earlier harvests have been satisfactorily stocked with trees. No other large timber sale is planned at this time. In the near future, it is foreseeable that blowdown, 150" sales, and other small sales may occur as well as non-commercial and commercial thinning within some of the proposed harvest units. The thinning treatments are intended to reduce tree stocking and competition, maintain vigor, and improve species diversity. The Yaak Community Center project is planned with the intent of providing defensible space to the facility. These foreseeable actions are consistent with the objectives of the proposed action and help to maintain the trajectory of these forest conditions towards a desirable condition.

Forest Plan Consistency

All proposed treatments in all action alternatives are consistent with the Forest Plan standards (USDA, 1987) for timber management and meet or exceed the standards and guidelines for vegetative management. Forest Plan direction provides that timber management activities will be the primary process used to minimize the hazards of insects and diseases and will be accomplished by maintaining stand vigor and diversity of plant communities and tree species.

All action alternatives were designed to meet all Forest Plan standards.

Treatment areas were designed to be spread out less intensively over a larger portion of the landscape. The end result would be less edge and patchwork units created with greater connectivity between forested areas. While there is no specific Forest Plan standard for maintaining forest connectivity, the NFMA does direct the Forest Service to maintain or improve biological diversity. Forest connectivity provides habitat and dispersal opportunities for plant and animal species across the landscape.

Consistency With The National Forest Management Act

The National Forest Management Act and the implementing regulations require specific findings to be made when implementing the Forest Plan. Those findings include the following:

a. Suitability for timber production. Harvest units proposed on suitable lands have been reviewed by a certified silviculturist and determined that they are located on suitable lands and are capable of being regenerated within five years of timber harvest.

b. Clearcutting and even-aged management. The Kootenai Forest Plan direction favors use of even-aged silvicultural systems with the Management Areas proposed for harvest in this assessment. The ID Team and the silviculturist have determined that prescribing even-aged systems on specified units is appropriate. The decision path for this rationale is displayed in the project file. Many of the target stands would be two-storied, yet would be considered even-aged. In order to meet the purpose and need for the project, some proposed units are prescribed as a clearcut with reserves regeneration harvest. The rationale for choosing this method as the optimum regeneration method is provided in a site-specific diagnosis located in the project file. Further information on proposed silvicultural treatments is described in Chapter 2 and Appendix A.

c. Vegetative Manipulation. The National Forest Management Act provides that timber harvest and other silvicultural practices shall be used to prevent damaging population increases of forest pest organisms and treatments shall not make stands

susceptible to pest-caused damage levels inconsistent with management objectives. Harvest of trees provides social and economic benefit, reduces potential losses attributed to insects and diseases, and manipulates forest vegetation to enhance wildlife habitat and/or meet associate objectives. The silvicultural prescription which directs the vegetative management process is designed to meet Forest Plan goals, objectives, and guidelines for forest productivity and wildlife habitat improvement while achieving ecosystem-based management.

Improvement harvest and commercial thinning are proposed for some stands in order to improve tree vigor of the desired leave trees and to maintain or enhance the plant diversity. NFMA provides for these treatments where they increase the growth rate of residual trees, favor commercially valuable species, favor species valuable to wildlife, or achieve some other multiple use objective.

***d. Regeneration Potential*.** The National Forest Management Act specifies, "timber would be harvested from National Forest system lands only where there is assurance that such lands can be adequately stocked within five years after final harvest" (16 USC 1604). Determination of adequate stocking is based on reforestation surveys conducted within a five-year period following harvest or site preparation. Results of these stocking surveys are compared with the desired and minimum levels identified in a site-specific silvicultural prescription written for each treatment area. Restocking is considered satisfactory when the harvest area contains the minimum number, distribution, and species composition of vegetation specified in the prescription.

Proposed treatment areas may include the use of regeneration harvests in order to rehabilitate affected areas and move them towards the desired future conditions. These harvest openings would be planted or seeded naturally to create a diverse community of plants and trees. The survey records on the Three Rivers Ranger District have been analyzed for each vegetative group where treatment is planned. Table 3-13 demonstrates assurance that these sites can be adequately restocked within the required timeframe.

TABLE 3-13. REGENERATION SUCCESS BY VRU

VRU	DISTRICT PLANTATIONS STOCKED WITHIN FIVE YEARS (%)		ACRES OF REGENERATION HARVEST			
	NATURAL	PLANTED	ALT A	ALT B	ALT C	ALT D
2	78	92	0	63	79	79
5	87	93	0	569	375	238
7	88	93	0	0	0	0
9	86	96	0	0	0	0

URBAN INTERFACE FUELS

Introduction

This section addresses the purpose and need of this project to reduce fuels in the urban interface. For more information on fire ecology and changes resulting from fire processes in the project area, please see Chapter 3, Forest Vegetation.

Three areas of concern listed in the purpose and need to reduce fuels in the urban interface are: 1) protection of private lands, 2) firefighter and public safety, and 3) reducing excessive fuels buildup.

Analysis Area

For this analysis the urban interface includes National Forest lands adjacent to private property and the Yaak Highway (see Vicinity Map, M-1). All areas proposed for treatment are in management areas where Kootenai National Forest policy is to suppress wildfires. Options on how to manage wildfires, such as whether to confine, contain, and/or control the wildfire, are limited to topography, weather, fuels, values at risk, and safety considerations, as well as policy and land management planning constraints.

Analysis Methods

Walk-through surveys and fuels transects were used to determine the amount of ground fuels present on each site and to assess the presence of ladder fuels and other factors which could result in “extreme” fire behavior.

Affected Environment

The Garver project area includes areas considered in the National Fire Plan wildland/urban interface as “Intermix Communities.” For the purpose of this analysis, this area will be referred to as the “wildland/urban interface.” The intermix community exists where structures are scattered throughout a wildlland area. There is no clear line of demarcation. Wildland fuels are continuous outside of and within the developed area. In the Garver project area these intermix areas include private homes, summer residences, the Yaak Community Center, the town of Yaak, power lines, timber production areas, proposed subdivisions, outbuildings and other structures. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites.

When wildland fire enters these areas the suppression efforts require a large commitment of firefighting resources. Experienced fire managers know that the intermix area is one of the most dangerous environments in which to conduct fire suppression operations. Poor ingress and egress compromise firefighters’ escape routes. Hazardous materials and other manmade materials produce toxic gases when burned and pose threats to firefighters and the public. The high values at risk (homes, vehicles, domestic animals, etc) can lead even the most seasoned wildland firefighters to take risks that he or she would not consider in the wildland environment.

Recent research (Cohen 2000a) addresses home ignitibility, or the potential for a home to ignite, in the wildland/urban interface. Cohen concludes that homes ignite via one of two processes, direct flame contact with the structure and lofted firebrands landing on a receptive fuel (house). The Structure Ignition Assessment Model (SIAM) developed by Cohen (Cohen 1995) and results from the International

Crown Fire Modeling Experiment (Alexander et al 1998) generally concur that a flaming front at a distance of 40 meters or more from a structure does not deliver sufficient heat energy to ignite the exterior of a home. However, lofted firebrands are also a principle wildland/urban interface ignition factor, and in the 2000 Cerro Grande Fire in New Mexico, surface fires ignited homes while leaving green needles on trees around the home (Cohen 2000b). Highly ignitable homes can ignite during wildland fire without fire spreading near the structure. This occurs when firebrands are lofted downwind from fires. The firebrands subsequently collect on and ignite flammable home materials (such as roofs) and adjacent flammables (such as woodpiles, decking, or landscaped vegetation). Firebrands that result in ignitions can originate from wildland fires that are a distance of 1 kilometer or more (Cohen 2000a). Cohen concludes, “Because homeowners typically assert their authority for the home and it’s immediate surroundings, the responsibility for effectively reducing home ignitability can only reside with the property owner rather than wildland agencies.”

The above-cited research exclusively addresses home ignitibility. Not addressed in the research are some of the other issues and problems faced by resource managers, fire professionals and residents when considering fire in the wildland/urban interface. When fire enters the wildland/urban interface there remains the potential for loss of life, property and other values even if homes have been made fire safe. Not addressed above is the uncertainty regarding the number of property owners who would take the responsibility to reduce the ignitibility of their homes and maintain that condition over the ensuing decades. Also not included is the potential loss of vehicles, other structures, domestic animals, and infrastructure (roads, utility lines, water supply, etc). So in this sense, simply reducing home ignitability ignores the cost to private and public entities when these values are damaged or destroyed in a wildland fire event. When fire enters areas adjacent to private land, there is high probability that firefighting resources will be deployed and members of the public may be exposed to the above-mentioned hazards even if all homes have been made fire safe. Many homeowners would likely find it undesirable to live in an intensely or severely burned over forest even if their home has survived the passage of fire. Not only are aesthetic values decreased for most people, but the risk of flooding and landslides can put homes and lives at risk during subsequent precipitation events.

Because of the problems and complexities associated with the intermix community, resource mangers and fire managers find it desirable to exclude, to the extent possible, wildland fire from these areas, and prefer to use prescribed fire to manage fuels; however, sociopolitical constraints may preclude or limit its implementation. Limitations include public attitudes toward smoke, fear of escaped fire, and potential negative visual effects of burns. The purpose of fuel treatments is to provide for firefighter safety and minimize future loss of property and natural resources. Hazardous fuel situations (woody fuels less than 3” diameter and fine fuels) can be proactively managed before wildland fires occur, and such practices can effectively decrease fire spread, resistance to control, and resource impacts.

Fire Behavior

Fire behavior is the manner in which a fire reacts to available fuels, weather, and topography (these three elements make up what is called the fire behavior triangle). A change in any of these components results in a change in fire behavior (DeBano 1998). Fire behavior is most often characterized by flame length, rate of spread, and fireline intensity (Rothermel 1983). Rate of spread is readily observed in the field, and intensity is estimated by observed flame length. These two observations can be assessed by firefighters to determine whether conditions are conducive to spotting and crowning—fire behavior that determines firefighter strategies and

tactics during fire suppression operations (Rothermel 1983). Favorable conditions for crown fires include heavy accumulations of dead and downed litter, conifer reproduction and other ladder fuels, and continuous conifer tree forest (Rothermel 1991). Experience has shown that firefighters can more safely fight a fire if it stays small (low rate of spread: largely determined by small fuels), has lower intensities (determined by fuel structure and accumulation), has relatively little spotting potential (determined by potential firebrand source, how far they travel, and probability of ignition upon landing), and low resistance to control (suppression force required to control a unit of fire perimeter; determined by amount of dead and down fuels). Fire behavior is complex with many contributing factors, all of which fall into the categories of topography (slope, aspect, elevation), weather (climate, air temperature, wind, relative humidity, forecasts) and fuels (size, type, moisture content, total loading) (Agee 1993). These three elements comprise the fire environment, the surrounding conditions, influences, and modifying forces that determine fire behavior (NWCG, 1996).

Weather influences large fire events. Long-term drought conditions can dry out large diameter trees, which can then take a long time period to regain moisture. Short-term events, such as a rainstorm, can influence fire events by retarding large fire growth. Extreme fire years are mostly controlled by long-term climate, while extreme fire events can be influenced through both long-term climate and short-term weather. Like weather, land managers have very little control over topography, and are only able to choose where to fight a fire once it begins.

Land managers have the ability to modify fuels, which has a direct result on fire behavior. In a national survey, nearly 80% of all wildland firefighters identified fuel reduction as the single-most important factor for improving their margin of safety on wildland fires (Tri-Data 1996). Firefighters and land managers have the most control over wildland fires by managing fuels. Therefore, fuel reduction can play an important part in increasing firefighter and public safety by modifying fire behavior in the fire environment through a reduction in fire intensity and severity (Pollet and Omi 1999).

Fuels management modifies fire behavior, ameliorates fire effects and reduces fire suppression costs and danger (DeBano 1998). Fuel management includes reducing the loading of available fuels, converting fuels to those with a lower flammability or isolating or breaking up large continuous bodies of fuels (DeBano 1998). A reduction in surface fuels can limit fireline intensity (Brown and Davis 1979) and can help to lower fire severity (Ryan and Noste 1985).

Treatments that reduce fuel loads have been shown to decrease fire behavior (Buckley 1992). Van Wagtendonk (1996) found in fire simulations that a reduction in fuel loads decreased subsequent fire behavior, increased fireline control possibilities and decreased fire suppression costs. Efficient fireline construction rates are also enhanced where fuel reduction has occurred, which decreases resistance to control (Agee et al 2000). Increased fireline control leads to enhanced firefighter safety.

Fuel characteristics affecting fire behavior are vegetative density, species composition, amount of surface fuel, arrangement of fuels and moisture content (Rothermel 1983). Fuels contribute to the rate of spread of a fire, the intensity/flame length of the fire, how long a fire is held over in an area, and the size of the burned area (Rothermel 1983, Agee, et al 2000).

Fuel Categories and Fire Control

There are three categories of fuels that affect fire behavior; 1) fine fuels such as grass or forbs, 2) small woody fuels less than three inches in diameter and 3) large

woody fuels greater than three inches in diameter. Fine fuels are the major contributors to fire spread, carrying the ignition and flaming front of a fire (Rothermel 1983). Without these fine fuels, many fires will not get large. However, eliminating fine fuels (litter, duff, grasses) is neither possible nor desirable. Small woody fuels influence a fire's rate of spread and fire intensity, and small woody fuels lose their moisture faster, start easier and burn more readily (Agee 1993). Under a frequent fire regime it is possible to maintain fine fuels at lower levels and various patch sizes than under a less frequent fire regime, but fine fuels will always exist. Aside from eliminating the fine fuels that contribute to fire spread, only the total amount and arrangement can be modified to benefit fire control efforts. From a firefighter's perspective, it is better to construct fireline through 2" of this small material to reach mineral soil (therefore stopping fire spread) than to dig through 10" of fine fuels because the fireline construction will progress faster and the fire could potentially be contained at a smaller size.

Large woody fuels (greater than 3" diameter) do not contribute greatly to fire spread, though they do remain burning after the fire front has passed and contribute to fire severity. Large woody fuels also contribute to the development of large fires and high fire severity (Brown et al 2001). As they burn, live needles and twigs of pole-sized trees and overstory branches may ignite and "torch," throwing embers to the wind, and possibly igniting other nearby tree crowns.

Heavy concentrations of fuels and state of decay contribute to fire persistence (the ability for a fire to remain burning on a site, even if current conditions are not conducive to fire spread), burnout time (the amount of time necessary to consume a piece of fuel of a certain diameter), and resistance to control (resistance to fireline construction efforts) (Brown et al 2001, Anderson 1969, and NWCG 1996). For example, "High" resistance to control means "slow work for dozers, very difficult for hand crews; hand line holding will be difficult." Fire hazard and resistance to control reach high ratings when large woody fuels exceed 25 to 30 tons per acre in combination with small woody fuels of 5 tons per acre or more (Brown et al 2001). Line construction rates for initial attack hand crews are lower in the fuel models with larger diameter fuels than in the other fuel models. Increased fire persistence, resistance to control, and burnout time negatively influence firefighter safety by hampering suppression actions and increasing firefighter exposure to environmental hazards. Reducing the amount of large, dead and down woody debris will also increase the future potential for using and controlling prescribed fire to help keep the fine fuel load at a relatively low level.

When high fuel accumulations occur across the landscape in large, contiguous areas, it is problematic for suppression forces because there is no relatively "easy" place to build line—the large fuels must be removed before digging to mineral soil and stopping the spread of fire. This means locating control lines out in front of the fire so that there is enough time to build the line before the fire gets there (changing from direct to parallel or indirect line construction strategies). Steep terrain on the Forest frequently limits use of mechanical equipment in line construction; thereby increasing dependence on hand crews. Hand crews are usually effective in direct line construction adjacent to four-foot flame lengths and less (Rothermel 1983). Localized accumulations of fuel may be of less concern when weather conditions allow successful fireline construction around these areas. The same location, under more extreme weather conditions can throw embers across firelines and create spot fires ahead of the main fire, rendering suppression efforts ineffective and increasing firefighter exposure to fire elements.

Large, dead and down woody debris is a major component of Rocky Mountain forests. Beschta et al (1995) recognized the importance of this debris and the potential loss during salvage operations and the need for research on the amount of

large woody debris to leave. Graham et al (1994) conducted studies on coarse woody debris (woody residue larger than 3 inches in diameter) in the Rocky Mountains. They state that "Forested ecosystems evolved with a continual flux of coarse woody debris (CWD). The creation and accumulation of CWD depends on forest type, successional stage, insect and disease activity, weather events, fire-return intervals, decay rates, and timber management activities….During the last 100 years, the fire frequencies in all of the Rocky Mountain ecosystems have been greatly extended, potentially increasing CWD accumulations." They maintain that CWD performs many physical, chemical and biological functions in forest ecosystems and make conservative recommendations by habitat type to ensure that enough organic matter is available after timber harvest to maintain long-term productivity. (For more information on coarse woody debris for this project, see Chapter 2, Table 2-2, Chapter 3, Soils, and Chapter 3, Forest Vegetation.)

Lowering the Potential for Extreme Fire Behavior

"Extreme" fire behavior implies a level of fire behavior characteristics that ordinarily preclude methods of direct control. The contribution of small and large fuels to fire behavior is discussed above. One or more of the following fire behavior characteristics is usually involved: high rate of spread, crowning, spotting, presence of fire whirls, and strong convection column. Extreme fire behavior results in unpredictability because such fires often exercise some degree of influence on their environment and behave erratically, sometimes dangerously. Flame lengths greater than eight feet, fireline intensities approaching 500 btu/ft/s, fire blowups, fire flare-ups, and fire storms are often observed during times of extreme fire behavior. Under these conditions, fires are too intense for direct attack by hand crews, and handline and control at the head of the fire is ineffective (Rothermal 1983). Bulldozers, engines, and use of retardant may have limited effectiveness.

Long range spotting is also associated with extreme fire behavior and severely affects the ability of firefighters to confine a fire. Spotting occurs when burning embers are lofted in front of the main fire and land in receptive fuels to start new fires. Spotting is determined by three factors: (1) the source of the firebrands, (2) how far they travel, and (3) the probability of ignition on landing (Rothermel 1983). Short-range spotting is not very significant as such spots are often overrun by the main fire and contribute little to forward fire spread. Long-range spotting is caused by embers lofted in the fire's convection column and can be carried a mile or more in front of the main fire to start new fires that will burn independently of the main fire. Firebrands can be lofted by torching trees, a concentration of ground fuels burning with enough intensity to loft firebrands, or a fire whirl. Long range spotting is hard to predict except for the fact that it is associated with high fire intensities, torching, crowning, and fire whirls (Rothermel 1983). Tree torching is determined by weather, total fuel load, live fuel moistures (for those fuel models that include this as an input) and ladder fuels (Andrews and Chase 1989). Fires exhibiting long-range spotting pose some of the greatest threats to firefighter safety because they are extremely difficult to control.

Environmental Consequences

Proposed urban interface fuels reduction treatment units in the Garver project were designed to provide a defensible fuel arrangement where firefighters would be in less danger and fires could be more easily and safely suppressed. These treatments are not intended to fireproof the forest, as this is not possible nor desirable from an ecological standpoint. Rather, fuel reduction treatments are designed to maintain green, forested conditions, and increase the ability of the agency to use low-intensity prescribed fire in the future. Fuel treatments in and near

the intermix community also serve to protect National Forest lands from the risk of wildland fire spreading from private property.

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

With no action, the fuels condition in the area would continue to be unfavorable. As stands age and trees die, the branchwood and fallen tree boles would continue to accumulate, regeneration would continue to provide ladder fuels, and the potential for "extreme" fire behavior would increase. The increased fuel loading would make suppression actions more difficult than they are at present.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Harvest and Fuel Reduction Treatments

All of the proposed treatments in the urban interface area of the Garver project are intended to reduce fuel loadings and hence decrease fire behavior and resistance to control making suppression by hand crews a possibility. To achieve this, three basic treatment options are proposed: harvest with subsequent slash treatment, mechanical fuels treatment, and maintenance burning in old growth areas. The difference in effects among action alternatives is relative to the number of acres of fuels reduction within the urban interface as displayed in Table 3-14:

TABLE 3-14. URBAN INTERFACE FUELS TREATMENT

FUEL REDUCTION METHOD	ALT A	ALT B	ALT C	ALT D
Harvest followed by Slash Treatment	0	368	308	308
Mechanical Fuels Treatment	0	261	270	280
Maintenance Burning	0	113	113	104
TOTALS	0	742	691	692

Timber Harvest followed by Slash Treatment: Most of the harvest units in the urban interface are intermediate harvests in which the excess trees would be removed from the unit and subsequent activity fuels would be disposed of through yarding tops or excavator piling and burning. These treatments would result in the reduction of continuous ladder fuels, lower surface fuel loadings, and a more open canopy structure. These combinations of factors would result in a condition less prone to crown fire and hence provide an environment more conducive to firefighter and public safety.

Mechanical Fuels Treatments: The intent of the mechanical fuels treatment units is the same as the harvest units (remove excess trees, reduce surface fuel loadings and promote a more open canopy structure). These units would be excavator piled and burned or underburned to treat slash created by tree removal.

Maintenance Burning: Units proposed for maintenance burning are areas in which the existing ground fuel loadings are currently at acceptable levels for suppression by hand crews and the existing ladder fuels are not indicative of crown fire potential. The intent of the treatment in these areas is to maintain the current fuel condition, promote the old growth character of the areas, and mimic the frequent low intensity underburns that historically maintained these areas.

The overall effect of these treatments would be to provide areas with fuel loadings in which suppression actions by firefighter hand crews could be engaged in safely and more effectively than under the existing condition. The risk of crown fire is reduced (not eliminated as the transition from surface fire to crown fire is a complex process dependent on fuels, weather, and topography variables often outside human control). In this regard the treatment areas may act as a buffer if a crown fire does

burn in the project area. The more open canopy structure could slow the spread of a crown fire causing it to transition to a ground fire allowing fire fighters safe access for suppression actions. The arrangement of the proposed treatments in the southern one-third of the project area provides an almost continuous defensible zone from Pete Creek to milepost 32 on Yaak Hwy 92. (See alternative maps, M-4 – M-5.)

Increase in Grizzly Bear Core Habitat

Roads closed for core habitat in the project area will limit the ability of firefighters to drive to fires in some areas (While helicopter transport is a possibility at times, there is often not a suitable helispot in which to unload the firefighters). Limiting road access could increase response times and provide time for small fires to get larger before suppression forces can reach them. This could negatively affect firefighter and public safety while at the same time increasing suppression costs due to larger fire size.

Non-Commercial Thinning

Slash produced from the non-commercial thinning treatments produces a short-term fire risk due to the amount of fine fuels produced and left on site. The volumes of slash produced are generally light to moderate (5-15 tons/acre). Due to the shallow depth of the fuel bed and the light character of limbs and needles, snow loading and rain events compress the fuel easily. Within three to five years, the needles and small twigs (fine fuels) would be incorporated into the duff layer leaving little problem with volatility and risk of intense fire.

Cumulative Effects

In addition to the above-described direct and indirect effects, the following foreseeable activities would also affect fuel loadings in the Garver project area, and reduce fuels further:

- Yaak 92 road paving project. This project may generate right-of-way slash piles that will need to be burned.
- Yaak Community Fuels Reduction project. This project would reduce fuels and hazard trees in the area adjacent to the Yaak community center.
- Blowdown and other small timber sales. Blowdown and 150” timber sales may be implemented and would reduce fuels in small areas within the project area.
- Small fuels reduction projects. Some small fuels reduction projects may be implemented in the project area. These would further reduce fuels in the area.

Cumulatively, the fuel hazard would be further reduced in the wildland/urban interface areas for the action alternatives, the threat of wildfire on National Forest land moving onto private lands would be decreased, and there would also be a reduction in potential for extreme fire behavior. These benefits from fuels reduction would occur to the extent funding is received for treatment. Timber harvest fuels reduction would be required under the timber sale contract, so as long as these sales are sold, funding would be assured. As explained previously, the district would seek funding for the mechanical fuels treatment and maintenance burning, but it is not guaranteed.

Forest Plan Consistency

This project is consistent with Forest Plan standards and goals relating to prescribed fire.

OLD GROWTH

Introduction

This section addresses the purpose and need to improve conditions in old growth and Major Issue #2, regarding effects to old growth habitat from the Proposed Action.

On the Kootenai National Forest, old growth habitat is recognized for its unique ecological characteristics that serve as important habitat for both wildlife and some species of rare plants. The Forest Plan lists 58 species of wildlife that find optimum breeding and/or feeding habitat in old growth. Five of these (barred owl, great grey owl, pileated woodpecker, boreal redback vole, and brown creeper) have a strong preference, or possible dependence, on old growth.

Most researchers categorize old growth as mature and overmature stands, which provide habitat for many wildlife species. Forest Plan Appendix 17, pg. A17-2, classifies old growth as a "distinct successional stage" having specific characteristics. It defines the "classic" old growth stand as one which is physically imposing with tall, full-crowned trees; large standing dead material; fallen dead material; a dense canopy; and having moderated temperatures. Specific information about old growth characteristics and surveys used to determine old growth stands can be found in the project file.

The pileated woodpecker is an inhabitant of old growth habitat and a management indicator species (MIS) for old growth habitat on the Kootenai National Forest. According to Thomas (1979) and others, optimal pileated habitat can be defined as old growth. These stands provide both nesting and feeding habitat for the woodpecker in all seasons. Large diameter snags provide the pileated nesting habitat, while both snags and down woody material provide habitat for the woodpecker's primary prey species, the carpenter ant (Warren 1990). See also the Pileated Woodpecker analysis in the Chapter 3, Wildlife section.

Management activities (timber harvesting, road construction, mining etc.) have the potential to impact the effectiveness of existing old growth habitat or specific components of old growth. These specific components include interior habitat and vertical structure.

Criteria used to analyze the alternatives for this project by their impacts on old growth and the pileated woodpecker include:

- number of acres of vertical structure removed,
- acres of interior habitat made ineffective,
- acres of potential snag loss due to firewood cutting, and
- number of acres that would potentially be lost from wind events.

Acres of vertical structure removed would be that acreage directly cut down.

Acres of interior habitat made ineffective would be the length of the area where harvest occurs adjacent to old growth, or Management Area (MA) 13 and multiplying that by 150 feet and converting the result to acres. This would also be the method for calculating acres of potential snag loss.

Acreage lost from wind events was also calculated this way, although the canopy removal of the harvested stand influences whether an increase in wind effect will occur. Generally, partial harvesting does not result in as great a wind effect as regeneration harvesting does.

Analysis Area

The old growth resource for this project was analyzed at the subunit level during the Garver landscape assessment. The Garver landscape assessment found that the Northwest Yaak subunit meets Forest Plan standards for old growth management area allocations, and is within the historic range of variability for old growth stands as Losensky describes for this climatic region (Losensky 1994). This analysis for the Garver DEIS looks at the distribution of old growth at the timber compartment level. The analysis area for old growth includes Compartments 9 (Pete Creek), 17 (Hensley Hill), 18 (Slim Creek), 19 (Waper Ridge), 20 (Mt. Obermayer), 21 (Dusty Peak), and 22 (Lick Mountain). See Old Growth Analysis Area Map for these locations. The old growth analysis area includes all of the timber compartments where proposed treatment projects are planned (the project area), as well as the compartments where old growth has been designated to supplement old growth within the project area to meet Forest Plan standards.

Forest Plan Standards And Guidelines

The Forest Plan, Appendix 17, specifies that no less than 10 percent of National Forest System (NFS) lands below 5,500 feet elevation be allocated to MA-13**,** or other non-base management area with old growth designation (such as MA-21/OG or MA-2/OG) and managed to provide an old growth forest condition (see Management Areas map for locations of these MAs in the project area and their relation to the proposed harvest activities). For the analysis area, the minimum allocation (10%) to MA-13 is 6,233 acres. The analysis area contains 6,969 acres of MA 13 and other old growth MA allocations below 5,500 feet. (See Table 3-15 below for old growth acreages in this area). In regards to those compartments on the Kootenai National Forest that do not have enough old growth available to meet the Forest Plan standard of 10%, the Forest Service manual (2432.22--2) KNF supplement 85 states that all available old growth present shall be designated, and then if no other effective old growth is available, identify the best available soon-to-be future old growth to bring the total for the area to 10% (replacement old growth); OR designate additional old growth in an adjacent area to make up the difference. (See Table 3-15 below for allocations of surplus old growth and replacement old growth to meet Forest Plan standards)

Methodology

The old growth management area allocations have been defined within the analysis area utilizing the old growth validation methodology described in KNF supplement 85 (2432.--2). These allocations were initially determined, and later reviewed, during the the analysis conducted for previous projects within portions of the analysis area, including the Upper Yaak EIS in 1990, the West Yaak EA in 1997, the Wood Rat EA in 1998; as well as the additional analysis and validation conducted for this project. The methodology described in Forest Service manual (2432.22--2) KNF supplement 85 is as follows:

1. Define analysis boundaries.
2. Measure N.F. land below 5,500 feet elevation.
3. Field-examine designated MA-13 areas.
4. Field-examine undesignated old-growth in other MAs.
5. Tally total effective old-growth acreage, including the sample area projection.
6. Does 10% of the area below 5,500 feet elevation have well-distributed old-growth?
7. If YES, make any needed corrections to MA maps and ship to the S.O. Planning Department.

8. If the answer to Step #6 is NO: then designate any additional available old-growth below 5,500 feet elevation to bring the total up to 10%. Field-verify for effectiveness. Ship corrected MA map to S.O. Planning.
9. If additional available old-growth does not exist, identify soon-to-be future old-growth to bring the total to 10%. Utilize the non-developmental MAs as much as possible for this step. The option to this Step is to go to Step #10.
10. Designate additional available old-growth in an adjacent compartment to bring the total for both compartments to 10%. Ship the corrected MA maps to S.O. Planning for Steps #9 or #10.

TABLE 3-15 ALLOCATIONS OF OG IN ADJACENT COMPARTMENTS TO MEET FP STANDARDS

COMPARTMENT NAME (NUMBER)	FOREST PLAN MINIMUM ACRES	ACRES ALLOCATED TO OLD GROWTH MAS			SURPLUS OR DEFICIT OG NEEDED TO MEET 10% FOREST PLAN STANDARD	ACRES OF OLD GROWTH DONATED FROM ADJACENT COMPARTMENTS TO MEET FOREST PLAN STANDARDS
		Actual Old Growth	Replacement Old Growth	Total Allocated		
Pete Creek (9)	1,344	1,970	0	1,970	+626	0
Hensley Hill (17)	834	230	691	921	0	0
Slim Creek (18)	680	142	334	476	-204	204 (from comp 9)
Waper Ridge (19)	1,018	978	0	978	-40	40 (from comp 22)
Obermayer (20)	725	728	0	728	3	0
Dusty Peak (21)	782	568	108	676	-105	105 (from comp 22)
Lick Mountain (22)	850	1,220	0	1,220	+370	0
Totals	6,233	5,836	1,133	6,969	--	--

Affected Environment

Old growth stands in the analysis area are mainly composed of very old western larch, western redcedar, pondorosa pine, and other conifers. There are several areas of large contiguous old growth blocks in the analysis area, as well as some isolated and fragmented old growth stands.

Compartments 17, 18, 19, and 21 have a shortage of actual old growth. To offset this shortage additional old growth in adjacent compartments has been designated in old growth MAs, also additional replacement old growth has been set aside into old growth MAs (to provide for old growth in the future). Compartment 17 is lacking 691 acres of actual old growth to meet Forest Plan standards. No additional old growth is available in adjacent compartments, therefore, an additional 691 acres of replacement old growth has been set aside into old growth management areas to meet Forest Plan standards, to provide for old growth in the future within this compartment. Compartment 18 is lacking 538 acres of actual old growth, therefore, an additional 204 acres has been designated in an adjacent compartment (C-9), and 334 acres of replacement old growth has been set aside into old growth management areas to meet Forest Plan standards, and to provide for old growth in the future. Compartment 19 is lacking 40 acres of actual old growth to meet Forest Plan standards. Therefore, an additional 40 acres has been designated in an adjacent Compartment (C-22) to make up for this shortage. Compartment 21 is lacking 214 acres of actual old growth to meet Forest Plan standards. Therefore, an additional 105 acres has been designated in an adjacent Compartment (C-22) to make up for this shortage, and an additional 108 acres of replacement old growth has been set aside into old growth management areas to provide for old growth in the future. Table 3-15 shows the Forest Plan minimum and actual allocation to old growth MAs for the analysis area, and the total acreage of actual old growth and replacement stands, as well as the additional acres designated in Compartments 9 and 22 to meet Forest Plan standards.

Stands with the most old growth character and least fragmentation have been allocated to MA-13**,** or other old growth MAs. In other words, the best stands available have been allocated to old growth MAs. These allocations may be seen

on the Old Growth Analysis Area map, M-11. Also displayed on the map are undesignated old growth stands in compartments where there is a surplus of old growth above what is needed to meet Forest Plan standards (1,152 acres in Compartment 9 and 718 acres in Compartment 22).

Environmental Consequences

All of the alternatives meet Forest Plan standards regarding management of old growth. Specific effects to the old growth resource from each alternative are addressed below.

ALTERNATIVE A
Direct and Indirect Effects

This alternative would have no effect on designated old growth or associated plant and animal species. All old growth areas would maintain their existing conditions, and continue to provide habitat for those species which utilize this habitat over the long-term. Potential natural disturbance such as wildfire, insect or disease epidemics, or wind may reduce old growth characteristics, or completely remove an area of old growth under extreme conditions. If such events occur, other mature stands in the project area or adjacent compartments would be evaluated for their potential to replace those stands that were lost. This alternative would not treat any of the encroaching ladder fuels on warm, dry sites, allowing the fire hazard to increase. If the No Action alternative is selected, the sustainability of the dry site old growth stands that require frequent low intensity burns to reduce fuel loadings would be in jeopardy. Also, the opportunity to promote growth and development of mature forest structure in the immature stands proposed for treatment in the action alternatives would be lost.

ALTERNATIVES B AND C
Direct and Indirect Effects

Under Alternatives B and C no harvest of the existing MA-13 (or other old growth MA) stands in the project area would occur. Units 1, 4, 10, 24, 32, 34, 35, 50, 50a, 50b, 50c, 55, 57, and 60, are adjacent to MA-13 stands.

The harvest units adjacent to old growth stands could have effects to old growth by increasing light and wind at the edge of the stands. Of the proposed units adjacent to designated old growth, 4, 24, 34, 35, 50, 50a, 50b, 50c, 55, 57, and 60 are intermediate harvest units. These harvest treatments thin the overstory component in these stands, and leave high residual canopies. These units will maintain conditions that reflect the importance of these stands as transitional habitat adjacent to old growth. A high component of overstory trees will remain, and these units would have little or no effect to adjacent old growth.

In Alternative B, Units 1 and 10 are regeneration harvests, and may have effects to adjacent old growth. Remaining canopies for these units are low. There is a potential for the loss of approximately 4 acres of overstory due to wind, and 4 acres of interior habitat will be converted to edge.

Alternatives C and D differ from Alternative B in that Unit 10 is an intermediate harvest unit, and Unit 32 is a regeneration harvest that may have effects to adjacent old growth. Under Alternatives C, and D, there is a potential for the loss of approximately 6 acres of overstory due to wind, and 6 acres of interior habitat will be converted to edge.

No new roads or temporary roads would be constructed through old growth stands in any action alternative. Existing old growth habitat would not be fragmented. Some yearlong closures will be opened that would potentially result in firewood cutting in old growth stands. These roads are #276B, which would be used to access the harvest units in the Mud Creek drainage, and #5879D, which would be

used to access units near Rauch Point. These actions are consistent throughout the action alternatives. The potential effect of these road openings on old growth is that less than 1 acre of snags may be cut for firewood.

Harvest units 11, 12, and 17, contain stands that have been identified as habitat that could have potential for old growth management designation. The Forest Plan standard of 10% of old growth management area designation per compartment will still be met without designating these stands. Under Alternative B and C, Unit 12 is proposed for intermediate harvest, and is designed to leave the large old trees, and a multistoried canopy; and much of the old growth characteristics present in this stand will be maintained (although the stand structure will be simplified). Under Alternative B and C, Units 11, and 17, are proposed for regeneration harvest. Treatment in those stands will mimic the role wildfire naturally had on the landscape to regenerate western larch and western white pine. Much of the overstory will be removed in these units, and the old growth attributes will be lost. However, The old larch relics and approximately 8-10 large trees per acre will be retained.

Fuels treatment units K, L, O, and I are proposed as maintenance burn units for old growth maintenance. These maintenance burn projects are needed to maintain the natural condition of stands with old growth habitat that historically experienced frequent low intensity wildfire events. Low intensity wildfire events reduced the fuel loadings, eliminated the buildup of ladder fuels, and created scattered large snags for wildlife. Because these stands experienced frequent fires, the wildfires historically occurred in these stands without damaging the large western larch, and pondorosa pine overstory. Because portions of these stands have experienced fuel and ladder fuels accumulations in the absence of natural wildfires, some hand work (i.e. slashing, and hand pile burning) will be required to prepare portions of these units for maintenance burning. All pre-burn work will be accomplished by hand, without the use of heavy equipment. Portions of burn unit O contain mixed conifer species that may experience detrimental effects. To avoid killing overstory trees during underburning and causing the forest canopy to be more open than would be desirable for old growth, microsites where this would occur will be excluded from the actual burn units during the layout and burn prep portion of this project. These fuels treatment projects would improve the quality of the old growth stands within the analysis area. These alternatives propose burning in 303 acres of old growth management areas.

ALTERNATIVE D
Direct and Indirect Effects

Alternative D was developed to propose a redelineation of MA-13 to provide better quality habitat for replacement old growth designation, and to remove poor quality replacement old growth from MA-13 designation in Compartment 17 (Hensley Hill). This alternative also drops harvest on 123 acres in stands that have been identified as habitat that could have potential for old growth management designation. They would be available in the event of any losses from natural events (such as stand replacing wildfires) if they were to occur in the present old growth allocations.

This alternative differs from Alternative C by dropping Unit 54 from harvest, and designating that 83-acre area as replacement old growth. It also proposes to delineate an additional 34-acre area on Hensley face, and 38 acres near Lap Creek into MA–13. These management area changes would result in the designation of an older, more diverse stand structure into MA–13 than is presently represented; as well as the designation of areas that will be less accessible to firewood gathering. This will result in less potential impacts to the snag component, which is critical for wildlife species that utilize old growth stands.

This alternative also includes a redelineation that excludes the poor quality replacement old growth presently designated into MA-13 in the Hensley Hill area.

Harvest units 50, 50a, 50b, 50c, and 60 are proposed in these areas of poor quality replacement old growth dropped from MA- 13 designation.

The acres of old growth maintenance burning has been adjusted to match the MA-13 designations proposed for Alternative D. Therefore, this alternative proposes burning in 228 acres of old growth management areas, 75 fewer acres than the other Action Alternatives.

The management area changes proposed in Alternative D will result in the removal of 120 acres of poor quality replacement old growth, and the addition of 155 acres of superior quality replacement old growth into old growth management area designation. This will also result in the increase of 35 acres of MA-13 designation within Compartment 17.

Alternative D proposes to drop harvest in 122 acres of stands with potential for old growth designation in Compartment 22 (Lick Mountain). This will drop Units 11, 12, and part of Unit 17, which are proposed for harvest in both Alternatives B and C. These stands are not needed for designation into old growth management areas in Compartment 22, since that compartment already meets Forest Plan standards for old growth. However, dropping harvest in these stands would supplement old forest structure within the analysis area as a whole, which is prudent since there is a shortage of effective old growth elsewhere in the analysis area (compartments where designation of replacement old growth was necessary to meet the Forest Plan standards). Also these stands will provide additional options for old growth designation if old growth stands are ever lost within the analysis area from natural disturbances (such as stand replacing wildfires, insect or disease epidemics, and severe wind events). Regeneration harvest is proposed for the remaining 19 acres in Unit 17. This treatment would create openings for wildlife forage and initiate regeneration of western larch and western white pine. The old relic western larch overstory would remain in the unit, as well as functional snags, snag replacement trees, and down logs. However, this 19-acre area would no longer function as old growth habitat.

TABLE 3-16. MA 13, MA 2-OG, MA 21-OG---COMPARISON OF ALTERNATIVES

Units of Measure	Alt A	Alt B	Alt C	Alt D
Acres of vertical structure removed	0	0	0	0
Acres of interior habitat made ineffective	0	4	6	6
Acres of potential snag loss due to firewood cutting	0	0.8	0.8	0.8
Acres potentially lost from wind events	0	4	6	6
Acres allocated to MA- 13 designation in Compartment 17	922	922	922	957
Acres of habitat with potential for old growth management designation dropped from proposed treatment	N/A	0	0	122
Acres of fuels reduction and underburning in designated old growth	0	303	303	228

CUMULATIVE EFFECTS COMMON TO ALL ALTERNATIVES

Basic road maintenance, noxious weed spraying, blowdown harvest projects, firewood cutting, and various recreational uses are additional activities, which would likely occur adjacent to old growth in the project area. These activities are generally not considered to have adverse impacts on old growth or associated species, and combined with the activities proposed by this project will not significantly increase impacts to old growth. These activities may incidentally affect wildlife use within some areas of old growth on a temporary basis, but are not likely to affect the viability of any associated species. Adherence to Forest Plan standards relative to old growth and snag habitat assist in the avoidance of cumulative effects on old growth and associated species.

FOREST PLAN CONSISTENCY AND OTHER MANAGEMENT DIRECTION

All alternatives for this project meet Forest Plan standards for old growth. Each alternative maintains at least 10 percent of Forest Service managed acres below 5,500 feet elevation in an old growth or replacement old growth condition.

WILDLIFE HABITAT

This section addresses the purpose and need to improve and maintain winter range conditions and to improve quality and quantity of grizzly bear and old growth habitat, as well as displaying effects of the proposals to wildlife habitat.

The Kootenai National Forest provides habitat for approximately 280 different species of wildlife (Forest Plan - Appendix 12, page A12-1), many of which occur on the Three Rivers Ranger District and within the project area. The presence or absence of these various wildlife species depends on the amount, distribution and quality of each animal's preferred habitat. In addition to habitat, many of these animals are affected by hunting or trapping; Montana Department of Fish, Wildlife and Parks (MDFWP) regulates these game animal populations. The Forest Service and the MFWP work together to insure that an ecologically appropriate balance is maintained between habitat capability and actual population numbers of socially desired species. The Forest Service also works closely with the U.S. Fish & Wildlife Service (USFWS) to aid in the recovery and maintenance of viable populations of animals listed under the Endangered Species Act (ESA). Proposed federal projects which have potential for affecting wildlife regulated by the ESA, require consultation with the USFWS.

The data used in this section is derived from the following:

Timber Stand Management Resource System
Road layers from Kootenai National Forest GIS reference library
Lynx Conservation Assessment Strategy mapping and model
Sensitive Species models based on Landsat satellite imagery

These wildlife species have been selected for detailed analysis and are presented in this section as follows:

1. Big Game:
Rocky Mountain Elk* and White-tailed Deer*
A. Cover:Forage Ratios
B. Open Road Densities and Habitat Effectiveness
C. Elk Security

2. Threatened or Endangered Wildlife Species:
A. Grizzly Bear (Threatened)*
B. Gray Wolf (Endangered)*
C. Canada Lynx (Threatened)
D. Bald Eagle (Threatened)

3. Sensitive Wildlife Species:
A. Fisher
B. Wolverine
C. Black-backed Woodpecker
D. Northern Goshawk
E. Boreal Toad
F. Coeur d'Alene Salamander
G. Harlequin Duck
H. Flammulated Owl

4. Cavity Habitat:
Pileated woodpecker*

5. Biological Corridors, Interior Forest Habitat And Fragmentation

6. Migratory Birds

*=Management Indicator Species (MIS). Management Indicator Species (MIS) are designated within the Forest Plan and are specific animals used to symbolize particular habitats or habitat complexes. Each MIS represents a group of species that share common habitat components required for sustained growth and successful reproduction. Managing the landscape to benefit a specific MIS population would have corresponding favorable effects on many other wildlife species, which they represent.

The mountain goat, Townsend's big-eared bat, northern leopard frog, northern bog lemming, Columbian sharp-tailed grouse and woodland caribou, which would not be affected by any of the alternatives due to the fact that their habitat is not available within the project area, were reviewed but are not discussed in detail in this document (see Table 3-26).

The bounds of analysis for most species in this section is the project area. However, the grizzly bear, big game summer range ORD, gray wolf, and wolverine were analyzed at the Bear Management Unit (BMU) scale. The lynx is analyzed by Lynx Analysis Unit (LAU).

TABLE 3-17. BMU 15 ACRES

BAA	SIT 1 SQ MILES BY BAA
4-15-1	10.86
4-15-2	10.64
4-15-3	15.11
4-15-4	11.15
4-15-5	12.47
4-15-6	12.01
4-15-7	7.47
(Situation 3 Land-BMU wide)	12.53
Total BMU 15	92.25 Sq. Mi.

See map M-15 for specific BAA locations.

TABLE 3-18. LAU ACRES

LAU	ACRES
Hawkins	58,695

BIG GAME

Three ungulates are designated by the Forest Plan as MIS. These are elk, white-tailed deer and mountain goat. Mountain goats inhabit alpine ecosystems, which are not present within the project area. Since mountain goat habitat is not found within the project area, they are dropped from further discussion.

Elk and white-tailed deer are representative of general forest habitat and are analyzed in the following section. Generally, conditions favorable to these species will also benefit other big game species found within the project area such as mule deer, moose, black bear and mountain lion. Large predators such as grizzly bear and gray wolf also benefit from healthy ungulate populations.

The Forest Plan recognizes the importance of summer and winter range, as well as the effects that timber harvest and associated activities have on big game habitat.

The Garver project area will be used to analyze big game parameters and address potential effects of the proposed actions across the landscape. In addition to summer and winter range, the indicators for big game species that will be addressed include Cover:Forage ratios, forest opening sizes, habitat effectiveness, open road density, and elk security (vulnerability).

The cumulative effects of past and present management activities, as well as random natural events, have been incorporated into the description of affected environment in the analysis area.

TABLE 3-19. COMPARISON OF ALTERNATIVES ON BIG GAME HABITAT COMPONENTS

COMPONENT	ALTERNATIVE A (Existing)	ALTERNATIVE B	ALTERNATIVE C	ALTERNATIVE D
Summer Range Cover:Forage	70:30	67:33	68:32	68:32
Winter Range Cover:Forage	88:12	86:14	86:14	87:13
Habitat Security	58%	65%	65%	65%
ORDs in BMU 15	.44	.45	.45	.45

Elk And White-Tailed Deer

Although preferred habitat characteristics of elk and white-tailed deer may vary somewhat, their basic habitat needs of cover, forage, and security are similar and may be altered by human management activities in similar ways. Both animals are considered big game in Montana and their populations are actively managed by MDFWP.

In northwest Montana, ungulate habitat consists of a mixture of forested communities providing cover, foraging habitat and water within reasonable proximity. Tree harvesting and fire typically remove or alter ungulate cover and create foraging areas by converting older forest stands to earlier successional stages - often with associated increases in edge and diversity. As these foraging areas become reforested, cover is either regained or improved. The extent to which ungulates use a natural or man-made opening depends on seasonal forage quality, the proximity of adjacent security cover and, most importantly, the presence of roads. Roads provide access for motorized vehicles and other non-motorized travel. Elk are more sensitive to roaded environments than white-tailed deer and other ungulates. Management of human access minimizes loss of habitat effectiveness or displacement of animals to less productive habitats.

Prescribed fire is used to improve habitat for ungulates and other species of big game. The palatability, nutrition, quantity and selection of forage plants increases following fire; elk, mule deer, white-tailed deer and moose show a preference for feeding on post-fire vegetation. Tall shrubs often resprout vigorously after fire, and the new growth is no longer out of reach. Fire often creates a mosaic of thermal and hiding cover and forage areas, with patchy burns especially beneficial.

The Forest Plan considers summer range to be the most important seasonal component for elk while winter range is determined to be the most crucial factor governing white-tailed deer populations. The project area is roughly divided equally between winter and summer range. Elk and mule deer will be the featured species in the project area. This analysis will concentrate on biologically important elk range values. Due to some of the past harvesting and burning, portions of the project area have become attractive to these species. A majority of the project area is in elk and mule deer elevational ranges.

The Garver project area (see Vicinity Map, M-1) will be used to analyze big game parameters and is sufficiently large enough to address potential effects of the proposed actions across the landscape. Within this area, cover to forage ratios, opening sizes, open road densities (from BMU 15 data), habitat effectiveness, and security were calculated to assess existing condition and potential effects to big game from proposed alternatives. Cumulative effects will be measured using the larger bear management unit (see map M-15 for a display of this BMU).

Cover:Forage Ratios & Opening Sizes

An important consideration when evaluating big game habitat is the distribution of cover and forage within a given area. A cover-to-forage ratio describes the percentage of an area contained in each component. Cover is divided into hiding (vegetation capable of hiding 90 percent of an elk at 200 feet), and thermal (stands of timber greater than 40 feet tall, with canopy closure of greater than 70 percent) which reduces stress to animals during hot/cold weather extremes. One of the greatest values of thermal cover in northwest Montana is snow interception. Snow intercept thermal cover becomes critical during severe winters (ie 1996/97). The definition for snow intercept is somewhat different from elk thermal cover needs for hot/cold extremes. For the most part, stands with a high component of larch do not provide as high a quality snow intercept as Douglas-fir and ponderosa pine.

The size, shape, and interspersion of cover and forage, as well as the position relative to landscape features (riparian zones, ridges, saddles, roads) greatly influences the use of these components by big game. Forest Plan standards consider a 30/70 ratio of cover to forage optimal for elk/mule deer and harvest created openings should not exceed 40 acres. Since the Forest Plan was formalized, elk habitat management direction has changed in response to modern research and current professional judgment of local managers. In 1991, a committee of Kootenai National Forest and MDFWP biologists developed new recommendations and the following apply to elk/mule deer management: 1) to maintain at least 60% cover on winter range with at least 40% in thermal cover 2) to maintain 60-70% cover on summer range in any combination of hiding and thermal cover 3) to restrict harvest created openings to 20 acres or less on winter range 4) to restrict harvest created openings to 40 acres or less OR maintain all portions of harvest created openings within 600 feet of cover on summer range.

Opening sizes, as well as their shapes, are important factors in determining how much they will actually be used by big game. In general, forage utilization decreases when big game is required to venture more than 600 feet from cover (Thomas 1979). On summer range and winter range, the Forest Plan recommends regeneration harvest units not exceed 40 acres in size for elk/mule deer and that shape more than size is important if edge length is maximized. When it is necessary to harvest timber from units greater than 40 acres, the shape becomes increasingly important and should be designed so the majority of the unit remains within 600 feet of functional cover.

Open Road Density - Habitat Effectiveness

Disturbance is one of the most important factors in regulating the actual use of habitat by elk and, to a lesser extent, other big game species. The amount of human-related disturbance is measured by open road densities (ORDs) or the number of miles of open road per square mile. Studies have shown animal use of habitat to be inversely correlated with the density of open roads. Direct and indirect effects to ORD-habitat effectiveness are viewed on a project area basis for big game. Cumulative effects to big game and consistency with Forest Plan standards for ORD (within portions of the Kootenai National Forest which are designated as grizzly bear recovery areas), are calculated within large bear management units where the standard is less than or equal to 0.75 mile/square mile (Schrenk 1995).

The habitat effectiveness (HE) of an area refers to the percentage of available habitat that is usable by elk during the nonhunting season. Habitat effectiveness levels for big game are not specifically set in the Forest Plan. The ORD standard of less than or equal to 0.75 miles/sq. mi. for Bear Management Units and MA -12 (summer range), equates to 68 percent habitat effectiveness and is derived from

Lyon's habitat effectiveness graph (Lyon et al. 1985). Lyon recommends for areas intended to benefit elk summer range and retain high use, that the habitat effectiveness be 70 percent or greater, and in areas where elk are only one of the primary resource considerations, habitat effectiveness should be 50 percent or greater (Christensen, A; Lyon J.; Unsworth, J., 1993). The Garver project falls into the second category. This area was determined to be a medium elk emphasis area (as determined by Elk Task Force of KNF and MFWP biologists). Medium defines elk as only one of the primary resources.

Elk Security

Security is an important consideration during hunting season and is considered to be any area that provides relatively secure habitat for elk during periods of stress. "Security" is defined as areas of predominantly cover which are larger than 250 contiguous acres in size and greater than one half mile from an open road. These areas offer elk refuge/reduced vulnerability during hunting season and can greatly influence future age structure and composition of the herd. The Forest Plan contains no standard for security. Hillis and others (1991 pgs 39-40) recommended that a minimum of 30 percent of an elk's fall use area should be maintained as security habitat. This is the minimum amount thought necessary to: 1) maintain the current relatively unregulated five-week hunting season, 2) distribute bull harvest over the hunting season, and 3) maintain a desired level of mature bulls in the post-hunting season population.

Affected Environment

Within the project area, many of the past harvest created forage openings have returned to hiding cover making the current ratio 86:14. About 16 percent of Forest Service land in the project area is in early regeneration stages of succession (seedling/sapling stage) and offers some quality forage, however, it will soon be considered hiding cover. Most of the forage (available through shrubs) is in fair condition throughout the project area. The southern portion of the project area in the Hensley Hill and Rausch Point areas are heavily browsed. Field observations in the spring noted that big game are browsing buffalo berry to the ground, which is uncommon due to the fact that it has poor palatability. An increase in high quality forage would benefit big game species within the project area. Recently created forage openings range from 4 to 136 acres in size (averaging 25 acres) and these current patterns of harvest-created forage openings are generally well designed and equitably distributed for big game utilization with good travel corridors between units. Most of these forage openings are small enough to be efficiently browsed by ungulates.

Summer thermal cover is available (7,558 acres or 70 percent of summer range) and well distributed in the project area. Winter range (MA-11) in the project area is 11,100 acres. There are 9,569 acres within winter range that are currently thought to function as snow intercept/thermal cover (86 percent of the winter range in the project area).

Current open road densities and resulting habitat effectiveness values are favorable for big game. The Open Road Density (BMU 15) is 0.44 miles per square mile with a corresponding habitat effectiveness of approximately 77 percent (Lyons, et.al. 1985). The majority of the open roads in the project area are located on the edge of the project boundary. This creates two large secure areas with a high security value. Elk security is excellent and comprises about 58 percent of the project area.

Environmental Consequences

ALTERNATIVE A
Direct and Indirect Effects

Implementing the No Action alternative would allow natural processes of vegetative succession to continue throughout the project area. High quality forage areas would continue to be a limiting factor for ungulate populations. Fire suppression actions would continue to exclude most wildfires that historically played a beneficial role in creating varied habitat conditions and enhancing forage.

This alternative continues existing road closures and restrictions, which maintains desirable habitat for elk. Habitat effectiveness is above the recommended measure due to low ORDs. Security during hunting season is excellent due to limited open road systems. All of these factors contribute to extensive use by elk during the summer and moderate vulnerability during hunting season. ORDs in the project area are within the Forest Plan standard (actually calculated on a BMU basis) for big game summer range.

This alternative is consistent with big game standards except for less than optimal percentages of forage.

Cumulative Effects

The cumulative effects of past and present management activities as well as natural random events have been incorporated into the description of existing conditions in the project area. A No Action scenario would maintain present populations of big game in the short term. In the long term this alternative would probably decrease numbers and distribution into future due to lack of high quality forage.

ALTERNATIVES B, C, and D
Direct and Indirect Effects

All action alternatives would incorporate shrub planting (approximately 100 acres) in the Hensley Hill and Rausch Point units (32, 41, 42, 44-53, 56, 57, 58, 59) to improve big game forage habitat. Shrubs (red stem ceoanothus, serviceberry, willow) would be planted in small groupings and in accordance with the appropriate habitat type. Netting or protective plastic tubing may be used to aid in the success of this planting. The effect to big game would be positive in the long term once the shrubs have established themselves.

All action alternatives propose mechanical fuels treatment to reduce fuels in the wildland/urban interface. The units are located in big game winter range. A variety of treatment methods are proposed such as mechanical thinning of understory trees (using a clipper), hand slashing, excavator piling, and understory burning. The effect to big game would be the animals would be temporarily displaced due to the anticipated short duration of the activity.

All action alternatives would improve the cover:forage ratio within the project area. (See Table 3-19.) A maximum of 2 percent of the cover component is converted into open forage conditions within the project area. This will improve forage conditions but still remain substantially below the recommendation of 30-40% forage. Underburning would be a key component to the success of the rejuvenation of the forage post harvest. Units scheduled for burning include the following: #29 (102 acres, Alt. B, 88 acres, Alt. C & D); 30 (29 acres, Alt. B, C, &D); 57 (49 acres, Alt. B, C, & D). Fuel treatments units will stimulate browse species from planned

underburning of units #: B (74 acres), I (35 acres), K (114 acres, Alt. B, C & 124 acres, Alt. D) and L (76 acres, Alt. B, C).

All of the created openings have been designed so that at any one point in the opening, cover will be within 600 feet in at least one direction. In many of the units, riparian buffers and topography provide cover and are not affected by the alternatives. Natural movement corridors (riparian and ridgeline) are maintained in all action alternatives.

The project area existing situation is within recommended percentages of snow intercept/thermal cover levels in winter range. Thermal cover/snow intercept is minimally reduced by harvest alternatives. It varies between 169 acres (1 percent reduction) in Alternative B, 187 acres (2 percent reduction) in Alternative C, and 105 acres (1 percent reduction) in Alternative D. Alternative D has the least impact to snow intercept values in the project area and maintains the best distribution and available thermal/snow intercept values to big game.

All action alternatives minimally increase open road densities because currently restricted roads would be opened to access harvest units. The opening of closed roads would be scheduled on a rotation to minimize effects to habitat effectiveness at any point in time. The highest ORD in the project area that would occur within the scheduling framework is 0.45 miles/square mile which equates to a habitat effectiveness in the project area of 77 percent. Roads 5873 (past Unit #27), 276, 5840, and 5856 would be restricted to vehicular use during phases of the harvest operation in order to maximize habitat effectiveness within the BMU, which also is beneficial to big game (see Appendix E). All alternatives maintain the BMU ORD below 0.75 and thus comply with Forest Plan standards for big game. Elk habitat effectiveness in the project area is above 50 percent (77 percent), which also meets recommendations for management in areas where elk are one of the primary resource concerns.

Winter logging would occur in the Rausch Point units, #32, 41, 42, 44, 45, and 46, and units #31, 37, 38, and 38a in all action alternatives due to the fact that helicopter logging (l mile buffer) decreases habitat effectiveness for grizzly bear. Timing restrictions during hunting season would be incorporated to insure security for big game and would include no activity allowed during hunting season.

The action alternatives increase elk security acreage during project implementation. Elk security is projected to increase to 65% for Alternatives B, C, and D due to roads changing from open to gated for grizzly bear habitat effectiveness. The Road #5879 system (Rausch Point) would be restricted during the project due to the importance of the area for big game. This would reduce vulnerability of elk and maintains 65 percent security during the hunting season.

Cumulative Effects

The cumulative effects of past and present management activities as well as natural random events have been incorporated into the description of existing conditions in the project area. Taking these and foreseeable activities into account, all alternatives result in acceptable cover:forage ratios, open road densities, habitat effectiveness, and elk security. All alternatives are designed to keep the BMU-ORD below 0.75 mi./sq.mi.

THREATENED AND ENDANGERED WILDLIFE SPECIES

Threatened, endangered and proposed (T&E) species are managed under the authority of the Endangered Species Act and the National Forest Management Act. The Endangered Species Act (ESA) requires federal agencies to disclose potential effects to species covered by the ESA from all actions which they "authorize, fund, or carry out." An objective of the U.S. Forest Service in this regard is to make sure its projects are not likely to jeopardize the continued existence of any threatened, endangered or proposed species. Agencies are further required to develop and carry out conservation programs for these species. T&E wildlife species that could occur in the analysis area include: the threatened grizzly bear, lynx, bald eagle and the endangered gray wolf (See Table 3-20).

TABLE 3-20. THREATENED AND ENDANGERED WILDLIFE SPECIES FOUND IN PROJECT AREA

SPECIES	KEY HABITAT COMPONENT	OBSERVED IN ANALYSIS AREAS	HABITAT IN ANALYSIS AREA	COMMENTS
Grizzly bear	Winter: Dens > 6000' elevation Summer: Security = ORD < 0.75	Yes	Yes	Species and habitat known to occur within the project area
Bald eagle*	Open water > 40 acres, fish, ungulate winter range	Yes	Yes	No known nesting territories in the project area
Canada lynx	Forage: young, thick LPP regen. Den: mature forest w/down woody material	Yes	Yes	Suitable habitat identified by LCAS mapping
Gray wolf	Spring: Dens < 4000' Winter: Ungulate winter range	Yes	Yes	Recent wolf presence documented in the area

*Bald eagles are known to inhabit the analysis area but no nests are known. Since nesting activity is absent, there are no known or anticipated effects to the bald eagle. This is also the case when combined with past, present, and reasonably foreseeable future actions.

The shrub planting in the winter range mentioned above in the big game section and the mechanical fuels treatments will have no effect on threatened and endangered species, thus will not be addressed again.

Grizzly Bear (*Ursus arctus horribilus*)

Portions of two grizzly bear recovery zones exist on the Kootenai National Forest: the Northern Continental Divide Ecosystem (NCDE) and the Cabinet-Yaak Ecosystem (CYE). The NCDE would not be affected by this proposal. Approximately 70 percent of the CYE is located on the Kootenai, consisting of 17 Bear Management Units (BMU) generally in the western half of the Forest. Basic grizzly bear ecology, recovery zones and recovery goals are described in the Grizzly Bear Recovery Plan (USDI 1993), hereby incorporated by reference.

Grizzly bear habitat on the Kootenai is described in the Forest Plan (USDA Forest Service 1987) and by Christensen and Madel (1982). Grizzly bear populations on the Forest are discussed by Kasworm, et. al. (2002). A conservative population estimate for the Cabinet-Yaak Grizzly Bear Recovery Zone is 30-40 grizzly bears. The overall mortality rate for the entire CYE had decreased during the past several years, until 1999 when there was a sharp increase of mortality in the last 3 years. Twelve grizzly bears have been confirmed dead; eight from what appear to be natural causes, one by management removal, one defense of life, and two mistaken identity (Kasworm, et. al., 2002).

Management Guidelines

In Montana, the Grizzly Bear is classified as threatened and is protected under provisions of the Endangered Species Act. The analysis area is contained within the Cabinet-Yaak Recovery Zone (USDI 1993). Section 9 of the Endangered Species Act of 1973, as amended, requires that threatened and endangered species be

protected from "harm" and "harassment" wherever they occur, regardless of recovery boundaries.

Grizzly bear management and analysis is guided by the Kootenai National Forest Plan standards, and project Biological Opinions and consultation agreements. Currently, grizzly bear analysis is guided by the amended USFWS Biological Opinion and Incidental Take Statement (McMaster 1995), the Kootenai National Forest Plan, and new information contained in the “Final EIS Forest Plan for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones” (Kootenai, Lolo and Idaho Panhandle National Forest, March, 2002).

The goal for grizzly bear management on the Kootenai National Forest is to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery. A number of measures are used to gauge whether habitat objectives are being met. The following analysis uses individual bear management units (BMUs) to describe the existing conditions and potential effects, including cumulative effects of the proposed action by examining how these measures are implemented in order to achieve specific objectives as currently understood relating to grizzly bear recovery.

Affected Environment And Environmental Consequences

The grizzly bear analysis incorporates data for habitat effectiveness, open road densities, and core models. District employees gave professional input on road and project status, and other pertinent information such as foreseeable actions. The District Wildlife Biologist and GIS specialist created road layers based on this information and ran the “grizztools” models. The subsequent maps and reports that were generated, are the most up-to-date available information.

Objective 1. Provide adequate space to meet the spatial requirements of a recovered grizzly bear population.

A. Habitat Effectiveness:

Habitat effectiveness (HE) should be maintained equal to or greater than 70 percent of the BMU. Habitat effectiveness is calculated as a percentage of the BMU and is all land further than 1/4 mile from small private landholdings, open roads and major activities. Table 3-21 displays the habitat effectiveness values resulting from the action alternatives.

The existing open road density within Situation 1 land in the BMU is 0.44 miles/sq. mile with a resulting habitat effectiveness of 71 percent.

BMU 15 has one project that is anticipated to operate in 2002. The project is a fuels reduction project around the Yaak Community Center. The project is in Situation 3 land and will not affect any grizzly bear habitat components.

TABLE 3-21. GRIZZLY BEAR HABITAT EFFECTIVENESS BY PERCENT OF BMU DURING AND POST ACTIVITIES

BMU	ALT A	ALT B	ALT C	ALT D	POST PROJECT
15	71%	68%	68#	68%	71%

In Alternatives B, C, and D, HE would decrease somewhat based on opening roads for harvest activities, but the greatest decrease is due to the buffering of helicopter units. Helicopter units are buffered by a one mile ineffective zone unless there are topographic or locality reasons for using the ¼ mile HE buffer. The effect of helicopter harvest is less than opening and/or building roads into an area due to the

fact that helicopter harvest activity time is much less than traditional ground-based systems. Timing of road closures to ensure HE numbers remain relatively stable (68% during) and include the following (see Appendix E for a display of these actions):

Roads 5856, 5857C, Road 276 at the 5846 junction, and 5859 closed during harvest.

Roads 5882, 5883, 5879, 5879C, 5879D, and 5879G will be closed for winter harvest of Units 31, 32, 37, 38, 38A, 41, 42, 42A, 44, 45, and 46.

The effect of the harvest activities is that grizzly bears would be displaced due to the human, helicopter, and harvest activity in the area. The effect of the activity would displace grizzly bears to the large contiguous core habitat available in BMUs 14, 15, and 16.

B. Open Road Density (ORD) :

1) *The analysis area will be the BMU*.

BMU 15 contains approximately 80 square miles of Situation 1 land and 12.0 square miles of Situation 3 land (private land with 1/4 mile buffer).

2) *The open road density is displayed below at the BMU and BAA scales and confined to Situation 1 land. BAAs not affected by harvest projects should maintain ORDs equal to or less than 0.75 miles/square mile. Also affected BMUs should maintain ORDs equal to or less than 0.75 miles/square mile.*

BMU 15 currently has fairly low ORDs both in its component BAAs and in its total existing situation (See Table 3-22).

TABLE 3-22. BMU 15 OPEN ROAD DENSITIES

BEAR ANALYSIS AREA (BAA)*	ALT A ORD-mi/sq.mi.	ALT B ORD-mi/sq.mi.	ALT C & D ORD-mi/sq.mi.
4-15-1	0.50	0.50	0.50
4-15-2	0.66	0.90	0.90
4-15-3	0.38	0.55	0.55
4-15-4	0.00	0.00	0.00
4-15-5	0.55	0.11	0.11
4-15-6	0.69	0.75	0.75
4-15-7	0.23	0.23	0.23
Total BMU 15	**0.44**	**0.45**	**0.45**

*See map M-15 for a display of BAA locations.

In Alternatives B, C, and D, a small increase in total BMU ORDs would occur during harvest activities, 1 percent. BAA 4-15-2 ORD will increase to 0.90 with Alternatives C and D. The ORD at the BAA scale may be >0.75 mi./sq.mi. for those BAA's affected by the project, but the ORD for the affected BMU must <0.75 mi./sq.mi. (McMaster 1995). The ORD for the BMU is well below the recommended maximum of 0.75 miles/square mile of open roads for BMUs. The effect to grizzly bears would be that bears would be displaced due to human and harvest activities.

Post project ORDs for these BMUs would return to their pre-project existing condition.

C. Displacement or Core Areas:

The existing core area is mapped and displayed as a percentage of the BMU. The requirements of a core area include: no motorized access (roads or trails) during the active bear season, and be at least 500 meters from open or gated roads. The core area discussion incorporates data for the project area and BMU 15. Also included is core data taken from the Wood Rat EA. Core area from this decision is included in the existing, during, and post core for Garver. Also, included are numbers for the adjacent BMU's, 14 and 16.

BMU 15: Within BMU 15, existing core is composed of several large areas that meet the core area definition and total 47 percent of the BMU (2000 Kootenai National Forest Plan Monitoring). After careful examination of the quality of core habitat and meeting with Wayne Kasworm, Grizzly Bear Biologist for the U.S. Fish and Wildlife Service, the decision was made to increase core in the northern half of the BMU. Two areas adjacent to private land modeled out to be core habitat. These small acreages were removed from core based on the fact that they do not provide quality core habitat because they are in a very high use area. The effect would be that grizzly bears would utilize the large, contiguous, secure habitat available in the northern part of the BMU and would not be near areas of human habitation where mortality risk would significantly increase. During the project, core would increase to 50 percent (see During Core map, M-15). The post project core area would increase to 53 percent. Roads that would be barriered to provide core habitat include several small spur roads that are currently gated. The roads earthen barriered to increase core during project are: Roads #5835, 5857L, 757A, 5841, 5857C). Also, included in the during project core are roads that were scheduled to go into core based on the Wood Rat Decision Notice and includes the Road 757 system from the existing gate. Post core roads that would be earthen barriered are: Roads #276A, 5840 where the gate is currently located, 5849, 5859, 5882, 5883, 5839, 5861, 5840B, 276 at the junction of the 5842 road, 5840A, 5840C (see Post Project Core map, M-16, and the Access Management Plan and Map, Appendix E).

BMU 14 and 16: These adjacent BMUs, along with BMU 15, are currently providing the northern portion of the Three Rivers Ranger District with high quality, large core areas. Within BMU 14, existing core is composed of several large areas that meet the core area definition and total 56 percent of the BMU. There are currently no large projects ongoing or any foreseeable actions in BMU 14. Within BMU 16, during the Kelsey- Beaver Fire Recovery project, core will be 47 percent. The Kelsey-Beaver Fire Recovery sales will be sold in the summer of 2002. Post project core would be increased to 52 percent when the Kelsey-Beaver project is completed, the 6061 road system is closed, and the Turner Creek rehabilitation and storm proofing work is completed

The three northern BMUs on the Three Rivers Ranger District are currently providing a large expanse of core area. The core area would be increased during and post Garver project.

TABLE 3-23. EXISTING, DURING AND POST CORE

BMU	ALT A (Existing)	ALT B (During)	ALT C and D (During)	Post project core
15	47%	50%	50%	53%

Objective 2. Manage for an adequate distribution of bears across the ecosystem.

Grizzly bear habitat on the Kootenai National Forest is analyzed for five standards to determine if the distribution objective is being met:

A. Opening size:

Proposed timber harvest units, either individually or in combination with existing unrecovered units should normally be designed to be less than or equal to 40 acres.

Where the 40-acre limitation is exceeded for justifiable reasons, no point in the resultant opening should be more than 600 feet from cover (i.e. maximum 1200-foot opening width.)

The Garver project area includes timber sales that were harvested in the 1970s and 1980s. Some of these units were larger than 40 acres and are currently providing hiding cover. Design criteria of the project leaves riparian areas and ridgelines intact. The project has treatment areas identified that are larger than 40 acres but the actual harvest will be less than 40 acres. The units will include patches of live and dead trees and shrubs and the effect will be a mosaic of harvested area, non-harvested areas, and groups of standing dead and live trees. The topography of the area will also provide some cover due to the rolling/broken nature of the land.

B. Movement corridors:

Unharvested corridors greater than or equal to 600 feet in width should be maintained between proposed timber harvest units and unrecovered existing harvest units.

On a larger scale, movement corridors of core area are available from the Canadian border south through BMU 11 and 16, into BMU 17, and further south to BMU 10. In Ruediger's "Report to the Interagency Grizzly Bear Working Group On Wildlife Habitat Linkages" important priority wildlife linkages were identified. This report is specific to highways. The Garver project area does not include priority wildlife linkage habitat in regards to highways, related to this literature. In July 2001, Servheen, et. al., published "Identification and Management of Linkage Zones for Grizzly Bears Between the Large Blocks of Public Land in the Northern Rocky Mountains". The document identifies linkage zones based on landscape views from the Linkage Zone Prediction Model. The Garver project area is included in the NCDE to Cabinet/Yaak Linkage Zone Prediction Model. The Garver project area is located in the northwest corner of the modeled output. The project area is not in an identified linkage zone and thus, will not affect any linkage zone.

C. Seasonal components:

Major activities should be scheduled to avoid known spring habitats during the spring-use period (April 1 to June 15) and known denning habitats during the denning period (November 15 to April 15.)

No den sites are known to exist within the analysis area. All proposed timber harvest activities that take place in spring bear range would avoid the spring bear use period (4/1-6/15); this applies to all units **except:** Units 27, 33, 34, 35, 36, and 37 in Alternative B; Units 33 and 35 in Alternatives C and D. Approximately 2,410 acres of the proposed timber harvest would take place in spring range in Alternative B; 2,138 acres in Alternative C; and 2002 acres in Alternative D.

Objective 3. Manage for an acceptable level of mortality risk.

Most human-caused grizzly bear mortalities on the Kootenai have resulted from interactions between bears and big game hunters. Grizzly bear vulnerability to human-caused mortality is partially a function of habitat security. Therefore, mortality can be partially managed by the application of standards, which are designed to

maintain or enhance habitat security. These standards would be achieved by meeting objectives 1, 2 and 6.

It is important to note that human-caused grizzly bear mortality is also a function of other factors, such as the regulation of big game hunting, which are beyond the authority of the Forest Service to control. Regulation of hunting is the responsibility of the State of Montana.

Objective 4. Maintain/improve habitat suitability with respect to bear food production.

This would be achieved by meeting Objectives 1 and 2.

Objective 5. Meet the management direction outlined in the Interagency Grizzly Bear Guidelines (51 Federal Register 42863) for management situations 1, 2, and 3.

This would be achieved by meeting Objectives 1, 2, 3 and 4. The proposed activities meet the intent of the Interagency Grizzly Bear Guidelines.

Objective 6. Meet the interim management direction specified in the July 27, 1995, Biological Opinion Amendment, which defines incidental take levels.

A. Open road density:

Manage the density of open roads within the Forest Plan standards.

The BMU would maintain open road densities resulting from action alternatives within Forest Plan standards (see objective 1B).

B. Open motorized trail density:

Do not increase the density of open motorized trails within the affected BMU.

The proposed alternatives would have no effect on the existing motorized trail density.

C. Total motorized access route density (TMARD):

Manage all motorized access routes in the affected BMU to avoid a net increase over the existing density.

The potential increase in TMARD from temporary roads would be balanced by earth berming Roads 5857C and 5857L. There would be no net increase in TMARD during implementation of the action alternatives. As temporary roads are recontoured during the latter phases of project implementation, TMARD within the affected BMU would decrease.

D. Existing Core Area:

Manage the Existing Core Area within the affected BMU to avoid a net decrease.

All action alternatives increase core habitat within the BMU so there is no net decrease at any point in time.

Grizzly Bear Environmental Consequences - Summary

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

Alternative A would fully comply with all grizzly bear standards, ORD, HE, and core. Cumulatively, past harvest and wildfires have provided a variety of age classes and successional stages across the project area. This is providing habitat conditions favorable for grizzly bear and for forage such as huckleberries and big game, although these areas are moving towards a condition where forage will be reduced due to canopy closure. Roads associated with past management in some cases have had negative effects by providing easy access by humans, the associated disturbance and occasional human-caused mortality. However, recent reductions to open road densities and increases in core habitat would be beneficial to grizzly bears. In 1993, ORD in BMU 15 was 1.01, and now it is 0.44. Core habitat has increased across the landscape, providing large core areas from Canada south to the Kootenai River.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Alternatives B, C, and D were designed to meet habitat effectiveness measures, although the helicopter buffering reduces HE to 68%. The effect will be that grizzly bear habitat will be less impacted by helicopter harvest than ground-based systems due to the fact helicopter harvest would take less time. All alternatives fully comply with open road density standards. All alternatives fully comply with standards for core habitat. Non-commercial thinning is planned for the action alternatives. Some of the proposed thinning is located in core habitat. No roads will be opened to access these sites due to the fact that the contractors will walk in. The short duration of 2-3 days in the units would be a very minor effect to the grizzly bear due to the large contiguous habitat available to a wide-ranging species like the grizzly bear.

Cumulative Effects

The Garver analysis area has had substantial management activities in the last 40 years. The result of this management is a landscape that is a mosaic of various stages of succession. In addition to the harvested areas, there are unharvested areas including roadless areas and areas that have had natural disturbances like insect and disease infestations, and blowdown. Recent harvest in the area includes French Mudpickens, Mud Little, Wood Rat, Waper Ridge Overstory Removal, and Gator Copter, and other small timber sales. These sales treated approximately 2,800 acres with a variety of harvest types; sanitation salvage, clearcut with reserves, shelterwood, and seed tree. The harvest of the above projects is now complete. The Wood Rat Timber Sale has units that are yet to be prescribed burned. The Garver preferred alternative was designed to meet grizzly bear standards and guidelines. Cumulatively, the potential exists to displace grizzly bears to core areas or areas not affected by the activities. Post core areas would be substantially increased when the project is completed, from existing 47 percent to 53 percent. Grizzly bears are wide ranging species that use a variety of habitats and can move from one area to another easily.

Past harvest has provided a variety of age classes and successional stages across the project area. This is providing habitat conditions favorable for grizzly bear and for forage such as huckleberries and big game. Open road densities have dramatically dropped in the past several years as a result of closing roads through Environmental Analysis decisions intended to facilitate grizzly bear recovery. In

1993, ORD in BMU 15 was 1.01, and during the Garver project it would be 0.45. Core habitat has increased across the landscape, providing large core areas from Canada south to the Kootenai River.

REGULATORY CONSISTENCY

Alternatives A, B, C, and D meet current regulatory standards within the affected BMU. Habitat effectiveness measures are below the recommended number of 70 percent.

STATEMENT OF FINDINGS

Implementation of Alternative A, the no action alternative, would have **No Effect** on the grizzly bear because existing conditions would be maintained for ORD and HE. Core area would remain at 47%.

Implementation of Alternatives B or C or D **May Affect But Is Not Likely To Adversely Affect** (direct, indirect or cumulative) the grizzly bear. These alternatives would not adversely affect bear denning sites or spring range and would provide for a substantial increase of large secure core areas. ORDs in the BMU would slightly increase and HE would slightly decrease for the duration of the project. This would meet the intent of the provisions of the amended USFWS Biological Opinion and Incidental Take Statement (McMaster 1995) and the Kootenai National Forest Plan.

Gray Wolf *(Canis lupus)*

The Rocky Mountain wolf, or gray wolf, is a year-round resident of the Kootenai National Forest. Habitat is generally dictated by available ungulate (prey) populations. Wolves are highly social animals, which form packs of 2-30 individuals. They are opportunistic predators of elk, deer and moose, and to a lesser extent, small mammals. Dens are located in underground burrows dug into steep hillsides, in hollow logs or in abandoned beaver lodges. Isolated meadows within forested areas are used as rendezvous sites for the pack.

Key habitat components for wolves are: 1) a sufficient, year-round prey base for big game or alternate prey, 2) suitable and somewhat secluded denning and rendezvous sites, and 3) sufficient space with minimal exposure to humans (USFWS, 1987).

Population declines of the wolf are attributed to conflicts with human settlement, livestock and extensive eradication programs. The gray wolf was listed as an Endangered species throughout the lower 48 states (except Minnesota) in 1978, and in 1987 the USFWS released a Recovery Plan for the wolf (USFWS, 1987). The recovery plan recommends that management emphasis be directed at preventing human-caused mortality and adhering to Forest Plan big-game management guidelines.

The analysis area is within the Northwest Montana Wolf Recovery Area. Wolves can survive in most habitat conditions as long as sufficient prey is available and human-caused mortality is not excessive, and no special habitat requirements or land use restrictions are necessary except protection of den sites (Ream et al., 1995). Wolf habitat management direction focuses on providing the three key habitat components listed above.

Forest Plan monitoring indicates that gray wolf populations are increasing based on increased sightings and increasing prey populations (white-tailed deer) (USDA

Forest Service, 2000). Wolf habitat has not changed much over time, although increased habitat security for big game has also improved security for wolves.

In Montana, the Gray Wolf is classified as endangered and is protected under provisions of the Endangered Species Act. Section 9 of the Endangered Species Act of 1973, as amended, requires that threatened and endangered species be protected from "harm" and "harassment" wherever they occur. Management direction applicable to the analysis area from the U.S. Fish and Wildlife Service includes maintaining an adequate prey base for wolves and minimizing mortality risk for wolves. Management goals and standards contained in the Forest Plan includes the following: "Maintain or enhance all identified gray wolf habitat to facilitate recovery" (II-1).

Affected Environment

There are no known established packs, denning or rendezvous sites within the project area, but wolves have been regularly observed in the area. Observations of wolves have increased in the project area based on the fact that eight collared wolves were released in the Yaak River drainage in December 2001 by the USFWS. Potential denning and rendezvous sites are available. No human-caused mortalities have been documented in the project area. The analysis area supports abundant year-round prey for wolves. Big game species are present in the summer and winter. The prey species include white-tailed and mule deer, moose and elk. Habitat for gray wolf is available and well distributed across the Kootenai National Forest.

Environmental Consequences

In general, recovery management of wolf habitat is associated with availability of natural prey and minimal contact with humans. The three key habitat components described in the introduction are used to determine the potential effects of management activities to wolves.

ALTERNATIVE A
Direct and Indirect Effects

No timber harvest or road openings are proposed in this alternative. Other habitat characteristics such as ORD, habitat effectiveness and security are favorable for wolves and their ungulate prey. This alternative maintains the current conditions for prey habitat and human access within the project area. The risk of mortality in the analysis area would be considered low due to low open road densities. Most human-caused mortalities result from mistaken identity or from personal conflict/dislike of wolves, and are generally independent of harvest activities. There would be minimal effects on wolves with this alternative. Cover establishment and tree species diversity would be inferior to the action alternatives.

Cumulative Effects

The cumulative effects analysis for the grizzly bear, done on a BMU basis, is considered an effective method for analyzing existing conditions and their influence on wolves and their prey base (Buterbaugh, 1991). The measures quantified for the cumulative effects analysis include opening size limitations on big-game summer range, movement corridors, open road densities, available core habitat both during harvest and in the post project phase, and total motorized access route density. Adhering to these measures are believed to assist in protecting gray wolves and their prey base.

For these reasons, the cumulative effects analysis for gray wolves is the same as that given for grizzly bears. The direct, indirect and cumulative effects of this alternative on the ungulate prey base of wolves is addressed under the Chapter 3, Wildlife Habitat, Big-Game, section.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Denning and Rendezvous Sites – The alternatives would not affect known denning or rendezvous sites. The proposed alternatives would not decrease potential sites, although disturbance associated with harvest alternatives may deter potential use while activities were ongoing. Suitable habitat for sites would remain available following all alternatives.

Adequate cover and overall cover:forage ratios would be suitable for all alternatives on a landscape basis. Conditions that decrease or improve big game use would also affect gray wolf population.

The most important limitation to wolf recovery is human caused mortality. Some temporary increases in risk from human caused mortality would accompany localized increases in ORD during harvest activities. This increased risk would remain within acceptable levels during harvest activities

Prey Base – The analysis for big game habitat determined that Alternatives B, C, and D would have ORDs below 0.75 miles/square mile (see Chapter 3, Wildlife Habitat, Big Game section). The proposed harvest activities have been discussed in terms of effects to big game prey species and general habitat security. The action alternatives create improved forage which is important for maintaining an adequate prey base in the future.

Potential wolf use would likely follow the availability of big game, which would likely increase with forage availability. No adverse effects to wolves would be expected

Sufficient space with minimal human exposure – The action alternatives would create varying levels of disturbance in the analysis area thus reducing effective habitat and security acreage during project implementation. The most important limitation to wolf recovery is human caused mortality. Some temporary increases in risk from human caused mortality would accompany localized increases in ORD during harvest activities. This increased risk would remain within acceptable levels during harvest activities. Effects would be limited to avoidance of activity areas if necessary, and transient use could still occur. Proposed harvest activities alone would not be considered adverse because most human-caused mortalities result from mistaken identity and are generally independent of harvest activities.

Cumulative Effects

Ongoing timber harvest and post-harvest activities identified for this project also have the potential to temporarily increase human disturbance in the analysis area and reduce wolf use while activities are ongoing. No denning or rendezvous sites would be affected. Timber sale activities are generally not a source of increased risk of human-caused mortality.

Noxious weed control, road and trail maintenance, data collection, monitoring and other administration of NFS lands and resources have not been identified as impacting wolf use of the analysis area. No adverse cumulative effects from these types of activities would be expected.

Most of the roads opened for proposed activities would be open for public use during activities and the opportunity for human/wolf encounters would increase temporarily, and the risk of mortality due to individual actions would increase. Cumulatively, the risk of mortality could increase as public use increases temporarily with firewood cutting, berry picking, and general sight seeing on roads that may have been closed to the public in the past. Other public actions associated with recreational use or forest product removal would not increase normal levels of risk of mortality.

Statement of Findings

Alternative A would have **No Effect** on gray wolves or their habitat. This finding is based on: 1) no activities would occur near known denning or rendezvous sites, 2) no activities would occur that would decrease wolf or prey habitat, and 3) no activities would increase the risk of human caused mortality.

Alternatives B, C, and D **May Affect, But Are Not Likely to Adversely Effect** gray wolves or their habitat. This finding is based on: 1) no known denning or rendezvous sites would be affected, 2) the potential for human-caused mortality due to slight increases in open road densities 3) the big game prey base would not be adversely affected by proposed activity, and increased forage production in the next several years would improve prey availability, and 4) transient use would not be adversely affected.

Canada Lynx (*Lynx canadensis)*

Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare. Lynx populations may be cyclic with snowshoe hare populations, although at the southern end of their range they may depend more on other small mammal species. Lynx are naturally a low-density species. They are solitary and nocturnal in nature, and den in hollow logs, beneath root wads or dense blowdown, or in other sheltered places. Declines in population may be a result of many factors, including habitat loss (timber management, fire suppression, grazing, winter recreation), trapping, human development and movement barriers (Ruediger et al., 2000).

Suitable habitat for lynx consists of a mosaic of spruce, subalpine fir and lodgepole pine forests generally above 4,000 feet. Early succession habitats are important to snowshoe hare and therefore to lynx, but they are reluctant to cross openings greater than about 300 feet, so maintenance of travel cover is important. They also forage in small, dense lodgepole pine stands 20-40 years old, and den in mature and old forest subalpine fir stands with a heavy component of down woody debris.

Events such as fires historically played an important role in maintaining the mosaic of forest successional stages that provide for lynx and lynx prey habitat. For the first few years after a fire, there appears to be a negative correlation between lynx use and the amount of area burned. This short-term effect is likely due to the reduction of snowshoe hare cover which develops in about 15 years following a stand-replacing event (Ruediger et al., 2000). Lynx use increases as hare populations increase, and decreases with hare declines when the forest canopy closes and shades out understory hare forage. As forests mature and generate large woody debris, lynx denning use increases.

In 2000, lynx were listed as a threatened species in the lower 48 states (Clarke, 2000). Prior to listing, Lynx Analysis Units (LAUs) were delineated using the Lynx Conservation Assessment and Strategy (LCAS) direction, approximating the female lynx home ranges of about 7 mi^2 to 27 mi^2. The LAU identified in the analysis area is 14402 (referred to as LAU 02). Current management direction for lynx comes

from the Canada Lynx Conservation Assessment and Strategy (Ruediger et al., 2000). For this project, essentially three standards apply: 1) management shall not change more than 15% of lynx habitat within an LAU to an unsuitable condition within a 10-year period; 2) within an LAU, maintain denning habitat in patches generally larger than 5 acres, comprising at least 10% of the lynx habitat; and 3) if more than 30% of lynx habitat within an LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of management activities. Additional standards not applicable to this project or addressed previously are documented in the project file.

Forest Plan monitoring to date has not included lynx, however, Forest-wide lynx surveys to determine occupancy are ongoing, and will be used for monitoring in the future.

Affected Environment

LAU 02 provides 52,245 acres of lynx denning, foraging, and lynx habitat. The Hawkins LAU (LAU 02) has had lynx research ongoing through a Challenge Cost-Share Project since 1996. This research ascertained that lynx were present in the area. The physiographic and vegetative characteristics were also discussed in the research (Weaver 2002).

Lynx habitat in LAU 02 currently meets LCAS standards applicable to this project, as shown in the following table. The affected environment includes the effects of past management activities in the LAUs.

TABLE 3-24. LCAS STANDARDS AND AFFECTED ENVIRONMENT OF LYNX HABITAT IN LAU 02

LAU	LCAS STANDARD	EXISTING CONDITION	MEETS STANDARD?
02	No more than 15% management change in 10-year period	5%	yes
02	Maintain at least 10% denning habitat	42%	yes
02	No more than 30% in unsuitable condition	3%	yes

Habitat connectivity with other LAUs is very good to the north, east, and south. The Yaak River drainage is to the south and east and connectivity is influenced by low elevations and human habitation.

Environmental Consequences

ALTERNATIVE A
Direct and Indirect Effects

The No Action alternative maintains and allows the natural decay and regeneration to occur within the project area. Access within the project area would stay the same. This would maintain the current level of trapping potential during the winter months. With no action, management activities would be deferred and stand development would only be affected by natural processes and fire exclusions.

Cumulative Effects

Past harvest in lynx habitat provides a variety of successional stages and habitat for lynx. The desired future condition for lynx within the project area would require development of more forage acreage and vegetative regeneration within portions of the project area will likely contribute to this goal.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

No new permanent road construction would occur for any of the alternatives, and the risk of mortality from incidental trapping would not increase. There would be no change in road management associated with allowable snowmobile use, and increased use would not be expected. Winter harvest roads would be gated to provide secure habitat for wildlife. Denning habitat would decrease slightly but the overall denning habitat available is higher than the recommended 10%.

Existing connectivity with other LAUs would not be affected by any alternative implementation. Pre-commercial thinning is proposed in the action alternatives but is not located in the LAU, thus there would be no effect to lynx by these actions.

Table 3-25 below shows the LCAS standards during implementation of alternatives. Harvest would affect 846 acres in Alt. B, 802 acres in Alt. C, and 682 acres in Alt. D of modeled lynx denning habitat. This results in a minimal amount of denning habitat that would be affected (2-1.5-1 percent). Observation of areas that would not be treated reveal that currently downed woody material is available and would be into the future.

TABLE 3-25. LCAS STANDARDS DURING IMPLEMENTATION OF ALTERNATIVES OF LYNX HABITAT IN LAUs 04 and 05

LAU	LCAS STANDARD	ALT. B	ALT. C	ALT. D	MEETS STANDARD?
02	No more than 15% management change in 10-year period	2%	1.5%	1%	yes
02	Maintain at least 10% denning habitat	39%	39.5%	40%	yes
02	No more than 30% in unsuitable condition	5%	4.5%	4%	yes

Cumulative Effects

Past, ongoing and foreseeable timber harvest and post-harvest activities were included in the effects analysis for lynx. Past harvest in lynx habitat provides a variety of successional stages and habitat for lynx. Since all LCAS standards would be met with both the proposed alternatives and with past, current and foreseeable actions, no adverse cumulative effects would be anticipated.

There is no foreseeable thinning proposed in suitable lynx habitat in the decision area. Other agency actions such as noxious weed control, road and trail maintenance, data collection, monitoring and other administration of NFS lands and resources are generally not activities that have been shown to reduce suitable habitat for lynx. No adverse cumulative effects from these types of activities would be expected.

Public actions such as woodcutting and public actions associated with recreational use or forest product removal would not cumulatively affect lynx or their habitat.

Statement of Findings

Alternative A would have no effect on lynx or their habitat. This determination is based on: 1) no activities that would alter or remove existing suitable habitat would occur, and 2) the effects of the fires reduced suitable habitat short-term, but will provide excellent habitat starting in approximately 15 years.

Alternatives B, C, and D May Affect, but are Not Likely to Adversely Affect lynx or their habitat. This finding is based on: 1) all applicable LCAS standards would be met, 2) the risk of mortality from trapping would not increase as a result of the

alternatives, 3) adequate suitable habitat would be maintained to facilitate movement between LAUs.

Regulatory Consistency

All alternatives would meet applicable standards in the LCAS. There are no other laws or regulations for providing management direction for lynx.

SENSITIVE SPECIES

Sensitive species are determined by the Regional Forester (FSM 2670) and are those species for which population viability is a concern. The "sensitive" determination of individual species is based on "significant current or predicted downward trends" in 1) population numbers or density or 2) habitat capable of supporting viable populations thus affecting species distribution (USDA Forest Service, 1991b, FSM 2670).

Federal laws and direction applicable to sensitive species include the National Forest Management Act (NFMA, 1976) and Forest Service Manual (USDA Forest Service, 1991b, FSM 2670). There are no specific goals or standards for sensitive wildlife species in the Forest Plan. However, the Kootenai National Forest is directed to "identify, protect and manage" habitat for sensitive species in order to assist in maintaining viable populations. Information on the natural history and habitat needs of these species is located in the project file.

An updated listing of all sensitive fish and wildlife species known to occur on the National Forests of Montana was received in March of 1999 (Bosworth 1999). The species list was used to help determine which species may be present in the analysis area or its area of influence for this project. Wildlife species are included in Table 3-26 below.

TABLE 3-26. SENSITIVE WILDLIFE SPECIES ON THE KOOTENAI NATIONAL FOREST

SENSITIVE SPECIES	STATUS WITHIN PROJECT AREA*	HABITAT CONDITION
Fisher	S	Suitable habitat identified along riparian zones
Wolverine	S	Suitable habitat identified along high elevation ridgelines
Black-Backed Woodpecker	S	Suitable habitat identified within project area
Northern Goshawk	S	Suitable habitat identified within project area.
Boreal Toad	S	Suitable habitat identified within project area.
Coeur d'Alene Salamander	S	Suitable habitat identified along riparian zones
Harlequin Duck	S	Suitable habitat present along lower elevation, large rivers and creeks within project area
Common Loon	NS	No suitable habitat in the project area
Northern Leopard Frog	NS	Closest known population is to the northeast near Eureka, MT.
Peregrine Falcon	NS	No suitable habitat in the project area
Northern Bog Lemming	NS	Preferred habitat does not occur within project area. Closest known occurrence is approximately 8 air miles to the west near Northwest Peak.
Flammulated Owl	S	Suitable habitat identified within project area.
Townsend's Big-Eared Bat	NS	Caves and tunnels for winter habitat are not available within the project area. No known occurrences within project area.
Columbian Sharp-Tailed Grouse	NS	Project area does not support suitable grassland habitat. Closest known population is 15 air miles to the east near Eureka.
Woodland Caribou	NS	Old historic records north of project area. Closest known recent (1980s) occurrence is 15 miles to the northwest near the Northwest Peaks Scenic Area.

*Status Key: K = This species is known to occur within the project area.
S = This species is suspected to occur within project area.
NS = This species is not suspected to occur within the project area, and is, therefore, dropped from further evaluation.

The shrub planting in the winter range mentioned above in the big game section and the mechanical fuels treatments, based on anticipated short time duration and minimal disturbance, would have no impact on sensitive species, thus will not be addressed again.

Fisher *(Martes pinnanti)*

The limit on fishers in Trapping District #1, which includes the Three Rivers Ranger District, is a total of two individuals. Presently, the State of Montana gives it a status of a furbearer with restricted harvest. Fishers are generally associated with diverse habitats ranging from swamps to spruce forest to dense, mixed conifer forests. However, most researchers agree that habitat use is largely determined by prey availability and that fishers avoid areas lacking overhead cover, such as regeneration harvest units or large natural openings (Heinemeyer and Jones, 1994). The availability of suitable denning sites may also influence habitat selection.

Fishers are opportunistic feeders or generalized predators. The diet of fishers is wide-ranging and is associated with their habitat. Fishers are historically known for their ability to prey upon the porcupine where they occur together, however, their list of prey species is extensive and includes: numerous small mammals (mice, voles, squirrels, snowshoe hares); reptiles; amphibians; bird eggs; fish; nuts and fruit (Heinemeyer and Jones, 1994). Major winter food sources include deer and moose carrion, birds, mice and voles.

Affected Environment

The project area provides foraging and denning habitat for fishers. Current and historic extent of fisher usage in the project area is largely unknown, however, this analysis will model their potential habitat. Potential habitat for fisher was modeled as timber stands at least 50 years old in the wetter, more productive habitat types within 1/4 mile of permanent creeks. There is 6,242 acres of fisher habitat within the project area or 15 percent.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

The No Action alternative maintains the present condition and allows the natural decay/regeneration processes to occur within stands experiencing high mortality rates. Open road densities would remain the same allowing for continued access of the area. Potential trapping mortality would remain at current levels. The cumulative effects of past and present management activities (including blowdown, small sales) as well as natural random events have been incorporated into the description of existing conditions in the project area.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

The action alternatives would harvest various amounts of timber within identified fisher habitat. Alternative B would harvest 464 acres within fisher habitat. Alternative C and D would both harvest 384 acres within fisher habitat (Table 3-27). The alternatives would decrease effective habitat for the fisher in the project area by 6-7 percent. The alternatives do not harvest timber in riparian areas, which are an important habitat component for fisher. The effect to fishers is that during harvest activities, fishers would be displaced to secure habitat within the area. The

intermediate harvest (20-40 percent canopy removal) would have less of an impact to fishers due to the fact that 60-80 percent canopy would remain after harvest.

It is generally recognized that trapping mortality has been a primary cause of reductions in fisher populations throughout the northwest. Action alternatives would affect current winter access but would not affect potential fisher habitat. Action alternatives would not change trapping pressure. Trapping mortality is outside the scope of this analysis and the responsibility of the MFWP.

TABLE 3-27. FISHER HABITAT AND EFFECTS BY ALTERNATIVE

PROJECT AREA	ALT A	ALT B	ALT C	ALT D
Fisher Habitat (acres)	6,242	5,778	5,858	5,858
% Reduction	0%	7%	6%	6%

Cumulative Effects

The proposal would affect a maximum of 7 percent of current fisher habitat within the project area. Post project trapping pressure would remain at current levels and is likely one of the limiting factors affecting fisher recovery.

Wolverine *(Gulo gulo)*

Presently, the wolverine is a furbearer in the State of Montana with a specific trapping season (Dec. 1 thru Feb. 15 of following year for Trapping District #1 which includes the Kootenai National Forest). Wolverine trapping is limited to Montana resident trappers and hunters with a valid trappers license. Trappers with a trapping license may take one individual for a given season (Their, 2000).

Presently, there are no records of observations of individuals or tracks within the project area but suitable habitat is believed to exist for this species. Wolverine habitat consists of vast, contiguous areas with wilderness type qualities (little human utilization) that support adequate levels of food sources.

Wolverines are suspected to use the project area for hunting and scavenging. Having opportunistic feeding habits, they are known to feed on hares, squirrels, birds, marmots, fruits and a variety of other smaller bodied species (Fischer and Bradley, 1987). Conversely, due to their large size, they cannot survive solely on small prey, therefore large mammals are also an important component of their diet. In the winter they are mostly scavengers of carrion killed by larger carnivores like wolves and mountain lions. They may also take a large mammal themselves when opportunities occur in deep snows (Butts, 1992).

Two scales will be used to display potential effects to the wolverine during this discussion. Direct and indirect effects will be framed within the project area and cumulative effects will be viewed in relation to the much larger BMU. The larger BMU perspective is thought to be necessary for displaying landscape level effects because the wolverine maintains such large home ranges.

Affected Environment

Habitat conditions for wolverines are more difficult to define than previously discussed wildlife species because these animals do not habituate any particular ecological community in terms of vegetative associations or stand structure. Seasonal distribution seems to be a function of security from human disturbance and prey availability. Within the project area wolverines would be expected to follow prey species which would be relatively more common during the winter on the high

energy aspects located on south and west aspects at lower elevations. During the summer, the wolverine and its prey species would shift toward the cool/moist aspects north and east of the ridgelines. All of the area would be considered potential habitat during all seasons as wolverines are known to travel miles from natal snow caves to forage during the winter.

The habitat effectiveness of the project area would be an important component in determining actual use of the area by wolverines during any season. Human use on open roads could affect distribution of potential prey species and also control mortality rate from trapping. In the analysis area, the existing ORD is 0.44 mi./sq. mi. with a corresponding habitat effectiveness of 71 percent (derived by generating 1/4 mile buffers around open roads within project area).

Travel cover is available throughout both the project area and the BMU is furnishing connectivity along favored travel routes such as riparian zones, ridgelines and through high elevation saddles. The BMU maintains low ORDs during the active bear season. This would provide secure spring, summer, and fall habitat resulting in a very low mortality risk associated with human predation. During the winter however, most of the roads within these BMUs are open to use by snowmobiles and could be accessed by trappers which could result in trap mortality. This would result in high mortality risk during the winter trapping season.

Wolverine habitat was modeled and it was determined that there were 3,073 acres of habitat in the analysis area, although it generally accepted that wolverine are a wide-ranging species and not associated with specific topography and vegetative types. This equates to 7 percent of the analysis area.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

The No Action alternative maintains and allows the natural decay/regeneration processes to occur within the project area. No direct, indirect or cumulative effects would alter the conditions in the area. The cumulative effects of past and present management activities (including blowdown, small sales) as well as natural random events have been incorporated into the description of existing conditions in the project area.

The No Action alternative would also maintain the present condition in the larger portions of the BMU. Forest stands would continue along their successional pathways and access would remain unchanged.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

The action alternatives would harvest timber in the analysis area. There are no units in modeled wolverine habitat.

The action alternatives would open roads currently restricted from motorized use or construct temporary roads. Opening roads would minimally increase open road densities and helicopter harvest would reduce habitat effectiveness within the project area for a short duration (Table 3-28). The effect to wolverine, should they be present in the area, would be a temporary displacement until the activity was completed.

TABLE 3-28. ORD/HE IN ANALYSIS AREAS BY ALTERNATIVE

ANALYSIS AREA	ALT A ORD/HE	ALT B, C, & D ORD/HE
BMU 15	0.44/71%	0.45/68%

The action alternatives contain increasing core habitat for grizzly bear after the project implementation. This would create larger security areas, which would also benefit wolverine habitat.

Cumulative Effects

BMUs are used for the cumulative effects analysis area for the wolverine. Table 3-28 above demonstrates that ORDs and resulting habitat effectiveness values should remain favorable for wolverine within these large areas during spring, summer and fall. Non-project activities that may occur within these areas, which have potential to temporarily disturb or displace the species include various recreational activities, firewood cutting, road maintenance, and resource information collection. These activities are considered to be minor in effects and would not cause a trend toward federal listing or loss of viability.

Mortality associated directly with trapping is an important factor affecting wolverine populations and trapping success is largely related to access in occupied habitat. Management of access routes is key to controlling risk of wolverine mortality resulting from trapping. Although the BMU maintains relatively low open road densities during the active bear year, most roads are available for winter use via snowmobile. This maintains potential for access to much of the BMU during the trapping season.

Core areas of grizzly habitat would be expanded by road management actions designed to reduce human disturbance in large tracts of land. This would benefit wolverine.

Blacked-Backed Woodpecker *(Picoides arcticus)*

This uncommon resident of dense northern coniferous forests is characteristically found in areas supporting numerous dead trees. Most northern Rocky Mountain forests maintain low resident population numbers, but when events that create large numbers of dead trees occur, such as wildfires or epidemic insect mortality, this highly mobile species quickly congregates and colonizes the disturbed forests. They specialize in feeding on the larvae of wood-boring beetles that attack dead/dying trees, which are especially numerous following wildfire events. Black-backs will forage by pulling bark off the trees to access the larvae. Dead Douglas-fir, ponderosa pine or western larch are preferred, but other species such as lodgepole pine are readily used if insect larvae are present in elevated numbers. Black-backed woodpeckers also nest in the cavities of dead trees, with breeding territories of about 75 acres. Use by black-backed woodpeckers peaks within 2-3 years after a burn, then declines. Caton's studies (1996) of the 1988 Red Bench Fire in NW Montana documented strong resident black-backed woodpeckers at least six years after the fire, with resident population numbers showing no sign of declining.

Black-backed woodpeckers in the Northern Rockies appear to be ecologically linked to habitat created by wildfire. Primary foraging habitat is thought to consist of dead/dying, charred, beetle-infested trees. This type of habitat was historically created in the project area by stand replacing wildfires over large areas. Since the 1930's, fire suppression tactics have decreased the amount of primary foraging habitat created by lethal fire. Since 1957, 38 acres have burned during wildfires in the project area. One of the ecological results of less wildfire across the landscape has been a reduction in fire dependent species. These woodpeckers are an

excellent example of a fire dependent species that has experienced reductions in populations corresponding to reduced wildfire occurrence.

Outside of large disturbed (fire) areas, black-backed woodpeckers use forests with scattered occurrences of insect infested trees weakened by disease, spot fires, frost pockets, etc. Bird occurrences in these areas are low. On the Three Rivers Ranger District, black-backed woodpeckers have been found in lodgepole pine stands with mountain pine beetle mortality, in wildlife burn areas, in harvest units that have been underburned, and in wildfire areas. They have also been observed in general forest areas feeding on the occasional recently dead tree. Surveys for this species are not regularly conducted although observations are reported on occasion.

According to Thomas (1979, p74), a snag level of 40 percent or more should maintain viable populations of birds dependent on cavities for nest sites. Because black-backed woodpeckers actively seek out and colonize specific habitats, current management recommendations in lieu of a completed Conservation Strategy focus on maintaining adequate suitable habitat when it occurs, or creating habitat during normal management activities such as wildlife burns or harvest unit underburning. In addition, mature to old forest conditions below 4,500 feet should be maintained to provide general forest foraging opportunities.

Feeding habitat is also an important consideration for maintaining viable populations of black-backed woodpeckers. Stands supporting pole-size to overmature conifers are considered suitable secondary feeding habitat. Timber stands supporting lodgepole pine are considered good potential feeding sites, as the lodgepole is susceptible to mountain pine beetle attack. It is assumed that a viable population of black-backed woodpeckers can be sustained by maintaining at least 40 percent of their potential habitat as suitable habitat.

Affected Environment

The Kootenai National Forest has developed a landscape approach to modeling habitat, which utilizes a data set developed from Landsat satellite imagery. A committee of forest biologists has created a standardized query to run with this data set; the specifics of this data set and query are on file in the District Office. Existing habitat was analyzed using the above-mentioned modeling process. The model determined that adequate nesting and feeding habitat is available to support low populations of resident black-backed woodpeckers since large areas of fire, insect or disease mortality are unavailable in the project area. The black-backed woodpecker model reveals 31,103 acres or 72 percent of the project area as secondary feeding/cavity habitat. Habitat for black-backed woodpecker is available and well-distributed across the Kootenai National Forest.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

The No Action alternative maintains and allows the natural decay/regeneration processes to occur. No direct, indirect or cumulative effects would alter the conditions in the area. Tree mortality would not change from current levels and this area would remain available to woodpeckers.

Alternative A would not remove suitable foraging and nesting habitat from the area, and would not decrease black-backed woodpecker habitat in the project area.

Alternative B, C, and D
Direct And Indirect Effects

Table 3-29 shows what percentage of the secondary habitat (72% of the project area) that would be maintained as a result of Alternatives B, C, and D.

TABLE 3-29. BLACK-BACKED WOODPECKER HABITAT

ALTERNATIVE	ACRES HARVESTED	% HABITAT MAINTAINED
A	0	100% (72%)
B	2,453	92% (64%)
C	2,125	93% (65%)
D	1,970	94% (66%)

Alternatives B, C, and D would remove varying amounts of suitable secondary black-backed woodpecker habitat as shown in Table 3-29. Snags left on site would provide opportunities for nesting and foraging. Un-harvested areas would maintain adequate habitat availability, and no adverse effects would be expected from any of the harvest alternatives. All alternatives would be expected to maintain adequate suitable habitat to maintain viable populations.

Cumulative Effects

Cumulatively, with the proposed activities, the project area would maintain adequate black-backed woodpecker habitat to maintain viable populations. No cumulative adverse effects to suitable habitat would be expected.

Normal road and trail maintenance activities have the potential to remove nesting and foraging trees if they are close to a trail or road and present a safety hazard. Effects would include removing site-specific, individual trees, and would not be expected to adversely affect black-backed woodpeckers. Other agency actions such as monitoring and administration of NFS lands and resources would have little to no effect on black-backed woodpeckers or their habitat. No adverse cumulative effects from these types of activities would be expected.

Firewood cutting would remove snags and would reduce nesting and foraging habitat availability along open roads. The decrease in habitat would be limited to areas within about 150-200 feet of open roads, and would not be extensive enough to decrease habitat by significant amounts or cause adverse cumulative effects with the activities proposed for this project. Other public actions such as recreational use or small forest product removal would have no effect on black-backed woodpeckers or their habitat. No adverse cumulative effects would be expected.

Northern Goshawk (*Accipiter gentilis*)

The Northern Goshawk is the largest North American accipiter, or woodland hawk. It is a forest habitat generalist, breeding in coniferous, deciduous, and mixed forests across its Holarctic range (Reynolds et. al. 1992). Although goshawks occur in a wide variety of forest successional stages, nesting birds appear most commonly associated with mature and old growth conifer forests in western Montana and northern Idaho (Hayward and Escano 1989). This forest type has structural characteristics that allow this large hawk to maneuver in and below the main canopy while foraging primarily on other birds and small mammals, which they capture on the ground, in trees, or in the air.

Mature and old growth forests also provide abundant large trees for the placement of large stick nests, which are placed next to the bole of a live conifer on a whorl of large branches. Nests are commonly placed about 40 feet above ground in the

lower one-third of the living crown (Ibid). There is usually a clear flight corridor leading to the nest, with the nest tree itself having an open canopy structure to allow easy nest access.

Goshawk nests found to date on the neighboring districts have been associated with moderate mid-slope mature and/or old growth forest. Nests were usually located adjacent to a water source (marsh or stream), with western larch being the preferred nest tree. In the northern Rockies, both single and multi-storied stand structures with relatively high basal areas were used by nesting goshawks (Ibid). However, nest sites found on neighboring districts are most usually associated with multi-storied stand structures. No recent goshawk nest surveys have been completed on the Three Rivers Ranger District.

The goshawk's home range consists of three components: the nesting area (approximately 30 acres), post-fledging area (approximately 420 acres), and foraging area (about 5400 acres) (Reynolds et. al. 1992; Kennedy et. al. 1994). Variability in the three home range components can be high due to sexual differences in parental care strategies, the familiarity of a bird with its territory, food requirements related to brood size, prey availability within the territory, and the quality of nesting habitat (Kennedy et. al. 1994).

Affected Environment

Forested ecosystems found in the Garver area may be suitable for the northern goshawk. The older mature stands provide potential nesting habitat. The foraging habitat quality is high due to broken topography and mixed age classes, which include openings. The KNF has developed a model for the northern goshawk, which runs on current computer software and uses latest research available to define nesting and foraging habitat. This model predicted approximately 18,099 acres (42% of the project area) of potential habitat within the project area. This potential habitat is found throughout the project area. Habitat for northern goshawk is available and well distributed across the Kootenai National Forest.

Environmental Consequences

Alternative A
Direct, Indirect, and Cumulative Effects

Alternative A would not harvest any trees, and would not remove components that would improve structural diversity for future stands, such as large old trees, snags and coarse woody debris.

Alternatives B, C, and D
Direct and Indirect Effects

Alternatives B, C, and D would remove a portion of both dead and live trees, which indirectly would reduce future structural components for goshawk habitat. Old growth in the project area would not be affected by the action alternatives, thus there would be no impact to goshawk nesting habitat. Intermediate harvest (20-40 canopy removal) would have a positive effect on foraging habitat for goshawks due to the fact that the understory would be opened up for ease of maneuvering to capture prey. No adverse impacts from any of the harvest alternatives would be expected.

TABLE 3-30. NORTHERN GOSHAWK HABITAT AND EFFECTS BY ALTERNATIVE

PROJECT AREA	ALT A	ALT B	ALT C	ALT D
N. Goshawk Habitat (acres)	0	2,042	1,765	1,611
% Reduction	0%	11%	10%	9%

Cumulative Effects

Other agency actions such as noxious weed control, road and trail maintenance, data collection, monitoring and other administration of NFS lands and resources would not affect goshawks or their habitat. No adverse cumulative effects from these types of activities would be expected.

Firewood cutting would continue to occur, and would reduce potential future structural components of future goshawk habitat. Other public actions such as recreational use or other forest product removal would not affect would not affect goshawks or their habitat. No adverse cumulative effects would be expected.

Boreal Toad (*Bufo boreas boreas*)

The boreal toad occurs in a wide variety of habitats from the Great Basin deserts of Nevada to the coastal forests of southeastern Alaska and from sea level to timberline in mountainous areas. These toads are usually nocturnal in behavior but are occasionally found active during daylight especially on rainy, overcast days or during breeding activity. Mature toads eat a wide variety of insects as well as spiders, crayfish, earthworms, snails and ants. Some studies suggest that ants are a major food item in the Rocky Mountains. Sexually mature adults migrate to water for spring breeding and favor ponds, shallow lake edges and slow moving streams or rivers. Females lay about 12,000 eggs per clutch (Nussbaum et al 1983) and double strings of eggs are deposited in shallow water. Eggs hatch in a week or so depending on water temperature and the resulting small black tadpoles frequently form dense schools close to the shoreline while searching for warm water in which to feed. By late summer tadpoles transform into small toads about 12-14 mm in length and begin their terrestrial life.

Declines in amphibian populations of North America have been reported by biologists since the early 1970s with well documented declines noted in the frog genus *Rana* and the toad genus *Bufo* (Corn 1994). The boreal toad has undergone severe population declines within the last 25 years particularly in the southern portion of its range. This has included Colorado, Wyoming and northern New Mexico. The specific causes for this decline remain unknown but recent field work has focused on several possible causes. Corn and Vertucci (1992) explored acid rain as a possible cause for observed declines in *B. boreas* and *Rana pipiens* in the mountains of Colorado and Wyoming but concluded that "acidic deposition poses little risk regionally to amphibians in the Rocky Mountains." Blaustein and Wake (1995) found reduced hatching success in *B. boreas* eggs when exposed to UV-B radiation in Oregon but Corn (1998) found no adverse UV-B effects to toad embryos during his work in Colorado. In addition, Corn pointed out that during *B. boreas* population declines of the 1970s and 1980s in the southern Rockies there was no evidence for increased amounts of UV-B radiation. Blaustein and Wake suggested that synergistic effects between UV-B and a locally occurring fungus *Saprolegnia* was causing amphibian mortality. New evidence (Cunningham 1998) suggests that a previously undescribed chytridiomycete fungus might be responsible for worldwide declines of amphibians; this new possible cause has not been verified in boreal toad populations.

In Montana, Black (1970) and others have established that boreal toads were common in the western part of the state in the 1960s and earlier. Recent work by Werner et al (1998) in western Montana concluded that the boreal toad has likely undergone a population reduction. Unfortunately, available historic references are somewhat ambiguous and do not lead to definite conclusions. In Canada, Green (1997) and his collaborators have not detected declines in boreal toad populations in British Columbia, Alberta or the Yukon.

Affected Environment

Surveys between 1993 and 1995 on the Kootenai National Forest located 63 adults. The total population size on the Kootenai National Forest is unknown. Out of 134 wetland sites surveyed for amphibians on the Kootenai, only 10 had evidence of successful breeding (eggs, tadpoles) during the 1993-94 survey (Werner and Reichel 1994), and five additional sites were confirmed during the 1995 field season (Werner and Reichel 1996). Surveys (1997 and 1998) of approximately 200 potential sites in the Bull River drainage found boreal toads breeding at only eight sites (Corn et. al. 1998). Additional breeding sites have been located by Forest Service personnel during non related field work. The table below summarizes occurrences and active breeding sites by planning unit in the Kootenai National Forest.

TABLE 3-31. BOREAL TOAD OCCURRENCES AND ACTIVE BREEDING SITES BY PLANNING UNIT

PLANNING UNIT	KNOWN OCCURRENCES@ PRIVATE LANDS*	ACTIVE** BREEDING SITES PRIVATE LAND	KNOWN OCCURRENCES NFS LANDS	ACTIVE BREEDING SITES NFS LANDS
Bull	3	1	8	2
Clark	6	0	9	1
Fisher	1	0	1	0
Koocanusa	1	1	16	12
Kootenai	4	3	6	3
Stillwater	0	0	0	0
Tobacco	4	4	15	10
Yaak	1	0	14	7
Forest-wide	20	9	69	35

@ Occurrences include eggs, larvae, juveniles or adults
* Private lands included are within the exterior perimeter of the Kootenai National Forest
** Active breeding sites include sites with current evidence of breeding (field verified 1995-1998) - egg masses or tadpoles

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

The No Action alternative maintains existing conditions within the project area and allows natural processes to occur (except wildfire). No direct, indirect or cumulative effects would alter conditions in wetland breeding sites or in upland areas. No impacts to local toads or their habitat are expected. The cumulative effects of past and present management activities as well as natural random events have been incorporated into the description of existing conditions in the project area.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

The action alternatives would harvest varying amounts of timber in the project area. Harvest units have been designed with riparian setbacks (RHCAs) sufficient enough to protect breeding habitat from adverse effects associated with logging. Units 5, 24, 32B, and 34 may have some equipment movement through the RHCAs, if water

and soil resources can be adequately protected. Design features addressed in the Water Resources section are sufficient to minimize impacts to boreal toads. Harvest and site prep (burning) does have some probability of causing direct, incidental mortality among local boreal toads. Although there is a high risk that individuals present within harvest units would be killed, it would have minimal effect on the overall population in the project area (5-6% of project area treated) and thus not be expected to affect the continued viability of the boreal toad within the project area. Harvest units would likely be recolonized after post harvest activity was completed. Coarse woody material retention requirements would maintain adequate structure for boreal toads and their food base in early stages of vegetative succession.

Cumulative Effects

There would be no adverse effect to this toad from all past, present, proposed, and foreseeable activities known within the project area which would compromise the continued viability of this animal species.

Coeur D'alene Salamander *(Plethodon idahoensis)*

Primary habitats for the salamander include the streamsides of small rivers or creeks, waterfall spray zones and seeping rock outcrops below 5,000 feet in elevation. Many small colonies are known to occur along creeks dropping into the Kootenai River valley both upstream and downstream from the city of Troy. Large-scale management activities usually do not occur within salamander habitat because of the need to conserve riparian corridors. However road management involving bridge/culvert structures at creek crossings can impact salamanders and their habitat directly.

Affected Environment

Coeur d'Alene salamanders occur in and around waterfalls, coldwater seeps and riparian zones of rivers and creeks in the Yaak River system. Preferred Coeur d'Alene salamander habitat within the project area is restricted to riparian zones below 5,000 feet in elevation. There are documented sightings of Coeur d’Alene in the project area.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

The No Action alternative maintains existing conditions within the project area and allows natural processes to occur (except wildfire). No direct, indirect or cumulative effects would alter conditions in riparian zones. No impacts to local salamanders or their habitat are expected. The cumulative effects of past and present management activities as well as natural random events have been incorporated into the description of existing conditions in the project area.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Both action alternatives would harvest varying amounts of timber from the project area. Harvest units have been designed with riparian buffers (RHCAs) sufficient enough to protect salamanders and their habitat from adverse effects associated with logging.

The action alternatives contain Best Management Practices road work, which could directly affect salamanders and their habitat. Culvert installation or reworking ditch lines could directly contribute to incidental mortality if salamanders were present. Although there is a low risk that some individuals could be impacted, it would have minimal effect on the overall population and thus not be expected to affect the continued viability of the Coeur D'Alene salamander within the project area.

Cumulative Effects

Peak flow increases would be maintained within standards thus preventing adverse water quality changes or physical changes in channel morphology. For further discussion on water quality read the Chapter 3, Watershed Resources section. In summary, there should be no adverse effect on this salamander from all past, present, proposed, and foreseeable activities known within the project area, which would compromise the continued viability of this animal.

Harlequin Duck *(Histrionicus histrionicus)*

The harlequin duck is a rare but regular nester along isolated, swift rivers and streams in the mountains of Montana. Harlequin duck surveys have documented 110 breeding pairs within the state of Montana. Human encroachment and activities that affect the availability of aquatic invertebrates or stream flows, can disrupt breeding success. Diets consist of crustaceans, mollusks, small fish, and aquatic insects. Degradation of water quality of mountain streams supporting harlequin ducks seriously impacts food resources. Harlequin ducks, especially nesting females, avoid areas frequented by people. Fishing, whitewater rafting and camping are recreational activities associated with harlequin duck habitat.

Affected Environment

The Kootenai and Yaak River drainages are known to contain harlequin ducks. Sightings have been documented on the Yaak River, West Fork Yaak River, and Pete Creek during the 1990s (District wildlife files). The species also occurs in a number of other streams throughout the Kootenai National Forest. The cumulative effects of past and present management activities (including blowdown, small sales) as well as natural random events have been incorporated into the description of existing conditions in the project area.

Potential harlequin duck habitat within the project area is located on the West Fork Yaak River and the Yaak River. Surveys specifically for harlequin ducks have not been completed within the project area recently.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

This alternative would have no impact on the harlequin duck or its habitat due to the fact that no action would be taken.

Alternatives B, C, and D
Direct and Indirect Effects

Proposed harvest units and related road work are far enough away from the main Yaak River and the West Fork Yaak that indirect disturbance would be minimal. Harvest activity would not contribute to direct or indirect effects to harlequin ducks because of the distance between the harvest activity and potential habitat.

Cumulative Effects

Peak flow increases would be maintained within standards thus preventing adverse water quality changes or physical changes in channel morphology. For further discussion on water quality read the Chapter 3, Watershed Resources section. In summary, there should be no adverse effect on the harlequin duck from activities within the project area, which would compromise the continued viability of this bird.

Flammulated Owl *(Otus flammeolus*)

The flammulated owl is migratory in the northern latitude, arriving in their nesting territories in May and leave by mid-October. Most studies indicate that flammulated owls prefer dry habitat groups. However they are known to use a variety of cover types. Studies in Region 1 of the Forest Service (includes Kootenai, Flathead, and Panhandle forests) indicate that flammulated owl were found in conifer stands dominated by ponderosa pine and or Douglas fir (Hayward and Verner, 1994). They favor older stands with low to medium stem densities. Stands that support a high prey (insect) density are favored for feeding. The flammulated owl is a secondary cavity nester and depends on cavities excavated by woodpeckers such as the flicker and pileated. Fire suppression has allowed stand stem densities to increase in some historical flammulated habitat. This may have led to reduced foraging potential in these habitats (Hayward and Verner, 1994).

Affected Environment

It is currently unknown at this time if flammulated owls are known to inhabit the project area. Observations of flammulated owls south of Troy were located in a mixed conifer stand dominated by Douglas-fir and a supporting component of lodgepole pine (District files). The KNF has developed a model for flammulated owl, which runs on current computer software and uses latest research available to define potential habitat. This model predicted approximately 6,702 acres (16% of the project area) of potential habitat within the project area. Suitable habitat includes mature to overmature timber stands of ponderosa pine and mature to overmature stands dominated by Douglas-fir and larch. These stands support a semi-open canopy. The ponderosa pine/Douglas fir stands in the project area are being encroached to varying degrees by mixed conifers. Much of the encroachment can be attributed to fire suppression over the years. Large snag availability is good within the project area. This species is almost entirely insectivorous, and it is assumed that prey availability is not limiting. Habitat for flammulated owl is available and well-distributed across the Kootenai National Forest.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

The No Action alternative maintains existing conditions within the parcel areas and allows natural processes to occur (except wildfire). The cumulative effects of past and present management activities (including blowdown, small sales) as well as

natural random events have been incorporated into the description of existing conditions in the project area.

ALTERNATIVES B, C, and D
Direct, Indirect and Cumulative Effects

Alternatives B, C, and D would harvest varying amounts of timber in the project area. The direct effect of the harvest in these potential habitat areas would be that flammulated owls would be displaced. Depending on the availability of insects after the harvest and associated site prep activities, flammulated owls could return to the project area.

Regulatory Consistency – Sensitive Species

The State of Montana (MDFWP) currently classifies many of these sensitive species as "species of special interest or concern", but has no laws regulating habitat. Federal laws and direction applicable to sensitive species include the National Forest Management Act (NFMA, 1976) and FS Manual 2670. Long-term management direction for sensitive species is currently being developed at the regional level of the Forest Service. Future conservation strategies for each species will present direction on maintaining habitat diversity and managing for population viability, as required by the NFMA.

The Forest Plan contains the following goals and direction for sensitive species: "Determine the status of sensitive species and provide for their environmental needs as necessary to prevent them from becoming threatened or endangered" (II-1); "Maintain diverse age classes of vegetation for viable populations of all existing native, vertebrate, wildlife species, ... in sufficient quality and quantity to maintain viable populations" (II-1).

In accordance with FSM 2673.42, determinations have been made as to the degree of impact the proposed activities may have to sensitive species. These statements, along with the section above for each species, meet the requirements of the Biological Evaluation for Sensitive Wildlife Species. These statements are for the segment of the population using the project area, not the entire population.

Sensitive Species Findings Common to all Alternatives

No Impact (direct, indirect or cumulative) to the northern leopard frog, northern bog lemming, Townsend's big eared bat, common loon, Columbian sharp-tailed grouse or woodland caribou, since no suitable habitat/animals occur in the affected area for these species.

Sensitive Species Findings for Alternative A - No Action

No Impact (direct, indirect, or cumulative) to the fisher, wolverine, black-backed woodpecker, flammulated owl, northern goshawk, boreal toad, Coeur d'Alene salamander, harlequin duck, or common loon.

Sensitive Species Findings Common To The Action Alternatives

No Impact (direct, indirect, or cumulative) to harlequin duck or due to the distance between their habitat and harvest activities.

May Impact Individuals But Is Not Likely To Cause A Trend To Federal Listing Or Loss Of Viability to the fisher, wolverine, black-backed woodpecker, northern goshawk, boreal toad, flammulated owl or Coeur d'Alene salamander. This is due to

the direct loss of small amounts of habitat or indirect decrease in habitat quality due to harvest operations or disturbance. The boreal toad and Coeur d'Alene salamander could experience low levels of incidental mortality.

CAVITY HABITAT AND PILEATED WOODPECKERS

This species is the management indicator species for cavity habitat as well as old growth. Primary cavity-excavators, such as the pileated woodpecker, commonly breakthrough the outer, harder shell of snags during courtship and foraging activities exposing the softer, rotting heartwood. Besides the cavities created by woodpeckers, secondary cavity excavators, such as the brown creeper and the mountain chickadee continue the excavating process, creating a cavity which is used by many other bird and animal species. According to Thomas (1979, p74), a snag level of 40 percent or more should maintain viable populations of birds dependent on cavities for nest sites.

Forest Plan direction for cavity habitat management is to maintain at least 40% of the potential population capacity of cavity-using species throughout NFS lands, and at least 60% of the potential population capacity in riparian areas (Vol. I, II-31; Vol. II, A-16-3). Analysis is usually conducted on a project area scale. A 100% potential population capacity level, commonly called the snag level, would equate to approximately 225 snags per 100 acres, which is considered the number needed to support full occupancy by cavity excavator species. The 40% snag level equates to approximately 90 snags per 100 acres, and is considered to be the minimum level needed to maintain viable, self-sustaining excavator species populations. Retaining live replacement trees in unit areas is also important for maintaining cavity habitat through time until a stand can generate it's own snags. Snag levels which approach or drop below 40% may be too low to sustain viable populations of cavity-dependent species (Thomas, 1979).

The Kootenai Forest Plan identifies the pileated woodpecker as the management indicator species for cavity habitat (Vol. II, A-12-1). Pileated woodpeckers are important as primary cavity excavators because they create a number of cavities during feeding, nesting, courtship and communication activities that are further excavated by other cavity oriented species. For nesting, they prefer ponderosa pine, Douglas-fir and western larch on old mature stands that are at least 20 inches DBH and at least 60 feet tall. Pileated woodpeckers will forage in most forested sites. They feed on large snags or trees with decay and moist rotting tree butts, especially where carpenter ants are present. Down woody debris and high stumps are important feeding sites where harvest management has taken place. Pileated woodpeckers will use shelterwood and small group selection cut areas, and will fly through open areas, but avoid them for longer feeding, perching and nesting. They tend to move to lower elevations in the winter, and feed on smaller diameter snags if larger trees are not available or if snow depths cover old stumps and down logs. Population viability for pileated woodpeckers and other cavity-dependent species would start to become a concern if overall snag levels approached 40%.

Historically, two processes generally created cavity habitat. One was the natural degeneration of dead trees that is a normal part of the successional stages of forest vegetation. They tended to be fewer in number and intermixed within mostly live stands. Causal agents included disease, insects, physical damage or simply the end of a life cycle. The other process was associated with catastrophic conditions, such as wildfire or large-scale insects or disease. These conditions normally had numerous snags concentrated in one area, with fewer to no green trees, depending on the causal agent. Cavity nesters respond positively to post-fire conditions (Caton, 1996), which provide an increase in cavity or nest sites and increased food (insects). The life of a snag was subject to the influence of wildlife use, fire, wind, snow loads or other natural influences. In more recent years, timber harvest and

woodcutting have influenced snag levels. Forest Plan implementation in 1987 included the retention of wildlife trees to maintain cavity habitat. On a landscape level, cavity habitat has been reduced from historical conditions, but not to a level where the viability of cavity-dependent species would be of concern.

Information from the Northern Region Snag Management Protocol (2000) provides an optional snag retention standard specific to the Northern Region. These recommendations represent expected numbers of snags in the Vegetative Response Units (VRUs) that would support 100% of the potential population capacity for cavity-dependent species in the area, ranging from 4 snags per acre in the lower, warmer VRUs to 12 snags per acre in the higher, cooler VRUs (see M-7 for a display of VRUs in the project area).

Affected Environment

There are currently 6,969 acres of old growth on federal land being maintained for old growth dependent species within the compartments of the Garver analysis area. Distribution is good within the analysis area (see Chapter 3, Old Growth) and will continue to provide adequate habitat for both plant and animal species utilizing the old growth ecosystem.

Snag levels within the project area are relatively high. TSMRS data base information from the past 10 years reveals snags at a level of 6-11 trees per acre with DBHs ranging from 17-21 for these trees in the analysis area. Mature to old growth stands generally have relatively high numbers of snags. Past harvest within the project area was concentrated in lower to mid elevations and did not stress the retention of snags to the degree of current practices. The portion of the landscape made up of the older harvested areas contains a limited number of standing snags capable of providing cavity habitat.

The following table calculates potential snag habitat by VRU as measured through harvest history on federal land. Regeneration harvests are modeled as supplying no snags and intermediate harvests are modeled as supplying about 70% of potential snag habitat. These results demonstrate the abundance of snag habitat currently remaining within the Garver analysis area (70%).

TABLE 3-32. POTENTIAL SNAG HABITAT BY VRU ON FEDERAL LAND WITHIN THE GARVER ANALYSIS AREA

Federal Land VRU (acres)	Regeneration acres	(%VRU)	Intermediate acres	(%VRU)	Potential Snag Habitat %VRU
2 (4,760)	1,350	(28)	697	(15)	67%
3 (2,012)	460	(23)	340	(17)	70%
5 (29,428)	8,729	(30)	4,452	(15)	34%
7 (5,356)	829	(15)	516	(10)	82%
9 (1,166)	38	(3)	129	(11)	93%
Total (42,722)	11,406	(27)	5,504	(13)	**70%**

Environmental Consequences

ALTERNATIVE A
Direct, Indirect, and Cumulative Effects

The No Action alternative would sustain the present condition within the old growth stands and in all of the analysis area that is currently suitable cavity/feeding habitat. Tree mortality would not change from current levels and this area would remain available to woodpeckers. This would be above the minimum 40 percent thought necessary to sustain viable populations. Although firewood cutting would continue to occur along open roads, the impact to cavity habitat would be minimal.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

The action alternatives would minimally change the present condition within some old growth stands identified in the Chapter 3, Old Growth section.

All action alternatives propose regeneration and intermediate harvest of similar acreage amounts and concentrate on mature lodgepole pine stands, overstocked but otherwise healthy stands, and some mature stands of hemlock/cedar. These stands currently furnish nesting and feeding habitat for woodpeckers. Management activities would reduce existing feeding habitat within the project area by 2-3 percent (see Table 3-33). Units proposed as clearcut or seed tree harvest are modeled as losing the ability to support adequate cavity habitat. The other units are predicted to maintain 70 percent of their ability to support cavity habitat, due to many more trees left on site especially western larch. All alternatives leave more than the recommended 40 percent of potential habitat across the landscape necessary to maintain viable populations of cavity nesting birds.

Under Alternatives B and C, no harvest of the existing MA-13 (or other old growth MA) stands in the project area would occur. Alternative D was developed to propose a redelineation of MA-13 to provide better quality habitat for replacement old growth designation, and to remove poor quality replacement old growth from MA-13 designation in Compartment 17 (Hensley Hill). The effect would be that acres allocated to MA-13 in Compartment 17 would increase from 922 to 957. This alternative also drops harvest on 123 acres that is currently available as habitat for old growth dependent species in Compartment 22 but is not designated as old growth. These stands would be available for designation in the event of any losses from natural events (such as stand replacing wildfires) if they were to occur in the present old growth allocations. Under Alternative D, regeneration harvest is planned for 19 acres in Unit 17 that is currently functioning as old growth. The treatment will create openings for wildlife forage and initiate regeneration of western larch and western white pine. From a landscape and project area approach, the effect of harvesting 19 acres of old growth habitat would be minimal. Wildlife species currently using the area would be displaced to suitable habitat adjacent to the unit.

Implementation of any of the alternatives would meet Forest Plan standards for cavity habitat (see black-backed woodpecker). The majority of the harvest proposed in the action alternatives is intermediate harvest. This type of prescription would retain the older trees and existing snags since it is targeting younger trees. The regeneration units in the project area, will designate that 4-12 snags per acre are to be left with the intent of achieving 3-4 standing snags per acre after timber harvest and site preparation activities. This would provide habitat suitable to maintain cavity nesters at higher than minimum viable populations. It should be noted that although snags would be left within harvest units, firewood cutters may take trees that have been marked to leave.

TABLE 3-33. PILEATED WOODPECKER HABITAT AND HARVEST EFFECTS BY ALTERNATIVE

ALTERNATIVE	HABITAT COMPONENT			
	CAVITY HABITAT WITHIN PROJECT AREA		FEEDING HABITAT IN PROJECT AREA	
	Acres Cavity Habitat Harvested	% Cavity Habitat Remaining	Acres of Feeding Habitat Lost	% of Feeding Habitat Remaining
A	0	70%	0	70%
B	1251	67%	1251	67%
C	1002	68%	1002	68%
D	866	68%	866	68%

Although harvest activity would displace birds if they were present, adequate nesting and feeding habitat remains unaffected within the analysis area and available for woodpecker utilization. It is possible that some incidental mortality (eggs or young of the year) could result from incidental harvest of nest trees.

Proposed prescribed fire would have the possibility of disturbing woodpeckers if they were present. Certainly some incidental mortality (eggs or young of the year) could result from these burns if nest trees were occupied within the burn. Overall, these prescribed burns should help maintain habitat by restoring ecosystem processes to which these birds have adapted. Potentially, these burns could also create cavity trees.

Cumulative Effects

Past, ongoing, proposed, and foreseeable activities were assessed for effects to snag habitat on a drainage level. No adverse effects were identified from those actions, and no cumulative adverse effects to pileated woodpeckers or the species they represent as MIS would be expected with this project.

Noxious weed control, road and trail maintenance, data collection, monitoring and other administration of NFS lands and resources would have no effect on snag habitat or snag levels. No adverse cumulative effects from these types of activities would be expected.

For all alternatives, firewood gathering would likely continue along open roads. Since snag levels would remain above 40%, no adverse cumulative effects to pileated woodpeckers or the species they represent as MIS would be anticipated. Public actions associated with recreational use or forest product removal may remove the occasional snag, but would not affect overall snag levels, and no cumulative adverse effects would be expected.

The FY 2001 KNF Forest Plan Monitoring Report states that of the acres evaluated for old growth designation across the forest, 11.2 percent of those acres have been designated as old growth. Much of the unevaluated areas are in wilderness, proposed wilderness, or areas with very little Forest Service ownership (FY 2001 KNF Monitoring Report, pg. 2).

Regulatory Consistency

Forest Plan Standards – All alternatives would be consistent with Forest Plan direction to maintain cavity habitat for at least 40% of the potential capacity of cavity-dependent species (60% in riparian areas) (Vol. I, II-22, II-31). The Forest Plan has no standard specific to pileated woodpeckers other than general direction to provide for viable populations (Vol. I, II-22).

BIOLOGICAL CORRIDORS, INTERIOR FOREST HABITAT AND FRAGMENTATION

Biological corridors are a measure of ecosystem connectivity and have long-term effects on viability of local animal populations and their contribution to regionwide biodiversity. Movement corridors support integration of existing populations by acting as conduits for genetic exchange as well as providing passageways for colonization of unoccupied habitat.

Because the project area is inhabited by animals largely adapted to forest conditions, movement corridors would be used by more of the local fauna if it were forested. Many species prefer to inhabit the interior of mature forests and are out competed along forest edges or in openings. The importance of interior forest habitat has been documented by studies which examined nesting success of birds along a gradient from forest openings into interior forest habitat.

Forest fragmentation is the division of large homogenous forested areas into smaller patches isolated by areas converted into a different type of land use. In a forested environment such as the project area, fragmentation is caused by disturbances such as wildfire or timber harvest. Fragmentation can result in decreasing or rerouting movement corridors and can also reduce available interior forest habitat.

Within the project area, forest fragmentation has historically occurred as a result of wildfires and more recently through timber harvest. The most obvious difference between these two types of fragmentation is patch size. Wildfires were usually several orders of magnitude larger (thousands of acres) than harvest unit, which generally range from 20 to 40 acres in size. Natural fires resulted in a complex mosaic of different burn intensities that often blended with unburned forest in a very gradual manner. Harvest units have resulted in much more predictable homogenous openings which retain little cover and are defined by very sharp ecotones with surrounding vegetation.

Movement corridors are considered at several scales in this analysis. Stand level corridors have already been discussed in relation to proposed unit design. These are the smallest corridors considered and are generally maintained at least 600 feet in width. The landscape level scale is considered across the project area and features major ridgelines as well as third order riparian zones. The regional level scale is considered across the BMU and concentrates on connectivity between Inventoried Roadless Areas (IRAs).

Affected Environment

Currently the project area could be considered more fragmented than it was 50 years prior. This is because recent timber harvests along with associated road construction have converted about one third of the project area into earlier stages of forest succession. Even though this has reduced interior forest habitat and potential travel corridors, the project area maintains enough connectivity to ensure adequate distribution of all animal species known to inhabit the area. Because roads and their connected actions frequently follow low altitude, productive drainage bottoms, ridgelines commonly offer the best opportunity for animal movement.

Within the project area, lodgepole pine is widespread and comprises large percentages of many individual stands. Much of this lodgepole resulted from landscape level fires in 1889 and 1931 and is nearing its natural life-span. Before these high mortality rates began to affect stand canopies, many of these stands were considered interior forest habitat and functioned as excellent movement corridors. However, as natural lodgepole maturation progresses, these stands lose their interior forest qualities as openings punctuate the canopy. Movement corridor value also changes as many larger animals (particularly ungulates) avoid deep accumulations of woody debris.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect, and Cumulative Effects

Alternative A would have no effect on these parameters, as the existing condition would not be altered by proposed Garver activities. Areas of dead lodgepole pine would continue to fall, creating areas of high fuels and an increased risk of a stand replacing fire. Areas of high fuel accumulation still provide movement corridors for many wildlife species. Extremely high fuel loads may cause ungulates to avoid and area. Naturally occurring wildfires and wind events may also affect existing corridors.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

All action alternatives propose timber harvest to varying degrees. Much of the proposed harvest will retain the structure of the timber stands due to the intermediate harvest prescriptions. Treatments were designed to be spread out less intensively over a larger portion of the landscape, to reduce edge and patch effects. The intermediate harvest treatments may also allow the stands to be more resistant to wildlfire and therefore more likely to persist longer than stands not treated. Movement corridors would remain functional in the majority of these stands. At the landscape level (which includes interactions of wildlife species from adjacent drainages with one and other), riparian corridors, and ridgelines play an important role in foraging, mating and dispersal activities. By providing forested corridors connecting interior forest habitat, species such as the wolverine, lynx and fisher are provided for in the project area (see individual species sections). None of the alternatives would create a barrier to movement or dispersal for any wildlife species known to inhabit the project area. At the regional level, the connectivity is very good between BMUs 14, 15, and 16. See discussion on Displacement or Core Areas in the grizzly bear analysis for discussion of the core area in these BMUs. The region includes two Inventoried Roadless Areas that provide large areas of connectivity within the region. These areas are incorporated into the BMU core area. The Garver project will not affect the connectivity of the region.

Cumulative Effects

At the landscape level, the most valuable movement corridors in the project area would be largely unaffected regardless of alternative chosen and activities identified on page 3-2. A few proposed units are located as close as one fourth mile to the ridgeline and could produce some level of disturbance but this would be temporary and considered minor. Riparian corridors will remain intact. At the regional level, the connectivity of the large, contiguous areas will remain intact regardless of the alternative chosen.

MIGRATORY BIRDS

The National Forest Management Act (NFMA) requires that Forest plans "preserve and enhance the diversity of plant and animal communities...so that it is at least as great as that which can be expected in the natural forest" (36 CFR 219.27). Additional direction states that "management prescriptions, where appropriate and to the extent practicable, shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species, so that it is at least as great as that which could be expected in a natural forest". Furthermore, implementation regulations for the NFMA specify that, "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area". On January 10, 2001, President Clinton signed an Executive Order titled “Responsibilities of Federal Agencies to Protect Migratory Birds.” On January 17, 2001, the USDA Forest Service and the USDI Fish and Wildlife Service signed a Memorandum of Understanding to complement the Executive Order.

There are currently no Forest Plan Standards specific to migratory songbirds. Some migratory birds, such as the flammulated owl, are classified as endangered, threatened, or sensitive, and are discussed in the DEIS and in other sections of the project record. The Migratory Bird Treaty Act covers many ground-nesting and shrub-nesting birds. Some migratory birds are covered by state hunting regulations; others are protected by non-game status by the Montana Department of Fish, Wildlife, and Parks. Old growth habitat has the highest density and diversity of birds nesting in tree cavities (McClelland and Schmidt 1995).

For Neotropical migratory birds breeding in the western United States, information on population trends, habitat relationships, and effects from past management activities is sparse. The USFS Northern Region Songbird Monitoring Program (Hutto 1995a) has provided some data, however, monitoring did not begin until 1994. The data have been combined to determine population trends on a continental, regional, statewide, or physiographic region scale.

Brown-headed cowbirds can have negative effects on songbird populations through nest parasitism. They are common to abundant, particularly in rangeland, agricultural and residential areas. Population trend estimates for 1966 to 1994 from the Breeding Bird Survey show statistically significant, large increasing trends in Montana, North Dakota, and Idaho. The cowbird is expanding in concert with landscape changes caused by European settlement of North America. In the USFS Northern Region, the species range has likely expanded out of the Plains to areas where it was once uncommon to nonexistent. Historically, cowbirds likely occurred in short-grass prairie, shrub-steppe, and grassy valley bottoms wherever there were herds of grazing animals. Cowbirds are now moving into coniferous forest landscapes where they were once uncommon to nonexistent.

Affected Environment

The project area provides a variety of bird habitat, with a substantial amount of riparian habitat within the boundaries. Songbird Monitoring Program data indicates the project area is used by many species of birds. Grazing is occurring on the north side of the Canadian border.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

The No Action would maintain existing conditions of the activities identified on page 3-2. Natural processes would prevail and those birds that find suitable nesting and foraging within coniferous forest landscapes would be unaffected except as natural changes over time occurred.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Some portions of the project area have had human induced forest fragmentation as a result of past timber harvesting. Bird populations that breed in the western United States appear to be suffering from forest fragmentation in breeding habitat (Hejl et al. 1995), and harvest and excessive tree mortality further contributes to short-term fragmentation (Rotenberry et al. 1995). Problems associated with forest fragmentation include overall habitat loss, increase in high-contrast edge habitat and edge effects, isolation effects, and increased predator pressure (Finch 1991). Brown-headed cowbirds, nest parasites on many migrant birds, appear to benefit from forest fragmentation, particularly where livestock graze within about 5 miles. The project area does not include livestock grazing and would not contribute to an increase in brown-headed cowbirds. Each of the alternatives do provide for future needs of birds that use snags throughout their life cycle by retaining varying levels of snag densities within proposed units. Snags, over time, will fall to the forest floor where they provide a variety of micro-habitats (Hutto 1995b). There would be no expected extirpation threat to any migratory birds.

Cumulative Effects

The long-term effects will vary widely among different bird species. Considering past habitat modifications, the natural habitat, and proposed snag retention levels within each of the units, no significant loss of migratory bird habitat is expected from the implementation of any of the proposed action alternatives.

FISHERIES

Introduction

Analysis Area

The major drainages with this subunit include West Fork Yaak River, French Creek, Pete Creek, Lap Creek, Waper Creek, and Mud Creek, as well as several small drainages that are tributary to the Yaak River. Additional watershed information can be found in the Chapter 3, Water Resources section.

Regulatory Framework

Endangered Species Act

The Endangered Species Act (ESA) of 1973 declares, "…. all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." Federal agencies also must consult with the Secretary of the Interior (for non-marine species) whenever an action authorized by such agency is likely to affect a species listed as threatened or endangered.

The Kootenai River population of the Columbia basin redband rainbow trout (*Oncorhynchus mykiss gairdneri*) was petitioned for listing under the Endangered Species Act in 1994. This petition was denied by the United States Fish and Wildlife Service (USFWS) August 8, 1995 (Federal Register, Vol. 60, No. 152) because the petition failed to substantiate the interior redband rainbow trout of the Kootenai River as a distinct population segment. USFWS was again petitioned to list redband trout on September 4, 1997. USFWS concluded the listing may be warranted and initiated a status review on November 16, 1998 (Federal Register, Vol. 63, No. 220).

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) was petitioned for protection under the Endangered Species Act on June 6, 1997 by several groups. The USFWS ruled that a status review was warranted on June 10, 1998. On April 5, 2000 (Federal Register, Vol. 65, No. 73) the USFWS ruled that listing the westslope cutthroat trout was "not warranted". The "not warranted" decision was remanded back to USFWS on March 31, 2002. The court decision stated the USFWS determination does not reflect a reasoned assessment of the statutory listing factors on the basis of the best available science. USFWS must evaluate the threat of hybridization as it bears on the ESA's statutory listing factors and issue a new 12-month finding for westslope cutthroat trout within one year.

Bull trout (*Salvelinus confluentus*) are listed as a threatened species under the ESA, (June 10, 1998 Federal Register, Vol. 62, No. 114). The white sturgeon (*Acipenser transmontanus*) is currently listed as an endangered species under the ESA, (September 1994 Federal Register, Vol. 59, No. 171).

Forest Service Guidelines

The Inland Native Fish Strategy (INFS) is incorporated by amendment to the Kootenai Forest Plan (USDA, 1995). The primary objective of INFS is to prevent further degradation of inland native fish habitat. INFS establishes riparian goals for achieving healthy, functioning watersheds. In lieu of a site-specific watershed analysis, INFS requires the use of default standards for fisheries habitat called Riparian Management Objectives (RMOs). Riparian Management Objectives for

forested streams include pool frequency, large woody debris, temperature, and width/depth ratio.

INFS also establishes stream and wetland protection zones called Riparian Habitat Conservation Areas (RHCAs), and sets standards and guidelines for management activities that could potentially affect conditions within the RHCAs. RHCAs of varying widths are delineated on all fishbearing streams, permanently flowing non-fishbearing streams, seasonally flowing or intermittent streams, ponds, lakes, reservoirs, wetlands, landslides, and landslide-prone areas. Widths of RHCAs are partially defined by whether or not a stream is fishbearing and/or perennial, and by the size of the waterbody. Widths of RHCA buffers are assumed to be adequate to protect streams from non-channelized sediment inputs and protect other riparian functions including delivery of organic matter, recruitment of large woody debris and stream shading.

Sensitive species are managed under the authority of the National Forest Management Act (NFMA, FSM 2670.22). The Forest Service is directed to maintain viable populations of native species and to avoid actions that may cause a species to become threatened or endangered. The Northern Region Sensitive Species List (March 1999) includes the following native species: genetically pure interior redband trout (*Oncorhynchus mykiss gairdneri*) genetically pure westslope cutthroat trout (*Oncorhynchus clarki lewisi*), torrent sculpin (*Cottus rhotheus*), and burbot (*Lota lota*).

State Guidelines

Bull trout, westslope cutthroat trout and redband trout have been given special status by state and federal agencies. Montana Department of Fish, Wildlife and Parks (MDFWP) has designated them as species of special concern due to their limited distribution, sensitivity to environmental disturbances, vulnerability to hybridization, and/or competition with other fish species, and risk of over exploitation. Thus, the State will take appropriate measures to preserve and enhance populations of these fish through its stocking programs, fishing regulations, and habitat protection efforts.

In a Memorandum of Understanding (MOU) between the Forest Service and the State of Montana, the Forest Service has been designated as the management agency for water quality protection on National Forest System Lands. In the MOU, the Forest Service has agreed to follow State Water Quality Standards, primarily through the use of Best Management Practices (BMPs). BMPs are designed to ensure water quality and beneficial uses are protected during land management activities. The Soil and Water Conservation Practices Handbook (USDA, 1988) is incorporated as a supplemental document to the Forest Plan. It describes the soil and water conservation objectives that the Kootenai National Forest uses when implementing projects. The objectives are met by applying site specific BMP' to minimize the effects of management activities on soil and water resources, and to protect water-related beneficial uses.

Upper Columbia River Basin (UCRB) Integrated Scientific Assessment

The Upper Columbia River Basin Scientific Assessment (USDA & PNWRS, 1997, Vol. II) identified a number of factors related to timber harvest and road construction that are causing a decline in watershed conditions on National Forests. The analysis of this project considers the relevant UCRB findings on effects of timber harvest and road management on aquatic ecosystems. Implementation of INFS is consistent with UCRB findings.

Data Sources, Methods and Assumptions

Effects of the proposed project are evaluated for the following watersheds: Yaak River, West Fork Yaak, French Creek, Pete Creek, and two face drainages: Upper Yaak River Face, Middle Yaak River Face.

The following indicators were used to assess the current condition of the watershed and potential effects of activities on the watershed and fisheries.

1. Stream Channel Condition and Sensitivity Assessment - walk through and spot check (at road crossings, steep reaches and confluences) - stream gradient, substrate size, evidence of recent scour, riparian disturbance, stream size, and surface and subsurface flow conditions.

2. Function of the road drainage system - culvert spacing, road grade, and interaction of cross drains and streams.

3. Road and road/stream crossing densities

4. District Stream Survey Data: West Fork Yaak (1979 and 1993), Pete Creek (1979 and 1991), Lap Creek (2002) and French Creek (1978 and 1993).

5. RHCA survey and mapping - all units in the project area were surveyed for stream channels to receive the appropriate riparian buffer width.

Additional Data and Information Sources:

Montana Fish Wildlife and Parks Fisheries Information System (MRIS)
Historic stocking records (Montana Fish, Wildlife, and Parks)
Aquatic Biota Information System (ABIS) (USDA Forest Service 1994)
Fisheries and Oceans Canada, Fisheries Information Summary System (FISS Database Search Engine)
Aquatic Ecosystem Inventory Macroinvertebrate Analysis (USDA Forest Service 1991, 1992-1993)
USGS Topographic Maps
Upper Yaak EIS - 1990
West Yaak EA - 1997
1997 Aerial Photos

Affected Environment

Fisheries

Historically, the upper Yaak River and its tributaries (above Yaak Falls) supported inland redband trout, westslope cutthroat trout, mountain whitefish *(Prosopium williamsoni)*, longnose dace *(Rhinichthys cataractae)*, longnose sucker *(Catostomus catostomus)*, and slimy sculpin (*Cottus cognatus*). It is unlikely this area has ever supported burbot, torrent sculpin, bull trout or white sturgeon. The nearest potential habitat for the white sturgeon and burbot is thought to be the mainstem of the Kootenai River. Bull trout and torrent sculpin are found in the Yaak River below Yaak Falls.

Of the westslope cutthroat trout and interior redband trout, the cutthroat was the first to repopulate the surrounding deglaciated valleys. Geologic data suggests a remnant glacial ice plug dammed a couple of valleys when the westslope cutthroat trout repopulated the Yaak River, blocking movement of cutthroat trout into these dammed drainages. The North Fork and East Fork of the Yaak River were among

the valleys inaccessible by the westslope cutthroat trout. The later arriving redband were more dominant and specialized in mainstem systems; therefore the cutthroat were out-competed and displaced from the mainstem of the Yaak River into smaller headwater systems (West Fork and South Fork Yaak River). Once the ice plug broke opening access to the North Fork and East Fork Yaak Rivers, the redband occupied these waters and adopted a life of residency (Perkinson, 1997). Along with geologic data, genetic sampling throughout the Yaak River supports this hypothesis of inland redband trout naturally predominating the North and East Fork Yaak River and tributaries (Sage et. al, 1992).

The existing condition of the composition, distribution, and status of fish within the Columbia River Basin are different than historic conditions, and in many cases irreversible (USDA & PNWRS, 1997, Vol. III). One of the major causes has been the introduction of non-native fishes and aquatic invertebrates to create or expand fishing opportunities. Such introductions have resulted in the elimination of some native populations, and further fragmentation of other populations, putting these isolated populations at risk of extirpation. Non-native fish introductions have caused competition with native fishes resulting in displacement or further isolation of native species of fish. Furthermore, native fishes are also threatened by non-native fish through hybridization and subsequent loss of genetically pure populations through introgression.

Upstream from the Yaak River Falls, most of the trout and whitefish in the main Yaak River migrate into tributaries to spawn. They cannot migrate far up most of these tributaries due to natural waterfall barriers. Above these tributary falls, most creeks contain populations of small resident trout that do not migrate. These waterfalls have isolated native fish for thousands of years, and fish surveys have found several streams that still harbor the native, pure stain of westslope cutthroat. No populations of the rare shorthead sculpin or torrent sculpin have been located in the Yaak River, though they are thought to occur elsewhere on the Forest.

Based upon previous fish habitat surveys and water quality monitoring, the Yaak River drainages are generally in good condition. However, current information suggests that some streams are receiving undesirable effects from tributaries with too many unforested acres or streams flowing out of Canada. Some effects are also due to natural phenomena like tree blowdown, beaver dam collapse, and natural streambank erosion. The lingering effects from historic log drives and wildfires are also major factors limiting increases in fish populations in the Yaak River drainages. These habitat limitations take the form of shortages of woody debris and pools for fish hiding cover and channel stabilization, and a shortage of good spawning gravels in tributaries to the Yaak.

FISH POPULATIONS

Threatened and Endangered Species

White Sturgeon (*Acipenser transmontanus*)

The Kootenai River stock of white sturgeon stock has been isolated from other populations for up to 10,000 years and is one of 18 known landlocked white sturgeon populations in western North America (Apperson and Anders, 1991). White sturgeon spawn during spring peak flows when velocities are high and turbidity is elevated. The older white sturgeon are relatively sedentary in the deepest locations in the Kootenai drainage, often selecting waters more than 20 feet deep with low velocities. They are opportunistic feeders, and subsist on insects, clams, snails and fish.

Potential habitat for white sturgeon includes waters flowing through the Kootenai National Forest. The white sturgeon is restricted to 168 miles of the Kootenai River from Cora Linn Dam, Canada, upstream to Kootenai Falls, Montana. The Yaak River is considered to be potential habitat, but movement to the upper portion of the drainage is effectively blocked by the Yaak River Falls.

The final ESA Species Recovery Plan for the Kootenai River white sturgeon was approved on September 30, 1999 (USFWS, 1999). The plan describes a series of actions that are believed necessary to recover the endangered white sturgeon. The short-term recovery objectives are to: (1) reestablish successful natural reproduction using Kootenai River flow augmentation, and (2) prevent extinction through conservation aquaculture. The Kootenai River white sturgeon could be considered for downlisting to threatened status if criteria described in the plan are achieved. Ultimately, recovery will be based on providing suitable habitat conditions and restoring an effective population size and age structure capable of providing a self-sustaining population (USFWS, 1999). INFS contains standards to protect land adjacent to existing or potential white sturgeon habitat.

Critical habitat for the Kootenai River white sturgeon was designated in September 2001 (Federal Register Vol. 66, No. 173). The critical habitat area for the Kootenai River white sturgeon is entirely within Boundary County, Idaho, and is managed by the state of Idaho. It extends downstream to river mile 141.4, below Shorty's Island. The area contains the only known spawning and early-life stage rearing sites for the species.

Bull Trout (*Salvelinus confluentus*)

Bull trout are found in cold, clear streams and rivers. They are adfluvial spawners and migrate from a lake or large river to spawn in smaller tributary streams. Historically, bull trout were likely distributed throughout the Kootenai River basin, although they are not thought to have ever occupied waters in the Yaak River above the Yaak Falls (Huston 1995, Carlson pers. comm. 2002). Construction of Libby Dam and the formation of Lake Koocanusa functionally separated bull trout into different populations. With the exception of the Lake Koocanusa population, all stocks of bull trout within the Kootenai National Forest are uncommon to rare and at high risk of extinction (Thomas, 1992). Past spawning surveys suggests the historically important migratory populations of bull trout are at the threshold of viability, if not already non-viable.

Reasons for decline include hydropower, forest management (including road building), overharvest, mining, and introductions of exotic fish (Goetz 1989; Ratliff and Howell 1992). Spawning and rearing habitat conditions in all known tributaries of the Kootenai River have been adversely affected due primarily to forest management (including road building) for the lower Kootenai River population in Montana and Idaho. Additionally, many of these tributaries also contain brook trout that are known to interbreed and are thought to competitively exclude bull trout. Currently, all populations in the Kootenai River are at a high risk of extirpation.

The only known use of the Yaak River by bull trout is below Yaak River Falls. Due to the habits of this species and based on extensive surveys, it is highly unlikely that there are any populations of bull trout in the project area. The only potentially affected bull trout population with the proposed project is the Lower Kootenai River stock of bull trout (below Kootenai Falls).

Sensitive Species

Torrent Sculpin (*Cottus rhotheus*)

The torrent sculpin is restricted to the Kootenai drainage in Montana, but is locally abundant in the habitats it occupies. They are bottom dwellers that inhabit riffle areas of small streams and large rivers with rubble or gravel bottoms and cool water temperatures. To date, this species has been located in abundance in twenty-five third order or larger tributaries to the Kootenai River (Gangemi, 1993; Edson, 1992). The existence of the torrent sculpin in the Kootenai River and downstream end of lateral tributaries, and replacement of the species in pristine headwater habitats by the common slimy sculpin indicates the high tolerance of torrent sculpin to sediment, and cool or nutrient-laden waters. Although torrent sculpin require fast water, cobble dominated reaches in the lower ends of tributaries for spawning and nursery areas, they have been found as much as 35 miles upstream in low gradient streams with warm water temperatures and elevated sediment levels. Due to the conditions of habitats currently occupied by torrent sculpin, the principal threat to this species is not fully understood. Although found in other areas of the Kootenai river system, its presence has not been confirmed in the project area. The Yaak River below the falls is the nearest potential habitat for the torrent sculpin.

Burbot (*Lota lota*)

The burbot is the only member of the codfish (Gadidae) family native to Montana. Locally referred to as the "ling" or "ling cod", it is also the only freshwater member of the codfish family (Holton 1990). This species is associated with larger streams or rivers and deep, cold lakes or reservoirs including the Kootenai drainage. The natural distribution of the burbot also includes much of Canada, the northern states of the U.S. from coast to coast and south to include Wyoming, Missouri and Connecticut (Brown 1971). Recent research (MDFWP 1996-97) below Libby dam estimates the population in that area to be near 1000 individuals (range 680-1700). This is higher than previous estimates (MDFWP, 1995-96). Even though spawning has been confirmed below the dam, but not below Kootenai Falls, they still could potentially inhabit the Kootenai River at or near the mouth of the Yaak River.

Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)

The distribution and abundance of westslope cutthroat trout have been severely limited in recent years (Behnke 1992; Liknes and Graham 1988). The strongest populations exist most frequently in the wilderness, Glacier National Park and areas of low road densities or roadless areas. The higher the road density, the lower the proportion of subwatersheds that support strong populations of cutthroat trout (USDA, 1996). Populations persist in 85 percent of their historic range in the Columbia River Basin and only 27 percent of their historic range in Montana and are genetically pure in only 2.5 percent (Rieman and Apperson 1989, Liknes and Graham 1988; USDA, 1996).

Westslope cutthroat trout live in clear, cool streams usually with water temperatures under 60 F and require habitat containing rocky, silt-free riffles for spawning and deeper pools for feeding and resting. Westslope cutthroat populations throughout Montana have been affected by changes in habitat and the stocking of non-native cutthroat and rainbow that have hybridized with the westslope cutthroat and eliminated many of the original native populations.

There are 14 known genetically pure westslope cutthroat trout populations in the Yaak River watershed above the falls. All of these populations occur in the upper reaches of tributaries with hybridized populations found below in stream main

courses and the Yaak River itself. Some of these populations are found above migration barriers, and all populations are effectively isolated from each other due to hybridized and exotic populations occurring between the genetically pure populations.

Streams within the project boundary that contain genetically pure cutthroat trout are French Creek, Pete Creek, Garver Creek, and the West Fork Yaak River. (See Native Fish Distribution Map, M-14.)

Interior Redband Trout (*Oncorhynchus mykiss* gairdneri)

Behnke (1992) differentiates the redband-rainbow-golden-steelhead trout complex into six "subspecies", one of which is the Columbia/Frazier redband, including the Kootenai River redband. The Kootenai River and tributaries, including the entire Yaak River drainage, in Montana represent the furthest inland penetration of redband trout in the Columbia River Basin, with the Kootenai Falls being the upstream migration barrier.

Historically, the interior redband trout occupied much of the Kootenai River system, including the Yaak River. Now, only a few remnant populations exist due to habitat degradation and planting of non-native stocks of coastal rainbow trout. Genetic introgression with these exotic stocks is thought to be the principle cause of reductions in distribution and abundance throughout its historic range (Behnke 1992). Much of the controversy surrounding the redband is over the genetic integrity of remaining populations, and the imminent danger of hybridization with non-native hatchery propagated fish.

Of the six known populations of interior redband trout in the Kootenai River basin, two are found partially in Montana. Of these two metapopulations, one is located within the Upper Yaak watershed area, occupying portions of the East Fork Yaak River and the North Fork Yaak River. Although there are genetic remnants of interior redband throughout the mainstem of the Yaak River and Pete Creek, they are not considered a distinct population due to hybridization. The other metapopulation of interior redband trout are found in Callahan Creek, a tributary to the Kootenai River. At least one migration barrier (Yaak Falls) and over 50 miles (Yaak River and Kootenai River) occupied by hybridized fish separate these metapopulations.

Watershed and Fisheries Condition by Stream

West Fork Yaak River: A Canadian survey indicates the presence of bull trout in the Canadian portion of the West Fork Yaak River (Radridge, 2000). Personal communications with the Nelson B. C. Regional fisheries biologist, Bill Westbrook, reveal confusion and lack of confidence in their data. Montana Fish, Wildlife and Parks has repeatedly surveyed the Yaak River, West Fork Yaak and their tributaries and have not located any bull trout above Yaak River Falls. Assumptions made in this document are based on the MDFWP data for these reasons.

The West Fork Yaak River channel is controlled by large rock, gravels and bedrock outcrops. Channel bottom materials, for the most part, range in size from cobble to coarse sand. This indicates the smaller sediment is being transported downstream from the headwater tributaries (USDA 1990). A stream survey of West Fork Yaak documented a stable channel with several large logjams and riparian areas frequently characterized by old growth and mature timber (USDA Forest Service, 1993).

A stronghold for westslope cutthroat trout on the Kootenai National Forest exists in the West Fork Yaak River and its tributaries. Westslope cutthroat trout above the upper falls in the West Fork Yaak River are genetically pure. Unlike, other areas on the Three Rivers Ranger District, there are no introduced species in this drainage. Thus, westslope cutthroat trout in the West Fork Yaak River are free from the threats of displacement, isolation, and hybridization caused by non-native species. The watershed has the most connected habitat occupied by only pure westslope cutthroat trout population on the district (about 28 km from its headwaters downstream to the Canada border and 15 km downstream from the Canada border to Upper WF Yaak Falls). The West Fork Yaak River probably supports both fluvial and resident life history strategies. The combination of the two life history strategies and the large segment of interconnected habitat provide the subpopulation protection from extinction as a result of stochastic events.

French Creek: Stream surveys conducted in 1993 show good spawning gravel in the lower reaches of French Creek, stable banks, abundant large woody debris and hiding cover. Very few fish were noted in French Creek, which supports fair to poor populations of trout. French Creek enters the West Fork of the Yaak River through a bedrock chute that likely serves as a fish barrier at least part of the year. Present at 700 feet from the confluence with the West Fork Yaak, is a series of steep cascades and falls that are likely fish migration barriers. Also a twenty-five foot falls at approximately river mile 1.5 appears to be the upstream extent of fish distribution. Flow in the upper reaches is often subsurface as the channel narrows. Portions of this channel contain fairly unique wetland habitats where subsurface flow runs through cedar and spruce dominated areas.

French Creek is a third order tributary of the West Fork Yaak River. Streams tributary to French Creek are small first order streams that have probably never been occupied by fish due to their small size and steep gradients.

The section of French Creek in the vicinity of unit 33 (a, b, & c) and was surveyed for fish in the summer of 2002. No fish were found in the mainstem or the tributaries in the unit area.

Pete Creek: Pete Creek is a third order tributary to the Yaak River. Pete Creek contains some meadow complexes and beaver activity, characteristic of low energy systems. Watershed stream survey data from 1991 suggest good stability for the majority of the stream length. As a result of past management, the lower section of Pete Creek is void of large woody debris.

Based on observations made during the 1991 watershed stream survey, sediment levels may be limiting fish habitat by degrading winter rearing habitat and decreasing residual pool volume; and by degrading spawning habitat by increasing levels of fine sediment within spawning gravels. It also may be reducing emergence success.

Lap Creek: Lap Creek is a third order tributary to the Yaak River. Although the genetic composition of the trout in Lap Creek has not been identified, the stream does support poor to moderate trout habitat. A survey of Lap Creek in 2002 found cutthroat trout to the 2.7 river mile. The culvert at Yaak Hwy 92 is a barrier to upstream migration limiting Lap Creek to a resident population only. Sections of Lap Creek are dry in the summer months and a private water withdrawal exists in the lower reaches reducing the quality and quantity of habitat available. Based on the stream survey data, Lap Creek is a stable system, with well vegetated banks and abundant large woody material.

Mud Creek: Mud Creek is a second order tributary to the West Fork Yaak. There has not been a stream survey of Mud Creek but general characteristics observed

conclude it is a stable, marsh like system with very low flows. Near the confluence of Mud Creek with the West Fork Yaak is a barrier culvert at the 928 road crossing. The stream below this crossing to the confluence is a steep, chute dominated channel with very low flow that also appears to limit fish migration into Mud Creek.

Due to the physical characteristics of Mud Creek (size, gradient and low flows) fish presence is highly unlikely.

Unnamed tributaries to the Yaak River on the south slope of Hensley Hill: These small tributaries are first order, intermittent streams. The lowest reaches of these streams flow through wetlands on private lands both on the terrace above the Yaak River and in the riparian area adjacent to the Yaak. Upstream migration into any of these streams is effectively blocked by barrier culverts at Yaak Hwy 92. None of these streams have probably ever been occupied by fish due to their small size, steep gradients and lack of connectivity to the mainstem of the Yaak River.

Macroinvertebrates

Macroinvertebrate data has been collected from the Yaak River, West Fork Yaak and Pete Creek (USDA 1991, 1992-1993). Aquatic macroinvertebrates make good monitoring subjects for assessing water quality; they reflect habitat integrity over time. Information from macroinvertebrate samples can be used to monitor management activities, to evaluate ecosystems, aquatic biodiversity, terrestrial habitat effects on aquatic ecosystems and to establish desired future conditions for ecosystems. During short-term exposure to water of poor quality or adverse changes in habitat, organisms that cannot tolerate the stress are destroyed and the aquatic macroinvertebrate community structure changes. Since aquatic organisms respond to their total environment, they can become an effective tool for detection of environmental changes. (USDA 1991)

Pete Creek: There were warning numbers of moderately sediment tolerant taxa in the community indicating organic enrichment and sedimentation. Cleanwater taxa indicated good water quality and some good instream spawning substrate. The observed number of shredders in the community is generally found where the riparian habitat is in good condition. The diversity and number of organisms present show evidence of a fair to good fishery potential. The biotic condition index (BCI) for the four stations monitored in Pete Creek ranged from good (BCI 85) to excellent (BCI 100). This data indicates the stream condition. The macroinvertebrate community present in Pete Creek indicated the stream was close to meeting its potential and that the ecosystem was stable (USDA 1991, USDA 1992-1993).

West Fork Yaak: Most of the macroinvertebrate taxa in the community had less than resident population numbers, which often indicates instability in the ecosystem. Low alkalinity and difficulty in taking samples during high flows may have played a role. Cleanwater taxa present indicated fairly good water quality and some good instream spawning substrate. The potential for a fishery appeared to be poor to fair. The macroinvertebrate biomass was low even for a stream with low alkalinity, would limit the number and size of fish that could be supported in the community. The observed number of shredders in the community is generally found where the riparian habitat is in good condition. The biotic condition index (BCI) for the West Fork Yaak rated from good (BCI 74) to excellent (BCI 93) for the sites and dates macroinvertebrates were sampled. The BCI rating indicates there may be opportunities for management to improve stability and instream habitat in the aquatic ecosystem (USDA 1991, USDA 1992-1993).

Yaak River: There were indications of organic enrichment and sedimentation at the stations sampled. Cleanwater taxa indicated fair to good water quality and some

good instream spawning substrate. The potential for a fishery appeared to be fairly good. The macroinvertebrate biomass could provide nutrients for a fair to good fishery but could limit the number and size of fish that could be supported in this community. The BCI for the Yaak ranged from 68 – 81. A BCI below 72 is rated as poor, indicating that stress conditions were present. The macroinvertebrate community indicated that there might be opportunities for management to improve water quality and instream habitat in this ecosystem. The observed number of shredders in the community is generally found where the riparian habitat is in at least fair condition. In large rivers the sparse distribution of allochthonous materials does not support the high numbers of shredders generally found in smaller streams (USDA 1991).

Environmental Consequences

Water quality and fish habitat in the Yaak River drainage basin are environmental concerns. Fish are a primary beneficial use of water resources. Timber harvest activities modify hydrologic features that can affect the quality and effectiveness of fish habitat. Increases in sedimentation in tributaries and main stream channels decreases the amount of resting and holding pool habitat available to fish. Sediment accumulations in streams can affect the availability of crevices among rocks, roots and large woody material required by fish. Increased sediment can also decrease aquatic insect production, affect the quality of fish spawning habitat and subsequent egg survival.

Stream water temperature can be altered through riparian harvest. This allows more sunlight to reach the water surface thereby potentially causing an increase in water temperature during summer months. Also, more heat energy will escape during winter months possibly causing anchor and frazzle ice to form. Both these conditions can be detrimental to aquatic life. Riparian timber harvest has occurred along many of the mainstem channels within the analysis area.

Fish populations and habitat are directly, indirectly and cumulatively associated with the water resources in the area. Direct impacts are associated with activities within stream channels and/or riparian areas. Indirect impacts are associated with activities outside of these areas, which influence water and sediment levels. Water quality, in particular sediment levels, is affected by soil disturbance, vegetative cover changes and stream channel alteration. Direct effects of road construction and timber harvest include; the alteration of the watersheds vegetative cover, soil loss or soil disturbance on road and skid trail areas and alteration of stream channel morphology at culvert and bridge installations. Watersheds function in receiving, storing, and transmitting water of quantity and quality sufficient to maintain beneficial water uses depends upon maintaining a healthy vegetative and soils cover. Indirect effects of these activities are alteration of the water yield amount and timing and alteration of water quality, primarily sediment.

Anticipated effects on the fisheries resources and the aquatic habitat that supports them traditionally have been estimated by the effects on representative habitats and species. By ensuring that such representative habitats and species are adequately considered, sufficient habitat quality and diversity are presumed to exist where all species using similar habitats are protected and/or restored. To gain a crucial perspective on how best to manage riparian and aquatic habitat, it is necessary to not only focus on specific representative habitats and species, but also on the ecological processes that create and maintain these habitats, their structure and function.

To remain productive a fish population must have relatively stable habitat conditions over time. Forest management actions produce changes that are similar in kind and

intensity to natural environmental variability. However, human-caused changes tend to persist for longer periods, either because they are more widespread, or because we continually disturb an area. More importantly, human effects generally add to rather than replace, natural factors that affect fish productivity. Fish species vary in their tolerance for, and reaction to, adverse or positive environmental changes. Further, the response of one species may act as an additional negative effect on another species.

ALTERNATIVE A
Direct, Indirect, and Cumulative Effects

Vegetation in previously harvested units will mature over time resulting in gradually decreasing water yield for all watersheds. This recovery should improve overall watershed conditions. If wildfires are successfully suppressed and no prescribed burning occurs, fuel loadings would increase resulting in a greater risk of high intensity fires that could affect watershed conditions.

Existing roads would likely continue to channel surface flow and sediment to the streams. This would keep flows elevated until a majority of vegetative recovery has taken place and hydrologic recovery begins. If these problems were not corrected, they would continue to contribute to habitat degradation. Peak flow increases will never fully recover with the existing road system in place. Undersized culverts could plug and wash out resulting in large increases of sediment to the streams. There would be no road closures to meet grizzly bear standards so road maintenance would continue as scheduled on roads in the project area.

It is assumed that fish populations would stay at current levels. There is a threat to fish and fish habitat if unmaintained roads and culverts fail. Large failures could result in an entire year class loss of fish. There would be an increased risk of fire hazard. Fish have evolved with fire and if a large fire were to occur, fish would most likely move downstream to the Yaak River and then recolonize afterwards if there are no barriers to upstream migration

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Effects to the fisheries resource would be consistent among the action alternatives and are described below by activity.

Maintenance Burning/ Mechanical Fuels Reduction

The proposed burns are low to moderate intensity controlled fires ignited in the spring. The intent is to burn hot enough to cause mortality in sapling size trees, but not kill the overstory vegetation. Using fire as a tool to thin understory trees mimics natural processes that should encourage the growth and retention of larger larch and Douglas fir. It would help return the area to historic vegetative conditions. The RHCAs may be affected by some low intensity burning; however, burning would not retard attainment of riparian management objectives (RMOs). Ignition would not occur in the RHCAs, but some creeping of fire into the RHCAs is possible.

Mortality of large trees is highly unlikely. Some mortality of sapling and pole size trees within the RHCA may occur. Since large trees provide shade for most of the stream length in the project area, no significant reduction in shade is expected. No increase in stream water temperature would occur. Due to the low intensity of fire planned, there is not expected to be any mortality of large trees, or a measurable increase in water yield or sediment. As a result, large woody debris recruitment and bank stability would not be affected.

Harvesting Operations and Associated Activities

Timber harvest activities include temporary road construction, haul road BMP work and maintenance, and slash treatment.

Temporary Road Construction

Four temporary roads with a combined length of 0.91 miles are proposed. They would be completely recontoured after use. They are not located in RHCAs and are located on moderate ground (less than 40 percent sideslopes) so construction and recontouring would not result in sediment delivery to streams, or affect watershed integrity.

Forest roads can cause serious degradation of salmoid habitats in streams (Furniss et al. 1991). Roads directly affect natural sediment and hydrologic regimes by altering stream flow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition and water quality within a watershed (Lee et al. 1997). Roads can interrupt hill-slope drainage patterns and alter the timing and magnitude of peak flows and change base stream discharge and sub-surface flows. Poor road location or concentration of surface and sub-surface water by cross slope roads can lead to road-related mass soil movements. However, roads usually have most direct effects to fish habitat if located in RHCAs and especially if they cross streams where they can intercept water and sediment and directly route it to streams. Temporary roads do not affect hydrologic regimes for as long as permanent roads, so effects to peak flow increases and timing are minimized. Because much of the sediment increases associated with roads occurs during road construction, temporary roads can adversely affect fish habitat. Temporary roads will be located outside of RHCAs, will not cross streams, and will be adequately drained to prevent mass soil movements.

Road Maintenance and BMP Work

Pre-haul road brushing would include scarification in places. Some increase in fine sediment delivery is possible during the first season, but long-term adverse effects would not occur.

No new road construction is proposed under any of the alternatives. Therefore, no new stream channel crossing would be created. Immediate increases in stream turbidity would be negligible. Road maintenance has the potential to directly and indirectly input sediment to streams through ground disturbance in ditch lines and sediment basins. Any increase in sediment would be short term. Over the long term, road maintenance and reconstruction is expected to reduce erosion and the input of sediment into streams. The application of BMPs during and following road maintenance and reconstruction would further reduce short and long term sediment input to stream systems.

If a rain-on-snow event occurs during winter log hauling there is some risk of sediment delivery due to inadequate road drainage. The timber sale contract provisions require maintenance of drainage facilities and shutdown of haul during unsuitable conditions, so adverse effects would be minimized. Short term, minor increases in fine sediment may occur in any of the watersheds due to road maintenance for log hauling, or snow plowing.

Effects Of Timber Harvest

The difference among the alternatives is the amount of harvest. The amount of harvest affects water yield and acres of soil disturbance. Soil disturbance is

discussed in the Chapter 3, Soils section. Sedimentation from harvest units is a very low concern in this area due to the moderate terrain, implementation of RHCAs and the restriction of ground-based logging systems to slopes less than 35 percent.

Increasing sediment production also decreases habitat diversity, degrades spawning and rearing habitat and consequently fish reproduction and survival, and reduces aquatic insect production. The density of salmonids in rearing habitat has been shown to be inversely proportional to the level of fine sediment (Bjornn and Reiser 1991). Fine sediment can greatly reduce the capability of winter and summer rearing habitats and when levels reach 30 percent or more, survival to emergence is significantly reduced (Shepard et al. 1984). Fine sediment may have the greatest impact on winter rearing habitat for juvenile salmonids. Fine sediments can cap or fill interstitial spaces of streambed cobbles. When interstitial rearing space is unavailable, juvenile salmonids migrate until suitable wintering habitat can be found (Hillman et al. 1987). Fine sediment has also been shown to cause alterations in macroinvertebrate abundance and diversity.

Changing the availability of woody debris over time can affect channel stability and habitat complexity and suitability that is important for fish habitat (Fausch and Northcote 1992). Because INFS RHCAs would be implemented, the recruitment of large woody debris would not be affected.

Altering water quality parameters such as temperature and availability of nutrients can affect fish and their habitat. Temperatures would not increase because INFS RHCAs will be implemented. Nutrient delivery from riparian areas would be maintained as well. In addition, the habitat complexity and large woody debris that affects nutrient storage and cycling would be maintained. Typically, there is a 3 to 4 year increase in nitrogen and phosphorus in streams draining a newly harvested area. This brief increase in the two nutrients critical to stream productivity results from the breakdown of logging slash, the flushing of some soil nutrients normally taken up by trees, and in some cases due to slash burning. These short-term indirect and cumulative water quality effects do not generally extend very far downstream because of mitigation by instream sediments and uptake by plants and animals (Murphy and Meehan 1991). However, these nutrients are in general short supply in the affected area and the potentially affected waters downstream would increase aquatic productivity for a short time.

Effects Of Noxious Weed Treatment

Effects upon fisheries and water resources were evaluated in the KNF Herbicide Weed Control Environmental Assessment and Decision (USDA 1997). Spraying would be done by a State of Montana licensed commercial applicator, and only by personnel under the direct supervision of the licensed applicator and will follow the safe application methods and practices and approved herbicides as outlined in the Herbicide Weed Control Environmental Assessment.

Protection of Riparian Area Conservation Areas (RHCAS)

All proposed activities would follow the standards and guidelines prescribed by INFS (USDA 1995). RHCAs would be established along all wetlands and stream courses. INFS highlights four roles of RHCAs: 1) influencing the delivery of coarse sediment, organic matter, and woody debris to streams, 2) providing root strength for channel stability, 3) shading the stream, and 4) protecting water quality (Naiman et al. 1992). Processes in riparian areas and streams vary within watersheds. In steep, high gradient, non-fish bearing streams, RHCAs will be important in protecting water quality, shading the stream, influencing and storing sediment, and providing a source of recruitment of wood to streams. Farther down in the watershed,

vegetation helps store sediment, trees provide stability along the banks, and as trees fall into the stream they will help scour pools and provide cover for rearing fish. Lastly, they provide a colonization site for aquatic insects. Therefore, it is important to understand that processes change along a gradient from the top of the headwater tributaries downstream to main rivers.

Understanding these processes in context with the location of the project is important because objectives may vary. For example, if the project is along a headwater fish bearing stream, retention of large woody debris along the stream would be a must because that wood is important for shading, bank stability, filtering sediment, cover, pool formation and insect production. However, if the project is along a river, the wood is important for filtering sediment and bank stability but has a reduced role in pool formation, cover, shading, and production. Other processes have an increased role in providing fish habitat in larger rivers.

The Yaak River watershed is not a priority bull trout watershed. RHCAs widths would be 300' for all fish bearing streams in the project area, for example, Lower French Creek, Lap Creek and Pete Creek and the West Fork Yaak River (Unit 24 and 25 are the only units that are close to fish bearing streams); 150' for perennial non-fish bearing streams (Upper French Creek, Benefield Creek, and Mud Creek) and 50' for seasonally flowing or intermittent streams and wetlands less than 1 acre.

Cumulative Effects

There would be little cumulative effect from the harvest activities as many of these units sit above the West Fork Yaak and Yaak Rivers. Water yield is not a concern to the aquatic resource since activities are essentially not being funneled through a watershed but are occurring along face drainages.

All alternatives identified a number of non-commercial thin units which would be treated in the next five years. As cover would be maintained within these thinning units, none of the action alternatives would have a cumulative effect on peak flows.

It is assumed that some small salvage sales would be identified within the next ten years. These small sales would be analyzed prior to implementation to determine the effects of the proposed action on aquatic resources.

Effects to Threatened and Endangered Species

Pursuant to the Endangered Species Act the proposed action, and activities connected with it must be analyzed to determine effects to threatened and endangered species.

White Sturgeon: Based on the nature of the proposed activities and distance to the point of effect (Kootenai River). There will be **no effect** to the Kootenai River white sturgeon. The peak flow increase that would occur from this project is an insignificant portion of the total runoff of the Kootenai River. Similarly, any other effects would be diluted to the point of being immeasurable at the point of effect for the white sturgeon.

Bull Trout: Based on: the nature of preferred alternative and connected actions, the distance to the point of effect (Yaak River below Yaak Falls, and the Kootenai River), and the immeasurable effects on the water resource, the proposed activities **may affect, but are not likely to adversely affect** the Lower Kootenai River bull trout population.

Effects to Sensitive Fish

Torrent Sculpin: The point of affect for the torrent sculpin is the Yaak River below Yaak Falls and the Kootenai River. Based on the nature of the alternatives and connected activities, and the distance to the point of effect. All alternatives would have **no impact** on the torrent sculpin.

Burbot: Burbot inhabit similar habitat to that of the white sturgeon. Therefore, the analysis used for the white sturgeon is applicable to the burbot. Based on the nature of the alternatives and connected activities, and the distance to the point of effect. All alternatives would have **no impact** on the burbot.

Interior Redband Trout: All action alternatives are designed meet the intent of INFS and would limit adverse affects to native fish populations by protecting habitat. Any impacts would be short-term and relatively minor considering the range of habitat occupied by the affected population and is not expected to affect viability or resilience of the local population or the Yaak River metapopulation.

Based on the analysis above, all alternatives **may affect individuals and habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**.

Westslope Cutthroat Trout: All action alternatives are designed to meet the intent of INFS and would limit adverse affects to native fish populations by protecting habitat. Any impacts would be short-term and relatively minor considering the range of habitat occupied by the affected population and is not expected to affect viability or resilience of the local population or the Yaak River metapopulation.

Based on the analysis above, all alternatives **may affect individuals and habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.**

Forest Plan Consistency

Based on the available information, all action alternatives are consistent with the Kootenai National Forest Plan direction for protection of fish resources. This is accomplished through implementation of the following: INFS Guidelines and Best Management Practices.

Federal Guidelines - Consistency with the National Forest Management Act

None of the proposed alternatives would affect viable populations of native or desired non-native fish.

Federal Guidelines - Protection of Recreational Fishing

Most streams located in the analysis area do not provide a high degree of recreational opportunity for fishing because of their small size. Alternatives that increase access or degrade fish habitat, in turn, have the ability to limit the number of adult fish available for fishing. If the redband trout, or cutthroat trout is listed under the Endangered Species Act (ESA) because of declines in their natural range, then alternatives that contribute to a trend towards listing could adversely affect recreational opportunities because angling might be restricted. However, streams within the project area support very few fish large enough for angler interest and, therefore, do not provide a high degree of recreational opportunity. None of the alternatives increase access to areas where high numbers of catchable fish reside, and hence, there would be no effect to recreational fishing from increased harvest.

PTES PLANTS

Introduction

Activities associated with timber harvesting, site preparation, fuels reduction, non-commercial thinning, and temporary road construction have the potential to impact proposed, threatened, endangered and sensitive (PTES) plant populations.

The purpose of this analysis is to:

1) determine if the alternatives will adversely impact any of the PTES plant species that have potential to occur in the analysis area, and if so, list mitigation measures. The analysis area for this resource is Compartments 17 (Hensley Hill), 18 (Slim Creek), 19 (Waper Ridge), 20 (Mt. Obermayer), and portions of Compartments 21 (Dusty Peak), and 22 (Lick Mountain). (See Old Growth Analysis Area map, M-11, for compartment locations).
2) insure that the alternatives do not contribute to the loss of viability of any sensitive plant species or cause a trend toward federal listing;
3) comply with USDA Forest Service Region 1 policy to insure that sensitive plant species receive full consideration in the decision-making process;
4) comply with the Endangered Species Act.

This analysis considers the short- and long-term management of the project area as it may affect:

- existing and potential habitat,
- the welfare of existing plants,
- human disturbance,
- cumulative effects.

The following steps were taken to complete this analysis for PTES plants:

1. A map of areas with moderate to high potential for providing habitat for PTES plant species was completed for the analysis area. This map is in the project file. This map shows potential plant habitat at a large scale, and does not adequately map microsites that may also provide habitat. In other words, it is a tool, but does not replace field surveys.

2. District records and the Montana Natural Heritage Program database were then scanned to determine species already known to exist in the analysis area. These populations are included on the analysis map. Areas of proposed activity were overlaid on this map to determine actions with moderate to high potential to impact PTES plants.

3. The next step is for field surveys to be completed for all proposed harvest units, burns and temporary roads with emphasis on areas with moderate to high potential to provide habitat for PTES plants. In general, these areas are streams, wetlands, and riparian zones, mesic coniferous forest with a component of mature western redcedar, moist cliffs and talus slopes, dry meadows, park-like ponderosa pine forest, and dry south facing rocky areas. Unique landscape features have more potential to provide habitat for PTES plants than more common landscape features, so these are emphasized during surveys. Surveys have not yet been completed for this project. However much survey work has been completed in this area for past projects. This past work gives an understanding of PTES plant communities and their habitats in this area. Field surveys for PTES plants will be completed before the implementation of any ground disturbing activity associated with this project.

4. This analysis was completed using the maps, surveys completed to date, literature, experts, and personal knowledge about the requirements of each suspected plant species of concern.

Affected Environment

No Proposed,Threatened, or Endangered plant species are known to occur on the Kootenai National Forest (KNF).

Two threatened plant species, *Howellia aquatilis*, and *Silene spaldingii*, are suspected to occur on the Kootenai National Forest. Also one candidate species, *Botrychium lineare* is suspected to occur on the Kootenai National Forest. "Suspected" means that these species are believed to have potential to occur but, to date, have not been found on the Kootenai National Forest. Fifty sensitive plant species are also known or suspected to occur on the Kootenai National Forest.

There are no known populations of sensitive plant species in any proposed treatment unit or road work site. Two species have been found during surveys for this project within harvest units, and the boundaries of those two units have been modified to drop the areas occupied by those species from any harvest activity. The analysis area contains known populations of sensitive plant species. There is one population of *Botrychium ascendens* (upward-lobed moonwort), two populations of *Botrychium montanum* (mountain moonwort), two populations of *Lycopodium dendroidium* (Prickly tree clubmoss), and one population of *Phegopteris connectilis* (Beech fern).

Forest Service Manual (2670.5 section 19) defines **sensitive** species as "those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by:

a. Significant current or predicted downward trends in population numbers or density.
b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution".

The Forest Service is mandated to maintain viable populations of all native and desirable nonnative species under the National Forest Management Act.

Of the 50 Forest Service designated Sensitive plant species known or suspected for the Kootenai National Forest, 4 species are known to occur, and 3 species are believed to have potential to occur in the analysis area. These 7 plant species plus *Howellia aquatilis* (water Howellia), *Silene spaldingii* (spalding's catchfly), and *Botrychium lineare* (slender moonwort) are listed below in Table 3-34. *H. aquatilis* and *S. spaldingii* are included because they are threatened species. Other than these two species, this analysis only considers those species which are believed to have potential to occur in the analysis area**.** *B. lineare* is included in this analysis because it is a candidate for listing under the Endangered Species Act. As a candidate species *B. lineare* does not have any formal protection under the Endangered Species Act, and it is not currently listed as a Forest Service sensitive species. However, because of this species' rarity and its potential to occur within the project area, it is included in the probability analysis, and will be searched for during the project surveys for rare plants. Mitigation measures will be applied to avoid impacts to *B. lineare* if it is located within any of the activity areas.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

This alternative proposes no ground disturbing activity. The response of each of the PTES plant species to management activity varies by species, and in some cases, is not fully known. We do know that these rare plants and all the native vegetation of the Kootenai National Forest evolved with and are adapted to the climate, soils, and natural processes that took place prior to settlement of this area by Europeans. Any management or lack of management that causes these natural processes to be altered may have a negative impact on native vegetation, including rare plants. An example of altered natural processes would be the removal of fire from the ecosystem. If the No Action alternative is selected and fire is continuously excluded from the analysis area, there could be a negative impact on PTES plant species due to an unnatural build up of fuels, increased canopy closure with a resulting decrease in light to the forest floor, and a decrease in naturally occurring open meadows. This negative impact would be particularly true for *Corydalis sempervirens*, which occurs mainly in post fire plant communities and which may be eliminated from ecosystems if fire intervals become too long. Increased fire intensity due to increased fuels is also likely to be detrimental to native and rare plant species.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

The action alternatives all include timber harvest with associated temporary road construction, prescribed burning for fuels reduction, planting, and road improvement work. These activities have the potential to impact PTES plant species. Four populations of sensitive plant species are known to occur within the analysis area. There are no known populations of rare plants within any proposed treatment units.

Proposed treatment units do not fall into areas of high probability for providing habitat for rare plants. Microsites that could provide habitat for rare plants may occur within these units. Proposed treatment units, temporary roads and road improvement areas will be surveyed for rare plants during the appropriate seasons in 2002 prior to ground disturbance. Emphasis for these surveys will be placed on areas with moderate to high potential to provide habitat for rare plants and units in close proximity to known rare plant populations. These surveys will be conducted by the District Botanist or a qualified biological technician.

Harvest units 4, 7, 9, 17, 33, 34, 35, 38, and 55, have a high component or small pockets of western redcedar and may provide habitat for *Botrychium montanum*. These units will be surveyed for *Botrychiums* and mitigation measures applied to protect any populations that may be found. Mitigation measures generally consist of dropping harvest units or portions of harvest units to protect populations and habitat. It should be noted that many stands of western redcedar do not provide habitat for *Botrychium montanum.* A population of Botrychium montanum, has been found in unit 4, and a population of Lycopodium dendroidium has been found in unit 40 during the surveys that have been conducted for this project so far. The portion of the units that that were occupied by these two sensitive species have been dropped to protect them from potential impacts from this project.

The action alternatives have the potential to spread noxious weeds by increasing disturbed areas that are vulnerable to weed infestation, and through increased vehicle traffic. Recreational and logging traffic and equipment, contaminated gravel, livestock and wildlife can transport weed seeds from infested areas to uninfested locations. Noxious weeds can have a detrimental effect on PTES plant species and other native vegetation by more effectively competing for soil moisture, sunlight, and

nutrients. These impacts can be reduced by eliminating noxious weed seed transport mechanisms into populations of PTES plants. Design features and mitigation measures are prescribed in Table 2-2 Appendix D to reduce the spread of noxious weed seeds.

Cumulative Effects

Past effects to sensitive plant species in the analysis area may have occurred due to wildfire, soil disturbance, overstory removal, fire suppression, and the recent introduction of noxious weeds. The extent or probability of any impact to rare plants from any management activity, or natural event in the analysis area is unknown. It is likely that populations of *Botrychium montanum* may have been impacted by past timber harvest in western red cedar stands. It is also likely that populations of *Corydalis sempervirens* may have existed before fire suppression policies were adopted; however, small populations and seed banks may be present in the analysis area, and the recent fire activity in 2000 may have created more potentially suitable habitat for this species.

The proposed and reasonably foreseeable future projects with the most potential to impact PTES plants include timber harvesting and associated activities, mechanical fuels treatments, herbicide application and fire suppression. These activities may impact rare plants through ground disturbance, toxicity, or removal of overstory canopy. All proposed and future ground disturbing activities, except wildfire suppression, will be evaluated through surveys and biological assessments/evaluations as to their impact on PTES plant species.

PTES PLANT SPECIES BIOLOGICAL ASSESSMENT/EVALUATION

Table 3-34 summarizes the biological assessment/evaluation for the plants considered in this analysis. A detailed report, which includes ecology and response to management activity by individual plant species, is located in the project file.

TABLE 3-34. PTES PLANT SPECIES BIOLOGICAL EVALUATION SUMMARY

SPECIES	HABITAT	CONCLUSION	JUSTIFICATION
PROPOSED,THREATENED, AND CANDIDATE SPECIES			
Howellia aquatilis **(Water Howellia)**	Glacial ponds and river oxbows that dry in late summer	No effect	Habitat absent from activity areas; species not found on KNF
Silene spaldingii **(Spalding's Catchfly)**	Palouse Prairie grassland	No effect	Habitat absent from activity areas; species not found on KNF
Botrychium lineare **(slender moonwort)**	Roadsides in early seral habitat	No impact	Species not known to occur within the project area; surveys will be completed prior to project implementation and mitigation measures applied if necessary
SENSITIVE SPECIES			
Botrychium ascendens **(Upward-lobed Moonwort)**	Roadsides	May impact**	Surveys will be completed prior to project implementation and mitigation measures applied if necessary
Botrychium montanum **(Mountain Moonwort)**	Mature western redcedar stands and wet meadows	May impact**	Surveys will be completed prior to project implementation and mitigation measures applied if necessary
Carex paupercula **(Poor Sedge)**	Sphagnum fens	No impact	Habitat absent from activity areas
Corydalis sempervirens **(Pink Corydalis)**	Post fire plant communities and forest openings	No impact	Surveys will be completed prior to project implementation and mitigation measures applied if necessary
Heterocodon rariflorum **(Western Pearl Flower)**	Vernally moist Submaritime bedrock meadows and dry forest parks, on lightly disturbed soil sites	No impact	Surveys will be completed prior to project implementation and mitigation measures applied if necessary
Lycopodium dendroideum **(Prickly Tree Clubmoss)**	Mesic coniferous valley bottoms	No impact	Surveys will be completed prior to project implementation and mitigation measures applied if necessary
Phegopteris connectilis **(Beech Fern)**	Riparian areas and weeping walls	No impact	Habitat absent from activity areas

**May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

CONCLUSION

Based upon this evaluation and the available information on these species needs, the proposed project and associated activities will have **no effect** on *Howellia aquatilis, and Silene spaldingii,* **may impact individuals or habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species** for *Botrychium ascendens,* and *Botrychium montanum*, and **no impact** on the viability of the other known and suspected sensitive plant

CONSISTENCY WITH THE FOREST PLAN AND OTHER MANAGEMENT DIRECTION

This project is in compliance with Forest Service policy on sensitive species (FSM 2670.32) and the Endangered Species Act. The Forest Service is mandated to maintain viable populations of all native and desirable non-native species under the National Forest Management Act. Clause R1-C6.251#, Protection of Habitat of Endangered Species, will be used in the timber sale contract to modify the action as necessary to protect PTES plant populations in the event that they are missed by field surveys and found after the timber sale contract is awarded.

NOXIOUS WEEDS

Introduction

The spread of noxious weed species has been identified as a concern for this project. FSM 2080.5 defines noxious weeds as "those plant species designated as noxious weeds by Federal or State law. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier host of serious insects or disease, and generally non-native." The Lincoln County Weed Control Act (MCA 7-22-2101) defines a noxious weed as "any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities and that is designated:

(i) as a statewide noxious weed by rule of the department; or

(ii) as a district noxious weed by a board, following public notice of intent and a public hearing."

Invasive plant species include noxious weeds and other non-native plant species with invasive characteristics that are not currently recognized by law. Invasive and noxious weeds have characteristics that permit them to rapidly invade and dominate new areas, out competing other vegetation for light, moisture and nutrients. Some of these characteristics include:

- Early maturation;
- Profuse reproduction by seeds and /or vegetative structures;
- Seed with long viability periods;
- Seed dormancy allowing periodic germination during favorable conditions;
- Adapted to spread via human or natural agents such as in contaminated gravel or crop seed, in tires, and on livestock, pets or clothing;
- Production of biological toxins that suppress the growth of other plants;
- Prickles, spines or thorns that can cause physical injury and repel animals;
- The ability to parasitize other plants;
- Seeds that are the same size and shape as crop seed, making cleaning difficult;
- Root structures with large food reserves;
- Able to survive and produce seed under adverse environmental conditions;
- High photosynthetic rates (Westbrooks 1998).

Noxious weeds are often spread by human activities associated with vehicles and roads (Roche and Roche 1991), contaminated livestock feed, contaminated seed, and poor range management practices (Lacey et al 1995). Monocultures of noxious weeds can become established in unmanaged lands and spread to adjacent rangeland, forests, and farmlands, causing great environmental and economic impacts.

According to a recent survey by the U.S. Department of the Interior, noxious weeds have invaded over 17 million acres of public rangelands in the West, more than quadrupling their range from 1985-1995 (Westbrooks 1998). When invasive species such as cheatgrass, red brome and medusahead are included, there are 100 million acres of moderately to heavily infested land (Westbrooks 1998). Invasive species are expanding their range on public lands at the rate of approximately seven square miles per day (Westbrooks 1998). The public has become increasingly concerned as aggressive noxious weeds replace native plants, reduce access to recreational sites, and reduce forage for livestock and wildlife.

Economic impacts of noxious weeds can be substantial. In North Dakota, it is estimated that the effects of noxious weeds produce an annual loss of $87 million (Westbrooks 1998). In 1994, grazing capacity lost to leafy spurge in Montana, the Dakotas and Wyoming would have supported a herd of about 90,000 cows and generated about $37.1 million in annual livestock sales. Direct and secondary economic impacts of leafy spurge infestations on grazing land and wild land in the four state area amount to approximately $129 million and represent the potential loss of 1,433 jobs (Leitch et al. 1994).

Noxious weeds may also have adverse health effects on humans by causing mechanical injuries and creating allergic reactions. A summary of adverse environmental impacts of noxious weeds is presented below (Westbrooks 1998).

Wildlife, Plant Communities and Biodiversity

- Solid stands of invasive plants can replace natural ecosystems;
- Noxious weed invasion can lead to extinction of native plant species, including threatened and endangered species;
- Noxious weeds can impair soil and water resources;
- Invasive plants can ruin fish spawning habitat by causing soil erosion;
- Noxious weeds can reduce the amount of cryptogammic ground crust which is important for nitrogen fixation;
- Invasive plants degrade wildlife habitat.

Cultural Resources

- Plant species and populations traditionally used for religious and cultural practices by American Indians, Hispanics, Anglos, and others can be threatened by invasive plant species.

Recreation

- Noxious weeds can be a nuisance to hikers, campers, boaters, pets, and rafters;
- Invasive plants can reduce revenues from hunting, fishing, and tourism.

Forests

- Noxious weeds can increase the risk of fire hazards;
- Invasive plants are serious problems in forest nurseries;
- Invasive species reduce regeneration, growth and yield in plantations.

Wetlands and Waterways

- Invasive aquatic plants slow water flow which results in more evaporation from ditches;
- Invasive aquatic plants reduce water intended for crops;
- Invasive aquatic plants can interfere with boat travel.

Croplands

- Weeds limit choices of crop rotation sequences and cultural practices;
- Weeds cause loss of crop quality;
- Invasive plants can be vectors of other pests;
- Weeds interfere with crop harvesting;
- Weed control is costly: $5 billion was spent by farmers on herbicides in 1995;
- Weeds interfere with water management in irrigated crops;
- Weeds reduce land values.

Yards and Gardens:

- Invasive weeds cost time and effort to control.

Rights-of Way: Highway and Utility Corridors

- Invasive weeds increase road maintenance costs by growing through cracks in asphalt;
- Weeds can obscure vision at intersections;
- Weeds increase costs of vegetation management.

Rangeland and Pastures:

- Invasive plants can injure grazing animals and reduce forage and water available;
- Weeds can create or contribute to existing soil erosion problems.

Analysis Area

The analysis area for noxious weeds is the Garver project area (see Vicinity Map).

Affected Environment

A number of noxious weed species have been introduced throughout the Three Rivers Ranger District. Noxious weed surveys in the Garver Project Area have located infestations of absinth wormwood (*Artemisia absinthium*), spotted knapweed (*Centaurea maculosa*), oxeye daisy (*Chrysanthemum luecanthemum*), Canada thistle (*Cirsium arvense*), orange hawkweed (*Hieracium aurantiacum*), meadow hawkweed (*Hieracium pratense)*, common St. John's-wort (*Hypericum perforatum*), spotted cat's-ear (*Hypochaeris radicata*) and common tansy (*Tanacetum vulgare*). A single rush skeletonweed plant (*Chondrilla juncea*) was found in the West Fork gravel pit in 1997. This plant was sprayed, and the site monitored for the presence of other plants. None have been found to date.

Spotted knapweed is one of the predominant noxious weeds in the project area. This is a biennial or perennial forb that can produce up to 18,000 seeds per plant per year under favorable conditions (Lacey et al 1995). These seeds are known to survive in weed-contaminated soils or gravel for at least 12 years.

Spotted knapweed ranks as the number one weed problem on rangeland in western Montana. It is adapted to a wide range of environmental conditions. It was previously believed that, on the Kootenai National Forest, invasions of knapweed mostly occurred on roads and roadsides. However infestations now occur on skid trails and other disturbed areas, and even spread into healthy native plant communities. This is especially true in big game winter range and other dry habitats.

Orange and meadow hawkweeds are increasing in number of infestations, size of infestations, and density of plants within infestations in the project area and on the District in general (Ferguson, personal observation). Seeds of both these species are wind dispersed, as compared to spotted knapweed, which has a heavier seed. The hawkweeds appear to spread faster than spotted knapweed and can disperse without human assistance. Orange and meadow hawkweeds have been found to colonize and dominate understory vegetation in regeneration harvest units on the district and within the project area. The exotic hawkweeds also spread vegetatively through stolons and, once established, form dense mats that exclude most other forms of vegetation.

The Lincoln County Weed Control Act (MCA 7-22-2116) states that "it is unlawful for any person to permit any noxious weed to propagate or go to seed on his land" unless entered into an agreement with the county for management of those weeds. The goal of noxious weed management on the KNF is to comply with this law, and manage weeds in order to protect forests, rangelands, wildlands, and adjacent farmlands, and to cooperate with private individuals and county and state agencies concerned with managing noxious weeds (USFS 1997). All of these plants are very effective competitors. Preventing noxious weeds from invading new areas is the cheapest and easiest way to control them. Spraying of herbicides is currently the most effective method of control for smaller populations once noxious weeds have been introduced. Roads, railways and waterways are common dispersal corridors for weeds, and spraying of these dispersal corridors can be effective in reducing the spread of weeds to and from there (Sheley et al 1999).

Recently, biological control agents, or biocontrols, have been released on the District to control spotted knapweed, Canada thistle, St. John's-wort, and Dalmatian toadflax. A total of ten different insect species have been released. Releases of *Agapeta zoegana*, a yellow root-feeding moth, and *Cyphocleonus achates*, a root-feeding weevil, have been made within the project area. These insects feed on spotted knapweed. Monitoring of these sites indicates that the *Agapeta* release was successful and the insects established. The *Cyphocleonus* release does not appear to have become established. The result of the releases on the district is not yet apparent. Biocontrol agents require a number of years to increase their populations to a level that will noticeably impact their weed hosts, if they become established at all. One biocontrol insect, *Urophora affinis*, a seed head fly, is well established on the KNF and in Montana, and is currently decreasing seed production of spotted knapweed.

Biological controls generally impact their host weeds by reducing their vigor and/or seed production. Biocontrols generally do not eliminate weeds, and they do not prevent their spread, since seeds are usually still produced. Biocontrols have the greatest impact on their weed hosts when several insect species are attacking the same plant host species. Biological controls are best used on weed species that are already well established in an area, that have sizable populations, and which have little or no possibility of being eradicated. Herbicides or hand pulling are best used on new invaders that still may be eradicated, or on small new populations of other well-established weeds.

Environmental Consequences

Noxious weed treatment is ongoing in the Garver project area. This treatment will be done in accordance with the guidelines listed in the Herbicide Weed Control EA for the Kootenai National Forest, completed January 1997. It should be noted that all noxious weeds on National Forest lands will not be sprayed or disappear. Roadsides are prioritized for treatment since they are dispersal routes for weed seeds to other potentially uninfested sites. Other high priority sites include recreation sites and gravel pits.

ALTERNATIVE A
Direct, Indirect & Cumulative Effects

The no action alternative would not implement the management actions described in Chapter 2. Stands would continue to be unnaturally dense, fuel ladders would remain present, susceptibility to bark beetles and other forest pathogens would remain high, western larch and white pine stands would not be restored, fuel loadings in the urban interface would remain high, browse for wildlife would not be regenerated, and timber products would not be contributed to the economy.

While minimization of soil disturbance and maximization of tree canopy would help reduce the total area susceptible to weed infestation in the short term, long-term effects to weeds would be less obvious. Lack of management of unnatural fuel accumulations and ladder fuels would ultimately result in more intense wildfires. These more intense fires are also more conducive to establishment of noxious and invasive plant species. So a lack of management now would have the long-term effect of higher disturbance due to fire. Higher disturbance would result in a risk of greater spread of noxious weeds. Also, wind events have the potential to open tree canopy, which would then create areas vulnerable to weed infestation.

ALTERNATIVES B, C, & D
Direct and Indirect Effects

Timber Harvest and Associated Activities, and Mechanical Fuels Treatments.

The action alternatives all contain timber harvesting with construction of temporary roads, road maintenance, fuels treatment and tree planting. These activities have the potential to increase the spread of noxious weed species, causing negative impacts to native vegetation and wildlife.

Impacts to native vegetation and wildlife from noxious weeds are caused by stress to, or elimination of native vegetation through competition for light, water, and nutrients. Native vegetation provides forage, cover, denning or nesting habitat for big game animals and other wildlife, including birds, and insects. Some animal and insect species depend specifically on one native plant species, and will not survive without that plant. In comparison, noxious weed species do not provide valuable forage or habitat for native animals (Trammell and Butler 1995) and insects, although some incidental use does occur. By displacing native vegetation, noxious weeds can reduce the ability of land to support insects and animals native to that ecosystem. In one study, elk pellet-group densities averaged 81% lower in infested sites than in noninfested sites (Trammell and Butler 1995). Noxious weeds have also been shown to increase surface runoff and sediment yield by reducing plant community diversity and increasing patches of exposed soil (Lacey et al. 1989). One study of road decommissioning found that a knapweed infested control plot contributed much more surface runoff and sediment yield than other control plots, and had runoff and sediment values approaching those of forest system roads (Hickenbottom 1997). Infiltration on the knapweed-infested site was reduced about 20% when compared with the other two control plots.

Noxious weeds may be spread via seeds that arrive at new sites on vehicles, humans, animals, road maintenance equipment, and contaminated road gravel. A study by Montana State University found that a vehicle driven several feet through a spotted knapweed infestation picks up about 2,000 seeds, which are then dispersed along the route driven afterwards (Trunkle and Fay 1991). Road construction and maintenance can spread noxious weeds by use of contaminated gravel, seeds transport on road building equipment, and recreational travel along the new road.

Logging and mechanical fuels treatments can spread noxious weeds from personal vehicles, equipment, and by driving equipment through infested areas while skidding, decking, and piling. Helicopter yarding equipment can also spread noxious weed seeds by transporting seeds from the decking, landing and servicing areas to uninfested sites in harvest units. Helicopter logging is generally less likely to spread weed seeds than more conventional systems due to reduced soil disturbance and reduced road construction/maintenance needs as compared to conventional logging.

Table 3-35 compares acres of disturbance and logging systems between Alternatives A, B, C and D. Higher disturbance levels correlate to more favorable conditions for spreading noxious weeds. Alternative B has the highest potential to create conditions favorable to spreading weeds because of the number of acres disturbed. The total number of acres disturbed does not indicate that all of these acres would be infested with noxious weeds if the treatment were implemented. It does give comparison of risk levels for each alternative. Regeneration harvest units are more susceptible to weed infestation than intermediate harvest units. Tractor logging has higher levels of soil disturbance than skyline or helicopter logging and thus is more likely to encourage weed spread. Alternative B has the greatest number of acres of regeneration harvest and tractor logging. Alternative C has less risk of weed spread than B, and Alternative D has the least risk of weed spread as a direct result of this project. Winter logging generally protects understory vegetation better than summer logging, particularly when tractor logging is used. Thus, winter logging tractor harvest units would reduce the risk of weed spread. The amount of winter logging does not vary by action alternative, so the effects are consistent throughout.

Reducing disturbance levels in areas infested with noxious weeds will slow the rate of spread of weeds and decrease the density of weed infestations over the short term.

TABLE 3-35. DISTURBANCE LEVELS - COMPARISON OF ALTERNATIVES

ALTERNATIVE	A	B	C	D
Acres of Harvest	0	2,697	2,282	2,146
Helicopter Harvest	0	996	846	824
Skyline Harvest	0	52	52	52
Tractor Harvest	0	1,490	1,348	1,259
Regeneration Harvest	0	632	454	317
Intermediate Harvest	0	2,065	1,828	1,829
Winter Logging	0	352	247	247
Acres of Mechanical Fuels Treatment	0	338	338	328
Acres of road maintenance (miles x 3)	0	154	156	156
Acres of temporary road construction (miles x 3)	0	3	2	2
Total Disturbance Acres	0	3,192	2,778	2,632

In some areas this project proposes harvesting directly adjacent to existing regeneration harvest units with substantial infestations of hawkweeds. Since hawkweeds have demonstrated the ability to spread rapidly and completely displace other vegetation, they are considered to be the most threatening noxious weed currently found in the project area.

This project includes measures to treat weeds. This weed control would be implemented under the 1997 KNF Herbicide Weed Control EA. The goal of this weed treatment is to eradicate weeds (in the case of weed species such as Dalmation toadflax), or at least suppress weeds (as in the case of hawkweed). Prior to, during, and for at least 5 years after the timber sale closure, Forest Service crews would periodically patrol and spray weeds within 300 feet of proposed regeneration harvest units located adjacent to existing infestations. Repeat visits to these areas by Forest Service crews would be required since individual plants are often missed during any single treatment and because weed seed will continue to germinate on these sites. During these repeat visits, any weeds found in these newly harvested areas would also be sprayed. Also, prior to harvest roads would be sprayed by the timber sale purchaser, and off-road equipment would be cleaned prior to entering the sale area. See the noxious weed section of Table 2-2, and Appendix D for more information on weed control measures)

This approach toward weed management would be new for the district and the forest. Currently, appropriated dollars for noxious weed treatment are not enough to

implement this level of treatment across the district for all projects. Emphasis is currently placed on treating roads, which tend to be linear infestations in otherwise uninfested vegetation, on weed species that are not well established, and on other priority areas such as airports, recreation sites, and gravel pits. Due to public concerns regarding weeds in this project area (see Chapter 2, Other Concerns), and the threat to ecosystems posed by orange and meadow hawkweeds, this project warrants an elevated contribution of time and money. Without such treatment of hawkweeds, management actions in each action alternative would increase the size, density, and species diversity of noxious weed infestations. Again, however, as discussed under Alternative A, environmental effects from the spread of hawkweeds is expected to be similar with no action. Although deferring harvest treatments would retain overstory canopy in the short term, which will suppress the hawkweeds and many other weed species, unnatural accumulations of forest fuels and eventual wildfire or even wind events would open tree canopy at some point in the future, which would then create areas vulnerable to weed infestation. Ultimately, implementation of control measures, prevention strategies, release of biological control agents, and other aspects of an integrated pest management strategy are needed to reduce the effects of noxious weeds displayed in this analysis.

Maintenance Burning, Non-commercial Thinning, and Core Area Increase

All action alternatives include ecosystem maintenance burning, non-commercial thinning, and increasing core habitat. The effects of these activities on noxious weeds are addressed below.

Effects of fire on noxious weeds varies with burn intensity, composition of understory vegetation and presence or absence of weeds in the pre-fire stand. The maintenance burning proposed in this project is designed to reduce fuel loadings while still maintaining a healthy overstory. Because burn intensities would be low, the post-burn stands should maintain healthy understory plant communities and therefore be less vulnerable than intensely burned stands. These stands will not be impervious to weed colonization, but should have similar weed colonization characteristics to the pre-burn stand. Therefore maintenance burning should have no effect on weed spread or only slightly increase the rate of weed spread as compared to current conditions.

Non-commercial thinning would slow the rate of canopy closure of timber stands. Closed canopy stands tend to reduce the vigor of weeds and decrease the number of seed produced (personal observation), but do not completely exclude noxious weed species. By slowing the rate of canopy closure, existing weed populations would continue to be present in these stands if they currently exist. These populations would continue to increase in infestation size and density. However, increasing the health and vigor of overstory trees, mature timber stands may be produced that will persist and be more resistant to disturbance.

Creation of additional core habitat eliminates vehicle traffic. Since vehicles are very efficient weed spreaders, closing of roads can eliminate an important vector of weed spread. But creation of core habitat also eliminates motorized access along the road for weed management activities. Existing weed populations in core habitat may spread due to the lack of noxious weed management actions such as spraying. Biological controls may be used to reduce this spread, but are often only marginally successful, and for some species such as the hawkweeds, not available at all.

Cumulative Effects

Past soil-disturbing activity and vehicular traffic have helped spread noxious weeds into the project area. Surveys of roads were conducted in the project area to search

for noxious weed populations. These surveys are located in the project file. Maps of weed infestations on some of the roads in the project area have also been completed and are also located in the project file.

Spraying of roads in the project area would reduce weed infestations along open roads in the project area in the short term. Management actions proposed in this project would increase total infested area in the project in the short term. Selection of the no action alternative would also result in increased total infested area at some unknown time in the future. All alternatives, including the no action alternative, would add cumulatively to the already large area infested with noxious weeds in the project area. The only way to avoid this increase is through intensive weed management actions which are not feasible with current budgets for weed management.

Future projects in this area will consider how they influence the spread of noxious weeds. Future projects are also likely to contribute to cumulative effects by increasing area susceptible to infestation.

Consistency with the Forest Plan and Other Management Direction

Forest Service Manual (FSM) 2080.1 directs the National Forests to conform to the Federal Noxious Weed Act of 1974, as amended.

The Kootenai National Forest has entered into a weed management agreement Memorandum of Understanding (MOU) with Lincoln County. Because the measures described in Appendix D will be followed, this project is in compliance with the MOU and the Federal Noxious Weed Act.

These actions will also help to meet the goal for noxious weed management as stated in the Forest Plan.

Chapter 3

SOIL RESOURCES

Introduction

This section discusses effects to soil productivity. Soil erosion and sediment delivery are discussed in the Water Resources section.

Analysis Area

The analysis area for soil resources is the activity area of the timber harvest units, the natural fuels treatment units, the temporary roads, and the landings, and the non-commercial thinning units.

Regulatory Framework

State Guidelines

In a Memorandum of Understanding (MOU) with the State of Montana, the Forest Service has agreed to follow Best Management Practices (BMPs) during timber harvest and road construction activities. Although primarily designed to prevent soil erosion and protect water quality, several BMPs address prevention of soil damage.

Forest Service Guidelines

The Forest Service Soil Management Handbook requires that lands be managed to ensure the maintenance of long-term soil productivity, soil hydrologic function, and ecosystem health. Management goals should strive to create as little detrimental disturbances as possible, not just to keep from exceeding guidelines (USDA 1994).

Cumulative soil damage can occur with repeated harvest in the same area. Region 1 guidelines state that detrimental soil disturbance should be limited to 15% or less of the activity area, not including roads. If an area already exceeds 15% or would exceed 15% detrimental disturbance as a result of the project, then harvest entries must include actions to mitigate cumulative impacts so that the total impact is less than 15%. Only the areas of severe or detrimental disturbance are considered when determining impacts on soil productivity. These are the areas where reduction in future site productivity is expected (USDA 1999).

Regional guidelines for retention of organic matter reference research by R.T. Graham (Graham et al. 1994) if Forest specific guidelines do not exist (USDA 1999). This research is the basis for the coarse woody debris retention recommended for this project in the silvicultural prescriptions and identified in Table 2-2.

Kootenai Forest Plan

Forest Plan guidelines state that for each project using heavy equipment the effect of operating that equipment on soil productivity will be evaluated. Project plans shall (1) minimize the area allocated to skid trails, landings, and temporary roads, and (2) consider the potential hazard to soil productivity before planning practices requiring the operation of equipment off established roads and trails (KNF September 1987).

The Soil and Water Conservation Practices Handbook (USDA 1988) is incorporated by reference into the Forest Plan and describes the specific conservation practices, also known as Best Management Practices (BMPs), that apply to timber sale activities.

Analysis Methods

Because soil structure and fertility are difficult to quantify, surrogate soil parameters are monitored. These parameters include the extent of soil compaction,

displacement, and mixing, extent of severely burned soil, and distribution of above ground organic matter (litter and woody debris).

Existing detrimental disturbance is estimated using site visits, harvest history, and aerial photo interpretation to determine the extent of ground previously disturbed by activities such as temporary roads, skid trails, dozer piling and landings. Methods of analysis are described in the Kootenai National Forest Soil Analysis Guidelines (KNF April 1998, KNF July 1998).

Soil disturbance for proposed timber harvest is estimated based on Kootenai National Forest post harvest monitoring results which are reported in Forest Plan Annual Monitoring reports.

Affected Environment

Bedrock in this area is predominantly metamorphosed sedimentary rock. During the last ice age varying depths of glacial till were deposited over this bedrock. The glacial till is dense, rocky, and not very productive. The Cascade volcanic eruptions, particularly Mt. Mazama about 6,800 years ago, deposited ash over the glacial till. The volcanic ash is a significant component in the top soil layer that is approximately 7-14 inches thick (USDA and NRCS September 1995). Soil productivity is dependent on the maintenance of this surface soil layer which is known as an “ash cap.”

Forests evolved with a combination of biological and fire decomposition processes that regulate nutrient availability and cycling. Lower intensity fires can induce the release of nutrients and convert large woody debris into smaller, more readily decomposed material. Severe fires can decrease soil productivity by consuming large amounts of organic matter and vegetation, killing soil biota, evaporating nutrients, and causing hydrophobic conditions. (KNF 1994, USDA and USDI 1997).

Approximately 20% of the acres proposed for harvest and burning in this project have had previous selective harvest and woodcutting activity. In some of the proposed units there are 35-50 year old skid trails where compaction and displacement are evident. Although these trails have revegetated with natural vegetation, the locations are visually evident through slight depressions, berms and a lack of stumps. Existing detrimental disturbance in the units where there is considerable evidence of old skid trails appears to range from 2 to 4% of the total unit area. See Table 3-36 for a summary of disturbance by unit.

Environmental Consequences

ONGOING AND FORESEEABLE ACTIONS THAT MAY IMPACT SOIL QUALITY

Fire Suppression

Wildfire suppression has the potential to impact soils through fireline construction, development of water sources, opening of revegetated roads for access, construction of turnarounds, and rehab of fireline and other disturbed areas. The location, timing and magnitude of such effects are impossible to predict.

Blowdown Sales and other Small Salvage Timber Sales

Blowdown sales may occur in the project area. Each project is analyzed in accordance with the 1998 Kootenai National Forest Blowdown EA and Decision Notice (KNF 1998).

With respect to soils small timber sales would be subject to the same regulations as this project. Salvage activities could increase cumulative detrimental disturbance, but total extent of disturbance would be small because projects are typically less than 100 mmbf.

ALTERNATIVE A
Direct, Indirect, and Cumulative Effects

Alternative A would have no direct effects on soil productivity. No new detrimental soil disturbance as a result of timber harvest, slash disposal, mechanical fuel treatment, maintenance burns, landing construction or temporary road construction would occur. There would be cumulative soil disturbance as a result of previous, ongoing, proposed and reasonable foreseeable management activities.

Soil productivity in the proposed harvest and burn areas would continue to increase as organic matter (needles, branches, dead trees) is contributed to the soil. Some of this increase would be attributable to fire suppression by preventing wildfires from consuming this material.

Despite efforts at suppression, wildfires of varying intensity would periodically occur. Wildfire would affect soil productivity both positively and negatively. The risk of uncharacteristic high intensity fire would increase on some slopes as the fuel loading increases, and natural fires continue to be suppressed. Wildfires typically occur in the late summer and early fall. This is the time of year that ground conditions are the driest and high intensity fires are most likely to result in detrimental soil disturbance.

Under Alternative A there would be higher risks of high intensity fire damage in the proposed treatment areas if fires occurred. This is because the proposed harvest, slash disposal activities and maintenance burns would reduce total fuel loadings. This does not mean a high intensity fire would occur in any of these areas in the near future, it just means that if a fire occurs there would be more fuel to combust given the right conditions. There is a risk of indirect and cumulative effects to soils in the proposed treatment areas as fuels accumulate.

ALTERNATIVES B, C, AND D
Direct, Indirect, and Cumulative Effects

Timber Harvest

Timber harvest activities usually result in some soil disturbance. Soils are adversely impacted by activities such as building temporary roads and landings, operating heavy equipment, skidding logs, and piling slash. The amount of detrimental disturbance that would occur depends on soil moisture, slope steepness, complexity of topography, rock content of the soil, depth of duff and slash, season of harvest, skidding design, the type of equipment used, sale administration and the skill of the equipment operators. Combinations of these factors affects the magnitude and areal extent of disturbance.

The proposed harvest activities would occur on Landtypes 103, 104, 106,108, 352, 353, 355, and 522. These landtypes are all suitable for timber management. (See the project file for more information on landtypes in the project area.)

Soil disturbance may include compaction, displacement, erosion, puddling, reduction of infiltration capacity, and mixing of rock into the surface soil layers. Physical soil damage has long-term impacts. Recovery from compaction of the top soil layer can occur in approximately 50 to 80 years if there are sufficient organic matter inputs and freeze-thaw cycles (USDA & USDI 1997). Soil displacement, such as occurs with excavated road or skid trail construction, may have longer term effects.

Long-term soil productivity may be impaired by reduction of organic material available to be recycled back into the soil. This is a concern if too much coarse wood (greater than 3 inches in diameter) is removed from the harvest unit by either logging or burning (Graham et al. 1994).

Logging systems: 60% of the proposed area to be harvested in this project is designated for tractor yarding, 2% skyline (cable) yarding, and 38% helicopter yarding. In most of the proposed tractor units cutting may be done by hand or mechanical harvester at the option of the timber purchaser. Most of the helicopter units are inaccessible to machines and hand falling would be required. The yarding method is stipulated in the NEPA analysis and in the timber sale contract.

Tractor yarding is generally limited to slopes less than 35%. Tractor logging may involve rubber-tired or track-mounted skidders, log forwarders, and mechanized harvesters and processors. This equipment may be used individually or in combination. Rubber-tired grapple skidders are the most common for skidding operations.

Skyline yarding is usually used on slopes greater than 40%. Cable logging impacts much less ground than tractor operations. Compaction and displacement are limited to the cable corridors and the landing areas.

Helicopter yarding is used where road access is not available or feasible, or where topography or resource conserns makes other logging systems environmentally unacceptable. Helicopter yarding virtually eliminates soil disturbance in the unit.

Slash Disposal Methods: Underburning is used where slash is light and residual trees can withstand fire. Fireline construction by hand or by excavator is needed when units are underburned.

Tree tops are yarded to a landing area and burned when slash is relatively light and remaining trees need to be protected from fire. Yarding tops is also used where excavator access is not feasible.

Excavator piling and burning is used where slash is relatively heavy and remaining trees need to be protected from fire. Excavators are used for slash piling in tractor, or occasionally helicopter units. Excavators generally need to be confined slopes less than 45% to prevent track slippage.

Roads and helicopter landings: No new permanent roads would be constructed. Five temporary roads, approximately ¼ mile each, are proposed under all action alternatives. These roads would be located on sideslopes of less than 30% and would not cross any RHCAs. They would be completely recontoured after use. Soil productivity cannot be completely restored by recontouring due to mixing of the original soil layers. Approximately 2 acres of would be detrimentally disturbed by temporary road construction.

Approximately 8 helicopter landings are proposed. They would be approximately one acre in size. These would be considered long-term dedicated sites. A substantial degree of compaction and displacement is expected to occur at these sites so the entire sites are considered detrimentally disturbed. The proposed locations were selected based on location relative to the unit, gentle sideslopes and road access. It is estimated that construction of the landings would result in 8 acres of additional detrimental disturbance.

The following assumptions of detrimental disturbance were used for this project analysis. The rationale for values #1 - #5 are described in the Kootenai National Forest Soil Analysis Guidelines. Values for #6 and #7 are based on the aerial extent of physical disturbance expected.

1) Ground-based logging disturbs less than 10% of a logging unit. 7% was used as an average for summer harvest. 3% was used as an average for winter harvest. Ground-based logging includes use of skidders and mechanized harvesters. Disturbance areas include skid trails and landings.
2) Cable or skyline logging activity disturbs l % of a logging unit.
3) Helicopter logging disturbance is negligible. For the purposes of this analysis 0% detrimental disturbance is assumed in the harvest units. Landing and fueling areas, which are usually outside the units, are summed separately.
4) Excavator slash piling disturbs 2% of a logging unit.
5) Underburning, broadcast burning and pile burning do not result in measurable detrimental disturbance (less than 0.5%). Fireline construction results in 1% disturbance.
6) Temporary road construction on sideslopes less than 40% disturbs 2 acres per mile of road.
7) Helicopter landings disturb 1 acre per landing.

Table 3-36 displays the existing detrimental disturbance, the expected project disturbance and the cumulative disturbance by harvest unit. Results from monitoring of harvest units on the KNF indicate that the total actual cumulative disturbance would probably be less than the values predicted in this table. Forest plan monitoring on units harvested since 1998 has found that approximately 1/3 of monitored units have detrimental disturbance in the 6-10% category. The remaining 2/3 of units monitored have less than 6% disturbance. No units exceeded 10% (KNF 2002).

TABLE 3-36. DETRIMENTAL SOIL DISTURBANCE IN HARVEST UNITS

Unit No.	Unit Acres By Alternatives B/C/D	Logging System	Logging Season	Slash Treatment	% Existing Disturbance	% Project Disturbance.	% Cumulative Disturbance
1	10	Tractor[1]	Summer	Excavator Pile	0	13	13
2	43/28/28	Tractor	Summer	Yard Tops	0	7	7
3	33	Tractor	Summer	Excavator Pile	0	9	9
4	58	Tractor	Summer	Excavator Pile	0	9	9
5	34	Tractor	Summer	Yard Tops	2-4	7	9-11
6	11	Tractor	Summer	Lop and Scatter	0	7	7
7	23	Tractor	Summer	Excavator Pile	0	9	9
8	34	Tractor	Summer	Excavator Pile	2-4	9	11-13
9	17/0/0	Tractor	Summer	Yard Tops	2-4	7	9-11
10	27	Tractor	Summer	Yard Tops	0	7	7
11	41/41/0	Tractor	Summer	Excavator Pile	0	9	9
12	69/69/0	Tractor	Summer	Excavator Pile	0	9	9
13	56/46/46	Helicopter	Summer	Lop and Scatter	0	0	0
13a	0/10/10	Helicopter	Summer	Yard Tops	0	0	0
14	60/41/41	Helicopter	Summer	Excavator Pile	0	2	2
15	34/65/65	Helicopter	Summer	Excavator Pile	1-2	2	2-3
15a	0/9/9	Helicopter	Summer	Excavator Pile	1-2	2	2-3
16	39/0/0	Helicopter	Summer	Yard Tops	1-2	0	1-2
17	31	Tractor	Summer	Excavator Pile	0	9	9
18	26	Tractor	Summer	Excavator Pile	0	9	9
19	179	Tractor	Summer	Yard Tops	1	7	8
20	13	Tractor	Summer	Yard Tops	1-2	7	8-9
21	40/0/0	Helicopter	Summer	Lop and Scatter	2-4	0	2-4
22	47/0/0	Helicopter	Summer	Lop and Scatter	2-4	0	2-4
23	52	Skyline	Summer	Lop and Scatter	1-2	1	2-3
24	22	Tractor	Summer	Yard Tops	2-4	7	9-11
25	25	Tractor	Summer	Yard Tops	1	7	8
26	46	Tractor	Summer	Yard Tops	2-4	7	9-11
27	35	Tractor	Summer	Excavator Pile	0	7	7
29	102/88/88	Helicopter	Summer	Lop and Scatter	0	0	0
30	29	Helicopter	Summer	Lop and Scatter	0	0	0
31	17	Tractor	Winter	Excavator Pile	4-6	5	9-11
32	21	Tractor	Winter	Excavator Pile	2-4	5	7-9
33	40/20/20	Tractor	Summer	Excavator Pile	0	9	9
33a	0/11/11	Helicopter	Summer	Excavator Pile	0	2	2
33b	0/9/9	Helicopter	Summer	Excavator Pile	0	2	2
34	114/135/ 135	Helicopter	Summer	Excavator Pile	0	9	9
35	79/124/ 124	Tractor	Summer	Yard Tops	0	7	7
36	59/0/0	Tractor	Summer	Yard Tops	0	7	7
37	13/0/0	Helicopter	Winter	Yard Tops	0	0	0
38	54/28/28	Helicopter/Tractor	Winter	Yard Tops	0	0/3/3	0/3/3
38a	0/16/16	Tractor	Winter	Yard Tops	0	3	3
40	21	Tractor	Summer	Yard Tops	2-4	7	9-11
41	50/0/0	Tractor	Winter	Excavator Pile	0	5	5
42	82/50/50	Tractor	Winter	Yard Tops	0	3	3
42a	0/8/8	Tractor	Winter	Yard Tops	0	3	3
42b	0/2/2	Tractor	Winter	Excavator Pile	0	5	5
44	17	Tractor	Winter	Excavator Pile	0	5	5
45	66	Tractor	Winter	Excavator Pile	1-2	5	6-7
46	31/23/23	Tractor	Winter	Excavator Pile	2-4	5	7-9
47	21	Tractor	Summer	Excavator Pile	2-4	9	11-13
48	56/19/20	Tractor	Summer	Yard Tops	2-4	7	9-11
49	30/17/17	Tractor	Summer	Excavator Pile	2-4	9	11-13
49a	0/9/9	Tractor	Summer	Excavator Pile	2-4	9	11-13
50	13/0/13	Tractor	Summer	Excavator Pile	2-4	9	11-13
50a	0/0/15	Tractor	Summer	Excavator Pile	2-4	9	11-13
50b	0/0/5	Tractor	Summer	Excavator Pile	2-4	9	11-13
50c	0/0/16	Tractor	Summer	Excavator Pile	2-4	9	11-13
51	14	Tractor	Summer	Excavator Pile	1-2	9	10-11
52	122/117/ 117	Helicopter	Summer	Excavator Pile	1	2	3
52a	0/6/6	Helicopter	Summer	Excavator Pile	1	2	3
53	67/68/68	Tractor	Summer	Excavator Pile	0	9	9
54	50/50/0	Helicopter	Summer	Excavator Pile	0	2	2
55	111/120/ 120	Helicopter	Summer	Yard Tops	1	0	1
56	54/37/37	Helicopter	Summer	Excavator Pile	1	2	3
56a	0/24/24	Helicopter	Summer	Excavator Pile	1	2	3
57	54/49/49	Helicopter	Summer	Underburn	0	1	1
58	17/0/0	Helicopter	Summer	Yard Tops	0	0	0
59	28	Tractor	Summer	Excavator Pile	2-4	9	11-13
60	0/0/24	Tractor	Summer	Excavator Pile	2-4	9	11-13

[1] Disturbance includes 0.3 mile skid trail to unit from Road 5857.

Fuels Reduction

Mechanical Fuels Reduction: Several units would be thinned using a mechanical harvester, and possibly a log forwarder. An excavator may be used to pile slash. These activities may result in detrimental disturbance due to equipment impacts. Table 3-37 displays existing, project-related, and cumulative detrimental disturbance.

TABLE 3-37. DETRIMENTAL SOIL DISTURBANCE IN MECHANICAL FUELS REDUCTION UNITS

Unit	Acres	Thinning System	Slash Treatment	% Existing Disturbance	% Project Disturbance.	% Cumulative Disturbance
B	74	Hand Slashing	Excavator Pile	2-4	2	4-6
C	10	Clipper	Excavator Pile	1	3	4
F	29	Clipper	Excavator Pile	1	3	4
G	28	Clipper	Excavator Pile	1	3	4
H	49	Clipper	Excavator Pile	2-4	3	5-7
M	34	Clipper	Excavator Pile	2-4	3	5-7
N	48	Clipper	Excavator Pile	0	3	3

Maintenance Underburning: Generally, the use of underburns and maintenance burns are considered positive for long-term soil productivity. Fire is an essential and integral part of the cycling of nutrients. See the Forest Vegetation section for more detailed discussion of the natural role of fire in this landscape. Low intensity burning makes nutrients such as nitrogen available for plant uptake (KNF 1994).

Underburning units would be hand lit relatively light burns designed to reduce fine fuels and protect all but the smallest trees from mortality. High intensity fire and resulting soil impacts are not expected.

The proposed maintenance burn (Unit A) would be approximately 234 acres. It is on a west-facing slope that has been previously burned for browse rejuvenation. The vegetation cover is approximately 50% brush and has considerable bedrock exposure. Approximately 20% mortality of the existing trees is expected. It would be lit using aerial ignition and is designed to more closely mimic natural fire. A moderate intensity fire is anticipated. The ability to control burning intensity would be less than with the other underburn units. High intensity fire of short duration may occur in limited areas.

High intensity fire of prolonged duration can biologically, chemically and physically damage the soil (KNF 1994). In the past broadcast burns under low moisture conditions have resulted in high intensity burns that caused soil damage. Current prescribed burning policy limits burning to higher moisture conditions in the spring or late fall. Under all action alternatives, it is a low risk that proposed burns would experience high intensity fire for a long enough duration that results in detrimental disturbance.

Non-Commerical Thinning

The proposed non-commercial thinning would not result in any measurable effects to soils. There would be no physical soil disturbance and there would be no removal of biomass from the site. For 3-5 years after the thinning, the dead trees would be provide more flammable fuels than the live trees but, because of the light nature of fuels, detrimental soil damage from fire is not expected.

Under all action alternatives (B, C and D) there would be direct detrimental effects to soils in the harvest and mechanical treatment units, and in the temporary road and landing locations. In Table 3-38 the total project related disturbance is shown by alternative. There is less than an 11% difference in project related detrimental disturbance expected among the three action alternatives.

TABLE 3-38. PROJECT-RELATED DETRIMENTAL DISTURBANCE BY ALTERNATIVE

Alternative	A	B	C	D
Project Related Disturbed Acres	0	153	142	139

The difference in disturbance is due to the difference in acres harvested. The mechanical fuels treatment, temporary road construction and helicopter landing disturbance is the same under all action alternatives. There is no measurable difference in effects from underburning, pile burning or maintenance burning.

Alternatives B, C and D would all increase the cumulative management-related soil disturbance in the project area. Fire suppression and blowdown salvage activities could add to this cumulative increase. Previously compacted soils are slowly decompacting and organic recruitment in previously treated areas is adding biomass and nutrients. These natural processes are improving soil conditions, but at an unknown rate and extent.

Alternatives B, C and D may have the indirect and cumulative positive effect of reducing the risk of soil damage *if* a high intensity wildfire occurs in any of the proposed harvest or fuels reduction treatment areas within the next several decades.

Regulatory Consistency and Monitoring Results
State Guidelines

BMPs would be implemented through harvest design and the timber sale. Results from State of Montana BMP audits for 2000 indicate sales on the Kootenai received a 95% rating for implementation and a 98% rating for effectiveness (KNF September 2001).

Forest Service Guidelines

Under all action alternatives the amount of cumulative detrimental disturbance is expected to be under the regional guidelines of a maximum disturbance of 15% of the activity areas. The expected maximum cumulative disturbance in any harvest unit is 13% and in any mechanical treatment unit is 7%. Monitoring by the Kootenai National Forest has shown that recent harvest units are consistently below the 15% regional guidelines (KNF March 2002).

The silvicultural prescription, the timber sale contract and the slash disposal contracts would include provisions to retain coarse woody material in the harvest units which meet the guidelines recommended by Graham.

Kootenai Forest Plan

Kootenai Forest Plan guidelines are met by conducting this environmental analysis, designing logging systems to minimize disturbance, and implementing soil and water conservation practices through design and implementation.

WATER RESOURCES

Introduction

Analysis Area

The analysis area for water resources is the watersheds in which timber harvest, road maintenance and fuels reduction activities are proposed.

Activities are proposed in the lower West Fork Yaak River watershed, the lower Pete Creek watershed and along the west side of the main Yaak River between Sink Creek and Pete Creek. Activities are proposed in the following named tributary watersheds: French Creek, Benefield Creek, Mud Creek, Slim Creek, Hensley Creek, Sink Creek, and Lap Creek. Activities are also proposed in approximately ten unnamed small watersheds.

Regulatory Framework

Federal and State Guidelines

The Clean Water Act (CWA) establishes Federal water quality policies. Both the Environmental Protection Agency and individual states have responsibility for implementing the CWA. States are required to designate the beneficial uses of each stream and determine the criteria sufficient to protect these uses.

Within this analysis area there are 83 water rights on file with the Montana Department of Natural Resources and Conservation (www.dnrc.state.mt.us/wrd/home.htm, May 2002). Most of these claims are on private property along the west side of the main Yaak River. The water rights uses on file include domestic use, stock water, lawn and garden, and irrigation. Other beneficial uses include recreation (swimming, boating, and fishing), and maintenance of habitat for cold water fisheries, native macro and micro-invertebrates and associated plant life.

In a Memorandum of Understanding (MOU) between the Forest Service and the State of Montana, the Forest Service has been designated as the management agency for water quality protection on National Forest System lands. In this MOU, the Forest Service has agreed to follow State Water Quality standards, primarily through the use of Best Management Practices (BMPs). BMPs are designed to protect water quality and beneficial uses during the implementation of land management activities.

In order to comply with the Clean Water Act and cooperate with the State of Montana, the Forest Service has agreed to display Water Quality Limited Streams (WQLS) that might be impacted by proposed projects, and implement such projects in a manner so as not to cause further degradation. In the long term, the Forest Service has agreed to work with the State, tribes, private land owners and the Environmental Protection Agency to improve impaired conditions for WQLS that are in, or downstream of, National Forests.

As required by the Clean Water Act, the State of Montana has published a list of streams and portions of streams where the State has identified water quality concerns. Many of the streams in the upper Yaak River watershed were originally put on this list based on water quality concerns mentioned in Forest Service NEPA documents. However, the State has found that there was insufficient scientific data to support a determination that the streams were actually impaired. Between 1996

and 2000 a number of streams have been removed from the list for lack of sufficient credible data supporting the impairment listing including Slim, Hensley, Lap, and Pete Creeks. The West Fork Yaak River is the only stream within the project area that is still listed. (www.deq.state.mt.us/ppa/mdm/tmdl/tmdl_index.asp, 4/9/2002).

TABLE 3-39. WATER QUALITY LIMITED SEGMENTS

Stream Name	Length (miles)	Probable Impaired Beneficial Uses	Probable Use Support Status	Probable Cause[1]	Probable Source[1]
West Fork Yaak	19.5	* Aquatic Life Support * Cold Water Fishery - Trout	Partial Support	Siltation	* Agriculture – Grazing related Sources[2] * Silviculture

[1] Causes and sources are not linked.
[2] The source of the grazing related problems is in the Canadian portion of the West Fork Yaak.

The State of Montana has established an implementation schedule for the development of Water Quality Restoration Plans for impaired streams. The Yaak River watershed is scheduled for development of a plan in 2004. Over the next two years the Kootenai National Forest will be working with the Environmental Protection Agency, Montana Department of Environmental Quality and other partners on development of a Water Quality Restoration Plan for Yaak River watersheds.

Forest Service Guidelines

The Kootenai Forest Plan requires adherence to the following guidelines with respect to water resources and management activities: (1) Water yield increases will be limited to that which will protect beneficial uses; (2) soil and water conservation practices will be followed, and actions will meet State of Montana standards for protecting water quality; (3) actions in watersheds with mixed ownership will be modified or delayed if necessary to maintain the watershed condition; (4) sediment yields will not be increased beyond acceptable limits; (5) opportunities to mitigate adverse effects on water-related beneficial uses will be identified; and (6) all actions will comply with the Inland Native Fish Strategy (INFS) which was adopted as an amendment to the Forest Plan.

The Forest Plan requires considering the effects of water yield increases resulting from cumulative timber harvest. Guidelines for analyses are found in the Kootenai Forest Plan (USDA FS September 1987), and two subsequent letters of clarification (Johnson March 13,1991; Solem October 2,1995).

The Soil and Water Conservation Practices Handbook (USDA FS, May 1988) is incorporated as a supplemental document to the Forest Plan. It describes the best management practices that the Kootenai National Forest will use when implementing projects that could adversely affect soil and water resources, or water-related beneficial uses.

Timber harvest and ignition of prescribed burns are prohibited in Riparian Habitat Conservation Areas (RHCAs) which are designated buffer areas on all perennial and intermittent streams, wetland areas, springs, seasonally saturated soils and landslide prone areas. See the Chapter 3, Fisheries section for a description of the riparian management requirements of the Forest Plan as amended by INFS.

Analysis Methods

There are two primary watershed concerns with a proposal to harvest timber: the potential for increased peak streamflows and the potential for increased sediment delivery.

1) Effects of Timber Harvest on Streamflow Regime and Channel Morphology

Numerous studies have shown timber harvest, and related road construction, can alter streamflows (Jones and Grant 1996; King 1989). Harvested areas accumulate more snow, and melt more quickly than forested areas (Cheng 1989). Roads and skid roads intercept subsurface and surface water, and redirect runoff more rapidly to stream channels (Megahan 1972; Burroughs and others 1972). These alterations in the watershed's hydrologic processes can change the duration, magnitude, and timing of stream flows as compared to natural flow regimes. Increases in magnitude or duration of peak streamflows can change stream channel conditions. Typical adjustments to increased peak flows are increased channel scour in the steeper reaches and increased deposition of the resulting sediment in the flatter reaches.

Stream channel conditions are a function of the upland watershed's natural characteristics, changes related to land management activities, the inherent stream channel sensitivity, and the recent stream channel disturbance history. The ability of increased streamflow to cause channel erosion depends on the stream channel type and condition. The relative sensitivity of a channel to disturbance depends on a number of factors including stream gradient, size and shape of substrate, bank stability, and access to floodplain and overflow channels. Sensitivity to erosion varies naturally among stream reaches. Stable channel segments can withstand sizable flood events without a major change in overall condition whereas channels that are in an unstable condition may be measurably degraded by relatively small runoff events.

The potential of fire or harvest to affect water yield is projected by calculating the equivalent clearcut area (ECA) of a watershed. ECA is defined as the total area within a drainage that exists in an equivalent clearcut condition in a given year (USDA 1974). As ECA increases, water yield increases, which can cause changes in duration, frequency, timing, and magnitudes of streamflows (King 1989). ECA is used by itself as an indicator for changes in water yield, and also as input data for water yield models that predict changes in streamflows based on watershed characteristics.

As regeneration occurs after a timber harvest or wildfire, water yield decreases. The rate of recovery depends on habitat type. Full recovery periods take 80 to140 years depending on habitat type. However, the bulk of the recovery occurs in the early part of these periods. 80% recovery is achieved in 30 to 60 years depending on habitat type. Most of the habitat types in the Garver project area are in the fastest recovery group. These recovery periods assume successful regeneration of a well-stocked stand after planting (see Chapter 3, Forest Vegetation, Regeneration Potential section for more information).

Thinnings recover more rapidly than clearcuts because the remaining trees usually respond to the lack of competition with rapid growth. A commercial thinning can recover in as little as ten years (Galbraith December 1973).

The ECA of a watershed indicates a risk for change in streamflow, but actual effects vary by watershed. Streams in watersheds of the same size, and the same ECA, will have different levels of response. Natural factors such as soils, topography, and geology affect proportion of surface flow to subsurface flow. Watersheds with a

relatively high proportion of subsurface flow have fewer and less developed scour channels. Since subsurface water takes longer than surface water to reach stream channels, it dampens the effect precipitation events have on streamflow.

Timber management has had the effect in many watersheds of increasing the proportion of surface flow to subsurface flow. Skid trails and roads prevent infiltration and intercept subsurface flow, converting it to surface flow. Skid trails and roads can become new tributaries, and as such, route runoff more efficiently to the natural stream channels. Roads cause “interruption of hillslope drainage patterns (which) alter the timing and magnitude of peak flows and changes base stream discharge; and subsurface flows”... Factors that increase the effects of roads on peak flows include road density, stream density, number of road/stream crossings, location of the roads within the drainage area, road grades, road design, and road conditions (Wemple 1994).

The elevated ECA due to harvest, combined with the increased efficiency of water routing on skid trails and roads, causes a chronic condition of increased peak streamflows in a managed watershed. This is in contrast to the historic pulse nature of wildfire-induced increases in ECA that may have been quite dramatic, but then had periods of complete recovery.

2) Effects of Roads and Timber Harvest on Sediment Delivery

Considerable sediment can be generated during and immediately following new road construction. Sediment delivery usually declines substantially over time as fillslopes and ditches revegetate, channels adjust to culverts, and cutslopes gradually stabilize and begin to revegetate.

Road/stream crossings can continue to be a chronic source of sediment to streams because sediment from the road surface or ditch water is delivered directly to the stream at these sites. Sediment often originates from erosion on the cutslopes, scour in the ditchline or washing of surface fines from the road surface.

Culverts affect the stream channel condition at the road crossing and downstream. Unnatural channel widths, slopes, and streambeds can occur upstream and downstream of stream crossings (USDA FS and USDI BLM, June 1997a).

Plugged or undersized culverts can result in water overtopping the road, causing erosion or even a complete road failure. These failures may result in debris flows that add substantial quantities of sediment to the stream. Failures can occur on maintained or unmaintained roads, including those that are heavily revegetated. Logging roads may fail several decades after they were constructed (Furniss and others, 1991).

Harvested areas can cause sediment delivery to streams from exposed soil areas resulting from log skidding, landing construction and fireline construction. A very effective mitigation is the prohibition of harvest and the operation of equipment in riparian areas. Ground vegetation and slash acts as a filter, trapping sediment before it reaches the stream. Sediment delivery to streams directly from harvest units rarely occurs with good protection of riparian areas. However, sediment delivery can occur where skid trails or firelines intersect roads. The road can route sediment from skid trails or firelines to stream crossings. Effective implementation of BMPS such as waterbarring can minimize this impact.

Timber harvest or fire can increase the risk of sediment delivery from hillslope failures. Live trees decrease the risk of slope failures occurring by reducing soil moisture through transpiration and providing root strength. Trees can also reduce

the impacts of slope failure by trapping debris and sediment.

Fine sediment can adversely affect streams by increasing turbidity, accumulating in pools, and clogging interstitial spaces in gravel/cobble areas. Bedload sediment can scour channels, completely fill in pools, and reduce channel capacity causing bank erosion or overland flow. This can destabilize significant sections of stream channels, cause a decline in water quality and a decline in habitat for aquatic species.

Indicators for Potential Effects

Streamflows: Would the proposed activities increase streamflows enough to cause stream channel scour?

a. Existing and post project equivalent clearcut area (ECA) by watershed (acres)
b. Existing stream channel stability (Poor, Fair, Good, Excellent)
c. Natural watershed hydrologic sensitivity (Low, Moderate, High)
d. Interaction of roads and skid trails with stream channels (Low, Moderate, High)

Sediment Delivery: Would the proposed activities result in sediment delivery to streams that degrades water quality or affects channel substrate conditions?

a. Number and location of road/stream crossings by watershed on proposed haul roads
b. Location and type of BMP work committed to for this project.

Data Sources

ECA:	ECA recovery curves Previous WATSED results for upper Yaak watersheds Forest Water Yield Guidelines
Channel Stability:	District stream survey data 1979-1999, field info collected by hydrologist, fish biologist, and fish survey crew
Natural Watershed Hydrologic Sensitivity:	Topographic, landtype and precipitation maps
Interaction of Roads and Skid/Trails:	Road density, road/stream crossing density, length of ditches or road surfaces contributing to channels, quantity of apparent flow in ditches, scour channels in skid trails and firelines

Affected Environment

Landforms And Climate

The proposed project area has been strongly influenced by continental glaciation which completely overrode the terrain. As a result most of the mountains and ridgetops are rounded and have moderate slopes. The elevation within the project area ranges from 2,900 feet at the confluence of Pete Creek and the Yaak River to 5,874 feet on top of Garver Mountain. The underlying bedrock is metamorphosed Precambrian-aged sedimentary rock. A significant structural feature is the Thompson Lakes Fault trace along which the West Fork Yaak flows. There is one major igneous intrusion, a metadiorite dike, that trends north-south from upper Slim Creek through French Creek. The soils are derived from glaciation, glacial/fluvial deposits and weathered bedrock material. A volcanic ash-influenced deposit exists over the entire area. (USDA and NRCS September 1995).

Average annual precipitation ranges from 25 to about 45 inches. More than half of this precipitation falls as snow. Annual streamflow peaks are usually snowmelt and rain induced late spring events. Rain-on-snow events occur, but with less severity than other watersheds to the south. This area is in the KNF Hydraulic Region II (moderately influence by rain-on-snow events). Occasionally mid-winter rain events occur and, in the larger streams, ice-breakup may result in severe bank scour.

Current Watershed Conditions

Watershed condition is a result of a complex interaction between natural watershed physical attributes, natural history of fires and flooding, and management history. The departure from natural conditions is a qualitative assessment that considers the effects of fire suppression and land management activities. The activities that have had the most impact on watershed conditions in this area are timber harvest and related slash disposal, road construction, and riparian area impacts from land development.

The total watershed area disturbed by previous harvest indicates the extent of potential impacts such as skid trail development and soil compaction. This indicates the potential for more rapid runoff than would have occurred naturally during storm events.

The current ECAs are not greater in magnitude, but are more sustained than would have occurred naturally. The current ECA in these watersheds is due solely to timber harvest, since the last major wildfire was 70 years ago. Historically wildfire would have caused many small and occasionally large reductions in forested cover in small to moderate sized watersheds. ECA in these watersheds would have varied over time from 0% to well over 50%. This would have resulted in substantial increases in peak flow, followed by recovery periods. In frequent fire interval areas, peak flows in small watersheds may have been chronically increased due to fire most of the time. In less frequent fire interval areas, peak flows may have been at base levels most of the time. Large watersheds such as the Yaak River probably always had some areas experiencing increased peak flows due to fire during any time period, so there was probably a constant cumulative effect of fire on the peak flow of the main Yaak River.

Road density is used to indicate the level of modification the road system may have on the natural drainage response. Roads are also a causative factor for chronic increased peak flows in managed watersheds. On the Kootenai National Forest road density is rated with respect to precipitation zone (KNF January 2002). Watersheds appear more sensitive to road density in higher precipitation zones. The Garver project area is in the moderate precipitation zone. Road densities are rated as follows: Less than 1.5 miles of road per square mile of watershed is considered Low, 1.5 to 3.5 miles/square mile is Moderate and greater than 3.5 miles/square mile is High.

Road/stream crossing density indicates the degree of interaction between the roads and the stream system. There are no established ratings for the numerical values. Greater values indicate the potential for the road system to have increased peak flows and/or sediment delivery in a given watershed.

Natural watershed sensitivity is a qualitative assessment that considers precipitation zone, topography, landtypes, stream responsiveness to storm events, water storage capacity such as wetlands, and stream channel connectivity. Hydrologically sensitive watersheds can be adversely affected with less timber harvest and road development.

Current stream channel stability is a qualitative assessment of extent of bank and channel scour, the extent of recent bedload movement, the ability of existing channel features such as logs, rocks and roots to withstand flood events. This assessment takes into account the stream channel type and recent flow history.

West Fork Yaak River: The West Fork Yaak River is the second largest tributary to the Yaak River. (See Water Yield Analysis Areas map, M-12, for a display of analyzed watersheds.) It has a watershed size of 70,000 acres (65 square miles) and represents 30% of the total Yaak River watershed area above the confluence of the West Fork and the Main Yaak Rivers. 64% of the West Fork watershed is in the United States and the remainder is in British Columbia. The West Fork originates in the Northwest Peaks Scenic Area. It flows northeasterly into Canada and then flows back south into the U.S. Approximately three miles of the main channel is in Canada. Aerial photos along the Canadian border show large regeneration harvest areas, including riparian harvest along the main West Fork channel. This area is also used for cattle grazing.

The West Fork Yaak River alternates between steeper cobble/bolder reaches and lower gradient depositional areas with extensive bar development. The steeper channels are confined, with bedrock control, and good bank stability. Within the Garver project area there are several bedrock controlled cascades or falls. The riparian vegetation is dominated by mature coniferous forest. Large wood debris jams are a significant component of this system. In 1982 a number of these log jams were removed by sawing and burning because it was thought that the log jams were undesirable for fisheries. New jams have since accumulated.

The lowest reach of the West Fork is on private land where the riparian area has been heavily harvested. There is considerable bar development visible on aerial photos indicating this is a depositional reach.

The earliest large-scale regeneration harvest was spruce salvage in the upper watershed in the 1950s and 1960s. Since that time most harvest has occurred in the mid to lower portions of the watershed. Harvest intensity has been fairly evenly spread out over a 50-year period. Analysis for the Upper Yaak EIS in 1989 (KNF 1990) determined that the peak flow increase (PFI) for the entire West Fork Yaak including Canada was 8%. This PFI would correspond to an ECA of 15-20%. In the Upper Yaak EIS it was estimated that 8% of the total stream miles had riparian harvest on both sides and 18% had harvest on one side.

Most road construction occurred in support of timber harvest. Roads were built in the upper West Fork watershed primarily in the 1950s and 1960s. Given the more erodible landtypes and higher precipitation in this area, it is likely that considerable quantities of sediment were delivered to the upper West Fork during this era. This sediment would have moved down through the West Fork over a period of many years.

Road construction in the lower West Fork occurred during primarily during the 1960s and 1970s. Although natural sediment delivery potential is less in the lower watershed there is a higher density of roads and road/stream crossings. This period undoubtedly produced considerable sediment in the lower watershed. This segment of the West Fork is a steep gradient, sediment-transport reach and much of the sediment would have been rapidly transported out to the main Yaak River.

West Fork Trib #2: West Fork Trib #2 is a first order stream that enters the West Fork just above French Creek. It is on a southwest aspect with generally drier habitat types. The channel condition is generally good, but one steeper reach does

have fairly active scour and bedload transport. It was harvested primarily in the 1970s and 1980s. Although there are only three road/stream crossings, the interaction of roads and skid trails in this watershed may be increasing peak flows. The lowest reach of the West Fork Trib #2 is a very low gradient channel which limits sediment transport to the West Fork Yaak.

French Creek: French Creek is a third order tributary to the West Fork Yaak River. Its confluence is about 3.5 miles up the West Fork from the Yaak River. The main channel of French Creek has good stability from tree roots, large wood and boulders. The banks and channel remained stable through a flood event this spring that greatly exceeded bankfull conditions. Most of the riparian areas in the lower reaches have not been harvested. There are several tributaries to French Creek. Some of these tributaries are very stable or of such low gradient they have little or no ability to transport sediment. Other tributaries have steeper reaches and are moving sand to cobble size material down into the mainstem of French Creek.

French Creek is a moderate source of sediment to the West Fork Yaak River. There are 30 road/stream crossings which have been the source of sediment over several decades. One washout was identified, and there are several high-risk sites. Road surface erosion and long ditch runs are severe in several locations. Two tributaries were visibly degraded from road and harvest activities. The effect of these tributaries on the condition of the main channel of French Creek is partially mitigated by other tributaries which are quite stable and in good condition. Areas of gentle topography and wetlands have also helped mitigate effects of harvest and road construction on the main channel.

Mud Creek: Mud Creek is a second order stream that flows into a wetland area just above its confluence with the West Fork Yaak River. It has a stable stream channel with considerable subsurface flow in the lower reaches. Contrary to its name, the stream was exceptionally clear during the Yaak River flood event in May 2002. This high water quality is probably due to the lack of road crossings, the extent of subsurface flow and wetland areas. There are only two road/stream crossings. Lower mud Creek was selectively harvested for primarily cedar during the 1960s. Logs were skidded down to a small mill located near the confluence of Mud Creek and the West Fork. The stream currently flows through a small pond at this site. There are two road/stream crossings in the watershed. Mud Creek has a very limited ability to deliver sediment to West Fork Yaak.

Sink Creek: Sink Creek is a second order stream that is a tributary to the West Fork Yaak. The stream does not flow into Koo Koo Creek as is shown on the USGS topographic map. Sink Creek flows into the West Fork Yaak about ½ mile above the mouth of the West Fork. Sink Creek alternately flows surface and subsurface. Its riparian area is generally intact, but similar to Mud Creek, there was selective cedar harvesting in the 1960s. There are skid trails and large cedar stumps along the stream and on the slopes above the stream. The upper watershed was impacted by timber harvest and road construction for the Mud Little Timber Sale which occurred in the 1990s. There are six road/stream crossings. The stream channel condition is naturally very stable, but there is evidence of some bank stress from peak flow increases. Sink Creek has a low potential to deliver sediment to the West Fork due to its low gradient and subsurface flow.

TABLE 3-40. WATERSHED CONDITION INDICATORS FOR WEST FORK YAAK TRIBUTARIES

Watershed	Area (acres)	% Previously Harvested	Existing % ECA	Road Density	Road / Stream Crossing Density	Natural Watershed Sensitivity	Current Channel Stability
West Fork Yaak[1]	69,734	20	10-12[2]	2.3[1]	1.2	Low	Fair/Good
WF Trib #2	743	43	22	3.4	3.4	Mod	Fair/Good
French	5,443	39	18	3.3	3.5	Mod	Fair/Good
Mud	829	25	14	2.0	1.6	Low	Good/ Excellent
Sink	1,077	47	23	4.5	3.6	Low	Good

[1] U.S. portion of watershed
[2] Exact ECA unknown. Estimation based on harvest history.

Pete Creek: Pete Creek is a cobble/boulder channel with good channel stability. The headwaters of the main channel initiate from a large wetland area. The riparian forest along the main channel is generally in good condition. The watershed had been fairly heavily harvested, particularly in the 1960s, 1970s and 1980s. ECA peaked at 24% in the 1980s. Current ECA is about 17%. Fine sediment probably continues to be elevated due to sediment delivery at road crossings. There are 101 stream crossings.

TABLE 3-41. WATERSHED CONDITION INDICATORS FOR PETE CREEK

Watershed	Area (acres)	Existing % ECA	Road Density	Road /Stream Crossing Density	Channel Stability
Pete	21,684	17	3.3	3.0	Good

Yaak River: The main Yaak River flows south along the eastern edge of the project area boundary, and then turns and flows west in the vicinity of the town of Yaak. West Fork Yaak, Waper Crek, Lap Creek, and Pete Creek enter the Yaak from the Garver Project area along this section of river. Vinal Creek, South Fork Yaak River, and Cool Creek are major tributaries on the other side of the River.

The main Yaak River valley bottom in this area is ¼ to ¾ of a mile wide with an extensive flood plain. The channel has a meandering form typical of low gradient streams. Riparian vegetation is primarily forbs and shrubs. Although some of this meadow system is natural, much of the riparian area has been converted from forest to meadow by private landowners. The floodplain is almost entirely privately owned and has been subject to homesteading, logging, and grazing for almost 100 years.

Because both sides of the river are privately owned, the Kootenai National Forest has limited survey information on this segment of the Yaak River. 1998 aerial photos show that in the vicinity of the confluence of the West Fork Yaak (both upstream and downstream of the confluence) the main Yaak is abandoning meander bends and becoming straighter. There is a fair amount of braiding and bar development. This may indicate excessive sediment supply and/or bank instability. In the vicinity of the town of Yaak the stream is very stable and sinuous, but appears to be unnaturally confined.

Some sediment in the Yaak River originates from bank erosion along the main channel. However, the bulk of the sediment comes from its tributaries. The amount of sediment contributed by each tributary depends primarily on stream size, but also on the amount of natural and management induced sediment produced in that watershed. It is likely that most roaded and harvested watersheds are contributing sediment over natural levels.

TABLE 3-42. WATERSHED CONDITION INDICATORS FOR YAAK RIVER TRIBUTARIES

Watershed	Area (acres)	% Previously Harvested	Existing % ECA	Road Density	Road / Stream Crossing Density	Natural Watershed Sensitivity	Channel Stability
Lap	3,695	52	30	4.2	4.1	Low	Good
Yaak Trib #1	900	21	8	3.1	4.3	Low	Good
Yaak Trib #2	505	27	13	3.0	6.3	Low	Fair/Good
Yaak Trib #3	577	31	15	5.0	10.0	Low	Fair/Good

Lap Creek: Lap Creek is a third order tributary to the Main Yaak River. The lowest ½ mile of stream is on private land and conditions are unknown. The stream has good bank stability provided by tree roots and woody debris. The watershed has gentle topography and low precipitation. These factors have helped mitigate a high level of timber harvest and road construction. There are frequent intermittent reaches in the summer time that indicate subterranean flow. Timber harvest primarily occurred in the 1950s to 1970s. Most of the road construction occurred in the 1960s. There are 24 road/stream crossings in this watershed. Relative to the stream size, sediment loading from road construction was probably particularly high in the 1960s. Lap Creek has been a small, but chronic source of sediment to the Yaak River.

Yaak Tributaries #1, #2 and #3: These are three unnamed first and second order tributaries of the Main Yaak River flow on southerly aspects near Hensley Hill. The lowest reaches of all three streams are on private land and conditions are unknown. All three streams are intermittent. Yaak Tributary #1 has lower channel gradients, and flows through several wetland areas. It does not have surface flow to the Yaak River except through wetland areas during very high runoff. It has no ability to deliver sediment to the Yaak River. Yaak Tributaries #2 and #3 have steeper gradients and appear to have continuous scour channels to the floodplain of the Yaak River. These two streams deliver small quantities of sediment during peak runoff. The three tributaries have 6, 5 and 9 road/stream crossings, respectively.

Environmental Consequences

ONGOING AND FORESEEABLE ACTIONS THAT MAY IMPACT WATER QUALITY

Canadian Land Management: 36% of the West Fork Yaak watershed is in Canada and is primarily Crown land managed by the British Columbia Forest Service. Timber harvest, road construction and grazing are major activities in the Canadian portion of this watershed. 1998 aerial photos show large recent clearcut units, including riparian harvest along the main West Fork stream channel. Impacts of these activities probably include sediment delivery from roads, bank erosion resulting from logged riparian areas and cattle grazing, and peak flow increases from timber harvest in tributary watersheds. It is likely that Canadian management activities will continue to impact water quality and stream channel conditions in the lower West Fork and to a lesser degree in the main Yaak.

Private Land Activities: 90% of the portion of the Yaak River in the project area flows through private land. The last mile of the West Fork, approximately 5% of its total stream length, flows through private land. Specific conditions of the stream channel and riparian areas in these reaches are not known. Aerial photos show evidence of ongoing activities and development in the flood plains of both streams. Grazing, diversions, diking, road construction, riparian harvest, removal of woody debris and beaver dams, and construction of houses and outbuildings have modified the floodplains and riparian areas. Residential activities have the potential to effect water quality and stream channel conditions directly through chemical contaminants,

nutrient loads, and sediment from roads and ditches, channelization, and indirectly through removal of riparian vegetation and large woody debris, and riprapping.

There are approximately 30-40 small private landowners along the side of Yaak River in the project area. More subdivisions and continued home construction are expected over time. Private land development in wetlands and stream channels is subject to both federal and state permits coordinated by the Department of Natural Resources and Conservation. The effectiveness of this permit system depends on the willingness of landowners to initiate the permit process and follow through with the recommendations of the District Conservation Board.

Road Maintenance: Road maintenance activities include blading gravel roads, applying dust abatement, applying and repairing asphalt, repairing washouts, cleaning catchbasins and culverts, replacing culverts, and cleaning ditches are performed by the Forest Service on National Forest Roads and by the County and State on portions of the Yaak Highway. Snowplowing, sanding and application of deicing chemicals are performed by the County and State on the Yaak Highway. These activities have both negative and positive impacts on water quality. The greatest chronic impacts from road maintenance are probably from annual road blading and culvert work on National Forest land. BMPs apply to these activities and State permits are required for work in stream channels. Some of these activities result in short term sediment impacts, but many of these activities also correct chronic sediment sources and prevent road failures.

Fire Suppression: Wildfire suppression has the potential to impact water quality through fireline construction, development of water sources, dozing open roads for access, construction of turnarounds, and rehabilitation of firelines and other disturbed areas. The location, timing and magnitude of such effects are impossible to predict. Forest Service fire management guidelines emphasize minimizing resource impacts and immediate rehabilitation.

Noxious Weed Treatment: Noxious weeds are sprayed annually along District roads in accordance with the 1997 Kootenai National Forest Herbicide Weed Control EA and Decision Notice (KNF January 1997). Spraying under the guidelines of this decision minimizes the possibility of adverse effects on aquatic species.

Blowdown Sales: Blowdown may occur in the project area during and/or after this project. Blowdown occurring during the timber sale blowdown may be harvested by the timber sale purchaser under the guidelines of this analysis. Other blowdown sales would be analyzed in accordance with the 1998 Kootenai National Forest Blowdown EA and Decision Notice (KNF 1998). Salvage of blowdown under the guidelines of this decision would have no adverse impacts on water quality.

Yaak Community Hall Fuels Reduction: Trees would be removed on four acres around the Yaak Community Hall under this project. The trees would be yarded to the parking lot. This project area is in the main Yaak watershed. It would have no direct, indirect or cumulative impacts on water quality and is being analyzed under a separate project analysis.

ALTERNATIVE A
Direct, Indirect and Cumulative Effects

Alternative A is the no action alternative. It would have no direct effects on watershed condition or water quality. No timber harvest, slash disposal, mechanical fuel treatment, maintenance burns, landing construction, temporary road construction, road improvement (BMP) work or timber harvest related weed spraying would occur. There would still be cumulative watershed disturbance as a result of

previous past management activities and ongoing water quality impacts as a result of Canadian land management, private land activities, fire suppression activities and road maintenance.

The increases in peak flows resulting from past timber harvest would continue to decline as vegetation recovers in the harvested areas. Peak flows would not completely recover to pre-management conditions because roads and skid trails would continue to route water to streams.

Alternative A would not change the rate or risk of sediment delivery to streams in the project area. Roads would continue to be a source of chronic sediment to project area streams. No extensive BMP work other than routine road maintenance is expected to occur in the next 3-4 years. Alternative A does not preclude the implementation of BMP work. Much of this work could be done under existing agreements. The timing of future BMP work in this area depends on District workload and priorities.

Despite efforts at suppression, wildfires of varying intensity and sizes would periodically occur in this area. Slight to moderate increased peak flows are likely if a large fire occurred. Over many decades without harvest or fuel reduction, and continued fire suppression, fuel loadings would become higher, and the risk of high intensity fire would correspondingly increase.

ALTERNATIVES B, C AND D
Direct and Indirect Effects

Non-commercial thinning would have no effect on water resources and will not be further analyzed. There would be temporary changes in road access as a result of this project to protect wildlife habitat, including grizzly bear core area. Since critical road maintenance could still be performed if needed, there would be no watershed effects as a result of changes in access.

There are two primary areas of concern when considering the effects from the proposed activities of timber harvest, harvest-related road maintenance, temporary road and landing construction, excavator piling and burning, underburning, maintenance burning, and timber harvest related weed spraying: 1) streamflows and 2) sediment delivery. Two other areas of possible effects are riparian conditions and overall water quality.

1) Streamflows: Would the proposed activities increase streamflows enough to cause stream channel scour?

Increases in ECAs would be expected to increase peak flows. Peak flows could be increased through harvest or burning, or by an increase in new roads or skid trails that are hydrologically connected to stream channels. Peak flows could be decreased by decreasing the length of existing ditches and roads that are hydrologically connected to stream channels. Effects of ECA and roads on peak flows are more likely to be seen in small watersheds due to their shorter response time during storm events. ECA recovery is continuing to occur in previously harvested areas in the project area watersheds. This recovery was not modeled, but would offset the project-related increase in ECA in these watersheds.

R1 WATSED is a model that has been used on the Kootenai National Forest to project changes in the average peak monthly streamflow due to increases in ECA. This is called peak flow increase (PFI). The R1 WATSED model was not run for the Garver project, because reasonable projections of PFI can be made from previous modeling done in other similar watersheds. ECA increases for this project were

limited to levels that would clearly meet Forest Plan Standards without the need to run the R1 WATSED model.

The effect of this project on peak flows is not measurable at the scale of the West Fork Yaak, Pete Creek or the main Yaak. This project proposes to harvest approximately 3% of the total West Fork Yaak watershed area, 0% of Pete Creek watershed and less than 1% of the main Yaak Watershed. The fuels reduction/burning projects (Units B - P) would primarily kill understory trees and have no measurable effect on ECA. The proposed maintenance burn (Unit A) would result in an estimated 20% overstory tree mortality. It would slightly increase ECA, but it would not be measurable at the scale of the West Fork watershed.

For changes in ECA due to proposed activities in the smaller watersheds see Table 3-43. ECAs of 25 to 30% would generate PFIs of 10-12%. ECAs of 30 to 35% would generate PFIs of 12-14%. Under Forest Plan Standards these would be acceptable increases for all streams except those with a rating of Poor for channel stability. None of these streams are in Poor condition.

TABLE 3-43. ECA FROM TIMBER HARVEST AND MAINTENANCE BURNING

Watershed	Total Acres	Existing % ECA	Alt B % ECA	Alt C % ECA	Alt D % ECA
West Fork Trib #2	743	22	34	30	30
French	5,443	20	23	22	22
Mud	829	14	31	29	22
Sink	1,077	23	33	24	24
Lap	3,695	30	30	30	30
Yaak Trib #1	900	8	17	22	13
Yaak Trib #2	505	13	14	19	17
Yaak Trib #3	577	15	26	16	16

Alternative B would result in the greatest ECA increases. Alternative B increases the peak flow in Mud Creek, West Fork Trib #2, Sink, Yaak Trib #1 and Yaak Trib #3. Alternative B raises the ECA in three watersheds to over 30%. Although bank stability should be adequate in all three watersheds, there is a slight risk of increased scour, especially in West Fork Trib #2.

There would be no measurable change in ECA in Lap Creek. Yaak Trib #2 would probably have no measurable change in flows. Yaak Trib #1 would have a measurable increase, perhaps 3-4% increase in peak flows, but the total increase would acceptable for the channel condition.

Alternative C increases the peak flow in Mud Creek, West Fork Trib #2, Yaak Trib #1 and Yaak Trib #2. Alternative C does not raise the ECA over 30% in any watershed. There is less risk of scour in West Fork Trib #2, Sink Creek and Yaak Trib #3 in Alternative C than in Alternative B. Alternative C provides less risk peak flow increases that may cause channel scour than Alternative B.

Alternative D increases the peak flows in Mud, West Fork Trib #2 and Yaak Trib #1. Alternative D does not raise the ECA over 30% in any watershed. There is less risk of channel scour in West Fork Trib #2 in Alternative D than in Alternative B. There is less risk of channel scour in Mud Creek and Yaak Trib #3 than in Alternative B or C. Alternative D provides the least risk of harvest-related flow increases that may cause channel scour.

The other factors that were considered were the natural hydrological sensitivity of the watershed, the current effect of roads and skid trails on the watershed hydrology, and the benefit of the committed BMP road work. See Table 3-44 for a summary of these factors. Under Alternative C and D there is a low to moderate risk of peak flows scouring the stream channel in the West Fork Trib #2. This risk would

be mitigated by the implementation of the committed BMP road work which would include adding ditch relief culverts and drain dips to disperse runoff.

Implementation of road improvement work would decrease water routing in the West Fork. This would be a particular benefit to West Fork Trib #2 and French Creek where road segments that adversely impact stream channels have been identified. Although there would be new skid trails in the tractor units, implementation of BMPs would minimize the effect of these skid trails on routing water.

TABLE 3-44. RISK OF STREAM CHANNEL EFFECTS FROM WATER YIELD INCREASES FROM HARVEST AND BURNING FOR ALTERNATIVES C AND D

Watershed	Total Acres	Natural Watershed Sensitivity to Hydrologic Events	Existing Road /Skid Trail Hydrological Effects	Current Channel Stability	Existing % ECA	Alt C % ECA Increase	Alt D % ECA Increase	Risk of Alt C Flow Increases Adversely Affecting Channel	Risk of Alt D Flow Increases Adversely Affecting Channel
West Fork Trib #2	743	Mod	High	Fair/Good	22	8	8	Low/Mod	Low/Mod
French	5,443	Low	Mod	Fair/Good	20	2	2	Low	Low
Mud	829	Low	Low	Good/ Excellent	14	15	8	Low	Low
Sink	1,077	Low	Mod	Good	23	1	1	Low	Low
Lap	3,695	Low	High	Good	30	0	0	None	None
Yaak Trib #1	900	Low	Mod	Good	8	14	5	Low	Low
Yaak Trib #2	505	Mod	Low	Fair/Good	13	6	4	Low	Low
Yaak Trib #3	577	Mod	High	Fair/Good	15	1	1	Low	Low

2) Sediment Delivery: Would the proposed activities result in sediment delivery to streams that affects water quality or channel substrate conditions?

Sediment delivery could occur at road/stream crossings from road maintenance activities. Road maintenance would include blading roads, cleaning ditches, cleaning catchbasins, replacing and adding culverts, installing drain dips and belt drains, adding gravel or pit run surfacing, constructing sediment catch basins, and buttressing cutslopes and fillslopes. Many of these activities are BMPs designed to reduce long-term sediment delivery. Where culverts are replaced or removed in live streams some introduction of sediment is usually unavoidable. Elevated turbidity usually occurs downstream of the culvert during the work.

Since most impacts occur at road/stream crossings, the number of crossings being used for project activities can be use as a measure of risk of sediment delivery. Roads that are currently vegetated may need to be scarified with a grader or a bulldozer. Stream crossings on these segments of road are at greatest risk for sediment introduction.

There is no significant difference between Alternatives B, C and D with respect to sediment delivery. It is likely that any of the action alternatives would produce some sediment from road-related activities in the short term. Long-term sediment production at the stream crossings in the West Fork would be reduced by implementation of the committed road BMP work.

TABLE 3-45. ROAD SURFACE SEDIMENT DELIVERY POTENTIAL AT HAUL ROAD STREAM CROSSINGS

Main Watershed	Watershed	No. of Gravel Road/ Stream Crossings (Very low potential)	No. of Dirt Surfaced Road/ Stream Crossings (Low potential)	No. of Vegetated Road/ Stream Crossings (Moderate potential)	Total No. of Haul Road Stream Crossings	BMP Priority by Location[1]
		Alt B/C/D	Alt B/C/D	Alt B/C/D	Alt B/C/D	Alt B/C/D
West Fork Yaak	West Fork Trib #2	1	0	3	4	High (Committed Work)
	French	2	2	3	7	
	Mud	0	0	0	0	
	Benefield	4	0	2	6	
	Sink	0	0	0	0	
	Other small tributaries to West Fork	3	0	0	3	
	Total West Fork	**10**	**2**	**8**	**20**	
Pete	**Pete Total**	**5**	**0**	**1**	**6**	**Mod**
Lap	**Lap Total**	**0**	**0**	**0**	**0**	**Mod**
Main Yaak	Yaak Trib #1	1	2	0	3	Low
	Yaak Trib #2	1	0	0	1	
	Yaak Trib #3	4	0	5	9	
	Other small tributaries to Main Yaak	3	1	3	7	
	Total Main Yaak	**9**	**3**	**8**	**20**	

[1] See BMP Priority Areas Map, M-13.

A total of approximately one mile of temporary road construction is proposed for this project. These temporary roads would not cross any stream channels or be located within RHCAs, so sediment delivery directly from the temporary roads to stream channels would not occur.

Skid trails, temporary roads or firelines that route water to roads could deliver sediment or cause scour that results in sediment being delivered to streams at road crossings. Implementation of BMPs such as minimizing extent of ground disturbed, recontouring excavated areas, installation of waterbars, and seeding disturbed areas would decrease sediment delivery. BMP audits indicate a high level of compliance with these requirements during implementation (KNF September 2001a). The retention of RHCAs makes direct sediment delivery from a unit to a stream unlikely because the vegetation in the RHCA acts as a sediment trap.

The risk of sediment from mass failures as a result of this project is very small. Landslide prone areas would be identified and excluded from harvest.

Riparian Condition

In the past timber harvest activities have occurred in riparian areas. Since the implementation of INFS guidelines for riparian protection by Forest Plan amendment in 1995, riparian areas and wetlands have been designated as RHCAs and completely excluded from harvest. Forest plan monitoring results indicate the protection of RHCAs has been effectively implemented on the Kootenai National Forest (KNF September 2001). As a result of these requirements there would be no discernible effects from timber harvest to riparian function, stream shading, or large woody debris recruitment.

Equipment may be allowed to cross riparian areas in Units 5, 24, 33b, and 34 if suitable sites are found to adequately protect soil and water resources.

Ignition of prescribed burns are prohibited in RHCAs. However, prescribed underburns or maintenance may enter RHCAs of small intermittent stream channels

or wetland areas. The fire intensity is expected to be low because of the moisture conditions under which the burns would occur, and the even higher moisture conditions typically found in RHCAs. Prescribed fire may kill riparian vegetation, including trees. In the short term this could decrease shading, and increase woody debris recruitment. These effects are expected to be similar to the natural effects of low intensity wildfires. Short-term effects are expected to be minor, and no long-term adverse effects are anticipated.

Water Quality

Water quality impacts with respect to sediment are discussed under the Sediment Delivery section above. Other possible water quality impacts include nutrient increases, water temperature increases and chemical contamination. Significant changes in nutrients and temperature are usually associated with widespread riparian disturbance from harvest or fire. There would be no effect on stream temperature because there is no riparian harvest. There may be a slight effect on nutrients, but levels would remain well within water quality standards.

There is potential for spills or leaks of petroleum products associated with the operation and refueling of logging trucks, logging equipment and helicopters. Incidents involving sizable spills of petroleum products are rare. Design Features to prevent and control spills are included in the timber sale contracts. See Table 2-2. This is a very low risk.

Noxious weeds would be sprayed along the haul roads by the timber sale purchaser. Specific requirements for chemical concentrations, application rates and handling procedures are in the timber sale contract. These requirements are specifically designed to protect water quality. No adverse water quality effects are expected with herbicide application under these restrictions.

CUMULATIVE EFFECTS OF ACTION ALTERNATIVES WITH ALL FEDERAL PROPOSED ACTIONS AND FORESEEABLE ACTIONS ON OTHER LANDS

Streamflows: Alternatives B, C, and D would increase streamflows in several small watersheds as described in the previous section. No other foreseeable actions would affect streamflows in these smaller watersheds. Alternatives B, C and D would not change the cumulative peak flow increase that exists in the West Fork Yaak, Pete Creek and the Main Yaak River from previous timber harvest. Future harvest in Canada may increase peak flows in the West Fork Yaak and Main Yaak watersheds.

Sediment Delivery: Alternatives B, C, and D would result in short-term sediment delivery from road maintenance activities. Although very minor, this would add to sediment delivery from existing road conditions, Canadian activities, private land activities, and on-going road maintenance activities. The amount of sediment added would not be measurable at the scale of West Fork, Pete Creek or Main Yaak. In the long term, these roads should produce less sediment as a result of the implementation of the BMP work.

Riparian Condition: Alternatives B, C and D would have very little effect on riparian conditions. There would be no harvest in riparian areas. There may be localized short term effects in riparian areas adjacent to underburn areas on Hensley Face or the maintenance burn area by Dusty Peak. Previously harvested riparian areas on National Forest would continue to improve in condition as regrowth occurs. Riparian areas in Canada and on private land along the Yaak River would probably remain in the same overall condition.

Water Quality: There would be no change in overall water quality in any of the streams from activities associated with the Garver project other than as discussed

under the above Sediment Delivery section. Other federal ongoing and foreseeable activities would have no effect on water quality as discussed in the Ongoing And Foreseeable Actions section. The effects on water quality in the Yaak River from private land activities are unknown, but water quality could be expected to slightly decline with increased land development.

CONSISTENCY WITH REGULATORY FRAMEWORK

Alternative A maintains existing conditions and does not violate federal, state or Forest Service regulations. Other ongoing and foreseeable federal activities must comply with standards to protect water quality as previously discussed in the Ongoing And Foreseeable Actions section.

Alternatives B, C and D meet the requirements of the Clean Water Act by protecting beneficial uses, preventing degradation of Water Quality Limited Streams and protecting wetlands. This project would also comply with the MOU with the State of Montana to implement BMPs on land management projects.

Water quality would be maintained at a sufficient level to protect beneficial uses. No long-term effects are expected. Short term sediment increases would be minor and of short duration. There would be no measurable effects in fish bearing reaches, or to downstream private landowners.

The West Fork Yaak River is listed as a Water Quality Limited Stream due to excessive fine sediment. Some of this sediment has originated from past timber harvest and road construction activities on National Forest land both within and upstream of the Garver project area. An unknown proportion of this fine sediment has and continues to originate from Canada. The Garver project would generate small quantities of sediment during the project from road maintenance, including BMP work, from blading currently vegetated roads, blading roads during haul, and skid trail crossings in RHCAs, and the interaction of skid trails and landings with the road drainage system. This short-term increase in sediment may cause elevated turbidity levels in first order or second order streams during construction work, but would not be noticeable or measurable in the West Fork Yaak River. This short-term increase in sediment would be offset by a long-term reduction from road-related chronic sediment sources. The committed road BMP work would reduce sediment delivery at stream crossings in the West Fork.

Protection of Wetlands

All wetlands are identified as Riparian Habitat Conservation Areas. Wetlands less than an acre would have an RHCA width of 50 feet, and wetlands greater than an acre would have an RHCA width of 150 feet. No timber harvest, no temporary road construction, operation of heavy equipment or ignition of prescribed fire (underburns and maintenance burns) would be allowed in these areas. It is possible that prescribed fire may enter wetlands. Due to the naturally moist conditions of these areas only low intensity fire is anticipated. This should closely mimic natural fire conditions and no long-term adverse effects are expected.

Forest Plan Consistency

Alternatives B, C, and D are consistent with the Forest. Water and sediment yields resulting from the proposed activities were analyzed and determined to maintain current levels of beneficial use protection. Soil and water conservation practices would be followed through implementation of BMPs. Sale implementation would protect RHCAs as described by INFS. Opportunities to improve watershed conditions by implementing BMPs on haul roads were identified. The work would be prioritized based the benefit to native fisheries and protection of beneficial uses.

AIR QUALITY

Under the 1977 Clean Air Act amendments (42 U.S.C. 7401 et seq), areas of the country were designated as belonging in Class I, II, or III Airsheds for Prevention of Significant Deterioration purposes. Class I areas are all international parks, national parks greater than 6000 acres, and national wilderness greater than 5000 acres which existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional, human-induced air pollution which can be added to these areas. Class II areas are currently all other areas of the country that are not Class I. To date, there are no Class III airsheds.

The 1977 amendments of the Clean Air Act contained provisions for the Prevention Of Significant Deterioration (PSD) Program to prevent the growth of stationary industrial sources from causing a significant deterioration of air quality in areas that meet the present air quality standards or NAAQSs (attainment areas). The PSD requirements call for careful monitoring of actual air quality conditions and placement of limits on the "increment" of clean air that can be used by industrial projects. Monitoring data has been collected and national allowable increments have been established for Class I airsheds such as the Cabinet Mountain Wilderness which is approximately 30 air miles south of the project area.

The PSD program is administered by the State air regulatory agencies with oversight authority retained by EPA.

The Clean Air Act authorizes states with approved Prevention of Significant Deterioration (PSD) programs to exclude particulate matter emissions caused by temporary activities from consuming increment. EPA expects the states, on an individual basis, to decide the extent to which prescribed fires (and the resulting emission increases) should be considered temporary sources of air pollution when determining increment consumption in specific areas.

The majority of the legal entities in Montana (including the Forest Service) which create particulate as a result of their burning activities have formed the Montana/Idaho State Airshed Group. Through a Memorandum of Understanding with the Montana Air Quality Bureau, this group has established a smoke monitoring system that provides daily air quality predictions, and air quality restrictions, to its members. The Montana Air Quality Bureau issues an annual burn permit to the Forest Service. Issuance of this permit is based on Forest Service participation and compliance with burning restrictions set forth by the Montana Airshed Group.

All prescribed burning within the analysis area will comply with the State Requirements of the State Implementation Plan and the Smoke Management Plan (Kootenai Forest Plan, II-26). Prescribed burning is reported to the Airshed Coordinator on a daily basis. If ventilation problems are forecasted by the monitoring unit, prescribed burning is either restricted by elevation or curtailed until good ventilation exists.

The Lincoln County Department of Environmental Health has Particulate Matter (PM) -10 and PM-2.5 monitors located in Libby, MT. PM monitors are also located in Kalispell, Whitefish, Thompson Falls, Missoula, Helena, and several other sites in Montana.

The monitoring information, fire weather and spot forecasts, smoke dispersion models, and regular coordination between the Airshed Coordinators and the County Air Quality program are all available to help manage the air resource.

The coordination unit is located in Missoula, Montana. Currently, the coordination unit is formally operational during the fall months. Coordination/monitoring for spring, summer, and fall prescribed burning will begin in the spring of 2003. Other information pertaining to the operating procedures of the airshed group is available in the "Montana/North Idaho Smoke Management Program Operating Guide". A copy of this guide is in the project file.

The winter months of December through February are closed to all open burning due to the high occurrence of cold air inversions, and the resulting poor smoke dispersal.

The combustion products of prescribed burning include: carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons, nitrogen oxides, and trace minerals. Federal and State ambient air quality standards have been established for particulate matter (PM), which is the pollutant of most concern in prescribed burning. Specifically, particulate matter less than or equal to 10 micrometers in aerodynamic diameter (PM-10) is the size which can penetrate the inner recesses of the lungs, causing health problems. It is also the size that most severely impacts local and regional visibility.

In July of 1997, the EPA issued revised national air quality standards for ozone and particulate matter in the 2.5 micron class (PM-2.5). The EPA proposed the following implementation plan for the new standards which took effect on September 18, 1998:

- 1998 - 2000 Nationwide fine particulate monitors in place.
- 2000 - 2002 States and EPA collect data from nationwide network.
- 2002 - 2005 States submit to EPA their State Implementation Plans (SIP's) describing how they'll meet and enforce the new standards.
- 2007 - 2016 States implement their Plan to assure they attain the standards.

The current Federal and State standards are:

PM 10: 1) the concentration of PM-10 must not exceed 150 micrograms per cubic meter over a 24-hour period; or 2) the annual arithmetic average must not exceed 50 micrograms per cubic meter.

PM 2.5: 1) the concentration of PM-2.5 must not exceed 65 micrograms per cubic meter over a 24-hour period; or 2) the annual arithmetic average must not exceed 15 micrograms per cubic meter.

Nonattainment areas within 80 miles of the project area include: Libby, Kalispell, Columbia Falls, and Whitefish.

Air quality monitoring in Troy, MT by the Montana Department of Health and Environmental Sciences, has shown that particulate levels are typically under the national limit of 150 micrograms/cubic meter.

Studies taken by the Health and Environmental Sciences Department also show that prescribed burning under State regulations is not a major contributor to reduced air quality. Source apportionment studies taken in Libby, a nonattainment area, have shown that slash burning contributes less than 3 percent of the total PM-10, with road dust and woodstove smoke being the major contributors (see project file for more information). In a survey of monitoring documents for fall PM-10 readings in Libby since 1988, the air quality has shown a trend of improvement during the months of September through November when a good percentage of the prescribed

burning takes place. This improvement since 1988 would indicate that the monitoring and restriction program operated by the Montana Airshed Group is working successfully.

Affected Environment

Air quality is affected by prescribed burning and any harvest related activity that deals with slash disposal.

Need for Fuel Treatment. There are situations in forest management where it is desirable, even required by law, to treat activity created fuels after a timber harvest is completed. Prescribed fire is one of the most common techniques used to dispose of these fuels. Prescribed fire simulates some elements of wildfire, so, it simulates natural processes better than other fuel treatment alternatives. Hall (1972) summarized the chemical and thermal processes involved with fire, and concluded that the adverse effects of prescribed burning are compensated for by the reduction in wildfire hazard. Prescribed burning is conducted within the limits of a fire plan and prescription that describes the acceptable range of weather, moisture, fuel and fire behavior parameters, and ignition methods to achieve the following forest management objectives:

1. Treat activity fuels to reduce the potential for uncontrolled wildfire, which helps maintain long-term air quality.
2. Prepare harvested sites for tree planting
3. Prepare harvested sites for natural seeding
4. Reduce competition from unwanted vegetation
5. Enhance wildlife habitat and forage production
6. Maintain natural succession of plant communities
7. Provide ecological control of insects and disease
8. Alleviate natural fuel buildup created by wildfire suppression

The most obvious effects of prescribed burning is the impact on air quality and its temporary impairment of visibility. When compared to presettlement times and natural conditions, the air quality today is markedly better. Records covering a 30-year period, for the area including the Kootenai, Flathead, Idaho Panhandle, and Lolo National Forests, illustrate that this region averaged approximately 480 lightning caused fires per year (Barrows, Sandberg, and Hart, 1977). Prior to settlement, Native Americans also started fires for a variety of reasons. These ignitions contributed to the number of fires burning during the spring, summer, and fall months. Before fire suppression, these fires simply burned until they went out. The results of this activity would vary from year to year depending on the nature of the weather experienced during the burning season and the location of the fires. Overall, the amount of smoke produced by natural processes during the fire season probably exceeded that amount generated today by prescribed burning. Ward et al (1976) estimated that emissions (per ton of fuel) created by wildfires were approximately three times greater than that produced by prescribed burning. It is difficult to determine the beneficial or detrimental effects to ecosystems that smoke from natural fires may have produced. It is important to note, however, that fire (and associated smoke) has played an important role in the development of Northern Rocky Mountain ecosystems and the species that evolved with them.

The primary method that will be used to treat sites for hazard reduction and site preparation will be prescribed burning. It is the most ecologically sound tool and is a way to restore fire into an ecosystem where fire has been suppressed for the last 80 years. Initial resource benefits include reduced fire risk and optimum regeneration in a shorter time frame. Other benefits include the establishment of healthy vegetation

to protect soil and water values, and quicker establishment of long term wildlife cover and habitat.

Other methods of slash treatment and site preparation are available. Using these alternatives without prescribed fire does not always meet objectives. Mechanical treatments can be very costly and do not remove fine fuels. In many areas natural fuels combined with harvest slash, create an excess of fuel. Mechanical treatment such as piling excess fuel, then burning is very effective at reducing fuels while not stressing residual trees.

Prescribed burning is the most effective, most natural, and often the most economical method to achieve desired land management objectives.

Airshed Characteristics. The effects of smoke from prescribed burning within the Project area, and the area in general, is affected by the season of burning, the overall stability of the atmosphere, wind flows, topography, and the time of day that the burning actually takes place.

Season - Spring and summer seasons have usually produced the best times for smoke dispersal as daytime heating and general windflows help to raise the smoke columns high into the atmosphere and disperse them rapidly. By mid-September, the air quality naturally begins to deteriorate as nighttime inversions often develop. Inversions are hard to break during stable high-pressure systems. The effects of prescribed burning on air quality is usually most severe from mid-September through November when smoke dispersal may be poor much of the time. During the cold winter months from December through February air quality is at its poorest. There is no prescribed burning allowed, from December 1 until March 1.

Atmosphere and Wind Flows - Stable high-pressure systems are poor for smoke dispersal, especially during the fall and winter months. Inversions often develop where warm air at the higher elevations traps cold air and particulates in the lower elevations with very little wind flow. During the late spring and summer months there is usually enough daytime heating to lift the smoke high into the atmosphere even during stable high-pressure systems. Strong winds help to disperse smoke rapidly. Winds in excess of 15 miles per hour will sometimes push smoke from the higher elevations into the lower elevations, but it spreads and disperses so rapidly that it does not have a long lasting effect. Nighttime downslope winds carry some residual smoke downslope and may cause the smoke to pool up at the lower elevations. This trapped smoke is usually dispersed by afternoon the following day.

Smoke plumes from past burning on the District have traveled in an easterly direction due to the prevailing westerly winds. Most smoke columns are well dispersed by the time they have moved several miles east.

Topography - Topography also plays a role in the dispersion of smoke. Smoke produced from high elevation burns (above 4,500 feet) is lifted over the ridge tops (6,000 feet) and remains at altitude until it disperses. When burning at the lower elevations, such as the Project area, the smoke has to rise over the high ridges. Lower elevations usually are not as exposed to the prevailing winds, so the night time down slope winds tend to push more residual smoke down to lower elevations until convection from the next days heating lifts the smoke into the atmosphere.

Time of Day - The time of day that the burning takes place is also very important. Smoke dispersal is best when the daytime heating causes upward convection. This is usually when the winds are the strongest, aiding dispersal. The afternoon hours from 1:00 p.m. until around 6:00 p.m. are generally the best times. Night time

burning is usually poor for smoke dispersal, as the cool down slope winds normally prevent the smoke from rising up to the higher atmosphere.

Natural Conditions. Although there is no known historical air quality data for the natural ecosystems in Airshed 1, it is known that fire historically played a major part in the vegetative conditions of the area. Journals from early day explorers and newspaper articles from the late 1800's often mention the smoky conditions from fires burning in western Montana and northern Idaho (Losensky 1992).

The annual amount of smoke generated from forest and range fires has generally decreased since the early 1900's, even with today's use of prescribed fire. Prior to 1900 an estimated 5 to 150 fires started annually from lightning on the District (based on modern fire records). These fires would have generated smoke for as short as a few hours to as long as 120 days. Since that time smoke has been reduced considerably due to the advent of a policy of suppressing fires on forested and grasslands. Settlement and subsequent fire protection reduced the amount of area burned and reduced the duration of smoke emissions from wildland fires.

Today's prescribed burning is scheduled by forest managers to take place during periods of good smoke dispersal.

Existing Conditions. Air quality monitoring in Libby/Troy by the Montana Department of Health and Environmental Science has shown that air quality is fair to good and particulate levels are typically within the national standard of 150 micrograms/cubic meter. The monitoring unit in Troy was removed in 1990 since its data showed that Troy did not have an air quality problem. There is no evidence that particulate levels on a countywide basis have exceeded the national standard since this monitoring unit was removed.

Studies taken by the Health and Environmental Sciences Department also show that prescribed burning under State regulations is not the major contributor to reduced air quality in the Troy and Libby areas. Source apportionment studies taken in Libby, a nonattainment area, have shown that slash burning contributes less than 3% of the total PM-10, with road dust and wood stove smoke being the major contributors. PM-10 readings taken in Libby since 1988 have shown a trend in improving air quality during the months of September through November when most of the prescribed burning takes place. This would indicate that the monitoring program operated by the Montana Airshed Group is working successfully.

Only once did the particulate levels in Lincoln County (Eureka) exceed the National standard of 150 micrograms/cubic meter between 1988 and 1991. This was due to the Dry Forks wildfire which was burning on the Forest during September of 1988. This is indicative of the potential degradation in air quality that large-scale wildfires may cause. According to the Environmental Protection Agency's Report AP-42, Compilation of Air Pollution Emission Factors, some air pollution is generated by prescribed burning, although the net amount is believed to be a relatively smaller quantity than that produced by wildfires. The Environmental Protection Agency states in this report that "prescribed fire is a cost effective and ecologically sound tool for forest, range, and wetland management. Its use reduces the potential for destructive wildfires and thus maintains long term air quality."

Most of the burning tied to timber harvest done in the Troy area (both on Federal and private land) is done for hazard reduction reasons. Generally, three methods are used: broadcast burning, underburning and pile burning. Broadcast burning has to be done under somewhat dry conditions, especially at higher elevations, to achieve an efficient burn and to reduce particulates. Most broadcast burning on Forest Service land takes place in the spring, summer and early fall.

Some private landowners burn their grass fields in the spring. Few private landowners broadcast burn or underburn slash, due to the associated control problems. Most slash burning done by private landowners is pile burning which can be done at a later season of the year, after precipitation reduces the likelihood of escape.

Pile burning on both public and private lands normally takes place from mid-October through November for control reasons. Pile burning will often degrade air quality more adversely than broadcast burning since the piles are burned later in the season when smoke dispersal not as effective. Piles often contain dirt and are usually burned when wet, resulting in a fire that smolders (an inefficient phase of combustion) for a long period of time.

Road dust is a source for particulates during dry periods in summer and fall in the forested areas, and it is a year-round source of particulate in the town of Troy due to the winter sanding of roads. Pollution from this source is generally localized as the dust usually settles within close proximity of the road itself except on windy days.

Outside influences on the local airshed include dust and smoke from areas to the west. Much of the impact comes from dust off the Palouse prairie and smoke from the industrial grass burning which takes place in eastern Washington and northern Idaho.

The monitoring unit has shown that road dust from within the town and burning of wood to heat homes are the two main contributors to reduced air quality in the Libby area. These pollutant sources are most prevalent during the winter months and comprise most of the particulates throughout the year. When they are generated in the valleys under inversions, particulates cannot be lifted out and dispersed by the winds. The longer the inversion persists, the worse the air quality gets, until the inversion is broken allowing the pollutants to mix out. The air quality will sometimes reach the unhealthy stage during these winter months. In contrast, air quality has only occasionally reached the poor stage during times when prescribed burning was active. Road dust and wood stove smoke are the major contributors to these poor air quality events.

Sensitive Areas. Impacts from any burning within the project area are usually felt downwind in an easterly direction, since prevailing westerly winds are a dominant feature. Sensitive areas downwind (3-15 miles) include the community of Yaak and the Yaak River Valley. There is an impact zone around the Libby area, but burning on the Three Rivers Ranger District rarely affects this impact zone. The immediate vicinity of the burns will experience the major impact of the smoke from burning within the project area with the settling of smoke into the lower valley bottom areas during the night and early morning.

Glacier National Park, a Class I airshed, lies 80 miles to the east. Whitefish, Columbia Falls, and Kalispell, all nonattainment areas, are located 80 miles to the east. Smoke will be well dispersed from burning within the project area before reaching these areas. The Cabinet Mountain Wilderness, 30 miles south of the project area, is not expected to be impacted as the general wind pattern is from the south-southwest carrying smoke away from the wilderness area.

Environmental Consequences

ALTERNATIVE A
Direct and Indirect Effects

There would be no direct effects to the air quality or human health from the No Action Alternative. The indirect effects to the air quality would occur when a wildfire escapes initial attack efforts and starts to burn in unmanaged stands or in untreated fuels. The downed material associated with decadent stands combined with ladder fuels from the developing shade tolerant understory would act as a fuel source for a wildfire. Smoke from wildfires is unmanageable and would likely produce smoke in intensity and duration much greater than what would be produced by the planned ignitions of any of the Action Alternatives.

The severity of air quality degradation from wildfire is unpredictable. Air Quality impacts from wildfire would normally occur during the summer months when visitor use in affected airsheds is highest.

Cumulative Effects

Air quality would not be affected until a wildfire escapes initial attack efforts. At that time there would be a higher level of particulate matter released than prescribed burning because of the greater amount of fuel consumed. The eventual wildfire would have a much different impact than what a prescribed fire would have under a controlled situation. Prescribed fire impacts usually last for a short period of time and are managed and mitigated. Air quality from wildfires could be impacted for weeks, as was experienced in Northern California and Southern Oregon in 2002 and various parts of the Northern Rockies in 1988, 1994 and 2000.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

The proposed activities are all within Airshed One of the Montana Airshed Group. The Montana Airshed Group operates an air quality monitoring unit in conjunction with the State of Idaho. The monitoring unit is in operation from March 1 to November 30, annually. The practices of the Montana Airshed Group are considered the Best Available Control Technology by the Montana State Air Quality Bureau. Wherever National Forest burning activities will occur, the direction contained in the Forest Plan standards and guidelines will insure compliance with the Smoke Management Plan published by the Montana Air Quality Bureau and administered by the Montana State Air Shed Group. The objectives and practices of the Montana State Airshed Group are attached.

Besides the operation of the monitoring unit, there are several measures used to mitigate the effects of prescribed burning on air quality. These include:

> One of the objectives of prescribed burning is to reduce the threat of wildfires; therefore, burning itself is a smoke mitigation measure. The smoke from prescribed fire can be managed to a degree, whereas the smoke from wildfires is unmanageable.
>
> Spring and early summer burning is maximized. Smoke dispersal conditions are generally much better during these time periods than the fall of the year. Valley inversions are not as prevalent in the spring and summer months relative to fall. Air mixing allows for good ventilation on most days which allows smoke to leave the valleys.

After harvest of an area, slash is left to "cure out". This requires leaving the slash lie on the ground over the summer months to dry out. Allowable moisture conditions of the slash to be burned are predetermined in the district burn plan. Duff moisture content and slash fuel moisture are sampled prior to ignition so the burn will meet management objectives, while minimizing smoke production.

Individual burn bosses are trained in smoke management techniques as a prerequisite for qualification. The burn boss may terminate a burn in the event smoke behavior is not as forecasted and there is the potential for smoke to adversely impact local communities. This could occur when wind conditions are not favorable, unforecasted inversions are present, or an inversion is not breaking down as quickly as forecast. If there is some doubt as to the possible behavior of the smoke, a test fire is used to determine the probable direction the smoke plume will drift.

Many factors contribute to the amount of smoke produced from a burn including weather conditions, combustion processes, fuel properties (moisture, loadings, arrangement), and type of burn. The effects of smoke on air quality are of short duration due to previously described mitigation measures, regulatory requirements, weather factors, and the qualities of smoke itself. The proposed fuel management treatments for action alternatives involve prescribed burning.

Differences among the proposed alternatives are related to the type of burning and amount of fuel to be treated. The effects of the alternatives will be assessed based on the prescribed burn method and the acres of planned prescribed burning. The following prescribed burning methods will be used in all action alternatives:

Underburning is used where intermediate harvest activities take place. Underburning will also be accomplished in other areas. The objectives are: 1) to reduce fuel loading from harvest activities, while protecting the residual overstory trees, 2) reduce ladder fuels, 3) maintain sufficient down woody debris for nutrient and moisture sinks, 4) and minimize soil disturbance 5) increase palatable browse for wildlife. Leave trees should be a fire tolerant species such as ponderosa pine, larch, or Douglas-fir. Since underburning is deliberately slow (to protect leave trees), combustion is less efficient than with broadcast burning. More smoke per acre can be produced than with other methods. Well-developed convection columns are seldom obtained as fire intensities are deliberately moderated to facilitate leave tree survival. Smoke generated from underburns typically drifts with the prevailing wind present in the area.

Excavator Pile Burning is used in clearcut, seed tree, shelterwood, and other harvest units to dispose of debris after mechanical or hand piling. The objectives of pile burning are for hazard reduction. If site preparation is needed, it is accomplished during the piling process. Pile burning can create soil disturbance, as extremely high temperatures can produce impacts to soil composition and structure. Pile burning is more effective at protecting overstory trees which are susceptible to fire. Combustion can be very efficient but varies widely due to several factors. Unlike understory and broadcast burning, which is done in the spring, summer, and fall, pile burning is usually accomplished in the late fall when escape potential is lowest. Because of this time frame, pile burning is compressed into fall days with adequate ventilation. During this time of year days which do have good ventilation can be limiting. This can lead to greater emissions over a shorter period of time. Also, there is usually more competition within the airshed as wood stove users begin to heat homes.

Prescribed burning can cause smoke management concerns, especially if smoke drifts into populated, nonattainment, or Class I airsheds. Data derived from mass balance studies (various authors, 1988-1991) suggests that forestry slash burning contributes from 1.2% (Libby) to 1.5% (Kalispell) of the total PM-10 contribution to these communities on a yearly average. On a daily basis, the contribution has risen up to 8.8% (Kalispell). Federal and state ambient air quality standards have been established for PM-10 (particulate matter less than or equal to 10 micro meters) concentrations.

The single most important factor affecting the ambient air quality of these airsheds is the weather (Raisch, 1988). Because of the dynamic nature of the air resource and the inability to accurately forecast long-range weather conditions, effects on air quality from prescribed burning at a given location are difficult to analyze. In the future, tools may be available which prove reliable for predicting air quality impacts based on predicted weather conditions, topography, and emissions.

The principal impact to air quality in Class I airsheds from prescribed burning is the temporary visibility impairment caused by smoke. This may reduce the quality of forest recreation experiences, as vistas beyond the boundaries of the Class I airsheds may be temporarily obscured by smoke and haze. The conditions that may reduce visibility also produce visual benefits, as spectacular sunsets can be attributed to smoke on the horizon produced by prescribed burning.

All fall burning activities associated with the Proposed Action would be accomplished after prior approval of the Montana State Airshed Group.

Dust and exhaust from vehicles during timber harvest would contribute short-term effects to air quality. Effects would be localized to the immediate vicinity of the operations.

Types of Burning Proposed

The primary method of fuel treatment used is excavator piling/burning and underburning. For more information on types and acreages of burning see Appendices A and C.

Location and Frequency of Burning

See alternative maps M-4 – M-6 for the location of burn units for each alternative. Burning frequency would be dependant on sale dates and completion, but would be spread out over a five-year period. Some areas designated as maintenance burning units would be burned every 8-20 years to maintain natural conditions on these sites. This burning will be regulated by the Montana State Airshed Group and the air quality impacts will be analyzed in later NEPA documents.

Quantification of Amounts and Types of Material and Acreage to be Burned

See Appendices A and C for the acreage to be burned for each alternative.

The amounts of material which will be consumed by the different fuel treatments will vary. The areas planned for underburning with no harvest will only consume natural fuel accumulations. All areas planned for harvest will consume natural fuels as well as residual harvest slash. An estimate of particulates generated by alternative is in the project file.

Nighttime burning, in the vicinity of local communities, is generally avoided.

Fuel moistures are monitored closely to ensure they are in ranges that allow for efficient burning, resulting in less smoke production. Prescription parameters often demand that large woody debris is so moist as to not be combustible. This limits the volume and duration of the smoke from the burn.

The following broad prescription parameters apply to all burning except machine piles and landing piles:

Temperature	45-85 degrees Fahrenheit
Relative Humidity	25-50 percent
Eye level Winds	0-10 m.p.h.
10 hr Fuel Moisture	8-16
100 hr Fuel Moisture	12-25

Each burn must be approved by the airshed coordinator before it can be burned.

Site conditions of each individual unit would determine where in the prescription parameters the unit would be burned. For example, a high elevation north slope unit that is wet most of the year may require burning in August with temperatures in the 80's and low relative humidities to achieve the desired results.

Machine piles are constructed to minimize the incorporation of dirt into the piles. Piles are allowed to cure for a season to minimize emissions from burning green material.

Machine piles and landing piles are typically burned after receiving significant precipitation and risk of escape is minimal. Normally conditions are such that fire will not spread from the immediate vicinity of the pile. Often there is snow on the ground before piles are burned.

Silvicultural treatments which would take place under these alternatives include the burning of activity created fuels. Smoke created by burning activities would temporarily reduce air quality. Much of the burning and subsequent loss of air quality will occur in the spring and autumn seasons when fuel moisture and atmospheric conditions are conducive to meeting all resource objectives.

With management ignitions, smoke can be held to a minimum duration and intensity. Smoke levels from prescribed burning can temporarily reduce air quality, however they can reduce the acute impacts to air quality from wildfires in the long term. Levels of emissions from prescribed burning are below health standards, while wildfires can produce emissions that are more than double the Federal health standards. (Refer to the Upper Columbia River Basin DEIS for a more in-depth discussion about air quality trade-offs between prescribed fire and wildfire U.S. Department of the Interior, 1997 pp, 18-21).

The differences among the alternatives are negligible. All action alternatives will impact the local residents to the same degree.

During the springtime, when most of the underburning would be conducted and smoke dispersal is best, smoke would diminish relatively quickly, usually in 1-3 days. Burning in the spring emits less particulates overall, as larger fuels and duff layers are damp and are not included in the combustion.

Smoke from prescribed burning will likely collect in nearby valley bottom areas for a short time following burning. Proximity to the burn and wind direction would determine how much individual residents would be affected. While ignition is taking

place, residents located downwind or adjacent to the burn area would experience drift smoke due to prevailing winds. For approximately 1-3 days following the lower elevation burns, residual smoke has the tendency to settle close to the ground during the nighttime hours where it would remain until it lifts as surface heating begins near mid-morning the following day. Smoke from burning stumps and large diameter logs may be present at lower elevations for up to 1-2 weeks. Mopup and patrol crews would extinguish some of these smoldering stumps and logs to reduce the amount of smoke affecting adjacent residents and to help prevent escaped fires.

Smoke dispersion could take several days longer in the fall when inversions settle in the valleys and trap larger volumes of smoke. However, most of the burning is not planned for this time of year.

The levels of smoke anticipated from the Action Alternatives is not expected to be a health concern, with the exception of people living directly adjacent to the burns who are severely sensitive to smoke. The District will contact all residents adjacent to areas proposed for burning to inform them of potential burning and identify those that have health concerns associated with anticipated smoke levels. Additional steps (posting notices, contacting Troy Volunteer Dispatch, etc.) would be taken prior to burning to alert other nearby residents. The intent is to provide smoke-sensitive individuals adequate notice of planned burning.

Cumulative Effects

Past, present, proposed and reasonably foreseeable activities were reviewed to determine cumulative effects of smoke. Burning associated with other district projects as well as the adjacent districts projects outside the project area can be expected. All other district and forest burning is regulated by the Airshed Group.

In addition, smoke associated with burning on private land can also be expected to occur. While the District has no control over burning which takes place on private land, the conditions resulting from these sources, as well as from wildfires, would be taken into effect when determining whether to ignite proposed burns.

The greatest impact from burning outside the Project area would be from a visual perspective. Some smoke from prescribed burns taking place west of the Decision area may have some drift smoke reach these local residents, but it would be fairly well dispersed by the time it reaches these areas.

The cumulative effects on regional air quality due to forest management activities are difficult to quantify. Because prescribed burning reduces fuel loadings, the potential for fires escaping initial attack is minimized. Therefore, the long-term effects of smoke on air quality are reduced. As discussed earlier, prescribed burning of forest fuels is a minor although possibly significant contributor of PM-10 emissions when compared to other sources. Under favorable weather conditions, the impacts of all PM-10 and PM 2.5 contributors is minimized. However, under stagnant atmospheric conditions, smoke from prescribed burns, wildfires, residential wood burning, wind blown dust, vehicle exhaust, road dust and other sources of air pollution can create a short-term, unhealthy impacts on local air quality.

In the late spring, summer and autumn seasons, burning of slash is a common management practice occurring on the Kootenai National Forest, other Federal and State land management agencies, and private forestlands. Weather patterns, topography, and fuel characteristics during these burning seasons are the key factors affecting air quality. Spring burning conditions have the least impact on air quality. The reasons for this are summarized below:

- Large woody fuel and duff moistures are high. High fuel moistures in large woody fuels and duff limit the amount of fuel consumed. This limits the amount of emissions produced. Also, smoldering fires are less likely to persist when duff is moist.
- Spring weather patterns and normal daytime heating lessens the chance for temperature inversions. Without inversions, the chances for the cumulative effects of air pollution to have health impacts are minimized as dispersion and ventilation cleanses the airsheds.
- Unstable weather patterns allow for better smoke dispersion during the actual burning process.
- Fuels outside burn units have higher fuel moistures which minimizes the risk of an escaped burn. An escaped burn would produce emissions greater than those predicted.
- Cumulative impacts of PM-10 and PM 2.5 concentrations are reduced during spring months as a major contributor (residential wood smoke) produces fewer emissions (less wood stove use due to warmer temperatures).

Fall burning would have the potential to have the greatest impacts on air quality. To minimize the potential, this season is closely regulated by the Montana Smoke Management Group who make daily evaluations on whether or not members may burn based on local and prevailing weather information and existing air quality conditions.

Smoke from prescribed burning associated with the selected alternative, combined with that of other PM-10 and PM 2.5 producing activities in the region has the potential to temporarily reduce air quality in the area of Troy. General wind patterns may cause smoke to drift into Glacier National Park and the Bob Marshall Wilderness. Visibility may be temporarily reduced while prevailing weather influences mix and disperse smoke. The condition can also produce visual benefits such as vivid sunsets and sunrises. Effects would be minimized in the spring because of fewer park and forest visitors, higher fuel moistures (less emissions), better smoke dispersion, and reduced impacts from other PM-10 producing activities.

Forest Plan Consistency

The Forest-wide objectives for air quality are 1) to maintain excellent air quality on the Forest and to protect local and regional air quality by cooperating with the Montana Air Quality Bureau in the Prevention of Significant Deterioration (PSD) program and State Implementation Plan (SIP). Requirements of PSD and SIP and the Montana Smoke Management Plan will be met, and 2) to prevent long-term deterioration of the air quality, classified as Class I for the Cabinet Mountains Wilderness, and Class II for the rest of the Forest.

Smoke management for air quality is regulated by the Montana/Idaho State Airshed Group. The Kootenai National Forest coordinates and schedules burning activities to maintain air quality. Burning plans describing how and under what conditions the burning will take place are prepared by qualified personnel for all burning activities.

All activities under the proposed action would be consistent with Forest Plan standards.

RECREATION RESOURCES

Introduction

Analysis Area

The analysis area for this resource is the Garver project area as shown on the Vicinity Map, M-1.

Analysis Methods

The Recreational Opportunity Spectrum (USDA Forest Service, 1986) is used to describe settings and recreational opportunities associated with each setting. The Recreational Opportunity Spectrum (ROS) is used as a guideline to help managers and users describe these recreational activities.

TABLE 3-46. RECREATION OPPORTUNITY SPECTRUM

Attribute	Semi-Primitive Non-Motorized Recreation	Semi-Primitive Motorized Recreation	Roaded Natural	Roaded Modified
Interaction between users	Low	Low	Moderate	Little evidence or interaction of camp sites
Evidence of Other Users	Some	Predominantly Natural Appearing Environment	Mostly Natural Appearing	Substantially Modified Environment
Access and Travel	Non-Motorized Trails & Primitive Roads	Motorized, Involves challenge and risk	Little challenge and risk. Conventional motorized access.	Roads may be evident
Vegetation Alterations	Widely dispersed, not evident	Small and widely dispersed.	Maintain desired visual & recreational characteristics	Slash and debris may be evident
Activities and Facilities	Rustic & rudimentary. Minimum on-site controls	Rustic & rudimentary. No evidence of synthetic materials. Minimum on-site controls	Rustic, provides some comfort and site protection. Some Obvious on-site controls	Signing at major road junctions
Interpretation Guides	Self discovery, maps, brochures, & guide books	Very limited on-site facilities, maps, brochures & guide books	Simple wayside exhibits	Simple wayside signs
Handicapped Access	Difficult and challenging	Difficult and challenging	Moderate Challenge	Moderate Challenge

Affected Environment

This area provides recreational opportunities in a variety of settings, characterizations, and experiences as defined in the Recreation Opportunity Spectrum (ROS-1986). This area is a very popular recreation area and includes Hensley Hill, Pete Creek, West Fork Falls and Garver Mountain Lookout. The predominant settings in this area are semi-primitive non-motorized and roaded modified. Activities in the area include, but are not limited to hunting, fishing, horseback riding, viewing wildlife and nature, cross country skiing, snowmobiling, gathering forest products and camping. There are two recreation sites with some development; these are the Lower West Fork Falls and Garver Mountain Lookout. Lower West Fork Falls has a parking area, trail and viewing platform at the falls. Garver Mountain lookout is on the cabin rental program and is available for rent in the summer and fall. The area also has several trails including Obermayer Trail #33, French Creek Trail #32, Garver Mountain Trail #8, West Fork Falls Trail # 176, and West Fork Yaak River Trail #318. Pete Creek Road #338 is also used as a winter recreation trail by snowmobiles, dog sledders and skiers.

This area is used year round. Peak use periods and activities are during the fall hunting season, huckleberry picking in the late summer, and winter recreation in the Pete Creek area. Hensley Hill is a popular area due to its proximity to private property, good access, abundant wildlife and excellent viewing of the valley. Garver Mountain Lookout was put on the cabin rental program starting in 2001 and was very popular (rented 42 nights). Other recreational activities occur through out the area. There are two outfitter and guide permits in this area for hunting.

As mentioned above use of the area occurs year round. Spring bear season occurs in May, fishing season begins in late May, general camping and summer use occurs from June through September, huckleberry picking occurs in August and early September, grouse and archery season start in September, general hunting season runs from late October to December, and lion season runs in early December. Gathering forest products, primarily firewood, occurs year round with peaks in late summer and early fall. Winter recreation starts in December and runs through March. Other activities such as hiking, biking, camping and horseback riding occur through the spring and into the fall. This area provides excellent opportunities and is well used. Use is spread out through the whole area. The area has a good balance of roads and trails that provide access. Some of the roads are open to motorized use, some are open during the winter to motorized use for snowmobiles and some are open to non-motorized use for hikers, bikers and horse back riders. Recreation is an important part of the local economy.

Overall recreational use would be considered light to moderate with an occasional heavy use period during peak holidays. Residents make up the highest percentage of users with Washington and Idaho the next major use group. Recreational users from across the state of Montana and other parts of the nation are not uncommon. The current condition of recreational opportunities would be considered excellent. Use is spread over the entire area; there are no major concentrated use areas. There is no resource damage occurring from recreational activities at this time.

Environmental Consequences

ALTERNATIVE A
Direct and Indirect Effects

It is expected that recreational use will continue to increase in this area at levels projected in the Forest Plan. Recreational opportunities will continue to be varied and spread out through the area. The trails system will continue to be maintained. Outfitter and guide permits would continue to be issued to meet the needs of the public. Garver mountain lookout will continue to be offered on the cabin rental program. In the short term this area will continue to provide recreation opportunities and meet the needs of recreational users in a variety of settings. Over the long term as recreational use increases it can be expected that there will be more user interaction and recreational users will encounter other users more often. Some of the dispersed sites may start to show signs of compaction and loss of vegetation due to continual use. Overall the Garver area will continue to provide quality recreational opportunities for the foreseeable future.

Cumulative Effects

Past actions in this area have included timber harvest and associated activities; trail maintenance, and road maintenance. There would continue to be recreational use of this area. Trail maintenance would continue on existing trails. Recreational use of the area is expected to continue to increase at levels projected in the Forest Plan. The sale and subdivision of properties will increase the number of local users in the area.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

Recreational activity may be affected during the harvest of Unit 5. Use of Trail #318, which runs through the northern edge of this unit, may be interrupted for short durations during harvest activities for safety reasons. Provisions would be included in the timber sale contract to protect the trail tread and ensure that it be cleared upon completion of the harvest activities. There would be some visual changes along this portion of trail.

Smoke produced from prescribed burning from harvest and fuels treatments could affect recreationists in the area for short periods (see Chapter 3, Air Quality).

The other proposed harvest units and mechanical fuels treatment units, thinning units and maintenance burn units would have indirect effects to recreational users. There would be increased traffic on some roads utilized for harvest activities and thinning. Recreational users may encounter the sights and sounds of vehicles, chainsaws and other humans during the course of these activities. Opportunities for gathering firewood, mushrooms and other forest products would be improved for short durations during and after harvest activities and prescribed burning activities. There may be some short-term displacement of recreational users in some of these areas due to activities, but long-term, recreational activities would be available throughout the area.

Access in this area is good, with a variety of opportunities for access including trails, roads, gated roads, bermed roads and cross country travel by foot, horse, ski, snowshoe or snowmobile. Access management changes detailed in Appendix E would generally increase opportunities for motorized travel during the project. Some currently closed roads would be open to the public for travel, and some sections of open road would be gated. The effects of these changes on recreation opportunity would vary depending on the personal preference of the recreationist. For example some hunters prefer hunting on restricted roads while others prefer to access hunting areas by vehicle. Many of these changes would not further restrict existing public motorized access because they involve replacing a gate closure with an earth barrier.

Cumulative Effects

The Yaak 92 paving project may delay recreation traffic for short periods of time. Small timber or fuels reduction projects could also affect recreation activities for short periods of time. In the short term, access opportunities are increased with this project. In the long term, the level of public motorized access opportunities in the project area would not be changed substantially with this project.

Forest Plan Consistency

The environmental consequences from the all alternative on the recreational resource opportunities would be consistent with goals, objectives and standards of the Forest Plan.

ROADLESS AREA RESOURCES

Introduction

This section addresses roadless areas for this project and the environmental effects of the proposed activities on Inventoried Roadless Areas (IRA).

Analysis Area

The analysis area for the roadless resources section is the Garver analysis area. This includes one Inventoried Roadless Area identified as the West Fork Yaak IRA #694 (see Vicinity Map, M-1).

Existing Condition

Data collection and inventory of the West Fork Yaak IRA has been an ongoing process. Roadless area reviews were completed in the 1970's (RARE I and RARE II) and more recently in the Kootenai National Forest Plan. As more accurate information has been gathered these inventories have been updated. Ground verification and aerial photos were used to update information on roads and harvest areas. This information was then put into a Geographic Information System (GIS) for analysis needs and map production.

In 1997 the Forest reviewed the West Fork Yaak Roadless area and made a determination that the area was too narrow to be included in the roadless inventory. The West Fork Yaak Roadless Area was revisited in 1999. The area was validated using the criteria for delineating roadless areas based on the Regional Roadless Area Inventory Protocol, dated 11/20/96.

The West Fork Yaak Roadless Area #694 was validated as an IRA on December 1, 1999. Roads and harvest units, with a portion of its northern boundary following the Canadian border, generally bound the West Fork Yaak IRA. The West Fork Yaak IRA is not a compact roadless area; rather it is long and narrow. It does meet the protocol because it has areas at least 2 miles in width and connects to a larger area near Garver Mountain. Based on this review the West Fork Yaak roadless area was included as an IRA. The validated acres for the West Fork Yaak IRA are 8,232.

Roadless Area Characteristics

In order to evaluate the roadless area value, a method of describing its roadless characteristics has been developed. Six characteristics are used as a baseline to measure the effects of each alternative on the roadless value of the area. (See Inventoried Roadless Areas and Trails map.)

- **Natural Integrity** is defined as the extent to which long-term ecological processes are intact and operating. Impacts to natural integrity are measured by the presence and magnitude of human-induced change.

- **Apparent Naturalness** is how the area looks to people using it. Naturalness is usually reduced by human activity such as burning, timber harvest, grazing, mining, trail construction, etc.

- The concept of **Remoteness** is the sense of being secluded, inaccessible, or out of the way. This can be as a result of topography, vegetative screening, distance from human impacts, difficulty of travel to reach the area and the presence of roads.

- **Solitude** is a measure of the evidence or presence of other people, or their actions, during a person's use or stay in the roadless area. The lack of remoteness ties directly to a lack of solitude.

- **Special Features** are those unique topographic, geologic, biological, ecological, cultural or scenic features of the area.

- The **Manageability/Boundaries** Characteristic relates to the shape of the roadless area and whether manageable (easy to recognize) boundaries such as forest boundary, roads, power lines or a topographic feature such as a ridgetop or creek are available. This characteristic also deals with whether an area is large enough (greater than 5000 acres) to be reconsidered for wilderness when the Forest Plan is revised.

The West Fork Yaak IRA is heavily timbered and two of its prominent features are Dusty Peak and the West Fork Yaak River. The management areas assigned to this roadless area include MA-2, MA-13, MA-14 and MA-21. (See the Management Area map and chapter 1, Forest Plan Management Area Direction, for description of MA's).

Current Roadless Area Characteristics for the West Fork Yaak IRA are as follows:

Natural Integrity: There are several miles of hiking trails within the IRA. These trails are the main features produced by humans in the IRA. There is evidence of timber harvest adjacent to the IRA. The Natural Integrity of the IRA is good. Long-term ecological processes, for the most part, are intact and operating within the IRA boundaries. Fire has been suppressed in this area and natural fires have not been allowed to burn. Historically fire has been a natural part of this area.

Apparent Naturalness: The apparent naturalness of the West Fork Yaak IRA is overall very good. There are several trails in this area that have modified the apparent naturalness of the IRA. There is also evidence of human activity adjacent to the IRA from previous timber harvest and roading.

Remoteness: The West Fork Yaak IRA offers a good sense of remoteness. The hiking trails are long and provide tie throughs. The trails have heavy vegetation and timber along most of the routes, which adds to the feeling of remoteness. The West Fork Yaak River offers a good sense of remoteness, as does the area south of Obermayer Mountain. There is a narrow neck of the IRA north of Garver Mountain where the sights and sounds of human activity can be more prevalent and reduce the sense of remoteness. Winter use is light in the area and the sense of remoteness during the winter months is increased.

Solitude: The West Fork Yaak IRA provides good opportunities for solitude. The hiking trails in the area receive light use. The trails are where people are most likely to encounter each other. There are no major areas of concentrated use within the IRA. The Garver Mountain Lookout on the southern edge of the IRA is a rental lookout and is an area of concentrated use where people are most likely to encounter other users. The sense of solitude can be diminished when encountering other users.

Special Features: Special features include French Creek MA 21 Area and the West Fork Yaak River Corridor. The French Creek MA 21 Fen, is located in the bottom of French Creek in Sections 21 and 28, T37N, R32W. It is a fen as opposed to a bog, since the reaction ranges from slightly acidic to neutral to alkaline. A bog tends to be fairly acidic. The French Creek Fen is a low-lying peat land, made up of

sedge in various stages of decomposition. The water is at or near the surface. It lies within a zone of mostly forest riparian and some stream riparian. Sedges dominate surface vegetation in the fen.
The West Fork Yaak River riparian corridor provides a variety of vegetations and plant species. Spruce and lodgepole pine are the dominant tree species with a mix of aspen.

Manageability/Boundaries Characteristics: The boundary of the West Fork Yaak IRA is irregular. The boundary consists of the Canadian border, harvest unit boundaries, roads and topographic features. Much of the boundary is not easily defined.

Environmental Consequences

There are no timber harvest or road building proposals in or near the West Yaak IRA. Maintenance of existing trails will continue in the area. Fire suppression will continue in the area.

ALTERNATIVE A
Direct and Indirect Effects

The West Yaak IRA would remain intact. No new roads, timber harvest or prescribed burning would occur within the IRA. The “natural integrity” would not be altered by any activities. Natural ecological processes would continue within the boundaries of the IRA with the exception of fire; unplanned ignitions would be suppressed. The “apparent naturalness,” feeling of “remoteness” and “solitude” would not change because of activities. The manageability of the area would not be changed. Maintenance of trails, trailheads and trail signing would continue within the IRA.

Cumulative Effects

There have been no incursions within the IRA since the Forest Plan was signed (1987). Wildfire suppression activities have occurred and would continue to occur in the IRA.

Forest Plan Consistency

This alternative is consistent with the Forest Plan for this area.

ALTERNATIVES B, C, AND D
Direct and Indirect Effects

The Dusty Peak maintenance burn (Unit A) is a total of 234 acres, 214 of which are within the West Fork Yaak IRA. There is no timber harvest proposed in the IRA. The maintenance burning is in MA-2 as described in the Forest Plan. The burning would be completed utilizing helicopter aerial ignition.

The **natural integrity** of the IRA would continue to be good. Long-term ecological processes would remain intact. The prescribed burning would allow the ecological processes associated with fire to be restored to this portion of the IRA. Fire is a natural event that has occurred historically in this area and is part of the “natural integrity”. This prescribed fire would improve the “natural integrity” of the IRA.

The **apparent naturalness** of the IRA would remain good. There would be short-term effects from the prescribed burning and associated activities. Overall the apparent naturalness would not be reduced.

The sense of **remoteness** would be affected in the burn area by the sites and sounds of the activities associated with prescribed burning. These would be short-term affects and would not reduce the sense of being secluded for the long term.

The measure of **solitude** would not be affected for the long-term. There would be short-term affects from the prescribed burning activities. These would include the sights and sounds, noise and presence of human activity in and around the burn area. This would not be an irreversible effect.

There would not be any unique or **special** topographic, geologic, biological, ecological or cultural **features** impacted by this alternative. There may be some changes to the scenic features from various locations looking into the burn area. This would not be long lasting and would be similar to the effects of a natural fire in the area.

This alternative would not change the character of the IRA to the degree that acreage would be removed from the IRA status. The IRA acreage would remain intact and there would be no loss to the IRA acreage in the West Yaak IRA due to this alternative.

Cumulative Effects

There are no current or foreseeable activities that would cumulatively add to the effects of the proposed actions on the West Yaak IRA.

Forest Plan Consistency

This alternative is consistent with the Forest Plan for this area.

SCENIC RESOURCES

Introduction

This section addresses the environmental effects of the proposed activities on the visual resource. Project scoping did not identify visuals as a resource of concern.

Analysis Area

The analysis area for visual resources is the Garver project area. This area include proposed activity in the Hensley Hill Area, the West Fork Yaak (Mud, Benefield, French Creeks), and the Yaak Highway corridor.

Analysis Methods

The current visual quality of the area was defined by applying an existing scenic condition for the portions of the project area with proposed management activity, and then addressing how the character would change with the proposed management activity. Each of these areas was evaluated as to its visual significance based upon viewing opportunities from important travel routes in the vicinity. The proposed activities were then evaluated as to whether or not they meet Forest Plan standards for visual quality (visual quality objectives, or “VQOs”).

Existing Scenic Condition

To define the existing condition of the visual resource in the project area, the visual character of the landscape is assessed in terms of how it has been altered by human activities (not including fire). The method used categorizes the landscape into four condition classes based on the percent of apparent visual alteration of the characteristic landscape by human activities. The four classes are defined as follows:

Natural Appearing: No more than 5 percent of the area appears to be visually altered by management activities.

Slightly Altered: No more than 10 percent of the area appears to be visually altered by management activities.

Moderately Altered: No more than 20 percent of the area appears to be visually altered by management activities.

Heavily Altered: More than 20 percent of the area appears to be visually altered by management activities.

Forest Plan Visual Quality Objectives (VQOs)

The Forest Plan contains direction on the definition of the Visual Quality Objectives (VQOs), on what VQOs are appropriate for each management area (MA) and when the VQOs can be exceeded (see Management Areas map for a display of MAs within the project area). The Forest Plan allows some deviation from these VQOs for some management areas.

These are the Forest Plan definitions for VQOs:

Retention (R): Management activities are not evident to the casual forest visitor.

Partial Retention (PR): Management activities may be evident, but must remain visually subordinate to the characteristic (natural-appearing) landscape.

Modification (M): Management activities may visually dominate the characteristic (natural appearing) landscape, but must, at the same time, utilize established form, line, color and texture and should appear as a natural occurrence when viewed in middleground or background.

Maximum Modification (MM): Management activities may visually dominate the characteristic (natural-appearing) landscape, but they must look like natural occurrences when viewed as background.

Affected Environment

Concern Levels

The main travel routes which traverse the area and from which the area is viewed are:

Sensitivity Level 1 travel routes: State Highway #508/Yaak #92 (the Yaak Highway); the South Fork Road #68; Upper Ford Road.
Sensitivity Level 2 travel routes: Vinal Lake Road #746
Sensitivity Level 3 travel routes: Remainder of the roads within the project area.

The Yaak Highway traverses the south and east sides of the project area. In general, only the proposed units that border the highway would be visible from the highway. This is due to the vegetative screen that exists along the Yaak Highway. In those units bordering the highway, the views are foreground views. The views from this location would be considered moderately altered.

The County Road (Upper Ford Road #8015) that lies on the east side of the Yaak River is also a heavily traveled route. This route has two primary viewing locations; one at the County Bridge over the Yaak River (Viewpoint 1) and one at approximately Milepost 2 (Viewpoint 2). Both of these viewing locations consist of a pastoral setting – i.e Yaak River/open meadows in the foreground with the steep forested mountainsides in the middleground/background. Viewpoint 2 also contains old ranch buildings as part of the scene. The views from these locations would be considered moderately altered.

> Viewpoint 1: The ridge between Waper Creek and the West Fork Yaak is the primary middleground backdrop to the foreground scene from this viewpoint. The background is looking up into the West Fork Yaak and the viewer is looking at the main ridge between Mud Creek and Benefield Creek. In each of these areas, numerous older harvest units, primarily regenerated clearcuts, are visible. These units appear to be in a sapling/pole sized class and would not be recognized as logging units by the average forest visitor.
>
> Viewpoint 2: Middleground view is same as Viewpoint 1 (different angle) and also includes some of the ridge to the east of Mud Creek. It also has a backgound view of some of the ridge between Mud Creek and Benefield.

The South Fork Yaak/Pipe Creek road does not enter the project area (except for a small segment at the Jct. with the Yaak Highway). Visibility is generally limited to foreground viewing of roadside vegetation. As one travels west and starts to drop toward the town of Yaak (approximately 1 mile from the town), there are some short duration views of the Hensley Hill area. These views are being progressively blocked by tree growth in an old harvest unit on the downslope side of the road.

Environmental Consequences

ALTERNATIVE A
Direct, Indirect, and Cumulative Effects

The "No Action" alternative would have no effects on the area visually.

Forest Plan Consistency

This alternative would be consistent with the Forest Plan.

EFFECTS COMMON TO THE ACTION ALTERNATIVES

The units in the action alternatives were given a broad evaluation based upon percent crown removal from existing condition, location within the areas visible from important viewing areas, and management area the unit was located in. The results are shown in Table 3-47. In the visual effects analysis, effects are sometimes split into short term (less than 5 years) and long term (greater than 5 years).

TABLE 3-47. HARVEST UNIT – VISUAL EFFECTS

Unit #	Alt B	Alt. C	Alt. D	Visual Significance	FP MA/VQO	Crown Removal
1	x	x	x	Low	12/MM	H
2	x	x	x	Low	12/MM	L
3	x	x	x	Low	12/MM	H
4	x	x	x	Low	12/MM	L
5	x	x	x	Low	11/MM	L
6	x	x	x	Low	12/MM	H
7	x	x	x	Low	12/MM	H
8	x	x	x	Low	12/MM	L
9	x			Low	11/MM	H
10	x			Low	12/MM	H
		x	x	Low	12/MM	L
11	**x**	**x**		**Moderate**	**14/MM**	**H**
12	**x**	**x**		**Moderate**	**14/M**	**L**
13	x	x	x	Low	12/MM	L
13a		x	x	Low	12/MM	H
14	**x**	**x**	**x**	**Moderate**	**12/M**	**H**
15	**x**	**x**	**x**	**Moderate**	**12/M**	**L**
15a		**x**	**x**	**Moderate**	**12/MM**	**H**
16	x			Low	11/12/MM	L
17	**x**	**x**	**x**	**Moderate**	**14/M**	**H**
18	x	x	x	Low	11/MM	H
19	**x**	**x**	**x**	**Moderate**	**11/M**	**L**
20	x	x	x	Low	11/MM	L
21	x			Low	11/MM	L
22	x			Moderate	11/M	L
23	x	x	x	Low	11/MM	L
24	x	x	x	Low	11/MM	L
25	x	x	x	Low	11/MM	L
26	**x**	**x**	**x**	**High**	**11/PR**	**L**
27	**x**	**x**	**x**	**Moderate**	**12/M**	**M**
29	**x**	**x**	**x**	**Moderate**	**11/12/M**	**L**
30	**x**	**x**	**x**	**Moderate**	**11/M**	**L**
31	**x**	**x**	**x**	**Low**	**17/M**	**PR**
32	x			Low	11/MM	L
		x	x	Low	11/MM	H
33	x			Low	12/MM	H
		x	x	Low	12/MM	H
33a		x	x	Low	12/MM	M
33b		x	x	Low	12/MM	M
34	x	x	x	Low	12/MM	L-M
35	x	x	x	Low	12/14/MM	L-M
36	x			Low	14/MM	L-M
37	x			Low	11/MM	H
38	x	x	x	Low	11/15/MM	L
38a		x	x	Low	11/15/MM	L
40	**x**	**x**	**x**	**High**	**17/PR**	**L**
41	x			Low	11/MM	L
42	x	x	x	Low	11/MM	L
42a		x	x	Low	11/MM	L
42b		x	x	Low	11/MM	L
44	x			Low	11/MM	H
		x	x	Low	11/MM	L
45	x	x	x	Low	11/MM	L
46	**x**	**x**	**x**	**High**	**11/PR**	**L**
47	**x**	**x**	**x**	**High**	**11/PR**	**L**
48	x	x	x	Low	11/MM	L
49	x	x	x	Low	11/MM	L
49a		x	x	Low	11/MM	L
50	x	x	x	Low	11/MM	L
50a			x	Low	11/MM	L
50b			x	Low	11/MM	L
50c			x	Low	11/MM	L
51	x	x	x	Low	11/MM	L
52	x	x	x	Low	11/MM	L
52a		x	x	Low	11/MM	H
53	x	x	x	Low	11/MM	L
54	x	x		Low	11/MM	H
55	x	x	x	Low	11/MM	L
56	x	x	x	Low	11/MM	L
56a		x	x	Low	11/MM	H
57	x	x	x	Low	11/MM	L
58	x			Low	11/MM	L
59	x	x	x	Low	11/MM	M
60			x	Low	11/MM	L

Crown Removal: light (L=Up to 40%), moderate (M=40%/60%) and heavy (H=greater than 60%).
PR=Partial Retention; MM=Maximum Modification

TABLE 3-48. FUELS REDUCTION UNIT-VISUAL EFFECTS

Unit #	Visual Significance	FP MA/VQO	Treatment
A	Low	2/R	U
B	Low	11/MM	M
C	Low	11/MM	M
D	Low	11/MM	M
F	Low	17PR	M
G	Low	11/MM 17/PR	M
H	Low	11-13/MM	M
I	**High**	**11-13/PR**	**U**
J	Low	11/MM	M
K	Low	13/MM	U
L	Low	13/MM	U
M	Low	11/M	M
N	Low	11-13/MM	M
O	Low	11-13/MM	U

Activity: Maintenance Underburning=U, Mechanical Fuels Reduction=M

The broad evaluation determined that the units with a visual concern are bold type/gray. These units would be the ones visible from the two main viewing locations – the Yaak Highway and the Upper Ford Road. The remainder of the units would not be visible from the main viewing locations and would meet the Forest Plan visual quality objectives. Unit A is in the West Fork Yaak IRA and would not result in adverse effects to the visual resource (see Chapter 3, Roadless Resources section for more information).

Non-commercial thinning (899 acres) would not result in adverse effects to the visual resource.

EFFECTS SPECIFIC TO THE ACTION ALTERNATIVES

ALTERNATIVE B
Direct, Indirect, and Cumulative Effects

1. Yaak Highway - Roadside Units – This route has five units of concern – harvest units 26, 40, 46 and 47; and maintenance burn unit I . These units are directly adjacent to the highway (Unit 26 is split by the Yaak Highway) and are visible in a foreground view. Units 26, 46, 47 and Unit I lie within partial retention VQOs; Unit 40 lies within a retention VQO.

Unit 26 consists of a predominantly larch/Douglas-fir/lodgepole pine overstory. The planned activity would remove approximately 30-40% of the overstory to create a more open stand that would be more resistant to a crown fire. Removal would consist primarily of lodgepole pine, smaller Douglas-fir and larch, and some scattered other species.

Effects: The characteristic landscape within this unit is the large larch/Douglas-fir overstory with a general open understory. The planned activity would retain the large overstory component and create a more open understory. The short term effects are that the "logging" would be visible. Design features would include keeping backs of the units away from the highway;and that a strip approximately 50-100 feet wide along the highway would have the included timber felled back into the unit and then pulled into the unit to avoid skid trails near the road. This unit would meet the partial retention visual quality objective.

Units 46 and 47 are also roadside harvest units. Unit 46 is primarily a larch/ponderosa pine/Douglas-fir stand. The proposed activity would reduce the overall crown density by 30-40%, and promote the large, mature overstory and a

more open understory. Unit 47 is primarily a lodgepole pine stand. The activity would remove approximately 30% of the least desirable overstory.

Effects: The characteristic landscape for Unit 46 is the larger, more open grown larch, ponderosa pine and Douglas-fir. The activity would remove some of the overstory and it would emphasize the retention of the character desired – i.e. large trees/open understory. This unit would meet the partial retention visual quality objective. In Unit 47, the logging would remove only a portion of the lodgepole pine stand. This logging would be much more noticeable due to the stand character – closely spaced lodgepole. The skid trail would create gaps in the stand, and would generally be more "messy" appearing due to the timber type. This unit would not meet the partial retention objective but is permissible under the Forest Plan to meet management area objectives.

Design features for Units 46 and 47 would include keeping landings small and away from the Yaak Highway. No skidding would be allowed along the road.

Maintenance burn unit I is also a roadside unit in a partial retention VQO. The proposed activity would be to under burn this unit. The current stand is an open grown stand dominated by large larch and Douglas-fir.

Effects: The underburning of this unit would create a short-term change in the "color" of the understory – from brown-green to black for 1-2 years. This activity would mimic a natural ground fire in this timber type. It would have no effect upon the characteristic landscape and would meet the partial retention visual quality objective.

Unit 31 is in MA-17 and the VQO would be partial retention. This proposed unit is on a relatively flat area, with a fairly wide strip between it and the Yaak Highway, and it is not visible from the Yaak Highway.

Effects: This unit would have no effect upon the visual resource.

Unit 40 lies within this VQO, and lies on the east side of the Yaak Highway. The unit consists primarily of an even aged larch stand of varying diameters with numerous large diameter larch logs on the ground with a very open understory. The stand was created following a fire in the 1940s**.** The planned activity would remove approximately 25-30% of the overstory to trend the stand toward a larger diameter old growth larch stand.

Effects: The characteristic landscape of an open larch stand would be maintained under the proposed activity. The logging activity would be evident in the short term, and would disappear in a short time (3-5 years) with continued needle fall. The activity would be subordinate to the characteristic landscape and would meet the partial retention visual quality objective. The unit would be designed to minimize the number of skid trails to reduce visual impacts – i.e. pull cable; landings should be located at the lower side of the unit away from the highway; remove tops with last log, and winter harvest to reduce ground disturbance.

2. "Upper Ford" Area – The proposed units visible from these locations lie within modification and maximum modification VQOs.

<u>Viewpoint 1</u>: Bridge Across Yaak River on County (Upper Ford Road)

The units that would be of visual concern are Units 29 and 30 in the middleground and Units 11, 12, 17 and 19 in the background view. These units lie within a

modification VQO. The other proposed units near the mouth of the West Fork of the Yaak would generally be hidden by topographic features on the landscape.

Unit 11 is a regeneration harvest high on the slope in Mud Creek. The harvest of the stand would create an opening that would be visible in a background view as a logging unit.

*Effects**:** This unit will appear as a logging unit for a substantial period of time to the average viewer, and would not appear as a natural occurrence. This unit would not meet the maximum modification visual quality objective but is permissible in the Forest Plan to meet management area objectives.*

Units 29 and 30 are planned for 25-30% crown removal and helicopter yarding. The only visible effects would be that the stands would be less dense after the activity. The reduction in the overstory would mimic the change that naturally occurs when a stand has a natural understory fire or insect infestation.

Effects: These units would generally not be apparent to the casual forest visitor post activity and meet the modification visual quality objective.

Units 12, 17 and 19 cover almost the entire visible portion of the ridge between Mud Creek and Benefield Creek. Units 12 and 19 are intermediate cut, tractor log units. The activity would remove approximately 30-40% of the overstory. Unit 17 would be a regeneration harvest, tractor skidded, and would remove 70-85% of the overstory.

Effects: The logging in Units 12 and 19 would create a more open stand condition over a large area. The large area is a benefit visually, as it would create less visible "edge" between the activity stands and the residual stands. The reduction in the overstory would mimic the change that naturally occurs when a stand has a natural understory fire or insect infestation. These units would meet the modification VQO.

The proposed activity in Unit 17 would change the stand condition from one of a closed green canopy to an area with 8-10 large trees per acre left. In the short term (approximately 5 years) the area would appear brown/black due to slash left on the unit and to the resulting slash disposal. Once the area started to green up with ground vegetation, the primary color would be green once again. Looked at individually, this stand would not meet the modification VQO. As it is, sandwiched between Units 12 and 19, the harvest would mimic a crown fire in the middle of a larger fire area. This stand would meet the modification VQO with the following design feature; retain more leave trees along the common edges of Unit 17 and Units 12/19 – i.e. feather the change from a intermediate cut harvest to a regeneration harvest.

<u>Viewpoint 2</u>: 2-mile marker on Upper Ford Road.

In general, the same effects analysis for Viewpoint 1 would apply, with the addition of the effects from Units 14, 15, and 27. This viewpoint brings the ridge to the east of Mud Creek into view. These units are in a modification VQO.

Unit 14 is a large, 135-acre helicopter regeneration harvest.

*Effects**:** Only parts of the unit would be visible to the angle of view. This large of a harvest unit would visually dominate the area and it would not appear as a natural occurrence. It would not meet the modification visual quality objective, but is permissible in the Forest Plan to meet management area objectives.*

Unit 15 is proposed as a 25-30% crown reduction, helicopter logged unit.

Effects: This change in the appearance of this unit would not be noticeable to the average forest visitor. This unit would meet the modification VQO.

Unit 27 is proposed as a regeneration harvest unit.

Effects: From this viewpoint, a view of the unit is blocked by topography and would not be visible. This unit would meet the modification VQO.

Forest Plan Consistency

As above, all of the proposed units meet the Forest Plan VQOs except for Units 11, 14, and 47. This alternative would be consistent with Forest Plan standards.

Unit 11 is in MA-14. The direction for MA-14 allows for deviation from the VQO when attempting to meet the goals of the management area. The goals of this management area are grizzly bear habitat and timber production. This unit is planned for timber harvest while at the same time, the project will maintain or improve grizzly bear habitat. With these goals in mind, the deviation from the established VQO is allowable under the Forest Plan.

Unit 14 is in MA-12. The direction for MA-12 allows for deviation from the VQO when attempting to meet the goals of the management area. The goals of this management area are big game summer range and timber production. This unit is planned for timber harvest while at the same time, the project will maintain or improve big game habitat. With these goals in mind, the deviation from the established VQO is allowable under the Forest Plan.

Unit 47 is in MA-11. The direction for MA-11 allows for deviation from the VQO to meet the goals of the management area. The goal for unit 47 is to reduce the crown density and fuel loadings in order to provide for a more defensible area from wildfire around the Yaak School. With this goal in mind, the deviation from the established VQO is allowable under the Forest Plan.

ALTERNATIVE C
Direct, Indirect, and Cumulative Effects

Under this alternative, the units identified as visually sensitive were the same as Alternative B, with the following exceptions:

1. Units 14 was reduced from 135 acres to 40 acres.
2. Unit 15a (part of Alt. B unit 15) was changed from an intermediate harvest to a regeneration harvest.
3. Unit 29 was reduced from 102 to 88 acres.
4. Unit 46 was reduced from 61 acres to 53 acres.

The changes in effects are:

1. Yaak Highway - Roadside Units

Unit 46 would be reduced from the proposed 61 acres in Alternative B to 53 acres.

Effects: The effects of the reduction in acreage under this alternative would be no different than the effects under Alternative B. The portion of the unit dropped is not apparent from the Yaak Highway. This unit would meet the partial retention VQO.

2. "Upper Ford" Area –

<u>Viewpoint 1</u>: Bridge Across Yaak River on County (Upper Ford Road)

Units 29 would be reduced from the 102 acres proposed under Alternative B to 88 acres.

Effects: This change would have very little difference visually from the unit proposed in Alternative B. It might create a more visible line on the north end of the unit than in Alternative B because the north end of the unit would lie in a very visible location rather than on a ridge as in Alternative B. This unit would meet the modification VQO.

<u>Viewpoint 2</u>: 2-mile marker on Upper Ford Road.

Unit 14 would be reduced from 135 acres to 40 acres.

Effects: This change would be much less impactive than the unit proposed in Alternative B. The portion of the unit dropped is in the upper elevations of the original unit which were the more visible portions of Unit 14 in alternative B. The cutting would be moved off the ridgetop which would make the unit less conspicuous. This unit would meet the modification VQO.

Unit 15a (part of Alternative B Unit 15) was changed from an intermediate harvest to a regeneration harvest.

Effects: The change is this portion of Unit 15 would not result in any significant differences from Alternative B. The portion of the unit that would change from an intermediate cut to a regeneration harvest is narrow and parallel with the contour and on relatively flat slopes. This regeneration harvest would be screened by the residual timber in Unit 15 below it. This change would meet the modification VQO.

Forest Plan Consistency

As above, all of the proposed units meet the Forest Plan VQOs except for Units 11, 14, and 47. This alternative would be consistent with Forest Plan standards.

Unit 11 is in MA-14. The direction for MA-14 allows for deviation from the VQO when attempting to meet the goals of the management area. The goals of this management area are grizzly bear habitat and timber production. This unit is planned for timber harvest while at the same time, the project will maintain or improve grizzly bear habitat. With these goals in mind, the deviation from the established VQO is allowable under the Forest Plan.

Unit 14 is in MA-12. The direction for MA-12 allows for deviation from the VQO when attempting to meet the goals of the management area. The goals of this management area are big game habitat improvement and timber production. This unit is planned for timber harvest while at the same time, the project will maintain or improve big game habitat. With these goals in mind, the deviation from the established VQO is allowable under the Forest Plan.

Unit 47 is in MA-11. The direction for MA-11 allows for deviation from the VQO to meet the goals of the management area. The goal for Unit 47 is to reduce the crown density and fuel loadings in order to provide for a more defensible area from wildfire around the Yaak School. With this goal in mind, the deviation from the established VQO is allowable under the Forest Plan.

ALTERNATIVE D
Direct, Indirect, and Cumulative Effects

Under this alternative, the units identified as visually sensitive were the same as Alternative C, with the following changes:

1. Units 11 and 12 were dropped.
2. Unit 17 was reduced from 32 acres to 19 acres.

1. "Upper Ford" Area

Viewpoints 1 and 2:

Units 11 and 12 are dropped and Unit 17 was reduced from 32 to 19 acres.

Effects: This change would substantially reduce the visual effects of the proposed activities the Mud Creek area. Under Alternatives B and C, Unit 11 did not meet the visual quality objective for the area, and under this alternative, that problem would be alleviated by dropping the unit.

Unit 17 would be reduced from 32 acres to 19 acres.

Effects: The portions of the unit that were dropped were the most visible parts of the units under Alternative C The elimination of Unit 12, and the elimination of the common boundary of Unit 17 and Unit 19 (due to reduction in size of Unit 17) would cause Unit 17 to stand out more than under Alternative C, due to the sharp line that would be created between Unit 17 and the residual timber. Without the buffering effect of the other units, Unit 17 would not appear as a natural occurrence, and would not meet the modification visual quality objective, but would be permissible under the Forest Plan in meeting management area goals.

Forest Plan Consistency

In this alternative, all of the proposed units meet the Forest Plan visual quality objectives except for Units 17 and 47. This alternative is consistent with Forest Plan standards.

Unit 17 is in MA-14. The direction for MA-14 allows for deviation from the VQO when attempting to meet the goals of the management area. The goals of this management area are grizzly bear habitat and timber production. This unit is planned for timber harvest while at the same time, the project will maintain or improve grizzly bear habitat. With these goals in mind, the deviation from the established VQO is allowable under the Forest Plan.

Unit 47 is in MA-11. The direction for MA-11 allows for deviation from the VQO to meet the goals of the management area. The goal for Unit 47 is to reduce the crown density and fuel loadings in order to provide for a more defensible area from wildfire around the Yaak School. With this goal in mind, the deviation from the established VQO is allowable under the Forest Plan.

TABLE 3-49. SUMMARY OF VISUAL EFFECTS BY ALTERNATIVE

INDICATOR	ALT A	ALT B	ALT C	ALT D
Ranking by Visual Effects (1=Least, 4=Most)	1	4	3	2
Units not meeting Forest Plan visual quality objectives but permissible to meet MA goals.	None	11, 14, 47	11, 47	17, 47
Alternative is consistent with Forest Plan Goals	Yes	Yes	Yes	Yes

ECONOMICS

Introduction

This section addresses the purpose and need to contribute forest products to the economy.

Analysis Area

The combination of small town and rural settings, along with people from a wide variety of backgrounds, provide a diverse social environment for the geographical region around the Three Rivers Ranger District. Local residents pursue a wide variety of life-styles, but many share a common theme -- an orientation to the outdoors and natural resources. This is reflected in both vocational and recreational pursuits including employment in the logging and milling operations, outfitter and guide businesses, hiking, hunting, fishing, camping and many other recreational activities.

Timber, tourism and agricultural industries are the mainstays of local areas. Despite the common concern for and dependence on natural resources within the local communities, social attitudes contrast sharply with respect to their management. Local residents offer a broad spectrum of perspectives ranging from complete preservation to maximum development and utilization of natural resources.

The effects of management activities within the project area have the potential to ripple throughout a wide cross-section of nearby communities. However, it is unlikely that the economic effects of this project alone would be noticeable or "traceable" in these communities. More than one timber sale project would have to be considered to accurately determine the effects to the economy in the nearby communities. This type of analysis was done in the Forest Plan.

Analysis Method

The economic analysis is specific to the timber harvest activities associated with the proposal as directed in Forest Service Manual 2400- Timber Management (FSM 2400). The changes to resources like wildlife and fisheries habitat have been measured using changes to habitat conditions and will not be described in financial or economic terms for this site-specific project. Non-market values such as dispersed recreation were not analyzed for this site-specific project. These were, however, analyzed at the Forest Plan level - refer to Appendix B, Chapter IV of the Forest Plan for more information. According the FSM 2400 Sec. 2432.22c, "Forest Service managers are not required by law or policy to make a profit on timber sale projects. However, it is policy to operate timber sale projects in the most cost efficient manner practicable to achieve the objectives outlined by forest plans and produce a program where long term benefits exceed costs." The purpose of this economic analysis is to provide financial and economic information in order to determine feasibility and "salability" of the timber sales proposed for this project.

The indicators for economic issues are (1) amount of timber harvested measured in hundred cubic feet (CCF) and million board feet (MMBF), (2) jobs supported by project activities, (3) economic contribution to local communities and (4) present net value. Table 3-50 compares the indicators by alternative.

Present Net Value: The present net value (PNV) is one indicator for comparing the cost efficiency between alternatives. PNV is the difference between the present value of the revenues and the present value of the expenses. PNV converts expenses and revenues over the entire time frame of the project into a single figure for a selected year. A positive PNV means that the project would generate more benefits than expenses and, therefore, would not be considered "below-cost". Forest Service costs used to estimate PNV include stand exam data gathering, transportation planning, environmental analysis and documentation, timber sale preparation, and timber sale administration. These costs were derived from the Timber Sale Program Annual Report for the Kootenai National Forest Fiscal Year 1998, (TSPIRS). In addition, types of logging systems, road reconstruction, temporary road construction and subsequent decommissioning, road maintenance, tree planting, site preparation (burning, piling, etc.) and environmental protection (slash disposal, seeding and fertilizing, noxious weed control, etc.) were taken into account.

The computer spreadsheet TSPAS (Timber Sale Planning and Analysis System) was used to generate PNV for each alternative. TSPAS uses regression formulas to estimate PNV. Cost estimates within the TSPAS spreadsheet are specific to the Kootenai National Forest. TSPAS was patterned after the “Transaction Evidence” type of appraisal system used to appraise sales within Region 1.

Number of Jobs and Economic Contribution: Harvest of timber generates jobs and revenue to the local communities. In the timber industry, each million board feet (MMBF) that is harvested from National Forest Systems lands requires individuals that are directly involved with harvesting such as loggers, truck drivers, and mill workers as well as Forest Service employees to prepare and administer the timber sales. These are considered "direct jobs and income" relating to timber management. In addition, there are also "indirect and induced” jobs as a result of those individuals involved with the timber industry using businesses such as gas stations, grocery stores, equipment repair and supply stores and for such things as housing (M.Niccolucci, 1995). Although there is no way to adequately measure the economic effect of a single project on the local economy, a projection of numbers of jobs and income to the local communities that could be supported by the alternatives can be used to compare alternatives. Multipliers were used to estimate the number of jobs and economic contribution and come from the Bureau of Business and Economic Research at the University of Montana. To estimate direct jobs and economic contribution to local communities, the response coefficients used are 10.0 jobs/MMBF and $319,000/MMBF. To estimate indirect and induced jobs the response coefficients used is 22.2 jobs/MMBF (USDA, 1996a, "Employment and Income Spreadsheet).

Affected Environment

The Kootenai National Forest occupies approximately 75 percent of the land base in Lincoln County and plays a dominant economic role in Lincoln County. The population centers in Lincoln County include Eureka, Libby, and Troy, Montana. Forest related products represent the largest component of manufacturing. As a result of the Fiscal Year 1998 (FY98) timber program on the Kootenai National Forest, it is estimated that approximately 3,444 private sector jobs were generated with an estimated $107,895,000 of local community income generated (TSPIRS table 3).

Within the last several years, the stud mill at the Stimson Lumber Company site in Libby was dismantled and now the Stimson mill is only producing plywood and finger-joint lumber. In addition, the Louisiana-Pacific, Inc. mill in Libby closed. Because of this, significant portion of the timber harvested on the Three Rivers Ranger District within the last few years has been hauled to mills in Eureka, Montana, Moyie Springs and Bonners Ferry, Idaho. There are also several small mills that generate lumber and specialty products such as house logs and cedar products that use timber harvested from the area. These mills rely, in part, on the supply of timber from National Forest Systems land.

It is difficult to determine the economic benefit of timber harvest within the project area since statistics are not compiled separately for individual areas. However, a rough estimation can be made by examining the average share of total timber harvest on the Kootenai National Forest from the Three Rivers Ranger District over the last 6-years. From the period of 1993 to 1998, the Three Rivers District has sold approximately 398,000 hundred cubic feet (CCF) (or 163 million board feet (MMBF) of timber. During the same 6-year period, the Kootenai National Forest sold around 1,215,000 CCF (498 MMBF) for a total value to the communities of $158,862,000. The Three Rivers Ranger District's contribution was roughly 33 percent of the total.

Environmental Consequences

A comprehensive socio-economic analysis was completed during the development of the Forest Plan. It assessed Lincoln and Sanders counties in northwest Montana as primary impact areas. Flathead County in Montana and Bonner and Boundary Counties in Idaho were assessed as secondary impact areas. The analysis estimated the relationship of Forest activities to communities. Short-term impacts were given primary emphasis with lesser consideration given to long-term effects. Many projects over a large area were consolidated so that socio-economic effects could be shown effectively (Kootenai Forest Plan, Appendix B, p. B-61). Although activities within the project area influence local socio-economic conditions, these influences and effects cannot be effectively analyzed at the project level. The comprehensive analysis conducted at the Forest Plan level can more readily project effects to the local and regional communities. Therefore, this analysis will concentrate on the economic effects and financial integrity of the alternatives. The action alternatives were analyzed as a single sale; however, some units or groups of units may be sold as separate sales.

ALTERNATIVE A
Direct, Indirect, and Cumulative Effects

Under Alternative A, there would be no direct, indirect or induced jobs or income generated to the local communities. The payments to Lincoln County in the form of National Forest Fund payment as a result of the potential timber sale would be forgone.

Alternative A has an estimated negative PNV (-$1,051,330) because this alternative would incur only the costs to prepare this environmental assessment. The costs used to estimate the PNV for the proposed action include the cost of collecting stand exam data ($0.94/CCF), transportation planning ($0.44/CCF), and the costs of environmental analysis and document preparation ($7.01/CCF). These costs are averages that are specific to the Kootenai National Forest and were generated using the TSPAS Spreadsheet.

Cumulative effects associated with the no action alternative in combination with the recent downward trend in timber harvest on National Forest Land could contribute to long-term loss of jobs and possible mill closures.

ALTERNATIVE B
Direct And Indirect Effects

Alternative B proposes to harvest approximately 42,129 CCF (17.3 MMBF) on 2538 acres. Three types of yarding systems would be used as follows: helicopter 996 acres (39%), skyline 52 acres (2%) and tractor 1490 acres (59%). Helicopter harvest is designated for areas inaccessible to ground-based yarding systems due to lack of roads and steep broken terrain. Helicopter yarding costs would be minimized by design features that would enhance ease of yarding.

It is estimated that 173 direct jobs and 384 indirect and induced jobs would be generated from harvesting under Alternative B. In addition, approximately $5,518,700 worth of income to the local communities would be generated. The PNV for Alternative B is $2,297,630.

ALTERNATIVE C
Direct and Indirect Effects

Alternative C proposes to harvest approximately 35,021 CCF (14.4 MMBF) on 2246 acres. Three types of yarding systems would be used as follows: helicopter 846 acres (38%), skyline 52 acres (2%) and tractor 1348 acres (60%). Helicopter harvest is designated for areas inaccessible to ground based yarding systems due to lack of roads and steep broken terrain. Helicopter yarding costs would be minimized by design features that would enhance ease of yarding.

It is estimated that 144 direct jobs and 320 indirect and induced jobs would be generated from harvesting under Alternative C. In addition, approximately $4,593,600 worth of income to the local communities would be generated. The PNV for Alternative C is $1,402,350.

ALTERNATIVE D
Direct and Indirect Effects

Alternatives D propose to harvest approximately 33,721 CCF (13.8 MMBF) on 2135 acres. Three types of yarding systems would be used as follows: helicopter 824 acres (39%), skyline 52 acres (2%) and tractor 1,259 acres (59%). Helicopter harvest is designated for areas inaccessible to ground based yarding systems due to lack of roads and steep broken terrain. Helicopter yarding costs would be minimized by design features that would enhance ease of yarding.

It is estimated that 138 direct jobs and 306 indirect and induced jobs would be generated from harvesting under Alternative C. In addition, approximately $4,402,200 worth of income to the local communities would be generated. The PNV for Alternative C is $1,251,560.

Table 3-50 summarizes the direct and indirect economic effects of the alternatives.

TABLE 3-50. DIRECT AND INDIRECT ECONOMIC EFFECTS BY ALTERNATIVE

ALTERNATIVES	A	B	C	D
Total MMBF	0	17.3	14.4	13.8
Total CCF	0	42,129	35,021	33,721
Acres of Helicopter Yarding/(Percent of Total Acres)	0	996 (39%)	846 (38%)	824 (39%)
Acres of Skyline Yarding/(Percent of Total Acres)	0	52 (2%)	52(2%)	52 (2%)
Acres of Tractor Yarding/(Percent of Total Acres)	0	1,490 (59%)	1,348 (60%)	1,259 (59%)
Direct Job	0	173	144	138
Indirect Jobs	0	384	320	306
Economic Contribution To Local Community	0	$5,518,700	$4,593,600	$4,402,200
PNV	-1,051,330	2,297,630	1,402,350	1,251,560

Cumulative Effects

As mentioned previously, a comprehensive socio-economic analysis was conducted on a Forest-wide basis for the Forest Plan, where many projects over a large area for a long period of time were consolidated and socio-economic effects could be shown effectively (Kootenai Forest Plan, Appendix B, p. B-61). Although activities within the project area influence local socio-economic conditions, these influences cannot be adequately analyzed at the project level because of the large-scale analysis that is necessary to assess the impacts of many projects.

The Lincoln County residents and government recognize the need to create a diversified economy. The Lincoln County Commissioners, the Lincoln County Economic Development Council, as well as the city governments, strongly support rural development and economic diversification by participating in studies and by encouraging value-added wood product businesses and tourism activity within the county. Although tourism and recreational related industries are on the increase in Lincoln County, they are typically service industries where the wage rate is lower and stability is questionable. Lincoln County is attempting to increase its economic diversity, but timber harvesting and lumber mills are still the base industry.

Fiscal years 1993 through 1998 show a downward trend in the amount of volume sold on the KNF (TSPIRS, table 3). For example, volume sold in FY98 was almost half of the volume sold in FY93. Fiscal year 1996 was somewhat higher because of the timber sales, which resulted from the wildfires of 1994. This is also the period of time when unemployment rates in Lincoln County were on the increase. Although closing the Asarco Mine and the selling of the Champion International interests to Stimson Lumber Company and Plum Creek Timber Company played a major role in changing the unemployment rate in Lincoln County, the decrease in volume sold on the KNF also played a role. It is expected that the volume sold off the KNF may continue to decline, although the decline is not expected to be as sharp as in recent years and is expected to level off. This situation is part of a larger trend of declining timber supply from public lands across the Western United States.The level of timber harvest on the KNF has had, and will continue to have, an effect on the economic stability of Lincoln County. The volume that would be sold as a result of this project is a portion of the planned timber sell program for the KNF. A decrease in the economic base of the timber industry could result in a decline in the income produced by both primary and secondary businesses.

In addition to the economic benefit provided by timber sales, fuels reduction activities, non-commercial thinning, noxious weed treatment, and data gathering have the potential to provide additional employment opportunities and additional income to the local community.

CULTURAL RESOURCES

Introduction

Analysis Area

The area analyzed for cultural resources is the Garver project area which lies in the northwest portion of the district from the town of Yaak to the US/Canadian border. This area includes Dusty Peak, Bonnet Top, Garver Mtn. and Obermayer Mtn., as well as portions of Pete Creek and the West Fork of the Yaak River (see Vicinity Map, M-1). The south and southeast portions of the unit are bounded by the Yaak River.

Analysis Methods

Analysis methods used in this section consist of a review and synthesis of all pertinent literature, records, and documentation available on the history and prehistory of the analysis area and surrounding area. This information includes not only that available from a variety of generalized sources, but also that information resulting from past Forest Service heritage resource surveys conducted in the analysis area.

Forest Plan Standards And Guidelines

Cultural resource inventories are required prior to road construction, timber harvest, and any other ground-disturbing activities, in an effort to locate and identify cultural sites. The Forest Service and other Federal Agencies are required to protect and manage cultural sites in the United States under several statutes, most notably the National Historic Preservation Act of 1966 as amended. These requirements are carried forward in the Forest Plan standards (Forest Plan, Vol. 2, appendix 19).

Historic properties are identified by a cultural resource inventory and are determined as either eligible or not eligible to the National Register. Sites that are determined as eligible are then managed to either protect them in-place or to mitigate adverse project impacts. Eligibility and management provisions must be reviewed by the State Historic Preservation Office. This process must take place prior to impacts on the ground.

The location of cultural resource sites is exempt from public disclosure as described in FSH 6209.13 11.2 & 11.22. The purpose of this exemption is to protect sites from harm and to retain confidentiality of sites culturally significant to American Indian Tribes.

Affected Environment

Archaeological evidence in the Yaak Valley indicates human use from the early Holocene to the present. An early site adjacent to the Garver analysis area yielded artifacts ascribed to the Windust prehistoric phase believed to date back almost 9,000 years. Another site in the vicinity shows evidence of occupation as far back as 3,000 years, with evidence that the native inhabitants practiced burning as a method of environmental control for at least the past 500 years (Zweifel, 1995: pg 24). Within the analysis area, a Cascade style point gives evidence of hunting which may date to about 6,000 years ago. More recently, the Kootenai Indians have left their mark in the form of scarred trees, where the bark was peeled as part of traditional food gathering activities that continued into the early 1900s. Numerous other sites in the Garver analysis area and Yaak River valley have been recorded.

Because most of these sites have not undergone scientific data recovery and did not yield diagnostic artifacts during preliminary recordation, the dates these sites were occupied has not been established. However, these sites, in addition to those which have yielded more diagnostic evidence, indicate a long and continuous use of the area.

Early Euro-American use of this area began in the late 1800s when prospectors passed through the Yaak Valley on their way to the gold fields near Wildhorse, British Columbia in 1864 (Calvi 1993: 4). Although some of the historic sites within the analysis area may date to the late 1800s, most probably date from the early 1900s and into the 1950s. Mining activities continued in the Yaak Valley with prospecting activities radiating out from the Sylvanite Mining area from the late 1800s to the present day. Early Forest Service surveys identified non-forested lands within the Forest boundary which were made available for homesteading. When homesteaders failed, the land was often sold back to, or reverted to National Forest lands. Evidence of these homesteads remains in much of the private land within the valley today and in cabins and dump sites scattered throughout the area. The Forest Service built numerous lookouts within the analysis area in addition to several administrative sites. The Garver Lookout cabin was built in 1929 as a residence for the lookout who would climb a 48 foot tower to a 6' x 6' cab. The current lookout on Garver Mountain was built in 1963. Hensley Hill was the site of an early Forest Service lookout, and later the site of an Airforce Radar Base as part of the Defense Early Warning (DEW) system. There is also a network of trails winding through the analysis area, less than a third of which have yet been recorded as sites. Most of these were constructed between the early 1900s and the 1940s, and were used to access the fire lookouts, provide access to remote areas in the event of wild fire, and to provide recreational and administrative access to the Forest. Several of these had associated phone lines to facilitate communication between the fire lookouts and the various Forest Service offices.

Environmental Consequences

Cultural resources can be diminished in value by any change in their historical, architectural, archaeological, or cultural character. Adverse impacts to cultural resource sites can result in their damage or complete destruction, which results in irreversible effects. In cases of partial damage the undisturbed portion of the site may still provide valuable information.

Although the management intent is to identify all cultural sites and avoid them or mitigate the effects of proposed activities, the potential exists for unidentified sites to be encountered and disturbed as the project proceeds. If such sites are encountered, they will be protected under requirements for forest activities which provide for their protection. Implementation of any alternative will not result in impacts to cultural resources.

ALTERNATIVE A- NO ACTION

Under this alternative no action is planned, and all sites (known and unknown) would remain undisturbed.

ALTERNATIVES B, C, AND D
Direct, Indirect, and Cumulative Effects

Many of the proposed activity units have been inventoried; with ongoing inventory for the remaining units scheduled during 2002. This inventory will be completed, documented and submitted to the Montana State Historic Preservation Office in accordance with the provisions of the Region One Programmatic Agreement

regarding Cultural Resource Management in the State of Montana (R1 PA) prior to project implementation. All associated sites will be recorded and impacts to eligible historic properties will be mitigated through consultation with SHPO. The Confederated Salish and Kootenai Tribes would be included in these discussions where Native American sites are involved.

Historic trails will be treated according to the Kootenai National Forest Programmatic Memorandum of Agreement regarding Historic Trails and Logging Sites (KNF PMOA). The location of historic trails on the Kootenai National Forest is known from historic Kootenai National Forest maps. When a trail is shown within a proposed activity area, a survey is conducted to locate the trail on the ground. Because of the small scale of the historic maps, the actual location often differs from the location shown. In addition, the lack of maintenance and natural deterioration may have obscured the trail. Where continuous evidence of the trail is found on the ground, the tread, blazes and other features are protected according to the KNF PMOA.

All other historic properties will be avoided if possible. Avoidance usually entails a buffer zone of 30 meters. Other mitigation measures especially for subsurface prehistoric and historic sites could include logging over at least 12” of snow and frozen ground, restrictions on the type of equipment used, or other measures which would limit ground disturbance.

If additional sites are encountered in the course of project implementation, a Forest Service archeologist would consult with the State Historic Preservation Office, as required by law, to determine the significance of the discovery, and the effects of the project upon them. The Confederated Salish and Kootenai Tribes would be included in these discussions where Native American sites are involved. Mitigation could be accomplished through avoidance of the sites as described above, or through scientific investigation and/or removal of the resource.

Forest Plan Consistency

The Forest Plan, in accordance with Section 106 of the National Historic Preservation Act, requires integration of cultural resource management into the overall multiple resource management effort. In addition, the Forest must work closely with the appropriate scientific community and Native American groups concerning this resource. Cultural resource inventories must be completed prior to road construction, timber harvest, and other ground-disturbing activities.

The guidelines of the Forest Plan and that of other jurisdictions were recognized in the development of all alternatives. In addition, the laws and policies that govern cultural resource protection on Federal lands are coordinated with the State Historic Preservation Officers (SHPO) of Montana, who serves in an advisory capacity. The policies of the USFS and SHPO are consistent. Assuming that the surveys and any mitigation measures developed in consultation with the Montana or Idaho SHPOs are applied, the implementation of these alternatives will be in compliance with the appropriate cultural resource guidelines.

TRIBAL CONSULTATION

Introduction

Analysis Area

The area taken into analysis for Cultural Resources is the Garver Planning Unit which lies in the northwest portion of the District from the town of Yaak to the US/Canadian border. This area includes Dusty Peak, Bonnet Top, Garver Mtn. and Obermayer Mtn., as well as portions of Pete Creek and the West Fork of the Yaak River (see Vicinity Map, M-1). The south and southeast portions of the unit are bounded by the Yaak River.

Analysis Methods

Federal guidelines direct federal agencies to consult with modern American Indian tribal representatives and traditionalists who may have concerns about federal actions that may affect religious practices, other traditional cultural uses, as well as cultural resource sites and remains associated with American Indian ancestors.

The project area lies within the aboriginal territory of the Kootenai Tribe. Modern members of the Kootenai Tribe are represented by the Confederated Salish and Kootenai Tribes (CSKT) and the Kootenai Tribe of Idaho. The Salish also occasionally passed through the project area. The Salish are also represented by the CSKT.

Analysis methods used in this section consists of consultation with the tribes who have been identified as having an interest in the project area. The concerns of the CSKT and the Kootenai Tribe of Idaho were solicited through project scoping. In addition, the CSKT has provided a Tribal Liason to work in partnership with the Kootenai National Forest to review project proposals and provide Tribal input. Information obtained from the CSKT and Kootenai Tribe of Idaho is taken into account to assess impact to issues related to cultural sites, traditional plants, and other resources related to treaty rights. Information exchanged through consultation is considered confidential.

Forest Plan Standards And Guidelines

American Indian Tribes are afforded special rights under various federal statues including those listed below. The Indian Sacred Sites Executive Order 13007 of June 1996 directs Federal land managers to "(1) accomodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites", and to "maintain the confidentiality of sacred sites" where appropriate. The American Indian Religious Freedom Act of 1978 preserves the inherent rights of American Indians "for freedom to believe, express and exercise" their traditional religions. The National Historic Preservation Act of 1966 as amended through 1992 requires federal agencies take into consideration the effects of their activities on cultural properties, and provides for the participation of Indian tribes where there is the potential to affect sites culturally significant to Americans Indians. The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) recognizes the rights of the Indian Tribes and Native American organizations as caretakers of human remains, funerary objects, sacred objects, and objects of cultural patrimony with which they can demonstrate a reasonable biological or cultural affiliation, and conveys to such groups the rights to decide upon the disposition of such items.

In addition to the general federal statutes listed below, the Salish (Flathead), Kootenai and Upper Pend d'Oreilles have rights under the Hellgate Treaty of 1855. The Forest Plan recognizes these treaty rights on the Kootenai National Forest (FP Vol I pg V-4). These reserved rights include the "right of taking fish at all usual and accustomed places, in commom with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering roots and berries, and pastering their horses and cattle upon open and unclaimed land". The federal government has trust responsibilities to Tribes under a government to government relationship to insure that the Tribes' reserved rights are protected.

Affected Environment

The project area is within the aboriginal territory of the Kootenai Tribe, and was occaisionally used by the Salish. Consultation with the CSKT and Kootenai Tribe of Idaho centered around the project area but took into account any outside area that might affect the project area.

Environmental Consequences

Tribal comments on the environmental consequences of the Garver project are:
None received to date.

POTENTIAL CONFLICTS WITH PLANS AND POLICIES OF OTHER JURISDICTIONS

Cultural Resources

The laws and policies that govern cultural resource protection on Federal Lands are coordinated with the SHPO of Montana, who serves in an advisory capacity. The policies for USFS and SHPO are consistent. The Forest Service would inform and consult with the Confederated Salish and Kootenai Tribes on proposed activities, site information and potential impacts.

Wildlife

The Forest Service and the MFWP work together to manage wildlife, but the missions of the two agencies are different. The Forest Service manages the land and affects wildlife by adjusting cover, forage relationships, or through travel management. The State of Montana manages the animals, and they affect wildlife by adjusting hunting seasons, bag limits, and enforcing other rules that affect the populations of fish and wildlife.

The Forest Service works with the US Fish and Wildlife Service for the recovery of Threatened and Endangered Species. The Forest Service consults with the US Fish and Wildlife Service when Threatened and Endangered Species may be affected.

Water Quality

Section 313 of the Clean Water Act requires Federal Agencies to comply with all Federal, State, interstate and local requirements, administrative authority, and process and sanctions with respect to the control and abatement of water pollution. Executive Order 12088 also requires the Forest Service to meet the requirements of the Act.
All action alternatives would comply with the Clean Water Act and Montana State Water Quality Standards. These alternatives would incorporate reasonable Soil and Water Conservation Practices, avoid channel degradation, and comply with the Forest Plan.

Air Quality

The prescribed burning of harvest units under all action alternatives has the greatest potential to affect local air quality. This activity is conducted in accordance with the State of Montana air quality guidelines administered by the Montana/Idaho State Airshed Group, made up of industry, State and Federal agencies, and local Health Department representatives.

Potential conflicts occasionally exist between National Forest concerns for meeting land management goals and the commitments of the State Agencies for clean air.

Other sources of potential conflict exist between private landowners within Montana, State land management agencies, and other adjoining National Forests competing for the limited number of suitable burning days. When such conflicts are identified, the Forest Service does not burn.

PROBABLE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Implementation of any alternatives would inevitably result in some adverse environmental effects. The severity of the effects can be minimized by adhering to the features of the alternatives such as the Best Management Practices. If management activities occur, however, some effects cannot be avoided. Even the no action alternative has effects.

Cultural Resources

There is no assurance that every cultural resource site would be located in advance of all planned management activities. Some ground-disturbing activity may affect an undiscovered historic or prehistoric site. Sites discovered in this manner would be immediately protected from further disturbance.

Scenic Resources

The introduction of timber harvest units would add a variety of line, form, color, and texture to the landscape. Recreation visitors may see a modified forest in the near foreground, middle-ground, and background where harvest is implemented.

Wildlife

All the action alternatives would have an effect on the cover/forage relationships in the project area. Old growth-dependent wildlife species may experience fluctuations in their populations as successional conditions change.

Air Quality

Temporary seasonal effects on air quality are unavoidable under any of the action alternatives. Prescribed fire is an integral part of ecosystem management, fuel treatment, and site preparation for reforestation. These activities would be scheduled when air dispersion is good.

RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

Short-term uses are those uses that generally occur annually. Long-term productivity refers to the ability of the land to produce a continuous supply of a resource.

Water Quality

The duration of the effects of timber management on the water resource is highly variable and dependent on land and vegetation types. Stream channel conditions may be altered as a consequence of short-term direct and indirect effects of management activities. .

Wildlife

Key habitat requirements for wildlife species include feeding habitat or foraging areas interspersed with nesting or denning habitat and thermal and hiding cover. As the feeding habitats experience successional changes and reforestation, they would again provide cover. The appropriate scheduling of timber harvest can provide and sustain a mosaic of cover and feeding habitat.

Vegetation

Managed stands produce a higher volume of wood fiber through time than unmanaged stands. Regeneration of desired fast-growing species, planting of genetically improved trees, stocking control to reduce competition and improve growth of individual trees, and intermediate treatments to maintain the health and vigor of stands are silvicultural means of maintaining the long-term yield of forest stands.

In the short term, harvesting stands that are at a high risk of mortality captures economic value that would otherwise be lost. Timely reforestation puts the land back into a productive growing condition.

Depending on the level of timber harvesting and the site preparation method which follows, reductions in organic matter could reduce long-term site productivity. Silvicultural prescriptions include measures designed to maintain varying levels of organic matter. Reforestation of harvest areas could change plant succession, stand development, and species composition.

Air Quality

The temporary impacts of smoke from prescribed debris burning and road dust from vehicles associated with proposed activities would have minor, short-term effects on visual quality and recreation use. The short-term impacts are traded for by minimizing the risks from wildfire and long-term, increased site productivity. The short-term impact of prescribed burning is required to decrease the risk from wildfire on these sites. Wildfires generally provide significantly more air pollution. Silvicutural treatments and prescribed burning will increase long-term site productivity.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible commitment of resources refers to the loss of production or use of a non-renewable resource due to a land use decision that, once executed, cannot be changed. An irretrievable commitment of resources applies to losses of production or use of renewable resources for a time.

Soil Productivity

Best Management Practices would be used to avoid soil productivity losses from timber harvesting and associated temporary road/skid trail construction. Temporary roads would constitute an irretrievable commitment of resources even though they would be recontoured. The soil mixing and disturbance that would be associated with temporary construction would lower soil productivity. While plant and tree growth on these sites would occur over the short term, full productivity recovery would take decades to hundreds of years.

Air Quality

The impact of prescribed burning and road dust would have temporary seasonal impacts on the air quality in all alternatives except Alternative A, no action.

Scenic Resources

Irretrievable changes in the existing appearance of the landscape would occur under the action alternatives. These changes would become progressively less noticeable as vegetation recovered in harvested areas and along roads.

Wildlife

The loss or modification of habitat for certain wildlife species is an irreversible commitment of resources. As vegetation recovers, this habitat would recover. However, the timeframe for this to occur may be as long as several decades for mature and old growth-related species.

Cultural Resources

Any activity that would disturb a cultural resource is an irreversible commitment.

SPECIFICALLY REQUIRED DISCLOSURES

Effects of Alternatives on Social Groups:

Executive Order 12898 ordered federal agencies to identify and address the issue of environmental justice (i.e. adverse human health and environmental effects of agency programs that disproportionately impact minority and low income populations). Based on experience with similar projects on the Three Rivers Range District none of the alternatives would substantially affect minority or low-income individuals, Native American Indians, women, or civil rights. The implementation of this project is expected to provide job opportunities in communities such as Yaak, Montana. Small or minority-owned business would have the opportunity to compete for some of the work, including timber sales, non-commercial thinning, and fuels reduction projects.

Effects on Floodplains and Wetlands:

Floodplain areas constitute all of the wetlands in the project area and are protected as RHCAs. Wetlands may occur in the form of seeps, springs, and small bogs; however, the exact locations of all these have not been identified prior to unit layout. These seeps, springs, and small bogs are not evident through aerial photography and are probably less than one-quarter acre in size. These areas would be protected by adhering to the Montana Stream Management Zone regulations, Kootenai National Forest Riparian Area Guidelines as amended by INFS (USDA, Forest Service, 1987), Best Management Practices and Section 404 of the Clean Water Act (33 CFR 323). See the Water Resources section of this chapter for more specifics.

Effects of Alternatives on threatened and Endangered Species

Threatened and endangered wildlife, fish, and plant species may be affected by the proposed activities in the project area. A biological assessment will be prepared and submitted to the US Fish and Wildlife Service for concurrence according to the Endangered Species Act to insure protection of these species.

Energy Requirements and Conservation Potential of Alternatives

The energy required to implement the alternatives in terms of petroleum products would be insignificant when viewed in light of the production costs and effects of the national and worldwide petroleum reserves.

Effects of Alternatives on Prime Rangeland, Forest Land, and Farm Land:

The alternatives presented are in compliance with Federal Regulations for prime lands. The definition of prime forestland does not apply to lands within the National Forests. Lands administered by the Forest Service in the project area do not include prime farm lands or range lands. In all alternatives, Federal lands would be managed with the appropriate consideration to the effects on adjacent lands.

Garver
Timber Harvest Treatment Summary

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
1	10	12	Stand replacement in areas where tree health has declined due to exclusion of fire-maintained processes and uncharacteristic levels of dwarf mistletoe and blister rust fungal disease. Maintain forest structure and restore western larch and western white pine. Create small forage opening.	Initiate regeneration harvest through removal of LP, WRC, H, and GF, retain the best quality trees of all other species and existing snags, snag replacement and down logs at levels specified in silviculture Rx. **Seedtree with Reserves, Excavator Pile, Wide Plant**	75-90%	Tractor
2	43 only 28 acres in Alt C and D	12	Modify existing conditions to reduce stand density, reduce risk of crown fire, improve stand health, and maintain important non winter wildlife habitat. Capture economic value in blowdown and dead LP. Promote a more open canopy structure of overstory seral species Protect integrity of wet areas, RHCAs, etc.	Thin from below, reduce forest density, especially the intermediate crown class. Create more growing space for the best trees .Emphasize retention of overstory relics. **Stand Improvement, yard tops**	30-40%	Tractor
3	33	12	Stand replacement in areas of uniform, mature LP and overstocked poor growing WRC to recover economic value, create forage opening. Create conditions for greater long-term species and structural diversity through restoration of species characteristic of the site.	Initiate regeneration harvest through removal of LP and undesirable trees specified in silviculture prescription. Retain existing snags, snag replacement and down logs at levels specified in silviculture Rx. **Seedtree with Reserves, Excavator Pile, Wide Plant**	75-90%	Tractor
4	57 58 in Alt C Alt D	12	Modify stand in order to maintain healthy forest conditions while improving growth potential of the healthy, more fire adapted and dominant trees. Reduce risk of crown fire through fuels treatment and stand density reduction. Protect RHCAs. Maintain old growth characteristics where they occur.	Remove excess and poor quality trees of all species, striving to achieve a target basal area averaging 90-100 sq.ft/acre.. **Most if not all overstory WL, WRC relics hould left as snag replacements, structural and genetic diversity, etc**. . Leave the best quality trees and most suitable to the site. **Preferred leave species are WL, ES, DF, WRC, WP**. Existing functional snags and replacement snags should be left. **Stand Improvement, excavator pile**	30-40%	Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
5	33 34 in Alt C Alt D	11	Modify conditions to reduced clumped nature of the trees within the stand, capture economic value in blowdown and LP, improve species mix and overall stand health, maintain important habitat components for wildlife. Protect integrity of wet areas, RHCAs, etc. Protect West Fork Yaak trail	Species designate LP, WH, WRC, and GF for removal. Thin other species beginning with lower diameter classes, reducing stand density of poor quality and excess trees. Favor retention of healthy, dominant well-formed PP, WL, and DF. **Stand Improvement, yard tops**	30-40%	Tractor
6	11	12	Replace portions of an expansive, even aged and uniform LP patch that is mature and at risk to continued bark beetle impacts. Provide a means to restore a wider compliment of species and structural diversity while providing more options for future habitat management	Initiate regeneration harvest through designation on LP for removal and individually select out poor quality, intermediates where density is uncharacteristic. Retain existing snags, snag replacement and down logs at levels specified in silv Rx. **Seedtree with Reserves, lop and scatter**	25-50%	Tractor
7	23	12	Stand replacement to improve long term species and structural diversity in area of mature LP stand and dense mixed conifer in poor health. Recover value in area of declining health. Create forage opening for wildlife. Restore species characteristic of the site	Initiate regeneration harvest through removal of all LP, and other species described in the silvicultural Rx. Emphasize retention of healthy, fire adapted species, healthy understory trees, existing snags, snag replacement and down logs **Seedtree with Reserves, Excavator Pile, Wide Plant**	75-90%	Tractor
8	34	12	Modify existing conditions to reduce areas of heavy fuels from older dead LP. Reduce stand density improving growth of best trees. Recover value in mature LP at risk to continued beetle-caused mortality. Promote higher quality forage and maintain important wildlife hiding cover. Protect integrity of wet areas, RHCAs, etc.	Species designate the AF, LP and reduce density of poor quality trees, particularly around the healthy WL, DF, ES. Target density ave 80-100 sq.ft of basal area/acre. Thin out clumps, including WL of poor health and crown ratios <30%, poor height to diameter ratios. **Stand Improvement, selective slashing, spot pile concentrations of slash**	30-40%	Tractor
9 Alt B	17	11	Remove the existing overstory seed source for the regenerated stand. Retain scattered overstory reserves, Restore appropriate species in openings. Protect integrity of wet areas, RHCAs, etc	Designate all LP for removal. Retain the scattered remaining overstory for structural diversity, snag replacement, etc. **Seedtree Final Cut with Reserves, yard tops, examine for interplanting needs**	90%	Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
10 Alt B	27	12	Stand replacement to improve long term species and structural diversity, recover economic value in mature, dead/high risk LP and poor quality trees. Create wildlife forage opening. . Restore species adapted to site	Initiate regeneration harvest. Designate all LP for removal. Mark to leave 10-15 TPA of the healthy WL and DF from the dominant and codominant crown class … **Seedtree with Reserves, yard tops, plant**	90%	Tractor
10 Alt C Alt D	27	12	Modify conditions to reduce risk of crown fire in areas of high stand density in LP, with increasing levels of fuels. Recover economic value in the mature LP with expected increasing levels of bark beetle susceptibility. Promote sustainability and improved growth potential of the remaining dominant and co-dominant WL/DF, which enhance the old growth quality of this area.	Designate all LP for removal. Retain all other species irregularly distributed throughout the stand. **Stand Improvement, yard tops**	25-35%	Tractor
11 only in Alt B Alt C	41	14	Stand replacement to improve long term species and structural diversity in areas where forest health conditions have markedly declined and maintenance of seral species is jeopardized. Recover economic value in excess and poor quality trees. Create wildlife forage opening. Restore species adapted to site Protect integrity of wet areas, RHCAs, etc	Initiate regeneration harvest through removal of all LP, H, and other species meeting criteria in silvicultural prescription. Retain an average of 8-10 TPA in healthy WL, DF, WP overstory. In particular, leave the relic WL overstory. Leave existing, functional snags, snag replacement and down logs at levels specified in silvicultural Rx. **Seedtree with Reserves, excavator pile, plant**	70-85%	Tractor
12 only in Alt B Alt C	68 69 in Alt C	14	Modify conditions to improve growth of best trees, create conditions for maintenance of fire adapted species, and promote a more open structured yet multiaged stand. Protect integrity of wet areas, RHCAs, etc	Mark to improve species composition and quality while reducing stand density to an average basal area of 100 sq.ft/acre and opening the canopy. In particular, increase growing space around WL, DF, ES reserves. Maintain structural diversity and uneven-aged condition in marking effort. **Stand Improvement, excavator pile**	30-40%	Tractor
13	56 in Alt B 46 in Alt C Alt D	12	Modify conditions to improve growth of best trees, create conditions for maintenance of fire adapted species, and reduce susceptibility to DF bark beetle. Maintain important wildlife habitat functions and protect integrity of wet areas, RHCAs, etc.	Designate LP for removal. Thin with emphasis on reducing tree density in lower diameter classes and excess or poor quality trees in the co-dominant and intermediate size class. Retain an average basal area of 80-90 sq.ft/acre, with preference of leaving the best WL, DF, ES where appropriate for the site. **Stand Improvement, lop and scatter**	25-30%	Helicopter

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
13a Alt C Alt D	10	12	Initiate regeneration activities in an area that is becoming undestocked due to bark beetle caused mortality in a mature LP stand. Recover economic value in dead, dying and high risk trees while reducing threat of future unplanned wildfire through LP removal	Designate all LP for removal. Mark to leave available PP,WL, DF,ES seedtrees with >25% live crown, good diameter to height ratios and windfirmness. Leave all functional wildlife snags and provide for snag replacement. Approx. 10-15 reserve trees/acre are expected to be left as a seedsource, future snags, and structural diversity. **Seedtee Seedcut with Reserves, slash damaged saplings, yard tops, plant openings**	40-60%	Helicopter
14	135 in Alt B* 40 in Alt C Alt D	12	Stand replacement to improve long term species and structural diversity in areas with declining forest health, while maintaining structure, snags, etc. Recover economic value in excess and undesirable trees. Create a short term wildlife forage opening. Provide a mechanism to restore WL and WP, species at risk due to fire exclusion and lack of natural regeneration. Protect integrity of wet areas, RHCAs, etc. Meet Forest Plan standards for opening size and distance to hiding cover.	Initiate regeneration harvest through removal of all LP and excess, poor quality trees expecially WRC, H and GF. Mark to retain an average of 8-10 TPA in healthy WL, DF, ES, WP and retain existing snags, snag replacement and down logs at levels specified in silv Rx. Treatment will retain minimum 600 feet to hiding cover. **Seedtree with Reserves, excavator pile, plant**	90%	Helicopter
15	34 in Alt B 65 in Alt C Alt D	12	Modify stand conditions to improve growth of best trees, increase component of fire-adapted species, and reduce stand density to enable restoration of fire as an ecosystem process and increase forage potential. Recover value in LP that is mature, dead and/or high risk to continued beetle caused mortality. Protect integrity of wet areas, RHCAs, etc	Designate LP for removal. Also, in clumpy areas, thin out poor quality trees from lower diameter classes and reduce overstory density where appropriate. Some areas are fairly open and LP removal alone may be sufficient treatment. **Stand Improvement, spot excavator pile**	25-30%	Helicopter
15a Alt C Alt D	9	12	Stand replacement to improve long term species and structural diversity in areas where fuel loadings are high, forest health conditions have markedly declined and maintenance of seral species is jeopardized. Recover economic value in excess and poor quality trees. Create small forage opening for wildlife. Restore species adapted to site	Initiate regeneration harvest. Mark to leave 5-7 TPA in the best quality WL, WP, DF, WRC, ES according to marking guide criteria. In addition, leave all functional snags and provide for replacement snags. **Clearcut with Reserves, excavator pile, plant**	90-95%	Helicopter

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
16 only in Alt B	39	12	Same as unit 15	Same as unit 15 **Stand Improvement, yard half the tops**	30%	Helicopter
17	31 in Alt B 32 in Alt C 19 in Alt D	14	Stand replacement to improve long term species and structural diversity in areas where forest health conditions have markedly declined and maintenance of seral species is jeopardized. Recover economic value in excess and poor quality trees. Create wildlife forage opening. Restore species adapted to site Protect integrity of wet areas and RHCAs.	Initiate regeneration harvest through removal of all LP, H, and other species meeting criteria in marking guide. Retain an average of 8-10 TPA in healthy WL, DF, WP, WRC. It is our intent to leave the relic WL overstory. Leave existing, functional snags, snag replacement and down logs at levels specified in silvicultural Rx **Seedtree Seedcut with Reserves, excavator pile**	70-85%	Tractor
18	26	11	Stand replacement in a dense, stagnated stand of LP and WL that has increasing fuels. Recover economic value in mature, poor quality LP that continues to be impacted by bark beetles. Retain reserve trees for seed source, site protection, future snag replacement. Reduce threat of crown fire while retaining healthy fire adapted species. Maintain important winter range habitat functions.	Designate LP for removal. Retain an average of 15-25 TPA in healthy WL, DF across the treatment area. Uniform spacing is not required. Leave any relic WL overstory. Leave existing, functional snags, snag replacement and down logs at levels specified **Shelterwood Seedcut with Reserves, excavator pile**	60-75%	Tractor
19	179	11	Improve long-term forage potential, fire adaptiveness, and tree health by reducing forest density and creating a more open canopy. Modify stand structure to enable the eventual return of fire as ecosystem process. Maintain important winter range habitat functions.	With a target density averaging 80-90 sq. ft. of basal area, thin from lower diameter emphasizing the retention of the healthy, full crowned WL, DF, ES (other species in microsites). Harvest DF impacted by bark beetles. Leave snags and snag replacement trees. **Stand Improvement, yard tops**	30-40%	Tractor
20	13	11	Modify conditions to improve winter range by opening forest canopy, improve growth in best trees, and reduce susceptibility to DF bark beetle. Trend toward more open stand structure and suitability for eventual re-introduction of fire and increased forage potential. Maintain important winter range habitat functions.	Reduce stand basal area in all size classes to an average of 80-90 sq.ft/acre. Re-allocate growth to the best WL/DF dominant and codominant crown class. Remove diseased trees, trees in competition with reserved trees, and focus on areas that are overstocked. **Stand Improvement, yard tops**	30-40%	Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
21 only in Alt B	40	11	Modify conditions to reduce uncharacteristic stand densities,improve individual tree health and create a more open structured forest canopy. Maintain important big game habitat features with emphasis on snow intercept functions..	Reduce stand basal area to an average density of 90 sq.ft/acre. Emphasize retention of the healthy, well formed codominant and dominant PP, WL, DF. Retain important snow intercept trees for thermal cover in key areas **Stand Improvement, lop and scatter**	25-30%	Helicopter
22 only in Alt B	47	11	Modify conditions to reduce uncharacteristic stand densities improve individual tree health and create a more open structured forest canopy. Maintain important big game habitat features with emphasis on snow intercept functions..	Reduce stand basal area to an average density of 90 sq.ft/acre. Emphasize retention of healthy, well formed codominant and dominant PP, WL, DF. Retain important snow intercept trees for thermal cover in key area. **Stand Improvement, lop and scatter**	25-30%	Helicopter
23	52	11	Modify conditions to reduce the risk of crown fire, reduce stand density and promote a healthy forest condition with reduced vulnerability to DF bark beetle. Maintain the inherent forest structure while improving the growth potential of the healthy, more fire adapted overstory dominants. Manage and maintain for conditions that promote trend towards a more open structured yet multiaged forest with potential for development of large diameter trees Improve the winter range forage base by promoting a more open stand structure, with greater suitability to a fire maintained ecosystem Maintain important winter range habitat functions. Protect historic trail	Mark to improve the overall stand health by reducing tree density to an average basal area of 90-100 sq.ft per acre, leaving the best PP, WL, DF, ES, WRC. Trees can be left from any crown class, however, selecting from the dominant and codominant level is preferred. Leave functional wildlife snags and replacement snags, with preference to broken topped and old, decadent WL, WRC trees. Be aware of bark beetle activity in the DF and adjust the marking to this condition. **Stand Improvement, lop and scatter**	30-40%	Skyline

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
24	22	11	Modify stands in order to maintain healthy forest conditions while improving growth potential of the healthy, more dominant trees. Minimize change in scenic value and ecological integrity as viewed from roadside and the adjacent Special Interest Area. Maintain conditions that promote trend towards a more open structured yet multiaged forest with potential for continued development of large diameter trees. Manage to maintain the existing unique forest structure, especially the large down WL relic trees. Capture economic value in dead DF and LP trees, killed by bark beetles. Protect integrity of wet areas and RHCAs. Minimize disturbance on sensitive landype.	Reduce tree density to an average basal area of 90-100 sq.ft per acre, leaving the best PP, WL, DF, WP, ES, WRC..Give preference to leaving trees from, the dominant and codominant crown class. Leave all relic overstory WL. Leave functional wildlife snags and replacement. The unit has a variety of stand conditions each with a different species mix, stand structure, and density. Adjust marking to fit the objectives and the varriable conditions encountered **Stand Improvement, yard tops**	30-40%	Tractor
25	25	11	Modify stands in order to maintain healthy forest conditions while improving growth potential of the healthy, more dominant trees. Minimize change in scenic value and ecological integrity as viewed from roadside and the adjacent Special Interest Area. Maintain important hiding cover for wildlife security adjacent to unrecovered plantation. Improve the winter range forage base for big game species Maintain conditions that promote trend towards a more open structured yet multiaged forest with potential for continued development of large diameter trees	Remove excess and poor quality trees of all species, striving to achieve a target basal area averaging 90-100 sq.ft/acre in healthy dominant WL, ES, DF, WRC, WP. Uniform spacing is not necessary. Leave the old overstory WL, WRC relics as snag replacements, structural and genetic diversity, etc. . Existing functional snags and replacement trees should be left. **Stand Improvement, yard tops**	30-40%	Tractor
26	46 47 in Alt C Alt D	11	Maintain important winter range habitat functions and roadside hiding cover while reducing tree density in an urban interface setting. Promote a more open forest condition that is resilient and more suitable to a fire maintained ecosystem while maintaining the trend towards old growth character. Minimize change in scenic value and ecological integrity as viewed from roadside	Remove LP. Remove excess trees to reduce canopy closure trend and number of size classes while maintaining structural integrity of this stand. Thin from below, leaving an average of 90-100 basal area/acre in the best WL, ES, DF, WP. Retain all existing wildlife snags. No equipment within 100 feet of road. **Stand Improvement, selective slashing, yard tops**	25-30%	Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
27	35	12	Initiate regeneration activities in a forest condition that is becoming understocked due to high levels of bark beetle-caused mortality in LP. Reduce downed fuel accumulations and density of ladder fuels to reduce negative effects in the event of an unplanned wildfire. Restore a greater proportion of species best adapted to this site and the inherent fire regime.	Mark to leave an average of 8-10 quality WL, DF, ES dominant and co-dominant trees/acre, selecting out trees with <30% live crowns, poor form, directly competing with potential crop trees, etc. Uniform spacing is not desirable All existing, functional snags (ie: broken tops, cavity nester signs, etc) should be left. Snag replacement trees should be left in proximity to other leave trees, if at all possible. **Seedtree with Reserves, selective slashing, excavator pile, wide plant**	40-50%	Tractor
29	102 in Alt B 88 in Alt C Alt D	11	Modify existing conditions to improve big game winter range through the reduction in canopy cover and re-introduction of fire as an ecosystem process. Improve forest health and sustainability of fire adapted species through the reduction in tree density and re-allocation of growing space. Maintain important winter range habitat functions.	This area will be underburned for wildlife. Mark to select out excess, poor quality and less fire adapted trees growing in direct proximity to dominant and codominant trees. While overstocked conditions are not common, it is desirable to thin out clumps where basal area exceeds 90 sq ft/ac, enabling further development of the best trees, and minimizing the potential for a ground fire to advance into the crowns of overstory trees. It is preferable that leave trees be over 14 " dbh to minimize adverse effects of underburning. If that size is not available and the preferred species is, smaller trees can be left. As this area is dominated by WL, look for opportunities to promote other species that exhibit growth potential, have healthy crowns, etc.In particular, the ES tend to flagging is low to moderate **Stand Improvement, underburn**	25-30%	Helicopter
30	29	11	Modify existing conditions to improve big game winter range through the reduction in canopy cover and re-introduction of fire as an ecosystem process. Improve forest health and sustainability of fire-adapted species through the reduction in tree density and the re-allocation of growing space. Maintain important winter range habitat functions.	See treatment summary for unit 29 **Stand Improvement, underburn**	25-30%	Helicopter

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
31	17 in Alt B 18 in Alt C Alt D	11	Modify stand conditions to reduce fuels and risk of crown fire in an urban interface setting. Recover economic value in mature LP. Maintain important winter range habitat functions. Promote a more open forest condition that is resilient and more suitable to a fire maintained ecosystem. Improve growth potential of shade intolerant, more fire adapted species.	Species designate LP and mark to remove poor quality intermediate size trees and WL with heavy dwarf mistletoe infection. The dominant/ codominant WL are to be left as reserves or snags even in poor health. **Improvement Cut, selective slashing, excavator pile**	30-40%	Winter Tractor
32 Alt B	21	11	Modify stand conditions to reduce fuels and risk of crown fire. Recover economic value in mature LP. Maintain important winter range habitat functions. Promote a more open forest condition that is resilient and more suitable to a fire maintained ecosystem. Improve growth potential of shade intolerant, more fire adapted species	Remove all LP. Thin out stand while retaining the best WL, DF. **Stand Improvement, excavator pile**	30-50%	Winter Tractor
32 Alt C Alt D	21	11	Stand replacement in areas of mature, uniform LP that has and will continue experiencing stagnation, bark beetle-caused mortality and stem decay. Reduce fuels and risk of unplanned stand replacing fire. Restore a greater mix of conifer species adapted to this site and conducive to the inherent fire regime. Promote long and short term improvements for wildlife.	Remove all LP. Leave all WL with minimal dwarf mistletoe infection and any other healthy trees greater than 7", with over 20% live crown.. Broken top trees of suitable as snags or showing sign of cavity nesting that are greater than 12" at DBH should be left **Clearcut with Reserves, selective slashing, excavator pile, plant**	95%	Winter Tractor
33	102 in Alt B 21 in Alt C Alt D	12	Stand replacement in areas of declining tree health and restoration needs that emphasize species at risk, in particular, WL and WP. Open up areas for wildlife forage enhancement. Protect RHCAs Meet Forest Plan standards for opening size and distance to hiding cover	Initate regeneration harvest. Mark to leave a minimum of 10-15 TPA of healthy WL, ES, DF, WRC for leave. In addition, leave all existing functional wildlife snags with preference for WL and WRC. **Seedtree Seedcut with Reserves, excavator pile, wide plant**	90-95% except in leave islands (Alt B)	Tractor
33A only in Alt C Alt D	11	12	Modify forest conditions to reduce uncharacteristic tree density and re-allocate growth potential to the best trees. Improve trend towards a greater proportion of larger diameter trees and a more characteristic forest condition that may develop old growth structure Protect integrity of wet forest types and RHCAs	Remove excess and poor quality trees striving to achieve a target basal area ave 100 sq.ft/acre in healthy, more dominant WL, ES, DF, WRC, WP. Uniform spacing is not an objective, especially in cases where ES is left and windthrow is a concern. Leave functional wildlife snags. Leave the relic overstory WL, WRC as snag replacements, structural and genetic diversity. **Stand Improvement, excavator pile**	30-50%	Helicopter

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
33b only in Alt C Alt D	9	12	Modify forest conditions to reduce uncharacteristic tree density and re-allocate growth potential to the best trees. Improve trend towards a greater proportion of larger diameter trees and a more characteristic forest condition that may develop old growth structure Protect integrity of wet forest types and RHCAs	See unit 33 A **Stand Improvement, excavator pile**	30-50%	Helicopter
34	114 in Alt B 135 in Alt C Alt D	12	Modify forest conditions to reduce uncharacteristic tree density and re-allocate growth potential to the best trees. Improve trend towards a greater proportion of larger diameter trees and a more characteristic forest condition that may develop old growth structure Protect integrity of wet forest types and RHCAs	Considering the objectives outlined, mark to remove excess and poor quality trees striving to achieve a target basal area averaging 100-130 sq.ft/acre in healthy, more dominant WL, ES, DF, WRC, WP. Uniform spacing is not an objective, especially in cases where ES is left and windthrow is a concern. Leave functional wildlife snags. Leave the relic overstory WL, WRC as snag replacements, structural and genetic diversity. **Stand Improvement, spot excavator pile**	30-50%	Helicopter
35	78 in Alt B 123 in Alt C Alt D	12,14	Modify forest conditions to reduce uncharacteristic tree density and re-allocate growth potential to the best trees. Improve trend towards a greater proportion of larger diameter trees and a more characteristic forest condition that may develop old growth structure	Same as unit 34 **Stand Improvement, yard tops**	30-50%	Tractor
36 only in Alt B	59	14	Maintain structural diversity and integrity while enhancing the growth trend towards an old forest condition. Reduce vulnerability to crown fire by reducing density of lower crown class and, in effect, emulating some of the change expected from mixed severity fire, which has been excluded	Same as unit 34 **Stand Improvement, yard tops**	30-50%	Tractor
37 only in Alt B	13	11	Stand replacement and reforestation in area becoming understocked due to LP mortality and high levels of dwarf mistletoe in WL. Protect important watershed values and winter range	Iniitate regeneration harvest. Designate LP, GF, H for removal. In addition, leave a minimum of 10-15 tpa in healthy WL, DF, ES primarily from the dominant and codominant crown classes. Other species and size classes can be left in microsites. **Seedtree Seedcut with Reserves, yard tops, wide plant**	75-80%	Winter Helicopter

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
38	54 in Alt B 28 in Alt C, D	11,15	Modify existing conditions to maintain and/or improve forage conditions through the reduction in canopy cover and creating conditions more suitable to the eventual re-introduction of fire as an ecosystem process. Reduce fuel loadings in areas of dead, dying LP and reduce risk of crown fire throughout. Improve forest health and sustainability of fire-adapted species through the reduction in tree density and the re-allocation of growing space. Maintain important hydrologic resources and function.	With a target of ave 90-100 sq. ft. of basal area, mark to reduce density and number of age classes. Focus on removal of poor quality trees primarily from the lower diameter classes, especially where excess and poor quality trees are growing within the crown dripline of healthy WL, ES, DF, WRC. Preference for leave trees should come from the dominant and codominant crown class, but where not available recruitment can come from healthy WL, ES, DF, WRC from the middle aged, intermediate class (generally 9-12" trees). In most cases the large diameter relic overstory trees should be left unless in a clumpy situation and could benefit from some release. **Stand Improvement, yard tops**	30-35%	Winter Helicopter in Alt B Winter Tractor in Alt C and D
38a only in Alt C Alt D	16	11,15	Modify existing conditions to maintain and/or improve big game winter range through the reduction in canopy cover and future re-introduction of fire as an ecosystem process. Maintain important winter range habitat functions. Improve forest health and sustainability of fire-adapted species through the reduction in tree density and the re-allocation of growing space.	With a target basal area ave 90 sq.ft acre, mark to reduce tree density especially in the poor quality trees of the intermediate crown class. Desired leave species are dominant and codominant WL, DF, WP although healthy intermediates with growth potential can be left for recruitment. Leave trees are not intended to be left in any uniform pattern or spacing. **Stand Improvement, yard tops**	30%	Tractor
40	21	17	Maintain scenic value of this roadside setting while modifying forest conditions to reduce canopy closure. Reduce stem density to re-allocate growth potential to the best trees, thereby improving trend towards a greater proportion of larger diameter trees and a more characteristic forest condition that may develop old growth structure. Retain the existing, downed woody large diameter logs.	Mark to reduce canopy closure, thinning from below, leaving an average of 90-100 basal area/acre in the best WL and ES trees. Retain all existing wildlife snags and old downed WL logs. **Stand Improvement, yard tops**	25-30%	Tractor
41 only in Alt B	50	11	Protect soil resource while capturing economic value of dead, dying and very poor quality LP. Reduce fuels to minimize risk of crown fire and potential undesirable impacts to the WL overstory.	Designate all LP for removal. Remove the suppressed and poor quality trees of other species while maintaining an average basal area of 90 sq.ft/acre. **Stand Improvement, excavator pile**	30-40%	Winter Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
42	82 in Alt B 50 in Alt C Alt D	11	Modify landscape conditions to maintain/ enhance winter range habitat effectiveness for big game. In the drier settings, trend towards more open canopy, suitable to PP maintenance and the eventual re-introduction of fire. In wetter settings, maintain the integrity and species mix of important wet areas, cedar bottoms, RHCAs	Maintain the open structure while reducing number of age classes and density to 90-100 sq.ft basal area. Focus on removal of poor quality trees primarily from the lower diameter classes, especially where growing within the crown dripline of PP, WL, DF leave trees. Large diameter relic overstory trees should be left unless density reduction is beneficial..All healthy WP and PP should be left. **Stand Improvement, selective slashing, yard tops**	30-40%	Winter Tractor
42a only in Alt C Alt D	8	11	Maintain the unique qualities of this forest type and species composition, while trending toward a somewhat more open-grown forest structure. Promoting the maintenance of a greater proportion of large fire-adapted species. Reduce vulnerability to uncharacteristic fires that would increase mortality in large diameter overstory. Improve winter range forage base through canopy reductions and improved stand suitability to eventual use of prescribed fire in some of the area. Protect RHCA	Area 1 (cedar basin) – leave an ave 100-130 sq. ft/acre mark to maintain an uneven aged and two storied stand condition. Focus on removal of poor quality and excess trees in all diameter classes but with emphasis on thinning from below. Give preference towards selecting leave trees from the healthly, more dominant WL, WRC, ES, DF (in order) that are 14" dbh and greater.. Area 2 (remaining areas)- leave an ave 80 sq.ft/acre to create a generally single storied, yet 2 aged forest condition composed of primarily WL, DF, WRC preferably from the dominant/codominant crown class. Leave most ES and WRC along the special treatment zone. Leave all existing wildlife snags and most of the relic overstory. **Stand Improvement, selective slashing, yard tops**		Winter Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
42b only in Alt C Alt D	2	11	In the long term, there is a need to improve the winter range forage base for big game species such as deer, elk, and moose. Reductions in canopy closure and trending of conditions towards what may be more suitable for eventual prescribed burning is desirable. Maintain important winter range functions for dependant wildlife while creating a more open structured forest condition.	With a target basal area of 80-90 sq. ft. create a more open structured condition reducing number of age classes, density and distribution of trees, especially the lower diameter classes growing within the crown dripline of healthy PP, WL, DF. Leave trees do not have to be uniformly spaced as quality and distribution over the stand is more important. Preference for leave trees should come from the dominant and codominant crown class, but where not available recruitment can come from healthy PP, WL, DF from the middle aged, intermediate class (generally 9-12" trees) **Stand Improvement, selective slashing, excavator pile**		Tractor
44 Alt B	18	11	Capture economic value and initiate stand replacement in areas of mature, uniform LP that has and will continue experiencing stagnation, bark beetle-caused mortality and stem decay. Create more sustainable conditions for the mixed species component, especially the large, yet scattered WL relic overstory. Reduce fuels and risk of unplanned stand replacing fire. Restore a greater mix of conifer species adapted to this site and conducive to the inherent fire regime. Promote long and short term improvements for wildlife.	Initiate regeneration harvest. Mark to leave 10-15 healthy WL, DF, ES per acre. Choose from amongst the dominant and codominant crown class. Leave all functional snags. **Seedtree Seedcut with Reservies, spot excavator pile, wide plant**	90%	Winter Tractor
44 Alt C Alt D	17	11	Modify forest conditions to promote a more open stand structure that creates less vulnerability to stand replacing fire and loss of the important scattered species mix, especially the relic overstory. Capture economic value in a stand with mature, dead and high risk LP. Improve growth potential of healthy trees in the more intermediate and codominant crown class while reducing uncharacteristic densities Maintain important winter range habitat functions.	Mark to remove all LP and thin remaining trees in the lower crown classes to an average reserve stand basal area of 80-100 sq. ft/ac. Some areas will meet the DFC with LP removal only. Other areas are overstocked with suppressed and intermediate sized trees. Leave tree preference is PP,WL,DF,ES and are intended to function as a seed source, genetic diversity, and evidence of historic fires. Retain the relic WL overstory. **Stand Improvement, slash damaged saplings, spot excavator pile**	30-40%	Winter Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
45	66	11	Modify conditions in a very diverse, ecologically important setting to reduce fuel loadings, uncharacteristic tree density, and risk of crown fire Improve growth potential and sustainability of all species promoting a more open structured condition that is more characteristic of the area and better suited to the eventuality of an unplanned wildfire. Promote improvements for wildlife. Protect wet areas, RHCAs, etc. Maintain important winter range habitat functions	With a target density ave 70-80 sq.ft.of basal area/ac mark to improve stand composition and structure, focusing on reducing density in lower diameter classes, especially opening up around healthy dominant and co-dominant PP,WL,DF. Areas marked alongside the RHCA will give consideration to leaving most ES and WRC, while striving to achieve the treatment objectives It is expected that leave trees will be left irregularly spaced and occasionally clumped in order to retain the best trees. Expect treatment of LP concentrations and/or dense DF thickets will result in very small openings, below the target BA. Leave all existing wildlife snags, preferably in clumps or close to other leave trees. **Stand Improvement, selective slashing, excavator pile**	30-40%	Winter Tractor
46	31 in Alt B 23 in Alt C Alt D	11	Modify conditions in proximity to an urban interface setting to reduce density of even-aged trees, fuels, and risk of crown fire. Improve growth potential of the more fire adapted trees, promote a more open stand structure that maintains options for future ecosystem maintenance burning Maintain important winter range habitat functions.	Reduce stand density to an average basal area of 60 sq.ft/acre in LP concentrations and up to 80 where other species are available to leave. Mark to improve stand composition and structure, reducing density in lower diameter classes, with emphasis on opening up around the best WL and PP while removing many of the LP. **Stand Improvement, selective slashing, excavator pile**	30-40%	Winter Tractor
47	20 in Alt B 21 in Alt C Alt D	11	Modify conditions to reduce fuel loadings and risk of crown fire where mature, high risk and dead LP occurs and stand density is uncharacteristic. Create a more defensible space adjacent to Yaak schoolhouse. Recover economic value. Improve growth potential of the best trees and promote a more open condition that is sustainable until stand replacement is appropriate Promote long and short term improvements for wildlife.	Mark to reduce stand density and increase longevity of remaining healthy LP. Remove the dead, excess and poor quality LP leaving an average basal area of 60-80 sq.ft/acre. Leave trees should be relatively free to grow with crowns spaced apart and have the most potential to respond to this treatment. Additional details are provided in the marking guides. **Commercial Thin, selective slashing, excavator pile**	25-30%	Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
48	56 in Alt B 19 in Alt C Alt D	11	Modify conditions in an urban interface setting to reduce stand density and risk of crown fire while improving growth potential of the best trees and promoting a more open structured condition conducive to the future use of ecosystem maintenance burning. Maintain important winter range habitat functions.	Where stand density exceeds 80 basal area in LP dominated areas and up to 100 in mixed species stands, mark to reduce the number of smaller intermediate, suppressed, or even poor formed codominants trees. Emphasixe retention of the healthy trees with ave diameter over 12". Additional details are provided in the marking guides **Commercial Thin, yard tops**	25-30%	Tractor
49A only in Alt C Alt D	9	11	Modify conditions in an urban interface setting to reduce fuel loadings and risk of crown fire where dead LP has accumulated and stand density is uncharacteristic Improve growth potential of the shade intolerant, more fire adapted trees and promote a more open structured condition conducive to eventual use of prescribed fire. Promote improvements for wildlife, including adequate crown cover for snow intercept	Reduce stand density to an average basal area of 60-80 sq.ft/acre, depending on proximity to the adjacent private lands .Emphasis includes removing undesirable trees beneath the drip line of WL, PP, DF overstory. **Stand Improvement, selective slashing, excavator pile**	30-40%	Tractor
49	30 in Alt B 17 in Alt C Alt D	11	Modify conditions in an urban interface setting to reduce fuel loadings and risk of crown fire where dead LP has accumulated and stand density is uncharacteristic Improve growth potential of the shade intolerant, more fire adapted trees and promote a more open structured condition conducive to eventual use of prescribed fire Promote improvements for wildlife, including adequate crown cover for snow intercept. Protect integrity of wet areas and RHCAs	With the exception of special zone along private lands, reduce stand density to an average basal area of 100 sq.ft/acre, with the emphasis on taking out the poor quality, intermediate size trees. Where species are mixed, emphasis removal of LP. Where LP is concentrated, leave the best trees where crowns are >30% Exception: within 100 feet of private, reduce BA to ave 60 sq.ft/acre where LP dominates, 80 otherwise. **Stand Improvement, selective slashing, spot excavator pile along private**	30-40%	Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
50	13 in Alt B Alt C 23 in Alt D	11	Modify conditions to reduce fuel loadings, density of ladder fuels and risk of crown fire Improve growth potential of the shade intolerant, more fire adapted trees promoting a more open structured condition conducive to eventual use of prescribed fire Maintain important winter range habitat functions	Area 1- (above and adjacent to past partial harvest unit). Where concentrated remove all LP. In mixed species areas with some poor quality trees, maintain a basal area of 90 square feet. Poor quality, intermediate DF within crown dripiine of PP or WL leave trees should be selected out. Area 2- (site of previous burn). reduce BA to 100 taking any LPP first then sick, lame or dying intermediate, DF, WL or PP reducing intermediate trees that are within the dripline of other larger or better formed trees. **Stand Improvement, selective slashing, excavator pile**	25-30%	Tractor
50A only in Alt D	15		Modify stand to reduce density of trees and ladder fuels while managing for winter range conditions. Create conditions more suitable for future ecosystem maintenance burning	Designate LP for removal. In characteristically dense areas, select out poor quality and excess trees primarily from the lower diameter classes. Retain a minimum stand density of 80 basal area with emphasis on retaining the healthy, fire adapted WL, PP, DF dominants and trees from lower diameter class with recruitment potential. **Stand Improvement, selective slashing, excavator pile**	20-30%	Tractor
50B only in Alt D	5		Modify stand to reduce density of trees and ladder fuels while managing for winter range conditions. Create conditions more suitable for future ecosystem maintenance burning	Same as unit 50 B **Stand Improvement, selective slashing, excavator pile**	20-30%	Tractor
50 C only in Alt D	16		Modify stand to reduce density of trees and ladder fuels while managing for winter range conditions. Create conditions more suitable for future ecosystem maintenance burning	Same as unit 50 B **Stand Improvement, selective slashing, excavator pile**	20-30%	Tractor
51	14	11	Modify conditions in an urban interface setting to reduce fuel loadings and risk of crown fire Improve growth potential of the shade intolerant, more fire adapted trees promoting a more open structured condition Maintain important winter range habitat functions	Reduce stand density within a 100 foot zone of private lands to an average of 60 sq.ft/ac in LP areas and 80 otherwise. Leave the best WL, DF, ES. Slash non merchantable trees also. Reduce stand density in the remaining areas to an average of 80 sq.ft/ac in LP areas and 100 otherwise. Leave the best WL, DF, ES. Slash damaged or suppressed trees less than 6" in diameter also. **Stand Improvement, selective slashing, excavator pile**	30-40%	Tractor

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
52	122 in Alt B 117 in Alt C Alt D	11	Modify conditions in an urban interface setting to reduce fuel loadings and risk of crown fire Improve growth potential of the shade intolerant, more fire adapted trees promoting a more open structured condition Promote improvements for wildlife. Protect wet areas, RHCAs, etc. Maintain important winter range habitat functions	Mark to improve stand composition and structure, focusing on reducing density in lower diameter classes, with emphasis on opening up around healthy PP and WL. Retain an average of 80 sq.ft. of basal area/ac in the best trees from all crown classes, but with an emphasis on retention of the large diameter dominant and co-dominant PP, WL, DF and intermediate ES. **Stand Improvement, excavator pile**	30-40%	Helicopter
52a only in Alt C Alt D	6	11	Stand replacement of a mature, uniform and stagnated LP forest followed by restoration with WL, WP regeneration. Retain old forest structure where available. Recover economic value.	Initiate regeneration harvest through removal of all LP and the excess or poor quality intermediate size trees in areas where species is mixed. Retain all WL overstory relics, healthy codominant WL/DF, PP and existing functional snags and provide for snag replacement. **Clearcut with Reserves, excavator pile, plant and tube**	95%	Helicopter
53	67 in Alt B 68 in Alt C Alt D	11	Modify conditions to reduce areas of high fuel loadings and dense ladder fuels that increase risk of crown fire Improve growth potential of the shade intolerant, more fire adapted trees promoting a more open structured condition conducive to eventual use of . Maintain areas of functional hiding cover for wildlife use and protection along roadside	Designate all LP for removal. Mark to improve stand composition and structure, focusing on reducing density in lower diameter classes, with emphasis on opening up around PP. Retain an average of 80 sq.ft. of basal area/ac in healthy trees from all crown classes, but with an emphasis on retention of the large diameter dominant and co-dominant PP, WL, DF. **Stand Improvement, selective slashing, excavator pile**	20-30%	Tractor
54 only in Alt B Alt C	83*	11	Stand replacement to enable restoration of WP and WL, considered at risk due to absence of historic disturbance processes and loss of effective seed source. Recover economic value in dead, dying and poor quality trees. Maintain integrity of wet areas, RHCAs. Maintain important winter range habitat functions. Meet Forest Plan standards for opening size and distance to hiding cover	**I**nitiate regeneration harvest through removal of all LP, H, and other species meeting criteria in marking guide. Retain an average of 8-10 TPA in healthy WL, DF, WP, WRC. It is our intent to leave the relic WL overstory. Leave existing, functional snags, snag replacement and down logs at levels specified in silvicultural Rx **Seedtree with Reserves, slash damaged saplings, excavator pile, plant**	75-80%	Helicopter

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
55	111 in Alt B 120 in Alt C Alt D	11	Modify forest conditions to reduce stand density, promote growth and sustainable conditions for the best, fire adapted trees. Also, reduce density and distribution of ladder fuels while retaining hiding cover. Maintain conditions that reflect the importance of the area as a transitional habitat adjacent to old growth. Maintain integrity of wet areas, RHCAs. Maintain important winter range habitat functions.	This area has considerable variation and very specific treatment details will be described in the marking guide. In general, basal area will be reduced to an average of 90 sq.ft/acre. The reserved trees will be mostly WL, DF, PP with some WP. Some areas of healthy, dense saplings will be thinned to maintain hiding cover and provide stand recruitment. **Stand Improvement, selective slashing, yard tops**	30-40%	Helicopter
56	54 in Alt B 38 in Alt C Alt D	11	Modify forest conditions to reduce fuel loadings and risk of crown fire in an area with high susceptibility to continued bark beetle mortality and windthrow. Create and maintain conditions more suitable to use of ecosystem maintenance burning and enhancement of wildlife habitat.	All LP is designated for removal. Also, mark to remove minor amounts of poor quality trees of other species where patch density exceeds 80 sq.ft/acre. Retention of the healthy WL, WP and PP is emphasized **Stand Improvement, selective slashing excavator pile**	20-30%	Helicopter
56a only in Alt C Alt D	24	11	Reduce risk of unplanned wildfire and undesirable effects through stand replacement of a mature and stagnated LP forest that has considerable mortality due to bark beetles. Initiate restoration of WL, WP regeneration. Maintain important winter range habitat functions. Retain old forest structure where available.	All LP is designated for removal. Also, mark to leave all WL with moderate mistletoe levels, and trees other than LP greater than 7 inches at dbh with at least a 20% live crown. **Clearcut with Reserves, selective slashing, excavator pile, plant**	90%	Helicopter
57	49	11	Modify existing conditions to improve big game winter range through the reduction in canopy cover and re-introduction of fire as an ecosystem process. Improve forest health and reduce DF bark beetle susceptibility through the reduction in tree density. Improve conditions for the maintenance of PP and continued growth of the leave trees. Maintain important winter range habitat functions	All LP is designated for removal. Also, thin from lower diameter classes and reduce intermediate size tree density in areas with basal area over 80. **Stand Improvement, selective slashing, underburn**	20-30%	Helicopter
58 only in Alt B	17	11	Modify existing conditions to improve individual tree health and reduce threat of crown fire through fuel reductions and thinning. Improve conditions for the maintenance of PP at risk due to absence of inherent processes. Maintain important winter range habitat functions	Designate LP for removal. In addition, remove the unhealthy, poor quality trees where densities exceed 90 basal area and/or where thinning from below is beneficial to the sustainability of the dominant, codominant WL, DF, PP. **Stand Improvement, selective slashing yard tops**	20-30%	Helicopter

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY	% CROWN REMOVAL	LOGGING METHOD
59	27 in Alt B 28 in Alt C Alt D	11	Initiate regeneration activities in a stand that is becoming understocked due to bark beetle caused LP mortality and is located next to private land. Reduce down fuel accumulations and composition of ladder fuels to avoid undesirable effects from unplanned wildfire. Maintain overstory structure and quality hiding cover.	Designate all LP for removal and mark to remove poor quality trees of other species, primarily that are within the dripline of overstory PP, WL, DF. It is estimated that approx 10-15 healthy, well formed trees will left from the dominant, codominant crown class as well as quality sapling and pole size trees within openings created by fallen LP. **Seedtree with Reserves, selective slashing, excavator pile, wide plant**	40-50%	Tractor
60 only in Alt D	24	11	Improve growth potential of shade intlerant, more fire adapted trees. Modify stand conditions to reduce fuel loadings and risk of crown fire Culture stand to allow for later treatments with prescribed fire. Promote long and short term improvements for wildlife.	This area has at least 3 distinct stand conditions and treatment will vary. The marking guides provides more detail, but in summary: designate all LP for removal. In areas of mature PP and areas of mixed species where stand density is high and composition is of mosty intermediate and codominant trees beneath dripline of overstory, reduce to 100 basal area . **Stand Improvement, selective slashing, excavator pile**	30-35%	Tractor

Table Abbreviations: (DF) Douglas-fir, (WL) western larch, (PP) ponderosa pine, (LP) lodgepole pine, (WRC) western redcedar, (WH) western hemlock, (WP) white pine, (GF) grand fir

Note: Units 14, 33 and 54 display treatment acres that exceed 40 acres under Alternative B. These regeneration harvest unit are designed to meet Forest Plan standards by using leave islands that provide security for wildlife and, in effect, provide areas with a distance to cover not exceeding 600 feet. Openings are not expected to exceed 40 acres in size.

PICTORIAL VIEWS OF VEGETATION TREATMENTS

The following views portray actual examples of silvicultural treatments in similar conditions as proposed with this project. The pictures are of conditions expected to result immediately after harvest and those within the next few decades.

CLEARCUT WITH RESERVES

Date 2002 - This stand is uneven-aged, storied, and composed of mostly shade tolerant species with scattered mature relic overstory. There is tree mortality from insects and disease that is occurring in individual western larch and white pine trees and in patches of grand fir. No regeneration of western larch is occurring. Some blowdown has occurred. Few healthy overstory trees are available as a seed source. Understory vegetation is relatively sparse. Snags are fairly abundant.

Date 2005 - The regeneration harvest results in the removal of the majority of the trees in the stand. Approximately 5-7 reserve trees per acre and snags are retained for wildlife, long-term productivity, and species diversity. Some trees will produce cones that may provide a supplemental seed source for the developing young stand. The unit was spot excavator piled and will be planted with white pine, larch, and Engelmann spruce seedlings.

Date 2020 - Fifteen years after stand replacement and reforestation, the young stand has developed into sapling-sized trees. Non-commercial thinning is planned to reduce density, select the best trees, and maintain a healthy stand condition.

Future Plans - Approximately sixty years after stand replacement and reforestation, the stand canopy will close. Individual tree growth is beginning to decline and a commercial thinning may occur within the next decade. This harvest is done to improve the growth of the preferred species by removing a portion of the trees that are overstocked.

SEED TREE and SHELTERWOOD WITH RESERVES

Date 2002 – This is a mature two-aged stand composed of lodgepole pine and Douglas-fir with a scattered western larch and Douglas-fir overstory. The stand is becoming understocked due to high amounts of beetle-caused lodgepole pine and Douglas-fir mortality. Risk of crown fire is high due to downed material. Understory shrubs are relatively sparse except in small openings created by tree mortality. Snags are fairly abundant in the larch overstory.

Two treatments are proposed for this landscape. A shelterwood prescription will take place on the more exposed sites where site protection of the overstory is needed and quality seedtrees are available. The remaining areas have limited number of seedtrees and shade is not required to protect young trees that regenerate.

Date 2005 - The regeneration harvest results in the removal of all but an average of 8-10 overstory trees per acre in the seedtree cut and 15-25 in the shelterwood cut. These reserve trees are retained as a primary seed source, snag replacement, structural diversity, and site protection. Functional snags are retained as well for cavity dependant wildlife, small mammals, and long-term site productivity. The unit was spot excavator piled and portions will be interplanted with blister rust resistant white pine and Douglas-fir seedlings.

Date 2020 - Fifteen years after harvest, site preparation and reforestation, the stand is two storied with the development of sapling-sized trees. Non-commercial thinning is planned to reduce density of saplings, select the best trees, and maintain a healthy stand condition. In the shelterwood portion, consideration will be given for partial harvest to reduce overstory competition on the developing stand.

Future Plans - Approximately sixty years after harvest the stand canopy is expected to close. Individual tree growth is beginning to decline and a commercial thinning may occur within the next decade. This harvest is done to improve the growth of the preferred species by removing a portion of the trees that are overstocked.

STAND IMPROVEMENT CUTTING

Date 2002 - This is a densely stocked Douglas-fir stand with ponderosa pine, average age is 70-80 years old. There are scattered old western larch, Douglas-fir and ponderosa pine overstory. The canopy is mostly closed. There are few small openings occupied by either brush or where a Douglas-fir has recently died from bark beetle attack. Snags and coarse woody debris are at a low to moderate level. Fuels loadings are increasing, risk of crown fire is high and continued bark beetle impacts are expected.

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Date 2005 - Thinning has reduced the uncharacteristic density of the trees by removing poorly growing and defective trees, most of which are found immediately below the upper canopy layer. The canopy is more open and is providing more growing space for the remaining trees. This is extremely beneficial to reduce susceptibility of Douglas-fir to bark beetles and provides growing space for the overcrowded ponderosa pine. Scattered remnant old mature trees and snags are intentionally left for structural and species diversity. Maintenance burning is planned to stimulate browse and minimize ingrowth of small trees.

Date 2033 - The canopy has begun to close again. Individual tree growth has begun to slow down somewhat. Maintenance burning has occurred and is successful at promoting browse and minimizing ingrowth of small trees. Based on stand age, species composition and density of trees the stand may again be at risk to Douglas-fir bark beetle.

Future Plans - A second harvest treatment is logical and would likely benefit this stand, depending on the resource objectives at the time.

Garver
Natural Fuels Reduction Treatment Summary

UNIT	ACRE	MA*	TREATMENT OBJECTIVES	TREATMENT DESCRIPTION AND SUMMARY
A	234	2	Restore ecological processes, stimulate browse, reintroduce fire into ecosystem, work with what was done in 1980s to maintain openings	Aerial ignition underburn
B	74	11	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length	Hand slashing combined with spring underburn in area W of Yaak Hwy. Mechanical treatment with excavator piling and burning of piles E of Yaak Hwy
C	10	11	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length	Mechanical treatment with excavator piling and burning of piles in flat area along private boundary.
D	12	11	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length. Improve health of current stand by reducing canopy competition/density	Hand slashing and handpile of understory trees below six inches DBH. Fall burn handpiles.
E	38		Drop due to RHCA's and possible MA change to old growth	N/A
F	29	17	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length. Improve health of current stand by reducing canopy competition/density	Mechanical treatment with excavator piling and burning
G	28 9 (C,D)	17	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length. Improve health of current stand by reducing canopy competition/density	Mechanical treatment with excavator piling and burning
H	49	11	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length. Improve health of current stand by reducing canopy competition/density	Mechanical treatment with excavator piling and burning in areas with existing fuels. Open areas do not require piling.
I	35	13	Maintain OG characteristics, stimulate browse, short term nutrient flush for natural seeding to occur	Minimal amount of hand slashing of DF followed by spring underburn
J	25	11	Improve health of current plantation, reduce risk of crown fire destroying the plantation, stimulate browse (serviceberry, huckleberry)	Hand slashing of <4" dbh trees favoring PP to leave. Prune leave trees to 4' for first live limb. Spring UB
K	114 124 (D)	13	Maintain OG characteristics, stimulate browse, short term nutrient flush for natural seeding to occur	Minimal amount of hand slashing of DF followed by spring underburn
L	76 0 (D)	13	Maintain OG characteristics, stimulate browse, short term nutrient flush for natural seeding to occur	Minimal amount of hand slashing of DF followed by spring underburn
M	34	11	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length. Improve health of current stand by reducing canopy competition/density	Mechanical treatment with excavator piling and burning
N	48 58(D)	11	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length. Improve health of current stand by reducing canopy competition/density	Mechanical treatment with excavator piling and burning
O	78 69 (D)	13	Maintain OG characteristics, stimulate browse, short term nutrient flush for natural seeding to occur	Minimal amount of hand slashing of DF followed by spring underburn
P	28	11	Reduce fuel loading and ladder fuels so that unit will not maintain 4' flame length. Improve health of current stand by reducing canopy competition/density	Mechanical treatment with excavator piling and burning

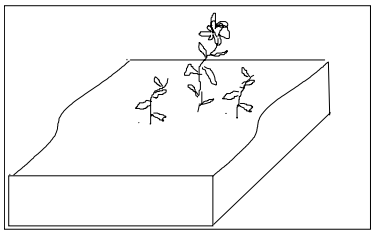
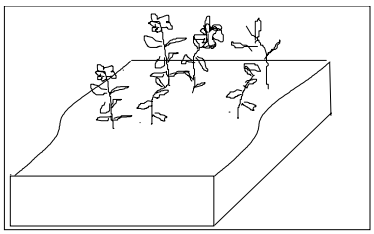
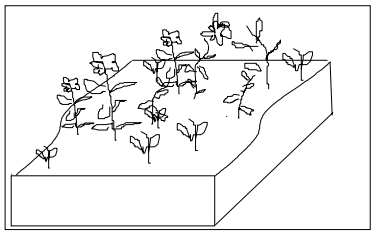
Noxious Weed Mitigation
1/2000
by
Leslie Ferguson, Three Rivers Ranger District Botanist

This document prescribes mitigative measures to attempt to stop the spread of noxious weed species during the normal project work that occurs on the District. These recommendations include and expand on those measures prescribed by the memorandum of understanding (MOU) with Lincoln County. This MOU prescribes certain actions to prevent weed spread, allowing the Kootenai National Forest to comply with the Lincoln County Weed Control Act (MCA 7-22-2116). The Act states that "it is unlawful for any person to permit any noxious weed to propagate or go to seed on his land" unless entered into an agreement with the county for management of those weeds.

Noxious Weed Gravel Pit Decision Table

(Based on a decision table by Joe Barcomb.)

Material Source Stage of Infestation	Road Segment and Surrounding Area Stage of Infestation (assumes infestation of roads and pit are the same weed species or group of species)			
	Heavy	Moderate	Light	None
Heavy	Use source, no prevention required.	Use source, no prevention required.	Preventive measures required. See below.	Do not use the pit. Obtain weed free gravel.
Moderate	Use source. Implement preventive measures listed below.	Use source. Implement preventive measures listed below.	Preventive measures required. See below.	Do not use the pit. Obtain weed free gravel.
Light	Use source. Implement weed control measures to protect investment in the pit.	Use source. Implement weed control measures to protect investment in the pit.	Use source. Implement weed control measures in the pit and on the road.	Do not use the pit. Obtain weed free gravel.
None	Use source. Ensure that seeds are not transported from road to pit.	Use source. Ensure that seeds are not transported from road to pit.	Use source. Ensure that seeds are not transported from road to pit.	Use pit.

Gravel Pit Preventive Measures:

- Hand pull or spray all weeds on stock piled gravel twice a year before plants go to seed. If plants are already flowering, bag plants and destroy, since they may still produce viable seed.
- Seed and fertilize for desirable species surrounding stockpile to prevent weeds from recolonizing the site.
- Within pits, provide vehicle pathways, including turn arounds, that are clean of all noxious weeds to prevent vehicular spread of weed seeds.
- Do not introduce weeds from infested roads to clean pits by keeping dump trucks out of weed patches on the road as much as possible. This may involve control of weeds on the road using hand pulling or spraying.
- Monitor and treat weeds when they first arrive.
- Steam clean all crushers, trucks or other equipment to prevent introduction of weeds.
- Gate entrance to the pit to prevent weed introduction by recreationists or administrative use.
- Place a high priority on maintaining weed free status where possible, since prevention is cheaper than eradication.

Specific Situations (Gravel Pits and Borrow Sources):

New invader species in pit/borrow? -> Don't use pit. Treat new invaders immediately. Monitor for reappearance of new invaders. Pit may be safe to use after 5 years without reappearance of new invader, depending on species and circumstances. (This does not mean after 5 years of weed treatment. It means 5 years without a single plant of the new invader species.) District weed specialist should be consulted.

Weed species different in pit/borrow than on road to be repaired? -> Don't use pit. Locate source with no weeds, or the same weed species as the road.

For road reconstruction/repair projects, it is possible to consider using a pit or borrow source with different weed species than are present on the road. However, the following mitigation measures, which do not apply to stockpiled gravel, will be followed:

1. Strip the floors of gravel pits down 6 to 8 inches so contaminated material on the pit floor is removed prior to any gravel removal. The face of the borrow areas will be stripped of material contaminated with noxious weeds. Material to a depth of 1 foot will be removed from above the borrow area prior to any gravel removal so contaminated soil cannot fall onto the face of the borrow area.

2. All of the material stripped before gravel removal will be stockpiled for spreading back over the area after each gravel removal project. This will minimize the amount of contaminated material in each pit since the top material would then be the only material contaminated.

3. The stockpiled material and the open gravel would be kept clean of growing noxious weeds if feasible (use measures described above).

4. Monitor the area where this material is used to ensure that no weed seeds are transported to the new site. Hand pulling or spraying of any transported weeds should be implemented immediately if necessary.

Pit has moderate or light infestation of noxious weeds, other than new invaders. -> Hand pull or spray all weeds on stock piled gravel twice a year before plants go to seed. If plants are already flowering, bag plants and destroy, since they may still produce viable seed. Do not use the pit on uninfested roads or on roads that don't have the same weeds as the pit, except as described above. Do not use the pit for new road construction. Within the pit, clean vehicle pathways, including turn arounds, of all noxious weeds to prevent vehicular spread of weed seeds. Try to provide clean turn arounds on the road also. Seed and fertilize for desirable species surrounding stockpile to prevent weeds from recolonizing the site. The pit may be considered weed free after 5 years with no reappearance of weeds.

Pit has heavy noxious weed infestation. -> Either treat weeds through hand pulling or spraying, or abandon pit. Do not use the pit on uninfested roads or roads that don't have the same weeds as the pit, unless as described above.

Roads and pits with no noxious weeds -> Monitor and treat weeds when they first arrive. Steam clean all crushers, trucks or other equipment to prevent introduction of weeds. Gate entrance to the pit to prevent weed introduction by recreationists or administrative use. Do not introduce weeds from infested roads to the pit by keeping dump trucks out of weed patches on the road as much as possible. Control of weeds on the road may be necessary through hand pulling or spraying. Seed desirable species and fertilize on exposed ground, both in pits and on roads. Place a high priority on maintaining weed free status, since prevention is easier than eradication. Consult District weed specialist.

Roads with light noxious weed infestations -> If funding allows, treat weeds to prevent further spread.

Silvicultural Practices Preventive Measures:

- Brush piling, scarification, and other silvicultural practices which cause soil disturbances would be planned and carried out to minimize the establishment and spread of noxious weeds whenever possible. This would include the selection of skid trails and decking and landing sites that are not infested with noxious weeds.
- Logging, brush piling and scarification equipment to be used off of roads would be thoroughly cleaned before being moved to National Forest lands that are relatively uninfested with noxious weeds.
- Seed skid trails and fire lines with certified noxious weed seed free grass or other desirable species.

Road Construction Preventive Measures:

- Seed newly constructed and reconstructed temporary road cuts, fills, and other surfaces with certified noxious weed seed free grass or other desirable species.
- All road construction equipment shall be cleaned of all mud and plant parts before being moved to National Forest System lands.
- When road construction or reconstruction occurs in an area containing new invader weed species or other weed species not widely distributed across the Forest, construction and reconstruction equipment shall be washed before leaving the area in order to prevent the spread of these weeds. In addition, if possible, these weeds should be sprayed or hand pulled to prevent setting seed prior to starting road construction/reconstruction.

Burning Preventive Measures:

- Use Minimum Impact Supression Tactics (MIST) to the degree possible in burning, suppression (if necessary) and mop up phases.

- Equipment used to construct fireline or excavator piles should be washed to remove all dirt and plant parts prior to entering National Forest System lands. This equipment should be inspected by the contract administrator. Appropriate clauses should be included in the contract.

- Consider inventorying, mapping, and spraying weed infestations in the vicinity of proposed burn projects. Use the inventory results to plan effective weed suppression efforts such as spraying to avoid increasing weed infestations. Spraying weed infestations occurring in or adjacent to burn units prior to implementation or the following season can effectivly keep burns from increasing weed populations.

FOREST SERVICE MANUAL
Missoula, Montana

SERIES 2000 - NATIONAL FOREST RESOURCE MANAGEMENT

Region 1 Supplement No. 2000-2000-1

Effective

POSTING NOTICE: Supplements to this Title are numbered consecutively by manual number and calendar year. Post by document name. Remove entire document and replace with this document. Retain this transmittal as the first page of this document. This is the first Region 1 supplement to this manual.

Document Name	Superseded (Number of Pages)	New (Number of Pages)
2080	--	1

Digest:

2080 - This supplement implements an Integrated Weed Management approach for management of noxious weeds on National Forest System lands in Region One.

DALE N. BOSWORTH
Regional Forester

SERIES 2000 - NATIONAL FOREST RESOURCE MANAGEMENT
REGION 1 SUPPLEMENT NO. 2000-2000-1
EFFECTIVE

ZERO CODE 2080 NOXIOUS WEED MANAGEMENT

2080.4 - Responsibility.

Encourage weed awareness and education in employee development and training plans and orientation for both field and administrative work.

2080.43 - Forest Supervisor. Forest Supervisors are responsible for:

1. Emphasizing weed awareness and weed prevention in all fire training, especially resource advisors, fire management teams, guard school, and district orientation.
2. Adding weed awareness and prevention education to Fire Effects and Prescribed Fire training.
3. Giving helicopter managers training in weed prevention and mitigation measures.
4. Resource Advisors should provide briefings to identify operational practices to reduce weed spread.
5. Providing Field Observers with weed identification aids and try to avoid weed infestations in fire line location.

2080.44 - District Rangers. District Rangers are responsible for:

1. Providing weed prevention briefings for helibase staff.
2. Ensuring at least one permanent staff member per District is trained and proficient in weed management.
3. Applying weed treatment and prevention on all Forest Service administrative sites including Ranger Stations, trailheads, campgrounds, pastures, interpretive and historic sites.

2081 MANAGEMENT OF NOXIOUS WEEDS.

2081.2 - Prevention and Control Measures.

1. Roads.
   a. Required Objectives and Associated Practices.
   (1) Incorporate weed prevention into road layout, design, and alternative evaluation. Environmental analysis for road construction and reconstruction will include weed risk assessment.
   (2) Remove the seed source that could be picked up by passing vehicles and limit seed transport.
   (a) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.
   (b) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders as determined by the Forest Weed Specialist. Reference Contract Provision C/CT 6.626.
   (3) Re-establish vegetation on bare ground due to construction and reconstruction activity to minimize weed spread.
   (a) Revegetate all disturbed soil, except the travel way on surfaced roads, in a manner that optimizes plant establishment for that specific site, unless ongoing disturbance at the site will prevent weed establishment. Use native material where appropriate and available. Use a seed mix that includes fast, early season species to provide quick, dense revegetation. To avoid weed contaminated seed, each lot must be tested by a certified seed laboratory against the all State noxious weed lists and documentation of the seed inspection test provided.
   (b) Use local seeding guidelines for detailed procedures and appropriate mixes. Use native material where appropriate and available. Revegetation may include planting, seeding, fertilization, and weed-free mulching as indicated by local prescriptions.
   (c) Monitor and evaluate success of revegetation in relation to project plan. Repeat as indicated by local prescriptions.
   (4) Minimize the movement of existing and new weed species caused by moving infested gravel and fill material. The borrow pit will not be used if new invaders, defined by the Forest Weed Specialist, are found on site.
   (5) Minimize sources of weed seed in areas not yet revegetated. If straw is used for road stabilization and erosion control, it must be certified weed-free or weed-seed free.
   (6) Minimize roadside sources of weed seed that could be transported to other areas.
   (a) Look for priority weed species during road maintenance and report back to District Weed Specialist.
   (b) Do not blade roads or pull ditches where new invaders are found.
   (c) Maintain desirable roadside vegetation. If desirable vegetation is removed during blading or other ground disturbing activities, area must be revegetated according to section (3) (a), (b), (c) above.
   (d) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
   (e) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders, as determined by the Forest Weed Specialist. Reference Contract Provision C/CT 6.626.
   (f) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.
   (7) Reduce weed establishment in road obliteration/reclamation projects. Revegetate according to section (3) (a), (b), (c) above.
   b. Recommended Objectives and Associated Practices.
   (1) Retain shade to suppress weeds. Consider minimizing the removal of trees and other roadside vegetation during construction, reconstruction, and maintenance, particularly on southerly aspects.
   (2) Consider re-establishing vegetation on bare ground due to construction and reconstruction activity to minimize weed spread. Road maintenance programs should include scheduled fertilization to maintain vigor of competitive vegetation (3-year period suggested).

(3) Minimize the movement of existing and new weed species caused by moving infested gravel and fill material. All gravel and borrow sources should be inspected and approved before use and transport. The source will not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they must be treated before transport and use.
(4) Minimize roadside sources of weed seed that could be transported to other areas. Weed infestations should be inventoried and scheduled for treatment.
(5) Ensure that weed prevention and related resource protection are considered in travel management. Consider weed risk and spread factors in travel plan (road closure) decisions.
(6) Reduce weed establishment in road obliteration/reclamation projects. Consider treating weeds in road obliteration and reclamation projects before roads are made undriveable. Monitor and retreat as indicated by local analysis and prescription.
(7) Evaluate and prioritize noxious weeds along existing Forest Service access roads leading to project area and treat as indicated by local analysis and prescriptions, before construction equipment moves into project area. New road construction must be revegetated as described in Weed Prevention measure see section (3) (a), (b), (c) above.

2. Recreation, Wilderness, Roadless Areas.
a. Required Objectives and Associated Practices.
(1) Minimize transport and establishment of weeds on National Forest Service lands.
(a) Include environmental analysis for recreation and trail projects in weed risk assessment.
(b) Post and enforce statewide weed-free feed orders.
(c) Seed only when necessary at backcountry sites to minimize introduction of nonnative species and weeds. Reseed according to Roads (3) (a), (b), (c) above.
(2) Reduce weed establishment and spread from activities covered by Recreation Special Use Permits.
(a) Include Clause R1-D4, see FSH 2709.11, Chapter 50, in all new and reissued recreation special use permits, authorizations, or other grants involving ground-disturbing activities. Include this provision in existing ground-disturbing authorizations which are being amended for other reasons.
(b) Revegetate bare soil resulting from special use activity according to Roads (3) (a), (b), (c) above.
(3) Prevent weed establishment resulting from land and float trail use, construction, reconstruction and maintenance activities.
(a) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).
b. Recommended Objectives and Associated Practices.
(1) Consider reducing weed establishment and spread from activities covered by recreation, special use permits. Consider including Clause R1-D4, see FSH 2709.11, Chapter 50, by amending existing ground-disturbing authorizations as indicated by local prescriptions.
(2) Prevent weed establishment resulting from land and float trail use, construction, reconstruction, and maintenance activities. All trail crews should inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.
(3) Maintain trailheads, boat launches, outfitter and public camps, airstrips, roads leading to trailheads, and other areas of concentrated public use in a weed-free condition.
(4) Inspect and approve all gravel and borrow sources before use and transport. The source will not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they must be treated before transport and use.

3. Cultural Resources.
Required Objectives and Associated Practices. Reduce weed establishment and spread at archeological excavations.
Revegetate bare soil resulting from cultural resource excavation activity according to the Roads (3) (a), (b), (c) section above.

4. Wildlife, Fisheries, and Botany.
Required Objectives and Associated Practices. Incorporate weed prevention into wildlife, fisheries, and botany project design.
a. Include weed risk assessment in environmental analysis for wildlife, fish and botany projects with ground disturbing actions.
b. Revegetate bare soil resulting from wildlife and fish project activity according to the Roads (3) (a), (b), (c) section above.
c. Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
d. Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).

5. Range.
a. Required Objectives and Associated Practices.
(1) Ensure weed prevention and control are considered in management of all grazing allotments.
(a) Include weed risk assessment in environmental analysis for rangeland projects.
(b) When other plans do not already address noxious weeds, include practices and control measures in Annual Operating Plans.
(2) Minimize ground disturbance and bare soil.
(a) Revegetate, where applicable, bare soil from grazing activities according to the Roads (3) (a), (b), (c) section above.
(b) Check areas of concentrated livestock use for weed establishment and treat new infestations.
(3) Minimize transport of weed seed into and within allotments.
(a) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
(b) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).
(c) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.
b. Recommended Objectives and Associated Practices.
(1) Transport of weed seed into and within allotments should be minimized.
(a) Avoid driving vehicles through off-road weed infestations.
(b) Feed certified weed-free feed to livestock for several days prior to moving them onto the allotment to reduce the introduction of new invaders and spread of existing weed species. Consider using transitional pastures when moving animals from weed infested areas to the National Forest. (Transitional pastures are designated fenced areas that can be logistically and economically maintained.)

(c) Consider excluding livestock from sites with new invaders or treat new invaders in these areas before entry by livestock.
(2) Maintain healthy desirable vegetation that is resistant to noxious weed establishment.
(a) Consider managing forage utilization to maintain the vigor of desirable plant species as described in the Allotment Management Plan.
(b) Minimize or exclude grazing on restoration areas until vegetation is well established.

6. Timber.
a. Required Objectives and Associated Practices.
(1) Ensure that weed prevention is considered in all timber projects.
(a) Include weed risk assessment in environmental analysis for timber harvest projects.
(b) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.) Reference Contract Provision C/CT6.26
(c) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as designated by the Forest Weed Specialist). Reference Contract Provision C/CT6.261
(2) Minimize the creation of sites suitable for weed establishment. Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above.
b. Recommended Objectives and Associated Practices.
(1) Ensure that weed prevention is considered in all timber projects.
(a) Consider treating weeds on roads used by timber sale purchasers. Reference Contract Provision C/CT6.26.
(b) Treat weeds on landings, skid trails and helibases that are weed infested before logging activities, where practical.
(2) Minimize the creation of sites suitable for weed establishment. Soil disturbance should be minimized to no more than needed to meet project objectives.
(3) Consider monitoring for weeds after sale activity and treat weeds as indicated by local prescriptions.
(a) Consider trust, stewardship, or other funds to treat soil disturbance or weeds as needed after timber harvest and regeneration activities.
(b) Consider monitoring and treating weed infestations at landings and on skid trails after harvest.

7. Minerals.
a. Required Objectives and Associated Practices.
(1) Minimize weed establishment in mining, oil and gas operations, and reclamation.
(a) Include weed risk assessment in environmental analysis for minerals and oil and gas projects.
(b) Include weed prevention measures in operation and/or reclamation plans.
(c) Retain bonds until reclamation requirements are completed.
(d) Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above.
(2) Remove seed source and limit seed transport into new or existing mining and oil and gas operations. Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
(3) Minimize weed spread caused by moving infested gravel and fill material.
(a) The borrow pit will not be used if new invaders (as defined by the Forest Weed Specialist) are found on the site.
(b) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
(c) Do not establish new gravel and fill material sources in areas where new invaders are present on National Forest Service lands. Where widespread weeds occur at new pit sites strip at least the top 8" and stockpile contaminated material. Treat weeds at new pits where widespread weeds are present.
b. Recommended Objectives and Associated Practices.
(1) Consider removing seed source and limiting seed transport into new or existing mining and oil and gas operations. Where applicable, treat weeds on project access routes. Reference Contract Provision C/CT6.27.
(2) Minimize weed spread caused by moving infested gravel and fill material.
(a) Inspect and approve all gravel and borrow sources before use and transport. The source should not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they should be treated before transport and use.
(b) Consider maintaining stockpiled material in a weed-free condition.
(c) Check the area where pit material is used to ensure that no weed seeds are transported to the use site.

8. Soil and Water.
a. Required Objectives and Associated Practices. It is required that integrated weed prevention and management be used in all soil, watershed, and stream restoration projects.
(1) Include weed risk assessment in environmental analysis for soil, watershed, and stream restoration projects with ground disturbing actions.
(2) Revegetate bare soil resulting from cultural resource excavation activity according to the Roads (3) (a), (b), (c) section above.
(3) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
(4) Clean all equipment prior to leaving the project site, if operation in areas infested with new invaders (as designated by the Forest Weed Specialist).
(5) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.
b. Recommended Objectives and Associated Practices. Integrate weed prevention and management in all soil, watershed, and stream restoration projects by considering treating weeds in road obliteration and reclamation projects before roads are made undriveable. Monitor and retreat as indicated by local prescriptions.

9. Lands and Special Uses.
a. Required Objectives and Associated Practices.
(1) Incorporate weed preventions in all special use permits, road use permits, and easements.
(a) Include weed risk assessment in environmental analysis for land projects with ground disturbing actions.
(b) Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above, as a condition of the authorization.

(c) Include approved special use provision R1-D4, see FSH 2709.11, chapter 50, (or subsequent approved direction) in all new and reissued special use permits, authorizations, or other grants involving ground disturbing activities. Include this provision in existing ground disturbing authorizations which are being amended for other reasons .
(d) Include noxious weed prevention and control measures as indicated by local prescriptions in new or reissued road permits or easements granted pursuant to FLPMA (P.L. 94579 0/2/76), FRTA (P.L. 88657 0/3/64) or subsequent authorities. This includes FLPMA Private and Forest Road Permits and Easements; FRTA Private and Forest Road Easements; Cost Share Easements; and Road Use (commercial haul) Permits (7730).
(e) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as designated by the Forest Weed Specialist).
(2) Minimize weed spread caused by moving infested gravel and fill material.
(a) Do not establish new gravel and fill material sources on National Forest Service lands in areas where new invaders are present. Where widespread weeds occur at new pit sites strip at least the top 8" and stockpile contaminated material. Treat weeds at new pits where widespread weeds are present.
(b) Remove all mud, dirt, and plant parts from all off-road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
b. Recommended Objectives and Associated Practices.
(1) Incorporate weed prevention in all special use permits, road use permits and easements.
(a) Consider including this provision by amending existing ground disturbing authorizations as indicated by local prescriptions.
(b) Consider including this provision by amending existing ground disturbing authorizations when determined to be necessary by the authorized officer. (While the approved terms and conditions of certain permits or easements may not provide for modification, the necessary weed prevention and control provisions may be included in written plans, specifications, stipulations and/or operation and maintenance plans attached to and made a part of the authorization.)
(2) Minimize weed spread caused by moving infested gravel and fill material. All gravel and borrow sources should be inspected and approved before use and transport. The source should not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they should be treated before transport and use.

10. Fire.
a. Required Objectives and Associated Practices.
(1) Increase weed awareness among all fire personnel. Include weed risk factors and weed prevention considerations in the Resource Advisor duties on all Incident Management Teams and Fire Rehabilitation Teams.
(2) Mitigate and reduce weed spread during fire activities
(a) Initiate establishment of a network of helibases, camps and staging areas that will be maintained in a noxious weed-free condition.
(b) Minimize weed spread in camps by incorporating weed prevention and containment practices such as mowing, flagging or fencing weed patches, designating weed-free travel routes and washing equipment.
(c) Inspect all fire going vehicles regularly to assure that undercarriages and grill works are kept weed seed free. All vehicles sent off Forest for fire assistance will be cleaned before they leave or return to their home.
(3) Minimize weed spread during smoke jumper operations.
(a) Inspect, remove, and properly dispose of weed seed and plant parts found on clothing and equipment.
(b) Coordinate with Weed Specialist(s) to locate and/or treat practice jump areas.
(4) Mitigate and reduce weed spread in Air Operations.
(a) Initiate establishment of a network of helibases that will be maintained in a noxious weed-free condition.
(b) Minimize weed spread at helibases by incorporating weed prevention and containment practices such as mowing, flagging or fencing weed patches, designating weed-free travel routes.
(c) Provide weed prevention briefings for helibase staff.
(d) Inspect, and if necessary clean, contract fuel and support vehicles before and after each incident when travelling off road or through weed infestations.
(e) Inspect and remove weed seed and plant parts from all cargo nets.
(5) Mitigate and reduce weed spread from Operations activities.
(a) Look for weed-free camps, staging, drop points and parking areas.
(b) Regularly inspect and clean fire vehicles as necessary to assure that undercarriages and grill works are kept weed seed free.
(c) Route traffic through camps to avoid weed infested areas.
(6) Integrate weed prevention and management in all prescribed burning. Mitigate and reduce weed spread during prescribed fire activities.
(a) Include weed risk assessment in environmental analysis for prescribed fire projects.
(b) Coordinate with local Noxious Weed Management Specialist to utilize helibases that are maintained in a weed-free condition, whenever possible.
(c) All crews should inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.
(d) Add weed awareness and prevention education to Fire Effects and Prescribed Fire training.
(7) Encourage desirable vegetation during rehabilitation activities.
(a) Revegetate only erosion susceptible and high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) as described in the Roads (3) (a), (b), (c) section above.
(b) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.
b. Recommended Objectives and Associated Practices.
(1) Mitigate and reduce weed spread during fire activities.
(a) Initiate establishment of a network of helibases, camps, and staging areas on private land that will be maintained in a noxious weed-free condition.
(b) Consider checking and treating weeds that establish at cleaning sites after fire incidents.
(c) Emphasize Minimum Impact Suppression Tactics (M.I.S.T.) to reduce soil and vegetation disturbance.
(2) Minimize weed spread during smokejumper operations. Travel through weed infested areas should be avoided or minimized.
(3) Mitigate and reduced weed spread from Operations activities. Traffic should be routed through camps to avoid weed infested areas.
(4) Integrate weed prevention and management in all prescribed burning. Mitigate and reduce weed spread during prescribed fire activities.

(a) Consider treating high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) with weed infestations (such as roads, disturbed ground) before burning and check and retreat after burning if necessary.
(b) Consider avoiding ignition and burning in high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) that cannot be treated before or after prescribed fire.
(5) Encourage desirable vegetation during rehabilitation activities.
(a) Check and treat weeds at cleaning sites and all disturbed staging areas.
(b) Treat weeds within the burned area as part of rehabilitation plan to reduce weed spread.
(c) Check weed spread resulting from fire and fire suppression activities.
(d) Consider applying for restoration funding for treatment of weed infestations within the fire area.

11. Administration.
a. Required Objectives and Associated Practices.
(1) Ensure all Forest Service employees are aware of and knowledgeable about noxious weeds.
(a) Train Line Officers in noxious weed management principles and practices.
(b) Each unit will have access to Weed Specialist at the Ranger District or Supervisor's Office.
(2) Ensure all Forest workers are reducing the chance of spreading noxious weeds. All Forest workers will inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment including Forest Service vehicles.
b. Recommended Objectives and Associated Practices. Consider a reward program for weed awareness, reporting, and beating new invaders.

2082 - COOPERATION.

a. Required Objectives and Associated Practices. Coordinate road maintenance activities with herbicide applications to maximize efficacy. Ensure road blading and roadside herbicide applications are coordinated chronologically to minimize herbicide use and increase effectiveness.
b. Recommended Objectives and Associated Practices. Consider providing Plans Section with weed control contact familiar with weeds in the fire area.

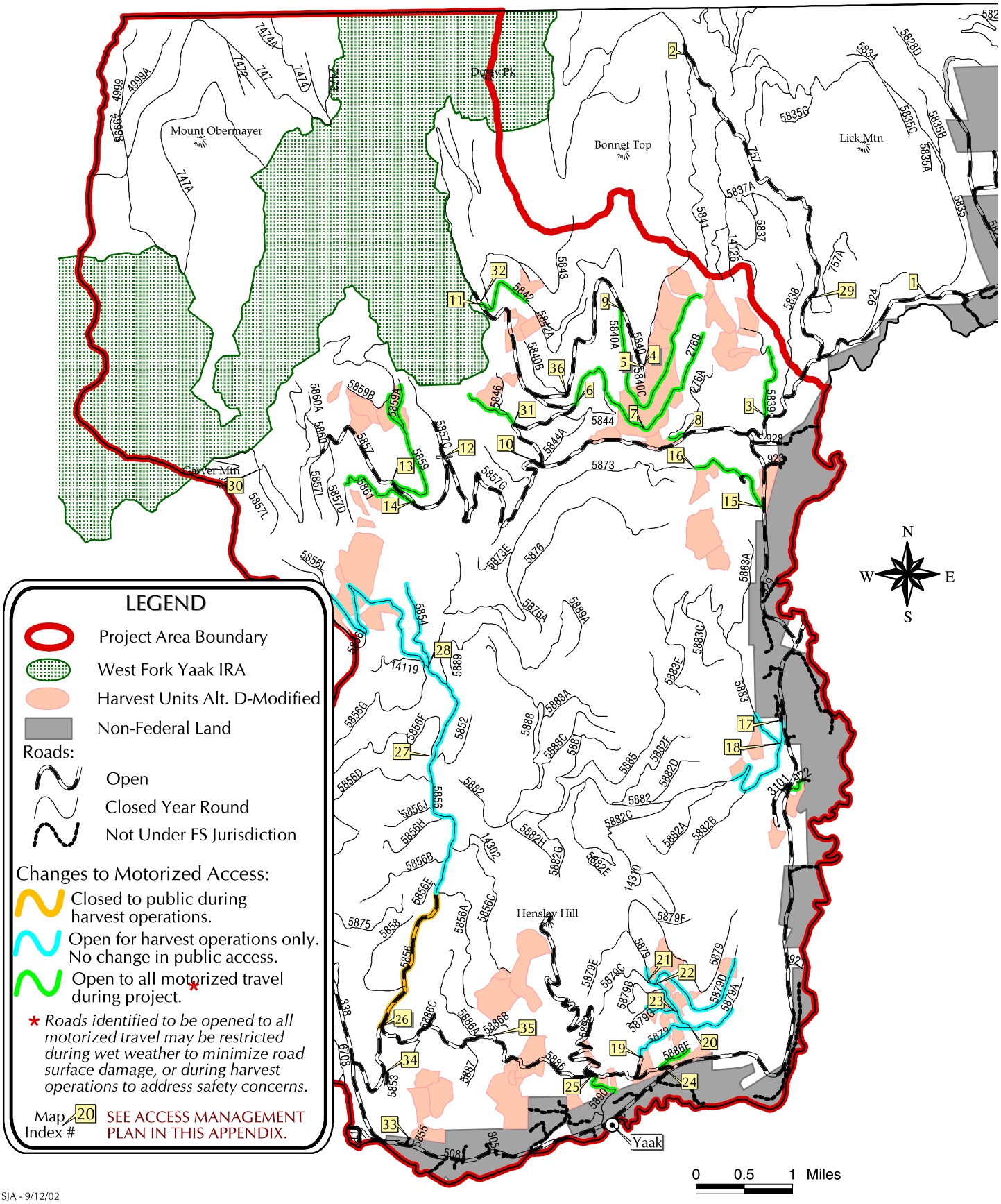
2082.2 - Methods of Cooperation.
6. Region 1 Required Objectives and Associated Practices.
a. Reduce weed establishment and spread at archeological excavations. Passports In Time programs and other Cultural Resource workers shall be given weed briefings and will inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.
b. Promote weed awareness and prevention efforts among range permittees. Discuss weed awareness and prevention practices at annual permittee meetings.

GARVER ACCESS MANAGEMENT PLAN

MAP INDEX #	RD. #	LOCATION	ACTION TO TAKE	TIMING	REASON FOR ACTION
1	5835-Lick Mt.	Jct. Hwy 92	Install double earth barrier	Start of project	Core
2	5841-Upper Sink Cr.	Jct. 757	Install double earth barrier	Start of project	Core
3	5839-Lower Sink Cr.	Jct. Hwy 92	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Core
4	5840-Benefield	Jct. 5840C	Install double earth barrier	After post harvest activities	Core
5	5840C-Benefield C	Jct. 5840	Install double earth barrier	After post harvest activities	Core
6	276B-W.Fk.Yaak River B	Jct. 276	Lock gate open	Start of harvest operations	Harvest
7	276B- W.Fk.Yaak River B	MP 1.0	Install double earth barrier	After post harvest activities	Core
8	276A- W.Fk.Yaak River A	Jct. 5857	Lock gate open	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Core
9	5840A-Benefield A	Jct. 5840	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Core
10	276-W.Fk. Yaak River	Jct. 5857	Lock gate closed	Start of helicopter harvest operations in Units #13A,13, 14,15,27,29,30, 34,35	Harvest/HE
11	276- W.Fk. Yaak River	Jct. 5842	Install double earth barrier	After post harvest activities	Core
12	5857C-French Garver C	Jct. 5857	Install double earth barrier	Start of project	Core
13	5859-Woodchuck	Jct. 5857	Lock gate open	Start of harvest operations	Harvest
		Jct..5857	Install double earth barrier	After post harvest activities	Core
14	5861-Waterloo	Jct. 5857	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Core
15	5873-Waper Ridge	Jct. Hwy 92	Lock gate open	Start of harvest operations	Harvest
		Jct. Hwy 92	Lock gate closed	After post harvest activities	HE-ORD
16	5873-Waper Ridge	Past Unit #27	Install gate	Start of harvest operations	HE
		Past Unit #27	Remove gate	When gate @ Jct. 92 & 5873 is closed.	See Map Index #15
17	5882-Lap Cr.	Jct. Hwy 92	Remove earth barrier, install gate, close when activity is not occuring.	Start of harvest operations	Harvest
			Remove gate. Install double earth barrier	After post harvest activities	Core
18	5883-Waper Cr.	Jct. 5882	Remove earth barrier	Start of harvest operations	Harvest
19	5879-Rausch Point	¼ mi. past jct.5886	Remove earth barrier, lock gate closed (closed to public for elk security).	Start of harvest operations	Harvest
20	5879A-Rausch Point A	Jct. 5879	Remove earth barrier	Start of harvest operations	Harvest
21	5879C-Rausch Point C	Jct. 5879	Remove earth barrier	Start of harvest operations	Harvest
22	5879D-Rausch Point D	Jct. 5879	Remove earth barrier	Start of harvest operations	Harvest
23	5879G-Rausch Point G	Jct. 5879	Remove earth barrier	Start of harvest operations	Harvest
24	5886E-Hensley Face E	Jct. 5886	Remove earth barrier	Start of harvest operations	Harvest
			Install gate	After post harvest activities	HE
25	5890-No Name	Jct. 5886	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After harvest activities	Winter range security
26	5856-Hensley Cr.	Jct. 5886	Install gate, open to harvest activities only	Start of harvest operations	Harvest/ HE
27	5856-Hensley Cr.	Jct. 5856F	Lock gate open	Start of harvest operations	Harvest

MAP INDEX #	RD. #	LOCATION	ACTION TO TAKE	TIMING	REASON FOR ACTION
28	5854-Upper French	Jct. 5856	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Core
29	757A-Koo Koo Cr. Boyd Cr.	Jct. 757	Install double earth barrier	Start of harvest activities in BMU 15	Core
30	5857L-French Garver L	Jct. 5857	Install double earth barrier	Start of harvest activities in BMU 15	Core
31	5846-Packtrail	Jct. 276	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Core
32	5842-Looby	Jct. 276	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Core
33	5855-No Name	Private boundary	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After post harvest activities	Winter range security
34	5853-No Name	Jct. 5856	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After harvest activities	Winter range security
35	5886B- Hensley Face B	Jct. 5886	Remove earth barrier	Start of harvest operations	Harvest
			Install double earth barrier	After harvest activities	Winter range security
36	5840B-Benefield B	Jct. 5840	Install double earth barrier	After harvest activities	Core

Garver EIS
ACCESS MANAGEMENT PLAN



SJA - 9/12/02

GARVER MONITORING PLAN

ITEM #	RESOURCE	OBJECTIVE	TIMING	METHODOLOGY	RESPONSIBLE
1	Watershed	Monitor implementation and effectiveness of Best Management Practices (BMPs) in harvest units.	During and post timber sale activities.	Complete BMP timber sale inspection reports. IDT and District staff will review sample of units.	Sale Administration/IDT
2	Watershed	Monitor implementation of Riparian Habitat Conservation Areas (RHCAs.)	Prior to advertisement of timber sales and post harvest.	Monitor application and protection of RHCAs as described in Chapter 2. IDT and District staff will review sample of units.	Sale Prep/IDT
3	Watershed	Monitor implementation and effectiveness of committed BMP road work.	One year and three years after implementation.	Inspect road work in critical areas for effectiveness at dispersing water and decreasing sediment delivery.	Fisheries Biologist/ Hydrologist/ Engineering
4	Soils/Wildlife	Monitor implementation of large woody debris retention, especially in wet habitat sites.	Post harvest and post fuel reduction activities.	Measure tons per acre of down woody debris using transects within a sample of units	Fire and Fuels Specialist/ Hydrologist/Wildlife Biologist
5	Fire	Wildfire management and presuppression through fuels management (both in harvest and other areas).	Ongoing	Monitor fuels levels and treatment needs and effects. Evaluate both long and short-term effects of completed or ongoing treatments. Monitor areas of risk with potential suppression problems.	Fire/Fuels Specialist
6	Silviculture /Fire/Soils	Determine whether Silv. Rx objectives were accomplished. Assess site preparation and tree planting needs. Review status of CWD on site. Verify or modify next treatment	Post harvest and prior to any site preparation or fuels treatment	Review treatment areas. Evaluate silvicultural objectives in light of accomplishments and, if necessary, modify the original prescription. Check for special fuels treatment needs (e.g. excavator piling, no treatment, or different timing of Rx burn) and special planting needs (e.g. excavator scalp, moving of slash, or different stock type needed)	Fuels Management Specialist/District Silviculturist
7	Silviculture/ Noxious Weeds	Determine status of regeneration harvest units. Note presence or absence of noxious weeds	First, third and, if necessary, 5th year, following initial planting. Where natural regen is planned monitoring begins the first or second fall after site prep, a fall seed crop, and a growing season.	Monitor stocking and status of regeneration (planted or natural regeneration) using walk-through and standard plot exams which follow R1 procedures. Determine status of non-native plants using monitoring survey form	District Reforestation Specialist
8	Wildlife	Verify maintenance and retention of cavity habitat	Pre- and Post-harvest	Representative sample of units taken to determine retention of cavity habitat.	Wildlife Biologist
9	Noxious Weeds	Noxious weed infestations	Pre-harvest, during harvest, and for 5 years following timber sale closure	Monitor and treat infestations adjacent to, and within, new regeneration harvest units	District Botanist
10	Wildlife	Determine effectiveness of burning to increase browse	1 year after burning	Walk-through survey to determine the species of browse and to what extent burning has stimulated browse.	Wildlife Biologist
11	Wildlife	Ongoing status of closure devices - Gates-EB-Signing	1-2 times a year	Adopt-A-Road - Access Management - Law Enforcement	Access Management
12	Wildlife	Determine effectiveness of planting shrub species for	Post-planting, every year for 5 years.	Review treatment areas to monitor staus of shrub planting using walk-through exams.	Wildlife Biologist

ITEM #	RESOURCE	OBJECTIVE	TIMING	METHODOLOGY	RESPONSIBLE
		for big game.			

GLOSSARY

A

ACCESS MANAGEMENT OBJECTIVES. Objectives that describe the extent and form of access needed to accomplish the management area direction, including how access to and within National Forest lands will be provided, whether by foot, horse, motorized vehicle, or aircraft; over water, roads, or trails; or through the air. (FSH 7709.55 section 06).
ACTIVITY AREA. Area within the project area where activities are proposed.
ACTIVITY FUELS. See Slash
AFFECTED ENVIRONMENT. The natural, physical, and human-related environment that is sensitive to changes due to proposed actions.
AGE CLASSES. A distinct group of trees, or portion of growing stock recognized on the basis of age (i.e., seedling, pole, mature.)
AGGRADATION. When more sediment enters a reach than leaves it, there is a buildup of sediment. This is called aggradation.
AIR QUALITY. Refers to standards for various classes of land as designated by the Clean Air Act, P.L. 88-206: Jan. 1978
AIRSHED. A geographical area that, because of topography, meteorology, and climate, shares the same air.
ALTERNATIVE. A mix of management prescriptions applied to specific land areas to achieve a set of goals and objectives. Each alternative represents a different way of achieving a set of similar management objectives. Sometimes the term "action alternative" is used when it is desirable to recognize that there is a "no action" alternative under which the proposed activity would not take place.
ANALYSIS AREA. The geographic area defining the scope of analysis for a particular resource. This area may be larger than the project area when effects have potential to extend beyond the boundaries of the proposed action.
APPEAL. A request by any party dissatisfied with a decision of a forest officer to have that decision reviewed at a higher organizational level within the Forest Service and, where appropriate, by the Secretary.

B

BANKFULL. The level water reaches in the stream that is at or near the lowest terrace.
BASIC INDUSTRY. These are fundamental manufacturing industries which serve as the basis of the economy. They do not include the service side. These are business and government activities that produce raw materials, products made from those materials, and which transport those materials or products.
BEAR ANALYSIS AREA (BAA). Management subunits of a BMU approximately 5,000 to 15,000 acres in size.
BEAR MANAGEMENT UNIT (BMU). A geographic subdivision of grizzly bear habitat, which approximates the home range size of a reproductive, female grizzly bear (about 100 square miles in the Cabinet-Yaak ecosystem).
BEST MANAGEMENT PRACTICES. A 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.
BIG GAME. Those species of large mammals normally managed as a sport hunting resource.
BIOLOGICAL ASSESSMENT. Information (document) prepared by or under the direction of the Federal agency concerning listed and proposed threatened and endangered species and proposed critical habitat that may be present in the action area and the evaluation of potential effects of the action on such species and habitats.
BIOLOGICAL EVALUATION. A documented Forest Service review of programs or activities in sufficient detail to determine how an action or proposed action may affect any sensitive species.
BLIND DRAIN. A drainage structure installed in the subgrade of a road which intercepts, collects, and redirects subsurface water.
BLOWDOWN. See windthrow.
BOARD FOOT (BF). A unit of measurement equal to an unfinished board one foot square by one inch thick. Timber volumes are often expressed in terms of thousands of board feet.
BOGS. Perennially saturated areas that usually have wetland and riparian plants surrounding them.
BOLE. The trunk or main stem of the above ground part of a tree.
BROADCAST BURN. See prescribed burning.

C

CANOPY. The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth. Layers of canopy may be called stories.
CANOPY CLOSURE. The progressive reduction of space between tree crowns as they spread laterally; a measure of the percent of potential open space occupied by the collective tree crowns in a stand.
CAVE. A natural underground chamber that is open to the surface.
CAVITY. The hollow, excavated in snags by birds; used for roosting and reproduction by many birds and mammals.
CAVITY HABITAT. Snags, broken-topped live trees and down logs used by wildlife species that excavate and/or occupy cavities in these trees.
CAVITY NESTERS. Wildlife species that nest in cavities.
CLEARCUT HARVEST. A regeneration method under which the entire mature stand is cut. Some snags and potential snags may be left to benefit snag-dependent wildlife species.
CLEARCUT WITH RESERVES. A variation of the clearcutting method where reserve trees are left for all or part of a stand rotation and serve a specific function that is consistent with management objectives.
CLOSED CANOPY. The condition that exists when the canopy created by trees or shrubs or both is dense enough to exclude most of the direct sunlight from the forest floor.
CODE OF FEDERAL REGULATIONS (CFR). The official, legal tabulation or regulations directing Federal Government activities.
COMMUNITY. A group of one or more populations of plants and animals in a common spatial arrangement; an ecological term used in a broad sense to include groups of various sizes and degrees of integration.
COMPARTMENTS. A geographic area delineated by a watershed drainage for management planning purposes.

CONIFER. Any of a group of needle and cone bearing evergreen trees.
CONNECTORS. Strips or patches of vegetation used by wildlife to move between habitats.
CORE AREA. An area of secure habitat within a BMU that contains no motorized travel routes or high use non-motorized trails during the non-denning season and is more than 0.3 miles (500 meters) from a drivable road. Core areas do not include any gated roads but may contain roads that are impassible due to vegetation or constructed barriers. Core areas strive to contain the full range of seasonal habitats that are available in the BMU.
CORE SAMPLE. Stream bed material removed from the stream for analysis.
CORRIDORS. Areas of vegetation (may be linear or patch-like) available to wildlife to facilitate movement between habitats. Corridors may vary in size by species need. For big-game, forested areas of at least 600 feet in width is generally acceptable.
COVER. Vegetation used by wildlife for protection from predators, breeding and rearing of young (hiding cover), or to ameliorate conditions of weather (thermal cover).
COVER/FORAGE RATIO. The ratio, in percent, of the amount of area in cover conditions to that in forage conditions.
COVER TYPE. See forest cover type
CROWN FIRE. A fire burning into the crowns of the vegetation, generally associated with an intense understory fire.
CULTURAL RESOURCES. The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) having scientific, prehistoric, or social values.
CUMULATIVE EFFECT. The impact on the environment which results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time.

D

DEADFALL. Previously dead trees that have fallen.
DEBRIS. The scattered remains of some things broken or destroyed; ruins; rubble; fragments.
DECADENT. Deteriorating; when used in reference to stand condition there are inferences of the loss of trees from the overstory and of the presence of disease, or indications of loss of vigor in dominant trees so that the mean annual increment is negative.
DECISION AREA. The geographic area defining the scope of this document and the alternatives proposed by it.
DEGRADATION. This occurs when a stream has excess energy and more sediment leaves a reach than enters it. This is associated with channel scouring.
DENNING SITE. A place of shelter for an animal; also where an animal gives birth and raises young.
DETRIMENTAL SOIL DISTURBANCE. The condition where established threshold values for soil properties exceed and result in significant change. (FSH 2509.18, section 2.05, 9).
DESIGN CRITERIA. The requirements derived from management area direction such as safety requirements and traffic characteristics that govern the selection of elements and standards for a road or section of a road. (FSM 7721.05. Also see FSH 7709.56, section 4.05)
DESIGN STANDARDS. The definitive lengths, widths, and depths of individual elements, such as a 12-foot traveled way, 2-foot shoulders, 3/4:1 cut slopes, 3-foot curve widening, and 6 inches of crushed aggregate, that define a road template. (FSM 7721.05 and FSH 7709.56, section 4.05)
DESIRED FUTURE CONDITION. A portrayal of the land or resource conditions which are expected to result if goals and objectives are fully achieved.
DISPERSED RECREATION. Outdoor recreation in which visitors are diffused over relatively large areas. Where facilities or developments are provided, they are more for access and protection of the environment than for the comfort or convenience of the people.
DISPLACEMENT AREA. An area of suitable habitat reserved for use by a local population of a wildlife species while that population is displaced from, or caused to vacate, its former habitat by disturbance from human activities.
DISTURBANCE. Any event which affects the successional development of a plant community (examples: fire, insect attack, windthrow, timber harvest).
DIVERSITY. The relative distribution and abundance of different plant and animal communities and species within an area.
DOWN WOODY COMPONENT. A component of forest habitats used by wildlife for feeding, denning, and shelter. (See Old Growth Habitat.)
DRAINAGE EFFICIENCY. The net runoff for a given amount of precipitation in a drainage.
DUFF. An organic surface soil layer, below the litter layer, in which the original form of plant and animal matter cannot be identified with the unaided eye.

E

ECOLOGICAL NICHE. The set of habitat conditions that are favorable for the growth and reproduction of a given species.
ECOSYSTEM. The complete system formed by the interaction of a group of organisms and their environment. In this context of activities on National Forest lands, humans are considered a part of the ecosystem.
ECOSYSTEM MANAGEMENT. A management practice and philosopy aimed at selecting, maintaining, and/or enhancing the ecological integrity of an ecosystem in order to ensure continued ecosystem health while providing resources, products, or non-consumptive values for humans.
ECOLOGICAL SUSTAINABILITY. The maintenance or restoration of the composition, strucutre, and processes of ecosystems including the diversity of plant and animal communities and the productive capacity of ecological systems. Ecological integrity, historical range of variability, and vegetation response units are means of measuring ecological sustainability.
ECOLOGICAL INTEGRITY. The capability of supporting and maintaining a balanced, integrated, adaptive, community of organisms having species composition, diversity, and functional organization comparable to that of natural habitats of the region.
ECOSYSTEM PROCESSES. Ecological functions such as photosynthesis, energy flow, nutrient cycling, water movement, disturbance, and succession.
EFFECTS (or impacts). Environmental consequences (the scientific and analytical basis for comparison of alternatives) as a result of a proposed action. Effects may be either direct, which are caused by the action and occur at the same time and place, or indirect, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable, or cumulative.
ENDANGERED SPECIES. Any plant or animal species which is in danger of extinction throughout all or a significant portion of its range. (Endangered Species Act of 1973).

ENDEMIC. Plant or animal species occurring only in a restricted geographic area.
ENVIRONMENT. The aggregate of physical, biological, economic, and social factors affecting organisms in an area.
ENVIRONMENTAL ANALYSIS. An analysis of alternative actions and their predictable environmental effects, including physical, biological, economic, and social consequences and their interactions; short- and long-term effects; direct, indirect, and cumulative effects.
ENVIRONMENTAL ASSESSMENT (EA). A concise public document which serves to: (a) Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact; (b) Aid an agency's compliance with NEPA when no EIS is necessary; (c) Facilitate preparation of an EIS when necessary.
ENVIRONMENTAL IMPACT STATEMENT (EIS). A detailed statement prepared by the responsible official in which a major Federal action which significantly affects the quality of the human environment is described, alternatives to the proposed action provided, and effects analyzed.
EPHEMERAL STREAMS. Streams that flow only as a direct response to rainfall or snowmelt events. They have no baseflow.
EPIDEMIC. The populations of plants, animals, and diseases that buildup, often rapidly, to highly abnormal and generally injurious levels .
EQUIVALENT CLEARCUT AREA (ECA). Equivalent Clearcut Area is an indicator of basin condition and is calculated from the total amount of crown removal that has occurred from harvesting, road building, and other activities based on the current state of vegetative recovery.
EROSION. Detachment or movement of soil or rock fragments by water, wind, ice, or gravity. Accelerated erosion is much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of activities of people animals, or natural catastrophes.
EVEN-AGED MANAGEMENT. Deliberate planned actions that result in stands of trees of essentially the same age, growing together. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.
EXTIRPATION . Complete loss.

F

FEDERAL REGISTER. A daily publication which reports Presidential and Federal Agency documents.
FLOODPLAIN. The lowland and relatively flat areas adjoining inland and coastal waters, including, at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year.
FIRE PERIMETER. The outer edge limits of a fire-burned area.
FIRE REGIME. The combination of fire frequency characteristics, predictability, intensity, seasonality and extent in an ecosystem.
FIRE TOLERANT. A plant which has properties or charistics which enable it to survive fire.
FORAGE. Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.
FORAGE AREAS. Vegetated areas with less than 60 percent combined canopy closure of tree and tall shrub (greater than 7 feet in height).
FOREST COVER TYPE. A descriptive classification of forestland based on the present vegetative species composition and/or locality (ie: lodgepole pine, mixed conifer). Most stands are given a classification (stratum label), based on aerial photo interpretation, that includes the forest cover type, the size class, density class, and stand development phase. For example: a stand with the stratum label of LP2W would be considered a lodgepole pine cover type (LP) that is of a pole/small sawtimber size class (2) and is well stocked with coniferous trees (W).
FOREST DEVELOPMENT ROAD. A forest road under the jurisdiction of the Forest Service. (PL 95-599), section 106 and FSM 7705. Also see 36 CFR 2161.2) These roads are not public roads. (FSM 7700)
FOREST HEALTH. An ecological perspective that looks at the resiliency of an ecosystem and its ability to be sustainable.
FOREST LAND. Land at least 10 percent occupied by forest trees or formerly having had such tree cover and not currently developed for nonforest use.
FROST HEAVING. Occurs when moist or saturated soils are frozen, causing seedlings which are not yet deeply rooted to be ejected from the soil. This occurs mostly in low elevation areas that have frost before there is a cover of snow.
FUELS. Combustible materials present in the forest which potentially contribute a significant fire hazard.
FUEL LOADING. The amount of available fuels, usually expressed in tons per acre.
FUELBED. The arrangement of available fuels, continuity and amount.
FUELS MANAGEMENT. Manipulation or reduction of fuels to meet Forest protection and management objectives while preserving and enhancing environmental quality.

G

GAP. An opening in the stand or canopy caused by some disturbance.
GENETIC INTROGRESSION . The entry or introduction of genetic material from one gene complex to another.
GRADIENT. The rise or fall of a ground surface expressed in degrees of slope.

H

HABITAT. The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.
HABITAT COMPONENT. A simple part, or a relatively complex entity regarded as a part, or an area or type of environment in which an organism or biological population normally lives or occurs.
HABITAT DIVERSITY. The variation in types, sizes, and shapes of landscape elements or vegetation types.
HABITAT EFFECTIVENESS. The ability of an area to support a species (individual or population) based on a potential of 100%.
HABITAT TYPE. An aggregation of all land areas potentially capable of producing similar plant communities at climax. Within the analysis area the following habitat types are present: western redcedar/queencup beadlily (531), western hemlock/queencup beadlily (571), western hemlock/menziesia (579), subalpine fir/queencup beadlily (620), subalpine fir/menziesia (670), subalpine fir/beargrass (690), subalpine fir/beargrass, grouse whortleberry (692), subalpine fir/grouse whortleberry, pinegrass (731), subalpine fir/alder (740).
HABITAT TYPE GROUP. A category of habitat types with similar ecological amplitudes and environmental conditions. Combined with information on stand conditions, habitat type groups can be used to develop silvicultural stand treatment priorities during the IDT process.
HARDWOODS. A conventional term for the wood of broadleaf trees. In the decision area these trees are generally confined to areas near water.

HIDING COVER. Vegetation capable of hiding 90 percent of a standing adult deer or elk at 200 feet or less. Includes some shrub stands and all forested stand conditions with adequate tree stem density or shrub layer to hide animals. In some cases, topographic features also can provide hiding cover.
HIGH RISK. Individual or groups of trees that are live (green) but have the physical characteristics favorable to insect infestation. Trees in this category are subject to mortality and loss of economic value.
HOST TREE. A tree in which other organisms, parasites, or insects live for part of their life cycle.

I

INDICATOR SPECIES. See management indicator species.
INDIRECT EFFECTS. Secondary effects which occur in locations other than the initial action or significantly later in time.
INFISH. (Inland Native Fish Strategy) On July 31, 1995, the Decision Notice for Inland Native Fish Strategy Environmental Assessment (INFISH) was signed. This strategy was developed to provide interim (approximately 18 months) direction to protect habitat and populations of native resident fish and supersedes the Kootenai Riparian Guidelines previously used.
INSTREAM FLOWS. The minimum water volume (cubic feet/second) in each stream necessary to meet seasonal streamflow requirements for maintaining aquatic ecosystems, visual quality, recreational opportunities and other uses.
INTERAGENCY GUIDELINES. A document which was originally developed in the Yellowstone grizzly bear ecosystem and later applied to all grizzly habitat through congressional mandate. Previously known as the "Yellowstone Guidelines" , it 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.
INTERDISCIPLINARY TEAM (IDT). A group of resource professionals with different expertise that collaborate to develop and evaluate resource management decisions.
INTERMEDIATE HARVEST. Any harvest in an even-age stand rotation which retains the major stand components and does not regenerate the stand.
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.
INVENTORIED ROADLESS AREA. Roadless areas studied for wilderness designation. Forest Plan, Appendix C.
IRREVERSIBLE. A term that describes the loss of future options. Applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity that are renewable only over long periods of time.
IRRETRIEVABLE. A term that applies to the loss of production, harvest, or use of natural resources. For example, some or all of the timber production from an area is lost irretrievably while an area is serving as a winter sports site. The production lost is irretrievable, but the action is not irreversible. If the use changes, it is possible to resume timber production.

L

LADDER FUELS. Small trees and understory shrubs that allow fire to burn up into the canopy of larger trees.
LANDSCAPE. The aspect of the land that is characteristic of a particular region or area.
LANDTYPE. A unit of land with similar designated soil, vegetation, geology, topography, climate and drainage. The basis for mapping units in the land systems inventory.
LARGE WOODY MATERIAL. (Also large woody debris; LWD)- Branches and/or tree trunks located within a stream channel, originating from trees growing in or near the channel. Such material is considered "large" if it is of sufficient size that it remains at least partially submerged during all but major flood events. These materials are important in stream systems because they serve a variety of functions related to channel hydraulics and morphology. Functions would include flow energy reduction due to friction and turbulence on downstream side of debris, and sediment storage on upstream side of materials. LWD is delivered to stream channels by decay and/or windfall of trees in close proximity to stream channels.
LETHAL FIRES A descriptor of fire response and effect in forested ecosystems of high-severity or sever fire that burns through the overstory and understory which consumes large woody surface fuels and may consume entire duff layer. Stand is essentially destroyed and will be replaced as stand is set back to initiation stage.
LIMITING FACTOR. The environmental influence through which the toleration limit of an organism is first reached, which acts, therefore, as the immediate restriction in one or more of its functions or activities or in its geographic distribution.
LODGEPOLE PINE. See explanation under timber type.

M

MANAGEMENT AREA. Geographic areas, not necessarily contiguous, which have common management direction, consistent with the Forest Plan allocations.
MANAGEMENT DIRECTION. A statement of multiple use and other goals and objectives, along with the associated management prescriptions and standards and guidelines to direct resource management.
MANAGEMENT INDICATOR SPECIES (MIS). A species of wildlife, fish, or plant whose health and vigor are believed to accurately reflect the health and vigor of other species having similar habitat and protection needs to those of the selected indicator species.
MASS EROSION (also called mass wasting) Downslope movement of a unit of soil. Mass erosion includes landslides, debris flows, debris avalanches, debris torrents, slumps and soil creeping.
MATURE. On lands allocated for timber harvest, mature is defined as trees or stands that have reached rotation age, generally around 100 years. In the context of wildlife - Mature forest habitat with characteristics needed to provide habitat for species such as pine marten and pileated woodpecker (generally occurs around age 100).
MID-SERAL. A middle transitory stage in forest succession.
MITIGATION. Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.
MIXED CONIFER. See explanation under timber type.
MIXED LETHAL FIRES A descriptor of fire response and effect in forested ecosystems of moderate fire, burns in surface fuels but may involve a tree understory. It consumes litter, upper duff, understory plants and foliage on understory trees. Individual and groups of overstory

trees may torch out if fuel ladders exist. Enough of the stand's overstory survives to provide for the major portion of the regeneration that results.
MONITORING AND EVALUATION. The evaluation, on a sample basis, of Forest Plan management practices to determine how well objectives are being met, as well as the effects of those management practices on the land and environment.
MONOCULTURE. A pure stand of a single species.
MOSAIC. The intermingling of plant communities and their successional stages in such a manner as to give the impression of an interwoven design.
MOUNTAIN PINE BEETLE. The common name for the bark beetle (Dendroctonous ponderosae, Hopkins) which is an insect pest that has caused more tree mortality in the intermountain west than any other
MULTI-STORY. A forest stand or plant community having more than two main canopy layers or "stories".

N

NEPA PROCESS. An interdisciplinary process, mandated by the National Environmental Policy Act, which concentrates decisionmaking around issues, concerns, alternatives and the effects of alternatives on the environment.
NO ACTION ALTERNATIVE. The No Action alternative is required by regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The no action alternative provides a baseline for estimating the effects of other alternatives. Where a project activity is being evaluated, the no action alternative is defined as one where no action or activity would take place.
NONGAME SPECIES. All wild animals not subject to sport hunting, trapping or fishing regulations.
NON-LETHAL FIRES A descriptor of fire response and effect in forested ecosystems of low-severity or cool fire. Has minimal impact on the site. It burns in surface fuels consuming only the litter, herbaceous fuels, and foliage and small twigs on woody undergrowth. Little heat travels downward through the duff. None of the large (commercial size) trees are killed.
NONSTOCKED. A stand of trees or aggregation of stands that have a stocking level below the minimum specified for meeting the prescribed management objectives.
NOXIOUS WEEDS. Rapidly spreading plants which can cause a variety of major ecological impacts to both agricultural and wild lands.
NUTRIENT. An element found in the soil that is needed for plant growth.

O

OBLITERATION. The reclamation and/or restoration of land to resource production from that of a transportation facility. This may include, but is not limited to, one or more of the following: ripping, seeding, pulling culverts, or recontouring.
OLD GROWTH HABITAT. Old growth is 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 19" 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) and an average age often in excess of 200 years.
OPEN ROAD DENSITY. A measure of the amount of open roads per area of land, usually expressed as miles per square mile
OUTBREAK. Sudden occurrence of a disease or insect pest.
OUTSLOPE. When the slope from inside of shoulder to outside of shoulder exceeds the alignment grade.
OVERMATURE. The condition that exists after an even-aged stand reaches maturity and decline in vigor, health and soundness.
OVERSTOCKED. Stands exceeding a prescribed standard or expected number of trees or basal area per acre.
OVERSTORY. The portion of trees in a forest which forms the uppermost layer of foliage.

P

PATCH. An area of vegetation that is relatively homogeneous internally with respect to composition and successional stage and that differs from what surrounds it.
PATHOGEN An organism which causes disease in another organism.
PAYMENTS TO STATES (or Payments to Counties) The portion of receipts derived from Forest Service resource management that is distributed to State and county governments as the Forest Service 25 percent fund payments.
PEAK FLOW. The greatest flow attained during the melting of the winter snowpack.
PERENNIAL STREAMS. Streams that flow continuously throughout the year.
PHYSIOGRAPHIC AREA (PA). Large areas of associated landtypes used in the mid-scale analysis of ecosystems. These areas typically have similar features in geology, soil types, fire occurrence and vegetative communities.
PLANT ASSOCIATION. A potential natural plant community of definite floristic composition and uniform appearance.
PLANTATIONS. Areas in the forest where trees have been planted.
POPULATION. In statistics, the aggregate of all units forming the subject of study; otherwise, a community of individuals that share a common gene pool.
PRE-COMMERCIAL THINNING A felling made in an immature stand in order primarily to accelerate diameter increment but also, by suitable selection, to improve the average form of the trees that remain. Usually occurs in crowded (by crown competition or stems per acre) stands to give remaining trees (a prescribed desired number of trees) a competitive advantage for full development.
PREFERRED ALTERNATIVE. The agency's preferred alternative, one or more, that is identified in the impact statement (40 CFR 1502.14).
PRESCRIBED BURNING. The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as to 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 (ie: silviculture, wildlife management, reduction of fuel hazard, 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.
PRESCRIPTION. Management practices selected and scheduled for application on a designated area to attain specific goals and objectives.
PROGRAMMATIC EIS. An environmental impact statement that establishes a broad management direction for an area by establishing a goal, objective, standard, management prescription and monitoring and evaluation requirement for different types of activities which are permitted.

It also can establish what activities are not permitted within the specific area(s). This document does not mandate or authorize the permitted activities to proceed.
PROJECT AREA. The geographic area defining the scope of this document and the alternatives proposed by it.
PROJECT FILE. An assemblage of documents that contains all the information developed or used during an environmental analysis. This information may be summarized in an Environmental Assessment or an Environmental Impact Statement. The project file becomes part of the administrative record for judicial review in case of legal action.

R

RANGER DISTRICT. An administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor.
RANGE OF VARIABILITY. The spectrum of conditions possible in ecosystem composition, structure, and function considering both temporal and spatial factors**.**
REBURN. Re-ignition and burning on incompletely burned fuels.
RECONDITIONING. This work consists of cleaning ditches and culverts, including inlets and outlets; removing slide material; scarifying turnouts, and approach road connections.
RECONTOUR. A form of obliteration where the road prism is eliminated by pulling back fill material to re-establish the natural sideslope.
RECORD OF DECISION. A concise public document disclosing the decision made following preparation of an EIS and the rationale used by the deciding officer to reach that decision.
RECREATION OPPORTUNITY SPECTRUM (ROS). A range of possible combinations or recreation activities, settings, and experience opportunities, from Primitive to Urban, arranged along a continuum. Classes used herein are:

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 in 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 predominately 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 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 if 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.

REFORESTATION. The natural or artificial restocking of an area with forest trees. It may include tree planting and seeding measures to obtain natural regeneration.
REGENERATION. The renewal of a tree crop, whether by natural or artificial means. This term may also refer to the crop (seedlings, saplings) itself.
REGENERATION HARVEST. Used in reference to clearcut, seedtree and shelterwood harvest methods which remove an existing stand to prepare a site for regeneration.
REHABILITATION. Returning of land to farm use or to productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.
RELIC. A tree that has survived several stand replacing events.
RESERVE TREE. Trees retained after the regeneration period (pole sized or larger) under the clearcutting, seed tree, or shelterwood methods.
RESIDUAL TREE. Trees remaining after any harvest.
RESTOCKING. The process of adding additional trees by planting or seeding to bring the stocking up to prescribed conditions.
RESTORATION. The act of returning to historic site conditions or ecological processes that existed before the disruption or interruption of these processes.
RESTRICTED ROAD. A National Forest road or segment which is restricted from a certain type of use or all uses during certain seasons of the year or yearlong. The use being restricted and the time period must be specified. The closure is legal when the Forest Supervisor has issued an Order and posted that Order in accordance with 36 CFR 261.
RHIZOME. A rootlike stem under or on top of the ground, ordinarily in a horizontal position, which usually sends out roots from its lower surface and leafy shoots from its upper surface.
RIFFLE STABILITY INDEX (RSI). A system of measure that predicts channel substrate stability.
RIPARIAN AREAS/HABITATS. Land areas where the vegetation and microclimate are influenced by perennial and/or intermittent water.
RIPARIAN MANAGEMENT OBJECTIVES (RMOs). Quantifiable measures of stream and streamside conditions that define good fish habitat and serve as indicators against which attainment or progress toward attainment of goals will be measured.
RIPARIAN HABITAT CONSERVATION AREAS (RHCAs). Portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent headwater streams, and other areas where proper ecological functioning is crucial to maintenance of the stream's water, sediment, woody debris, and nutrient delivery systems.
RIPPING. A form of obliteration; a method of aerating the surface and subsurface material of a road, landing, and/or skid trail to allow water infiltration by tilling the soil with a piece of machinery equipped with ripper bars.

ROAD. A general term denoting a way for purposes of travel by vehicles greater than 50 inches in width. (FSM 2355.05)
ROADLESS. Area characterized by its lack of roads; i.e. unroaded.
ROAD MAINTENANCE. The upkeep of the entire Forest Development Transportation Facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization.
ROAD MANAGEMENT OBJECTIVE. Defines the intended purpose of an individual road based on management area direction and access management objectives. Road management objectives contain design criteria, operation criteria, and maintenance criteria. (FSM 7721.31 and FSH 7790.55--33).
ROOT CROWNS. The point at or just below the surface of the ground where the stem and root join.
ROOT DISEASE. A fungal organism which lives in organic matter i the soil and invades the living roots systems of trees.
ROSGEN CHANNEL CLASSIFICATION. A system of measure that utilizes various channel features to rate a stream or river into reproducible classes.
ROTATION. The planned number of years required to establish (including the regeneration period) and grow timber crops to a specified condition or maturity for regeneration harvest.

S

SALMONIDS . Members of the family of elongate soft-finned fishes Salmonidae - the trout and salmon family.
SALVAGE HARVEST. The cutting of trees that are dead, dying, or deteriorating before they lose commercial value as sawtimber. The removed trees are generally overmature, damaged by fire, wind, insects, fungi or other injurious agencies.
SCOPING. The procedures by which the Forest Service determines the extent of analysis necessary for a proposed action, i.e., the range of actions, alternatives, and impacts to be addressed, identification of significant issues related to a proposed action, and establishing the depth of environmental analysis, data, and task assignments needed.
SCREE Refers to slopes covered with loose rock fragments, including the accumulation of rock at a cliff or slope base (talus) as well as loose, unstable material lying on slopes without cliffs.
SEDIMENT. Any material carried in suspension by water, which will ultimately settle to the bottom. Sediment has two main sources: from the channel area itself and from disturbed sites.
SEDIMENT TRAP. Any natural or man-made feature in a stream that traps sediment.
SEED TREE. A tree selected as a natural seed source within a shelterwood or seedtree harvest cut; sometimes also reserved for seed collection.
SEEDTREE HARVEST. A regeneration method under an even-aged silvicultural system. A portion of the mature stand, usually 10-15 trees/acre, is retained as a source of seed for regeneration of the stand. The seed trees are intended for removal after regeneration is considered to be established. Note: where there is no intention of removing the seed trees once the stand is regenerated, a seedtree seed cut with reserves is the appropriate silvicultural system.
SEEDLINGS AND SAPLINGS. Non-commercial-size young trees, generally occurring in plantations.
SELECTION HARVEST. The periodic removal of trees, usually at 10-20 year intervals, individually or in small groups, from an uneven-aged forest in order to realize yield and establish regeneration of irregular constitution.
SENSITIVE SPECIES. Those species identified by the Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trends in (a) population numbers or density, or (b) habitat capability that would reduce a species' existing distribution.
SENSITIVITY LEVEL. A particular degree or measure of viewer interest in the scenic qualities of the landscape.
SERAL STAGE. A transitory or developmental stage of a biotic community in an ecological succession (does not include climax successional stage or pioneer stage).
SEROTINOUS Late in developing; particularly applied to plants that flower or fruit late in the season and to fruit and cones that remain closed for a year or more after the seeds mature, but also to bud opening, leaf shedding etc. . Applies to the nature of lodgepole pine cones, as a positive adaptive trait for fire dependent ecosystems.
SHELTERWOOD HARVEST. A regeneration method under an even-aged silvicultural system. A portion of the mature stand is retained as a source of seed and site protection during the regeneration period.
SHRUB. A plant with persistent woody stems and relatively low growth form; usually produces several basal shoots as opposed to a single bole; differs from a tree by its low stature and nonarborescent form.
SIGNIFICANT. As used in NEPA, requires consideration of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole, and the affected region, interests, and locality. Intensity refers to the severity of impacts (40 CFR 1508.27).
SILVICULTURE. The art and science of growing and tending forest vegetation, i.e., controlling the establishment, composition, and growth of forests, for specific management goals.
SILVICULTURAL DIAGNOSIS. The process of comparing existing stand conditions to a desired condition or "target stand", and determining a need for treatment to bring the stand to the desired condition.
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 cuttings 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 or treat competing vegetation, slash, and other debris that may inhibit the establishment of regeneration.

GRIZZLY BEAR MANAGEMENT SITUATIONS. The following classes identify management situations which are used to stratify grizzly bear habitat consistent with definitions in the Interagency Grizzly Bear guidelines:
SITUATION 1. (Grizzly Bear Management Situation 1.) Habitat contains grizzly population centers and habitat components needed for the survival and recovery of the species. Management decisions will favor the needs of the grizzly. Habitat maintenance and improvement and grizzly/human conflict minimization will receive the highest management priority.
SITUATION 3. (Grizzly Bear Management Situation 3.) Areas where grizzly presence is possible but infrequent. Developments such as campgrounds, resorts, or other high human use associated facilities, and human presence result in conditions which make grizzly presence untenable for humans and/or grizzlies. Grizzly habitat maintenance and improvement are not management considerations in these areas. Grizzly/human conflict minimization is a high priority management consideration.

SIZE CLASS. A classification of forest stands based on live trees in the stand. The classification uses a four letter acronym based on descriptive adjectives. For example, a stand that is designated as a size class MLRS is a mature stand (M) that is considered low risk to damaging insects or disease (LR) and is stocked with sawtimber sized trees of a specified diameter and stocking level (S).
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.
SLASH BURNING. The treatment or burning of slash so as to reduce fire or insect hazards.
SNAG. A standing dead tree usually without merchantable value for timber products, but may have characteristics of benefit to some cavity nesting wildlife species.
SNAG DEPENDENT WILDLIFE. Wildlife species that are dependent on snags for nesting or roosting habitat or for food.
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.
SPECIES. A unit of classification of plants and animals consisting of the largest and most inclusive array of sexually reproducing and cross-fertilizing individuals which share a common gene pool.
SPECIFIED ROAD. A Forest System Road, including related transportation facilities and appurtenances, shown on a Timber Sale Area Map and listed in Table A9 of the Timber Sale Contract.
STAGNATION Refers to stand growth, implying that there is a failure to express dominance due to poor site conditions, competition of other trees that limit development of the crowns which suppresses individual tree growth and over all stand development. Usually diameter growth is severely limited and height growth still occurs but slowly.
STAND. A community of trees or other vegetation uniform in composition, constitution, spatial arrangement, or condition to be distinguishable from adjacent communities.
STAND COMPOSITION. The representation of tree species in a forest stand, expressed by some measure of dominance (ie % volume, number, basal area).
STAND DENSITY A measure of the degree of crowding of trees within stocked areas, commonly expressed by various growing-space ratios such as crown length to tree height, crown diameter to diameter at breast height, crown diameter to tree height, or of stem spacing to tree height.
STAND REPLACING FIRE. A fire that kills most or all of a stand, and causes a new stand to be started.
STAND STRUCTURE. The horizontal and vertical arrangement of the vegetation in a stand.
STANDARD. A particular action, level of performance, or threshold specified by the Forest Plan for resource protection or accomplishment of management objectives. Unlike "guidelines" which are optional, standards specified in the Forest Plan are mandatory.
STOCKED. Stands falling within a prescribed standard or expected number of trees or basal area per acre.
STOCKING. The degree to which trees occupy the land, measured by basal area and/or number of trees by size and spacing, compared with a stocking standard; that is, the basal area and/or number of trees required to fully utilize the land's growth potential.
STREAM CHANNEL STABILITY. A classification system that utilizes ocular estimates of various channel, bank, and riparian area features to evaluate channel health.
STREAM ORDER. It is often convenient to classify streams within a drainage basin by systematically defining the network of branches. Each nonbranching channel segment (smallest size) is designated a first-order stream. A stream which receives only first-order segments is termed a second-order stream, and so on. The order of a particular drainage basin is determined by the order of the principle or largest segment.
STRUCTURAL DIVERSITY. The variation in sizes and shapes of landscape elements, as well as diversity of pattern (ie: heterogeneity).
SUCCESSION. The changes in vegetation and in animal life that take place as the plant community evolves from bare ground to climax.
SUCCESSIONAL STAGE. A stage or recognizable condition of a plant community which occurs during its development from bare ground to climax.
SUMMER RANGE. A range, usually at higher elevation, used by deer and elk during the summer; a summer range is usually much more extensive than a winter range.
SUITABLE FOREST LAND. Forest land (as defined in CFR 219.3, 219.14) for which technology is available that will insure 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 219.4); and for which there is management direction that indicates that timber production is an appropriate use of that area.
SUPPRESSED Refers to individual trees, very slowly growing trees with crowns entirely below the general level of the crown cover, receiving no direct light either from above or from the sides, common in stands that are considered overstocked.
SURFACE EROSION. Downslope movement of individual particles of soil by water transport. Surface erosion includes sheet erosion, riling and gullying.

T

TARGET STAND. A classification of individual forest stands that reflects the desired attributes within a range of stand conditions that have the potential in meeting timber management objectives as described in the Kootenai Forest Plan. Target stands are generally described for each habitat type group based on site productivity for even-aged, multi-storied, and uneven-aged silvicultural systems. The reference to site productivity is differentiated between Mixed Conifer 1 (MC 1), Mixed Conifer 2 (MC 2), and Lodgepole Pine (LP). For example, an MC 1 designation refers to the productivity group made up of commercial conifer (other than LP) that have the potential to produce >85 cubic feet/acre/year at the culmination of mean annual increment. An MC 2 designation includes the group that encompasses all stands not meeting the above conditions. The LP group includes lodgepole pine stands that have a full range of productivity.
TEMPORARY ROADS. Any short-lived road not intended to be a part of the forest development transportation system and not necessary for future resource management. (FSM 7705. Also see Timber Sale Contract 2400-6T).
THERMAL COVER. Vegetation used by animals to modify the adverse effects of weather. A forest stand that is at least 40 feet in height with tree canopy cover of at least 70 percent provides thermal cover. These stand conditions are achieved in closed sapling-pole stands and by all older stands unless the canopy cover is reduced below 70 percent. Deciduous stands may serve as thermal cover in summer, but not in winter.
THINNING. A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or recover potential mortality.
THREATENED SPECIES. Any species of plant or animal which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

TIERING. The use of a previously written environmental document with a broad scope to cover discussion of issues common to both.
TIMBER TYPES. A descriptive classification of forestland based on present occupancy of an area by tree species (ie: lodgepole, mixed conifer). More appropriately called forest cover types, this category is further defined by the composition of its vegetation and/or environmental factors that influence its locality. See Appendix A (Silvicultural Prescriptions) for more information.
TRAMPLING. A method of treating fuels by knocking down by walking over or through small trees with a piece of machinery.
TURBIDITY. An optical measure of how fine sediment inhibits the transmission light in a given water sample due to scattering and absorption by suspended particles.
TWO-STORIED. A forest stand or plant community having two main canopy layers or "stories".

U

UNDERBURN. Understory fuels treatment.
UNDERSTORY. Vegetation (trees or shrubs) growing under the canopy formed by taller trees.
UNSUITABLE FOREST 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.

V

VEGETATION RESPONSE UNIT. An aggregation of lands with similar patterns in potential natural communities, soils, hydrologic function, landform and topography, climate, air quality, and natural processes (ie: nutrient and biomass cycling, sucession, productivity, and fire regimes). Each VRU has an associated description of its ecological structure, composition, and function. VRUs provide a means to describe and define the components of ecosystems
VERTICAL DIVERSITY. The diversity in an area that results from the complexity of the above ground structure of the vegetation; the more tiers of vegetation or the more diverse the species makeup is, the higher the degree of vertical diversity
VIABLE POPULATION. A wildlife population of sufficient size to maintain its existence over time in spite of normal fluctuations in population levels.
VIEWSHED. Sub-units of the landscape where the visitor's view is contained by topography similar to a watershed.
VISUAL QUALITY OBJECTIVE (VQO). A system of indicating the potential expectations of the visual resource by considering the frequency an area is viewed and the type of landscape.

Maximum Modification: A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.
Modification: A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.
Partial Retention: A Visual Quality Objective which in general means man's activities may be evident but must remain subordinate to the characteristic landscape.
Retention: A Visual Quality Objective which in general means man's activities are not evident to the casual forest visitor.
Preservation: A Visual Quality Objective that provides for ecological change only.
Variety Class: Diversity of landscape character
Sensitivity Level: A particular degree or measure of viewer interest in the scenic qualities of the landscape.

VARIETY CLASS. A particular level of visual variety or diversity of landscape character.
VISUAL RESOURCE. The composite of landforms, water features, vegetative patterns and cultural features which create the visual environment.

W

WATER ROUTING. Spring snowmelt and storm runoff intercepted and redirected by roads, ditches, and trails.
WATER YIELD. The measured output of the Forest's streams.
WILDERNESS. All lands included in the National Wilderness Preservation System by public law; generally defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation.
WILDFIRE. Any fire not designated and managed as a prescribed fire with an approved prescription.
WINDTHROW. The action of wind uprooting trees.
WINTER RANGE. A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually better defined and smaller than summer ranges.

Y

YARDING. A method of bringing logs in to a roadside area or landing, for truck transport. Methods may include forms of skyline cable logging systems, ground-based skidding, balloon, helicopter, etc.

ABBREVIATIONS AND ACRONYMS

ABIS	Aquatic Biota Information System
AIRFA	American Indian Religious Freedom Act of 1978
ALT	Alternative
BA	Biological Assessment
BAA	Bear Analysis Area
BLM	Bureau of Land Management
BMP	Best Management Practices
BMU	Bear Management Unit
CCE	Clearcut Equivalent Acres
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
CFS	Cubic Feet Per Second
CWA	Clean Water Act
CWD	Coarse Woody Debris
CYE	Cabinet-Yaak Ecosystem
DBH	Diameter Breast Height
DEIS	Draft Environmental Impact Statement
EA	Environmental Assessment
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
EMU	Elk Mangement Unit
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FDR	Forest Development Road
FEIS	Final Environmental Impact Statement
FP	Forest Plan
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Global Information Systems
HE	Habitat Effectiveness
ID	Interdisciplinary Team
IGBC	Interagency Grizzly Bear Committee
IGBG	Interagency Grizzly Bear Guidelines
INFISH	Inland Native Fish Strategy
IRA	Inventoried Roadless Area
KNF	Kootenai National Forest
KV	Knutson-Vandenberg Act of 1924
MA	Management Area
MIS	Management Indicator Species
MBF	Thousand Board Feet
MDFWP	Montana Dept. Fish Wildlife and Parks
MMBF	Million Board Feet
MOU	Memorandum of Understanding
MS	Management Situation
NCDE	Northern Continental Divide Ecosystem
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NRT	National Recreation Trail
ORD	Open Road Density (mi/sq. mi.)
PA	Physiographic Area
PL	Public Law
PFI	Peak Flow Increase
PNF	Present Net Value
PSD	Prevention of Significant Deterioration
RARE I & II	Roadless Area Review and Evaluation I & II
RHCA	Riparian Habitat Conservation Area
RMO	Road Management Objective
ROS	Recreation Opportunity Spectrum
RSI	Riffle Stability Index
SCS	Stream Channel Stability
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SWCP	Soil and Water Conservation Practices
T&E	Threatened and Endangered Species
TMARD	Total Motorized Access Route Density
USC	United States Code
USDI	United States Department of the Interior
USFS	United States Forest Service
USGS	United States Geological Survey
USFWS	USDI-Fish & Wildlife Service
VQO	Visual Quality Objectives
VRU	Vegetation Response Unit
VMS	Visual Management system
WQLS	Water quality Limited Segments

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The following is a list of recipients to whom this Draft EIS has been sent. This is a base list composed of respondents to the request for interest, required agencies, and involved parties. Additional copies of this Draft EIS are available upon request from the Three Rivers Ranger District in Troy, Montana.

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US Army Corps of Engineers
USDA Forest Service
USDA Office of Civil Rights
US EPA, Federal Building
US EPA Region 8, Montana Office
US EPA, Office of Federal Activities
USDA-National Agriculture Library
USDI – Office of Environmental Policy
USDI Fish and Wildlife Service

ORGANIZATIONS

Alliance for the Wild Rockies
Ambience Project
Forest Conservation Counci
The Ecology Center
The Lands Council
The Sierra Club
Yaak Valley Forest Council

STATE AGENCIES

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Montana Department of Fish, Wildlife and Parks
Idaho Department of Environmental Quality

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