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Preliminary Environmental Assessment

Bear Knoll Thinning Project

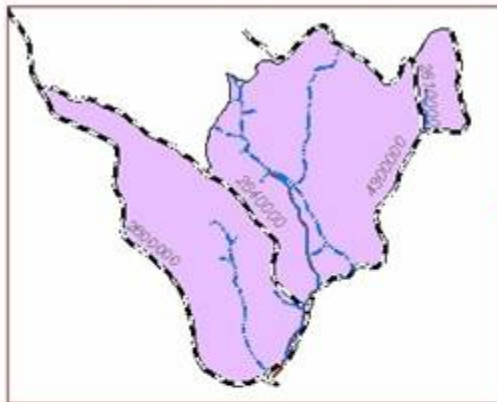
**Hood River Ranger District
Mt. Hood National Forest
Wasco County, Oregon
T4S, R9E; T5S, R9E; Willamette Meridian.**

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Bear Knoll Planning Area



Map 1

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SUMMARY

The Mt. Hood National Forest proposes a thinning project on the Hood River Ranger District. The project area is located in Wasco County, Oregon in the White River Watershed. The legal land description is T4S, R9E; T5S, R9E; Willamette Meridian.

The purpose of this initiative is to thin stands that are over-stocked and growing slowly, to create productive forest stands, and to provide forest products consistent with the NWFP goal of maintaining the stability of local and regional economies, now and in the future. This action is needed, because the project area contains stands of 70-95 year old trees that are growing slowly due to the effects of over-crowding, (400-600 trees per acre). If no action were taken, these stands would continue to grow slowly and would not contribute to a sustainable supply of forest products. In addition, there is a need to reduce open road density and a need to provide for wildlife security during the summer months.

The proposed action (Alternative II) is to thin 531 acres, reducing the current stand basal area range from 120-400 square feet to 120-160 square feet depending on existing stand conditions. The action would open 3.62 of currently restricted use - (closed with a gate), bring 1.16 miles of physically closed roads (decommissioned) up to standard, and utilize 1.46 miles of existing disturbed ground (such as existing skid trails) for temporary roads. All roads used for the timber sale would be closed or decommissioned after implementation. The proposed action would close an additional 5.47 miles of road. (Of those, 4.85 miles would be closed with a heavy-duty gate and 0.62 miles would be partially obliterated.) Road density would move from 3.32 to 2.22 miles². A detailed description of proposed road-related actions is provided in Chapter 2.

In addition to the proposed action, the Forest Service also evaluated the following alternatives:

- Alternative I - This is the No Action Alternative (evaluated as a baseline condition). Under this alternative, none of the proposed activities would occur.
- Alternative III – This alternative proposes to thin 289 acres. Under this analysis, no harvest would occur in the scenic viewsheds (designated areas visible from travel routes). The alternative would open 3.62 miles of currently restricted use road (closed with a gate), bring 0.85 miles of physically closed road (decommissioned) up to standard, and utilize 0.88 miles of existing disturbed ground (such as existing skid trails) for temporary roads. This alternative would not close any additional roads.

CHAPTER 1 - INTRODUCTION

1.0 Document Structure

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Environmental Assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized into four chapters and an appendices section:

- *Chapter 1—Introduction:* This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2—Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on issues raised by the public and other agencies. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3—Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the existing situation is described first, followed by the effects of the alternatives. The No-action Alternative provides a baseline for evaluation and comparison of the other alternatives.
- *Chapter 4—Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

1.1 Background

The planning area encompasses about 3,574 acres in the southern portion of the Hood River Ranger District in the White River Watershed. The legal land description is T.4S., R.9E., Sections 23-29, 33-36; T.5S., R.9E., Sections 2-4, 10. Government Camp is approximately 10 miles to the northwest and Hood River is about 30 miles to the north. Bear Knoll is bounded on the west by U.S. Highway 26, on the east by Forest Road 43, and approximately 1-2 miles north of the northwest corner of the Warm Springs Indian Reservation. Other familiar landmarks include Clear Lake (about 1 mile to the west), and Frog Lake (about 2 miles northwest). See Map 1.

The Bear Knoll Thinning project was first proposed to the public in 1998 as part of a larger project within the Bear Knoll planning area. After the assessment began, the responsible official decided that a better analysis could be done if the planning area was separated into two projects, including one for the stands proposed for thinning and the other, the stands proposed for regeneration harvest. While both projects are in the same planning area, the regeneration harvest stands identified in scoping are not analyzed in this document and subsequent analysis will not move forward at this time. This environmental assessment represents only the thinning harvest stands taken from the original proposal.

1.2 Planning Framework

In addition to all applicable laws and regulations, the planning area is administered according to both the Mt. Hood National Forest Land and Resource Management Plan, as amended, and the NWFP. The White River Watershed Assessment and the White River Late-Successional Reserve Assessment also provide recommendations for management within the project area.

Forest Plan Direction

The Mt. Hood National Forest Land and Resource Management Plan, (MHFP), as amended, sets forth the direction for completing site-specific projects and activities on the Mt. Hood National Forest. The MHFP establishes goals, the desired future condition, objectives, and standards and guidelines for each specific management area of the Forest, as well as Forest-wide standards and guidelines, and management prescriptions. The MHFP was a result of analysis included in the Mt. Hood National Forest Land and Resource Management Plan Final Environmental Impact Statement (1990), to which this environmental assessment is tiered.

The MHFP land allocations within the project area include: timber emphasis management areas (identified as C1 in the MHFP) and scenic viewsheds (identified as B2 in the MHFP). Included in both B2 and C1 allocations are areas designated as General Riparian Areas (identified as B7, and unmapped, in the MHFP).

Management Area C1: Timber Emphasis

According to the MHFP, the goals of the timber emphasis units are to provide lumber, wood fiber, and other forest products based on the capability and suitability of the land (MHFP, Standards and Guidelines, Chapter Four, 289-294).

Management Area B2: Scenic Viewshed

The project area contains scenic views in the foreground and midground, along Highway 26. The goals of scenic viewshed management areas are to provide attractive, visually appealing forest scenery, utilizing vegetation management activities to create and maintain long-term desired landscape characteristics through time and space (MHFP, Standards and Guidelines, Chapter Four, 218-228).

Management Area B7: General Riparian Areas

The goals of the General Riparian Areas are to achieve and maintain riparian and aquatic habitat conditions for the sustained, long-term production of fish, selected wildlife and plant species, and high quality water. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices (MHFP, Standards and Guidelines, Chapter Four, 253-260). Areas designated as B7 in the MHFP correspond with the riparian reserves designation from the NWFP. This project would not enter any General Riparian Areas.

See Map 2, Land Allocations, MHFP.

Other Management Considerations from the Forest Plan: Management Indicator Species

During the preparation of the MHFP, a group of wildlife species were identified as management indicator species (MIS). These species were selected because their welfare could be used as an indicator of other species dependent upon similar habitat conditions. Indicator species can be used to assess the impacts of management actions on a wide range of other wildlife with similar habitat requirements. The management indicator species in the planning area include: pileated woodpecker, pine marten, silver gray squirrel, deer, and elk (MHFP, Chapter Four, 21, 22).

Northwest Forest Plan

The Northwest Forest Plan (NWFP) amended the MHFP in 1994 by adding certain standards and guidelines to the MHFP land allocations. For this project, these include coarse woody debris, and survey and manage requirements. The NWFP was a result of analysis included in the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (1994), to which this environmental assessment is tiered.

Under the NWFP, lands within the project area include: matrix lands, late successional reserves, administratively withdrawn areas, riparian reserves, and key watersheds. Land allocations under the NWFP overlap and correspond with the MHFP Land Allocations. Where the MHFP and the NWFP differ, the most restrictive requirements are followed. For example, where NWFP matrix land overlaps with B2 Scenic Viewshed in the MHFP, the more restrictive B2 Standards and Guidelines apply.

Matrix

This management allocation consists of federal lands outside the other categories of designated areas. Timber harvest and other silviculture activities may be conducted on matrix lands with suitable forest lands. Most of the scheduled timber harvest contributing to meeting the probable sale quantity (PSQ) takes place in the matrix. Within matrix lands, there is an emphasis on providing for sufficient coarse woody debris, and snag retention (NWFP, Attachment A, Section C, 39-42).

Late Successional Reserves (LSR)

The objective of Late Successional Reserve allocations is to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl (NWFP, Attachment A, C-11). There are two 100-acre LSRs within the Bear Knoll planning area. The larger White River LSR lies to the north and outside the planning area; however, the environmental assessment does address The White River LSR in its cumulative effects analysis.

Administratively Withdrawn

Under this allocation, management emphasis precludes scheduled timber harvest (NWFP, Attachment A, C-29). Administratively withdrawn areas are identified through individual Forest Plans. Within the Bear Knoll planning area, there is a small portion of the White River Wild and Scenic Area, which has been administratively withdrawn from timber activity.

Riparian Reserves

Areas designated as riparian reserves in the NWFP correspond with the general riparian areas, identified as B7 in the MHFP and explained above. Riparian reserves establish specific reserve widths for perennial and intermittent streams.

Key Watershed

Key watersheds are identified with the objective of maintaining or recovering high quality habitat for at-risk stocks of anadromous salmonids and resident fish species. There are two categories of key watersheds: Tier 1 Key Watersheds emphasize conservation of at-risk anadromous fish species. Tier 2 Key Watersheds may not contain at-risk anadromous fish stocks, but were selected as sources (or potential sources) of high quality water (NWFP, Attachment A, B-18). The White River watershed is identified as a Tier 2 Key Watershed, important for high quality water.

See Map 3, Land Allocations, Northwest Forest Plan.

Other Management Considerations from the Northwest Forest Plan:

Aquatic Conservation Strategy

The NWFP identified an aquatic conservation strategy to restore or maintain ecosystem health at a watershed or landscape level to protect and restore fish and other riparian species and their habitats. The strategy details nine objectives that must be met on a watershed or landscape scale to obtain this goal (NWFP, Attachment A, B-9; Objectives listed on B-11). On March 22, 2004, Mark Rey signed the “Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy,” which changed the language of the NWFP, Standards and Guidelines to clarify that the Aquatic Conservation Strategy objectives “apply only at fifth-field watershed and larger scales” (Decision to Clarify Provisions Relating to the Aquatic Conservation Strategy, 7). The Bear Knoll Thinning project does not enter any riparian reserves. Therefore, the Bear Knoll Thinning EA does not specifically address ACS objectives (Forest Service Direction Letter, June 7, 2004).

Survey and Manage

The NWFP was amended in January 2001 to establish standards and guidelines for management of known sites and for conducting site-specific, pre-habitat disturbing surveys for species identified in Table C-3 of the NWFP (Attachment A, C-49-C-61).

The NWFP was further amended on March 22, 2004, with the decision to remove the Survey and Manage Mitigation Measure Standards and Guidelines from the NWFP. For projects that were in the development stage when this decision was signed, it is at the discretion of the line officer to either continue with the original Survey and Management standards and guidelines or comply with the Forest Service Sensitive Species Policies. Gary L. Larsen, Mt. Hood National Forest Supervisor has elected to follow the original Survey and Manage protocol.

Applicable Laws, Executive Orders, and Regulations

Although not exhaustive, some of the more applicable laws, executive orders, and regulations that guide National Forest System lands and this analysis include:

The National Forest Management Act (NFMA) of 1976

NFMA is the primary statute governing the administration of national forests. This Act guides development and revision of National Forest Land Management Plans and calls for procedures and requirements for integrated management (standards and guidelines). NFMA

guided the preparation of the Mt. Hood Land and Resource Management Plan, referenced in this document.

The National Environmental Policy Act (NEPA) of 1969, as amended

NEPA requires federal agencies to consider environmentally sound decisions and to disclose their effects. This law details requirements for public participation, environmental analysis, and sound decision-making for all appropriate federal actions. In 1978, the Council on Environmental Quality wrote the regulations for implementing NEPA. They can be found at 40 Code of Federal Regulations, Parts 1500-1508.

The National Historic Preservation Act (NHPA) of 1966, as amended

This Act requires Federal agencies to consult with American Indian Tribes, state and local groups before nonrenewable cultural resources, such as archaeological and historic structures, are damaged or destroyed. Section 106 of this act requires federal agencies to review the effects project proposals may have on the cultural resources in the analysis area.

The Endangered Species Act (ESA) of 1973, as amended

The purpose of this act is to provide for conservation of ecosystems upon which threatened and endangered species of fish, wildlife, plants, and their habitats depend. Section 7 of the ESA requires Federal agencies to ensure that any federal action is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

The Clean Water Act (CWA), as amended in 1977 and 1982

The primary objective of this act is to restore and maintain the integrity of the nation's waters. This objective translates into two fundamental national goals: eliminate the discharge of pollutants into the nation's waters; and achieve acceptable water quality levels. Each state has the delegated authority to ensure CWA compliance. The CWA establishes a non-degradation policy for all federally proposed projects. Under Section 303(d) of the Clean Water Act, the state has identified water quality-limited water bodies in Oregon. Clear Creek is on the 303(d) list for temperature.

The Clean Air Act (CAA), as amended in 1990

The purposes of this act are to protect and improve the quality of air resources, commence a national research and development program focused on the prevention and control of air pollution, provide technical and financial assistance to State and local governments in connection with air pollution prevention and control programs, and assist in the development of regional air pollution prevention and control programs.

Multiple-Use Sustained-Yield Act (MUSY) of 1960

The Multiple Use-Sustained Yield Act of 1960 requires the Forest Service to manage National Forest System lands for multiple uses including timber, recreation, fish and wildlife, range, and watershed). All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource.

Executive Order 12898—Environmental Justice

Under Executive Order 12898, Federal agencies are required to identify and address potential environmental effects, including human health, economic, and social effects of Federal actions, specifically on minority and low-income populations, and Indian tribes.

Local Assessments

These documents provide important background information for designing project work that will continue to move watersheds toward desired conditions. It is important to note, that while the watershed analysis and LSR assessment provide desired future conditions and recommendations within its analysis area, they are not management requirements. In the Bear Knoll Thinning EA, recommendations were used in designing the alternatives, mitigations, and best management practices.

White River Watershed Analysis

The NWFP mandated watershed analyses. Watershed analyses are a systematic process to characterize the aquatic, riparian, and terrestrial features within a watershed and provide recommendations for future management activities within the watershed. The White River Watershed Analysis was completed in August of 1995.

White River Late-Successional Reserve (LSR) Assessment

The White River LSR Assessment provides a tool to assess the desired conditions for the White River LSR as it pertains to the goals of the NWFP. Three major indicators used to analyze existing and potential stand function within the LSR were resiliency, connectivity, and riparian condition. The assessment provides recommendations on prioritizing actions where improvement of stand function is possible through management.

1.3 Purpose and Need for Action

The purpose of the Bear Knoll Thinning project is to:

- Provide wood fiber for local and regional economies;
- Increase health and vigor and enhance growth of selected stands; and,
- Provide for wildlife security while maintaining limited public and administrative access.

There is a need to manage National Forest System land to meet the probably sale quantity (PSQ) as identified in the NWFP.

In the planning area there are second-growth stands that are experiencing a slowing of growth due to overcrowding. Approximately 600 acres of these stands are within matrix lands (as identified in the NWFP) and are currently overstocked. If left unaltered, this overstocked condition would result in stands with reduced vigor and increased mortality. There is a need for forest stands that are healthy and vigorous with natural levels of mortality.

The current open road density in inventoried Deer and Elk Summer Range exceeds MHFP standards and guidelines of 2.5 mi/mi². There is a need to effectively close roads in the planning area that contribute to the open road density and possible wildlife harassment during spring, summer, and fall. In addition, there is a need to maintain snowmobile routes in the winter months. There is a need to maintain limited administrative access in the planning area, and a need to provide for dispersed recreation.

Desired Future Condition

The proposed action responds to the goals and objectives outlined in the MHFP, as amended, and helps move the project area toward desired conditions described in the plan. The desired future conditions from the MHFP that are relevant to this proposal are summarized below.

Health	Forests have low levels of disease, damaging insect populations and storm damage (MHFP, Chapter four, pages 92, 292).
Growth	Forest stands are healthy and vigorous, and have growth rates commensurate with the sites potential (at a rate at which the mean annual increment has not culminated) (MHFP, Chapter four, pages 5, 86, 91, 90).
Scenery	The forest is visually appealing with a wide variety of natural appearing landscape features. Forest stands and openings are blended with natural landforms and existing vegetation, and have natural shapes, edges, patterns, and sizes. This applies throughout the landscape with increased emphasis for areas seen from sensitive viewing positions (MHFP, Chapter four, pages 108, 113, 218).
C1 Timber Emphasis	The forest consists of stands with an even distribution of age classes, up to approximately 120 years, ranging from seedlings to mature timber (MHFP, Chapter four, pages 290).
Timber Harvest Levels	One goal is to provide a sustainable level of timber products to stabilize local economies and provide jobs. Timber outputs come primarily from the Timber Emphasis (C-1) portion of the Matrix lands, with lesser amounts coming from the "B" land allocations of the Matrix. Minor amounts of timber may also come from outside the Matrix where harvesting would be used as a tool to enhance resources and move the landscape toward the desired future conditions (MHFP, Chapter four, pages 86, 289).

1.4 Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to thin 531 acres in the Bear Knoll planning area. Of the 531 acres, 289 are located within timber emphasis management units (identified as C-1 in the MHFP), and 242 are located within scenic viewshed management units (identified as B2 in the MHFP). This action proposes to thin trees to 120-160 square feet of basal area. The trees selected to be left would be mostly be healthy, dominate and codominate trees. Species such as Douglas-fir, larch, and noble fir would be left where they are present in the stand. Existing remnant trees would be left on-site. Snags would be left at the rate of four per acre. Down woody debris would be retained in the treated stands at 240-500 lineal feet per acre and 3-10 % ground cover per acre.

The action would open 3.62 miles of currently restricted use road (closed with a gate), bring 1.16 miles of physically closed road (decommissioned) up to standard, and utilize 1.46 miles of existing disturbed ground (such as existing skid trails) for temporary road. Road maintenance would range from pre-haul maintenance to reconstruction. Temporary roads would be partially

obliterated, which includes ripping, re-contouring, re-vegetating and constructing water bars as needed, after completion of the project. All roads used for the timber sale would be closed or decommissioned after implementation. Currently restricted use roads that would be opened for the timber harvest would be re-closed with the existing gate after harvest activities. An additional 5.47 miles of roads would be closed. (Of those, 4.85 miles would be closed with a heavy-duty gate and 0.62 miles would be partially obliterated.) Road density would move from 3.32 to 2.22 miles². Refer to Tables 2-2 and 2-3 for a detailed description of actions on system roads.

The logging method would be a ground-based system. Fuels reduction of logging debris would include machine piling and burning. No riparian reserves would be entered.

1.5 Public Involvement

A scoping process to request public input for this analysis project was conducted. The scoping process helps to determine the focus and content of the Environmental Analysis by identifying the range of actions, alternatives, environmental effects and mitigation measures to be analyzed. Scoping is meant to be an effective method to address the concerns of affected or interested parties. A letter describing the initial Bear Knoll project and requesting comments was initially sent out on January 8, 1999. Soon after this initial scoping period, however, other priorities on the Forest arose and the Bear Knoll project was postponed. The interdisciplinary team and deciding official returned to the Bear Knoll project in 2002. Due to the length of time between the original scoping letter and returning to the analysis two years later, a second scoping letter was sent out on March 27, 2002. Numerous letters, e-mails and postcards were received during the comment periods. These comments have been incorporated into this analysis. See Chapter 4, Section 4.5 for a summary of scoping comments.

In addition to the scoping letters, the project appeared in the Fall 1998 edition of *Sprouts*, the Mt. Hood National Forest's quarterly Schedule of Proposed Action, and has appeared in subsequent editions since. Comments have been received periodically since the initial scoping period.

There has been a field trip to the planning area on July 30, 2001 with interested public groups, including members of BARK and the Oregon Department of Transportation (ODOT).

1.6 Issues

As stated previously, scoping helps the interdisciplinary team identify significant issues related to the proposed action. Public comments were received on the original proposal, which contained both thinning and regeneration harvest proposals. Comments that applied specifically to the regeneration stands are not detailed here, but are contained within the analysis file.

The public comments were separated into three categories, as follows:

1. Comments determined to be key issues that were incorporated into the alternatives.
2. Comments addressed through design features or mitigation measures.
3. Comments which were considered, but could not be addressed in this analysis.

Key Issues

The interdisciplinary team and the responsible official identified significant issues. The key issues are as follows:

Issue #1: Harvesting in Scenic Viewsheds

Public Concern: Cutting and removing trees within Scenic Viewsheds (Management Area B2) degrades the scenic quality in the area.

Management Perspective: Scenic Viewsheds have a prescribed visual quality standard in the MHFP that should be met. Both action alternatives meet the scenic quality objectives. Alternative III specifically addresses this concern by not proposing any harvest in Scenic Viewsheds.

Issue #2: Road Management/Transportation Concerns

Public Concern: Ineffective road closures and new road construction leads to higher road densities, which contribute to increased motorized use and resource impacts in the key watershed or planning area.

Management Perspective: The planning area has an existing high road density that contributes to various problems including noxious weed spread, increased soil erosion and sedimentation, and decreased wildlife security. The current open road density is 3.32 mi/mi². The MHFP has a standard for summer range for deer and elk of 2.5 mi/mi² of open road density. Both action alternatives address this issue by constructing no new roads and utilizing existing disturbed ground for access. In addition, Alternative II would close 4.85 miles of road with a heavy-duty gate and 0.62 miles with partial obliteration meeting MHFP standards and guidelines with a resultant road density of 2.22 mi/mi².

The Forest Service recognizes the importance of public access for a variety of reasons, including recreation, resource use, and forest fire protection. Alternative II closes Forest Development Road (FDR) 2640230 with a seasonal gate, that would allow for limited recreational use (winter months only) and administrative access.

Comments Addressed Through Design Features

The following comments were not determined to be key issues in relation to the purpose and need of the project; however, the interdisciplinary team and the responsible official made adjustments to the design of the action alternatives, where possible.

Comment: Connectivity between large-scale late successional reserves would not be maintained. Dispersal habitat would be reduced.

Response: The White River Late Successional Reserve Assessment addressed spotted owl areas of concern and connectivity between LSR's through matrix lands. Neither action alternative reduces the basal area below what is required for dispersal habitat.

Comment: No harvest in riparian reserves.

Response: Both because of public comments and internal concerns, it was decided that there would be no treatments in the riparian reserves within the project area. The interdisciplinary team excluded stands in riparian reserves in order to maintain water quality. It was also recognized that the stands in riparian reserves were non-commercial in size. Field reconnaissance identified unmapped wet areas; these were added to the project maps and will not be proposed for treatment.

Comment: No treatments in roadless areas.

Response: The Bear Knoll planning area has no inventoried roadless areas. Road management in general has been treated as a key issue and is addressed above. There would be no new road construction in either action alternative.

Comment: Use existing skid trails and landings where possible.

Response: This has been incorporated as a design feature for both action alternatives.

Comment: Entry into stand 235 will likely have a negative effect on water quality.

Response: After further analysis, this stand was dropped from the proposal to retain water quality standards.

Comments Considered But Not Addressed Through This Analysis

Comment: Harvesting in Old Growth Areas

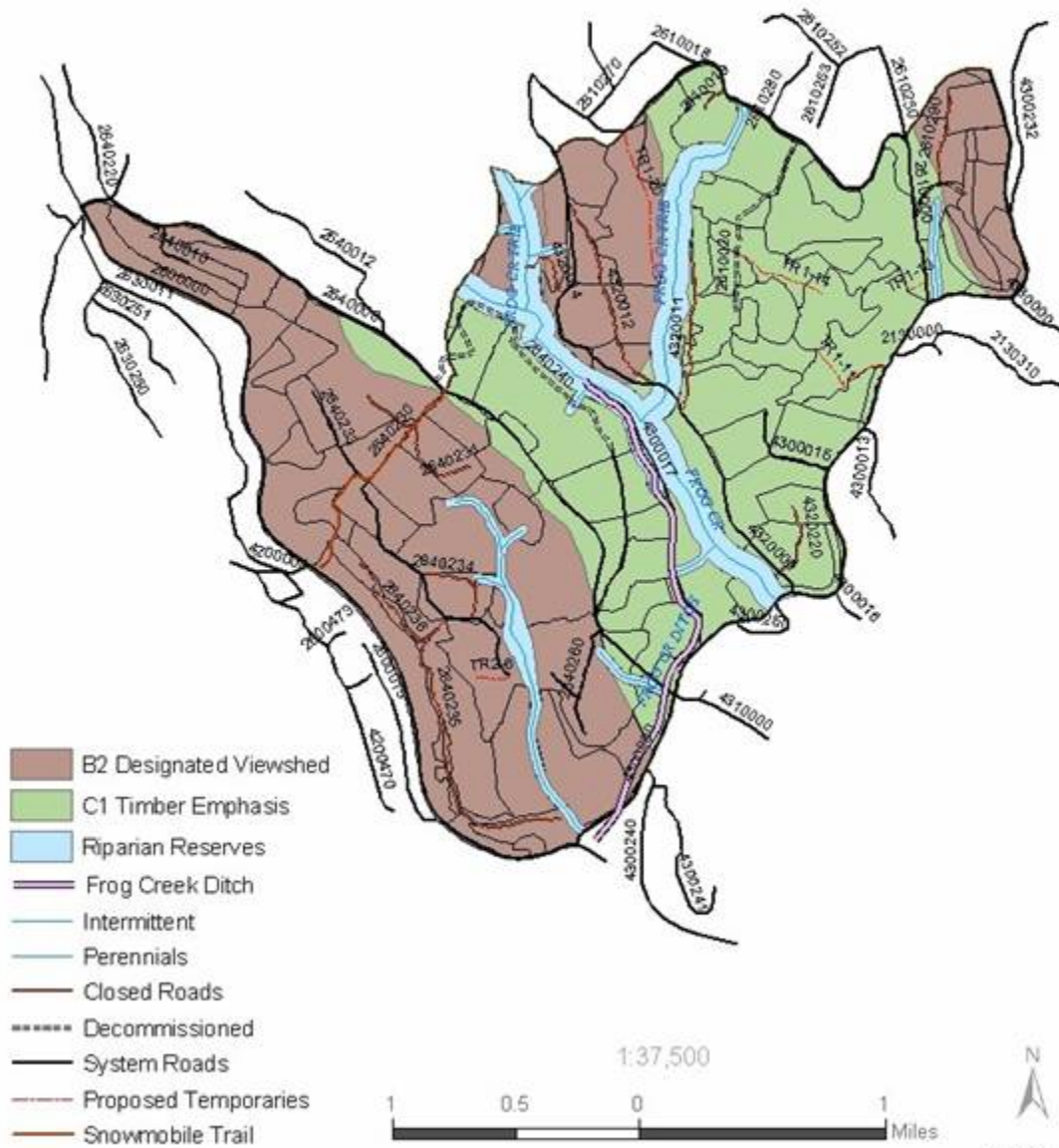
Cutting and removing old-growth (mature and late-successional) in the Bear Knoll planning area is a loss of social values, and biological and physical processes.

Response: Old growth forests are specific to vegetation layer and cover types and are defined here as “ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function” (Region 6 Interim Old Growth Definition, June 1993). Stands in this project are approximately 70 to 95 years old and diameters average 13 to 16 inches in the overstory and range from 7 to 12 inches in the midstory. Neither action alternative proposes to harvest any old growth as defined above.

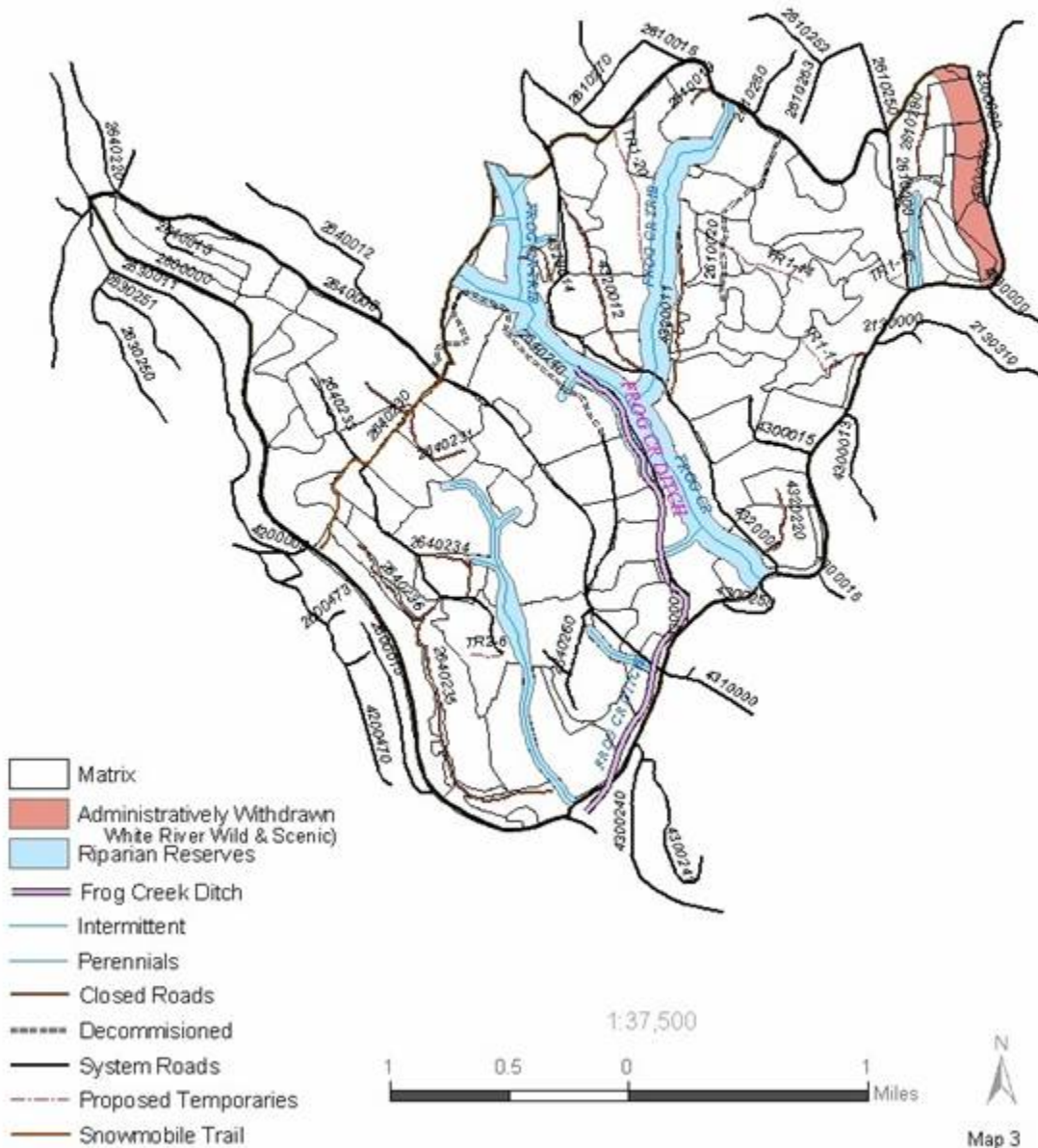
Comment: Stand 211 appears to have no commercial value

Response: This stand is included in the proposal because the average diameter is 12-13 inches diameter breast height, with 300-400 square feet of basal area.

Bear Knoll Planning Area Mt. Hood Forest Plan



Bear Knoll Planning Area Northwest Forest Plan



CHAPTER 2 - ALTERNATIVES

2.0 Introduction

This chapter describes and compares the alternatives considered for the Bear Knoll project. It includes a description and map of each action alternative. This section also presents the alternatives in comparative form, emphasizing the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

2.1 Alternative I – No Action

Under the No-action alternative, current management plans would continue to guide management of the project area. This alternative is analyzed to offer a baseline for the potential effects of the proposed action and its alternative.

Using this baseline, activities such as hunting, driving for pleasure, and wood-cutting would continue. Management activities such as road maintenance, noxious weed control, grazing and fire suppression would also continue. No timber harvest or other associated actions would be implemented to accomplish project goals. No additional roads would be opened or utilized. No roads would be closed under this proposal and open road density would remain at 3.32 miles per square mile, exceeding Forest Plan standards and guidelines.

2.2 Alternative II – Proposed Action

The action proposed by the Forest Service to meet the purpose and need is to thin 531 acres within the Bear Knoll planning area. Stands proposed for thinning consist primarily of overcrowded mid seral blocks that average 70-95 years of age. The current stands range from 120-400 square feet of basal area, with 220-600 trees per acre. The species mix is similar in each stand, but stands exhibit various concentrations and distributions of species. Western hemlock, noble fir, and grand fir generally dominate the overstory with minor to moderate amounts of western red cedar. Douglas-fir, western white pine and western larch are scattered throughout. Overstory diameters average approximately 13-16 inches diameter breast height (DBH). Midstory diameters average from 7-12 inches DBH. Overall heights in the project area average 75 feet. The stands average 3-4 snags/acre and 3-4 downed logs/acre. The distribution is scattered in some stands and concentrated in others.

This alternative would reduce the basal area to an average range of 120-160 square feet (220-293 trees per acre). Preferred species, such as Douglas-fir, larch, and noble fir, would be left where they are present in the stands. Existing remnant trees would be left on-site. Snags would be left at the rate of four per acre. Down woody debris would be retained in the treated stands at 240-500 lineal feet per acre and 3-10 % ground cover per acre.

Under the proposed action, a ground based logging system would be used. Fuels reduction of logging slash would be accomplished by machine piling and burning. No riparian reserves would be entered. Table 2-1, below, shows individual stands proposed for thinning.

The action would temporarily open 3.62 miles of currently restricted use road (closed with a gate), bring 1.16 miles of physically closed road (decommissioned) up to standard, and utilize 1.46 miles of existing disturbed ground (such as existing skid trails) as temporary road. Road maintenance would range from pre-haul maintenance to reconstruction. Temporary roads would

be partially obliterated, which includes ripping, re-contouring, re-vegetating and constructing water bars as needed, after completion of the project. Currently restricted use roads that would be opened for the timber harvest would be re-closed with the existing gate after harvest activities. Additionally, 4.85 miles of roads would be closed with a heavy duty, seasonal gate that would be open for winter recreation and 0.62 miles would be partially obliterated. This proposal addresses Key Issue #2 to reduce road miles in the planning area after harvest. The resultant open road density would be 2.32 mi/mi². Refer to Tables 2-2 and 2-3 for a detailed description of actions on system and temporary roads.

Under this alternative, activities such as hunting, driving for pleasure, and wood-cutting would continue. Management activities such as road maintenance, noxious weed control, grazing, and fire suppression would continue. Forest Development Road 2640230 would continue to be used as part of the snowmobile system. See Map 4 for locations of stands in Alternative II.

Table 2-1 Individual Thinning Stands

Stands	Acres	Existing Condition	Desired Condition
139	77	Basal Area: 240-360 ft ² Stand Attributes: two storied stand, Root Rot pockets, Western Larch, Douglas-fir, and true firs, dense	Desired Basal Area is 140 ft ² (Range of 140-160 ft ²), retain minor species
146 (North side)	57	Basal Area: 200-240 ft ²	Desired Basal Area is 150 ft ² (Range of 140-160 ft ²) Remnant trees will be left in stand (6-7 per acre), retain minor species
146 (South side)		Basal Area: 120-360 ft ² Stand Attributes: some remnant trees, thick, small trees, larger trees already logged	
160	14	Basal Area: 240 –280 ft ² Stand Attributes: canopy gaps in stand, no residual trees, root rot and mistletoe pockets, down wood is light & scattered	Desired Basal Area is 160 ft ² (Range of 140 – 160 ft ²), retain minor species
164	50	Basal Area: 200 –240 ft ² Stand Attributes: canopy gaps in stand, few residual trees, root rot pockets, down wood is light	Desired Basal Area is 160 ft ² (Range of 140 – 160 ft ²), retain minor species
167	19	Basal Area: 240 – 360 ft ² Stand Attributes: canopy gaps in stand, no residual trees, root rot pockets, a lot of down wood concentrated in root rot pockets	Desired Basal Area is 140 ft ² (Range of 140 – 160 ft ²), retain minor species
174	76	Basal Area: 200-400 ft ² Stand Attributes: existing skid roads, root rot pockets, 60% Noble fir	Desired Basal Area is 140 ft ² (Range of 140-160 ft ²), retain minor species
175	40	Basal Area: 200-280 ft ² Stand Attributes: Western hemlock root rot pockets, mistletoe	Desired Basal Area is 160 ft ² (Range of 150-160 ft ²) Maintain the stand with a higher basal area, retain minor species
177	55	Basal Area: 200-280 ft ² Stand Attributes: root rot pockets scattered throughout	Desired Basal Area is 140 ft ² (Range of 140-160 ft ² .) retain minor species in stand

211 & 225	111	Basal Area: 300-400 ft ² Stand Attributes: Stem decays in stand	Desired Basal Area is 120 ft ² (Range of 120-140 ft ²) Retain minor species; retain Western Red Cedar if possible
220	8	Basal Area: 240-280 ft ² Stand Attributes: stand has a mid story & understory, many remnants, Indian Paint present in stand	Desired Basal Area is 160 ft ² (Range of 150-160 ft ² .), retain minor species
217	3	Basal Area: 300 – 340 ft ²	Desired Basal Area is 140 ft ² (Range of 140-160 ft ²)
186	21	Basal Area: 280-300 ft ² Stand Attributes: Stand has scattered openings	Desired Basal Area is 140 ft ² (Range of 140-160 ft ² t)
Total Acres:	531		

Table 2-2 Temporary Roads Used in Alternative II				
Road Number	Accesses Stand	Type of Road	Length	Condition after project
TR1-11	174, 175, 186	Temporary	0.40	Rip & Re-contour
TR1-13	174, 175, 164	Temporary	0.08	Rip & Re-contour
TR1-14	164, 167, 175, 177	Temporary	0.40	Rip & Re-contour
TR1-20	139	Temporary	0.43	Rip & Re-contour
TR2-6	146	Temporary	0.15	Rip & Re-contour
		Total miles	1.46	

Table 2-3 System Roads Used in Alternative II				
Road Number	Accesses Stand	Type of Road	Length	Condition after Project
2610000	139, 160, 164, 167, 174, 175, 177, 186, 217 & 220	Open System Road	2.32	Open System Road
2610020	164, 167, 175, 177	Decommissioned Road will need to be added to system & re-opened.	0.85	Level 1 System Road, obliterate site distance and disguise
2610026	217, 220	Decommissioned Road, will need to be added to system & re-opened	0.31	Level 1 System Road, obliterate site distance and disguise
2640000	146, 211, 225	Open System Road	3.39	Open System Road
2640260	211, 225	Open System Road	0.46	Level 1 System Road, obliterate site distance and disguise beyond the dispersed site
2640261	211, 225	Open System Road	0.16	Level 1 System Road, obliterate site distance and disguise
2640230	146	Open System Road, part is used as a snowmobile trail	1.62	Level 1 System Road, regulated closure, Closed with seasonal gate (effectively closing 4.85 miles of road)
4320000	160, 167, 177, & 186	Closed System Road, closed by seasonal gate, used as snowmobile route	2.22	Level 1 System Road, closed by seasonal gate
4320011	160, 167, 177 & 186	Closed system road, will need to be re-opened	0.53	Closed System Road, closed by seasonal gate

4320012	139	Closed System Road, closed with seasonal gate	0.60	Closed System Road, closed by seasonal gate
		Total Miles	12.46	



2.3 Alternative III

Alternative III is designed to respond to public concern regarding harvest in scenic viewsheds. To address this concern, Alternative III proposes to thin 289 acres, all within the timber emphasis management area (C1) and defer harvest in designated scenic viewsheds (B2). Like Alternative II, this alternative would reduce the current average stand basal area range to 120-160 square feet. Species such as Douglas-fir, larch, and noble fir would be left where they are present in the stand. Existing remnant trees would be left. Snags would be left at the rate of four per acre. Down woody debris would be retained in treated stands at 240-500 lineal feet per acre and 3-10 % ground cover per acre.

The action would temporarily open 3.62 miles of currently restricted use road (closed with a gate), bring 1.16 miles of physically closed road (decommissioned) up to standard, and utilize existing disturbed ground (such as existing skid trails) for 0.88 miles of temporary road. Road maintenance would range from pre-haul maintenance to reconstruction. Temporary roads would be partially obliterated, which includes ripping, re-contouring, re-vegetating and constructing water bars, as needed, after completion of the project. Currently restricted use roads that would be opened for the timber harvest would be re-closed with the existing gate after harvest activities. No additional roads would be closed under this alternative. This proposal addresses Key Issue #2 by using existing disturbed ground for roads and skid trails. The open road density would remain the same, 3.32 mi/mi². Refer to Tables 2-2 and 2-3 for a detailed description of actions on system and temporary roads.

A ground based logging system would be used. Fuels reduction of activity fuels would be accomplished by machine piling and burning logging slash. No riparian reserves would be entered. Table 2-4, below, shows individual stands included in this alternative.

Under this alternative, activities such as hunting, driving for pleasure, and wood-cutting would continue. Management activities such as road maintenance, noxious weed control, grazing, and fire suppression would continue.

Stands	Acres	Existing Condition	Desired Condition
160	14	Basal Area: 240 –280 ft ² Stand Attributes: canopy gaps in stand, no residual trees, root rot and mistletoe pockets, down wood is light & scattered.	Desired Basal Area is 160 ft ² (Range of 140 – 160 ft ²), retain minor species.
164	50	Basal Area: 200 –240 ft ² Stand Attributes: canopy gaps in stand, few residual trees, root rot pockets, down wood is light.	Desired Basal Area is 160 ft ² (Range of 140 – 160 ft ²), retain minor species.
167	19	Basal Area: 240 – 360 ft ² Stand Attributes: canopy gaps in stand, no residual trees, root rot pockets, a lot of down wood concentrated in root rot pockets.	Desired Basal Area is 140 ft ² (Range of 140 – 160 ft ²), retain minor species.
174	76	Basal Area: 200-400 ft ² Stand Attributes: existing skid roads, root rot pockets, 60% Noble fir	Desired Basal Area is 140 ft ² (Range of 140-160 ft ²), retain minor species.

175	40	Basal Area: 200-280 ft ² Stand Attributes: Western hemlock root rot pockets, mistletoe.	Desired Basal Area is 160 ft ² (Range of 150-160 ft ²) Maintain the stand with a higher basal area, retain minor species.
177	55	Basal Area: 200-280 ft ² Stand Attributes: root rot pockets scattered throughout.	Desired Basal Area is 140 ft ² (Range of 140-160 ft ²) retain minor species in stand
211	14	Basal Area: 300-400 ft ² Stand Attributes: Stem decays in stand	Desired Basal Area is 120 ft ² (Range of 120-140 ft ²) Retain minor species; retain Western Red Cedar if possible
Total Acres:	289		

See Map 5 for stands in this alternative.

Road Number	Accesses Stand	Type of Road	Length	Condition after project
TR1-11	174, 175, 186	Temporary	0.40	Rip & Re-contour
TR1-13	174, 175, 164	Temporary	0.08	Rip & Re-contour
TR1-14	164, 167, 175, 177	Temporary	0.40	Rip & Re-contour
		Total miles	0.88	

Road Number	Accesses Stand	Type of Road	Length	Condition after Project
2610000	160, 164, 167, 174, 175, 177 & 186	Open System Road	2.32	Open System Road
2610020	164, 167, 175, 177	Decommissioned Road, will need to be added to system & re-opened.	0.85	Level 1 Road, obliterate site distance and disguise
2640000	211	Open System Road	3.39	Open System Road
4320000	160, 167, 177, & 186	Closed System Road, closed by super gate, used as snowmobile route	2.22	Level 1 Road, closed with super gate
4320011	160, 167, 177 & 186	Closed system road, will need to be re-opened	0.53	Closed System Road, closed by super gate
		Total miles	9.81	

See Map 6 for the transportation system.

2.4 Alternatives Considered But Not Fully Developed

Combination of Thinning and Regeneration Treatments

The Bear Knoll Thinning project was first proposed to the public in 1998 as part of a larger project within the Bear Knoll planning area. This larger proposal included an alternative to treat 217 acres with regeneration harvest. The regeneration harvest stands identified in scoping are not proposed in this project, nor are they identified as future planning efforts.

Restoration Only Alternative

Some of the comments received from the public indicated they were interested in seeing a restoration alternative, where actions would be limited within the Bear Knoll planning area to projects that restore natural forest conditions in lieu of commercial logging. This alternative was not brought forth into the analysis because it was determined by the interdisciplinary team early in the process that this alternative would not meet the purpose and need for action.

Alternative Including Hazard Tree Removal

Another comment received addressed the concern over hazard trees along high-use roads. A request for an alternative, which included hazard tree removal for public safety, was received. After meeting with the Oregon Department of Transportation, a mutual determination was made that hazard trees along Highway 26 (the major high-use road in the planning area) was not an issue, and it was therefore not brought forward into the analysis.

Helicopter Logging Alternative

The team considered a Helicopter Logging alternative. Both the areas of Alternative II and III were analyzed for helicopter logging. Neither area was economically feasible to harvest using a helicopter. The team instead focused on using previously disturbed ground in this heavily-roaded area.

Changes made to the Original Bear Knoll Thinning Alternative II

The ID Team analyzed stands that were identified in the original thinning alternative. The following stands were dropped from treatment for various resource concerns.

Stand Number	Reason for Dropping
144, 161	Trees short and small for thinning
202	Off site pine stand, trees too short and small for thinning
202, 148, 237 Riparian Reserve	Trees too small for thinning, No harvest in Riparian reserves
212	Between ditch and FDR 43000, needed for screening, shade for ditch
230	Stand needs a regeneration harvest rather than a thinning

2.5 Best Management Practices (BMPs) and Design Criteria

BMPs and Design Features Common to all Action Alternatives:

Sections 208 and 319 of the Clean Water Act of 1972, as amended (1977 and 1987) acknowledge land treatment measures as being an effective means of controlling non-point sources of water pollution and emphasizes their development. These land treatment practices are known as Best Management Practices, (BMPs). BMPs are identified in the Forest Plan as a practice or combination of practices that are the most effective and practical (including technological, economic and institutional considerations) means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals.

BMPs are applied as a system of practices rather than a single practice. They are designed to accommodate site-specific conditions and are incorporated into the design features. Site-specific design features include such things as the design of project units, in which boundaries are moved

to exclude seeps and springs found during planning. BMPs are identified within the Design Features below:

Harvest Systems

1. Where possible, use existing skid trails (BMP).
2. All paint marking that would be visible from Forest Development Road 4300 would face away from the road.
3. Directionally fall trees away from riparian reserves (BMP).
4. Rutting within skid trails should not exceed 12 inches in depth over more than 10 percent of a designated skid trail system.

Fuels Treatments:

1. The preferred method of treatment for units with activity fuels in the excess of 26.7 tons per acre is machine piling and burning.
2. Piling of down woody material, 9 inches in diameter and larger, should be avoided.
3. To the extent feasible, machine piles would be located on skid trails and landings (BMP).
4. All prescribed burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon State Implementation Plan to minimize the adverse effects on air quality. Burning would be conducted when smoke dispersion conditions are favorable. (Forest Plan, Chapter four, Standard FW-040).
5. All prescribed burning of activity fuels would comply with Forest Service Manual direction (Forest Service Manual 5100, Chapter 5140).

Aquatic Resources:

1. Log trucks or logging equipment shall not use Forest Development Road 4320 between the 4320012 and 4320014 junction.

Wildlife Requirements:

1. Leave 4 dead trees/acre, (minimum 16 inches diameter breast height and 40 feet tall) as wildlife trees. Leave green trees if no dead trees are available.
2. All other snags would be left, except those identified as safety hazards.
3. Leave a minimum of 240-500 lineal feet per acre of down woody material and 3-10 percent ground cover. Preference is for full-length trees.
4. A regulative closure (Code of Federal Regulations) would be placed on Forest Development Roads 2640230 and 4320000, except for vehicles under 40 inches wide from December 1st to April 1st.
5. A seasonal restriction (March 1-July 15) would be placed on all harvest operations within 0.25 miles of the proposed stands associated with LSRs.

Recreation

1. Designated snowmobile trails would utilize a locking gate capable of being opened with 12 inches of snow.
2. No logging would occur during snowmobile use periods.

Visuals

1. No stumps would be visible along Forest Development Road 4300, and trees would be marked away from roads.

Noxious Weeds

1. Prior to coming onto National Forest system lands, the purchaser/contractor would employ whatever cleaning methods are necessary to ensure that off road equipment is free of soil, seeds, vegetative matter or other debris that could contain or hold seed. Cleaning of equipment may include pressure washing or use of compressed air and shall be done outside of the Mt. Hood National Forest Boundary. The Contract Officer or Inspector shall enforce the specification as per FSM #2080.44-8 by inspecting all heavy equipment and machinery before allowing operation at the project site. An inspection report shall be filed in project contract folders for administrative review and/or audit. The inspection report should include: a) The last location that the contractor's equipment was operated prior to entering the Mt. Hood National Forest, b) the location of the cleaning station, and c) the date of equipment inspection and the results. Imported gravel, soil, and/or rock shall come from a certified weed-free source; certification may be requested from the residing county weed and pest control division or from a Forest Service botanist upon inspection of the source. Gravel and soil that is recovered, removed, or excavated from roads, ditches, or culverts in the project area should remain onsite if possible or may be moved to an approved storage area off-site if necessary. Consult with the district botanist to identify storage sites.
2. Revegetation of partially obliterated roads, landings, or temporary skid trails would be completed after project completion when weather conditions are feasible. The purchaser would use acceptable native or non-persistent non-native seed mixes at the site. Any straw mulch that is purchased for erosion control would be certified weed-free.
3. If noxious weed plants are emergent, during harvest activities, pretreatment using approved control methods prior to project activity on all proposed roads would be required. Species-specific bio-controls would be utilized to assist with approved control applications as per weed treatment plans. Treatment would continue as needed for up to 5 years. Monitoring data would be collected prior to and after each treatment and treatment would be adjusted as necessary to control noxious weed infestations.

Transportation

1. Restrict commercial haul when soil moisture is high enough for subgrade material to be in its plastic limit (BMP).
2. Long-term road closures would include gates and partial obliteration.
3. Partially obliterate temporary roads and skid trails, which would include ripping, re-contouring, re-vegetation, and water barring as necessary (BMP).
4. Time construction activities to minimize erosion (BMP).
5. Control surface road drainage to disperse runoff and minimize erosion and sediment from the road (BMP).
6. Appropriate water sources would be selected for compacting and dust abatement that assure stream flow and fish protection measures are met.
7. Spoils and brush disposal locations would be pre-located to reduce the likelihood of spreading noxious weeds.

Design Features Specific to Alternative II

Install a heavy-duty gate (supergate) at the end of Forest Development Road 2640235, between the end of the road and the snowmobile access tunnel.

Effectiveness of Best Management Practices

Extensive water quality monitoring within the Bull Run Watershed indicated that implementation of BMPs resulted in no effect on turbidity or suspended sediment from timber harvest operations (Bull Run Annual Activity Schedule 1994, page 39).

In the Oregon Coast Range and western Cascade Mountains riparian buffers of 100 feet or more have been reported to provide as much shade as undisturbed late successional/old-growth forests (Steinblums 1977), so activities associated with Alternatives II and III should not affect stream shade.

Effectiveness of stream buffers at improving water quality adjacent to logging operations was studied in three watersheds in western Washington and found that 200 foot buffers would be effective to remove sediment in most situations if the buffer were measured from the edge of the floodplain (FEMAT). Activities associated with Alternatives II and III are greater than 200 feet from streams and the associated floodplains so there would be no effects anticipated to sediment deposition.

The effectiveness of water quality BMPs are further discussed in Chapter 3, Section 3.1.

Monitoring of Best Management Practices

The Project Specific BMPs and practices listed above are standard operating procedures and they have been implemented in many previous projects. Past experience, research and monitoring indicate that these practices are highly implementable and highly effective based on the criteria found in the Forest Plan.

Once the BMPs are identified and implemented, monitoring is done on a Forest-wide basis to determine their effectiveness. After harvest operations are completed, these BMPs would be included in the pool of Forest wide projects available for monitoring their effectiveness. Monitoring implementation of project specific BMPs is ongoing during project planning, layout and sale administration. Monitoring reports can be found on the Forest's web site at <http://www.fs.fed.us/r6/mthood> under Forest Publications.

After planning, a cross walk would be prepared to check the provisions of the Timber Sale Contract and other implementation plans with the EA to insure that required elements have been accounted for.

During implementation, Timber Sale Administrators monitor compliance with the Timber Sale Contract which contains provisions for resource protection including but not limited to: seasonal restrictions, snag and course woody debris retention, stream protection, erosion prevention, soil protection, road closures and protection of historical sites.

Post harvest reviews would be conducted where needed prior to post harvest activities such as slash treatment, or firewood removal. Suitable nesting and dispersal habitat or non-habitat and snag and course woody debris retention is reviewed. Level II surveys of perennial fish bearing creeks would continue. Based on these reviews, post harvest activities would be adjusted where needed to achieve project and resource objectives.

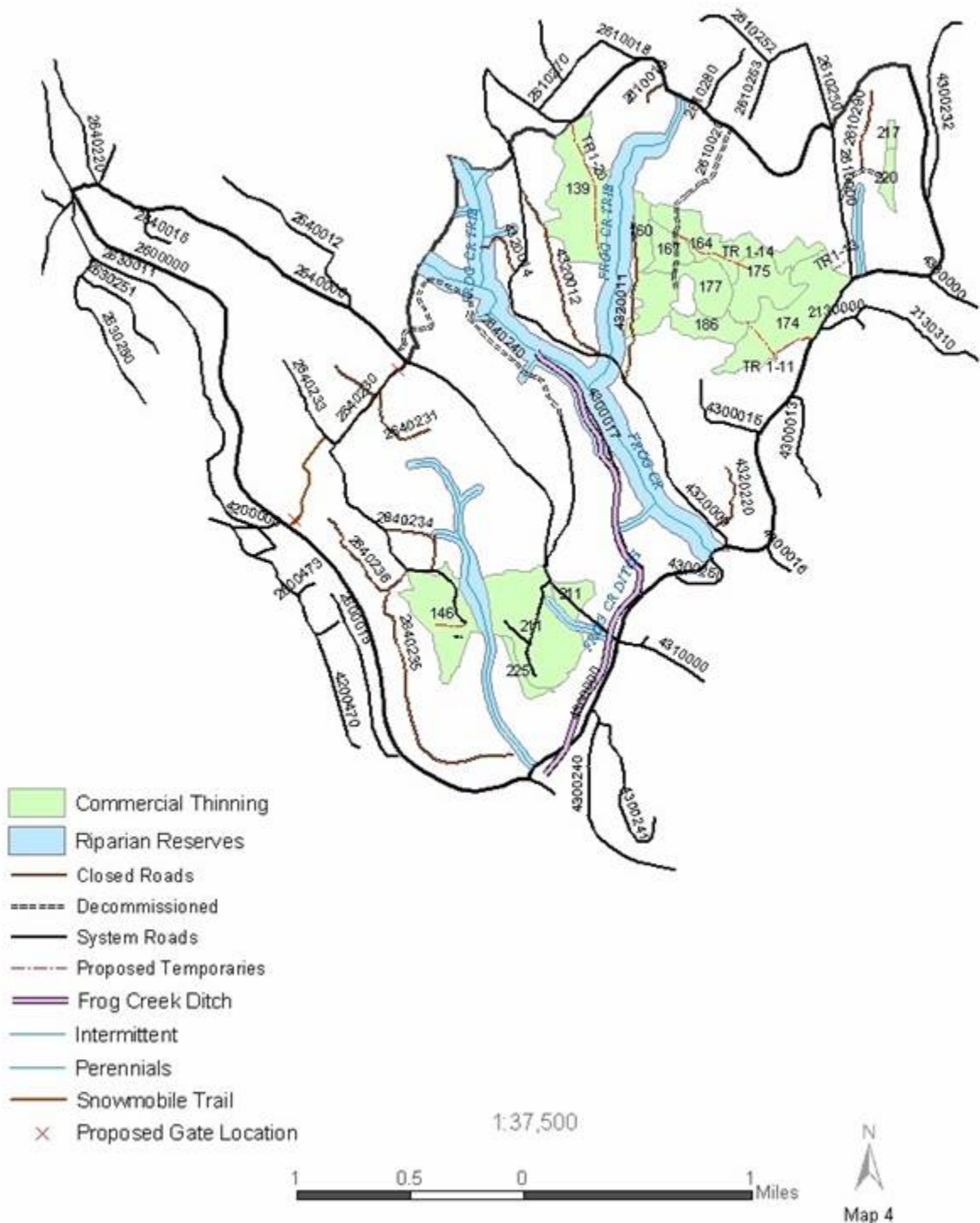
Monitoring of noxious weeds and invasive plants would be conducted where appropriate to track changes in populations over time and corrective action would be prescribed when needed.

2.6 Comparison of Alternatives

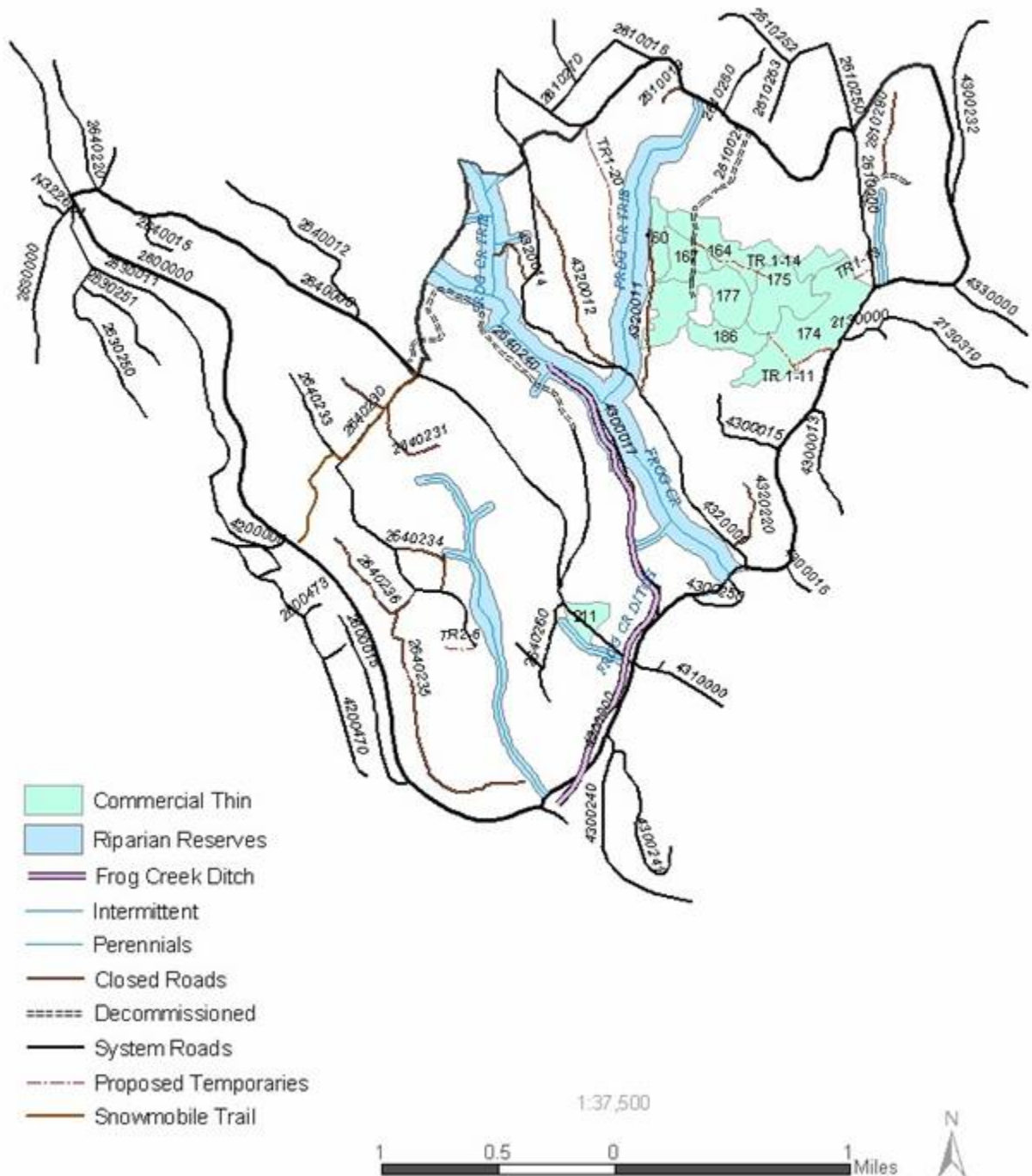
This section provides a comparison of implementing each alternative. Information in Table 2-7 is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2-7 Alternative Comparison			
	Alternative I No Action	Alternative II Proposed Action	Alternative III
Key Issue #1 Harvesting in Scenic Viewsheds	No harvest	Harvest of 242 acres in Scenic Viewshed (B2)	No harvest in Scenic Viewshed (B2)
Key Issue #2 Road Management/ Transportation Concerns			
<ul style="list-style-type: none"> • Use of Existing Roads and Previously-disturbed Ground • Miles of Roads Closed 	N/A 0 Miles	All roads on existing roadbeds and previously-disturbed ground 5.47 Miles	All roads on existing roadbeds and previously disturbed ground 0 Miles
Acres of Stand Improvement	0 Acres	531 Acres	289 Acres
Approximate Timber Output	0.0 MMBF	4.4 MMBF	2.4 MMBF

Bear Knoll Planning Area Thinning Alternative II



Bear Knoll Planning Area Thinning Alternative III



Map 5

Bear Knoll Planning Area Transportation Map



- Closed Roads
- ==== Decommissioned Roads
- Non System
- Road System
- Snowmobile Trail
- Stand Delineation



See 04-20

CHAPTER 3—ENVIRONMENTAL EFFECTS

3.0 Introduction

This chapter describes the existing environmental resources that would be affected by the alternatives if they were implemented. This description, combined with the description of effects of implementing the Proposed Action or the action alternatives provides the basis for evaluating the alternatives and their effects on resources.

Cumulative effects analysis includes past, present, and reasonably foreseeable future activities. Included are: timber harvest activities, slash treatment, opening roads and road closures, noxious weed treatment, recreation and OHV use, gathering of forest products, cattle grazing, and transportation of water for irrigation.

3.1 Aquatic Resources and Fisheries

Surface Water Resources

The planning area (about 3,574 acres) is located in the White River fifth-field watershed. White River has been identified in the NWFP as a Tier 2 Key Watershed where high quality water is important, but may not contain at-risk fish stocks, (NWFP, p. B-91).

The planning area is located in three sixth-field subwatersheds of White River watershed: Frog Creek (1,978 acres), Clear Creek (1,443 acres), and White River Gorge (150 acres). The middle reaches (II, III) of Frog Creek (tributary to Clear Creek), along with multiple unnamed tributaries to Frog Creek, are the primary waterways in the planning area. Frog Creek irrigation ditch headgate is located in the planning area, which flows into Clear Creek, then immediately feeds into the headgate of Clear Creek irrigation ditch.

White River originates from the White River Glacier located on the eastern flanks of Mt. Hood. Elevation in the watershed ranges from 6,525 feet to 800 feet. Precipitation amounts range from 12 inches to 100 inches per year.

The White River Watershed starts to become segmented about one mile from its confluence with the Deschutes River by a series of falls with the upper most falls, White River Falls at river mile (RM) 2.0. White River Falls stands at about 180 feet and is impassable to all upstream migrating fish. Below this point, Middle Columbia River (MCR) Evolutionary Significant Unit (ESU) summer steelhead trout *Oncorhynchus mykiss*, MCR spring chinook salmon *O. tshawytscha*, and bull trout *Salvelinus confluentus* have access. Above the falls, only native resident interior redband trout *O. mykiss gairdneri*, sculpin *Cottus spp.*, non-native resident rainbow trout *O. mykiss iridius* (hatchery stocks), and brook trout *S. fontinalis* are present.

There are approximately 9.4 miles of stream channels within the planning area. Approximately 5.6 miles of these streams are fish bearing streams/waterways, of which about 2.0 miles are located in the Frog Creek irrigation ditch.

Frog Creek is the primary stream that flows through the planning area. Multiple unnamed fish bearing tributaries of Frog Creek are present in the planning area. Frog Creek irrigation ditch flows in the planning area before it connects with Clear Creek.

Frog Creek

Frog Creek is a moderate to small sized stream with boulder to sand substrates present. Stream gradient is considered low ranging from 1.5 to 2 percent gradient. Fish habitat conditions are considered good due to a dense understory of shrubs overhanging the stream channel, as well as in-channel wood providing cover for fish in Frog Creek. Large woody debris (LWD) plays a vital role in defining the channel's characteristics, while creating and maintaining complex habitat such as quality pools, hiding cover for fish, and it also retains substrates.

The 1997 Frog Creek Stream Survey indicates that the MHFP standard for fine sediment (spawning habitat should retain less than 20 percent fine sediment, material less than 6mm, FW-097) in the Bear Knoll Planning area is not being met. Upstream of the diversion the associated stream reach has 50 percent fine sediments, and downstream of the diversion the stream reach has 56 percent fine sediments. This is in part due to past activities including timber harvest and road construction. In addition, due to the draw down by irrigation ditches, the streams do not get seasonally flushed and sediment layers build up.

A survey completed by the Oregon Department of Environmental Quality (ODEQ) in August of 2000 on a tributary to Frog Creek in the planning area indicates that 55.4 percent of the stream substrate is embedded. NOAA Fisheries Matrix of Pathways and Indicators indicates that the system is not properly functioning if embeddedness levels are greater than 30 percent. Based on the data collected for this survey a comparison to MHFP standards was not possible.

The MHFP standard for LWD is 106 pieces per mile (see Table 3-1) that are at least 35 feet long, and greater than 12 inches in diameter at the small end of the log (MHFP FW-094 and 095). Stream survey data from 1997 shows Frog Creek reaches 2 and 3 are not meeting the MHFP standard for LWD.

Pool habitat quality in Frog Creek is considered low, because pools are not well defined due to low residual depths. Fine gravels and sediment are the primary pool substrates. Due to the stream having a low gradient, step pool sequences are non-existent. Hydraulic controls were comprised by substrates 63 percent of the time, 20 percent from wood, and 17 percent from a combination of wood and substrates.

The MHFP standard for primary pools per mile requires a minimum three-foot deep pool, every five to seven bankfull widths for cobble-dominated streams. Based on the morphology of Frog creek, Reach 2 of Frog Creek should have approximately 82.9 primary pools (at least 3' deep) per mile. Reach 3 of Frog Creek should have approximately 34.4 primary pools per mile. The White River Watershed Analysis, 1995 (WRWA) displayed that this is far outside the range of natural conditions (RNC) for this watershed, being more characteristic of anadromous, west side streams. The WRWA did define the importance of measuring all pools but did not give a RNC for the watershed, stating that the RNC should be calculated by stable channel morphology and stable channel forms. Pool frequency will typically increase with increased stream gradient. A B4 stream channel type with a gradient <2 percent will typically have a pool-to-pool spacing of 3-4 bankfull channel widths, and a B4c stream channel type will typically have a pool to pool spacing of every 4-5 bankfull channel widths (Rosgen 1996). Reach 2 of Frog Creek has been identified as a B4c channel type, and therefore, should range between 116 and 145 pools per mile. Reach 3 of Frog Creek has been identified as a B4 channel type, and therefore, should range between 60 and 80 pools per mile. Review Table 3-1 for primary pools per mile in Frog Creek.

Table 3-1 LWD, Pools, and Primary Pools for Frog Creek						
Stream	Reach	Percent Surface fines <1 mm- (MHFP Standard <20%)	LWD/Mi (MHFP Standard is 106)	Primary Pools (3'+)/Mi	MHFP Standard Primary Pools/Mi (3'+)	Rosgen Channel Type
Frog Cr.	1	36*	40	0.6	52.4	B4
Frog Cr.	2	46	25	0.0	82.9	B4c
Frog Cr.	3	49	30	0.8	34.4	B4
Frog Cr.	4	40	40	0.0	87.7	B4c

Segments of Reaches 2 and 3 are located in the planning area.

* = Average percent fines from two sites in Reach 1 of Frog Creek between RM 0.0-2.5

Frog Creek Irrigation Ditch and Clear Creek

Frog Creek irrigation ditch is a perennial fish-bearing ditch, and flows into a natural fish bearing stream channel (Clear Creek). Therefore, the MHFP mandates the forest place a perennial fish-bearing Riparian Reserve on the constructed ditch in order to maintain a suitable water temperature for fish using Clear Creek. Brazier and Brown (1973) state that, "Direct solar radiation can be transmitted, absorbed, or reflected." Ice (2000) concluded, "Only direct solar radiation (not diffused) can possibly affect stream temperatures." Therefore, the riparian reserve widths along irrigation ditches on Forest, which flow back into natural stream channels only require enough area to provide shade to the water channel, such as two site potential tree heights, which in this area of the planning area is about 200 feet. Therefore a 200-foot riparian reserve width was placed on Frog Creek ditch.

The WRWA (page 6-11, paragraph 7) recommends giving Frog Creek irrigation ditch a riparian area land allocation. As stated in the WRWA, "Establish a perennial fish-bearing Riparian Reserve on any ditches that use natural channels and are fish-bearing. The purpose of such a reserve is to maintain a suitable water temperature for fish using the natural channels. This Reserve along the constructed portion of the ditch is not intended to prohibit maintenance to protect its function as a water transmission corridor. This Reserve is intended to be consistent with the management strategy of the MHFP (see FW-085, FW-086, FW-706, FW-707, FW-708, B7-049, and B7-050)."

Large woody debris in the Frog Creek irrigation ditch is undesirable due to high maintenance costs to remove the LWD and the damage, which could occur from LWD being in the ditch, such as blowing out the dirt fill berm. Future recruitment of LWD in the ditch is also undesirable. Since the LWD is undesirable in the ditch and shading is all the ditch is managed for, the 200-foot buffer is sufficient for maintaining stream temperature.

Frog Creek irrigation ditch is fish bearing because there are no fish screens at either end of the ditch. An exception to fish screening of water diversions for fish bearing streams has not been given to Frog Creek irrigation ditch. Therefore, the Juniper Flat Improvement District is not currently in compliance with MHFP Standard and Guideline FW-143 (All water diversions from fish bearing streams shall have screening facilities to preclude fish access into the diverted water), nor in accordance with the Oregon Revised Statute 509.615. Although not analyzed in this document, ditch companies have slowly been getting Oregon Department of Fish & Wildlife grants to install fish screens on all special use permit irrigation ditches on the Forest.

Frog Creek is the primary tributary to Clear Creek, and contributes about 10 percent of Clear Creek's total flow. Summer low flow for Frog Creek is 1 to 2 cubic feet per second. Frog Creek irrigation ditch diverts up to 80 percent of Frog Creek to the ditch, which then feeds into Clear Creek. The Juniper Flat Improvement District has a 26.34 cubic feet per second water right on Frog Creek. As an indication of the scale of the diversion, the 2-year recurrence interval storm event for the diversion point is estimated at 30 cubic feet per second. At this point the Clear Creek ditch begins, currently diverting about 70 percent of the stream flow from Clear Creek into the ditch.

These perennial flowing ditches alter the bankfull (channel maintenance flows) discharge in both Frog and Clear Creeks. This may impact fish spawning and foraging habitat by reducing the ability of fine sediment from being seasonally flushed through the system, which is inherent to mountain streams (Clear Creek riparian survey, 1990 and Rosgen, 1996).

In 1998, the ODEQ placed Clear Creek (RM 0 to 15.1) and White River (RM 0 to 12) on the Water Quality Limited 303(d) list for water temperature (Clean Water Act). However, the 7-day running average has not exceeded ODEQ standards (7-day average maximum greater than 17.8 degrees Celsius) from 1996 through 2003 at either of the two data collecting sites located in Clear Creek during the spawning or incubation period.

Frog Creek is the largest tributary to Clear Creek and currently meets Oregon State water quality standards. Frog Creek irrigation ditch is only managed to meet Oregon state water quality standards for water temperature. Water temperature data taken in Frog Creek ditch upstream of the confluence to Clear Creek was recorded only in 2003 with the 7-day average maximum being 10.5 degrees Celsius. A summer drought was experienced in 2001 and an extremely low snow pack was experienced in 2003, while 2002 was considered to have a normal water year. Water temperature was greater than 17.8 degrees Celsius for 6 consecutive days in 2001 and 0 days in 2002, though still meeting ODEQ standards. In 2003, water temperature exceeded the 17.8 degree Celsius standard for 14 consecutive days. Review Table 3-2 for additional information.

Table 3-2 Stream Temperature Summary		
Stream	Location	Days over Max 7 Day Average >17.8 ° C in multiple years from 1996 through 2003
Clear Creek	Above confluence of Camas Creek	0 (1998), 0 (1999)
Clear Creek	At Keeps Mills Campground	0 (1996, 1997, 1998, 1999, 2001, 2002, and 2003)
Frog Creek	At confluence of Frog Creek	0 (1997), 0 (2003)
Frog Creek	Frog Creek Ditch before diversion of clear Creek ditch	0 (2003)
McCubbins Gulch Creek (Clear Creek Ditch)	About 1.75 miles upstream of McCubbins Gulch Campground	6 (2001), 0 (2002), 14 (2003)
Clear Creek Ditch	In Clear Creek Ditch just below the headgate diversion	0 (2001), 0 (2002), 0 (2003)

Hydrological Effects

Direct and Indirect Effects of Alternative I

Under the no action alternative there would be no roads temporarily opened or reconstructed. No timber harvest activities would occur. Therefore there would be no effects to stream temperature or sediment yield associated with this alternative.

For this alternative, there are no short-term or long-term effects anticipated to peak streamflow timing, duration, or magnitude or to the water quality parameters of temperature or in-channel fine sediment.

Direct and Indirect Effects of Alternative II and III

Peak Streamflows

Based on the processes that affect peak streamflows and the associated methodologies for analysis, effects are analyzed at the subwatershed and fifth-field watershed scale during a cumulative effects analysis. See the Aggregated Recovery Percent model discussion, Section 3.15.

Temperature and Suspended Sediment

For Alternative II, 531 acres would be thinned and 1.46 miles of previously disturbed ground would be utilized for temporary roads. There would be no activity within the riparian reserves or within 200 feet of Frog Creek ditch.

For Alternative III, 289 acres would be thinned and 0.88 miles of previously disturbed ground would be utilized for temporary roads. There would be no activity within the riparian reserves or within 200 feet of Frog Creek ditch.

Frog Creek within the planning area meets the water quality standard for temperature, but does not meet the Mt Hood Forest Plan (MHFP) standard for in-channel fine sediment based on pebble counts from the 1997 Frog Creek stream survey.

Stream temperatures for Clear Creek tributaries were not measured in the planning area; however, Clear Creek adjacent to the planning area is water quality limited for stream temperature. The proposed activities in Alternative II and III would have no effect on stream temperature, because there is no proposed harvest in riparian reserves.

Based on the 1990 Clear Creek Riparian Survey, Clear Creek in the vicinity of the Bear Knoll Planning Area meets the MHFP standard for in-channel fine sediment.

Designed into each alternative are soil and water protection measures or best management practices (BMPs) with the express purpose of limiting erosion and associated sediment yield to the streams and/or protecting vegetation that is providing stream shade. Through implementation of site specific BMPs this project is in compliance with the Clean Water Act. The BMPs are identified in Chapter 2.

It is the responsibility of the Forest Service as a Federal land management agency through implementation of the Clean Water Act (CWA), to protect and restore the quality of public waters under their jurisdiction. Protecting water quality is addressed in several sections of the CWA including sections 303, 313, and 319. BMPs are used to meet water quality standards (or water quality goals and objectives) under Section 319.

Current statewide Water Quality Standards state:

Pursuant to Memoranda of Agreement with the U.S. Forest Service and the Bureau of Land Management, water quality standards are expected to be met through the development and implementation of water quality restoration plans, best management, practices and aquatic conservation strategies. Where a Federal Agency is a Designated Management Agency by the Department, implementation of these plans, practices and strategies is deemed compliance with this Division.

Extensive water quality monitoring within the Bull Run Watershed indicated that implementation of BMPs resulted in no effect on turbidity or suspended sediment from timber harvest operations (Bull Run Annual Activity Schedule 1994, pg 39).

In the Oregon Coast Range and western Cascade Mountains riparian buffers of 100 feet or more have been reported to provide as much shade as undisturbed late successional/old-growth forests (Steinblums 1977), so activities associated with Alternatives II and III should not affect stream shade.

Effectiveness of stream buffers at improving water quality adjacent to logging operations was studied in three watersheds in western Washington and found that 200 foot buffers would be effective to remove sediment in most situations if the buffer were measured from the edge of the floodplain (FEMAT). Activities associated with Alternatives II and III are outside of the riparian areas and associated floodplains, and therefore, there would be no effects anticipated to sediment deposition.

Based on implementation of BMPs, and no activities within the riparian reserves or within 200 feet of Frog Creek ditch, there are no impacts anticipated to stream temperature or sediment yield to the stream system.

Fisheries Effects

A complete Aquatics Biological Evaluation can be found in Appendix B. Table 3-3 displays aquatic species analyzed for the Bear Knoll planning area.

Table 3-3 Aquatic Species Analyzed for the Bear Knoll Planning Area EA			
Threatened			
Species	Suitable Habitat	Presence	Surveys
Mid-Columbia River Steelhead Trout (ESU)	N	N	Y
Columbia River Bull Trout (ESU)	N	N	Y
R6 Sensitive Species			
Interior Redband Trout	Y	Y	Y
Deschutes River Summer/Fall Chinook Salmon (ESU)	N	N	Y
Columbia dusksnail <i>Lyogyrus n. sp. 1</i>	Y	Y	Y
Essential Fish Habitat			
Chinook and Coho	N	N	N/A

Listed Species

Mid-Columbia River Steelhead Trout (listed 3/25/99)

Mid-Columbia River steelhead trout are not present in the planning area, but are present about 20 miles downstream below White River Falls. There is no historical or present evidence that steelhead have ever existed above White River Falls.

Columbia River Bull Trout (listed 6/10/98)

There is no evidence of Columbia River bull trout in the planning area, or above White River Falls. However, bull trout have been found in a neighboring basin (Hood River).

R6 Sensitive Aquatic Species

Interior Redband Trout

Presence of interior redband trout has been documented in the White River watershed and in the planning area. Interior redband trout are known to be present up to RM 7.75 in Frog Creek, as well as its major unnamed tributaries. Access is available for interior redband trout for the entire length of Frog Creek ditch. Interior redband trout are known to be present up to RM 12.8 of Clear Creek, as well as, Clear Creek ditch (entire length), and one unnamed tributary to Clear Creek (RM 0.25) located about 0.5 mile downstream of Frog Creek Confluence to Clear Creek (outside of the planning area). Suitable rearing habitat is present in other unnamed intermittent tributaries to both Frog and Clear Creeks. These tributaries may be used by interior redband trout when water is present, during winter and spring months. Review Map 7 for further detailed information on interior redband distribution in the planning area.

Deschutes River Summer Chinook Salmon

There is no evidence of Deschutes River Summer chinook salmon in the planning area, or above White River Falls. Summer chinook have been found in a neighboring basin (Beaver Creek).

Columbia Dusksnail

Columbia dusksnail is a Forest Service R6 sensitive. Surveys were conducted during 2000 and 2001 at multiple locations throughout the planning area. Habitat types that were surveyed varied from seeps and springs, small cold streams, and irrigation ditches. Columbia dusksnail has been documented in the White River watershed including the planning area. Review Map 7 for further information. The Columbia dusksnail was present in multiple habitat types such as springs, seeps, tributaries to Frog and Clear Creeks, and the Frog Creek ditch.

Management Indicator Species (MIS)

According to the MHFP, the salmonids group is identified as the management indicator species (MHFP Four-64). For this planning area, MIS include brook trout and hatchery rainbow trout. Brook trout and hatchery stock rainbow trout, non native to the planning area, were planted for recreational fisheries and are not managed.

Essential Fish Habitat

Chinook and Coho

Chinook and coho essential habitat (designated by NOAA Fisheries) stops at White River Falls. No documented historical presence of chinook or coho salmon is known to occur above the White River Falls.

Direct and Indirect Effects

Alternative I

Short-term direct and indirect effects are those that could occur during project implementation and in five years after projects are completed. Long-term direct and indirect effects are those that could occur between 5 and 50 years after the projects are completed.

There should be no short-term direct or indirect effects to aquatic habitat or individuals by implementing this alternative. There would be no soil disturbance because logging operations, timber related road use, road closing, or pile burning would not occur. No riparian vegetation would be disturbed. The existing stream channel and aquatic habitat conditions should stay the same until the next high flow event occurs. Amounts of LWD throughout the planning area and fine sediment levels in Frog Creek would still not meet MHFP standards and guidelines as covered under FW-092, FW-135, and FW-097.

There should be no noticeable long-term effects to aquatic habitat or individuals by implementing this alternative. Stand conditions over the landscape would not be improved, and thus desirable stand conditions mentioned in the purpose and need would not be met. Natural tree mortality would increase LWD and move the area towards meeting standards and guidelines for LWD.

Effects to Aquatic Species

Alternative I

Under the no action alternative, no proposed activities would occur; therefore, there would be “**No Effect**” to Mid Columbia River Steelhead trout, Columbia River Bull trout, and “**No Impact**” to Deschutes River summer Chinook salmon, interior Redband trout and Columbia dusksnail. In addition, there would be no change in the delivery of fine sediment, LWD would increase at natural levels, and there would be no increase in stream temperature.

Alternatives II and III

Fine Sediment

Neither action alternative proposes harvest in riparian reserves. Activities proposed in Alternative II and III would have a negligible increase of fine sediment (<1mm in diameter) to fish spawning and rearing habitat, as well as to aquatic mollusks or their habitat at the White River watershed fifth-field scale, the Clear, Frog, and White River Gorge sixth-field watershed scales, and the project-level scale. As long as the design layout and best management practices (BMPs) are followed, there would be no short or long-term direct or indirect effects to fish or their spawning and rearing habitat, or aquatic mollusks or their habitat from fine sediment. Some of the applicable BMPs include: timing of construction activities, partially obliterating temporary roads and skid trails, directionally falling trees away from riparian areas, and controlling surface run off would limit the introduction of fine sediment into creeks. Together with the proposed design criteria (i.e. no new road construction, reduced road density, harvesting practices), these alternatives would not increase fine sediment levels, therefore meeting MHFP standards and guidelines (FW-097).

Large Woody Debris (LWD)

Both action alternatives would maintain and restore the existing LWD for both the short and long-term. This is due to no riparian reserves being entered in this proposed action. There would be no short or long-term direct or indirect effects to LWD loading in either the fifth or sixth-field watershed scale from implementing Alternative II or III.

Temperature

Water temperature would be maintained for both the short and long-term with no direct or indirect effects to Frog and Clear Creeks and their tributaries, as well as Frog Creek irrigation ditch from implementing either of the action alternatives. Riparian reserve vegetation under both action alternatives would be left in place. Under Alternatives II and III, water temperature at the fifth and sixth-field watershed scale would be maintained.

Effects to Threatened, Endangered and Sensitive Species

Mid-Columbia River Steelhead trout, Columbia River Bull trout (both threatened species), and, Deschutes River summer Chinook salmon (a sensitive species) are not present in the planning area. Therefore, the action alternatives would have a “**No Effect**” determination to Steelhead and Bull trout and a “**No Impact**” determination for Chinook salmon.

R6 Sensitive Aquatic Species Found in the Planning Area

Interior Redband Trout

A “**No Impact**” determination is warranted to resident interior redband trout for both action alternatives. Following design layout and adhering to design features in the alternatives, there would be no impacts to spawning and rearing habitat, due to no riparian reserves being entered.

Throughout the Oregon interior basins, interior redband trout, which originated from the Columbia River system, are well known to be hereditarily resilient to high water temperatures; they have been found in water temperatures over 28 °C (Behnke R., 1992). Interior redband trout spawn in Frog Creek and Clear Creek during the latter half of April. Fry are believed to leave the gravel in late June, depending on water temperatures. Even though Clear Creek has occasional high temperatures; the levels are such that this would not have an effect on interior redband trout.

Columbia Dusksnail Aquatic Mollusks

A “**No Impact**” determination is warranted to Columbia Dusksnails. There would be no potential negative impacts to Columbia dusksnails and its habitat from either action alternative. The species habitat, life cycle, microclimate, or life support requirements at the 7th field or greater watershed scales would be maintained at existing conditions.

Essential Fish Habitat

Chinook and Coho Salmon

A “**No Effect**” determination is warranted to chinook and coho essential habitat. Chinook and coho essential habitat stops at White River Falls.

Table 3-4 displays the effects determination of the three alternatives on fish species.

Table 3-4 Specific Findings For Alternatives I, II, and III					
			Effects Determination		
Species	Species Present	Suitable Habitat Present	Alt. I	Alt. II	Alt. III
Steelhead trout	No	No	NE	NE	NE
Bull trout	No	No	NE	NE	NE

Interior Redband trout	Yes	Yes	NI	NI	NI
Chinook salmon	No	No	NI	NI	NI
Columbia Dusksnail	Yes	Yes	NI	NI	NI
Essential Fish Habitat (Chinook and Coho)	NA	No	NE	NE	NE

SUMMARY TABLE KEY:

NE = No Effect
 NI = No Impact
 NA = Not Applicable

3.2 Silvicultural Diagnosis

Existing Condition

Stands proposed for commercial thinning harvest in the Bear Knoll project area consist primarily of overcrowded mid seral blocks that average 70-95 years of age, with 400 to 600 trees per acre. These stands are found on nearly level to relatively steep (10 – 35 percent) slopes. Elevations range from approximately 3000 to 4000 feet with variable aspects.

Primary plant associations found in the Bear Knoll project area include ABAM/RHMA/XETE (*Pacific silver fir/Pacific rhododendron/beargrass*), and TSHE/RHMA/BENE (*western hemlock/Pacific rhododendron/dwarf Oregon grape*). The stands in the project area display an abundance of species diversity. Common overstory and understory species include Douglas-fir (*Pseudotsuga menziesii*), Pacific silver fir (*Abies amabilis*), western white pine (*Pinus monticola*), western hemlock (*Tsuga heterophylla*), noble fir (*Abies procera*), western redcedar (*Thuja plicata*), western larch (*Larix occidentalis*), and grand fir (*Abies grandis*). Ground cover includes Pacific rhododendron (*Rhododendron macrophyllum*), beargrass (*Xerophyllum tenax*), dwarf Oregon grape (*Berberis nervosa*), vine maple (*Acer circinatum*), salal (*Gaultheria shallon*), and huckleberry (*Vaccinium spp.*).

The species mix is similar for each of the stands but most exhibit various concentrations and distributions. Western hemlock, noble fir, and grand fir generally dominate the overstory with minor to moderate amounts of western redcedar, Douglas-fir, western white pine and western larch are scattered throughout. Overstory diameters average approximately 13 to 16 inches diameter breast height (DBH). Midstory diameters average from 7 to 12 inches DBH. Overall heights in the project area average 75 feet.

There is an abundance of snags and down wood in the proposed treatment stands, although much of it is small diameter wood. The stands average 3-4 snags/acre and 3-4 downed logs/acre (decay classes 1-5). However, the majority of the downed wood is not in desired decay classes 1, 2, or 3 and the distribution is scattered in some stands and concentrated in others. (See glossary for detailed explanation of decay classes.)

The soils in the project area present minimal limitations to timber harvest activities. All of the soil types within the proposed stands are suitable for timber management in terms of soil productivity and meet the Mt. Hood National Forest Land and Resource Management Plan Standard and Guide (FW-022). This Standard and Guide states that detrimental effects should not exceed 15 percent of the activity area (see Soils Report, Section 3.4).

Fire, wind, disease, and harvest activity have been the major disturbance agents in the project area. Historically, fire was the dominant landscape pattern-forming disturbance before timber harvest began. This watershed is within the Pacific silver fir fire ecology group, which is a stand replacement fire type with a frequency of 100-200 years (see Fuels Report, Section 3.8).

Windthrow potential in the project area is moderate as categorized by the Soil Resource Inventory (SRI January, 1979) and primarily occurs in the remaining isolated older stands, (not proposed for treatment) that have been affected by various stem and root diseases coupled with the effects of the NW/SW winds.

Closely associated with windthrow is disturbance by insects and disease. A number of forest insects are present at endemic levels throughout the project area. When abundant, favorable breeding habitat (weakened trees) becomes available, bark beetle populations can rise to epidemic levels creating mortality in live trees.

The Bear Knoll project area also offers favorable habitat for a variety of forest diseases. Douglas-fir dwarf mistletoe (*Arceuthobium campylopodum douglasii*), western hemlock dwarf mistletoe (*Arceuthobium campylopodum tsugense*), laminated root rot (*Phellinus weirii*), annosus root disease (*Heterobasidion annosum*), Armillaria root disease (*Armillaria ostoyae*) and Indian paint fungus (*Echinodontium tinctorium* Ell. & Ev.) are the most prevalent.

Armillaria and Annosus root disease are causing mortality, and a reduction in growth, productivity, and wood quality. The occurrence of Indian paint fungus is minor in the younger stands throughout the project area. Both hemlock and Douglas-fir dwarf mistletoe occur in minor to moderate amounts, respectively. In stand 160, the Douglas-fir dwarf mistletoe is severe. Small isolated pockets of laminated root rot (*Phellinus weirii*) are also present but are of little concern in most cases due to the species diversity of these stands.

These stands continue to lose growth and vigor as the trees compete for sunlight, nutrients and water. There is little understory vegetation being established. In terms of timber productivity, these stands are growing below their capability because of over crowding. Site ranges between Site Classes III and IV (Douglas-fir, Upper Limits of Site Indices for Dominant Trees, FSH June 1974).

Stand Objectives

Stands 139, 146, 160, 164, 167, 174, 175, 177, 186, 211, 217, 220 and 225 were analyzed for treatment. The primary silvicultural need and objectives for these stands is to maintain stand growth and health so that long-term resource objectives can be met. The desired forest condition is one in which the risk of present and future damage by natural and human caused stressors is minimized to meet site specific, long term resource management objectives.

The following summarizes the silvicultural objectives for the Bear Knoll timber sale:

- Thin matrix lands to meet desired management objectives
- Promote and maintain healthy vigorous stands with growth rates commensurate with the area's growth potential to meet timber production needs
- Promote growth of stands over the next 80 to 120 years or until culmination of mean annual increment

Treatment Options

Proposed areas under consideration for treatment were field-reviewed by a certified silviculturist and specific silvicultural systems were selected based on site specific analyses and management area goals and objectives. To meet the silvicultural objectives of these stands, several different treatments could be employed. All options must be considered and addressed.

Treatment options considered in this analysis were: no treatment, regeneration harvest, and thinning.

The **no-treatment option** was not chosen because it would not move any of the stands closer to the desired future condition, nor would it address capturing growth potential and mortality in these stands (MHFP, Chapter Four, 92, 289, 292).

The **regeneration harvest option** was not chosen as the optimal treatment to achieve the desired management goals for these stands in the project area. The stands proposed for treatment are younger stands that with some treatment would last for another 120 years.

The **thinning option** was chosen as the optimal treatment to achieve the desired management goals for all proposed stands in the project area because they have not surpassed culmination of mean annual increment and are maintaining their growth capability at a slower rate due to overcrowding and the presence of disease. This treatment method is considered the optimum harvest method for these stands to meet forest health and site productivity objectives for C1 and Matrix lands (MHFP, Four-86, FW-306; Four-88, FW-348; Four-92, FW-382). Thinning these stands and retaining healthy vigorous trees and those species less susceptible to stem and root disease would reduce the risk and subsequent spread of disease infection in immediate as well as adjacent stands.

Treatment Proposal

- Commercially thin from below approximately 531 acres of overcrowded, disease infected stands
- Residual stands should retain approximately 220 to 293 trees per acre (and an average Basal Area of 120 to 160)
- Retain desired species or those less susceptible to disease and insect damage
- Leave a minimum of 4 snags per acre (or live wildlife trees in the absence of snags) and a minimum of 240 linear feet of down logs per acre greater than 16 inches in diameter (or the largest available in the stand)

Effects of Alternative I

Under Alternative I, no thinning would occur. The health of the stands would remain the same and slowly decline over time. Existing diseases would continue to infect stands. Mortality of infected trees would continue over time.

If thinning is delayed in these stands, the crowns of prospective leave trees would be shortened by the intense competition for light and would become susceptible to damaging agents. Retention of trees infected with diseases such as Indian paint fungus and dwarf mistletoe would not reduce the risk of spreading these diseases to adjacent stands and would not meet DFCs.

Without treatment, stands in the project area would continue to experience a decline in growth, suppression mortality, decreases in crown size and density, and further infection by pathogens. This condition would increase the physiological stress level of the forest, thereby, increasing the susceptibility of these stands to disturbances such as pests, fire or wind damage. With the reduction of growth and vigor in the stands, this stressed condition would persist longer than with treatment, further increasing the risk for disturbance and reduction in diameter growth. Stands would also maintain their mid-seral structure longer or until some disturbance allows stand development to continue or reinitiate. Stands under this condition would be denser, less structurally diverse, have smaller diameter trees with few larger diameter trees, shorter crowns positioned higher on the stem, and less understory development than treated stands.

Effects of Alternative II and III

The objective of thinning is to redistribute nutrients, water and sunlight to a fewer number of trees, maximizing growth potential and leaving a stand with a desired structure and composition.

Thinning improves the overall vigor, growth, health and architecture of trees. Thinning can directly contribute to forest health by maintaining growth rates of stands.

Thinning the proposed stands would provide growing space for the remaining trees, giving them a better advantage. Trees would have the ability to expand their crowns into the growing room provided by the removal of neighboring trees. Trees with larger crowns would be less likely to suffer stem breakage, and more likely to recover from defoliation, than a tree that has a short restricted crown.

Thinning would increase wind firmness and stability of these second growth stands. Wind could damage trees by uprooting them, causing them to snap off or causing severe injury to their crowns. Trees that have been exposed to winds when they are young and rapidly growing are less likely to suffer damage at a later age than those that have grown in tight stands initially.

The effects to each action alternative are similar except that Alternative II would move 531 acres towards a more healthy desired future condition, while Alternative III would move 289 acres towards the desired future condition.

3.3 Wildlife

Please see below for a summary of the wildlife Biological Evaluation. The complete evaluation is located in Appendix C.

The status of threatened, endangered, and proposed species; USFS Region 6 sensitive species; Northwest Forest Plan (NWFP) special mention species and Mt. Hood NF management indicator species with potential to occur in the project area are as follows:

Table 3-5 Wildlife Survey Results			
Species	Habitat	Surveys	Presence
Threatened, Endangered or Proposed			
Bald eagle (<i>Haliaeetus leucocephalus</i>)	N ¹	-	-
Northern spotted owl (<i>Strix occidentalis caurina</i>)	Y ¹	N ²	Y ¹
Canada lynx (<i>Lynx canadensis</i>)	N ¹	Y ¹	N ¹
R6 Sensitive Species			
Oregon Slender salamander (<i>Batrachoseps wrighti</i>)	Y	Y	N
Larch Mountain salamander (<i>Plethodon larselii</i>)	Y	Y	N
Cope's giant salamander (<i>Dicombptodon copei</i>)	N	-	-
Cascade torrent salamander (<i>Rhyocotriton cascadae</i>)	N	-	-
Oregon spotted frog (<i>Rana pretiosa</i>)	N	-	-
Painted turtle (<i>Chrysemys picta</i>)	N	-	-
Northwestern pond turtle (<i>Clemmys marmorata marmorata</i>)	N	-	-
Baird's shrew (<i>Sorex bairdii permiliensis</i>)	N	-	-
Pacific fringe-tailed bat (<i>Myotis thysanodes vespertinus</i>)	N	-	-
Wolverine (<i>Gulo gulo luteus</i>)	Y ¹	-	-
Pacific fisher (<i>Martes pennanti</i>)	Y ¹	Y ¹	N
Horned grebe (<i>Podiceps auritus</i>)	N	-	-
Bufflehead (<i>Bucephala albeola</i>)	N	-	-
Harlequin duck (<i>Histrionicus histrionicus</i>)	N	-	-
Peregrine falcon (<i>Falco peregrinus anatum</i>)	N	-	-
Gray flycatcher (<i>Empidonax righti</i>)	N	-	-
Puget oregonium (<i>Cryptomastix devia</i>)	Y	Y	N
Columbia oregonium (<i>Cryptomastix hendersoni</i>)	Y ¹	Y ¹	Y ¹
Dalles sideband (<i>Monadenia fidelis minor</i>)	Y	Y	N

Crater Lake tightcoil (<i>Pristiloma arcticum crateris</i>)	Y	Y	N
Evening fieldslug (<i>Deroceras hesperium</i>)	Y	Y	N
Mt. Hood NF Management Indicator Species and Neotropical Birds			
Mule/Blacktailed Deer (<i>Odocoileus hemionus</i>)	Y	-	Y
Rocky Mountain Elk (<i>Cervus elaphus</i>)	Y	-	Y
Pine Martin (<i>Martes Americana</i>)	Y	-	-
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	Y	-	-
Western Gray Squirrel (<i>Sciurus griseus</i>)	N	-	-
Wild Turkey (<i>Meleagris gallopavo</i>)	N	-	-
Snag and Down Log Associated Species	Y	N	Y
Neotropical Migratory Birds	Y	N	Y
Special Mention Species			
Black-backed woodpecker (<i>Picoides arcticus</i>)	N	-	-
Flammulated owl (<i>Otus flammeolus</i>)	N	-	-
Pygmy nuthatch (<i>Sitta pygmaea</i>)	N	-	-
White-headed woodpecker (<i>Picoides albolarvatus</i>)	N	-	-

1. See narrative.
2. The last surveys were conducted in 1993. In accordance with the NWFPlan, additional surveys are not needed in this area.

Effects to Wildlife Resources

Threatened, Endangered, Sensitive, and Proposed Species

The following threatened, endangered, proposed, or sensitive species are known or suspected to occur on the Hood River Ranger District. The complete Biological Evaluation is located in the Appendix.

Threatened and Endangered Species

Bald eagle

There is no potential habitat within or adjacent to the planning area, nor have bald eagles been observed in the area. The closest known eagle nest site is south of Clear Lake. There would be **no effect** to bald eagles because of the lack of habitat.

Northern spotted owl

There are two 100 acre LSRs within the planning area. Neither one is proposed to have any treatment within them. Both 100 acre LSRs are associated with owl pairs. Surveys in the Bear Paw section of the planning area were last conducted in 1990. In 1998, two owls (*Strix* species) were seen and heard. Indications were that these were barred owls. Verification as to exact species was not obtained. Surveys in the Little Knoll portion of the planning area were last conducted in 1994. Suitable nesting, roosting, and foraging habitat is present within all of the late-seral/cathedral stands. None of the stands proposed for commercial thinning are considered nesting, roosting and foraging habitat. These stands are dispersal habitat.

The Bear Knoll planning area is not part of any designated critical habitat.

In the planning area, there are three main corridors of late-seral habitat: Frog Creek, made up of stands immediately adjacent to Frog Creek and its associated riparian reserve; Highway 26, the stands immediately adjacent to the highway; and White River, those stands leading from upper elevations of the river drainage and down to stands adjacent to it. The Frog Creek corridor is an area of large stands of old growth habitat and its combination of upland and riparian habitat. Highway 26 corridor is likely to be the least used because Highway 26 is centered through it. It is also narrower (little to no interior habitat conditions), and already receives various treatments by noise disturbance from constant traffic and hazard tree removal as part of highway maintenance. The White River corridor has fewer acres of old-growth habitat. The late-seral

stands associated with these corridors are valuable to the planning area and the watershed in providing for populations of the species that depend on these habitats. This is especially relevant giving both past harvest and current proposed harvest within this watershed.

The White River LSR Assessment and Landscape Analysis and Design (LAD) is made up of individual landscape units, including the Bear Paw and Little Knoll Landscape Units (LU), which make up the Bear Knoll planning area. The LAD identified the late-seral stands as connections to other habitat throughout the watershed. Many of these stands are focused on riparian reserves (with maximum widths of 300 ft on each side) and along roads (not an optimal location for habitat). The Bear Paw LU was identified as important for late-seral dependent species with small home range. As a desired future condition, these late-seral stands contribute to the connectivity of the watershed and between LSRs. Little Knoll LU was identified as a landscape barrier to late-seral habitat dependent species (IV-47), and is also within two areas of concern for connectivity as identified by the LAD.

As a standard, in the NWFP, at least 15 percent of a watershed would be maintained as late-seral or old growth habitat. Current estimates are that the White River watershed, as a whole, has approximately 21 percent of its land base in an old-growth/late-seral condition. This planning area currently has 1268 acres of late seral habitat (35 percent of planning area). These estimates incorporate stands determined to be late seral and those determined to be cathedral. The old growth layers used for this analysis are defined as late seral and cathedral stands where the DBH is greater than 20". This meets the definition for old growth in the NWFP.

Maps in the corporate data base show stands of mature stem exclusion as the old growth layer and exclude the late seral and cathedral stands. The mature stem exclusion stands are 80 years or older and average 14 to 16" DBH. Stands that are being entered, shown on the map as Mature Stem Exclusion (MSE) are 70 to 95 years old, and most should be classified as Stem Exclusion (SE) rather than MSE.

Direct and Indirect Effects of Alternative I

The No Action alternative **may affect but would not likely adversely affect** spotted owls because opportunities for thinning young stands and closing or decommissioning unwanted roads may be lost. Thinning these stands now would best provide NRF habitat into the future (20-50+ years). Closing or decommissioning roads in the planning area would help address concerns for disturbance not only to spotted owls, but also other species.

Direct and Indirect Effects of Alternative II

Under Alternative 2 approximately 531 acres of dispersal habitat would be degraded. The thinning of 531 acres of dispersal habitat in Alternative II (roughly 25 percent of the dispersal habitat in the planning area) would reduce crown closure to approximately 40 percent but still function as dispersal habitat post harvest. Total dispersal habitat for the planning area would be 2078 acres (59 percent).

Direct and Indirect Effects of Alternative III

Alternative III would degrade approximately 289 acres of dispersal habitat (see Table 3-5) Under Alternative III the effects are similar to Alternative II but would only alter 289 acres of dispersal habitat (approximately 14 percent of the dispersal habitat in the planning area). A total of 2078 acres (59 percent of the planning area) of dispersal habitat would remain post harvest.

Effects Common to Alternatives II and III

Neither of the 100 acre LSRs would be entered for harvest. Mitigation for the LSRs would include a seasonal restriction (March 1-July 15) on all harvest operations within 0.25 miles of the stands (Alternative II = 146, 160, 164, 167, 175, 177, 211, 225) (Alternative III = 160, 164, 167, 175, 177, 211) associated with these LSRs.

Both action alternatives **may effect and would not likely adversely affect** spotted owls. The dispersal habitat would be degraded but still function as dispersal habitat post harvest. The openings created could provide opportunities for competitors or predators to spotted owls (e.g. barred owl). These effects and the associated potential take of the owl pairs was consulted on with the US Fish and Wildlife Service (USFWS) under the FY 2003-2004 Habitat Modification Biological Assessment in the Willamette Province (USFWS reference: 1-7-03-F-0008). The USFWS concurred with the determination and as a mandatory term and condition, the earlier mentioned seasonal restriction for spotted owls was specified.

STOC Habitat	Existing Condition	Alternative 1 No Action	Alternative 2	Alternative 3
Nesting, Roosting, Foraging	1416	1416	1416	1416
Removed	0	0	0	0
Degraded	0	0	0	0
Downgraded	0	0	0	0
Dispersal	662	662	662	662
Removed	0	0	0	0
Degraded	0	0	531	289

Effects to Late Seral Habitat

Direct and Indirect Effects of Alternative I

The No Action Alternative would, in the short-term, maintain the existing levels of late-seral habitat (1,268 acres of Late-seral and Cathedral structural stages). The connections between these patches of habitat would also be maintained in their current conditions, in the short-term.

It is suspected that in the long-term (i.e., 20 - 50 years), much of the existing late-seral habitat would still function as such, and some of the current mature stem exclusion may function as late-seral habitat. Consequently, late-seral habitat levels would increase as a result of this alternative.

Although the connectivity and levels of late-seral habitat would likely increase, there would still be open roads and heavy use by motorized vehicles (OHV's and snowmobiles as well as cars/trucks). Disturbance and harassment currently occurring in the area by motorized vehicles as a result of the number of accessible and open roads would continue or perhaps increase.

Direct and Indirect Effects Common to Alternatives II and III

No net loss of late seral habitat would occur with either action alternative.

There would be a short term disturbance effect while the FDR 4320 is open for harvest activities. (FDR 4320 currently has a seasonal closure and is open for winter recreation.) Under all alternatives FDR 4320 would be re-closed with a gate (as specified in the Little Knoll Timber Sale EA). Closing this road would reduce disturbance and harassment within interior late-seral habitat. Likewise, under both action alternatives the 2640-230 network would be closed to summer and fall traffic, but remain open to snowmobile use. Harassment and disturbance to wildlife would be reduced during the months of closure.

Lynx

Lynx habitat as described in the Lynx Conservation Assessment and Strategy and subsequent interpretation is not expected to occur on the Mt. Hood National Forest. The Mt. Hood National Forest received new lynx habitat mapping direction¹ from the Lynx Steering Committee and the Lynx Biology Team addressing Lynx Habitat Mapping Direction in Regions 1,2,4,6, and 9. The new direction identified subalpine fir plant associations as the primary vegetation component from which lynx habitat and lynx analysis units would be delineated. The Forest ran this analysis based on our plant association groups and identified approximately 1270 acres of subalpine fir plant associations primarily on the east side of the Forest, none of which is in Bear Knoll Planning Area.

The Lynx Conservation Assessment and Strategy (LCAS) identified a need for at least 10 square miles (6400 acres) of primary vegetation to warrant delineation of a lynx analysis unit. *“Based on studies at the southern part of the lynx range in western U.S., it appears that at least 10 mi² of primary vegetation should be present within each LAU to support survival and reproduction”* (page 7-4). Surveys were done on the Mt. Hood National Forest from 1999 to 2001, and no lynx samples were collected. Based on our analysis, we do not have the minimum criteria to develop a lynx analysis unit. Therefore we have no mapped lynx habitat on the Forest or any lynx analysis units within which to apply the LCAS habitat objectives. However, any individual lynx that may move through the area could use these reforested units in the project area. These reforested units in the project vicinity could provide foraging opportunities as lynx travel across the landscape.

There would be **no effect** to lynx with any of the alternatives.

Sensitive Species

Wolverine

Wolverine may move through the area while foraging or dispersing, but no denning habitat is present within or adjacent to the planning area.

Wolverines mainly prey upon deer and elk, and often take advantage of carrion. They do not seem to be limited as much by foraging opportunities as by human disturbance. Wolverines tend to avoid places of high human disturbance (Verts, 1998). The area adjacent to Hwy 26 is not suitable wolverine habitat. It is possible that wolverine will try to cross the highway, but they would not stay in the immediate area. Wolverines are not likely to utilize the area because of recreational traffic through the year.

¹Refer to memoranda “Lynx Habitat Mapping” (September 19, 2000) and “Lynx Habitat Mapping Direction” (August 22, 2000).

Effects to Wolverines

Direct and Indirect Effects of Alternative 1 – No action

The no action alternative would not close or obliterate roads. Because of this, this alternative may impact individuals but would not likely cause a trend towards federal listing of the species.

Direct and Indirect Effects of Action Alternatives

Similarly the action alternatives would have some impact on an individual's foraging capability or movement through the area as a result of timber harvest. However with provisions to close and obliterate some of the roads, thereby reducing disturbance, then these alternatives **may impact individuals but would not likely cause a trend towards federal listing** of the species.

Wolverines seem to avoid crossing large openings. Maintenance of the corridors, especially the White River and Frog Creek corridors, would provide for movement and dispersal of wolverines in an east/west and north/south direction.

Pacific fisher

Fisher habitat from a variety of localities within its geographical range commonly is described as widespread, continuous-canopy forests at relatively low elevations (Powell, 1981). Only three specimens of fishers from Oregon have been collected, two from Lane County and one from Douglas County. Fishers are primarily carnivorous. Small and medium-sized forest mammals are the primary prey; porcupines, snowshoe hares, tree squirrels, mice and voles are among the most common preyed upon. The presence of fisher on the Mt. Hood National Forest has not been confirmed. Winter snow track surveys, camera bait stations and smoke track plates have been utilized in the past decade to determine carnivore and mustelid presence. No fishers were found using these survey techniques.

Direct and Indirect Effects

There would be no impact to fishers with any of the alternatives since presence has not been confirmed.

Columbia Oregonium

All of the area has been surveyed for the presence of terrestrial mollusks (see sensitive species list). The areas that have been surveyed have documented one individual Columbia oregonium (*Cryptomastix hendersoni*). This site is not located within any of the action alternatives. There would be **no impact** to this species.

Larch Mountain and Oregon Slender Salamanders

The planning area does contain habitat for the Larch Mt. Salamander and Oregon Slender salamander, as described in the existing survey protocol adopted by Region 6. Surveys were completed for larch mountain salamanders and Oregon slender salamanders in the fall of 2000. No larch mountain salamanders or Oregon slender salamanders were found. Surveys for other amphibian species on the Region 6 sensitive species list were not warranted because of the lack of habitat within units of either action alternative.

All of the Planning Area has been surveyed for these salamanders and no individuals were located. There would be **no impact** to this species.

Other Species

Snags and Down Log Associated Species

A pilot survey for snag density was performed in the planning area in the summer of 1998 (Bate, Lisa J.; Garton, Edward O.; Wisdom, Michael J. in press. *Estimating snag and large tree densities and distributions on a landscape for wildlife management*. Gen. Tech. Rep. PNW-GTR-425, 1999. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 76 pp;). Previous to this effort, a “walk-through” survey of the planning area by 2 biological technicians was conducted in the summer of 1997; they recorded qualitative densities of snags and logs. The entire planning area was also field visited by the wildlife biologist and silviculturist team members in the summer of 1998.

Although general "walk-through" surveys gave the impressions that much of the area was not meeting current snag and log density standards and guidelines, the pilot survey indicated that the planning area was meeting the standards and guidelines for snags over the whole planning area [2-3 snags > 15" dbh/ ac, MHFP (100 percent biological potential)], even though some areas were not (notably past regeneration harvest units). This pilot survey did not cover enough samples to be within a 90 percent confidence interval, statistically speaking, but it did give some initial quantitative data. This survey did not incorporate log densities; thus only qualitative data are available. Much of the planning area appears to be currently meeting the MHFP standards and guidelines for downed logs (6 logs >20" dbh/ac). Most notable areas appearing not to be meeting the standards and guidelines are past regeneration harvest units, and stands previously "high-graded". No harvest is proposed in these stands.

DecAID Advisor - DecAID is a planning tool intended to help advise and guide managers as they conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen et al. 2003). This advisory tool focuses on several key themes prevalent in recent literature concerning this subject and are as follows:

- Important decayed wood elements consist of snags, down wood and live trees with dead tops or stem decay.
- Decayed wood provides habitat and resources for a wide array of organisms and their ecological functions.
- Wood decay is an ecological process important to many organisms.

The DecAID tool provides information on the array of key ecological functions and functional groups of wildlife that use snags and down wood, and can be used to describe the effect of changing snag and down wood levels on those functions and functional groups. This tool is not a wildlife population simulator nor is it an analysis of wildlife population viability.

A critical consideration in the use and interpretation of the DecAID tool is that of scales of space and time. DecAID is best applied at scales of subwatersheds, watersheds, subbasins, physiographic provinces, or large administrative units such as Ranger Districts or National Forests. DecAID is not intended to predict occurrence of wildlife at the scale of individual forest stands or specific locations. It is intended to be a broader planning aid not a species or stand specific prediction tool.

The Bear Knoll Planning Area falls into the “Montane Mixed Conifer Forest, Small/Medium Trees Vegetation Condition” as described in the DecAID model. The snag densities of 30, 50 and 80 percent levels are extrapolated from limited wildlife data. This is the best data available. The 30 percent tolerance level has 10 snags/acre >10 inches, of which 2.7/acre are > 19.7 inches.

The 50 percent tolerance level has 16.6 snags/acre > 10 inches, of which 4.2/acre are > 19.7 inches. The 80 percent tolerance level has 32 snags/acre > 10 inches, of which 9.5/acre are > 19.7 inches.

The down wood cover of 30, 50 and 80 percent levels are extrapolated from limited wildlife data. This is the best data available. The 30 percent tolerance level provides 2.5 percent cover of down wood > 4.9 inches. The 50 percent tolerance level provides 4 percent cover of down wood > 4.9 inches. The 80 percent tolerance level provides 8 percent cover of down wood > 4.9 inches.

According to the White River LSR plan, this planning area falls mainly within the Crest Zone. This planning area is then capable of producing 4-10 snags/acre > 16 inches DBH and 4-8 LWD/acre (> 20 inches x 120 feet). This coincides mainly with the 30 percent tolerance level in the DecAID tool and some of the area capable of the 50 percent tolerance level.

Snag densities in central Oregon averaged 4 snags/acre > 10 inches DBH of which 60 percent were larger than 20 inches DBH (Bull et al, 1997, GTR-390). Based on the above research, we are recommending four snags per acre be left, with minimum of 240 linear feet of down wood material > 16 inches in diameter (or the largest available in the stand).

Effects to Snags and Down Logs

Direct and Indirect Effects of Alternative I

Under the No Action alternative the level of snags and logs within the planning would likely stay the same. Natural ecological succession would replace snags and logs lost. Relative abundance of large diameter snags may decrease over many years, as the MSE stands remain unthinned, and not allowing the trees to grow substantially bigger before they die. Subsequently, overall diameters of logs may decrease too.

Direct and Indirect Effects of Alternative II

The thinning of 531 acres of stem exclusion would increase the health and vigor of the stands and enhance growth of remaining trees.

Direct and Indirect Effects of Alternative III

The thinning of 289 acres of stem exclusion would increase the health and vigor of the stands and enhance growth of remaining trees.

Effects Common to Both Action Alternatives

A minimum of 4 snags per acre (or live wildlife trees in the absence of snags) and a minimum of 240 linear feet of down logs per acre greater than 16 inches in diameter (or the largest available in the stand) would remain in all alternatives. This would meet the 100 percent biological potential for snag dependent species (this exceeds the biological potentials as outlined in the NWFP and MHFP) within the harvested areas and is consistent with the above tools and research information. Using the *Photo Series for Quantifying Forest Residues in the: Coastal Douglas-Fir-Hemlock Type and Coastal Douglas-Fir-Hardwood Type* photo 3-DF-3-PC depicts what the ground would look like with 3-10 percent ground cover (see DecAID discussion above). See photos in Fuels, Section 3.8.

Management Indicator and Other Species of Concern

Surveys specific for any species of concern or management indicator species were not conducted. None of the special mention species listed within the NWFP Record of Decision

(ROD, 1994) (i.e., pygmy nuthatch, white-headed woodpecker, flammulated owl, and black-backed woodpecker) would likely be found within or adjacent to the project areas because of lack of habitat described for these species. Pileated woodpeckers, marten and big game are already known to exist or suspected to exist within the planning area because habitat is present. Potential effects were analyzed assuming presence, if not already known. Pileated woodpeckers and pine martens may be found in the area. Marten have not been documented within the planning area, but pileated woodpeckers have been heard within the area.

A variety of neotropical migratory birds can be found within the planning area. These species are often split into guilds based upon the habitat they use. Guilds associated with late-seral habitat (e.g. hermit warbler, *Dendroica occidentalis*), very early seral habitat (e.g. chipping sparrow, *Spizella passerina*), riparian habitat (e.g., Wilson's warbler, *Wilsonia pusilla*), and second-growth habitat (e.g., Nashville warbler, *Vermivora ruficapilla*) can be found in the area.

Pileated Woodpeckers

Pileated woodpeckers, a management indicator species of late-seral and snag habitat, would likely nest in the late-seral and cathedral stands. No Pileated Woodpecker Habitat Areas (B5, MHFP) are located within this planning area.

Effects of Alternative I

There would be no change in habitat conditions for this species within the planning area under the no action alternative. Pileated woodpeckers do not seem to be as limited by disturbance from roads as much as limited by nesting habitat (i.e., old-growth stands with large diameter snags). Pileated woodpeckers would likely use these stands more for feeding. Not treating blocks of late-seral and cathedral stands, such as in the corridors (Frog Creek and stand 203 in the Hwy 26 corridor), would benefit pileated woodpeckers by continuing to provide habitat in the area.

Effects Common to Alternatives II and III

Closing and obliterating roads would ultimately benefit pileated woodpecker, indirectly. High open road densities allow for access to firewood cutting, legal or illegal. Firewood cutting has the potential of removing snags or trees used for nesting or roosting. Reducing the open road density would reduce the chances that nesting habitat would be removed.

Commercial thinning would not likely affect pileated woodpeckers. The stands would currently be used for feeding with the exception of perhaps a few large trees that are remnants of the previous stand. The thinning would be focused in the understory and smaller diameter trees. Snags and logs used for foraging may be removed. Meeting the standard and guideline of at least 4 snags/ac (16 inches dbh or the largest size class available) and 240 lineal feet of logs/ac (16 inches dbh or the largest size class available), would ensure that feeding and nesting habitat for this species remains in the area.

Pine Marten

The pine marten is another management indicator species that is dependent upon mature forest with downed logs. This species will den within and under logs and use them as travel ways to hunt for prey in the summer and winter. No Pine Marten Habitat Areas (B5, MHFP) are located within this planning area.

Effects of Alternative I

The no action alternative would have **no impact** to this species. Current levels of logs would be retained as well as current levels of mature forest. It is unknown what effects open road densities have on marten populations. It is suspected that indirectly high open road densities can lead to the removal or destruction of logs by firewood gatherers and/or recreationists. High recreation use throughout the area may also limit the suitability of the area for martens.

Effects Common to Alternatives II and III

Alternative 2 and 3 would likely have similar impacts to martens. Timber harvest, especially tractor-based harvesting, increases the chances of existing downed logs to be either destroyed or removed. Use of existing skid trails would remedy this concern but not completely remove it because some skid trails would undoubtedly need to be added. A constant supply of logs is anticipated in the short and long-term because logs would be retained according to standard and guideline levels, as well as the thinning areas providing for large logs in the future. Meeting the standard and guideline of at least 4 snags/ac (16 inches dbh or the largest size class available) and 240 lineal feet of logs/ac (16 inches dbh or the largest size class available), would ensure that feeding and denning habitat for this species remains in the area.

Deer/Elk

The Bear Knoll planning area is classified as summer range for black-tail deer and Rocky Mountain elk, and is inhabited by both during the summer period and mild winters. Approximately 57 percent (2051 acres) of the planning area is classified as thermal cover and 3 percent (111 acres) is classified as optimal cover. The planning area exceeds the MHFP S&G (FW-206) of at least 30 percent thermal cover. Approximately 8 percent (287 acres) is foraging habitat. The desired amount is 20 percent on summer range. The remaining 32 percent (1126 acres) is hiding cover with various levels of forage mixed in. Fawning and calving habitat is scattered throughout the planning area, with most concentrated in and near the riparian reserves.

There are 18.54 miles of open road used to calculate wildlife open road density, for a density of 3.32 miles/mile² (this includes roads that are cataloged as decommissioned or closed but are drivable on the ground). This is above the 2.5 miles/mile² standard. Road Tables are located in the Appendix E.

Effects of Alternative I

Trees would not be harvested. The proportions of thermal, optimal, or hiding cover; or forage would not change. Fawning and calving habitat is concentrated in and near the riparian reserves and would remain unchanged.

No roads would be closed or built; therefore the open road density would remain unchanged. A portion of roads closed with guard rails have not been effective. These roads may continue to be breached.

Effects of Alternative II

Cutting trees, and building roads and landings would reduce canopy closure. Approximately 514 acres of thermal cover would be lost. Optimal cover would decrease by about 111 acres. The planning area would contain 46 percent thermal cover and 0 percent optimal cover which exceeds the standards and guides of at least 30 percent thermal cover (MHNH S&G FW-206 total

of 30 percent thermal cover). After the project there would be adequate thermal cover for big game but reduced optimal cover. Optimal cover is very limited across the landscape and difficult to produce. It is a combination of thermal cover with a forage component.

Cutting trees and building landings would not increase foraging habitat. This would result in foraging habitat remaining at 8 percent, which is short of the recommended 20 percent for summer range. Forage would not improve within the planning area. Fawning and calving habitat is mostly concentrated in and near the riparian reserves, which are avoided. The deer and elk population would not change from current levels as no increase in the amount of forage habitat would occur.

A total of 5.47 miles of road would be closed. Some previous road closures have been ineffective. Open road density would be reduced from 3.32 miles/mile² to 2.22 miles/mile².

The area between Highway 26, Forest Development Road 4300 and the 2640, would be closed to public access. There would be benefits to deer and elk during calving and fawning by the reduction of off-road vehicle harassment.

Effects of Alternative III

Cutting trees, building roads and landings would reduce canopy closure. Approximately 300 acres of thermal cover would be lost. Optimal cover would decrease by about 111 acres. The planning area would contain 53 percent thermal cover and 0 percent optimal cover. This would exceed the standards and guides of at least 30 percent thermal cover but would reduce optimal cover (MHFP S&G FW-206). After the project there would be adequate thermal cover for big game, but reduced optimal cover. Optimal cover is very limited across the landscape and difficult to produce. It is a combination of thermal cover with a forage component.

The effects to forage are the same as Alternative II.

Some roads that are currently closed would be used for the timber harvest then re-closed post harvest. No additional roads would be closed in Alternative III. Some previous road closures have been ineffective. Open road density would not be reduced from the current 3.32 miles/mile².

Neotropical Migratory Birds

These species occupy a variety of structure types (seral types) within the planning area. All habitat structures from late seral (old growth) to early seral openings (existing plantations) that could be expected within the lower western hemlock zone are present. All neotropical species associated with these habitats are assumed to be present. Approximately 35 percent (1,268 acres) of the area should support late seral dependent species such as hermit thrush. About 6 percent (75 acres) of the late seral acres are riparian reserves commonly containing a mix of conifer and hardwood vegetation potentially suitable for species such as red-breasted sapsuckers. About 23 percent (810 acres) should support mid-seral dependent species such as Cooper's hawk, and 42 percent (1,496 acres) should support early seral dependent species such as olive-sided flycatchers and red-tailed hawk.

Effects to neotropical migratory birds as a result of the alternatives would vary. Under the **no action alternative**, the habitat existing would remain, at least in the short-term. In the long-term, habitat for bird species dependent upon early seral habitats would be lost. If these openings are not maintained, or if there is no new harvest proposed within the next 20-50 yrs,

then this type of habitat would gradually decrease.

Bird species dependent upon late-seral habitat, under the no action and action alternatives would still maintain this habitat. Under the action alternatives, only SE stands would be entered. The SE stands were not included in the old growth calculation as they function similarly to mid-seral stands as wildlife habitat.

Bird species dependent upon riparian habitat would not see much of a change in their habitats as a result of any of the alternatives. No riparian areas would be entered with any of the alternatives.

Species dependent upon mid-seral stands would not have any change from the existing condition, as this structure type would remain constant through all the alternatives.

3.4 Soils

Existing Condition

There are three major soil map units in the planning area, which were validated concurrently with field evaluation of the proposed vegetation treatment stands.

The first of the three soil map units consists of gently rolling terrain resulting from hard, stable, volcanic rock deposits overlain by glacial deposits. Slopes do not exceed 30 percent, with the predominate soil type in the area mapped as 352 (Mt. Hood National Forest SRI, Howes, 1979). This soil is slightly to moderately rocky and well drained, having 10 to 60 percent coarse fragments throughout the soil profile and typically a silt loam to loamy surface soil. The surface and subsurface erosion potential are estimated as slight and moderate, respectively. The compaction hazard is estimated as moderate, and the susceptibility to soil displacement is low.

The second consists of steeper terrain resulting from stream carving activity down through glacial till deposits. Slopes range from 25-40 percent (there are slopes up to 90 percent, as well as very rocky ground within the map unit, but these areas are being avoided) with the predominate soil types in the area mapped as 350 (north and east facing slopes) and 351 (south and west facing slopes). Other than slope orientation these soils are basically similar, with 10 to 50 percent coarse fragments throughout the soil profile and typically silty to sandy loam surface soils. The surface and subsurface erosion potentials are estimated as moderate and moderate to high, respectively. The compaction hazard is low and susceptibility to soil displacement is moderate to high. These particular soils are the ones that have been previously impacted along the riparian areas and have exhibited revegetation difficulty due to past damage. Erosion has also occurred on the old skid trails, leaving behind a very rocky substrate.

The third consists of similar soils as 350/351, but mapped as a complex with soil type 7 (igneous rock outcrops). This is actually an old cinder cone with slopes ranging from 25-40 percent. This area contains more rock, and is therefore drier and less productive than the soils within the riparian area. Due to the nature of the cinder parent material, these soils are less developed and have very little organic matter accumulation. Although these soils are not glacially derived, the SRI interpretations such as erosion potentials, etc., are the same as in the above paragraph.

Because of the manner and extent of past ground based timber harvesting, the percentage of area in a detrimental soil condition varies from stand to stand, but is estimated to be well below 5 percent. Stands 145 and 164 (stand 145 is not in this proposed action, and stand 164 is) appear

to have the greatest existing damage using visual estimation. However, shovel probe transects revealed that the existing detrimental damage is about 2 percent.

Analysis Methodology

Impacts to soil resources are disclosed with appropriate mitigation measures based on the Mt. Hood National Forest Land and Resource Management Plan (MHFP) as amended by the Northwest Forest Plan. Impacts such as soil compaction caused by ground based harvest and fuels treatment as outlined in the proposed action are measured by percent of harvest area in detrimental soil condition. This is a cumulative measurement that includes soil compaction, displacement, and severe burning, and their relationship to erosion and long term site productivity. Activity areas *should* not exceed 15 percent detrimental soil conditions (FW-022). Should, as defined in the MHFP, means that the action is required. However, case-by-case exceptions are allowed if identified and documented during interdisciplinary project planning.

In 1999, the Hood River District monitored two proposed Bear Knoll Planning Area stands to determine existing impacts to soil quality and therefore predict effects from the proposed action. Table 3-7 summarizes the results:

Table 3-7 Summary of Shovel Probe Transects							
Planning Area	Stand No.	Acres	Silviculture Treatment	Logging System	Fuels Treatment	Previous Entries	% Existing Soil Impacts
Bear Knoll	145	25	Unknown	Ground-based	None apparent	1	1-2
Bear Knoll	164	50	Unknown	Ground-based	None apparent	1	1

Areas examined show very little existing damage. The small amount of existing impact was usually the result of a road or a few old skid trails in the two monitored stands.

Effects of Alternative I

There would be no new impacts from the No Action alternative to soil resources at this time. Soils would continue to develop through natural processes. Percent detrimental soil condition would remain unchanged in the short term and would slowly decline over the long term as compacted areas recover due to physical and biological processes. Bare skid trails in riparian reserves would continue to slowly heal, but would remain prone to erosion until sufficient surface cover is established. Open roads identified in the proposed action for closure would not be closed, some of which are experiencing erosion. Under this alternative there are no incremental effects, therefore no cumulative effects to the soil resource.

Effects of Alternatives II and III

Problems with erosion are not expected if closure, scarification, and/or surface cover measures (seeding, mulching, slash cover, etc.) are used on temporary roads, skid trails, and landings following timber harvest and fuel treatment activities. We are entering stands with acceptable percentages (estimated less than 5 percent) of existing detrimental condition from old compaction. Maximizing use of existing skid trails where possible should result in soil damage remaining within the acceptable MHFP standard of 15 percent following timber harvest and fuels treatment. The area is expected to remain productive over the long term provided the area impacted is below 15 percent.

Both alternatives should meet the MHFP standard of less than 15 Percent detrimental soil damage within the stands proposed for entry at this time. However, the Viewshed Alternative proposes less *overall* impact to the soil resource within the planning area as compared to the Proposed Action Alternative

3.5 Recreation, Special Uses, and Scenery

Existing condition

General Recreation

The existing recreation condition in the Bear Knoll Planning Area is that of dispersed recreation in summer and winter. No developed recreation sites exist. Summer recreation amounts to dispersed camping and hunting along with a minimal amount of pleasure driving and forest products collection. Winter recreation opportunities in the area are those of snowmobiling, dog sledding and a minimal amount of nordic skiing.

The main recreational use of the Bear Knoll area is dispersed camping in the summer, hunting during the fall and snowmobiling in the winter. Burning has the potential to degrade air quality for short periods of time affecting visibility for recreation users. With the action alternatives, there may be short-term movement of dispersed campers or hunters during and after project implementation. Some roads may be closed, and areas behind the road closures would not be available for motorized use. There may also be restricted use of snowmobile trails for short periods of time during implementation. However, none of these actions should fall disproportionately on minorities or low income people.

Special Uses

Two buried fiber optic cables on Road 2610, the Frog Creek irrigation diversion ditch and miscellaneous winter recreation event permits are under special use permit or easements in the area.

Scenery

US Highway 26 is the only designated viewshed near the project area. The views along Hwy 26 are natural appearing landscapes except for clearance zones where the forest is open from the pavement to the forests edge. None of the proposed thinning alternatives are visible from Hwy 26. The two key viewpoints from US 26 are at the top of Clear Creek grade westbound (large pull-off) and at MP 65 eastbound. None of the proposed thinning stands can be seen from either viewing location. The stands are screened by terrain from the Clear Creek grade location. The stands are screened by vegetation from the MP65 location, however, if that screening vegetation were removed, the viewer would see a thinned stand of trees from a distance of over 1 mile.

That distance puts the stands into a middle ground partial retention status and viewing natural appearing trees meets that particular visual quality objective. Cumulatively, there would be no change to the existing natural-appearing condition of the Hwy 26 corridor.

Forest Road 43, which runs closest to the planning area, is not a designated viewshed. The scenery is currently in a partly modified condition along this road where past harvest units are evident. The road including those stands if analyzed under the MHFP Visual Quality Objective (VQO) guidelines, would be classified as a mix of foreground retention and modification. None of the thinning stands would be visible from Road 43, hence the existing scenery condition would remain unchanged. There would be no change from the current situation. As plantations along Road 43 grow older and more dense, the scenery effects are minimized and the viewed scene becomes more natural appearing again.

Effects of Alternative I to General Recreation, Special Uses and Scenery

The No Action Alternative would have no new effects to recreation, special use permits or scenery resource. More roads would remain open for public recreation use and fewer people (i.e. hunters and OHV users) would be kept from driving existing roads. The buried fiber optic cables and Frog Creek irrigation ditch remain unaffected by forest management activities and there would not be potential for affecting scenery in or out of the Highway 26 viewshed.

Effects of Alternatives II and III

General Recreation

The proposed thinning would have no effect on summer recreationists except those people who might be in the area during harvest activities. Dispersed campsites would remain unchanged except for a few dispersed campsites located behind road closures which would be unavailable after these road were closed. Additional dispersed camp sites would be made available at the junction of road closures. Burning has the potential to degrade air quality for short periods of time affecting visibility for recreation users. With the action alternatives, there may be short-term movement of dispersed campers or hunters during and after project implementation.

Gate closures may preclude the use of large trail grooming machines. To mitigate this, the gates placed on each end of the 2640230 system would be designed to open even with 12 inches of snow on the ground. Hence, the closure would have no effect on winter recreation.

Special Uses

Special uses would not be affected by the thinning as long as design elements are used. The thinning would have no short-term or cumulative effects on any feature or use under permit. No actions proposed in the Bear Knoll area would affect any of the long-term permits and easements. The fiber optic lines are well buried and not at risk.

Scenic Viewshed

None of the proposed thinning stands are visible from Highway 26, so there are no effects to the Viewshed along this highway. None of the proposed thinning stands can be seen from either key viewing location along Highway 26.

3.6 Botany

Existing Condition

There are 32 vascular plant species and 37 non-vascular species currently on the Region 6 list of Sensitive Plants that are within range of the Mt. Hood National Forest.

Prefield Review and Field Surveys

Prefield review of the proposed planning area identified potential suitable habitat for 15 species listed in Table 1 in Appendix C. Field surveys focused on suitable habitats in riparian areas, natural openings, and forested stands older than 80 years. Surveys were conducted during appropriate seasons for definitive identification in May-July 1997, August-September 1998, June and August 1999, October 2000, and September 2004. No listed species were found.

Survey Results – Potential Suitable Habitat

Plant communities associated with *Botrychium minganense* and *Botrychium montanum* were found in Cedar forests along floodplains in riparian areas in Sections 25 and 26, Frog Creek and tributaries, and Frog Creek Ditch. Presence of associated plant communities indicates that

potential suitable habitat is present, although the species have not been found during repeated field visits to the area over 5 years; there are no known sites in the vicinity of the planning area.

There are 2 known sites of *Shistostega pennata* (moss) near Barlow Creek approximately 2 miles north of the planning area boundary. Potential suitable habitat, in the pits under uprooted trees in wet areas, was identified in late seral forested areas in the Frog Creek riparian reserve, although the species was not located during repeated surveys over 5 years.

Former Survey and Manage Fungi

Surveys were previously not required for 17 former Survey and Manage fungi species that were moved to the R6 Sensitive Plant List in July 2004 (Regional Forester memo 7/21/2004). It is the line officer's decision to continue with the original Survey and Manage (SM) Standards and Guidelines (S&Gs) or comply with the Forest Service Sensitive Species Policy for ongoing projects that were in the development stage when the amended decision to remove the Survey and Manage Mitigation Measure S&Gs was signed March 22, 2004. Bear Knoll was in the developmental planning stage when the decision was signed. The line officer has chosen to follow the original SM S&Gs for fungi species that are now listed as R6 Sensitive; therefore surveys are still not required.

Under the original SM S&Gs surveys were required for one fungi species, *Bridgeoporus nobillissimus*. Potential suitable Habitat was identified in late seral forested stands in the Frog Creek riparian reserve, although the species was not found during repeated surveys over 5 years between 1997 and 2004.

Former R6 Sensitive Plant Species

Two species formerly listed as R6 Sensitive Plants were found in the riparian reserve in section 3 and along Frog Creek: *Lycopodium annotinum* and *Lycopodium selago*. The species are not presently listed as R6 Sensitive because their populations are currently stable throughout their range. Protection Measures Are Not Required. The presence of these species is documented in this report for tracking purposes and historic reference.

Effects Determination

The following direct, indirect, and cumulative effects determinations are based on analysis of potential effects to unoccupied suitable habitat that exists for *Botrychium minganense*, *Botrychium montanum*, and *Shistostega pennata*, in the riparian reserves within the Bear Knoll planning area, although the species have not been found during repeated surveys over 5 years of field reconnaissance.

Short-term effects are those that occur during project implementation and during 5 years after projects are completed. Long-term effects are those that occur between 5 and 50 years after project activity.

Direct and Indirect Effects of Alternative I

There would be no short or long-term effects, such as those associated with activities described under Alternatives II and III, because there would be no change in the activities that are currently present in the planning area.

Direct and Indirect Effects of Alternatives II and III

Short and Long-Term Direct and Indirect Effects Common to Both Alternatives

Potential suitable habitat for *Botrychium minganense*, *Botrychium montanum*, and *Shistostega pennata* has been found only in the riparian reserves. Proposed activities identified under Alternative II and Alternative III do not include entering riparian reserves, therefore the Short and Long Term Direct and Indirect Effects would be the same as those identified under Alternative 1.

3.7 Management Of Competing And Unwanted Vegetation

The Mt. Hood National Forest utilizes an Integrated Weed Management (IWM) approach as outlined in the Mt. Hood National Forest Land and Resource Management Plan (1990) and the Environmental Assessment for the Management of Noxious Weeds on the Mt. Hood National Forest (1993). Under the existing EIS, strategies for control include prevention, early treatment, and correction.

Noxious weed control measures are required for all projects that have a Moderate or High risk of introducing or spreading noxious weeds. Prevention measures must be identified in decision documents (Forest Service Manual 2081.03, 11/29/95). Prevention measures meet the intent of the Vegetation Management EIS and the MHFP regarding biodiversity of desired native species. Control of noxious weeds also meets the intent of the recent Executive Order Regarding Invasive Species (2/3/99, sections 2 and 3). Implementation of the prevention measures listed in Chapter 2, Best Management Practices and Design Criteria, would lower the risk of introducing and/or spreading noxious weeds.

Existing Condition

Noxious Weeds Present In the Planning Area

Tansy (*Senecio jacobea*) is the number one species in the Bear Knoll Planning Area that is targeted for control by the Forest Service, the Oregon Department of Agriculture, and the Wasco County Weed and Pest Control. Since the 1980's Wasco County Weed and Pest Control and the Oregon Department of Agriculture have assisted Forest Service efforts to control the species by releasing specific biological controls and by hand pulling infestations that are scattered throughout the planning area. Tansy is spread by vehicular traffic on and off road and by the movement of grazing cattle in the existing allotment, wildlife and recreational use. Tansy is of particular concern because it is a west-side species that is migrating east where it poses an imminent threat to the integrity of agricultural lands. The goal is to use all available methods to control the infestations before they move beyond the Mt. Hood National Forest boundary. Tansy site locations that overlap with the proposed activities are listed in Table 3-8.

There are five other noxious weed species that are known to occur in the planning area: Diffuse knapweed (*Centaurea diffusa*), Spotted knapweed (*Centaurea maculosa*), St. Johnswort (*Hypericum perforatum*), Canada thistle (*Cirsium arvense*), and Bull thistle (*Cirsium vulgare*). These species are spread by vehicular traffic on and off road and by the movement of grazing cattle, wildlife and recreational use. Biological control insects have been released since 1984 to control these noxious weed species, but progress is slow. Site locations for these species that overlap with the proposed activities are listed in Table 3-8.

Road Number	Miles	Existing Condition	Noxious Weeds Present	Apply Treatment Prior to Project Activity
2610000	2.32	Open	Tansy, St. Johnswort, thistle, knapweed	Alternatives II and III
2610020	0.85	Decommissioned	Tansy, St. Johnswort, thistle, knapweed	Alternatives II and III
2610026	0.31	Decommissioned	None presently	None
2640000	3.39	Open	Tansy, St. Johnswort, knapweed	Alternatives II and III
2640230	1.62	Open	Tansy	Alternative II
2640260	0.46	Open	Tansy, thistle, knapweed	Alternative II
2640261	0.16	Open	Tansy, thistle, knapweed	Alternative II
4320000	2.22	closed	Tansy, St. Johnswort	Alternatives II and III
4320011	0.53	Closed	None presently	None
4320012	0.60	Closed	Tansy	Alternative II
TR 1-11	0.40	Open	St. Johnswort, knapweed	Alternatives II and III
TR 1-13	0.08	Open	St. Johnswort, knapweed	Alternatives II and III
TR 1-14	0.40	Open	St. Johnswort, knapweed	Alternatives II and III
TR 1-20	0.43	Open	St. Johnswort, knapweed	Alternative II
TR 2-6	0.15	Open	St. Johnswort, knapweed	Alternative II

Analysis of Potential Effects

Short-term effects are those that occur during project implementation and during 5 years after projects are completed. Long-term effects are those that occur between 5 and 50 years after project activity.

Direct and Indirect Effects of Alternative I

There would be no short or long-term effects, such as those associated with activities described under Alternatives II and III, because there would be no change in the activities that are currently present in the planning area. Treatment of noxious weeds in the planning area would continue using all approved methods of control.

Direct Effects of Alternatives II and III

Logging operations such as ground based yarding and cable activity, road construction/re-construction, road ripping (obliteration), culvert maintenance and ditch cleaning, and associated machinery and equipment are known to introduce and spread noxious weeds as they create disturbed soils that provide potential seed beds for the establishment of noxious weeds.

Indirect Effects of Alternatives II and III

Noxious weed seeds and vegetative material may be carried into the planning area inadvertently by logging equipment and road building or decommissioning equipment; this could be mitigated by following the prevention measures listed in Chapter 2. Established populations of noxious weeds listed in Table 3-8 could migrate from roadsides, units and other openings into disturbed soils on roads receiving heavy maintenance, ripped (obliterated) roads, skid trails and landings (if new soil is disturbed), and logged units. The effect is already present in previous timber sale units in the planning area.

Noxious Weed Risk Assessment

Both action alternatives were evaluated to determine what level of risk the activities would cause. For this project, both action alternatives would have a “high” risk of spreading noxious weeds. To have a “high” risk determination, there must be known weeds in or directly adjacent to the project activity with a high density per acre (greater than 25 percent cover), and two or more vectors (such as heavy equipment, grazing, recreationists) present. Refer to the noxious weed report in the project file for the detailed risk assessment.

Treat Tansy Prior to Project Activity

In the event that harvest related activities are scheduled to occur during the mature plant stages of tansy, pretreatment using approved control methods, prior to project activity on Alternative II roads 2600, 2610, 2610020, 2640, and 4320; or on Alternative III roads 2640230, 2640231, 2640233, 2640235, 2640236, 2640240, 2640250, 2640260, 2640261, 4300012 and 4320012 would be required. Species-specific bio-controls may be utilized to assist with approved control applications as per weed treatment plans. Continue treatment using KV or appropriated funds as needed for up to 5 years; collect monitoring data prior to and after each treatment; adjust treatment as necessary to control noxious weed infestations.

3.8 Fuels

Existing Environment

This planning area encompasses approximately 3574 acres and is located in the southern portion of the Hood River Ranger District. Elevations range from 3000 to 4000 feet. The area is predominately Douglas fir and western hemlock. Riparian areas are predominately Hemlock and Cedar. The understory is a combination of maple, chinquapin, rhododendron and some ceanothus in harvested areas

The White River Watershed Analysis was completed in 1995. Field reviews of the Bear Knoll planning area have determined that the fire/fuels report for the watershed analysis is inconsistent with the existing condition on-the-ground. The watershed analysis attributes Native American influences on the vegetative condition. However, field reviews indicate little to no direct influence by Native Americans on the area. These Native American influences are found outside the planning area on the lower elevational areas of the watershed. In addition, the analysis was conducted based on fire groups rather than fire regimes. Fire regimes are the current national standard for assessing historical fire influences in the area, while fire groups were an early eastside attempt to map historical fire regimes.

Historically, fires would have burned in this area every 100-200 years. Fire suppression activities in the past 100 years have not altered the historical development of the vegetation. However, the different land management practices such as timber harvest and the associated road development after 1855 have increased the risk in human caused fire. Both natural and human caused fires have changed the landscape and increased the risk of ignitions occurring.

Lightning strikes do occur in this planning area but are often accompanied by rain that puts any fire starts out. Fire suppression efforts have been used to extinguish small fires that have held over from lightning storms.

The current road system provides adequate access for fire suppression. The Bear Knoll Planning area has had nine to ten wildfires in the past ten years. The cause of ignition includes: lightning, cigarette disposal, equipment-caused sparks, abandoned campfires, and arson.

The planning area is roughly divided into three Fire Regimes: III B 50–100 year mixed severity, III C 100–200 year mixed severity, and IV C 100–200 year stand replacing. Fire regime refers to the natural role of fire in an ecosystem undisturbed by human interference. All three of these fire regimes in the planning consist of a full range of fuel loadings from light to heavy. These loadings are dependent on factors such as stand type, stand condition, fire history and past management practices. Fire Regimes in the Bear Knoll Planning area are all capable of sustaining a stand replacing wildfire. See Map 8 for location of fire regimes within the planning area.

Apart from fire regimes, areas are divided into fire condition classes. Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities. The stands in the planning area are composed of two of the three condition classes.

Condition Class One: Fire regimes are within or near an historical range. The risk of losing key ecosystem components is low. Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval. Vegetation attributes (species composition and structure) are intact and functioning within an historical range.

Condition Class Three: Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have been altered from historical levels, either increased or decreased, by multiple management actions. This change results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been significantly altered from their historic ranges.

Condition class two is not represented in the planning area at this time. See Map 9 for location of fire condition classes within the planning area.

Fuel loadings in the project area were verified using photo guides. There is an estimated 11.1–43.5 tons per acre of fuels throughout the stands in Bear Knoll (Maxwell and Ward, 1980; PNW – 105 and USDA Forest Service Tech Report PNW. 51 76).

Fuels Effects

The objectives of the fuel treatment in the Bear Knoll planning area are to limit the potential for natural and activity created fuel to sustain and /or carry a high intensity fire, while maintaining appropriate levels of organic material to provide for nutrient recycling and/or habit needs. In accordance with the NWFP and recommendation in the DecAID analysis tool, down woody material would be retained in treated stands at 240–500 lineal feet per acre. In addition, to meet the 3–10 percent ground cover requirement, material in the 3 to 9 inch size class would also need to be left on site. Estimated to be left on site are approximately 26.7 tons per acre, which meets the MHFP standards and guides for fuel loading (FW–033). Excess activity fuel left on the surface is not anticipated to be a problem within a year due to natural decomposition.

Direct and Indirect Effects of Alternative I

By selecting Alternative I, the landscape of the Bear Knoll Planning area would be left in its current condition. The potential risk for high severity fires resulting from excessive fuel loads would continue to present hazards to stands in the project area. Fuel loadings would continue to increase consistent with vegetation succession and mortality from insects and disease. Disturbance would be primarily from insects and disease. Fire suppression activities would continue to exclude natural fire from this area.

In areas where high fuel loadings and ladder fuels are present fire behavior could still occur as a result of an uncontrolled fire. This may pose a safety problem for fire suppression crews as well as the public.

If Alternative I is selected, stands in condition class one would move towards a higher condition class, departing from its historical range. The risk of losing key ecosystem components is elevated, which adds to the possibility of reduced effectiveness of fire suppression modules and fire personnel to safely suppress wildland fires in condition class three regimes.

In the no action alternative there would be no degradation of air quality from pile burning of activity slash.

Effects Common to Alternatives II and III

The preferred method of treatment for units with activity fuels in the excess of 26.7 tons per acre is machine piling and burning. (Twenty-five tons would be spread evenly across managed sites.) To the extent feasible, machine piles would be located on skid trails and landings to minimize organic soil damage. Placing machine piles on disturbed soils reduces the possibility of a fire burning outside the harvest unit (Frandsen, 1997).

All burning of slash piles would be scheduled in conjunction with the State of Oregon to comply with the Oregon State Implementation Plan (FW-040) to minimize the adverse effects on air quality. Burning would be conducted when smoke dispersion conditions are favorable to minimize the potential for adverse conditions.

All prescribed burning of activity fuels would comply with Forest Service Manual direction (Forest Service Manual 5100, Chapter 5140).

Machine piling and hand piling arranges scattered activity slash from thinning into concentrated piles away from residual trees so they can be burned with little or no damage to the remaining trees. This slash is typically piled the same year and burned after one summer of drying. Since this activity takes place after stands have been thinned, an individual pile, if ignited under adverse conditions, may cause adjacent trees to torch, but the likelihood of a moving crown fire is slight. Pile burning would remove fuel concentration created by mechanical methods. The piles can then be burned in the late fall or winter, when weather condition and soil moistures would help to minimize environmental effects of burning.

Direct and Indirect Effects of Alternative II

Alternative II treats 531 acres. Harvest activities under Alternative II would increase fuel loading, therefore fuel treatment would follow. Each unit would have a field reconnaissance after harvest activities have been completed to determine fuel loadings.

The Table 3-9 identifies fire regime and condition class for Alternative II.

Table 3-9 Fire Regime and Condition Class for Alternative II				
Stand	Acres	Fire Regime	Condition Class	Burn Pre/ Post
139	77	IV C, IIIC, IIIB	1	Post
217	3	IIIB	1 and 3 N ½ of unit	Post
220	8	IIIB, IVC, IIIC	3	Post
160	14	IV C, IIIC, IIIB	1	Post
164	50	IV C, IIIC, IIIB	1	Post
167	19	III C, III B, IV C	1	Post
174	76	III B, III C, IV C	1	Post
175	40	III B, III C, IV C	1 and 3 N ¼ of unit	Post
177	55	III C, III B	1	Post
186	21	III B, III C, IV C	1 and 3 E ¼ of unit	Post
146	57	IV C, III C	1	Post
211	86	III B, III C	1	Post
211	17	III B, III C	1	Post
225	8	III B	1	Post

As in Alternative I, fuel loadings would continue to increase consistent with vegetation succession and mortality from insects and disease. Fire suppression activities would continue to exclude natural fire from this area.

There is a possibility of smoke intrusion in the Mt. Hood Wilderness, a Class I Airshed, and the Badger Creek Wilderness, a Class II Airshed. All prescribed burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan (MHFP, FW-040) and to minimize the adverse effects on air quality. Burning prescriptions would be developed to minimize the potential for adverse effects. Implementation of these measures would ensure compliance with the Clean Air Act.

Stand 220 and parts of stands 175, 186, and 217 are in condition class three. Treatment of these units would return these stands back to their historical condition class and reduce the possibility of losing key ecosystems to wildland fire.

Direct and Indirect Effects of Alternative III

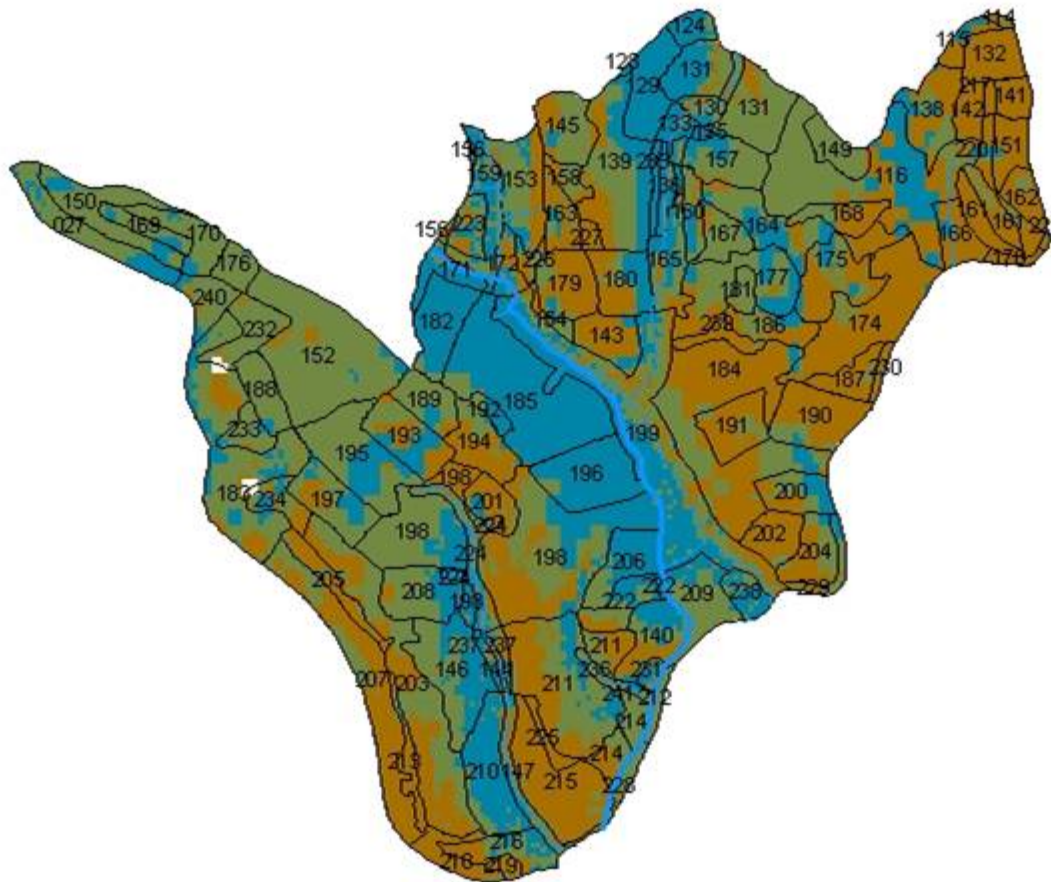
Alternative III treats 289 acres. Effects would be similar to Alternative II, with fewer acres treated.

Table 3-10 identifies treatment prescription, fire regime, and condition class for Alternative III.

Table 3-10 Fire Regime and Condition Class for Alternative III				
Stand	Acres	Fire Regime	Condition Class	Burn Pre/ Post
160	14	IV C, III C, III B	1	Post
164	50	IV C, III C, III B	1	Post
167	19	III C, III B, IV C	1	Post
174	76	III B, III C, IV C	1	Post
175	40	III B, III C, IV C	1 and 3 N ¼ of unit	Post
177	55	III C, III B	1	Post
186	21	III B, III C, IV C	1 and 3 E ¼ of unit	Post
211	17	III B, III C	1	Post

Parts of stands 175 and 186 are in condition class three. Treatment of these units would return these stands back to their historical condition class and reduce the possibility of losing key ecosystems to wildland fire.

Bear Knoll Planning Area Fire Regimes



- III B 50-100 yrs., mixed severity
- III C 100-200 yrs., mixed severity
- IV C 100-200 yrs., stand replacement
- Intermittent
- Perennials
- X
- Closed Roads
- Open
- Unclassified
- Decommissioned

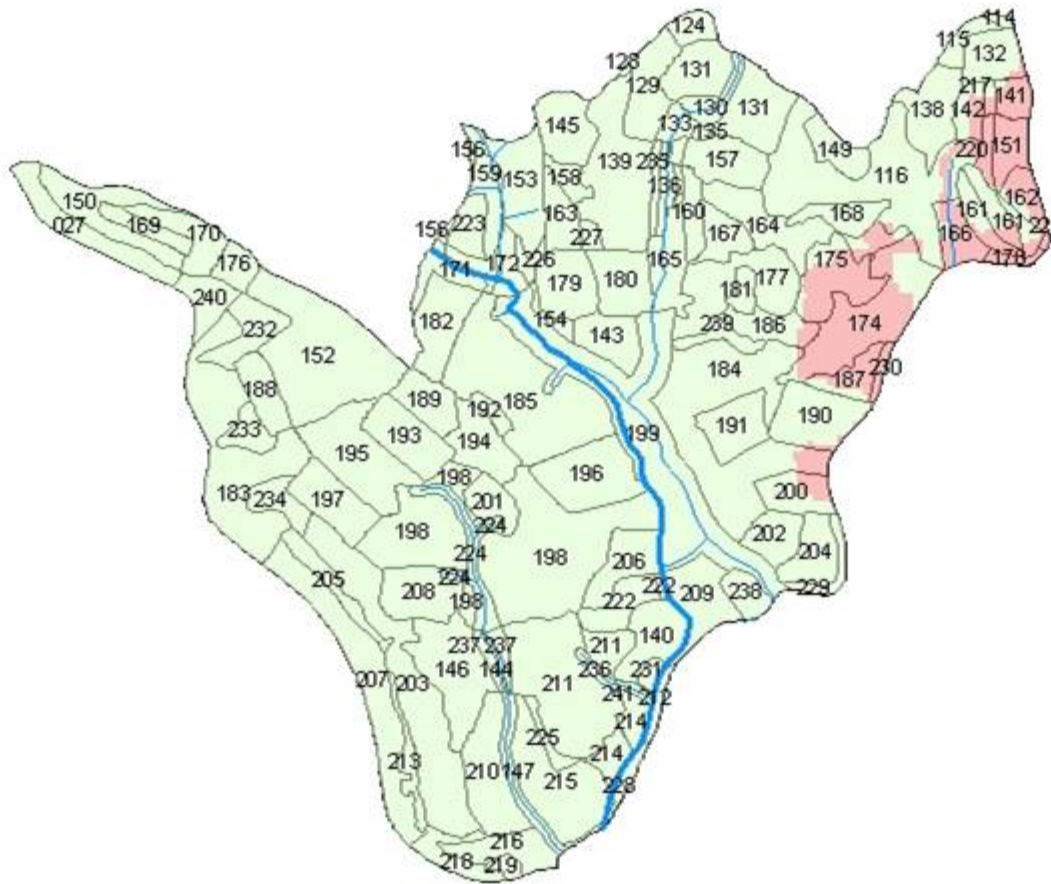


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Map 7



Bear Knoll Planning Area Condition Class



- Intermittent
- Perennials
- X
- - - - Closed Roads
- Open
- Unclassified
- · - · - Decommissioned
- Condition Class 1
- Condition Class 3



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Map 8





Photo 3-1

This is representative of the desired fuel levels as depicted by the fuels guide, recommended by DecAID, (10 percent ground cover, 14.9 tons per acre).



Photo 3-2

This is representative of the desired fuel levels as depicted by the fuels guide, recommended by DecAID, (10 percent ground cover, 26.7 tons per acre).



Photo 3-3
This represents 11.1 tons per acre of fuels on the ground.



Photo 3-4
This represents 43.5 tons per acre of fuels on the ground.

3.9 Air Quality

Air quality is of particular concern on the Mt. Hood National Forest Airsheds. Airshed is defined as a geographical area that, because of topography, meteorology, and climate, share the same air (Boutcher 94; MHFP, Glossary-1). Portions of the Mt. Hood Wilderness are federally designated as a Class I Airshed (MHFP, FW-046, and FW-047). The Mt. Hood Wilderness is ten miles north of the Bear Knoll planning area. The Badger Creek Wilderness, a Class II Airshed is five miles northeast of the Bear Knoll planning area. Management activities shall comply with all applicable air quality laws and regulations, including the Clean Air Act and the Oregon State Implementation Plan (MHFP, FW-040).

The Mt. Hood Wilderness and the Badger Creek Wilderness are characterized by relatively clean air which provides unobstructed views. Occasionally, particulate pollution from prescribed burning or wildfires outside the Forest, as well as from local sources, such as prescribed fire, agricultural operations or residential wood burning, can become trapped at the surface during periods of atmospheric stability. This air quality degradation can last for several days, especially during the fall and winter months.

Particulate standards were originally defined in terms of Total Suspended Particulates (TSP). Recently The Environmental Protection Agency has changed the particulate standards to apply to small particulates less than 10 microns in diameter (PM 10) and to particulates less than 2.5 microns in diameter (PM 2.5). Particulates less than 10 microns in diameter cannot be effectively filtered by the human respiratory system.

The size class distribution for wood smoke particles such that 82 percent of the particles range between 0.01 and .099 microns, 10 percent range between 1.0 and 4.99 microns, and 8 percent range between 5.0 and 15.0 microns. The most efficient particle size for scattering light (and thus reducing visibility) ranges between 0.3 and 0.7 microns. The majority (82 percent) of particulate emissions from wood combustion are in the size range that reduces visibility.

The characteristics, sources and potential health effects of coarse fraction particulates from 2.5 to 10 micrometers in diameter and fine particles smaller than 2.5 micrometers in diameter are very different. Coarse particles generally come from sources such as windblown dust from the desert or fields, and dust kicked up by vehicular use on dirt roads. Fine particles are generally emitted from activities such as industrial and residential combustion and vehicle exhaust. They are also formed in the atmosphere when gases such as sulphur dioxide and nitrogen oxides create volatile organic reactions in the air. Both coarse and fine particulate matter can be generated from the production of wood smoke.

PM 10 and PM 2.5 have been established as primary air quality parameters because of potential adverse human health effects. These small particulates can be inhaled and cause respiratory problems, especially in smoke sensitive portions of the population, such as the young, elderly, or those predisposed to respiratory ailments. Coarse particles can accumulate in the respiratory system and aggravate health problems such as asthma. Fine particles, which penetrate deeply into the lungs, are more likely than coarse particles to contribute to the health effects associated with hospital admissions.

All prescribed burning activities would comply with Forest Service Manual direction (FSM 5100, Chapter 5140)

Direct and Indirect Effects of Alternative I

By selecting Alternative I, the landscape of the Bear Knoll Planning area would be left in its current condition. Air quality would remain unaffected, with the exception of natural fire events and intrusions from outside influences.

The Mt. Hood wilderness and The Badger Creek Wilderness would be affected by smoke intrusion in the event of an uncontrolled wildfire in the planning area. Particulate matter would be high in such an event. There would be no effect from pile burning of timber harvest slash.

Direct and Indirect Effects of Alternative II

This proposed action is meant to meet the purpose and need to thin 531 acres. Burning would occur in this action alternative. Units that have activity fuels in excess of 25 tons per acre would be treated as per FW-033. Fuels treatment would be accomplished by machine piling and burning. Machine pile burning has the potential to degrade air quality for short periods of time. The primary impact to air quality from burning of machine piles is the temporary visibility impairment caused by smoke to recreational hunters. Past experience has shown that the effects to air quality are limited in scope to the general burn area and are of short duration. Machine pile burning would be scheduled in the fall or during periods of inclement weather.

The following areas are of concern for smoke intrusion: The Mt. Hood Wilderness, a Class I Airshed and the Badger Creek Wilderness, a Class II Airshed. All machine pile burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan to minimize the adverse effects to air quality. Machine pile burning would be conducted when smoke dispersion conditions are favorable to minimize the potential for adverse effects.

Health risks are considered greater for those individuals in close proximity to the burning site, due to overexposure to particulate matter. Few health effects from smoke should occur to Forest users due to their limited exposure. Due to the distance involved and the season in which machine pile burning would occur, there would be negligible effects to individuals in the airsheds.

Direct and Indirect Effects of Alternative III

This proposed action is meant to meet the purpose and need to thin 289 acres. Burning would occur in this action alternative. Units that have activity fuels in excess of 25 tons per acre would be treated as per the Forest Service Manual FW-033. Fuels treatment would be accomplished by machine piling and burning. Machine pile burning has the potential to degrade air quality for short periods of time. The primary impact to air quality from burning of machine piles is the temporary visibility impairment caused by smoke to recreational hunters. Past experience has shown that the effects to air quality are limited in scope to the general burn area and are of short duration. Machine pile burning would be scheduled in the fall or during periods of inclement weather.

The following areas are of concern for smoke intrusion: The Mt. Hood Wilderness, a Class I Airshed and the Badger Creek Wilderness, a Class II Airshed. All machine pile burning would be scheduled in conjunction with the state of Oregon to comply with the Oregon Smoke Implementation Plan to minimize the adverse effects to air quality. Machine pile burning would be conducted when smoke dispersion conditions are favorable to minimize the potential for adverse effects.

Health risks are considered greater for those individuals in close proximity to the burning site, due to overexposure to particulate matter. Few health effects from smoke should occur to Forest users due to their limited exposure. Due to the distance involved and the season in which machine pile burning would occur, there would be negligible effects to individuals in the airsheds. Under Alternative III fewer acres would be treated therefore less slash would be created and fewer emissions would be generated.

3.10 Economic Resources [Data Pending]

One of the goals of the NWFP is provide a sustainable level of forest products for local and regional economies and to provide jobs. This analysis tiers to the NWFP Final Environmental Impact Statement which has an in depth analysis of the economic basis behind the goal of providing forest products for local and regional economies. It also contains an analysis of the social and economic benefits and impacts of preservation, recreation, and other values.

For the action alternatives, most of the costs for planning have already occurred. All action alternatives would remove timber. Logging systems to remove the timber are similar in Alternatives II and III. Both alternatives use many of the same roads and use the same types of logging systems.

A timber sale would be appraised just prior to advertisement, so the figures below would likely change in today's fluctuating markets, but the relative difference between the alternatives would remain approximately the same. Competitive bidding may result in increased value. Table 3-11 displays costs and economic returns.

Table 3-11 Costs and Benefits [Data Pending]				
	Total Net Value \$	Agency Costs	Net Present Value	Benefit/cost Ratio
I	\$ 0	\$ 0	\$ 0	\$0
II				
III				

Agency Costs: This figure (undiscounted) is based on Regional and Forest Averages. For the action alternatives it includes costs that have not yet occurred such as sale administration.

Net Present Value: This is the present day project value where estimated administrative costs and essential KV costs (discounted), are subtracted from total revenue generated (discounted).

Benefit cost Ratio: this is a ratio derived from dividing the estimated bid value (discounted) by the estimated administrative and essential KV costs (discounted). A benefit/cost ratio greater than 1.0 indicates that benefits exceed costs.

Alternative I would not provide forest products consistent with the NWFP goal of maintaining the stability of local and regional economies now and in the future. No funding would be available for other projects, including road closures. Future costs for road closures may increase. There would be no return on the planning costs already used for this project.

Alternative II would produce approximately 4.4 MMBF. A full range of timber products would be removed, and logging systems would be the same as in Alternative III. Costs in these two alternatives are similar.

Alternative III would produce approximately 2.4 MMBF. A full range of timber products would be removed.

Between September 2001 and December 2003, 24 separate timber sales were auctioned on the Mt. Hood National Forest. Four of the sales received no bids. Three of the four sales were re-

auctioned at a later date. Two of these re-auctions had numerous bidders present and the sales were sold to the highest bidder. A total of 22 timber sales were sold during this time period. The highest bidders (purchasers) of the 22 timber sales are from what is considered the local and regional areas. Some of the purchasers have their own manufacturing facilities while others are considered log brokers. All of them to some extent market logs between different mills that have been tooled for specific species, size classes and/or products. It is not uncommon for logs from one timber sale to be trucked to 3 or 4 different mills within the region.

The purchasers of 19 of the 22 timber sales also qualify as small business” by the Small Business Administration (SBA). Eight of the timber sales were purchased by a business with less than 25 employees. Eleven of the sales were purchased by businesses with less than 500 employees. Three of the sales were purchased by business that have more than 500 employees and are not considered “small businesses” by SBA.

The highest bids on 15 of the 22 sales sold were in excess of the minimum required bid. The highest bids on 6 out of the 22 sales are almost double the minimum required bid. The bidding results of the timber sales sold since September of 2001 indicates substantial competition for forest products in the region as well as high demand for forest products from the Mt. Hood National Forest. Timber sales sold from the Mt. Hood National Forest provide forest products for the local and regional areas and would be purchased from businesses in these areas that employ people to work in the woods or in the mills.

In addition to the effects to the local economy, there would be a short-term impact to special forest product users while the Bear Knoll area is being harvested. Firewood and other products are available forestwide and therefore the impact would be minimal.

3.11 Transportation System

Existing Condition

The Bear Knoll road system consists of 18.54 miles of open roads, including system and non-system roads and 0.45 miles of snowmobile trail; 4.12 miles of roads are closed with gates, earth berms or guardrails. State Highway 26 serves as the boundary of the planning areas for 3.75 miles. A roads analysis of the Bear Knoll planning area has been completed. See Appendix E for more information.

There are 3.34 miles of asphalt roads, 16.23 miles of aggregate roads and 3.09 miles of native surface roads. Water generally drains down ditches to culverts or off the road by an outsloped road surface. In some places, water runs down the road or puddles in pot holes and low places, not draining as designed.

Roads in the Bear Knoll Planning Area provide access for administrative, public, and commercial users. Roads provide access to Frog Creek Ditch and a rock pit on FDR 4320014. There are underground fiber optic lines on FDR 2640. Recreational uses of the roads include access to the Barlow Trail on FDR 4300, picnicking, dispersed camping, hunting, and mushrooms/berry gathering. Roads are also used for access for fire suppression. Roads in Bear Knoll provide for timber haul and firewood removal. Roads also act as travel corridors for cattle and wildlife. Many roads are used for winter recreation, primarily as snowmobile trails. Roads used as snowmobile trails include 2640000, 2640230, 2540233, 43, 4320, and 2610.

For this analysis, a 0.45 mile section of snowmobile trail is counted toward the open road density because it is wide enough for vehicle passage and there is currently no seasonal closure. Access

to this trail, via FDR 26400233, was once blocked with an earth berm that has since been removed to allow for snowmobile grooming.

Limited road maintenance dollars have resulted in many roads becoming brushed in, drainages being blocked, and road surfaces needing repair. Lack of past maintenance affects safety, road structure, and storm water run off. Overgrown brush along the road reduces visibility for safe driving. Unmaintained ditches, culverts, dips and waterbars cause water to flow over the road, and have the potential to add sediment to creeks. Pot holes, ruts, washboards, breached water bars and pavement cracking can be obstacles to drivers, potentially adding sediment to creeks, and increase the rate of degradation to the road infrastructure.

Although there is a functioning ditch and culvert, ground water is percolating up through the surface of FDR 4320000 at mile 1.2. This section of road would not be used during timber harvest (See Design Criteria, Aquatic Resources).

A total of 5.08 miles of road in the planning area should be closed but are open due to ineffective road closures. There are earth berms, gates and guardrail closures in the area. Generally, earth berms have been a more effective method of road closure than guardrails or light weight metal road gates. Gates become ineffective road closures if they are left open or are removed. Generally, heavy-duty gates have been more effective than light weight metal road gates. The gate at FDR 4320000 is an example of a heavy-duty gate and has proved to be an effective closure.

Log haul has had the most critical effect on the transportation resource. The amount of moisture present in the subgrade or base course is a concern. Past commercial haul during wet conditions of the base and subgrade have weakened the structural capacity of aggregate and asphalt surfaced roads. In addition, plowing snow for winter haul eliminates insulation, which allows deeper frost penetration. Plowing also stores snow along the shoulders of the road. As the snow melts, the subgrade is saturated and prolongs the time it takes for the road to dry out in the spring.

Haul during freeze/thaw conditions has damaged road surface and base materials. As frost penetrates the road prism, it pulls moisture up into the subgrade and base course material, saturating the subgrade. When the moisture in the subgrade and base course freezes, the ice expands, pushing soil and rock particles apart. This action reduces the compaction in the subgrade and base course, which in turn reduces the structural capacity of the road.

The roads in the Bear Knoll Planning Area were designed for timber haul during the normal operating season, generally June through October. Haul could occur outside the normal operating season if conditions warrant and it is approved.

Direct and Indirect Effects

Activities related to timber sales affecting the transportation system include: log haul, road maintenance, road closures, opening currently restricted use roads (closed with a gate), bringing physically closed roads (decommissioned) up to standard, and utilizing existing disturbed ground for temporary roads. These relationships/effects will be discussed for the no action and action alternatives.

Alternative I

The No Action alternative would not involve log haul, timber related road maintenance, road closures, or additional road use. This alternative would not change the use pattern of roads or

limit access, correct existing road erosion problems, or correct ineffective road closures. Under this alternative, administrative and public access would remain the same. A roads analysis has been done for the planning area. Roads have been identified for closure and these closures could still occur in the foreseeable future with other funding and the respective environmental analysis and public comment.

Effects Common to Alternatives II and III

Log Haul

Both action alternatives would involve log haul. The main haul routes include Forest Development Roads (FDR) 4300, 4320, 2640, 2640230, and 2610. Log haul has been analyzed during both saturated and unsaturated road bed conditions. Given the existing state and life expectancy of roads in the planning area, hauling on saturated road beds does not protect the integrity of existing roads. Therefore, both action alternatives restrict log haul to unsaturated road bed conditions. Soil moisture in the subgrade must be below its plastic limit to meet this design parameter. Commercial haul would be prohibited when moisture is greater than the plastic limit in the subgrade (for most soil types, this occurs between 16-18 percent) and during freeze/thaw cycles. With this Design Criteria in place, the integrity of the road would be maintained.

Road Maintenance

Road maintenance would occur on the haul routes under both action alternatives associated with implementation of the timber sale contract. Maintenance would protect the road infrastructure, improve safety of the road, improve drainage structures, and decrease sedimentation. Brushing roads increases sight distance to improve visibility for safe driving. Blading, ditch and culvert cleaning, rocking, spot rocking, resurfacing, removing and replacing barriers and waterbars, corrects or improves water drainage. Road maintenance may cause a temporary increase in sedimentation while the work is being done. Waterbars would decrease the velocity of water that could carry sediment into creeks. Maintained ditches would decrease erosion.

Pavement patching and deep patching, together with the improvements listed above, would reduce obstacles, reduce maintenance costs, and protect the road infrastructure. Spoils and brush disposal locations would be prelocated to reduce the likelihood of spreading noxious weeds. Appropriate water sources would be selected for compacting and dust abatement that assure stream flow and fish protection measures are met. Maintenance activities could cause some short term delays or detours for road users while road work is being done.

Road Management/Transportation – (Key Issue #2)

Alternative II

This alternative would temporarily open 3.62 miles of currently restricted use road (closed with a gate), bring 1.16 miles of physically closed road (decommissioned) up to standard and utilize 1.46 miles of disturbed ground (such as existing skid trails) as temporary road. Additionally, 4.85 miles of roads would be closed with a heavy duty, seasonal gate that would be open for winter recreation and 0.62 miles would be partially obliterated.

Many comments received by the public expressed concern over new road construction, high road density, and ineffective road closures. Alternative II does not propose new road construction, but utilizes existing system roads. All the proposed temporary roads would make use of previously disturbed ground, such as old skid trails. To address the ineffective road closures, a heavy duty gate would replace the breeched guard rail and berm closures on the 2640230 system, closing 4.85 miles of road

Temporary roads would be partially obliterated, which includes ripping, re-contouring, re-vegetating and constructing water bars as needed, after completion of the project. Currently restricted use roads that would be temporarily opened for the timber harvest would be re-closed with the existing gate after harvest activities.

The only road closure proposed is a restricted use closure on the 2640230 system from April 1st to December 1st. A gate is proposed at the junction of the 2640 and the 2640230. Another gate would be located at the other end of the system (near the tunnel under Highway 26) and would block vehicular traffic to the snowmobile trail. This would limit public, vehicular access to the entire 2640230 system. Limited administrative use would still be available for fire suppression.

Road closures would decrease public, administrative and commercial access, decrease the current effective open road density, and reduce road maintenance costs. Removing berms to access roads for fires would take additional time and equipment. A road that has been effectively barricaded and has self maintaining water drainages has no maintenance costs. The only cost would be monitoring for resource damage and the effectiveness of the closure.

Alternative III

This Alternative would open 3.62 miles of currently restricted use road (closed with a gate), bring 1.16 miles of physically closed road (decommissioned) up to standard, and utilize disturbed ground (such as existing skid trails) for 0.88 miles of temporary road.

Alternative III does address the public concern over new road construction. Alternative III does not propose new road construction, but utilizes existing system roads. However, Alternative III does not reduce road densities or address ineffective road closures.

The proposed temporary roads would make use of previously disturbed ground, such as old skid trails. Temporary roads would be partially obliterated, which includes ripping, re-contouring, re-vegetating and constructing water bars as needed, after completion of the project. Currently restricted use roads that would be temporarily opened for the timber harvest would be re-closed with the existing gate after harvest activities. Additionally, 0.85 miles of currently decommissioned road that is proposed to be used for the timber sale would be partially obliterated. Logs would be placed on the ground and trees planted to make the entrance to the road unusable.

There would be a temporary increase in access for all forest users until roads are closed at the end of the project.



3.12 Range

Existing condition

This planning area encompasses approximately 3,574 acres and is located in the southern portion of the Hood River Ranger District. Elevations range from 3,000 to 4,000 feet. The area is predominately Douglas-fir, and grand fir. Riparian areas are predominately Hemlock and Cedar. The understory is a combination of maple, chinquapin, rhododendron and ceanothus in previously harvested areas. The herbaceous layer is a combination of grasses, both native and non-native, forbs and noxious weeds. The average annual precipitation levels are between 40 to 60 inches.

This planning area lies within the western portion of the White River Cattle Allotment (46,260 acres, total). The current permitted numbers of livestock on this allotment are 250 cow/calf pairs. Livestock are first turned out in the eastern pasture near McCubbins Gulch. The permitted grazing season for this allotment is from June 1st to September 30th, and livestock would most likely be in the planning area around July 15, after they have utilized the lower elevations in the eastern pasture for approximately one month. The pasture division line is the fence on Forest Development Road (FDR) 2110, the "Keeps Mill" road.

The current allotment management plan calls for a "deferred" grazing system. Under this system, the permittees turn out their livestock in the east pasture, after "range readiness" (firm soils, & maturing vegetation) has been achieved, somewhere around the first week of June. The livestock utilize this pasture for about one month, or until utilization levels are achieved, whichever comes first. The permittees then move their livestock into the west pasture for the remainder of the grazing season. This system defers utilization of forage in the west pasture until plant development progresses to a mature phenological stage.

The majority of permanent range occurs in meadows and in riparian areas to the east of this planning area. Very little forage occurs within this planning area. There are no meadows, and the only riparian areas are Frog Creek and two Frog Creek tributaries, before and after the diversion into the Frog Creek ditch, and three un-named intermittent streams.

In the timbered areas, the transitory range provides forage on a relatively short-term basis (20 to 50 years). This is forage produced in openings created by timber harvest activities (clearcuts or shelterwoods). Forage production can sometimes be significant for the first 8-10 years following harvest and drops off as tree canopy shades out the herbaceous vegetation. Past monitoring indicates that the cows do not spend much time in this planning area, since it does not provide enough forage to maintain them. Historical data shows this area is used for "passing through", between the lower and the higher elevation meadows. The planning area currently allows for livestock to move along Forest Development Roads 2610 and 2640, and behind closed roads such as FDR 4320.

Specific details of allotment management such as pasture movement schedules, range readiness recommendations, utilization limits, range improvement maintenance responsibilities etc., are discussed in the White River Allotment Management Plan, available at the Barlow Ranger District. Range improvements within the allotment are a combination of drift and boundary fences, stock watering ponds, spring developments, corrals and cattleguards.

Direct and Indirect Effects

Alternative I

No trees would be cut. Landings, skid trails or roads would not be utilized or closed. New openings in the forest canopy would not be created which would potentially produce new forage. There would be no increase in the carrying capacity from the harvest units proposed in Bear Knoll for additional forage or changes to the current distribution patterns of the livestock. Road closures would not be implemented with this project, thus there would not be an increase in the cost of permit administration, monitoring, and range improvement maintenance from the current condition.

Alternatives II and III

Alternatives II and III proposes the same type of treatment, thinning, to reduce the current stand basal area to between 120 to 160 square feet or 220 to 293 trees per acres, depending on existing stand conditions. Reforestation is not necessary after this type of harvest. There would be no conflict between grazing and reforestation with this prescription.

The proposed thinning would open the stands and create a minimal amount of herbaceous forage. Any additional forage could be expected to last from 5 to 10 years. Alternative II treats 531 acres and Alternative III treats 289 acres, so the difference between the alternatives is in the number of acres treated. This slight increase in forage is not expected to change the existing foraging patterns currently used by the livestock, since this area is utilized for “passing through,” and the livestock spend little time here.

Thinning would not occur in riparian reserves, thus no increase in utilization levels within the few riparian areas is expected (MHFP FW-293). Since these harvest prescriptions call for thinning existing live trees, and the leave trees are an average of 75 feet tall, there would be no threat of damage to leave trees from livestock.

Alternatives II proposes to close 5.47 miles of road. Road closures would limit administrative and public access in both action alternatives. This would increase the cost of permit administration and monitoring. Closing roads would also limit access to cattle, and would decrease the spread of noxious weeds.

3.13 Heritage Resources

Existing Condition

A cultural resource survey was conducted on a planning area scale and documented in Heritage Resource Report 01/06/03. Survey methodology was conducted in accordance with the 2003 agreement between Region 6 of the Forest Service, the State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (ACHP). Although the Bear Knoll Planning Area lies near the boundary for the Confederated Tribes of Warm Springs (CTWS), there are no known traditional use areas within the proposed project area. Huckleberries along Oregon State Highway 26 and Forest Road 43 are collected by all segments of the general public.

The Oak Grove/Oregon City Wagon Road (662EA0013) is a previously documented site known to pass through the Bear Knoll Planning Area. The road was constructed in the late 1800's as an alternative route to the Barlow Road, and connected the Willamette Valley to eastern Oregon. The wagon road has been extensively fragmented through past road construction and reconstruction, and from other development.

The Frog Creek Feeder Irrigation Ditch (662EA0035) is a previously documented site that bisects the Bear Knoll Planning Area. The ditch was constructed circa 1920 as part of the Clear Lake-Juniper Flat Irrigation Project. The ditch is in good condition and continues to be used and maintained by the improvement district to transport water.

One prehistoric isolate with an indeterminate cultural affiliation (666IS0194) lies within the Bear Knoll planning area. The isolate consists of one flake situated within a roadbed, and one flake recovered from a shovel test. Additional shovel tests conducted at the location proved negative for cultural material.

One historic can dump (666EA0228) lies within the Bear Knoll Planning Area. The site consists of eleven tin cans of various sizes situated near the Frog Creek Feeder Irrigation Ditch. The cans are believed to be associated with ditch maintenance activities.

Two historic carved cedar trees (666EA0229) lie within the Bear Knoll Planning Area. One tree exhibits a dendroglyph with numbers, letters and chop marks, while the second tree exhibits a blaze. The trees are in close proximity to the Frog Creek Feeder Irrigation Ditch, and are believed to be associated with the construction or maintenance of the ditch.

A portion of a historic cattle stock driveway (666EA0242) lies within the Bear Knoll Planning Area. The site consists of five metal stock driveway signs and one blazed tree indicating the center of the driveway. Cattle stock driveways were established in the 1930's, along with other improvements, in order to manage grazing and livestock movement within the national forest system.

Direct and Indirect Effects

Alternative 1

Since no activities would occur under this alternative, there would be **no effect** to heritage resources other than the natural processes that are already occurring.

Alternatives II and III

No distinct visible signs of the Oak Grove/Oregon City Wagon Road (662EA0013) were located within the Bear Knoll Planning Area. Archival maps indicate that the wagon road generally follows the current alignment of Forest Service Road 2640 through the project area. This segment of wagon road was apparently obliterated during the construction of Forest Service Road 2640. The alternatives would have **no effect** on the wagon road.

The Frog Creek Feeder Irrigation Ditch (662EA0035) has been maintained and widened since its construction, and no longer retains any historic character. The ditch is located outside of any proposed activities. The alternatives would have **no effect** on the ditch.

Shovel tests determined that prehistoric isolate 666IS0194 is ineligible for inclusion on the National Register of Historic Places. All significant information about the isolate was collected. The isolate offers no further research potential. No protective measures are required or recommended for ineligible isolates. The alternatives would have **no effect** on the isolate.

The historic can dump site (666EA0228) does not appear to be eligible for inclusion on the National Register of Historic Places. However, the site was not evaluated for this project. The site lies outside of any activities proposed for any of the alternatives. The alternatives would have **no effect** on the can dump.

The historic carved cedar trees (666EA0229) lie outside of any activities proposed for any of the alternatives. The alternatives would have **no effect** on the carved trees.

The historic cattle stock driveway (666EA0242) lies outside of any activities proposed for any of the alternatives. The alternatives would have **no effect** on the driveway.

Should additional historic or prehistoric cultural resources be discovered within the planning area, work would immediately cease in that area and Heritage Resource personnel would be notified to evaluate the site for potential effects and determine appropriate mitigation measures.

3.15 Summary of Cumulative Effects

Cumulative effects include the existing or baseline conditions described in Chapter 3 at the beginning of each resources discussion (i.e. past Forest Service activities in the Bear Knoll planning area), past projects outside of the planning area, impacts associated with this project, and other reasonably foreseeable projects identified in the cumulative effects analysis area. To be cumulative there must be an overlap of both space (geography) and time, and the effects must be related to the proposed activities.

Table 3-12 Past, Present, and Reasonably Foreseeable Future Activities Considered in the Cumulative Effects Analysis		
Project Name	Project Description and Scale	Resource Areas Affected
Proposed Activities for Bear Knoll		
1. Thinning of stands	Alternative II: thin 531 of 3,574 acres from below to a basal area of 120-160ft ²	All resource areas analyzed effects of all proposed activities
	Alternative III: thin 289 of 3,574 acres from below to a basal area of 120-160ft ²	
2. Machine piling and burning of slash	Machine pile and burn activity fuels in excess of 26.7 tons/acre for both action alternatives	All resource areas analyzed effects of all proposed activities
3. Use of currently restricted-use (gated) roads	Temporarily open and conduct prehaul maintenance on 3.62 miles for both action alternatives	All resource areas analyzed effects of all proposed activities
4. Use of existing temporary roads	1.46 miles of existing disturbed ground would be used for temporary roads during the timber sales. Roads would be partially obliterated after use, which includes ripping, recontouring, revegetating, and water barring as necessary.	All resource areas analyzed effects of all proposed activities
5. Road Closures	Alternative II: 4.85 miles of road would be closed with a heavy-duty seasonal gate except from December 1 st -April 15 th and 0.62 miles of road would be partially obliterated.	All resource areas analyzed effects of all proposed activities
	Alternative III: No additional roads would be closed.	

6. Noxious Weed Management	Alternative II: 11.62 miles of road would be pretreated for noxious weeds as well as all of the existing disturbed ground for temporary roads	All resource areas analyzed effects of all proposed activities
	Alternative III: 8.78 miles of road would be pretreated for noxious weeds as well as all of the existing disturbed ground for temporary roads	
7. Restriction of commercial haul when road conditions warrant	Haul would be restricted when soil moisture is high enough for subgrade material to be in its plastic limits.	All resource areas analyzed effects of all proposed activities
Activities Associated with Bear Knoll		
8. Brood Tree Timber Sale (1980)	173 total acres have been treated within this planning area using small clear cut harvests	Analyzed as part of the Existing Condition
9. Little Knoll Timber Sale (1987)	1,123 total acres have been treated within this planning area with overwood removal and clear cut harvests	Analyzed as part of the Existing Condition
10. Osprey (1998) • Ship Timber Sale	1,155 total acres have been treated within this planning area with shelterwood and thinning harvests.	Silviculture, Wildlife, Fire/Fuels, Recreation, Economic Resources
11. Hilynx (1998) • Rock Timber Sale • Hipo Timber Sale • Hi South Timber Sale • Hi North Timber Sale	1,393 total acres will be treated within this planning area. Timber sales will include machine piling and burning.	Silviculture, Wildlife, Fire/Fuels, Recreation, Economic Resources
12. Diablo Timber Sale • Path Timber Sale • Wildfire Timber Sale • Diablo Timber Sale	This planning area includes thinning and individual tree selection prescriptions on 1,455 acres. Of 3 timber sales within the planning area, 2 have been logged and 1 is planned for future logging. Timber sales will include machine piling and burning.	Silviculture, Wildlife, Fire/Fuels, Recreation, Economic Resources
13. Proposed Juncrock Timber Sale EIS	This planning area is a reasonably foreseeable action and may include regeneration and thinning harvests, machine piling and burning, and road construction, road closures, and road decommissioning.	Silviculture, Wildlife, Fire/Fuels, Recreation, Economic Resources
14. Timber-related road closures and decommissioning	<u>Hilynx</u> : Road density would be reduced from 5.41 miles/mile ² to 2.16 miles/mile ² . <u>Osprey</u> : Road density was reduced from 3.31 miles/mile ² to 2.41 miles/mile ² . <u>Diablo</u> : Road densities would be reduced from 3.09 miles/mile ² to 2.4 miles/mile ² . <u>Juncrock</u> : Road density could be reduced from 5.13 miles/mile ² to 3.46 miles/mile ² if the EIS moves forward to implementation.	Recreation, Fire/Fuels, Transportation, Wildlife

15. Logging on adjacent Warm Springs Reservation	[Data Pending]	Silviculture, Wildlife
16. Smoke emissions from adjacent timber projects	This would include pile burning of activity slash from all of the adjacent planning areas, as well as the Confederated Tribes of the Warm Springs	Fire/Fuels, Recreation
17. White River Cattle Grazing Allotment	The planning area lies in the western portion of the allotment which is 46,260 acres total; 250 cow/calf pairs	Botany/Noxious Weeds, Aquatics/ Fisheries, Soils, Wildlife
18. OHV Use	Limited OHV use in the Bear Knoll area compared with the rest of the eastside of the Forest	Botany/Noxious Weeds, Recreation
19. Backcountry Horseback riding	Limited backcountry horseback riding in the Bear Knoll areas	Botany/Noxious Weeds, Recreation
20. Routine Hazard Tree Removal	Proposed future projects along Highway 26 as part of the Forest's general road maintenance	Silviculture, Wildlife, Botany/Noxious Weeds
21. Routine Road Maintenance (not related to timber harvest)	General road maintenance is expected Forest-wide based on funding	Botany/Noxious Weeds, Hydrology, Fisheries
22. Special Forest Products	Wood cutting permits are available for use on a majority of the forest. Mushroom and beargrass permits are also available.	Special Uses, Recreation, Botany/Noxious Weeds

Aquatic and Fisheries Resources

The cumulative effects analysis area for hydrological and fisheries resources is Frog Creek and Lower Rock Creek subwatersheds, the White River and Beaver Creek fifth-field watersheds, which includes the Clear Creek, Upper and Middle Beaver Creek sixth-field subwatersheds.

Assumptions: Openings in the canopy will affect snow accumulation and snow melt. Activities that would reduce canopy closure below 70 percent in stands greater than 8 inches diameter at breast height (DBH) would have an effect on the Aggregate Recovery Percentage (ARP) values. Harvest activities that do not reduce canopy closure of stands greater than 8 inches DBH below 70 percent were considered "ARP neutral." The ARP model assumes that a plantation has fully recovered its snow handling capabilities at 40 years of age. A 40-year recovery curve was used to "grow" a plantation from seedlings to 8 inches DBH and 70 percent canopy closure. Water quality and quantity determines the abundance of aquatic biomass; leaving adequate large woody debris (LWD) improves aquatic habitat; Frog Creek ditch is maintained for temperature and not LWD; no riparian reserves would be entered with this proposal.

Overall, Alternatives II and III would maintain the overall riparian conditions at the fifth and sixth-field watershed scale.

Peak Streamflows/Rain-on-Snow

Changes in peak streamflows are attributed to increased snow accumulation and subsequent melt during rainfall (Berris and Harr 1987; Harr 1986; Harr and Coffin 1992); surface runoff from roads (Harr et al. 1975, 1979); extension of drainage networks by roadside ditches (Wemple 1996); and possibly reduced roughness of stream channels following debris removal and salvage logging in riparian zones (Jones and Grant, 1996).

This assessment was completed using the Aggregate Recovery Percent model (ARP). The ARP model was developed for use in the transient snow zone (2400-4800 feet). It provides a methodology for indexing the susceptibility of a watershed to increased peak flows from rain-on-snow events associated with management created openings in the canopy.

The ARP model measures the percent of watershed hydrologic recovery based on managed stand age and a recovery curve developed for the Mt. Hood National Forest. The model is tied to the MHFP standards and guidelines. This Forest recovery curve is a generalization of the percent of canopy cover and tree diameter expected at different ages of tree harvest plantations. Because it does not predict the increase in peak flows, the ARP model is most useful when utilized in conjunction with information on watershed condition and sensitivity.

The ARP values were calculated twice for each land area: for all lands within an area, and for lands available for harvest within an area. Lands available for harvest include National Forest System Lands that are not classified as Wilderness.

On a Forest-wide basis, ARP values above 65 percent have been recommended to prevent adverse effects associated with increased peakflows. As detailed by Tables 3-13 and 3-14, all of the affected watersheds and subwatersheds for all the alternatives are above the 65 percent threshold of concern. This indicates that the associated watershed and subwatershed are not at risk for adverse cumulative effects associated with increased peak stream flows associated with rain-on-snow events.

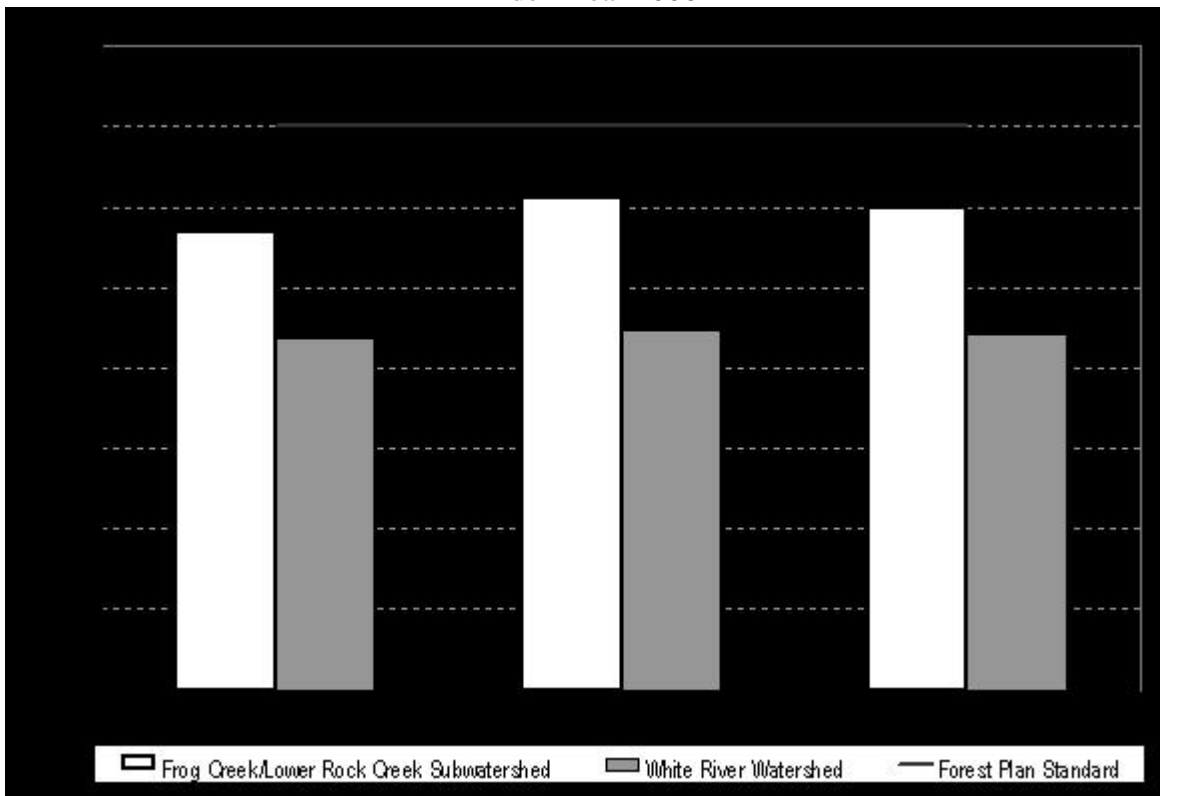
Table 3-13 -- ARP Calculated Using All Lands Index Year 2006		
Alternative	Frog Creek/Lower Rock Creek Subwatershed	White River Watershed
1	71.0	77.8
2	69.1	77.2
3	69.7	77.4

Table 3-14 -- ARP Calculated Using Lands Available for Harvest Index Year 2005		
Alternative	Frog Creek/Lower Rock Creek Subwatershed	White River Watershed
1	71.6	78.2
2	69.4	77.7
3	70.1	77.9

**Table 3-15 – Watershed Impact Area (Lands Available For Vegetative Manipulation)
Index Year 2006**

Alternative	Frog Creek/Lower Rock Creek Subwatershed	White River Watershed
1	28.4	21.8
2	30.6	22.3
3	29.9	22.1

**Table 3-16 -- Watershed Impact Area (Lands Available For Vegetative Manipulation)
Index Year 2006**



As detailed in Table 3-15 and 3-16, the watershed impact area for the associated watershed and subwatershed are below the MHFP standard of 35 percent. This indicates that the associated watershed and subwatershed are not at risk for adverse cumulative affects associated with increased peak streamflows associated with rain-on-snow events.

In addition to potential increases in peak streamflows channel sensitivity was examined for the associated watersheds and subwatersheds to assess any affects increased peak streamflows may have on the stream channel. For this analysis the Rosgen Channel types from the most recent stream surveys were used to assess channel sensitivity (Rosgen 1996). The results are presented in Table 3-17.

Table 3-17 Stream Channel Sensitivity

Area	Associated Stream Reach	Sensitivity to Disturbance ²	Sediment Supply	Streambank Erosion Potential
Clear Creek/Lower Rock Creek Subwatershed	Clear Creek @ Confluence with White River	Moderate	Moderate	Low
White River Watershed	White River @ Forest Boundary	Low	Low	Low

Clear Creek at the confluence with White River has a moderate sensitivity to disturbance, a moderate sediment supply potential, and low streambank erosion potential. The associated subwatershed is 69-71 percent hydrologically recovered with respect to increased peak streamflows from rain-on-snow events. Increases in peak streamflows are moderated by Clear Lake, an irrigation reservoir that very infrequently reaches its full storage potential, and Frog Creek diversion (the diversion allows up to approximately the two year recurrence interval storm event to be diverted). Therefore, the potential for adverse cumulative effects at the subwatershed scale is assessed as low (MHFP, FW-066).

This conclusion is consistent with the White River Watershed Analyses that concluded that peak streamflows are lower than the range of natural conditions in all streams with year round diversions (White River WA, 5-21).

White River at the Forest Boundary has low sensitivity to disturbance, low sediment supply potential, and low streambank erosion potential. With the White River Watershed being from 77-78 percent hydrologically recovered with respect to increased peak streamflows from rain-on-snow events, and this stream reach having a low sensitivity to disturbance, the potential for adverse cumulative effects at the watershed scale is low (FW-066).

The 5th and 6th field watersheds found in the planning area has been managed during the past century for grazing, irrigation, timber harvesting, road building, fires, recreational activities, such as off highway vehicles (OHV) and campgrounds, exotic fish introduction, and restoration activities. Cumulative effects from these activities in the White River watershed has had both a direct and indirect connection to the level of water quality and quantity, which can influence the health of the native resident interior redband trout and Columbia duskysnail populations that are present in the two watersheds. Alternatives II and III would maintain the overall riparian conditions at the 5th and 6th field watershed scale, while maintaining or improving other resource uses in the watershed. There should be no cumulative effects by implementing the no action alternative.

Grazing was considered in the cumulative effects analysis in its relation to riparian area impacts. Because neither action alternative proposes any activities in riparian reserves, actions that would have similar effects to grazing, including riparian thinning, would not have a cumulative effect. In addition there should be no increase in forage levels after thinning and therefore no increase in use of riparian areas by cattle.

Of all the cumulative effects activities, timber harvest and road building (from past timber sales) are the most likely to cause sedimentation. No silviculture treatment or temporary road use is proposed in riparian areas in the Bear Knoll planning area, so there should be no cumulative increase in sedimentation caused by timber harvest. Forest Development Roads 4320000 and

² Disturbance factors include increases in streamflow magnitude and timing and/or sediment.

2640000 cross riparian areas within the planning area; however, both roads are long term, system roads that do not require reconstruction or heavy maintenance for this project, and therefore their usage would not increase sedimentation. Routine road maintenance (not related to timber harvest) is not likely to cause additional long-term sediment delivery, and maintained roads may in fact decrease sedimentation. Rain-on-snow is another event that could cause sedimentation. However, the planning area is above the 65 percent threshold of concern, indicating that a rain-on-snow event would not increase sedimentation.

Although the effects are not measured, there may be increased sedimentation from OHV use in the planning area. The proposed actions would not directly increase OHV use, and may reduce OHV use by initiating road closures.

Cumulatively, watershed conditions in the short-term may be slightly decreased by harvest activities, but would be improved in the long-term by improving the number, type and health of the trees and stands over the long-term.

Silviculture

The cumulative effects analysis area for silviculture treatments includes the adjacent Osprey, Hilyn, Diablo and Juncrock planning areas. Brood Tree and Little Knoll timber sales were included in the Existing Condition analysis, as they occurred within the Bear Knoll planning area.

An assumption made for this analysis is that planned timber sales will move through to implementation.

Cumulatively, treatment that has occurred on the adjacent sales and would occur with the proposed actions would reduce competition and stand density. A total of 2,802 acres have been treated in the Bear Knoll planning area over time. Past actions include regeneration and shelterwood harvests, as well precommercial and commercial thinnings. A total of 4,003 acres have been treated (in the past 5 years) or are pending treatment within the larger cumulative effects area. An additional 531 acres would be treated with the proposed action or 289 acres under Alternative III, and an estimated 600 acres for future projects (Juncrock) for a total of 5,134 acres under Alternative II and 4,892 acres under Alternative III.

Thinning reduces competition between trees thereby improving the overall health of individual trees and the overall health of the stand. Considering the other timber sales in the analysis area, the cumulative effect of all of the thinning stands treated in all of the timber sales listed above would be moving more acres in the area towards the desired future condition of healthy stands.

Currently ODOT is working with the Forest Service to identify hazard trees along Highway 26. Bear Knoll is not proposing harvest in stands along Highway 26, so it would not have a cumulative effect.

Wildlife

The cumulative effects discussion is broken down by analysis area and detailed below. The boundaries are based on the species migratory range. The past, present and future activities described above were considered in this cumulative effects analysis.

Assumptions made: A trend of reduced forage habitat on summer range because of fewer

regeneration harvest units within the last 10 years; White River is a physical boundary on the east side of this analysis area; harvest activities on CTWS land will create forage over the foreseeable future; road densities are decreasing toward 2.5 miles/mile² on summer range MHFP S&Gs FW-209; the early seral structure types across the landscape would become limited within 10 years for those species; there is currently a limited amount of late seral structure types across the landscape; the mid seral structure types (closed canopy) are more than adequate for those species.

Lynx

Lynx are not thought to be present on the Mt Hood NF; therefore, there are no direct, indirect or cumulative effects to lynx habitat related to the proposed action.

Spotted Owl

The cumulative effects analysis includes the Confederated Tribes of Warm Springs (CTWS) Reservation to the south, the Mt. Hood National Forest elevational boundary to the east, the White River Late Successional Reserve on the north and west edge of the Bear Knoll planning area is the western boundary. This area includes the Bear Knoll, Clear, Camas, Hilynx, Diablo, Juncrock and Osprey planning areas in which portions of these planning areas are contained within an Area of Concern (AOC) and dispersal corridors in Bear Knoll. Bear Knoll and Juncrock are in the planning stages. The Diablo and Hilynx areas are in the implementation stage. Camas and Clear are not scheduled for planning. Brood Tree and Little Knoll timber sales were included in the Existing Condition analysis, as they occurred within the Bear Knoll planning area. The White River Late Successional Reserve (LSR) Plan identified the dispersal areas for owls as a concern. The White River LSR is not included in the analysis because it is considered fully functioning dispersal habitat. The goal for dispersal habitat is a minimum of 50 percent of an area. The older plantations (10-20 years old) were not considered, as they would not grow into dispersal habitat within 10 years.

The Bear Knoll planning area would have 59 percent dispersal remaining for either alternative selected. The Juncrock planning area would have 42 percent dispersal habitat remaining. The activities in the Diablo planning area would result in approximately 60 percent dispersal habitat remaining. The activities in the Hilynx planning area would result in approximately 53 percent dispersal habitat remaining. Clear and Camas planning areas have approximately 64 percent dispersal habitat. All the surrounding planning areas except for Juncrock have sufficient (above 50 percent) dispersal habitat. The Osprey planning area has 54 percent dispersal habitat post harvest. The cumulative effects analysis area would be at 55 percent for dispersal habitat. The Frog Creek drainage would function as a dispersal corridor through the Bear Knoll planning area, connecting to the Hilynx to the east and White River LSR to the north.

The removal of Nesting, Roosting and Foraging (NRF) habitat within the Bear Knoll planning area is covered within the US Fish and Wildlife Service's (USFWS) "Biological Opinion 2003-2004 Habitat Modification Projects for the Willamette Province" (USFWS reference: 1-7-03-F-0008). The conclusion by USFWS is that these projects are not likely to jeopardize the continued existence of the spotted owl or result in the destruction or adverse modification of spotted owl critical habitat. The openings created could provide opportunities for competitors or predators (e.g. barred owl) to the spotted owl and were addressed in the Biological Opinion.

The "draft" *Status and trends in Demography of Northern Spotted Owls* (Foresman et.al., 2004) states that the spotted owl numbers have fallen by roughly half over the past decade in parts of Washington, and the Confederated Tribes of the Warm Springs Reservation (CTWS) located in

Oregon, and they have dwindled by nearly a quarter in sections of Oregon's Coast and Cascade ranges. In only a few areas are owls maintaining their numbers. This draft report does not specify the reasons why the owls are declining. This report does not provide significant new information and would not change the effects determination for the Bear Knoll planning area as the habitat would be degraded but not lost.

The CTWS to the south of the planning area may not have adequate dispersal routes through the reservation because of loss of habitat. The riparian areas within the Reservation may be the only long-term travel corridors for owls. Owls dispersing into the Reservation may be exposed to higher levels of predation when trying to disperse to the south through tribal land.

Cumulatively, both action alternatives add to the habitat degradation within the watershed. If Juncrock and Bear Knoll move forward as proposed, there would be five timber sales planned within a span of 10 years within the White River Watershed. Each of these sales affects late-seral habitat although not every one of them removes habitat. The thinning prescriptions would not decrease the amount of late seral habitat.

The planning area and immediately adjacent areas are popular recreation areas that receive the full variety of recreation use, from snowmobiles and off-road vehicles to hiking, camping, and fishing. Only the action alternatives attempt to address this concern through a closer look at closing and obliterating portions of roads which would have positive effects on owl habitat.

Wolverine, Pacific Fisher, Downed Log Associated Species

The cumulative effects area of consideration for these species is the White River Watershed.

Wolverine use of the habitat is also limited in the area by the presence of humans, who are using roads and recreating throughout the watershed. The action alternatives do begin to address the human disturbance concern by proposing road closures and looking more seriously at the long-term need of some of the roads. These alternatives would cumulatively have a beneficial effect to wolverine as human disturbance would be reduced from road closures.

There would be no cumulative effects to pacific fishers as defined by CEQ since fishers are not thought to be present in the planning area, and the proposed activities would have no effect on fishers.

Although the proposed action would increase snag and downed logs within the proposed stands, past, present and future timber sales within the White River Watershed may have a negative cumulative effect on snag and log levels. Continued regeneration harvest (pending and future sales) would remove some snags and logs, not every snag and log can be retained during harvest activities. Also the demand for firewood by the public reduces snags and log levels, both in the short and long-term. Standard and guideline levels can and would be met throughout the watershed, but this may take place at the minimal levels, meeting both the MHFP and NWFP.

Columbia Oregonium, Larch Mountain and Oregon Slender Salamanders

The cumulative effects analysis area for these species is the Bear Knoll planning area. Larch Mountain and Oregon Slender salamanders were not found within the planning area and the Columbia oregonium is limited to one site. The proposed activities are not expected to have any direct and/or indirect effects to these species because a minimum of 240 linear feet of downed wood would be maintained within the proposed action alternatives. With no direct or indirect effects caused by the either of the action alternatives, no cumulative effects are expected.

Management Indicator Species and Species of Concern

The cumulative effects analysis includes the Confederated Tribes of Warm Springs (CTWS) Reservation to the south, the summer range natural boundary on the east, the White River on the north and the west edge of the Bear Knoll planning area forming the western boundary. This area includes the Bear Knoll, Hilyn, Diablo, Camas, Clear, Juncrock and Osprey planning areas.

The Bear Knoll planning area currently has eight percent ungulate forage and none of the alternatives would increase forage percentages. If the Juncrock EIS moves forward to implementation, forage within that area would be 13 percent. The Osprey planning area has 22 percent forage post-harvest. The Hilyn planning area would have 34 percent forage remaining post-harvest. The Diablo planning area would have 35 percent forage post-harvest. The Camas and Clear planning areas currently have 4 percent forage, with no harvest planned. The optimum habitat for deer and elk is 60 percent forage and 40 percent cover of proper size and distribution (Wildlife Habitats in Managed Forests, Thomas et al, 1979). A goal for planning is to have 20 percent of a planning area in forage, through time, for summer range. Forage is below planning goals in the Juncrock, Bear Knoll, Clear and Camas areas and above goals in the Diablo and Hilyn Areas. The CTWS land is also expected to supply adequate forage over the next ten years. Deer and elk using this summer range area will have adequate forage opportunities for the next ten years, however forage may not be distributed evenly across the landscape. Cattle may compete with deer and elk for forage especially in areas where forage is limited.

Open road densities are being reduced in the majority of planning areas. Closing roads reduces wildlife harassment and improves utilization of the habitat. The Bear Knoll area currently has 3.32 miles/mile² of open road density; this would be reduced to 2.22 miles/mile² with Alternative II, and remain the same for Alternative III. The current open road density for the Juncrock planning area is 5.13 miles/mile². If the Juncrock EIS moves forward to implementation, the entire planning area open road density could be reduced to 3.46 miles/mile². (This figure is derived from the 2004 FEIS that did not move forward. If a new FEIS is proposed this number could change.) After implementation, road densities will be reduced from 5.41 miles/mile² to 2.16 miles/mile² in the Hilyn planning area and from 3.09 miles/mile² to 2.4 miles/mile² in the Diablo planning area. Road density was reduced from 3.31 miles/mile² to 2.41 miles/mile² in the Osprey planning area. The Camas and Clear planning areas currently have 4.98 miles/mile² of open roads.

Neotropical Migratory Birds

The cumulative effects analysis includes the Confederated Tribes of Warm Springs (CTWS) Reservation to the south, the east edge of the Diablo planning area forming the east boundary, the White River LSR on the north and the west edge of the Bear Knoll planning area forming the western boundary. This area includes the Bear Knoll, Hilyn, Diablo, Camas, Clear, Juncrock and Osprey planning areas.

Early seral habitat within the Bear Knoll planning area currently amounts to 42 percent. The Osprey planning area has 49 percent early seral habitat. The Juncrock planning area would be 37 percent early seral habitat post-harvest. The Hilyn planning area will have 34 percent early seral habitat remaining post harvest. The Diablo planning area will have 35 percent early seral habitat post-harvest. The Camas and Clear planning areas currently have 36 percent early seral habitat with no harvest proposed. The early seral habitat does not appear to be limited in any of the planning areas. The CTWS land is also expected to supply early seral habitat over the next twenty to forty years. Early seral species using this area would have adequate habitat for the

next twenty to forty years, however habitat may not be distributed evenly across the landscape.

The Bear Knoll planning area currently has 35 percent late seral habitat. Late seral habitat within the Juncrock planning area would amount to 20 percent, post-harvest. The Hilyn timer planning area would have 41 percent late seral habitat remaining post-harvest. The Osprey planning area has 44 percent late seral habitat. The Diablo planning area would have 25 percent late seral habitat, post-harvest. Late seral habitat appears to be adequate to support neotropical migrant species and all areas are above the 15 percent threshold as outlined in the NWFP.

Soils

Analysis Area: The analysis area for soils is the proposed treatment stands in the planning area.

Assumptions: Recent improvements in logging systems do not increase soils damage more than 5-8 percent. When MHFP standards for forest floor organic matter are followed, nutrient recycling processes should not be altered by the proposed action and alternatives, or any management activities.

The expected soil damage from either action alternative, together with the existing soil damage from previous projects would not exceed 15 percent due to the very low existing detrimental soil damage.

Grazing impacts were not detected during the pre-project soil compaction monitoring. Favorable habitat conditions for soil microorganisms, including mycorrhiza, would be maintained for short and long-term soil productivity. Estimated to be left on site are 26.7 tons of down woody debris per acre, which meets MHFP standards and guides for fuel loading (FW – 33). Course woody debris retained on site for wildlife habitat would be included in the tonnage requirements. At least 25 tons should be maintained and evenly distributed across managed sites. (FW-032 & 033). Maintaining adequate supplies of organic material necessary for short and long term ecosystem health would provide future organic matter input into the soil system.

Recreation, Special Uses and Scenery

The cumulative effects analysis area for scenery and recreation management includes the Bear Knoll and adjacent planning areas (Juncrock, Hilyn timer, and Osprey), as well as travel corridors to and from this area.

Cumulatively, there would be no change to the existing natural-appearing condition of the Hwy 26 corridor except for a unit of the Rock Timber Sale (Hilyn timer planning area) that was cut in 2004. Portions of that one unit were right up against Highway 26 near Warm Springs Junction in the foreground area. The remnant stand should be natural appearing in several years after skid marks, ashes and slash disappear because of the way harvest activities were handled close to the road (e.g., flush-cutting stumps). Bear Knoll thinning is not close enough to the highway to cumulatively add to this short-term scenery impact. Bear Knoll management would not be visible from Highway 26. The management activities in the viewshed that are visually evident are the highway safety devices that ODOT must use and maintain: guardrails, signs, and weather stations. These facilities cannot meet foreground retention objectives, but are taken as needed public safety structures.

As discussed in the management indicator species section above, the Hood River Ranger District, through the Bear Knoll and adjacent timber sales, is closing roads and reducing the overall open road density in the watershed to meet MHFP standards and guidelines. This long-

term objective would reduce some recreational activities reliant on open public roads such as OHV travel and big game road hunting. While some OHV users and hunters would be affected by road closures, other hunters embrace the opportunities for a higher quality, roadless hunt. Most of the OHV use on the eastside of the Forest is concentrated in three areas: Rock Creek, McCubbins Gulch, and Mill Creek. The cumulative effects analysis area has limited OHV use and therefore this road closure would not have an impact on the larger OHV recreational community. Road closures would not limit backcountry horse use in the area.

Some recreationists, like hunters, may be in the area in late fall/early winter, when slash burning takes place. Although smoke usually would not be a significant factor for hunters, there is the chance of weather inversions at night that could trap smoke closer to the ground where hunters are camped, making for smoky breathing conditions.

Wood cutting permits are available on the majority of the Forest. Mushroom, beargrass, and other special forest product permits are also available. There may be a short-term effect to special forest product users during harvest activities, especially if several timber sales are being harvested simultaneously. Firewood cutters may be able to utilize slash from activity piles for firewood.

Botany

The cumulative effects analysis area for botany is the Bear Knoll planning area. Activities considered in the analysis include: all proposed Bear Knoll activities, cattle grazing, recreation, the harvest of special forest products, and general road maintenance including hazard tree removal.

In Alternative I, natural ecological succession of riparian plant communities would likely continue to develop suitable habitat for *Botrychium minganense*, *Botrychium montanum*, and *Shistostega pennata* and other riparian associated vascular plants, bryophytes, lichens, and fungi. Late seral habitat would likely continue to increase and as forested stands mature, large woody debris would continue to fall creating organic material that would enhance potential suitable habitat for terrestrial fungi, bryophytes, and vascular plants.

Although potential suitable habitat for *Botrychium minganense*, *Botrychium montanum*, and *Shistostega pennata* has been found in the riparian reserves, the species have not been found during 5 years of surveys conducted between May and September. There are no known sensitive plants in the planning area, therefore Alternative II and III would have no direct, indirect or cumulative effects on R6 Sensitive Plants or their habitats.

Management of Competing and Unwanted Vegetation

The cumulative effects analysis area for noxious weeds is the Bear Knoll planning, including transportation routes in and out of the area. This analysis also includes corridor routes for cattle, wildlife, and recreation users. St. Johnswort is a wind-dispersed species and the analysis area was expanded to the planning areas around Bear Knoll for that species. Activities considered in the analysis include: all proposed Bear Knoll activities, cattle grazing, recreation, the harvest of special forest products, and general road maintenance including hazard tree removal.

Under the No Action Alternative the noxious weed situation in the Bear Knoll planning area would likely increase because the primary areas of tansy infestation would not be as aggressively treated as they would be under Alternatives II or III. Activities such as those associated with

actions described under Alternatives II and III would not occur, so noxious weeds would not be spread or introduced as a result of proposed project activities.

In Alternatives II and III, logging operations such as ground-based yarding and cable activity, road maintenance, road ripping (obliteration), culvert maintenance and ditch cleaning, and associated machinery and equipment are known to introduce and spread noxious weeds as they create disturbed soils that provide potential seed beds for the establishment of noxious weeds. Other vectors within the cumulative effects analysis area include cattle, wildlife, off-road vehicle use, horses/horseback riders and other recreational activities. Heavy weed infestations have been reported at sites in the planning area where cattle are dropped off and picked up. Noxious weed seeds may be introduced in debris on the floors of trailers and in vehicles that are used to haul cattle, unload horses, and off-road vehicles. Deer and elk also act as vectors when invasive seedlings stick to their coats and are carried to new areas. Activities associated with the gathering of special forest products (such as firewood cutting), hazard tree removal, and routine road maintenance may also contribute to the spread of noxious weeds.

The potential spread and introduction of noxious weeds in the planning area could have long-term cumulative effects on the biodiversity of native plant communities, the quality of wildlife and livestock forage, and the integrity of agricultural lands. Tansy and St. Johnswort are toxic to wildlife and livestock. Most of the noxious weed species that are present in the planning area are allelopathic, which means they exude chemicals that suppress native vegetation; if left uncontrolled they could adversely alter the biodiversity of native plant communities and associated wildlife, and may have negative economic impact on agricultural lands in the area.

As mitigation for Alternatives II and III, all harvest-related equipment would be required to be washed and monitored to reduce the likelihood of seed introduction. Unless noxious weed plants have not emerged, pretreatment prior to project activity would be required. For the noxious weed species listed for treatment, see Table 3-8. Treatment would continue as needed for up to 5 years. Monitoring data would be collected prior to and after each treatment and treatment would be adjusted as necessary to control noxious weed infestations. With pretreatment and monitoring in place, noxious weed introduction should be prevented. In addition, pre-treating all proposed use roads should minimize the cumulative increase of noxious weeds in the larger planning area.

Fuels and Air Quality

The cumulative effects analysis area includes the Confederated Tribes of Warm Springs (CTWS) Reservation to the south, the Mt. Hood Wilderness airshed to north and the Badger Creek Wilderness airshed to the northeast. The White River LSR to the north is also included. Active and proposed timber sales in this area include the Juncrock, Hilynix, and Osprey planning areas. Past present and future activities described above were considered in the cumulative effects analysis.

Assumptions: the Fire Regimes for the cumulative effects planning area are IIIB, IIC and IVC; Condition Class one and Condition Class three are present in the area.

All of the current and future timber sales would machine pile and burn any activity slash exceeding 25 tons/acre (FW-033). Cumulatively it is possible that activity-created slash from more than one timber sale area would be burned at any one time. Machine pile burning would be conducted for all Forest Service projects in that area when smoke dispersion conditions are favorable to minimize the potential for adverse effects.

There is no prescribed burning currently planned or in the reasonably foreseeable future in the cumulative effects analysis area.

The Mt. Hood Wilderness and the Badger Creek Wilderness are characterized by relatively clean air which provides unobstructed views. Occasionally, particulate pollution from prescribed burning or wildfires outside the Forest, as well as from local sources, such as prescribed fire, agricultural operations or residential wood burning, can become trapped at the surface during periods of atmospheric stability. This air quality degradation can last for several days, especially during the fall and winter months.

If slash from adjacent timber sales are burned simultaneously with Bear Knoll timber sales, higher levels of particulate matter would be released into the atmosphere. However, as long as burning is conducted when smoke dispersion conditions are favorable, the potential for adverse conditions would be minimized.

Economic Resources

The cumulative effects analysis area for economic resources is the Mt. Hood National Forest.

Between September 2001 and December 2003, 24 separate timber sales were auctioned on the Mt. Hood National Forest. A total of 22 timber sales were sold during this time period.

Purchasers of 19 of the 22 timber sales qualify as “small business” by the Small Business Administration (SBA). Eight of the timber sales were purchased by a business with less than 25 employees.

Timber sales sold from the Mt. Hood National Forest provide forest products for the local and regional areas and would be purchased from businesses in these areas that employ people to work in the woods or in the mills.

There may be a short-term decrease in commercial forest product permits issued in the cumulative effects area during harvest, especially if several timber sales are being harvested simultaneously.

Transportation System

The planning areas that share common haul routes define the spatial area for the cumulative effects analysis. Bear Knoll, Hilyn, and Juncrock share Forest Development Road (FDR) 4300. Factors considered for cumulative effects on the transportation system include timber activities (log haul, road construction, reconstruction or obliteration), road closures, road density, road maintenance, and access.

Assumptions for this analysis include: Log haul would occur during the normal season. All the timber sales listed in Table 3-12 would be completed in 10 years. All timber sales would protect the roads to existing road maintenance standards.

In Alternative I, road use, access, and maintenance in the planning area would be unchanged. Timber sales from the adjacent planning area would continue independent of Bear Knoll. Maintenance and use of the 4300 road would increase due to timber haul from adjacent timber sales. Road densities in the cumulative effects analysis areas would decrease independent of Bear Knoll.

All of the active and proposed timber sales restrict operations to normal season haul. This would decrease the likelihood that there would be unacceptable damage to roadbeds on shared haul routes. Road densities would decrease overall in all of the planning areas. Even if Alternative III is selected and the road density remains the same in the Bear Knoll planning area, the overall road density in that region would decrease.

Range

The analysis area for cumulative effects is the White River Allotment which includes the Diablo, Juncrock, and Hilynix planning areas.

Assumptions: The White River Allotment would continue as an active allotment. Timber harvest activities and road closures are likely to continue into the reasonably foreseeable future within the allotment. Forage in some treated areas would increase for five to thirty years following past timber harvest activities, and then decrease as the tree canopy closes in. Forage in the Bear Knoll area is decreasing as canopies close in. The acres in the Bear Knoll planning area are approximately eight percent of the allotment.

In the Bear Knoll planning area the action alternatives would affect the overall increase in the acres of forage produced by less than two percent in the White River Allotment. This compares to three percent in Diablo and Hilynix and one percent in Juncrock.

Livestock grazing would be concentrated in the summer months and the limited forage available in the planning area would green up for use by deer and elk in the fall months.

Unimpeded livestock movement through existing clearcuts and shelterwood harvest units often involve existing open roads within this planning area. The typical numbers of livestock observed moving through this area can be from five to ten head at any one time. Livestock in these numbers do not pose a threat to the general public driving through this area for pleasure, as long as the public is driving at a safe speed (<20 mph).

Heritage Resources

No direct or indirect effects to heritage resources were identified under any proposed activities, therefore there would be no cumulative effects, as defined by CEQ.

3.16 Other Disclosures

Social Impact Analysis/Environmental Justice

On February 11, 1994, President Clinton issued the Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898). This order directs agencies to identify and address disproportionately high and adverse human health or environmental effects of projects on certain populations. In accordance with this order, the proposed actions has been reviewed to determine if it would result in disproportionately high and adverse human and environmental effects on minorities and low-income populations.

A public field trip to involve the potentially affected and interested individuals, agencies or organizations occurred in July 2001. No specific concerns regarding minorities or low-income families were identified during this public information process.

The Bear Knoll Planning area is located on the southern end of the Mt. Hood National Forest, adjacent to the Warm Springs Indian Reservation. For this analysis, the term “Bear Knoll area” is used to include the planning area and the approximately 15 square miles between the ODOT compound and the Bear Springs Work Center.

Potentially Affected Communities

There are two small compounds within four miles of Bear Knoll. The Oregon Department of Transportation (ODOT) Compound is approximately four miles east of the Bear Knoll area. This compound is for employees of ODOT; four families live there year round. The Bear Springs Work Center, approximately six miles to the east of Bear Knoll is a Forest Service Compound. There are five Forest Service families and an office building on this compound. Occasionally, members of the Confederated Tribes of the Warm Springs rent vacant houses on the Bear Springs Compound. The population at Bear Springs increases during the summer months when temporary summer employees are hired. The population at the ODOT Compound increases during the winter months when the winter road crew works out of the compound.

The community of Pine Grove is 13 miles east of the Bear Knoll area, while the largest community to the northwest is Government Camp (15 miles), with Zigzag, another 10 miles to the west. The communities of Hood River, Parkdale, and Odell are 20 to 34 miles to the north. Other communities that may have an interest in the Bear Knoll area would include Maupin, Madras, Redmond, and Bend to the east and south and Sandy, Gresham and Portland to the West.

Census data confirm that the larger communities have minorities and low-income populations that may be affected by the Bear Knoll planning area. The percentage of people below the poverty line ranges from 11 to 14 percent of the population. Minority populations range from 14 to 21 percent. The rural communities and small towns, have a lower income than the state and National average. Unemployment is also higher than state and national averages, especially in the logging and lumber milling operations, as mills in Maupin, Tygh Valley, and Parkdale have closed down in the last decade. It is common for individuals from smaller, rural communities to drive into larger communities for jobs, shopping or recreation. However, there are individuals who earn their living or supplement their income from activities that occur on the Forest.

The American Indian communities of the Confederated Tribes of the Warm Springs Reservation could potentially be affected by activities in the Bear Knoll planning area. Portions of past sales (wood fiber) in this area have been purchased by the Warm Springs Forest Products Mill, which is owned and operated by the Confederated Tribes of Warm Springs (CTWS). The Planning area lies within ceded lands of the CTWS. The Treaty of 1855 granted the CTWS the right of “usual and accustomed” gathering of traditional native plants and “special interest” use. According to the Ethnographic Study of the Mt. Hood National Forest (French et al, 1995), no traditional use areas have been identified. No activities are proposed that would preclude any granted rights. We received a response letter from Fara Ann Currim, Off Reservation Habitat Biologist for the Warm Springs Reservation dated July 8, 2002. This response letter addressed species to be replanted, species in the understory, closing roads in the riparian reserves, and open road density. The tribe was invited to two separate field trips to the planning area. They didn’t have any strong concerns over the proposed action and so did not attend. The District Archeologist had no information on historic huckleberry activity by the Confederated Tribes of the Warm Springs Tribes. The heritage analysis determined that there is no need for huckleberry restoration in the planning area (An Ethnographic Study of the Mt. Hood National Forest, Oregon, 1995). Based

on the above, the Confederated Tribes of the Warm Springs would not be disproportionately affected by the proposed action or any of the alternatives.

Potentially Affected Workers

Employment opportunities are limited in the Bear Knoll area. There is work available for employees of ODOT and the Forest Service, with seasonal employment opportunities for a limited number of local individuals. Logging and the work associated with timber harvest such as heavy equipment operation and post harvest activities are limited to the times harvest operations are actually occurring. There are individuals in Pine Grove who work for the local logging company and can benefit from harvest activity in the immediate vicinity. Post harvest activity, slash piling, and tree planting, are done mainly with contractors. Alternatives II and III would provide employment to woods workers with seasonal employment opportunities. The nearest operating mills are the Warm Springs Forest Products Mill, on the Warm Springs Reservation, and in Bingen and Carsen, Washington.

There are hazards and risks associated with working in the woods with heavy equipment, chainsaws, falling trees, burning and driving narrow roads. These risks do not fall disproportionately on minorities or low-income persons and there are safety practices in place to provide appropriate levels of protection.

Individual minorities and low-income people gather special forest products on the Mt. Hood National Forest. In the Bear Knoll area, no permits have been sold for any products on a commercial basis. Other products are harvested for resale to generate income. Some is harvested for personal use. These include mushrooms, firewood, and Christmas trees. Permits are issued for most gathering activities, but minor use occurs without need for a special use permit. A large percentage of product gathering is by minority and low-income individuals to supplement their income or as a primary job. Most of the people working in this area were originally from Mexico, Guatemala, Honduras, El Salvador, Laos and Cambodia (Voices from the Woods, July 2000).

The Bear Knoll planning area may result in a short-term increase in firewood opportunities and a short-term decrease in other products such as mushrooms, bear grass, and boughs. Forest product availability on a landscape level would not be negatively affected. The Bear Knoll area does not represent a special or unique source of forest products that are not available elsewhere.

Potential Effects to Recreation

The main recreational use of the Bear Knoll area is dispersed camping, hunting during the fall and snowmobiling in the winter. There is no indication that minorities or low-income people focus on the Bear Knoll area to recreate more than any other similarly remote portion of the Forest. Burning has the potential to degrade air quality for short periods of time affecting visibility for recreation users. With the action alternatives, there may be short-term movement of dispersed campers or hunters during and after project implementation. Some roads may be closed, and areas behind the road closures would not be available for motorized use. The area proposed for an area summer vehicle closure would preclude some opportunities for driving, dispersed camping and road hunting, but the number of individuals expected to be affected is small. There may also be restricted use of snowmobile trails for short periods of time during implementation. However, none of these actions should fall disproportionately on minorities or low income people.

Potential Effects to Health

The Bear Knoll area would not be a significant source of pollution. The proposed action does not propose any underburning; however, limited amounts of slash burning would occur. DEQ air quality standards would be followed in the action alternatives to ensure that there would be no adverse effects to those living in the airshed. The proposed action does not involve the use of herbicides or pesticides. See the discussion in Air Quality in Section 3.9.

Potential Effects to Environment

Many resources were evaluated to determine the extent of environmental benefit or impact that may affect minority or low-income communities. The following resources may be of particular value to these communities: rare plants and animals, fish, hydrology, wildlife, old growth, soils, scenery, air quality and heritage resources.

No adverse impacts were identified that would have a disproportionate affect on minority or low-income individuals.

Wetlands and Floodplains:

There are wetlands in the planning area. Some of these wetlands and riparian areas are associated with the Frog Creek Ditch. No riparian reserves would be treated in either of the action alternatives. There would be no impacts to wetlands or riparian areas from the action alternatives.

Short Term Uses and Long Term Productivity

The National Environmental Policy Act requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 Code of Federal Regulations 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans (NEPA Sections 101)

The Multiple Use – Sustained Yield Act of 1960 requires the Forest Service to manage national Forest System lands for multiple uses, including timber, recreation, fish and wildlife, range and watershed. All renewable resources are to be managed in such a way that they are available for future generations. The harvesting and use of standing timber can be considered a short-term use of a renewable resource. As a renewable resource, trees can be re-established and grown in again if the productivity of the land is not impaired

Maintaining the productivity of the land is a complex, long-term objective. All action alternatives protect the long-term productivity of the project area through the use of specific MHFP standards and guides, mitigation measures and design criteria. Long-term productivity could change as a result of various management activities proposed in the alternatives. Timber management activities would have direct, indirect and cumulative effects on the economic, social and biological environment. Soil and water are two key factors in ecosystem productivity, and these resources would be protected in all alternatives to avoid damage that could take years to correct. Sustained yield of timber, wildlife habitat and other renewable resources all rely on maintaining long-term soil productivity. No long-term effects to soil or water resources are expected to occur as a result of timber management activities.

All alternatives would provide the fish and wildlife habitat necessary to contribute to the maintenance of viable, well-distributed populations of existing native and non-native vertebrate species. The abundance and diversity of wildlife species depends on the quality, quantity and distribution of habitat, whether for breeding, feeding or resting. Management Indicator Species are used to represent the habitat requirement of wildlife species found in the project area. By managing habitat of indicator species, the other species associated with the same habitat would also benefit. The alternatives provide standards, guidelines, and mitigation measures for maintaining long-term habitat and species productivity. The alternatives vary in degree of risk to wildlife habitat and habitat capability.

Neither of the action alternatives would have an effect on the long-term productivity of timber resources. Trees would be thinned to provide post harvest productivity and health.

Unavoidable Adverse Effects

Implementation of either of the action alternatives would result in some unavoidable adverse environmental effects. Although formation of the alternatives and mitigation measures include avoidance of some potential adverse effects, some adverse effects could occur that cannot be completely mitigated. The unavoidable adverse impacts summarized below are those that are expected to occur after the application of mitigation measures, or that cannot be mitigated completely away.

Compaction: Under the Action alternatives, additional soil compaction would occur as a result of the use of ground-based equipment to remove trees. Mitigation measures would limit the area compacted to comply with Forest Standards and Guidelines for soil protection (no more than 15 percent cumulative detrimental impacts). It is expected that site productivity would be maintained over time, with no perceivable or measurable loss in tree growth. See the discussion under Soil in Section 3.4.

Air Quality: Project design and mitigation measures are expected to reduce the potential for air quality degradation. The potential exists for changes in atmospheric condition that could result in smoke and particulate matter to drift, causing minor, short-term impacts on air quality. All pile burning would be conducted in compliance with Oregon Smoke Management Guidelines administered by the Oregon Department of Environmental Quality. See the discussion under Air Quality in Section 3.9.

Invasive Plant Species: Under all action alternatives, conditions would be created that increase the risk of introduction or spread of invasive plant species. Mitigation measures would be used to reduce this risk, however, the desired open stand conditions would remain vulnerable to weed introduction. See the discussion under Management of Competing and Unwanted Vegetation in Section 3.7.

Disturbance to Residence and Visitors: The closest residence to the project is approximately four miles to the east. Implementation of activities under either of the action alternatives would cause noise, and may result in localized dust that could affect visitors in or adjacent to the project area, but should have no effect on residents. Transportation of equipment along Forest Roads may be a concern for visitors. Visitors would be notified, by signing, of activities that may affect them. See the discussion under Recreation, Special Uses and Scenery in Section 3.5.

Plants or Animals: Unknown occurrences of sensitive or special interest plants could be damaged or destroyed by activities associated with all action alternatives. The area was

surveyed and the activities would not result in a loss of viability for any species. Disturbance, displacement or loss of individual fish or wildlife may occur as a consequence of harvest activities. The intensity and duration of these effects depend on the alternative selected. Most disturbance or displacement is expected to be short-term. See the discussion under Botany (Section 3.6), Wildlife (Section 3.3), and Aquatics and Fisheries (Section 3.1).

CHAPTER 4—CONSULTATION AND COORDINATION

4.1 Consultation with the US Fish and Wildlife Service

This proposal was consulted on with the US Fish and Wildlife Service (USFWS) under the 2003-2004 Habitat Modification Biological Assessment in the Willamette Province (USFWS Reference 1-7-03-F-0008). The USFWS concurred in a Biological Opinion with the determination that habitat modification projects in the Willamette providence are not likely to jeopardize the continued existence of the spotted owl or result in the destruction or adverse modification of spotted owl critical habitat. Terms and conditions include a seasonal restriction for spotted owls.

No aquatic species or their habitat listed as Threatened or Endangered under the Federal Endangered Species Act occurs in the Bear Knoll planning area. Thus, no consultation is required for aquatic species with USFWS.

4.2 Consultation with the National Oceanic and Atmospheric Administration Fisheries

No federally listed anadromous fish species or their habitats occur within or near the Bear Knoll Planning Area. Therefore, consultation with the National Oceanic and Atmospheric Administration Fisheries was not necessary.

4.3 Consultation with the Oregon State Historic Preservation Officer

The National Historic Preservation Act requires consideration be given to the potential effect of federal undertakings on historic resources. This includes historic and prehistoric cultural resource sites. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, Region 6 of the Forest Service entered an agreement in 2003 with the Oregon State Historic Preservation Office and the Advisory Council on Historic Preservation. In accordance with the agreement, a survey of the projects proposed in the Bear Knoll Planning Area has been conducted. Based on the results of this survey, a **No Effect** determination has been made. The historic and prehistoric sites located within the planning area would be protected through measures described in section 3.14 of this EA. The SHPO has been consulted as to the determination made and had no objections with this finding.

A cultural resource survey was conducted on a planning area scale and documented in Heritage Resource Report 01/06/03. Survey methodology was conducted in accordance with the 1996 agreement between Region 6 of the Forest Service, the State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (AChP).

4.4 Consultation with Others

Among the public contacted during the initial scoping for Bear Knoll were Oregon Department of Fish and Wildlife for both The Dalles and Tygh Valley offices.

Responses to Scoping Comments

Approximately 140 responses in the form of letters and postcards were received. These comments came from private citizen, environmental groups, one federal agency and one recreation user group. Responses consisted of 35 letters and 101 post cards, although the content of most of the post cards was similar to the letters. Public comment addressed a wide range of topics, many of which were directed at general Forest Service Management.

Comments were received on both the thinning and regeneration harvest proposals. Included in this summary are only those comments which pertain to the current project. A complete list of comments is located in the Bear Knoll project file.

Comment: Prepare a Restoration Alternative that uses non-commercial methods to address forest health.

Response: A Restoration Only Alternative was considered but not developed in detail. This Alternative was addressed in Chapter II.

Comment: Ground based logging systems means heavy equipment that is unhealthy for roots and root mycorrhizal fungus.

Response: Where possible, existing skid trails would be used, allowing for scarification after the skid trail is no longer needed. Scarification of skid roads improves compaction. The project has been designed so that no more than 15% of the area is in a detrimental condition.

Comment: There should be no commercial harvest on federal lands.

Response: Not harvesting timber from lands designated as timber producing is outside the scope of this document.

Distribution List and Document Availability on the Internet

A letter of availability will be sent to individuals, groups and organizations that expressed interest in the planning area. The list includes elected officials, federal agencies; state local and county governments, American Indian Tribes and Nations; and other interested organizations and individuals.

In addition, the Preliminary EA has been made available to the public on the internet at: www.fs.fed.us/r6/mthood, under “projects and plans”.

Federal Agencies

Advisory Council on Historic Preservation

Agriculture, U.S. Department of

OPA Public Stockroom

Animal & Plant Health Inspection Service

National Resource Conservation Service

Policy and Planning Division

National Agricultural Library

Commerce, U.S. Department of

Ecology and Conservation Office

NOAA Fisheries (Oregon)

Defense, US Department of

U.S. Army Engineers Division
Energy, U. S. Department of
U.S. Department of Energy
Environmental Protection Agency
Office of Environmental Review
Environmental Protection Agency
Federal Aviation Administration
Federal Highway Administration
Federal Railroad Administration
U.S. Department of Housing & Urban Development, (Oregon)
U.S. Department of the Interior
Northwest Power Planning Council
USDA Forest Service
Environmental Coordination

Oregon Natural Resource Agencies

Oregon Department of Fish and Wildlife
Water Resources Department
Department of Environmental Quality, Bend Office
Oregon Department of Forestry, Resources Library
Governor's Forest Advisor

County and Local Governments

Hood River County Forester
Wasco County Planning Department

Native American Tribes

American Indian Tribes and Nations
Confederated Tribes of the Warm Springs Reservation of Oregon

Other Organizations

BARK
Lobos Motorcycle Club
Columbia Gorge Off-Road Association
Columbia Gorge Power Sledders
Mt. Hood Snowmobile Club
Oregon Equestrian Trails
Oregon Natural Resources Council
Sierra Club
Hood River Backcountry Horseman

Interested Individuals

A letter of availability will be sent to individuals who commented on this proposal. A list of names is located in the Project File.

4.7 List of Preparers

The following is a list of Interdisciplinary Team (IDT) members who assisted in the development of this Final Environmental Impact Statement.

Table 4-1 List of Prepares		
NAME	EDUCATION AND EXPERIENCE	RESOURCES/SPECIALTY
Glenda Goodwyne	Education: BS Forest Management, OSU Experience: 25 years with the Forest Service	Certified Silviculturist
Rich Thurman	Education: BS -- Wildlife Management, OSU Experience: 27 years with the Forest Service	Wildlife Biologist
Susan Nugent	Education: OSU Experience: 17 years with the Forest Service	Botanist
John Dodd	Education: BS -- Soils Science and Land Use, OSU Experience: 15 years with the Forest Service	Soil Scientist
Chris Rossel	Education: BS -- Fisheries Science, OSU Experience: 9 years with the Forest Service	Fisheries Biologist
Doug Jones	Education: BS—Forest Recreation, Utah State University Experience: 26 years with the Forest Service	Recreation & Scenic Resources
Dan Fissell	Education: BS -- Agriculture/Range Management, Cal State University, Chico Experience: 13 years with the Forest Service, 4 years with BLM	Range Conservationist & Noxious Weeds
Leo Segovia	Education: AA Degree Experience: 14 years with the Forest Service	Fire and Fuels and Air Quality
Mike Dryden	Education: BS -- Anthropology, OSU; Experience: 16 years FS, 5 years private contractors doing archeological work.	Heritage Resources
Erin Black	Education: BA – Political Science, Lewis & Clark College; Experience: 2 years with the Forest Service	Writer/Editor
Todd Parker	Education: BS—Forestry; BS—Business Management, OSU Experience: 21 years of experience with the Forest Service	Hydrology
Becky Nelson	Education: BS of Forestry, Northern Arizona University Experience: 29 years with the Forest Service	Team Leader

4.8 References

The following is a list of references and consultations used during the analysis of this project.

Altman, 2000, *Conservation Strategy For Landbirds Of The East-Slope Of The Cascade Mountains In Oregon And Washington*.

Behnke, R.J. 1992. Native trout of western north america. *American Fisheries Society Monograph 6*. American Fisheries Society, Bethesda, Maryland.

Bishop, D. 1999. Badger Creek/Highland Ditch Monitoring 1998-99

Burtchard, G. C. and Keeler, R. W. 1991. *Mt. Hood Cultural Resource Reevaluation Project*. Laboratory of Archaeology and Anthropology, Portland State University

Currens, K.P. C. B Schreck, and H. W. Li. 1990. Allozyme and morphological divergence of rainbow trout (*Oncorhynchus mykiss*) above and below waterfalls in the Deschutes River, Oregon. *Copeia* 3:730-746.

Eastside Watershed Analysis Team, 1995, Analysis of the White River watershed, *White River Watershed Subbasin Analysis*, First Iteration.

French et al, 1995. Ethnographic Study of the Mt. Hood National Forest., August 15, 1995.

General Water Quality Best Management Practices, US Department of Agriculture, Forest Service, Pacific Northwest Region, November 1988

Gregg, R. and F. W. Allendorf. 1995. *Systematics of Oncorhynchus Species in the Vicinity of Mt. Hood*: Preliminary Report to Oregon Department of Fish and Wildlife. Division of Biological Sciences, University of Montana, Missoula, Montana.

Hanek, G. L., and Truebe M. A., 2001. *Guidelines on the Use of Thermistors and Time Domain Reflectometry Instrumentation for Spring Thaw Road Management on Low-Volume Asphalt Roads*. USDA, Forest Service, Technology & Development Program. 7700-Transportation Management 0177 1805-SDTDC.

Hayward, G. D. and Verner, J. 1994. *Flammulated, boreal, and great gray owls in the United States: A technical conservation Assessment*. Gen. Tech. Rep. RM-253. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Experiment Station. 214 pages. 4 maps.

Howes, S. 1979. *Soil Resource Inventory and Report*, Forest Service, USDA. Pacific Northwest Region, Mt. Hood National Forest

Langille H. D. et al. 1903. *Forest Conditions in the Cascade Range Forest Reserve, Oregon*, Washington Government Printing Office.

Landscape Aesthetics; *A Handbook for Scenery Management*-Agriculture Handbook #701.

Leonard, et al. 1993 *Amphibians of Washington and Oregon*, also, Corkran and Thoms. 1996. *Amphibians of Oregon, Washington and British Columbia*.

Levy, S., *BioScience*, February 2004/Vol. 54 No. 2

Mt. Hood National Forest Current Vegetation Survey (CVS) plot data, Research Paper PNW-RP-493 1996).

Musser, L. A. 1984 *Documented Chronological History of the Clear Lake-Juniper Flats Irrigation Project*. Manuscript on file, Hood River Ranger District, Mt. Hood National Forest

Oliver, C. D. Larson, B. C. 1990, *Forest Stand Dynamics*, McGraw-Hill, Inc

Personal Communication, Gary Asbridge, Zone Fish Biologist, January 2000

Personal Communication, Patti O'Toole, CTWS Fish Biologist, August 2002

Personal Communication, Mike Weldon, CTWS Fish Biologist, August 2002

Personal Communication, Carl Exner, Former Steward on Bear Springs Ranger District

Rosgen, D. 1996. *Applied River Morphology*

Sidhom, N. and Hooker, E. 1992. Level II Riparian Survey, Badger Creek (1992)

Smith, P. 2001. Cultural Resource Inventory of the Juncrock Timber Sale, Heritage Resource Report #01/01/01, USDA Forest Service

Standard Specifications for Transportation Materials and Methods of Sampling and Testing – Part I and Part II. The American Association of State Highway and Transportation Officials

Thomas et al, 1979, *Wildlife Habitats in Managed Forests*.

USDA, 1990, Clear Creek riparian survey,

USDA Forest Service. 1986. *Commensurate Share Policy*: USDA Forest Service

USDA Forest Service. 1999 *Roads Analysis*. USDA, Forest Service. FS- 643

USFS, 1990, *Land and Resource Management Plan, Mt. Hood National Forest*, USDA Forest Service,

USFS, 1994. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl*

USFWS, Biological Opinion, 1999. *Habitat Modification Projects for the Willamette Province* – file name: 98F381.wpd.

USDA Forest Service. *Forest Disease Management Notes*, USDA Forest Service, Pacific Northwest Region

USDA Forest Service Mt. Hood National Forest, 1998-2003. *Sprouts*, USDA Forest Service

USDA Forest Service, , 7700 - *Transportation System.*, 7700 - *Zero Code*, 7710 – *Transportation Planning*, 7720 – *Development*, 7730 - *Operation and Maintenance*, 7740 - *Federal Lands Highway Programs*. USDA Forest Service

USDA Forest Service, 7700 - *Transportation System*: [7709.55 - Transportation Planning Handbook](#), [7709.56 – Road Preconstruction Handbook](#), [7709.56b - Transportation Structures Handbook](#) [7709.57 - Road Construction Handbook](#) [7709.58 - Transportation System Maintenance Handbook](#), [7709.59 - Transportation System Operations Handbook](#), USDA Forest Service

Utterback, P, Moore, T. 1995. *The Effects of Winter Haul on Low Volume Forest Development Roads*. USDA, Forest Service, Technology & Development Program. 7700-Transportation 9577 1207-SDTDC.

Behnke, R.J. 1992. Native trout of western north america. American Fisheries Society Monograph 6. American Fisheries Society, Bethesda, Maryland.

Bishop, D. 1999. Badger Creek/Highland Ditch Monitoring 1998-99

Currens, K.P., C.B Schreck, and H.W. Li. 1990. Allozyme and morphological divergence of rainbow trout (*Oncorhynchus mykiss*) above and below waterfalls in the Deschutes River, Oregon. *Copeia* 3:730-746.

Gregg, R. and F. W. Allendorf. 1995. Systematics of *Oncorhynchus* Species in the Vicinity of Mt. Hood: Preliminary Report to Oregon Department of Fish and Wildlife. Division of Biological Sciences, University of Montana, Missoula, Montana.

Ice, G. 2000. How direct solar radiation and shade influences temperature in forest Streams and relaxation of changes in stream temperature. Cooperative Monitoring, Evaluation and Research (CMER) Workshop: Heat transfer processes in forested watersheds and their effects on surface water temperature. Lacey, Washington February 2000.

Personal Communication, Gary Asbridge, Zone Fish Biologist, January 2000

Personal Communication, Patti O'Toole, CTWS Fish Biologist, August 2002

Personal Communication, Mike Weldon, CTWS Fish Biologist, August 2002

Rosgen, D. 1996. Applied River Morphology

Sidhom, N. and Hooker, E. 1992. Level II Riparian Survey, Badger Creek (1992)

USFS, 1990. Mt. Hood National Forest Land and Resource Management Plan (MHFP)

USFS, 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents In the Range of the Northern Spotted Owl (ROD)

USFS, 1995. White River Watershed Analysis (WRWA)

Voices from the Woods, July 2000