United States Department of the Interior

BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT OFFICE
3040 Biddle Road
Medford, Oregon 97504
email address: orll0mb@or.blm.gov

IN REPLY REFER TO:

1792 (116)
Deer Lake EA
A6767(LL:j1)

MAY 0 6 2002

Dear Interested Public:

The ***Environmental Assessment*** (EA) for the Deer Lake Project is being advertised in the Medford Mail Tribune for a 30 day public review period beginning May 7,2002. The EA analyzes a proposed action to improve forest health by reducing tree mortality and the risk of high intensity wildfire on approximately 3,055 acres in southwestern Oregon. The project would restore the vigor, resiliency, and stability of forest stands in order to improve ecosystem health for **a** wide range of plant and animal species. The project is also designed to manage developing forest stands to promote desired tree species, tree survival, tree growth, and to achieve a balance between wood volume production, quality of wood, and timber value at harvest.

Specific project objectives include the following:

- use a variety of tools to mimic the role fire has historically played in the ecosystem (create openings for species such as Douglas-fir and ponderosa pine, reduce understory density, etc.);
- reduce individual tree mortality resulting from bark beetles and dwarf mistletoe;
- reduce overall long-term sedimentation levels in the project area;
- facilitate the progression of late successional characteristics in forest stands by maintaining or improving existing structural and species diversity;
- promote long-term resistance to occurrence of stand replacement wildfire by reducing of fire hazard;
- take into consideration the historic development of these stands (before Euro-American settlers) and how recent activities have altered this natural process;
- reduce the conifer and hardwood densities in the overstocked stands to maintain forest health and promote overall individual tree vigor.

The primary purpose of a public review is to provide the public with an opportunity to comment on the BLM's determination that there are no significant impacts associated with the proposed action and, therefore, an environmental impact statement is not necessary.

We welcome your comments on the content of the EA. We are particularly interested in comments that address one or more of the following: (1) new information that would affect the analysis, **(2)** possible improvements in the analysis; and (3) suggestions for improving or clarifying the proposed management direction. Specific comments are the most useful. Comments, including names and addresses, will be available for public review. Individual respondents may request confidentiality. If you wish to withhold your name and/or address from

public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

All comments should be made in writing and mailed to Bill Yocum, Ashland Resource Area, **3040** Biddle Road, Medford, OR 97504. Any questions should be directed to Bill at **(541)618-2384.**

Sincerely,

Harold J. Hunt, Acting

Richard J. Drehobl
Field Manager
Ashland Resource Area

Enclosure as stated

ENVIRONMENTAL ASSESSMENT

for

DEER LAKE PROJECT

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
ASHLAND RESOURCE AREA

EA No. OR-110-02-26

This environmental assessment (EA) for the proposed Deer Lake Project was prepared utilizing a systematic interdisciplinary approach integrating the natural and social sciences and the environmental design arts with planning and decision making.

_____
Richard J. Drehobl
Ashland Field Manager

_____
Date

Public notice of the availability of this EA was provided through the BLM Medford District's central register and advertisement in the Medford Mail Tribune.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT

EA COVER SHEET

RESOURCE AREA: Ashland ACTION/TITLE: Deer Lake

LOCATION: T.37S.,R.2E., Sections 5,9,11,13, 15,17,20-23, 25, 27, 29,32,33, and 35
T.38S.,R.2E., Sections 1,3, and 11
T.38S.,R.3E., Section 6 Willamette Meridian

EA NUMBER: OR-110-02-26

List of Preparers	Title	Responsibility
Steve Armitage	Forest Manager	Team Lead
Mark Steiger	Botanist	Special Status Plants
Ted Hass	Soils Scientist	Soils
Victoria Arthur	Wildlife Biologist	T&E Animals, Wildlife
Greg Chandler	Fuels Specialist	Fire and Fuels
Karen Bolda	Fisheries Biologist	Fisheries, Riparian
John Samuelson	Forest Engineer	Engineering and Roads
Ken Brown	Forester	Harvest/Logging Systems
Scott Haupt	Silviculturist	Conifer prescriptions, Vegetation
Laurie Lindell	Hydrologist	Watershed, Riparian
Lorie List	Planning and Environmental Coordinator	NEPA

LIST of ACRONYMS

ACS	Aquatic Conservation Strategy
BGWRA	Big Game Winter Range Area
BLM	Bureau of Land Management
BMP	Best Management Practices
BO	Biological Opinion
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973
FONSI	Finding of No Significant Impact
ID TEAM	Interdisciplinary Team
LSR	Late Successional Reserve
NEPA	National Environmental Policy Act
NFP	Northwest Forest Plan
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
PDF	Project Design Feature
PFC	Proper Functioning Condition
PM	Particulate Matter
RMP	Resource Management Plan
ROD	Record of Decision
S&M	Survey and Manage (Northwest Forest Plan)
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service

ASHLAND RESOURCE AREA
Deer Lake Project OR-110-02-26

TABLE OF CONTENTS

CHAPTER I
PURPOSE AND NEED

Background

The Bureau of Land Management's (BLM) Medford District oversees the management of approximately 862,000 acres in southwestern Oregon. Due to the complexity of these lands, the Medford District is divided into four resource areas, one of which is the Ashland Resource Area. Following direction found in the Medford District Resource Management Plan (RMP), the Northwest Forest Plan (NFP), the Oregon and California Lands Act of 1937, and the Federal Land Policy and Management Act of 1976, the Ashland Field Manager formed an interdisciplinary team (ID Team) of resource specialists to design projects that accomplish the following objectives:

- Improve forest health by reducing tree mortality and the risk of high intensity wildfire. Restore the vigor, resiliency, and stability of forest stands in order to improve ecosystem health for a wide range of plant and animal species;

- Provide a sustainable supply of timber and other forest products;

- Manage developing forest stands to promote desired tree species, tree survival, tree growth, and to achieve a balance between wood volume production, quality of wood, and timber value at harvest.

The Ashland Field Manager also directed the ID Team to: 1) comply with the Medford District RMP and Record of Decision (ROD); and 2) design projects that minimize the financial burden to taxpayers by utilizing the value of existing resources.

Overview

The proposed Deer Lake project is one of several landscape projects designed to meet the above-listed criteria in the Little Butte Creek Watershed. Other landscape projects in various stages of planning and implementation by the Ashland Resource Area include Indian Soda, Poole Hill, Conde Shell, Heppsie, and Antelope. The BLM Butte Falls Resource Area also has portions of three (Beiber Wasson, Double Salt, and Ginger Springs) projects in the Little Butte Creek Watershed. The Forest Service has plans to manage a portion of the watershed with the Bibbits project. Collectively, these projects would account for approximately 13,305 acres of commercial harvest which is 6 percent of the Little Butte Creek Watershed (Appendix I, Table I-10). Each of these projects addresses a need to improve the ecological health of forest stands that have become overly dense as a result of fire exclusion and other past management activities. Indian Soda is the only project where management activities have taken place.

The Deer Lake project area encompasses approximately 17,089 total acres of which BLM administers approximately 7,399 acres. Management activities are proposed for approximately 3,055 acres, or 18 percent of the total project area. The NFP designated four 100-acre northern spotted owl cores within the planning area. These areas are reserved from harvest and were not considered for any type of management under the proposed project. Riparian Reserves, a land allocation defined by the NFP, were not considered for commercial treatment, but were considered for fuels treatments and precommercial thinning.

The Deer Lake project has been specifically designed to accomplish the following watershed restoration objectives:

- use a variety of tools to mimic the role fire has historically played in the ecosystem (create openings for species such as Douglas-fir and ponderosa pine, reduce understory density, etc.);

- reduce individual tree mortality resulting from bark beetles and dwarf mistletoe;
- reduce overall long-term sedimentation levels in the project area;
- facilitate the progression of late successional characteristics in forest stands by maintaining or improving existing structural and species diversity;
- promote long term resistance to occurrence of stand replacement wildfire by reducing of fire hazard;
- take into consideration the historic development of these stands (before Euro-American settlers) and how recent activities have altered this natural process;
- reduce the conifer and hardwood densities in the overstocked stands to maintain forest health and promote overall individual tree vigor.

This document complies with the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 CFR Parts 1500-1508) and the Department of the Interior's manual guidance on the National Environmental Policy Act of 1969 (516 DM 1-7).

CONFORMANCE WITH EXISTING LAND USE PLANS

The proposed activities are in conformance with and tiered to the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (USDI, USDA 2001) and the *Medford District Record of Decision and Resource Management Plan* (RMP) (USDI 1995b). These Resource Management Plans incorporate the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (NFP) (USDA and USDI 1994). These documents are available at the Medford BLM office and the Medford BLM web site at <http://www.or.blm.gov/Medford/>.

RELATIONSHIP TO STATUTES, REGULATIONS, AND OTHER PLANS

The proposed action and alternatives are in conformance with the direction given for the management of public lands in the Medford District by the Oregon and California Lands Act of 1937 and the Federal Land Policy and Management Act of 1976.

DECISIONS TO BE MADE ON THIS ANALYSIS

This Environmental Assessment (EA) is being prepared to determine if the proposed action or any of the alternatives would have a significant effect on the human environment thus requiring the preparation of an Environmental Impact Statement (EIS) as prescribed in the National Environmental Policy Act of 1969. It is also being used to inform interested parties of the anticipated impacts and provide them with an opportunity to comment on the various alternatives.

The Ashland Resource Area Field Manager must decide:

- Whether or not the impacts of the proposed action are significant to the human environment beyond those impacts addressed in previous NEPA documents. (If the impacts are not significant, then a Finding of No Significant Impact (FONSI) can be issued and a decision can be implemented. If any impacts are determined to be significant to the human environment, an EIS must be prepared before the manager makes a decision.)

- Whether to implement one of the proposed action alternatives and associated Project Design Features, or defer to the no action alternative.

RELEVANT ISSUES

During the scoping process, the ID Team identified potential impacts to resources that may occur under different alternatives. Upon closer examination, the team determined which potential impacts (issues) were relevant to the analysis. These issues (listed below) became the focus of the analysis.

Aquatic Systems: Hydrology, Water Quality and Fish

Lost Creek, Deer Creek, and the South Fork of Little Butte Creek are in the project area and are listed as 303(d) streams for varying reasons. Non-point source pollution (sedimentation) from management activities could further degrade the aquatic ecosystem (e.g., reduced water quality for salmon, steelhead, and trout).

Some soils in the project area are prone to landslides or slumping. Road construction or other activities on unstable soils could result in unacceptable sedimentation to local streams already listed as 303(d) for sedimentation.

South Fork Little Butte and Lost Creek are considered critical habitat for coho salmon (listed as threatened under the Endangered Species Act (ESA) of 1973). New road construction and other activities could potentially increase sedimentation and negatively impact critical habitat.

Removing vegetation in the transient snow zone could affect peak flows for local streams.

Some roads in the project area are currently contributing increased sediment to local streams. Repairing, decommissioning or relocating these roads could help decrease sedimentation rates in the area.

Dense Stands/Forest Health

Fire exclusion has resulted in overly dense stands throughout the project area. Dense stands are not vigorous (i.e., slow growth rates, too much competition for water, nutrients, and sunlight) and are more susceptible to insect infestation and high intensity wildfire. Dwarf mistletoe disease has reached epidemic proportions in Douglas-fir trees in portions of the Deer Lake area. Shade intolerant tree species are also declining in number.

Access

Some of the project area is not currently accessible by existing roads. Increasing access through road construction and road improvements would greatly decrease the cost associated with meeting current long-term management objectives. Some long-term management objectives (i.e. fuels treatments) may not be possible without increased access. New roads may also contribute to increased OHV use throughout the area.

Wildlife

Overall reduction of snags and forest stand canopy closures over large landscapes would reduce habitat for some wildlife species. The project area contains a relatively unroaded late-successional habitat corridor. Reductions in canopy closure could affect late successional species' habitat, dispersal and thermal cover for deer and elk winter range. Proposed road construction could increase human disturbance to wildlife. Logging operations could result in localized, short-term noise disturbances affecting wildlife (e.g., big game and nesting birds).

Special Status Animal Species

Several special status animal species occur in the proposed project area and would need to be protected from project-related activities through buffers appropriate to the species in question.

Special Status Plant Species
Several special status plant species occur in the proposed project area and would need to be protected from project-related activities through buffers appropriate to the species in question.

Noxious Weeds
Star thistle and Canada thistle are present in the proposed project area. Disturbance could facilitate the spread of these species.

CHAPTER II
ALTERNATIVES

INTRODUCTION
This chapter briefly describes the no action alternative and the action alternatives. Proposed activities (silvicultural method, yarding systems, fuels mgt.) in harvest units and size are listed in Appendix A (Table A-1). Detailed project design features (PDFs) are found in Appendix C.

ALTERNATIVE A (No Action)
Under the "no action" alternative, no management activities are proposed for the Deer Lake project area.

ALTERNATIVE B (Proposed Action)
Alternative B would use the following management tools to meet the purpose and need described in Chapter 1:

- Variable prescription commercial and pre-commercial thinning would occur on approximately 2,432 acres of forested stands (Deer Lake Project Area Map). (Pre-commercial thinning consists of removing trees that are seven inches or less in diameter.) The proposed silvicultural prescriptions (Appendix B) are based upon the present vegetation structure, species composition, aspect, and vegetation condition class, to allow for the development of old-growth forest structure over time.
- Fuel treatments (mechanical thinning, hand thinning, and prescribed fire) could occur in all commercial stands and on 623 acres of non-commercial (hardwoods and grasslands) lands in high risk wildfire areas.
- The transportation system would add 2.2 miles of permanent roads and 1.3 miles of temporary roads.
- Road decommissioning would take place on approximately 9 miles of existing roads.
- Approximately 37 miles of existing roads in the project area would be renovated including the surfacing of approximately 20 miles of currently unsurfaced roads.

ALTERNATIVE C
Alternative C is designed to accomplish project objectives without any new road construction. Without new road construction, the amount of helicopter logging would increase. All project units that are not accessible from existing road systems would be helicopter logged. Road renovation and decommissioning would be slightly less than under Alternative B.

Proposed Mitigating Measure for Paradise Lost Spotted Owl Nest Site
Formal consultation for the northern spotted owl with the U.S. Fish and Wildlife Service (USFWS), has been completed for timber sales in the Deer Lake project area that will be sold in fiscal years 2001-2003 [Biological Opinion 1-7-01-F-032 (BO)]. This project incorporates the mandatory terms and conditions of the BO requiring the implementation of project design criteria proposed in the Biological Assessment for the BLM, Rogue River and Siskiyou National Forests.

The Paradise Lost spotted owl nest site is not protected with a nest core because the owls nested after cores were established in 1994. The USFWS further recommends, but does not require, specific protection measures for spotted owls which have activity centers discovered since 1994. To reduce the impact of the proposed action on listed species within the action area, the USFW recommends to minimize the loss or degradation of suitable owl habitat within 0.7 miles of known spotted owl nest sites and to defer timber harvest for one to three decades around spotted owl activity centers in the Matrix and AMA that have been discovered since January 1, 1994.

Based on the BO recommendations, a mitigating measure to defer timber harvest in this activity center for the Deer Lake project is proposed for alternatives B and C. This would affect Unit 28 (9 ac) and the portion of Unit 33 west of the 37-2E-17 road (approx. 23 acres). The NE 1/4 of Sec. 29 is also in the activity center, but no treatments are proposed there.

COMPARISON OF ALTERNATIVES
Listed below is a brief summary of the major differences between alternatives. The environmental consequences of each alternative are provided in Chapter 4.

The number of acres treated by silviculture prescription (Table 2-1) would remain the same under Alternatives B and C. An explanation of each silviculture prescription is available in Appendix B.

TABLE 2-1. COMMERCIAL ACRES TREATED BY SILVICULTURE PRESCRIPTION

PRESCRIPTION	ACRES		
	ALT A	ALT B	ALT C
Dry Douglas Fir (DDF)	0	426	426
Pine (P)	0	324	324
Mistletoe (M)	0	902	902
Wet Douglas Fir (WDF)	0	265	265
Regeneration (REG)	0	245	245
Mixed Conifer	0	212	212

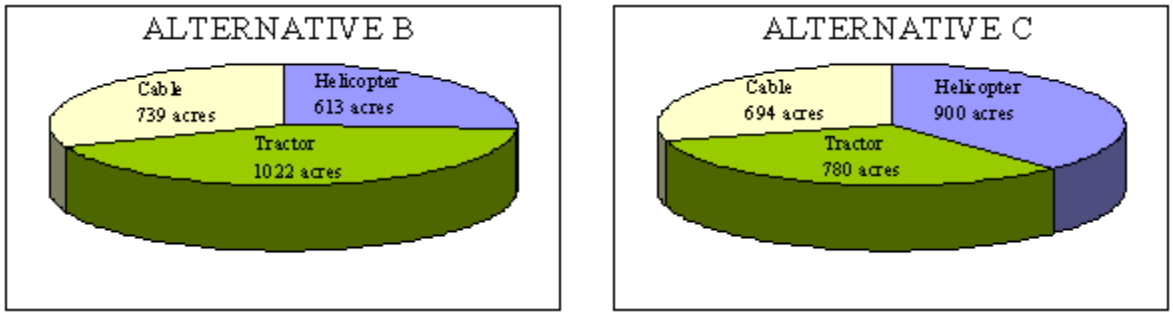
The miles of roads constructed, closed, and decommissioned changes by alternative (Table 2-2).

TABLE 2-2. CURRENT AND FUTURE ROAD MILAGE BY ALTERNATIVE

ROAD SUMMARY	MILES		
	ALT A	ALT B	ALT C
Existing BLM Roads	51.6	51.6	51.6
New Temporary Road Construction	0	1.3	0
Proposed New Road Construction	0	2.2	0
Proposed Decommissioning	0	9.0	8.5
Proposed renovation on existing roads	0	37	36
Roads Currently Closed with Gates/Barricades	18	18	18
Additional Roads Closed with New Gates/Barricades	0	7.1	4.8
Total BLM Roads after Project (Closed and Open)	51.6	44.8	43.1
BLM Roads Closed	18	25.1	22.8
BLM Roads Open	33.6	19.7	20.3

The availability of roads has a direct impact on the types of yarding systems used (Chart 2-1).

CHART 2-1. LOGGING SYSTEMS UTILIZED BY ALTERNATIVE



PROJECT DESIGN FEATURES (PDFs)

PDFs are an integral part of the project design for each alternative. PDFs include seasonal restrictions on many activities in order to minimize erosion and reduce disturbance to wildlife. PDFs also outline protective buffers for sensitive species, mandate the retention of snags, and delineate many measures for protecting Riparian Reserves throughout the project. Most PDFs reflect Best Management Practices and standard operating procedures. PDFs that apply to Alternatives B and C are found in Appendix C. Best Management Practices (BMPs) are also identified in Appendix C.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM ANALYSIS

The ID Team also considered an alternative that would have constructed approximately three miles of road in the Lost Creek drainage. The ID Team chose not to analyze this alternative in detail for the following reasons. The Oregon Department of Environmental Quality's (ODEQ) 1994/1996 303(d) list of water quality limited streams includes Lost Creek. The lower 3,300 feet of Lost Creek has also been identified as critical habitat for the Coho salmon. Most of the proposed road that would have been constructed was mid-slope within 0.25 mile of Lost Creek or a major tributary.

After a preliminary analysis, the ID Team decided to drop this alternative from consideration in order to eliminate what would have been the primary source of additional sediments to Lost Creek. The roads would have facilitated tractor or cable yarding of commercial timber. Without these roads helicopter yarding would be implemented to accomplish management objectives. Under the proposed action, approximately 179 acres of land would be yarded using a helicopter instead of cable or tractor yarding as a result of eliminating the roads. The additional cost of yarding would be approximately $232,000 to $402K. The cost of building the roads would have been approximately $151,000. This is a net increase in logging cost of approximately $81,000 to $251,000.

The ID Team also removed 128 acres of fuels treatments in oak woodlands adjacent to Lost Creek critical habitat in order to further reduce the risk of increased sedimentation.

CHAPTER III
AFFECTED ENVIRONMENT

INTRODUCTION

This chapter summarizes the present conditions within the proposed Deer Lake Project area that would be affected by the alternatives. The information in this chapter serves as a baseline for determining the effects of the alternatives. No attempt has been made to describe every detail of every resource within the proposed project area. Only enough detail has been given to determine if any of the alternatives would cause significant impacts to the environment beyond those described in the Medford District RMP.

FOREST HEALTH AND COMPOSITION

The project area is northwest of and adjacent to the Dead Indian Plateau in southwest Oregon. The north boundary of the project area is the South Fork Little Butte Creek. From this boundary the land slopes upward to the Dead Indian Plateau. As a result, there are many forest stands with northerly aspects. The main ridges run north-south in direction. The eastern boundary is the ridge between Deer Creek and Soda Creek. Forest stands on this ridge have westerly aspects and are predominantly Douglas-fir. The western boundary is the ridge between Lost Creek and Lake Creek so forest stands in this area have an easterly aspect. Forests here are predominantly pine series because of the soil.

The lower elevation forest stands with east and west aspects are pine and oak series forests. As the elevation increases, Douglas-fir and white fir become more abundant. There are drier Douglas-fir plant associations adjacent to the pine series forests and as elevation increases, mixed conifer sites are more common. Moist Douglas-fir plant associations are also found in the higher elevations with north aspects. Douglas-fir dwarf mistletoe is common throughout the project area.

There are approximately 7,399 acres of federally-owned land in the Deer Lake project area. The project area is presently composed of the following vegetation types:

Grass	5 %	Early seral	14 %
Shrub	3 %	Small pole-size trees	less than 1%
Hardwood	12 %	Mid seral trees	38%
Mature	28 %		

The present-day vegetation is a result of natural succession, the geology and soils of the area, and human influences. Over the coarse of thousands of years, native inhabitants regularly used fire on the landscape for a wide variety of purposes. Natural disturbances such as lightning fires, windstorms, drought, insects, and forest pathogens have helped create the varied forest structure and species composition. Logging and grazing early in the century to the present day have also played a part in creating the present day forest stands.

Historically, the forests were probably more open, had fewer and larger trees per acre, and of a different species composition. The pine series and mixed conifer forests are uneven-aged. A 118 tree sample shows trees in every 10 year age class from 60 through 250 years of age. A 256 year-old ponderosa pine tree was also sampled. This age variation could be the result of frequent natural disturbances and the steady influx of natural tree regeneration afterward. Because of the many tree age classes, there is diversity of diameter and height classes (resulting in vertical crown structure), and tree crown sizes.

Subtle changes in species composition and stand structure are occurring over the landscape. Many trees with old-growth characteristics are dying as a result of increased competition with second growth trees for limited resources. Mortality is also occurring in mid to mature vegetation classes due to heavy Douglas-fir dwarf mistletoe infection. Douglas-fir is replacing ponderosa pine, sugar pine and incense cedar because of its more shade-tolerant nature. In some areas white fir is migrating to lower elevations and encroaching upon the Douglas-fir tree series. Douglas-fir is also encroaching upon the edges of the

oak woodlands, although mortality of Douglas-fir along these edges has been noticeable during the last few years. Whiteleaf manzanita and ceanothus species are migrating into the oak woodlands and replacing the oaks, pines, and native grass species. In the mid-size vegetation condition class, suppressed shrubs and hardwood trees beneath the dominant tree canopy layer are dying. Pacific madrone and white and black oak have dropped out of conifer stands where light and water have become limiting. Dead whiteleaf manzanita may be found in the understory of some conifer stands and is indicative of a vegetation shift from shrubs to trees. Other shrub species dying out of the conifer stands include deerbrush ceanothus, creambrush oceanspray, and serviceberry.

It must be recognized that we are observing the landscape vegetation of today at one single point in time. Although current vegetation stem densities are high and are mostly in the late seral stage, the vegetation condition classes of today are atypical when compared to historic vegetation. This is due primarily to the effects of fire suppression on the landscape.

Absence of Fire

Fire is recognized as a key natural disturbance process throughout Southwest Oregon (Atzet and Wheeler 1982). Human-caused and lightning fires have been a source of disturbance to the landscape for thousands of years. Fire has played an important role in influencing successional processes. Large fires of varying severities were a common occurrence in the area based on fire scars and vegetative patterns. The natural fire regime appears to have been "slowed" through human activities and fire suppression in this last century.

Based on calculations using fire return intervals, five fire cycles have been eliminated in the southwest Oregon mixed conifer forests that occur at low elevations (Thomas and Agee 1986). Many seedling and pole size forests have failed to grow into old-growth forests because of the lack of natural thinning once provided by frequent fire. Consequently, much old-growth forest habitat has been lost along with diminished populations of old-growth dependent and related species. Species such as ponderosa pine and oaks have decreased as the elimination of fire has allowed Douglas-fir to grow in these once open stands. In addition, fire suppression has allowed these stands to become overstocked with Douglas-fir and white fir, changing the horizontal and vertical stand structure. The threat of crown fires, which were once historically rare, has increased. The absence of fire has also had negative effects on grasslands, shrublands, woodlands, and riparian areas.

Declining Vigor

One way to determine the health of a forest stand is by measuring individual tree vigor. Tree vigor is a measure of both individual tree and overall forest health. The average tree vigor index, as measured by leaf area index is 73 for Douglas-fir and 27 for ponderosa pine. Trees with vigor between 30-70 can withstand progressively higher attacks but are still in danger of mortality from the insect attacks. Trees with vigor between 70-100 can generally survive one or more years of relatively heavy attacks and trees with indices above 100 cannot be killed by bark beetles (Waring, 1980). Trees with vigor indices below 30 will succumb to attack from bark beetles of relatively low intensity.

Other signs of declining vigor in forested stands throughout the project area are:

1. Conifer mortality rates are higher than the naturally occurring range, indicating a decline from healthy forest conditions. Higher than normal tree mortality is occurring as a result of bark beetles and Douglas-fir dwarf mistletoe.

2. Many of the larger, shade-intolerant trees (pine species) are experiencing rapid mortality due to drought conditions, exacerbated by overstocked stands and the resultant attack on the stressed trees by the Western pine beetle *(Dendroctonus brevicomis)*. Natural stands in southwestern Oregon, in general, contain a variety of species, including hardwoods. Stands with several species tend to respond to stresses better and are more vigorous and productive than stands which

contain a single species. In particular, when the loss of a certain species occurs, the remaining forest is less vigorous, less productive and normally composed of more shade-tolerant species. These resultant stands can be very susceptible to wholesale mortality from drought and resulting insect attack, (as can be seen in the Blue Mountains in eastern Oregon of the wide spread mortality of white fir and Douglas-fir).

3. Throughout the Deer Lake area, the lack of understory disturbance such as fire, has promoted the growth of shade-tolerant species (Douglas-fir and white fir) in the understories of large, shade-intolerant trees (pine). As competition for moisture increases with these encroaching trees or shrub species, large overstory trees die because their respiratory requirements cannot be met.

4. Decreased diameter growth, small live crown ratios and tall skinny trees (large height/diameter ratios) are all indicators of low individual tree vigor. Many of the stands examined in the planning area exhibit these characteristics which are all symptoms of overly dense stands.

5. Merchantable trees per acre range from 184 to 493 trees. The average for the inventoried stands is 311 trees per acre. Basal area per acre ranges from 180 to 443 square feet. Average radial growth for the past ten years is .69 inches. Most stands in the project area have a relative density index of .500 or greater and this indicates that physiologically the trees are at the point of suppression and mortality. All the above are indicators of overly dense stand conditions.

Many young and small pole conifer forests are in the "stem exclusion stage" of development. This stage occurs when available resources begin to limit the growth and establishment of new trees or shrubs. At this stage, shade intolerant understory species begin to disappear and the stand appears to have a closed forest canopy layer. Sometimes large diameter trees are found with early seral trees because of past shelterwood and selection silvicultural systems used. Many of the larger pole sized and mature forest stands are in the "understory reinitiation stage" of forest development. This is a result of small scale natural disturbances causing tree mortality and past selection harvesting.

FIRE HAZARD

Fire hazard assesses vegetation by type, arrangement, volume, condition and location. These characteristics combine to determine the threat of fire ignition, the spread of a fire and the difficulty of fire control. Fire hazard is a useful tool in the planning process because it helps in the identification of areas within a watershed in need of fuels management treatment. Hazard ratings were developed for the project area (Table 3-1). In general, the existing fuel profile within the project area represents a moderate to high resistance to control under average climatic conditions.

Based on local knowledge of fire behavior in southwest Oregon, the following factors were used to assign a fire hazard rating to an area: fuel model, presence of ladder fuels, slope, aspect, and elevation.

Table 3-1. Fire Hazard Ratings for the Deer Lake Project Area

Fire Hazard Rating	Percentage of Acres in each Category
Low hazard	5%
Moderate hazard	57%
High hazard	38%

AIR QUALITY

Nonattainment Areas

In the past, the population centers of Grants Pass, Medford/Ashland (including Central Point and Eagle Point), and Klamath Falls were in violation of the national ambient air quality standards for particulate

matter smaller than 10 micrometers (PM 10) and are classified as nonattainment for this pollutant. The nonattainment status of these communities is not attributable to prescribed burning. Major sources of particulate matter within the Medford/Ashland nonattainment area is smoke from woodstoves, dust and industrial sources. The contribution to the nonattainment status of particulate matter from prescribed burning is less than 4% of the annual total for the Medford/Ashland air quality management area. Over the past seven years the population centers of Grants Pass and Medford/Ashland have been in compliance for the national ambient air quality standards for PM 10.

SOILS

The soils in the project area formed from material weathered from igneous rock on plateaus and hillslopes. The slope ranges from five percent to near 65 percent. The soils series identified in the project area are Bybee, Farva, McMullin, McNull, Medco, Pinehurst, Straight, Shippa, and Tatouche (Appendix E). The Bybee, McNull, Medco, and Tatouche soils have montmorillonitic minerology which causes these soils to have high shrink-swell potential and are subject to severe compaction. The Farva and McMullin soils have high rock content and/or are shallow in depth which limits moisture holding capacity. The Bybee and Medco soils have perched water tables December through May. The Bybee soil is subject to severe slumping, road failure and landslides are likely to occur after road construction. A map showing the location of these soils on the landscape is on file at the Medford District Office.

Most of the soils in the project area are on steep slopes (>35 %) and are highly erodible when disturbed. Current erosion rates in the project area are moderately high as is evident by the sediments identified in Deer Creek and Lost Creek (see Hydrology section).

The high erosion rates are primarily the result of the timber harvest on non-federal land within the past 20 years and many of the sections having road densities near or above four miles. In combination with the highly erodible soils, poor design and the lack of maintenance on many of the private roads has been one of the main factors for the high sedimentation rates in the local streams (Little Butte Creek Watershed Analysis (WA), 1997). The BLM-administered land has not been actively managed since 1988 and, except for the roads, erosion rates are near natural levels.

There is evidence of old (200+ years) landslides in the upper Lost Creek drainage and more recent slumping associated with roads and clear-cut harvest in the Deer Creek drainage. The potential for landslides or slumping on very steep (>55%) canyon sideslope terrain is moderate and may be exacerbated by roads cutting into the sideslope. Landslides and slumping are most often associated with large storm events particularly if the soil profile has been completely saturated.

HYDROLOGY

Analysis Area

The proposed Deer Lake project area is within the lower portion of the South Fork Little Butte Creek Subwatershed. Major streams in the project area include the South Fork Little Butte Creek (a tributary to Little Butte Creek), and Lost and Deer Creeks (tributaries to the South Fork Little Butte Creek). The project area is within the South Fork/North Fork Little Butte Creek Tier 1 Key Watershed, which was designated in the Medford District RMP (USDI 1995b). The Little Butte Creek WA (USDI and USDA 1997) provides a general description of geomorphology, hydrology, water quality, stream channels, and riparian vegetation for South Fork Little Butte, Deer, and Lost Creeks.

For purposes of analyzing the affected environment and the proposed project, the project area is divided into seven drainage areas. In general terms, a watershed is defined as any bounding area where water drains to a specified outlet. To better classify and analyze watersheds they are delineated to nest in a multi-level, hierarchical drainage system. The largest classification of this kind is termed a 1st level hydrologic unit (also called a Region). As part of the ranking system, a 1st level hydrologic unit is delineated into smaller 2nd levels (Subregions) which then can be subdivided into 3rd levels (Basins), then 4th levels (Subbasins), 5th levels (Watersheds), 6th levels (Subwatersheds), and 7th levels (Drainage Areas).

The Deer Lake project area is within the 4th Level Upper Rogue River Subbasin, the 5th Level Little Butte Creek Watershed, the 6th Level Lower South Fork Little Butte Creek Subwatershed and seven Level 7 drainage areas (Table 3-2) which will be used for the analysis. The Lost Creek drainage will also be analyzed as the sum of the four Level 7 drainage areas (LB 0627, LB 0630, LB 0633, and LB 0636) that comprise it.

Table 3-2. Drainage Area Description

Drainage Area Number	Drainage Area Name	Drainage Area Description	Drainage Area (Acres)	% BLM	Drainage Area within Project Area (Acres)
LB 0621 Deer	Deer Creek	All lands draining into Deer Creek	3,061	54	3,048
LB 0624 S. Fk. Little Butte 1	S. Fk. Little Butte Creek and unnamed tributaries	All lands draining into S. Fk. Little Butte Creek below Deer Creek and above Lost Creek	3,520	25	1,721
LB 0627 Upr Lost	Upper Lost Creek	All lands draining into Lost Creek from the headwaters to the outlet of Lost Lake	4,279	48	4,082
LB 0630 Mid Lost	Middle Lost Creek	All lands draining into Lost Creek from the Lost Lake outlet to the Charley Creek confluence	2,516	49	2,516
LB 0633 Charley	Charley Creek	All lands draining into Charley Creek	1,776	48	1,776
LB 0636 Lwr Lost	Lower Lost Creek	All lands draining into Lost Creek from below Charley Creek to its confluence with S. Fk. Little Butte Creek	2,874	45	2,874
LB 0639 S. Fk. Little Butte 2	S. Fk. Little Butte Creek and unnamed tributaries	All lands draining into S. Fk. Little Butte Creek below Lost Creek and above the Medford Irrigation District diversion	3,588	27	1,084

Non-BLM lands in Deer Creek and the mid-to upper portions of Lost Creek drainage areas are primarily owned by private timber companies. Management of these forest lands are guided by the Oregon Forest Practices Act. Non-BLM lands in the lower portion of Lost Creek and the two drainage areas with South Fork Little Butte Creek are primarily shrublands and agricultural lands.

Average annual precipitation in the Deer Lake project area ranges from approximately 28 to 48 inches. Elevations in the project area range from 1,688 feet to 5,470 feet. Rain predominates in the lower elevations with the majority occurring in the late fall, winter, and early spring. A mixture of rain and snow occurs between approximately 3,500 feet and 5,000 feet and this area is referred to as either the rain-on-snow zone or transient snow zone. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. A heavy rain falling on an existing snowpack can result in flooding. Above 5,000 feet, winter precipitation usually occurs as snow.

Surface water in the proposed Deer Lake project area includes streams, springs, wetlands, natural lakes and ponds, reservoirs, and ditches. Streams in the project area are classified as perennial, intermittent with seasonal flow, intermittent with ephemeral flow, and dry draws with ephemeral flow (Table 3-3). Perennial and intermittent streams require Riparian Reserves while dry draws do not.

Table 3-3. Stream Miles by Category in Project Area

Drainage Area	Perennial Streams (miles)	Intermittent Streams with Seasonal Flow (miles)	Intermittent Streams with Ephemeral Flow (miles)	Dry Draws with Ephemeral Flow (miles)
LB 0621 Deer	9.87	8.83	4.9	2.76
LB 0624 S. Fk. Little Butte 1	5.32	8.59	2.69	2.38
LB 0627 Upr Lost	9.47	11.9	3.36	9.34
LB 0630 Mid Lost	6.63	8.09	2.82	7.6
LB 0633 Charley	3.46	8.71	0.53	2.04
LB 0636 Lwr Lost	3.15	13.18	5.35	5.1
LB 0639 S. Fk. Little Butte 2	0.62	5.16	1.09	0.48

Springs, wetlands, lakes, ponds, reservoirs, and areas of unstable/potentially unstable ground have been identified in the proposed project area and are also required to receive Riparian Reserve protection.

Water Quality

Beneficial water uses in the project area include domestic water supply, irrigation, livestock watering, cold water fish, and other aquatic life (ODEQ 1992). State standards are designed to protect the most sensitive beneficial use within a waterbody. The key water quality criteria established to protect the most sensitive of these designated beneficial uses are flow modifications, temperature, dissolved oxygen, pH, bacteria/pathogens, turbidity, sedimentation, and habitat modifications.

South Fork Little Butte, Lost, and Deer Creeks are on the DEQ's 1998 list of water quality limited streams, also known as the 303(d) list from Section 303(d) of the 1972 Federal Clean Water Act.

Within the Deer Lake project area, South Fork Little Butte Creek is listed for flow modification, habitat modification, sedimentation, and summer temperature. Deer Creek is listed from the mouth to headwaters for sedimentation and Lost Creek is listed from the mouth to headwaters for sedimentation and summer temperature. All 303(d) listings within the project area are due to nonpoint source pollution. Sources of water quality concerns in the project area and recommendations for correcting them are addressed in the *Little Butte Creek Watershed Analysis* (USDI and USDA 1997). Major sediment sources for Lost and Deer Creeks are discussed in this chapter under Soils and Channel Morphology.

Channel Morphology

The portion of South Fork Little Butte Creek flowing through the project area is a large, low gradient (< 2%) stream, with approximately 1,000 feet of the stream flowing across BLM-managed land. The stream is predominately unconstrained in a broad valley, but also has a reach in the middle (on the BLM-managed portion in section 11) that is constrained by terraces. Land use on the non-BLM portion is primarily dominated by agriculture and grazing. Channel stability is low and streambank erosion is high. There is a low amount of large wood in this section of South Fork Little Butte Creek. The stream is wide

and shallow with a high width-to-depth ratio.

Channel gradients in the main stem of Lost Creek range from moderate (3-4%) in the lower reaches (below Charley Creek confluence) to steep (5-10%) and very steep (>10%) in the mid-to-upper reaches. Mean bankfull (1-2 year return interval flow event) widths for Lost Creek on BLM-administered lands range from 11.9 feet to 22.7 feet and mean bankfull depths range from 0.7 feet to 1.2 feet; width-to-depth ratios are moderate to high, ranging from 12 to 26. The entire length of Lost Creek is constrained, by terraces in the lower reaches and by V-shaped hillslopes in the mid-to-upper reaches. Tributaries to Lost Creek tend to be smaller channels with some moderate gradients, but mostly steep to very steep gradients. The main channel is unstable with a high percentage of actively eroding streambanks. Slumps are present in the main channel and tributaries. Fine sediments are at a high level throughout the main channel. Large wood is not very abundant in the Lost Creek stream system.

Deer Creek is a high energy, flashy stream system due to steep (7-10%) and very steep (>10%) gradients in the main channel and tributaries. Mean bankfull widths for the main channel on BLM-administered lands range from 3.9 feet to 10.5 feet and mean bankfull depths range from 0.7 feet to 1.4 feet; width-to-depth ratios are low, ranging from 4 to 8. Mean bankfull widths on the tributaries range from 1.2 feet to 8.9 feet and mean bankfull depths range from 0.1 feet to 3.2 feet. Large woody material is lacking in the main channel and tributaries due to high flows moving wood out of the system and past harvest of large trees in the riparian area. The low amounts of large wood in the channels result in a lack of energy dissipating structure in the channels and subsequent bank erosion and sedimentation. Sediment is moving into Deer Creek and its tributaries from unstable sideslopes and landslides in the headwaters. Sediment is also delivered to stream channels via road ditch lines in the drainage area. Several Deer Creek tributary channels are experiencing downcutting as a result of road crossings with undersized or "shotgun" culverts. A high percentage of the stream substrate in Deer Creek consists of fine sediment indicating that the sediment entering the stream system exceeds the transport capability.

Unnamed streams in the project area that flow into South Fork Little Butte Creek between Deer Creek and Lost Creek (drainage area LB 0624) and below Lost Creek (drainage area LB 0639) are small channels (mean bankfull widths range from 1.7 to 6.2 feet and mean bankfull depths range from 0.2 to 0.7 feet on BLM-managed lands) with steep to very steep gradients.

Riparian Areas

Riparian vegetation in the project area along South Fork Little Butte Creek is dominated by medium-sized deciduous trees and shrubs. Species present include maples, willows, madrone, and Douglas-fir. The riparian overstory on the BLM-managed land in section 11 is 10-35 inch dbh Douglas-fir and the riparian understory is primarily comprised of alder and big leaf maple. The average riparian area width on the BLM-managed portion is 130 feet (width from one side of the riparian area to the other, including the stream).

Riparian vegetation along Lost Creek and its tributaries consists of a variety of species including Douglas-fir, white fir, incense cedar, Ponderosa pine, yew, big leaf maple, Oregon ash, alder, willow, and oceanspray. The higher elevations are dominated by coniferous trees, with the low-to-mid elevations having a mix of deciduous and coniferous trees and shrubs. Riparian area widths vary from 5 feet along small channels to 300 feet on Lost Creek.

Riparian areas in the Deer Creek drainage are comprised of a diversity of species including Douglas-fir, incense cedar, ponderosa pine, alder, big leaf maple, sword fern, and snowberry. Conifers in the riparian areas are mostly small diameter (less than 20 inches) in the early-to-mid seral stages. Riparian area widths vary from 6-80 feet.

Riparian vegetation along unnamed streams in the project area that flow into South Fork Little Butte Creek between Deer Creek and Lost Creek (drainage area LB 0624) and below Lost Creek (drainage area

LB 0639) is dominated by white oak, black oak, Ponderosa pine, incense cedar, Douglas-fir, alder, Oregon ash, and big leaf maple. Riparian area widths vary from 6-40 feet.

Riparian areas on BLM-managed lands within the project area were assessed for proper functioning condition (PFC), which is a qualitative method for assessing the condition of riparian-wetland areas (USDI and USDA 1998). The PFC assessment considers hydrology, vegetation, and erosion/deposition attributes and processes to assess the riparian condition. The assessment places riparian areas into one of four categories: proper functioning, functional-at risk, nonfunctional, and unknown. The functional-at risk category is further defined by a trend: upward, downward, or not apparent.

The majority of riparian areas on BLM-managed lands within the project area are rated as being in proper functioning condition or functional-at risk with an upward trend (Table 3-4) with the exception of those in the Deer Creek drainage area (LB 0621). In most cases, past management on private lands upstream and low amounts of large wood were the primary reasons for riparian areas being rated as nonfunctional or functional-at-risk with a downward trend. All riparian areas on BLM-managed lands are well-vegetated and have adequate ground cover.

Table 3-4. Proper Functioning Condition Assessment for BLM-Administered Lands

Drainage Area Number	Miles Assessed	Proper Functioning Condition (% of assessed miles)	Functional-At Risk, Trend Upward (% of assessed miles)	Functional-At Risk, Trend Not Apparent (% of assessed miles)	Functional-At Risk, Trend Downward (% of assessed miles)	Nonfunctional (% of assessed miles)
LB 0621 Deer	10.9	7	21	39	16	17
LB 0624 S. Fk. Little Butte 1	1.1	32	61	0	7	0
LB 0627 Upr Lost	4.4	60	38	0	2	0
LB 0630 Mid Lost	4.6	62	22	11	5	0
LB 0633 Charley	1.3	0	80	0	20	0
LB 0636 Lwr Lost	3.0	76	8	0	16	0
LB 0639 S. Fk. Little Butte 2	0	--	--	--	--	--

Road stream crossings affect riparian vegetation as well as water quality and channel morphology. Riparian vegetation removal at road stream crossings reduces riparian habitat and stream shading. Road stream crossings are a major source of sediment delivery to stream channels. Existing road stream crossings taken from the BLM GIS transportation theme for the project area are shown in Table 3-5.

Table 3-5. Road Stream Crossings in Project Area

Drainage Area Number	Road Crossings on Perennial Streams (number)	Road Crossings on Intermittent Streams with Seasonal Flow (number)	Road Crossings on Intermittent Streams with Ephemeral Flow (number)	Road Crossings on Dry Draws with Ephemeral Flow (number)	Total Road Stream Crossing Density (number per sq. mile)
LB 0621 Deer	20	30	21	13	17.6
LB 0624 S. Fk. Little Butte 1	13	32	8	7	22.3
LB 0627 Upr Lost	17	23	10	30	12.5
LB 0630 Mid Lost	5	4	4	6	4.8
LB 0633 Charley	8	36	0	10	19.5
LB 0636 Lwr Lost	3	21	13	7	9.8
LB 0639 S. Fk. Little Butte 2	0	4	4	0	4.7

Road stream crossing density for the Lost Creek drainage (LB 0627, LB 0630, LB 0633, and LB 0636) is 11.2 crossings per square mile.

Upland Conditions Affecting Streamflows

Upland disturbances involving vegetation removal or soil compaction have the potential to affect the streamflow regime. Past road building, timber harvest, and agricultural land clearing have the potential to alter hydrologic processes (infiltration, interception, and evapotranspiration) in the project area. Changes to the hydrologic functions can result in increased magnitude and frequency of peak flows, which can cause accelerated streambank erosion, scouring and deposition of stream beds, and increased sediment transport.

The Forest Service developed a process for assessing upland watershed condition and the relative risk of adverse cumulative effects from proposed management actions (USDA 1993). The Forest Service process uses two primary indicators to assess the current watershed condition as it relates to hydrologic functions: road density and the percent of the drainage area that has forested stands less than 30 years old. A watershed risk rating for the existing condition in the project area is determined from these two indicators (Table 3-6). Road density was obtained from the BLM GIS transportation theme and the 2001 aerial photos. Stands less than 30 years old on BLM-administered land were estimated from the BLM Forest Operations Inventory database and those on private land were obtained from the 2001 aerial photos. A watershed with 30 percent or more of its forest stands less than 30 years old or road densities of 4.5 mi./sq. mi. or greater is given a high risk rating. The watershed risk rating is high for all drainage areas except LB 0639. Drainage areas LB 0624, LB0633, and LB0636 are given a high risk rating primarily due to high road densities. Drainage area LB 0630 is rated a high risk primarily due to the percent of area with stands less than 30 years old. Drainage areas LB 0621 and LB0627 are rated high due to a combination of high road densities and having more than 30 percent of the watershed in stands less than 30 years old.

Table 3-6. Watershed Risk Rating

Drainage Area Number	Road Density (mi./sq. mi.)			Percent of Drainage Area with Stands < 30 years old			Watershed Risk Rating
	BLM Lands	Non-BLM Lands	All Lands	BLM Lands	Non-BLM Lands	All Lands	
LB 0621 Deer	5.5	5.3	5.4	22	73	46	High
LB 0624 S. Fk. Little Butte 1	2.3	4.6	4.0	4	17	14	High
LB 0627 Upr Lost	5.4	4.2	4.8	17	56	37	High
LB 0630 Mid Lost	1.8	4.2	3.0	5	86	46	High
LB 0633 Charley	7.0	5.2	5.6	23	13	17	High
LB 0636 Lwr Lost	2.8	4.8	3.9	2	17	11	High
LB 0639 S. Fk. Little Butte 2	0.4	2.6	2.0	0	8	6	Low

Lost Creek drainage (LB 0627, LB 0630, LB 0633, and LB 0636) has a road density of 4.3 miles per square mile and 29 percent of the drainage has stands less than 30 years old. Road density and percent of drainage with stands less than 30 years old for BLM-administered lands are 4.2 miles per square mile and 12 percent of the drainage, respectively. Lost Creek has a high watershed risk rating primarily due to the high road density.

Large areas of vegetation removal in the transient snow zone are of particular concern due to alterations of the streamflow regime and resultant increased peak flow magnitudes. The *Oregon Watershed Assessment Manual* (Watershed Professionals Network 1999) provides a method for assessing the potential risk for peak flow enhancement from the transient snow zone. Factors affecting the risk level include the percent of transient snow zone with less than 30% crown closure and the percent of the analysis area that is within the transient snow zone. Three drainage areas (LB 0624, LB 0636, and LB 0639) in the project area have less than 25 percent in the transient snow zone and are not evaluated in this analysis. Upper Lost Creek (LB 0627) is the only drainage area where there is a potential risk of peak flow enhancement (Table 3-7). Lost Lake is at the lower end of Upper Lost Creek and it would likely dampen high flows originating in this drainage area.

Table 3-7. Risk of Peak Flow Enhancement

Drainage Area Number	Percent of Forestry Land Use Area in the Transient Snow Zone	Percent of Transient Snow Zone Area with Less than 30% Crown Closure			Risk of Peak Flow Enhancement
		BLM Lands	Non-BLM Lands	All Lands	
LB 0621 Deer	47	32	91	63	Low
LB 0627 Upr Lost	87	18	63	41	Potential
LB 0630 Mid Lost	52	11	89	58	Low
LB 0633 Charley	59	29	2	16	Low

Lost Creek drainage (LB 0627, LB 0630, LB 0633, and LB 0636) has 54 percent of the forestry land use area in the transient snow zone and 40 percent of the drainage has less than 30 percent crown closure. The drainage as a whole has a low risk of peak flow enhancement.

AQUATIC WILDLIFE

Fisheries

The fish bearing streams within the Deer Lake analysis area are approximately 3 miles of South Fork Little Butte, Lost, and Deer Creeks. South Fork Little Butte Creek is a Tier 1 Key Watershed recognized as contributing to the conservation of at-risk anadromous and resident fish species. Key watersheds are crucial to maintaining and recovering habitat for these at-risk species.

Southern Oregon/Northern California coho salmon (*O. Kisutch*), listed as threatened under the ESA, are found in South Fork Little Butte. The coho salmon population in the Little Butte Creek Watershed is depressed due to loss of habitat and poor water quality. South Fork Little Butte is considered critical coho habitat and essential fish habitat. South Fork Little Butte Creek is one of the primary rearing areas within the range of this depressed population (RVCOG 1997, Little Butte Creek WA, 1997). Coho are not found anywhere else in the project area.

In addition to coho, steelhead and rainbow trout (*O. Mykiss*), Pacific lamprey (*lampetra tridentata*), cutthroat trout (*O. Clarki*), Klamath smallscale sucker (*Catostomus rimiculus*) and reticulate sculpin (*Cottus perplexus*) are found in the South Fork Little Butte Creek. Non-native fish including Klamath speckled dace (*Rhinichthys osculus*), redside shiners (*Richardsonius balteatus*), and Eastern brook trout (*Salvelinus Fontinalis*) are also found in the South Fork Little Butte Creek.

Coho have not been confirmed in Lost Creek, however, there is no barrier to migration and some of Lost Creek appears to have suitable coho habitat. For approximately the first 3,300 meters, Lost Creek has a moderate gradient averaging 3.5 percent. Just above the end of BLM land at the start of section 37S-2E-16 the stream becomes constrained through a narrow valley and the gradient rises to 10 percent for over 100 meters. It remains steep up to Lost Lake, ranging from 6 percent to 21 percent (ODFW Habitat Inventory, 1994). Although it is difficult to establish a cutoff gradient above which coho will not spawn, coho prefer low gradient streams and generally spawn in gradients of less than 4 percent (ODFW fish report). Therefore the first 3,300 meters of Lost Creek are designated as coho Critical Habitat.

Steelhead are much better jumpers than coho and will travel up steeper gradients. The first 3.7 miles of Lost Creek support summer and winter steelhead. Rainbow trout are found up to 3 miles above Lost Lake and for 1 mile into the east arm. Brook trout are found in Lost Lake and probably occur for some

distance above and below the lake.

An existing stream ford in Lost Creek on private land at T. 37S., R. 2 W., Sec. 22 is an identified point source for sediment. The toe of the slope entering the ford erodes continuously, and combined with runoff coming down the road, provides a steady input of sediment to Lost Creek.

Deer Creek is a constrained, steep (7 percent to >10 percent) stream which makes it unsuitable coho habitat (ODFW Habitat Inventory, 1994). Steelhead use about 1/4 mile of Deer Creek before the gradient and narrow channel make the habitat impassable. Cutthroat use about 1.6 miles of Deer Creek (ODFW Fish presence data).

Habitat for other aquatic organisms such as Pacific giant salamanders (*Dicamptadon tenebrosus*), yellow legged frogs (*Rana boylii*), and aquatic garter snakes (*Thamnophis couchi*), may extend well beyond what is suitable habitat for salmonids though survey data for those species is lacking.

Fish habitat

Past human activities have altered this landscape and greatly simplified aquatic habitat. In the recent past, commercial timber harvest and road construction in riparian zones, instream wood removal, channel straightening, and rural residential development have all contributed to a degradation in the quality of aquatic habitat. Road densities and stream crossings, which affect riparian vegetation as well as water quality and channel morphology, are also high (see Hydrology). A high percentage of the area has already been harvested, especially on non-BLM lands, resulting in a high percentage of stands in the drainage area less than 30 years old (see also Hydrology section).

Young stands have decreased the supply of large wood in streams needed to create pools, provide cover for fish and other aquatic species, trap sediment, and stabilize banks during high flow events. Most sections of South Fork Little Butte, and Lost Creeks have inadequate amounts of large woody material (Little Butte Creek WA, 1997).

Where there is a lack of large wood, there is also a low quantity and quality of pools (Little Butte Creek WA, 1997). Pools are an important part of fish survival, providing rearing habitat in the summer and refuge from high flows in the winter (Meehan, 1991). The lower reaches of the streams in the analysis area are characterized by long riffles with few instream features. Upper reaches with greater than four percent slope contain many small, short step pools, however, they lack depth, wood cover, and microhabitat complexity (Little Butte Creek WA, 1997).

Streambed substrates (gravels, cobbles) lack variation in size because there are few instream structures (wood, root wads, log jams) to sort and grade cobbles and gravels. This results in poor spawning habitat, low quality pool habitat, and embedded stream cobbles. Macroinvertebrate sampling in Deer, Lost, and South Fork Little Butte Creeks found species associated with high temperatures and lots of sediment instead of the cold water species that should have been present in such small, mountain streams (Little Butte Creek WA, 1997).

The amount of sediment entering streams is exceeding the streams' ability to transport it downstream (see Hydrology). Activities contributing to increased sediments are timber harvest activities, road building, and natural and human caused landslides. There are a large number of road/stream crossings in several sections of Deer Creek and Lost Creek; these are likely to be the areas that experience the most sediment movement (Little Butte Creek WA, 1997, also see Hydrology). Excess sediment eliminates habitat for aquatic insects, reduces the permeability of spawning gravels, fills in pools, and blocks the interchange of subsurface and surface waters (Meehan, 1991).

In general, the interrelated aquatic and riparian habitats of the fish bearing streams in this analysis area are in poor condition and well below their potential for producing diverse ages and species of

anadromous fish and large resident trout (greater than eight inches). Most sections of the streams are riffle dominated, and lack side channel habitat, large woody debris, quality pools, cover, and spawning gravels (Little Butte Creek WA, 1997).

WILDLIFE

The project area's various plant communities provide habitat for approximately 200 terrestrial wildlife species that are known or suspected to inhabit the watershed. Although wildlife species richness is high, elements of habitat decline are present. A gradual loss of habitats such as oak savannahs, meadows, and brushfields has resulted from the exclusion of fire from the landscape. Grassy meadow habitat is less productive as wildlife habitat due to damage from cattle grazing and the encroachment of undesirable noxious weeds.

Most of the current early/seedling-sapling and pole habitat is the result of past timber harvest. Consequently, snags and coarse woody material are often lacking in these areas. Populations of species requiring snags and large coarse woody material have likely declined in these condition classes, while populations of species not requiring these components and associated with open areas and small trees have likely increased. Early successional species such as deer and elk have benefitted from the increased forage base.

In the coniferous plant communities, snag density and down woody material is inadequate in much of the early seral and pole condition classes due primarily to past timber harvest. Fire suppression has contributed to some pole and mature conifer stands becoming more dense than they would have under natural fire regimes. The lack of intrastand structure in these stands generally results in lower species richness in comparison to other condition classes. The abundance of mature/old-growth habitat has declined due to past timber harvest and fire suppression.

Some species have been adversely affected by a general decline in their habitat within the watershed from historical levels. Loss or modification of habitat is probably most pronounced in the mature/old-growth condition class, and wildlife species associated with this habitat have likely been the most affected. The volume of logging in the watershed steadily increased from the 1950s through the 1980s with clearcutting as a predominant method of harvest (Little Butte Creek WA, 1997). Mature/old-growth forests were historically prominent on the wetter, northern aspects of the watershed. Although supportive data are unavailable, the general decline in habitat condition probably has not resulted in a significant decrease in the number of wildlife species present. However, there has likely been substantial change in wildlife species abundance and distribution.

Big Game Winter Range Area

The northern portion of the Deer Lake project is within an area designated by the Medford RMP as a Big Game Winter Range Area for deer and elk. The Little Butte Creek WA (1997) indicated that this designation is meant to identify areas to promote forage, hiding, and thermal cover for deer and elk. The BLM RMP (1994) directs a seasonal road closure and a minimum of new road construction in Big Game Winter Range Areas. Road densities in the project and surrounding areas are considered high (Little Butte Creek WA, 1997).

The entire project area is within especially sensitive and important deer and elk habitat area. This area is identified in the Jackson County Land Use Plan as the Lake Creek Unit. The Lake Creek Unit was designated to protect big game winter range and summer habitat. This designation restricts development, home site location, and partitioning of private land. Oregon Department of Fish and Wildlife (ODFW) studies show a 40% decline in the Black-tailed deer population in Western Oregon. ODFW radio telemetry data has shown a high use of the project area as deer winter range (ODFW, 2002).

Hiding and thermal cover for summer and winter seasonal conditions are currently met through existing late-successional forest stands and brush fields present in the project area. Both winter and summer thermal cover generally have canopy closure values in excess of 60 percent. In the Deer Lake project

area, 66 percent of the acres capable of supporting forest growth are considered late successional. The high canopy closure moderates microclimatic extremes, and can benefit deer and elk by reducing the energy required to maintain body temperatures.

Hiding cover is also important to deer and elk because it provides areas for escaping predators and avoiding disturbances caused by other mechanisms, such as vehicular traffic. Paradoxically, fire suppression which has negatively affected forage conditions, has generally improved hiding cover conditions in the watershed. In the absence of fire, shrubs and trees that provide hiding cover have become more dense.

High quality forage is very important to both deer and elk, especially on winter ranges. Forage conditions are declining in the watershed. Introduced noxious herbaceous species, such as yellow starthistle and medusa, are displacing native grasses and herbs which generally provide high quality forage. Also, due primarily to fire suppression, large acreage of important browse species such as wedgeleaf ceanothus have become decadent and are not providing the quality forage that younger plants provide.

Threatened/Endangered Species
The northern spotted owl, a species listed as threatened under the ESA, is present in the project area. There is also potential for the presence of bald eagles, listed as threatened under the ESA.

As part of the NFP and BLM RMP, spotted owl core areas were established around known spotted owl nests in 1994. The purpose of the owl cores is to provide suitable habitat for nesting owls and other late-successional species outside of the Late Successional Reserve (LSR) system. This provides wider distribution of spotted owl populations and increases genetic exchange between populations in LSRs. Four 100 acre spotted owl core areas (that are managed as LSRs under the NFP) are located within the boundary of the Deer Lake project. Another spotted owl nest site is present in the project that does not have a designated nest core. Two additional spotted owl core areas are located adjacent to the project area.

There are approximately 3,854 acres of suitable spotted owl habitat and 782 acres of dispersal habitat on federally managed lands within the project area boundary. Suitable habitat includes nesting, roosting or foraging habitat and generally has the following attributes: high degree of canopy closure (approx. 60%+), multilayered canopy, presence of large snags and coarse woody debris. Dispersal habitat provides spotted owls some degree of protection from predators during juvenile dispersal and other movements, and generally has the following attributes: conifer stands in the large pole or mature/old-growth stands with 40-60 percent canopy closure.

Special Status Species
For purposes of management action concerns, species are recognized as "special status" if they are federally listed as Threatened or Endangered, proposed for federal listing as Threatened or Endangered, or if they are a BLM sensitive or assessment species. BLM policy is to manage for the conservation of these species and their habitat so as not to contribute to the need to list and to recover these species. Fourteen special status wildlife species are known or suspected to be present in the Deer Lake project area (Appendix F).

Survey and Manage/ Protection Buffer Species
The amended NFP Supplemental EIS ROD, Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, January 2001, provides extra protection for some species through Survey and Manage (S&M) standards and guidelines. The proposed project area was surveyed for the following S&M species: great gray owls *(Strix nebulosa)*, and 3 species of terrestrial molluscs (*Helminthoglypta hertleini, Monadenia chaceana, and Trilobopsis tehamana*). These surveys identified two nest sites for great gray owls and no mollusc species.

Connectivity
Connectivity refers to landscape-scale, interconnected forest areas that provide continuous forest habitat for wildlife species movement. Some of the species dependent on connectivity include special status species, game species, and invertebrates. Many forest species either cannot, or are reluctant to, move through large openings. This movement of individuals is essential to the prevention of genetic isolation.

Within the project area itself, 66 percent of the acres capable of supporting forest growth (3,854) are considered late successional. These forest stands provide a connected landscape of suitable nesting and foraging habitat for spotted owls and other late-successional dependent species and serve as internal travel corridors and habitat areas within the project area while providing connectivity to the larger landscape outside of the project area. There is an extensive system of riparian areas within the project area which many species use for habitat and travel.

Landscape
An overview of the landscape beyond the project area, reveals a large LSR to the east, consisting of 52,980 acres in the Rogue River and Winema National Forests. The LSR provides a connectivity link between the project area and other larger tracts of late successional forests. There are several sections of private industrial timber land within the project area and in the surrounding landscape. These sections have been heavily logged, resulting in a checkerboard pattern of forest fragmentation within the project area.

BOTANY
Bureau Special Status Species
All of the proposed activity areas were surveyed for Bureau Special Status and Survey and Manage vascular plants as well as the federally listed *Fritillaria gentneri*. Surveys were conducted by qualified botany contractors over a time period extending from 1996 through 1999. Surveys documented 44 occurrences for 8 species (Appendix G, Table G-1).

Cimcifuga elata occurs in moist areas in coniferous forests and is shade tolerant, but also appears to respond favorably to additional sunlight. *Cypripedium fasciculatum* occurs in a variety of habitats (most frequently on steep slopes at mid elevations) all of which seem to have a filtered light condition in common and. It is most often associated with Douglas fir and is usually tucked under some type of hardwood tree or senescent shrub such as manzanita, in areas with relatively little competition from other understory plants. *Cypripedium montanum* occurs in moist woods below 5000 ft elevation in mixed evergreen and yellow pine forests. *Plagiobotrys glyptocarpus* occurs in grasslands, foothill woodlands and moist places below 2000 ft. elevation. *Scirpus pendulus* occurs in marshes, wet meadows, and ditches. *Perideridia howellii, Scribneria bolanderi,* and *Smilax californica* are Bureau "tracking" species and do not require mitigation.

Northwest Forest Plan Species
All of the proposed activity areas were surveyed for the presence of Survey and Manage fungi, lichens, and bryophytes in the spring and fall of 1998 and in the fall of 2000, in accordance with established protocols. Surveys documented 97 occurrences for seven species (Appendix G, Table G-2).

Buxbaumia viridis occurs on very well rotted logs (decay class three, four, and five) as well as peaty soil and humus, in coniferous forests, from low elevation to subalpine. On the Medford BLM District, it is usually associated with very moist drainages and typically occurs on north facing slopes under a canopy closure of 60% or greater. *Dendriscocaulon intricatulum* occurs in mixed conifer/ hardwood and oak-woodland communities. On the Medford BLM District it is most frequently observed on California Black Oak (*Quercus kelloggii*) stems less than 12" in diameter. The fruiting bodies of *Helvella maculata* occur in scattered to gregarious patches at low to mid elevations in both mixed conifer and hardwood forest. *Pithya vulgaris* is restricted to fruiting from detached twigs and down foliage of white fir and seldom occurs in stands less than 50 years of age. *Plectania milleri* occurs in mixed conifer forest at mid to

higher elevations. *Ramaria rubrievancescens* occurs in mixed conifer forest at mid to higher elevations. *Sarcosphaera coronaria (eximia)*occurs in mixed conifer forest at mid to higher elevations.

CHAPTER IV
ENVIRONMENTAL CONSEQUENCES

INTRODUCTION
This chapter forms the scientific and analytic basis for comparison of alternatives. Discussions include the environmental impacts of the alternatives and any adverse environmental effects which cannot be avoided should the proposal be implemented.

OVERVIEW
Alternative B proposes to harvest commercial timber from approximately 2,374 acres of federal land and build approximately 3.5 miles of road while decommissioning about 9 miles of road. If implemented, the proposed action would renovate and improve approximately 37 miles of existing road including the surfacing of about 20 miles of existing natural surface road. In addition to treating slash on harvested sites, the proposed action would conduct prescribed fuel treatments on approximately 623 acres of grass/brush fields and oak woodlands that currently have high amounts of natural fuels. The majority of actions would occur in a three year period after the contract begins.

Alternative C proposes to harvest commercial timber from approximately 2,374 acres of federal land. If implemented, the project would decommission approximately 8.5 miles of road, and renovate and improve approximately 36 miles of new roads, including the surfacing of about 20 miles of existing natural surface road. In addition to treating slash on harvested sites, the proposed action would conduct prescribed fuel treatments on approximately 623 acres of grass/brush fields and oak woodlands that currently have high amounts of natural fuels. The majority of actions would occur in a three year period after the contract begins.

FOREST HEALTH AND COMPOSITION
Alternative A
Direct and Indirect Effects

Under the no action alternative, forest stands would remain in an overstocked condition and individual tree vigor and growth would remain in decline. With no action, forest structure and species composition would not be maintained or enhanced. On historic pine sites, Douglas-fir would remain the most prevalent species. Old-growth trees surrounded by dense understories would continue to die from competition for water. Pine species and Douglas-fir would continue to decline in number from competition with white fir. Overall, forest diversity would decline with the loss of old-growth trees and perhaps some ecosystem functions.

No action would contradict the Medford District RMP and the Little Butte Creek WA forest condition objectives in regard to forest health. The plans state that management emphasis be placed on treatments that restore stand conditions and ecosystem productivity.

Cumulative Effects

Without density reduction, slow tree growth and poor vigor would result in individual tree and perhaps stand mortality. This could further reduce some ecosystem functions, including canopy closure, old growth trees and associated benefits, and limit short-term (up to 50 years) options for silvicultural management.

Pine species and Douglas-fir would continue to decrease in number if large openings are not created for these species. The more shade-tolerant white fir would continue to dominate the forest in the higher elevations.

Where dense forest stands persist overtime, canopy closure would remain at 90 to 100 percent. When tree mortality is singular or in small patches, canopy closure would be approximately 50 to 80 percent. Where large patches of trees die, canopy closure would be 0 to 40 percent. Fire hazard would increase

with the abundance of dead vegetation and ladder fuels.

Alternatives B and C

Direct and Indirect Effects

The proposed prescriptions to be applied across the forest landscape are based upon the present vegetation structure, species composition, aspect, and vegetation condition class to allow for the development of old-growth forest structure and species diversity over time. It is important to recognize that with or without management, the vegetation will be changing continuously because of natural succession. There is no single state of a forest that is the only natural state. The prescriptions associated with this project (Appendix B) would cultivate late-successional characteristics such as variable stand structure and more vigorous growth within the stands. Ten to forty years from now, most of the mature stands would be composed of trees larger than 20 inches diameter, although even-aged, mid-size stands without residual old-growth trees may still require an additional 150 years to develop mature/old-growth characteristics.

Through forest stand treatments, tree densities would be reduced allowing for improved individual tree vigor and growth, and forest health. The smallest diameter trees in each forest stand would be harvested, leaving the largest diameter trees. Average stand diameter would increase immediately after harvest. Post-treatment tree diameters in younger, large pole stands are projected to increase approximately 6 inches over 20 years (Appendix B, Table B-2). Growth responses in the mature stands may be less because of decreasing tree vigor associated with older stand age. Timber harvests designed to achieve project objectives would also allow hundreds of trees per acre to be utilized as wood products (Appendix B, Table B-3).

- Application of the mixed conifer prescription would increase the species composition of species such as Douglas-fir and pine species primarily through the removal of white fir.

- Application of the Douglas-fir Dwarf Mistletoe prescription would manage for the desired location of the parasite over a very long period of time. The rate of infection should also decrease with time.

- Application of the Pine prescription would assure that pine species remain the predominant species over time. Vertical (tree height) structure should also be enhanced, and stand diameter would increase with time.

Canopy closure would be more variable after treatment. On Douglas-fir sites, canopy closure would range from 50 to 60 percent. On mixed conifer sites canopy closure would range from 20 (in small patches) to 50 percent (in larger homogeneous patches). On pine sites canopy closure would range from 20 to 40 percent in a similar pattern. On Douglas-fir dwarf mistletoe sites, canopy closure would range from 30 to 40 percent. Regeneration harvest sites would have approximately 40 percent canopy closure.

Cumulative Effects

By utilizing various landscape prescriptions, future silvicultural options would increase. The prescriptions would also assure that drought resistant conifer species such as ponderosa pine and incense cedar would be present in future stands where appropriate in regard to site conditions.

If surrounding private lands are clearcut, BLM forest stands would be the only patches of forest left to provide late-successional habitat. Surrounding BLM lands would be managed with similar prescriptions to improve late-successional habitat. This would assure that forest stands are healthier on a larger landscape scale. Forest canopy closures would be in the range of natural variability but sometimes below canopy closures recommended for full hydrologic recovery in the transient snow zone. These small areas (less than 1-acre) of open canopy closure would grow to full hydrologic recovery as specified in the WA in approximately 10 to 30 years.

FIRE HAZARD

Alternative A

Direct, Indirect and Cumulative Effects

The current trend of increasing stand density which results in increased mortality to the timbered stands would continue. The transition from ponderosa pine stands to excessively dense Douglas-fir stands would also continue at the lower elevations within the project area. Trees growing under these conditions often become weakened and are highly susceptible to insect epidemics and tree pathogens. Younger trees (mostly conifers) contribute to stress and mortality of mature conifers and hardwoods.

Ladder and surface fuels would also increase within these stands. Increasing stand densities and fuel loadings would increase the chance that more acres would burn in high intensity fires within the project area. Fire fighter safety would continue to be an issue as well as the potential of resource damage.

The objectives of improving grasslands would not be achieved. Also, the restoration of shrublands and woodlands would not be achieved.

Alternatives B and C

Direct and Indirect Effects

The environmental consequences of Alternatives B and C are the same because the proposed fuel treatments are identical.

Recent studies have demonstrated the effectiveness of management activities designed to reduce fuel hazard and minimize the impacts of wildfire in areas with a fire regime historically characterized by frequent, low severity fires (Omi and Martinson 2002; Pollet and Omi 2002). Treatments that result in forests with a lower density and larger trees show lower potential for crown fire initiation and propagation and for less severe fire effects (Pollet and Omi 2002).

The proposed commercial thinning would reduce the overall density of the treated stands. These treatments would reduce some of the aerial fuels present in the stands. Some of the smaller diameter commercial trees that are proposed for harvest also act as ladder fuels. The combination of removing some of the aerial component as well as the ladder fuels would reduce the chance of sustaining a crown fire in these stands (Omi and Martinson 2002). Over time, the commercial thinning would also increase diameter growth of the residual stand. Larger diameter trees are more tolerant to surface fires so there would be less mortality to the stand in the event of a surface fire. The commercial thinning would also favor more fire tolerant species such as pine.

Treatment of noncommercial size material is also proposed for stands that are commercially thinned. By treating this material, ladder fuels in these stands would be reduced. The reduction of this material along with the treatment of surface fuels would reduce fire behavior such as flame length and fire duration. With the reduction of flame length and fire duration the chance of a crown fire initiating in these stands would be greatly reduced. Also, mortality of the smaller diameter conifers would be reduced. The reduction of flame length would also increase the chance that direct attack of a wildfire could occur which would reduce acres burned in the event of a wildfire.

Treatments designed to reduce canopy fuels through density management, increase and decrease fire hazard simultaneously. Slash generated from the commercial thinning of timber stands, if not treated, would create surface fuels that would be greater than current levels. It is anticipated that fuel loadings after commercial thinning would be increased by approximately 3-15 tons to the acre. With this change in fuel loading, higher rates of fire spread and greater flame lengths would occur. However, despite the temporary increase in ground fuels, recent research indicates that a reduction in crown fuels outweighs any increase in surface fire hazard (Omi and Martinson 2002).

The reduction in stand density under Alternatives B and C would make it possible to use prescribed fire

as a tool to further reduce fire hazard in these stands. Slash generated from commercial and non-commercial treatments would be treated on the majority of units proposed for harvest within two years after a unit is harvested. Treatments would take place where slash three inches in size and less exceeds 5 to 6 tons per acre. Treatments should ensure that under most climate conditions, flame lengths would be less than three feet allowing for direct attack of a wildfire.

The objectives of improving grasslands and the restoration of shrublands and oak woodlands would be achieved under these alternatives. The high fire hazard in these areas would also be greatly reduced.

Cumulative Effects
Several landscape projects within the Little Butte Creek Watershed are in various stages of planning. To date, the Indian Soda project has gone through the environmental analysis process and approximately 1,300 acres are proposed for treatment. The Conde Shell project proposes to treat an additional 2,500 acres. The Deer Lake project, in addition to these projects and others, would greatly reduce the existing fuel hazard within this watershed.

AIR QUALITY
Alternative A
Direct, Indirect and Cumulative Effects
A large wildfire is more likely under this alternative as fire hazard would continue to increase. Air quality would be impacted in the event of a large wildfire. Emissions from wildfires are significantly higher than from prescribed burning. The wildfires which occurred in southern Oregon in 1987 emitted as much particulate matter as all the burning that occurred within the state that year.

Alternatives B & C
Direct and Indirect and Cumulative Effects
There would be some smoke-related impacts from the prescribed burning proposed under these alternatives.

Prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan and the Visibility Protection Plan. Prescribed burning under alternatives B and C is not expected to effect visibility within the Crater Lake National and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Mountain Lakes) during the visibility protection period (July 1 to September 15). Prescribed burning is not routinely conducted during this period primarily due to the risk of an escape wildfire. Prescribed burning emissions, under the proposed action is not expected to adversely effect annual PM10 attainment within the Grants Pass, Klamath Falls, and Medford/Ashland non-attainment areas. Any smoke intrusions into these areas from prescribed burning are anticipated to be light and of short duration.

The greatest potential for impacts from smoke intrusions is to localized drainages within and adjacent to the project area. Underburning requires a low intensity burn that would not have the energy to lift the smoke away from the project site. Smoke retained on site could be transported into portions of non-attainment areas if it is not dispersed and diluted by anticipated weather conditions. Localized concentration of smoke in rural areas away from non-attainment areas may continue to occur during prescribed burning operations.

The prescribed burning proposed under each alternative would emit some carbon monoxide (CO), from 20 to 500 lb. per ton of fuel consumed. This would be a concern if there were other persistent large CO sources in the immediate vicinity. CO is such a reactive pollutant, however, that its impact is quickly dissipated by oxidation to carbon dioxide where emissions are moderate and irregular and there is no

atmospheric confinement. Burning also emits moderate amounts of volatile organic compounds and minor amounts of nitrogen oxides. These are precursors to formation of ground level ozone. Here, fire-related emissions may be seen as important only when other persistent and much larger pollution sources already cause substantial nonattainment of National Ambient Air Quality Standards.

Particulate matter smaller than 10 micrometers (PM 10) is a term used to describe airborne solid and liquid particles. Because of its small size, PM 10 readily lodges in the lungs, thus increasing levels of respiratory infections, cardiac disease, bronchitis, asthma, pneumonia, and emphysema. The fate of PM emissions from prescribed burning is twofold. Most (usually more than 60%) of the emissions are 'lifted" by convection into the atmosphere where they are dissipated by horizontal and downward dispersion. The "unlifted" balance of the emissions (less than 40%) remain in intermittent contact with the ground. This impact is dissipated by dispersion, surface wind turbulence and particle deposition on vegetation and the ground. The risk of impact on the human environment differs between the two portions of smoke plume.

The impacts of the lifted portion of smoke are generally not realized until the mechanisms of dispersal bring the dispersed smoke back to ground level. Because the smoke has already dispersed over a broad area, the intensity of ground-level exposure is minimal. The duration of exposure may include the better part of a day, however, and the area of exposure may be large. Unlike smoke aloft, the potential for ground level smoke to create a nuisance is immediate. This part of the smoke plume does not have enough heat to rise into the atmosphere. It stays in intermittent contact with the human environment and turbulent surface winds move it erratically. Also in comparison to smoke aloft, human exposure is more intense, relatively brief (a few hours) and limited to a smaller area. Smoke aloft is already dispersed before it returns to the human environment while ground level smoke must dissipate within that environment. Dissipation of ground level smoke is accomplished through dispersion and deposition of smoke particles on vegetation, soil and other objects.

Prescribed burning would be scheduled primarily during the period starting in January and ending in June. This treatment period minimizes the amount of smoke emissions by burning when duff and dead woody fuel have the highest moisture content, which reduces the amount of material actually burned. Smoke dispersal is easier to achieve due to the general weather conditions that occur at this time of year. Prescribed burning would not result in any long-term adverse cumulative effects to air quality.

SOILS

Alternative A

Direct, Indirect and Cumulative Effects

The effect of the no action alternative on the soil resource would be the continuance of existing high erosion and sediment rates coming from the existing roads throughout the watershed. Erosion rates would not be an increase as a result of timber harvest activities and prescribed fuel reduction treatments, but the risk that a high intensity wildfire would burn more acres in the watershed would continue to increase. A catastrophic fire of any appreciable size would increase erosion and sedimentation rates dramatically. The would be no increase in erosion rates short-term but no decrease in erosion and sedimentation rates long-term as a result of the no action alternative.

Alternative B

Direct and Indirect Effects

The commercial timber harvest activities planned in Alternative B would disturb about eight to ten percent of the ground in the harvest area. Approximately 1,022 acres would be tractor logged using designated skid trails, 739 acres would be skyline-cable logged using partial suspension, and 613 acres would be yarded off site with a helicopter. All of the slash created by the logging would be treated to

reduce the total fuel loading on-site. The units tractor logged would result in approximately twelve percent of those units in skid trails. Studies have shown that in the western United States, tractor and ground-cable systems average about 10 percent of the area affected by roads to support harvest operations, and skyline-cable and helicopter operations average 2 percent (Megahan, 1988b). Erosion rates would increase moderately in the tractor units where the soil is disturbed and slightly in the cable or helicopter units. Although erosion rates would increase, most soil particles would remain on-site and soil particles reaching the waterways would increase slightly over the first few years after harvests then return to near normal rates.

Broadcast burning associated with the fuel treatments would have a moderate effect on the soil. Broadcast burning increases the amount of mineral soil exposed by a varying amount, depending on the depth and consumption of the forest floor. Additional soil exposure, beyond that due to logging, can be as little as eight percent or over forty percent. As the broadcast burning will be an underburn, the intensity of the burn would be moderate to light and have little direct effect on soil properties. A light surface fire will generally only char the litter, leaving most of the mineral soil at least partially covered. Most soil movement occurs during the first season after the slash is burned and quickly diminishes as vegetation cover re-establishes. Soil productivity would experience a slight negative decrease short-term but long-term positive effects would be realized from the proposed actions as the risk of catastrophic fire is diminished. Piled slash burns hotter than broadcast slash, increasing consumption of organic matter and nutrient losses. High soil temperatures generated under burning piles (typically, about 3-5% of the harvested area) severely and negatively effect soil properties by physically changing soil texture and structure and reducing nutrient content.

Disturbance associated with roads would have the greatest impact on the soil resource as approximately four acres of land is disturbed and taken out of vegetation production for every one mile of road constructed. Roads affect geomorphic processes by four primary mechanisms: accelerating erosion from the road surface and prism itself by both mass and surface erosion processes; directly affecting channel structure and geometry; altering surface flowpaths, leading to diversion or extension of channels onto previously unchannelized portions of the landscape; and causing interactions among water, sediment, and woody debris at engineered road-stream crossings.

New road construction, both permanent (2.2 miles) and temporary (1.3 miles), would be located on or near ridgetops in stable areas, thus minimizing the likelihood of disturbed soil reaching stream channels. Roads in ridgetop positions may have a small effect on the drainage network by initiating new channels or extending the existing drainage network. The newly constructed roads may decrease the critical source area required to initiate headwater streams by concentrating runoff along an impervious surface. Although concentrated road runoff channeled in roadside ditches can extend the channel network by eroding gullies or intermittent channels on hillslopes, the probability of this occurring is low as new roads are designed to be outsloped.

Increased sediment delivery to streams after road building has been well documented in the research literature in the Pacific Northwest and Idaho (Bilby and others 1989, Donald and others 1996, Megahan and Kidd 1972, Reid and Dunne 1984, Rothacher 1971, Sullivan and Duncan 1981). The largest sediment losses occur during road building and before exposed soils are protected by re-vegetation, surfacing, or erosion control materials. After construction, surface erosion from road surfaces, cutbanks, and ditches represents the dominant source of road-related sediment input to streams.

The *Water Erosion Prediction Project* (WEPP) model was used to estimate the sediment production from proposed road construction and renovation for this project. The WEPP model is a physically-based soil erosion model that provides estimates of soil erosion and sediment yield considering specific soil,

climate, ground cover, and topographic conditions. As with any erosion model, predicted erosion or sediment values are, at best, within plus or minus fifty percent of the true value. For this reason, the values listed are relative indicators of effects and are presented for comparative purposes and are no way portrayed as absolute values.

The WEPP model results indicate that the proposed new road construction would produce nearly one ton of sediments annually over a ten year period. Improving road cross drains and surfacing existing roads (proposed in this alternative) would decrease sediment yields by approximately thirty tons annually over the ten years. Improving the stream crossing on Lost Creek (T.37S.,R2E.,Section 22) will decrease sediments yielded annually by over ninety-five percent. Decommissioning of approximately nine miles of road would decrease sediment yields to near natural rates within the ten year period. There would be a slight short-term increase in sediments yielded to local streams the first few rain events after road work is completed. A long-term decrease in sediment production associated with the roads in Lost Creek and Deer Creek would result from the project as erosion rates on decommissioned roads lower to near natural levels. The surfacing of about 20 miles of existing natural surface road will help in reducing sediments reaching Lost Creek and Deer Creek.

Cumulative Effects

The cumulative effects to the soil resource in the affected South Fork Little Butte Creek analysis area would be a moderate short-term increase in erosion rates which would last about three to five years. A slight long-term decrease in erosion rates would occur as the affected harvest units re-establish ground cover, land that was once occupied by roads are put back into producing vegetation (ground cover), and the risk of catastrophic wildfire is reduced. The watersheds would continue to experience high erosion rates long-term as a result of the high road density per square miles and slight erosion rates due to harvesting timber and prescribed burning.

Alternative C

Direct, Indirect and Cumulative Effects

The effects of this proposal on the soil resource would be similar to those of Alternative B except there would be no increase in erosion and sedimentation as a result of building 3.5 miles of road (approximately one ton per year). The sedimentation rate decrease as a result of upgrading the stream crossing on Lost Creek (T.37S.,R2E.,Section 22) would not occur and this area would continue to yield 20 to 30 tons of sediments annually into Lost Creek. Cumulative effects to the soil resource in the South Fork Little Butte Watershed would be slightly less than Alternative B but, overall, the erosion rates would remain high long-term as a result of high road densities and slight erosion rates as a result of harvesting timber and prescribed burning.

WATER QUALITY, CHANNEL MORPHOLOGY, RIPARIAN, HYDROLOGY

BLM water quality policy common to all alternatives is in Appendix I.

Alternative A

Direct Effects

Alternative A would have no direct effect on designated beneficial uses or the 303(d) listed parameters in the project area. Alternative A would have no direct effects on stream channels, riparian vegetation, Riparian Reserves or streamflows in the project area.

Indirect Effects

Water Quality

Under Alternative A, there would be no indirect effect on flow or habitat modifications (303(d) listed parameters) in South Fork Little Butte Creek. Stream shade on BLM-administered lands would be

maintained in the short-term and increased in the long-term as riparian vegetation continued to grow. Management actions on private lands may still prevent stream temperatures from meeting the State water quality criteria. Beneficial uses sensitive to stream temperatures, such as cold water fish and other aquatic life, would not thrive under water temperatures that exceed the State criteria. Sediment input into South Fork Little Butte, Lost, and Deer Creeks would continue at the existing high rates in the short-term. In the long-term, continued fire suppression and lack of treatments designed to reduce fire hazard increase the increase the likelihood that more acres would burn in a high intensity fire within the project area. A severe intensity, catastrophic fire would result in levels of soil erosion and sedimentation that are higher than those existing. A catastrophic fire would likely eliminate stream shade which would result in increased water temperatures.

Channel Morphology

Short-term indirect effects to channel morphology would be the continued high percentage of actively eroding streambanks and lack of large wood. Long-term indirect effects of high sedimentation levels would be increased sediment deposition resulting in wider and shallower channels that can lead to higher water temperatures (ODEQ 1999). Channels would continue to experience headcutting below roads with undersized culverts or inadequate energy dissipaters. Channel structure would improve in the long-term, as large wood becomes available. Recruitment would occur although at a slower rate than if dense young conifer stands were treated to enhance late-successional riparian conditions. A catastrophic fire would reduce potential future large wood recruitment and extend the time for trees to become down large wood in stream channels.

Riparian

In the short-term, riparian conditions would be maintained on BLM-administered lands within the project area. Over the long-term, riparian vegetation would increase in size, although the growth rate would not be as fast as under natural conditions due to overly-dense stands. Riparian vegetation would eventually achieve late-successional characteristics and provide habitat and large wood recruitment. A high intensity fire in riparian areas would set back riparian recovery by at least 20-30 years. Continued accelerated streambank erosion and sedimentation would likely limit some riparian areas from achieving proper functioning condition.

Hydrology/Streamflow

High road densities in the project area would continue to contribute to increased peak flow magnitudes and frequencies in Lost and Deer Creeks in both the short and long terms. In the short-term, the Upper Lost Creek drainage area would remain a potential risk for peak flow enhancement due to the high percent of transient snow zone that has less than 30% crown closure. In the long-term, this risk would be reduced as the forest stands grow and crowns reach closure. However, a catastrophic fire or continued timber harvesting on private lands in the transient snow zone could maintain or increase the risk of peak flow enhancement for all drainages in the project area.

Alternative B

Direct Effects

Water Quality

Alternative B would have no direct effect on flow or habitat modification (303(d) listed parameters in South Fork Little Butte Creek) or on stream temperature (303(d) listed parameter in South Fork Little Butte and Lost Creeks). Shade on perennial streams would be maintained with all vegetation treatments in both commercial and non-commercial areas and proposed road work.

Alternative B would have a direct effect on sedimentation in Lost and Deer Creeks, but not on South Fork Little Butte Creek. Localized, short-term (limited duration) turbidity/sediment increases in Lost and Deer Creeks would occur due to the ford reconstruction in Lost Creek (Appendix H), removal of two

Deer Creek road crossings, and two stream crossing culvert replacements, one on Lost Creek and one on Deer Creek. These streams would be diverted around the work area and instream work would occur during the summer when streamflows are low. Movement of sediment downstream from the work sites would be minimized through the use of materials such as straw bales immediately downstream of the work area. Any turbidity/sediment increases during the instream work period would be very small and only observable in the immediate vicinity of the work site.

Channel Morphology
Under Alternative B, direct effects on channel morphology would occur where road stream crossings are removed in the project area. Stream channels at these locations would be immediately reconnected to the floodplain and the channel bottoms would change from metal pipes to natural material substrates.

Riparian
Alternative B implements the interim Riparian Reserve widths for streams and lakes as directed in the Medford District RMP and recommended Riparian Reserve widths for wetlands, springs, and unstable areas from the Little Butte Creek WA (USDI and USDA 1997). Riparian Reserve widths would range from 320 to 400 feet on each side of fish-bearing streams; from 160 to 200 feet on each side of perennial nonfish-bearing streams; from 140 to 200 feet on each side of intermittent nonfish-bearing streams; from 320 to 400 feet around lakes, ponds, and impoundments; from 100 to 180 feet around wetlands, and 100 feet around springs. Unstable and potentially unstable areas would be in Riparian Reserves as well as from 200 feet above the unstable area to the bottom and 75 feet along the sides.

New permanent road construction would cut across about 300 feet of Riparian Reserve on an intermittent stream. Commercial timber harvest would not occur within Riparian Reserves and therefore would have no direct effects on Riparian Reserves. Pre-commercial thinning would occur in Riparian Reserves, but only as needed to promote late-successional characteristics. Riparian vegetation providing stream shade or channel stability would not be cut. Direct effects of pre-commercial thinning would include a reduction in stand density. Project design features (Appendix C) for fuel treatments would minimize direct effects to Riparian Reserves from underburning prescriptions and to riparian vegetation from slashing and handpiling prescriptions. Direct effects of Alternative B fuel treatments on Riparian Reserves would be less than would occur under a natural fire regime. Implementation of Alternative B would not have a direct effect on the functioning condition of the riparian areas.

Hydrology/Streamflow
Alternative B would have no direct effects on the streamflow regime in the project area.

Indirect Effects
Water Quality
Alternative B would have no indirect effect on flow and habitat modification in South Fork Little Butte Creek or on stream temperature in South Fork Little Butte and Lost Creeks. Management activities proposed under Alternative B that could have an indirect effect on sedimentation in South Fork Little Butte, Lost, and Deer Creeks include commercial harvest, pre-commercial thinning, fuel treatments, road work, and log hauling. The potential for sediment from the commercial harvest units to reach stream channels is very low due to the BMPs (Appendix C) such as no harvest or yarding in Riparian Reserves and waterbarring skid trails. Pre-commercial thinning would not have any effect on erosion rates or sedimentation in the project area. Sedimentation resulting from proposed fuel treatments in commercial and non-commercial units would be negligible (see Soils).

The road construction, renovation, and decommissioning proposed under Alternative B would have the greatest likelihood of having indirect effects on sedimentation in South Fork Little Butte, Lost, and Deer

Creeks. The primary sediment source would be from on-site soil disturbance caused by installing, replacing, or removing drainage crossings. All road work would be done during the dry season to minimize sediment delivery to streams. Timing of road operations would reduce the amount of sediment entering streams at one time; new road construction and renovation would occur during the first year of the contract while the decommissioning would occur the last year of the contract, two years later.

New road construction, both permanent (2.2 miles) and temporary (1.3 miles), would be outsloped and located on or near ridgetops in stable areas, thus minimizing the likelihood of disturbed soil reaching stream channels (see Soils). There would be three new permanent drainage crossings (one on an intermittent channel and two on the same dry draw) and one temporary crossing on a dry draw. These three drainages are tributaries to South Fork Little Butte Creek. Culvert placement in these drainageways would disturb the soil and potentially result in sediment moving downstream. The risk of sediment moving out of the dry draws is very low. The crossing on the intermittent channel would be over 0.8 mile away from South Fork Little Butte Creek. The proposed road crossing would be located across the upper reach of this small channel, where bankfull widths are between 2.0 and 3.5 feet and maximum bankfull depths range from 0.2 to 0.4 feet. It is highly unlikely that any sediment entering the intermittent stream as a result of the road crossing would reach South Fork Little Butte Creek. If any sediment from the proposed road crossing did reach South Fork Little Butte Creek the amount would be negligible compared to background levels in South Fork. The temporary road would be obliterated at the end of the contract and once vegetation is reestablished there would be no additional potential for erosion.

One short (0.2 mile) segment of the temporary road construction would be located in the Lake Creek drainage. Lake Creek is a tributary to Little Butte Creek just downstream of the North/South Forks confluence. It is water quality limited for habitat modification, stream temperature, and sedimentation. This temporary road segment would be on a ridgetop and would not enter any Riparian Reserves or have any stream or dry draw crossings. Project design features would prevent any sediment from reaching streams in the Lake Creek drainage.

Replacement of approximately 12 stream crossing culverts (7 in the Lost Creek drainage and 5 in the Deer Creek drainage area) under the proposed road renovation would temporarily increase sediment movement into stream channels. The primary delivery mechanisms are slough at the inlet and outlet from both removal and replacement of the fill material. The amount of sediment delivered to the streams from culvert replacement would be very small. Sediment delivery to streams from the proposed road renovation would be localized and of limited duration. A local sediment pulse would most likely occur during storm events that occur the first fall/winter following renovation work. The timing of this sediment pulse would coincide with normal high turbidity levels and the sediment from the proposed project would not be discernible above background levels. This sediment would be transported out of the Lost and Deer Creek stream systems during the first bankfull flow event following the road renovation, which would occur prior to the decommissioning work.

Soil disturbance in stream channels would also occur during removal of 31 (9 on perennial streams, 15 on intermittent streams, and 7 on dry draws) existing road crossings. The majority (28) of the crossings to be decommissioned are in the Lost and Deer Creek drainage areas (15 and 13 respectively). The primary sediment delivery mechanism resulting from culvert removal would be streambank erosion during bankfull flows following completion of the instream work. Removing fill material to the extent of the bankfull width, pulling back side slopes to the natural slope, and mulching the streambanks are project BMPs (Appendix C) that would minimize the potential for streambank erosion. Sediment amounts transported downstream from culvert removal sites would be small and not discernible above normal bankfull sediment levels. Streambank erosion resulting from culvert removals would continue to occur

during successive bankfull events until bank vegetation becomes sufficiently established to protect the banks. It could take up to two winters for streambanks to stabilize after culvert removals.

It is highly unlikely that sediment from the proposed project would contribute to increased embeddedness in the fish-bearing portions of Lost or Deer Creeks. Short-term sediment increases in Lost and Deer Creeks from direct and indirect effects would eventually be transported downstream to South Fork Little Butte Creek during high streamflows. Any sediment increases in South Fork Little Butte Creek that result from the proposed project would be minute and not discernible from current sediment levels.

Short-term sedimentation as a result of log truck travel on roads in the project area would be minimal due to seasonal hauling restrictions (Appendix C) and proposed road surfacing.

Over the long-term, sedimentation in Lost and Deer Creeks would decrease due to road decommissioning and renovation, and the stabilization of an actively eroding landslide in the Deer Creek drainage area. Sediment delivery to Lost Creek from the existing stream ford would be greatly reduced by the proposed concrete reinforced crossing with paved approaches (Appendix H and Soils section). Road renovation on 20.4 miles of BLM-controlled roads and 16.3 miles of private-controlled roads would have a positive long-term effect on stream sedimentation in the project area.

Channel Morphology
Under Alternative B, road decommissioning at stream crossings would remove culverts and allow channels to return to their natural form. Road drainage improvements would reduce the amount of channel downcutting and streambank erosion that is occuring at culvert outlets. Pre-commercial thinning in Riparian Reserves would allow trees to attain late-successional characteristics sooner than if left in an unnatural, overly-dense condition. Large wood recruitment to stream channels would follow.

Riparian
Under Alternative B, pre-commercial thinning within Riparian Reserves would allow trees to attain late-successional characteristics sooner than if left in an unnatural, overly-dense condition. In the long-term, increased stand structure and diversity would lead to improved habitat conditions within treated Riparian Reserves. Treatment of overly-dense vegetation in the uplands and Riparian Reserves would reduce the likelihood that a high intensity fire would destroy the riparian areas. Riparian connectivity would be enhanced with the decommissioning and seeding and/or planting of 3.0 road miles within Riparian Reserves. The percent of riparian areas currently assessed as nonfunctional or functional-at-risk with a downward trend would be expected to decrease in the long-term, as riparian and watershed conditions improve.

Hydrology/Streamflow
Alternative B would indirectly effect streamflows in the project area as a result of changes in road drainage, road density, and vegetative cover. Road renovation under Alternative B is proposed for 37 miles. Drainage improvements would include adding cross drains and replacing under-sized culverts. Reducing the distance between drainage structures would decrease the rapid, concentrated routing of water to streams during storm events. Properly sized culverts would reduce the potential for plugging and subsequent "blow-outs" that could move large amounts of road fill into stream channels. Replacing "shot-gun" culverts would reduce downstream headcutting and channel erosion.

Road decommissioning would disconnect 9.0 road miles from the hydrologic network. Subsurface flows would no longer be intercepted and routed down ditchlines, thus reducing the magnitude of peak flows.

Under Alternative B, soil compaction from yarding would occur on less than one percent of the project

area. Project design features such as no yarding in Riparian Reserves, waterbarring tractor skid trails, and avoiding tractor skid trails on slopes over 35 percent, would prevent surface flow from traveling very far down skid trails or reaching stream channels. The risk of increased magnitude or frequency of peak flows as a result of soil compaction from proposed tractor skid trails would be very low.

Changes in road density and the percent of each drainage area that has forested stands less than 30 years old are analyzed for Alternative B and the Forest Service method (Chapter 3, Upland Conditions Affecting Streamflows) is used to assess the effect on the watershed risk rating for each drainage area. Road density in the project area would decrease from 4.0 to 3.8 miles per square mile after decommissioning 9.0 road miles, constructing 3.5 road miles, and obliterating 1.3 of the 3.5 newly constructed road miles. Road densities would be most reduced in drainage areas currently having the highest road densities, LB 0621 (Deer Creek), LB 0627 (Upper Lost Creek), and LB 0633 (Charley Creek) (Appendix I, Table 1). These drainage areas would be most likely to experience a reduction in frequency and/or magnitude of peak flows due to road decommissioning. There would be 4.1 road miles decommissioned in the transient snow zone, primarily in these same three drainage areas. Two drainage areas would incur slight increases in road density, from 4.03 to 4.09 miles per square mile for LB 0624 (South Fork Little Butte 1) and from 3.0 to 3.2 miles per square mile for LB 0630 (Middle Lost Creek). The percent of forested stands less than 30 years old would increase a small amount for all drainage areas under Alternative B (Appendix I, Table 1). Openings resulting from Alternative B are analyzed using a worst case scenario, where all pine and mistletoe stands in the transient snow zone would be harvested under the 30 percent canopy closure prescription and those in the rainfall zone would be harvested under the 20 percent canopy closure prescription. In actuality, pine and mistletoe harvest would range from 30 to 50 percent in the transient snow zone and from 20 to 50 percent in the rainfall zone. The watershed risk rating for each drainage area would remain the same as existing.

Lost Creek drainage (LB 0627, LB 0630, LB 0633, and LB 0636) has an existing road density of 4.3 miles per square mile and would change to 4.0 miles per square mile under Alternative B.

The risk of peak flow enhancement from the transient snow zone is assessed using the method described in the *Oregon Watershed Assessment Manual* (Watershed Professionals Network 1999). Drainage areas with less than 25 percent of their area in transient snow zone (LB 0624, LB 0636, and LB 0639) are not assessed. Harvest in the transient snow zone is restricted to no less than 30 percent crown closure in the transient snow zone and would result in no change to the existing risk of peak flow enhancement in all drainage areas (Table 3-7).

Alternative C

Direct Effects

Alternative C would have the same direct effects on water quality as Alternative B except there would be no sediment added to Lost Creek due to the ford reconstruction on private land. High sediment input from the existing ford crossing would continue.

Alternative C would have the same direct effects as Alternative B on channel morphology in the project area. Alternative C would have the same direct effects on Riparian Reserves and areas as Alternative B, except no new road would be constructed in a Riparian Reserve. Alternative C would have no direct effects on the streamflow regime in the project area.

Indirect Effects

Alternative C would have the same indirect effects on water quality as Alternative B, except with no new road construction there would be less potential for additional sedimentation in Lost Creek and the unnamed tributaries of South Fork Little Butte Creek.

Alternative C would have the same indirect effects on channel morphology as Alternative B.

Alternative C would have the same indirect effects on Riparian Reserves and areas as Alternative B, except 2.6 road miles would be decommissioned within Riparian Reserves.

Alternative C would have the same indirect effects on the streamflow regime in the project area as Alternative B. Overall road density in the project area would be the same as under Alternative B. Under Alternative C, road densities in drainage areas LB 0624 and LB 0639 would be unchanged, road densities in drainage areas LB 0621, LB 0627, and LB 0633 would be the same as under Alternative B, and road densities in LB 0630 and LB 0636 would be slightly reduced (Appendix I, Table 2). The percent of forested stands less than 30 years old would be the same as under Alternative B (Appendix I, Table 2). The watershed risk rating for each drainage area would remain the same as existing.

Lost Creek drainage (LB 0627, LB 0630, LB 0633, and LB 0636) has an existing road density of 4.3 miles per square mile and would change to 3.9 mi./sq. mi. under Alternative C.

Table 4-3. Water Quality, Channel Morphology, Riparian, and Hydrology/Streamflow Effects: Summary by Alternative

Resource	Alternative A		Alternative B		Alternative C	
	Short Term	Long Term[1]	Short Term	Long Term	Short Term	Long Term
Water Quality for 303(d) Listed Streams						
Flow modification	NE	NE	NE	NE	NE	NE
Habitat modification	NE	NE	NE	NE	NE	NE
Stream temperature	NE	BE/MAE	NE	BE	NE	BE
Sedimentation	NE	NE/HAE	LAE	BE	LAE	BE
Channel Morphology						
Width-to-depth ratio	NE	MAE	LAE	BE	LAE	BE
Channel structure (large wood)	NE	BE/MAE	NE	BE	NE	BE
Riparian	NE	BE/MAE	LAE	BE	NE	BE
Hydrology/Streamflow	NE	BE/MAE	NE	BE	NE	BE

Key: NE = no effect (i.e. no change from existing conditions); BE = beneficial effect; LAE = low adverse effect; MAE = moderate adverse effect; HAE = high adverse effect

1/ Potential long-term effects under Alternative A include a high risk for a catastrophic fire. Long-term effects are shown for no major fire followed by a '/' and then for effects resulting from a major fire.

Watershed Cumulative Effects

For the watershed cumulative effects analysis, the direct and indirect effects that result from the alternatives are considered with past, present, and reasonably foreseeable future forest management actions in the project area and at the larger scale. Past management actions are incorporated in the existing condition analysis. Chapter 3 of this E.A. describes the existing watershed conditions for the project area and the 1997 Little Butte Creek WA describes the existing watershed condition for the North and South Forks Little Butte Creek and the entire 5th level watershed. Present *federal* actions include BLM and USFS actions that have occurred since completion of the WA and reasonably foreseeable

future *federal* actions are known upcoming BLM and USFS projects. For present and reasonably foreseeable future management actions on private timber lands, it is assumed that all merchantable timber stands would be clearcut. Because the existing road density on private timber lands is fairly high, it is assumed that no new roads would be built on private lands in the reasonably foreseeable future.

Project Area

There are no Forest Service-administered lands in the project area, therefore the only foreseeable future actions would be those proposed for BLM-administered lands as part of the Deer Lake project (Alternatives B and C) and those projected for private lands. Private land harvest projections are based on analysis of the 2001 aerial photos.

Alternative A

Under Alternative A, the cumulative watershed risk rating (based on road densities and the percent of the drainage area with forested stands less than 30 years old) would continue to be high for all drainage areas except the area previously rated as low (Appendix I, Table 3). Projected road densities would remain the same. Based on projections assumed for harvest on private land, the percent of drainage area with stands less than 30 years old would increase in all drainage areas except one, which would remain the same. The cumulative watershed risk rating for Lost Creek would remain high.

Cumulative effects would not change the risk of peak flow enhancement in the project area according to the *Oregon Watershed Assessment Manual* method which analyzes the cumulative percent of transient snow zone area with less than 30 percent crown closure. The Upper Lost Creek drainage area would still have a potential risk for peak flow enhancement, while the other drainage areas would continue to have a low risk (Appendix I, Table 4). The Lost Creek drainage as a whole would maintain a low risk of peak flow enhancement.

Alternative B

Under Alternative B, the cumulative watershed risk rating (based on road densities and the percent of the drainage area with forested stands less than 30 years old) would continue to be high for all drainage areas except the area previously rated as low (Appendix I, Table 5). Projected road densities would be the same as for the indirect effects under Alternative B. Based on proposed harvest under Alternative B and projections assumed for harvest on private land, the percent of drainage area with stands less than 30 years old would increase in all drainage areas except one, which would remain the same (Appendix I, Table 5). The cumulative watershed risk rating for the Lost Creek drainage would remain high.

The cumulative percent of transient snow zone area with less than 30 percent crown closure would be the same as for Alternative A (Appendix I, Table 4). Cumulative effects under Alternative B would not change the risk of peak flow enhancement in the project area according to the *Oregon Watershed Assessment Manual* method. The Upper Lost Creek drainage area would still have a potential risk for peak flow enhancement, while the other drainage areas would have a low risk.

Alternative C

Under Alternative C, the cumulative watershed risk rating would remain high for all drainage areas except one, LB 0639, which would remain low. Projected road densities would be the same as the Hydrology/Streamflow indirect effects under Alternative C (Appendix I, Table 2) and the cumulative percent of drainage area with stands less than 30 years old would be the same as for Alternative B (Appendix I, Table 5). Cumulative effects on the risk of peak flow enhancement in the project area according to the *Oregon Watershed Assessment Manual* method would be the same as for Alternative B.

Cumulative Effects Outside the Project Area

Areas analyzed for watershed cumulative effects outside the project area include: South Fork Little Butte Creek analysis area, South Fork/North Fork Little Butte Creek Key Watershed, and Little Butte Creek Watershed (5th level hydrologic unit). For the Deer Lake project, only Alternative B is analyzed for cumulative watershed effects outside the project area since project level effects become diluted at the larger scale and effects of Alternative A and C would be less than Alternative B. Vegetation information for private forest lands was derived from the 1993 Western Oregon Digital Image Processing (WODIP) satellite imagery data. For analysis purposes, it is assumed that the total acres of merchantable timber obtained from the WODIP data have either been harvested since 1993 or will be harvested in the foreseeable future.

South Fork Little Butte Creek Analysis Area

Present and reasonably foreseeable future harvest on federal lands in the South Fork Little Butte Creek analysis area would occur only on BLM-administered lands and would cover approximately 7 percent of the area (Appendix I, Table 6). Treatments proposed would result in canopy closures that range from 20 to 50 percent, which along with Best Management Practices and Riparian Reserves would minimize adverse affects on hydrologic processes in the analysis area.

The estimated present and foreseeable future harvest from private lands would be 7 percent of the South Fork Little Butte Creek analysis area. Present and foreseeable future federal land harvest combined with projected private land harvest would total 14 percent of the South Fork Little Butte Creek analysis area.

Present and reasonably foreseeable future road construction and decommissioning on federal lands in South Fork Little Butte Creek analysis area would result in a net decrease of 17.9 miles (Appendix I, Table 7).

The Forest Service has decommissioned 52.9 miles of road in the South Fork Little Butte Creek analysis area from 1989 to 2000 and the BLM decommissioned 1.6 miles in 1994. The cumulative road density for South Fork Little Butte Creek would be 3.2 miles/sq. mile. This would be a reduction of 0.1 mi./sq. mi. from the existing road density.

South Fork/North Fork Little Butte Creek Tier 1 Key Watershed

Present and reasonably foreseeable future management actions on federal lands in the Key Watershed would occur on BLM-administered lands in two resource areas and on Forest Service-administered lands in one ranger district (Appendix I, Tables 8,9). These management actions would include timber harvest in approximately 6 percent of the Key Watershed (Appendix I, Table 8). Proposed treatments would result in canopy closures that range from 10 to 70 percent, with only 45 acres (less than one percent of the proposed harvest area) at the 10-15 percent level and the remainder above 20 percent. These proposed harvest prescriptions in addition to Best Management Practices and Riparian Reserves would minimize adverse affects on hydrologic processes in the Key Watershed.

The estimated foreseeable future harvest from private lands would be approximately 6 percent of the Key Watershed. Present and foreseeable future federal land harvest combined with projected private land harvest would total 12 percent of the Key Watershed.

Present and reasonably foreseeable future road construction and decommissioning on federal lands in the South Fork/North Fork Little Butte Creek Key Watershed would result in a net decrease of 20.6 miles (Appendix I, Table 9).

The Forest Service has decommissioned 68.9 miles of road in the South Fork/North Fork Little Butte Creek Key Watershed from 1989 to 2000 and the BLM decommissioned 1.6 miles in 1994. The

cumulative road density for the Key Watershed would be 3.1 miles/sq. mile. This would be a reduction of 0.1 mi./sq. mi. from the existing road density.

Little Butte Creek Watershed

Present and reasonably foreseeable future management actions on federal lands in the Little Butte Creek Watershed would include the management actions in the Key Watershed in addition to those projected for the watershed area from the mouth of Little Butte Creek to the North/South Forks confluence. These management actions would include timber harvest in approximately 6 percent of the Little Butte Creek Watershed (Appendix I, Table 10). Proposed treatments would maintain canopy closures that range from 10 to 70 percent, with only 101 acres (less than one percent of the proposed harvest area) at the 10-15 percent level and the remainder above 20 percent. These proposed harvest prescriptions in addition to Best Management Practices and Riparian Reserves would minimize adverse affects on hydrologic processes in the Little Butte Creek Watershed.

The estimated foreseeable future harvest from private lands would be approximately 6 percent of the Little Butte Creek Watershed. Present and foreseeable future federal land harvest combined with projected private land harvest would total 12 percent of the watershed.

Present and reasonably foreseeable future road construction and decommissioning on federal lands in the Little Butte Creek Watershed would result in a net decrease of 23.1 miles (Appendix I, Table 11).

The cumulative road density for the Little Butte Creek Watershed would be 2.9 miles/sq. mile. This would be a reduction of 0.1 mi./sq. mi. from the existing road density.

AQUATIC WILDLIFE

The Aquatic Conservation Strategy (ACS) was developed to restore and maintain ecological health of watersheds and aquatic ecosystems on public lands. The alternatives analyzed in this EA would meet the requirements of the Aquatic Conservation Strategy. The ACS consistency analysis is on file.

Alternative A

Direct, Indirect and Cumulative Effects

Alternative A would have no direct effect on fish or fish habitat. Under Alternative A, special funding for restoration work would be required and no BLM-funded road renovation would occur on private lands. Until funding for restoration became available, sediment input into South Fork Little Butte, Lost Creek and Deer Creeks would continue at the current high rates. These sediments would continue to settle in fish habitat, reducing the permeability of spawning gravels, filling in pools, and eliminating habitat for aquatic insects.

Riparian vegetation would continue to grow, although more slowly in areas with overly dense stands. Once the riparian vegetation reached late successional characteristics it would provide some large wood recruitment that is currently in short supply. Increased large wood would benefit fish by creating pools, providing cover for fish and other aquatic species, trapping sediment, and stabilizing banks during high flow events.

There would be an increased threat of a large, high intensity fire from the continued fire suppression and lack of silvicultural treatments in the project area. A catastrophic fire could lead to levels of soil erosion and sedimentation even higher than those existing, further damaging fish habitat. It could also eliminate stream shade and large wood recruitment.

Alternative B

Direct Effects

There could be impacts to steelhead, rainbow, or other aquatic wildlife in the immediate vicinity of the ford improvement on Lost Creek during construction. Timing of instream work (summer), screens while the water is being diverted, and minimizing sediment movement would limit the impacts to only a few fish.

Indirect Effects

Decommissioning, although reducing sediment in the long-term, can contribute sediment in the short-term. Excess sediment can eliminate habitat for aquatic insects, reduce the permeability of spawning gravels, fill in pools, and block the interchange of subsurface and surface waters. The largest sediment pulses occur during road building or decommissioning and before exposed soils are protected by re-vegetation, surfacing, or erosion control materials.

The road construction, renovation, and decommissioning proposed would have the greatest likelihood of having indirect effects on sedimentation in South Fork Little Butte, Lost, and Deer Creeks. The primary sediment source would be from on-site soil disturbance caused by installing, replacing, or removing drainage crossings. The amount of sediment delivered to the streams would be very small, localized and of limited duration. A local sediment pulse would most likely occur during storm events that occur the first fall/winter following renovation work. The timing of this sediment pulse would coincide with normal high turbidity levels and the sediment from the proposed project would not be discernible above background levels. This sediment would be transported out of the Lost and Deer Creek stream systems during the first bankfull flow event following the road renovation, thus having minimal impact on fish.

A localized, short-term (limited duration) turbidity/sediment increase would occur due to the ford reconstruction in Lost Creek. The stream would be diverted around the work area and instream work would occur during the summer when streamflows are low. Movement of sediment downstream from the work site would be minimized through the use of materials such as straw bales immediately downstream of the work area. Any turbidity/sediment increases during the instream work period would be very small and only observable in the immediate vicinity of the work site.

Although erosion rates would increase from commercial harvest, most soil particles would remain on-site and soil particles reaching the waterways would increase slightly over the first few years after harvests then return to near normal rates.

Pre-commercial thinning would not have any effect on erosion rates or sedimentation in the project area. Sedimentation resulting from proposed fuel treatments in commercial and non-commercial units would be negligible. Broadcast burning associated with the fuel treatments would have a negligible effect on sediments in the streams.

It is highly unlikely that sediment from the proposed project would contribute to increased embeddedness in fish bearing streams in the project area, including in coho Critical Habitat in Lost Creek or South Fork Little Butte Creek. Short-term sediment increases in Lost and Deer Creeks from direct and indirect effects would eventually be transported downstream to South Fork Little Butte Creek during high streamflows. Any sediment increases in South Fork Little Butte Creek that result from the proposed project would be minute and not discernible from current sediment levels.

Several features of Alternative B would have positive indirect effects on fish habitat. Decommissioning three miles of roads within Riparian Reserves would improve drainage networks and allow riparian corridors to become reestablished in these areas. Upgrading the Lost Creek ford to a concrete reinforced crossing would also benefit fish habitat by reducing the amount of sediment.

Over the long term, sediment yields within the project area are expected to decrease an estimated 30 tons annually over a ten year period due to the road decommissioning and renovation and the stream ford upgrade (see Soils). Over time, this would reduce the amount of fines in the substrate, thus improving fish habitat.

Precommercial thinning in Riparian Reserves would improve growth rates on a site specific scale. Once the riparian vegetation reached late successional characteristics it would improve large wood recruitment that is currently in short supply.

The proposed commercial harvest, precommercial and noncommercial thinning, and fuels treatments would reduce the possibility of a catastrophic fire. A large, high intensity fire could lead to levels of soil erosion and sedimentation even higher than those existing, and could also eliminate stream shade and large wood recruitment.

Alternative C
Direct Effects
There would be no direct impacts to fish in Alternative C.

Indirect Effects

Indirect effects of commercial harvest, precommercial thinning, and fuels treatments are the same as Alternative B.

Although there would be no new road construction in Alternative C, the road decommissioning would still result in a short-term increase of sediment described for Alternative B. The stream ford in Lost Creek would not be upgraded. The unimproved ford would continue to bleed sediments into Lost Creek at a rate estimated to be 20-30 tons annually (Soils report). Sediment yields within the project area are expected to decrease, but not as much as in Alternative B because of the unimproved ford.

Threatened and Endangered Aquatic Species and Essential Fish Habitat
This project is determined to be a "May Affect, Not Likely Adversely Affect (NLAA)" listed coho salmon, their Critical Habitat, or Essential Fish Habitat. The project is NLAA because project design features, Riparian Reserve stipulations and site conditions would ensure that there is a less than negligible chance of negatively affecting water quality for resident and anadromous fishes and other aquatic organisms. This project was submitted to the National Marine Fisheries Service (NMFS) in April and a Letter of Concurrence (LOC) is pending.

Table 4-4. Summary of the Effect of each Alternative on indicators relative to fisheries.

Issue	Alternative A	Alternative B	Alternative C
Effect of coho salmon	No change	Not Likely to Adversely Affect	Not Likely to Adversely Affect
Short-term sediment change	No change	Slight short-term increase	Slight short-term increase
Long-term sediment change	Remains at high current levels	Decrease of 30 tons per year	Decrease of 0-10 tons per year
Peak Flows	No change	No change	No change

WILDLIFE
Alternative A
Direct, Indirect, and Cumulative Effects
Since no projects are planned under this alternative, disturbances and vegetative succession would occur without the impact from forest management activities (except for fire suppression), and wildlife populations and distributions would change in response to these processes. Exclusion of natural fire regimes across the landscape would continue the trend toward loss of some plant communities within open pine, oak woodlands, and grasslands. Under this alternative, fire hazard would continue to increase, which increases the risk of a large catastrophic fire. A large scale loss of mature forests would result in adverse effects to those wildlife species that are associated with that habitat.

Alternative B
Direct and Indirect Effects
The general effects of timber harvest and fire management activities on wildlife/wildlife habitat are

discussed in BLM Medford District RMP, October 1994 Chapter 4, pages 51-65. The effects that are more site/drainage area specific are addressed further here.

Canopy Closure
Alternative B is designed to produce habitat conditions similar to what might be present if fires had not been suppressed in the past. In order to accomplish the objectives that have been established for Alternative B, existing habitat conditions would be modified on approximately 2,432 acres of commercial forest land and 623 acres of thinning in noncommercial size forest and fuels treatment. Most of the proposed treatments would reduce canopy closure, resulting in both negative and positive effects for wildlife species. Species associated with mid and late-successional conifer stands (e.g., northern spotted owl) would be negatively affected by reduced canopy closure. However, species preferring or adaptable to open canopies and/or early seral conditions such as the great horned owl and mountain quail, would benefit from the harvest since a reduction in canopy closure would stimulate growth of herbaceous and other early seral vegetation. Treatments designed to open the canopy of ponderosa pine stands would benefit some species such as western gray squirrels and acorn woodpeckers by restoring these stands to historic habitat conditions.

Road Construction
The primary concerns with new road construction in relation to wildlife are: 1) vehicle and human disturbance; 2) fragmentation of habitat; 3) increased loss of habitat; and 4) altered wildlife behavioral patterns and habitat use.

Road densities in the project and surrounding areas are high as identified in the Little Butte Creek WA (1997). Alternative B proposes to construct 2.2 miles of new roads and 1.3 miles of temporary roads. Based on an estimated 4 acres of permanent clearcut per mile of new road construction, the road construction that would occur under Alternative B would eliminate approximately 14 acres of the various habitat types present in the project area. Given the scale of the project, however, the quantity of habitat loss through road construction would be negligible.

The greater impact of the road construction on wildlife would be associated with the long-term vehicular and human disturbance that could occur if the roads remain open to use after harvest or if the proposed barricades/gates are breached on a regular basis. In this project, new road construction would take place well beyond existing gates or beyond roads that are not presently accessible due to natural blockages. The natural blockages would be replaced by a gate and barricades. Gates and other road barriers are sometimes vandalized or circumvented and roads may not remain blocked. Based on past experience, BLM gates receive the most vandalism when an existing road is blocked that has been used historically by the public. There is less liklihood of vandalism when newly constructed roads are blocked.

However, it is not safe to assume that the new roads will remain entirely inaccessible to vehicles. Even if the blocks/gates keep full sized vehicles out, off-highway vehicles (OHVs) and motorcycles would use them to access ridge tops and develop links to existing trails in the area. Vehicles using roads disturb wildlife and change behavioral patterns. Habitat within varying distances of roads is not used by wildlife to the extent it would be if the roads were not present.

Some of the new roads proposed for construction in Alternative B add roads to late-successional forest areas that are mostly unroaded. Approximately 0.5 mile of new road construction is proposed for the northwest portion of T37S, R2E, Sec. 27. Currently, this section is mostly inaccessible to vehicles, having only two private jeep roads and an irrigation canal coming in from the western edges of the section. This section has a spotted owl nest core and an historic goshawk nest site. The majority of the section is late-successional suitable spotted owl nesting habitat. Monitoring has shown the spotted owl

pair here uses habitat throughout this section. BLM manages all but 40 acres in this section. To the southeast, section 35 adjoins section 27. Four hundred acres of section 35 is designated as the Lost Lake Research Natural Area (RNA). This section also has a spotted owl core. A foot trail runs between Lost Lake in Section 35 and Section 27 following Lost Creek. Section 27 and the RNA portion of Section 35 have not been significantly disturbed by logging, roads, grazing, or recreation.

According to a recent study, the contributions of even small roadless areas such as the corridor of late-successional forest within the project can significantly add to overall landscape connectivity. The study notes that the importance of small roadless areas of approximately 1,000 acres becomes greater as more forests become fragmented (Strittholt & Dellasala 2001). Although the late-successional forest corridor in the project area has some roads and ownership is in a checkerboard pattern, adding new roads to these areas increases wildlife disturbance and adds to the cumulative effect of habitat fragmentation.

Under Alternatives B and C, a potential indirect impact to this area is the proposed renovation of a Boise road in T37S, R2E, Sec. 34 for a helicopter landing and haul road. Currently, this road is a less accessible jeep road. Improving this road would probably open the area to more people interested in visiting Lost Lake, potentially bringing more disturbance to this relatively isolated area.

Other areas proposed for road construction contain important deer and elk summer and winter range. The potential adverse effects of new road construction on deer and elk are increased harassment and poaching. In letters to BLM, the Oregon Deptartment of Fish and Wildlife (ODFW) notes that gates do not stop OHV traffic, such as ATV's and motorcycles. Once a road is built, vehicular disturbance and poaching is increased, even if the road is gated or blocked (ODFW, 2002).

Road Blocking/Decommissioning
Within this project area the BLM has approximately 18 miles of BLM-controlled roads that are located behind road blocks. At the completion of this project an additional seven miles of roads would be blocked resulting in more than a 50 percent closure of the miles of BLM roads within the project area. Road decommissioning is planned for nine miles of roads within this project. This would include blocking several existing roads with gates, ripping, and adding water bars to the road bed. This is expected to lessen the amount of human disturbance on these roads, which would have a positive effect on wildlife.

Threatened/Endangered Species, Northern Spotted Owl
There are five known spotted owl nest sites within the Deer Lake project.

Alternative B would modify approximately 1,897 acres of suitable northern spotted owl habitat (i.e., nesting/roosting/foraging habitat) and 341 acres of dispersal habitat (Table 4-1). Suitable habitat proposed for treatment, which accounts for 49 percent of the existing suitable habitat within the project area, would be downgraded by loss of canopy closure. A total of approximately 1,527 acres (33 percent) of the suitable and dispersal habitat would be lost. The pine, regeneration and mistletoe treatments prescribed for these areas would potentially open the forest canopies below 40 percent. Without additional harvest, these areas are expected to provide dispersal habitat again in 10-30 years. Thinning treatments would move approximately 675 acres from serving as suitable habitat to functioning as dispersal habitat.

Approximately 36 acres of dispersal habitat would retain dispersal habitat function after the harvest. Approximately 305 acres of dispersal habitat would be lost as dispersal habitat.

Table 4-1. Effects of Alternative B on Northern Spotted Owl Habitat in the Project Area

Suitable Habitat					Dispersal Habitat	
Existing Suitable Habitat	**Amt. Suitable Treated**	**Degraded but still Suitable (CC 60%)[1]**	**Downgraded to Dispersal (CC 40-60%)**	**Suitable Removed (CC < 40%)**	**Existing Dispersal Habitat**	**Dispersal Removed (CC < 40%)**
3,859 ac	**1,897 ac (49%)**	**None**	**675 ac (17%)**	**1,222 ac (32%)**	**783 ac**	**305 ac (39%)**

[1] **CC = Canopy Closure**

The habitat loss described above is expected to adversely affect the ability of spotted owls within and adjacent (within 1.2 miles) to the project area to successfully reproduce and would result in the "incidental take" of these owls. Formal consultation for the northern spotted owl with the USFWS has been completed for timber sales in the project area that may be sold in fiscal years 2001-2003 [BO 1-7-01-F-032].

Mitigating Measure for Paradise Lost Spotted Owl Nest Site

The Paradise Lost spotted owl nest site is not protected with a nest core because the owls nested after cores were established in 1994. Surveys have shown that the Paradise Lost activity center has been successfully used by this owl pair as a nesting site in 1997, 1998, 1999, and 2000. During three of these years, juvenile owls have been fledged from two known nest trees within this activity center. Incorporation of the mitigating measure to protect the activity center would increase the likelihood of retaining this area as a future nesting site for this northern spotted owl pair.

Special Status/Survey and Manage Species

Alternative B would (adversely) affect some special status species in both the short and the long term, due to the overall change in stand structure, specifically the reduction in canopy closure and snags. Those species which are likely to be most affected by the reduction in canopy closure are the northern spotted owl, northern goshawk, and great gray owl. Although most snags would be retained, species that would be most affected by a reduction in snags within the forested landscape are woodpeckers and bats. Protection requirements to lessen adverse effects to these species are met through several project design features. Impacts to northern spotted owls and great gray owls would be substantially mitigated by the retention of designated core areas around nest sites/activity centers. Riparian Reserves within the project would help provide corridors of late-successional forests between owl cores. Habitat requirements of northern goshawks are met through following NFP standards and guidelines.

Deer and Elk/Big Game Winter Range Areas

High quality forage is very important to both deer and elk, especially on winter ranges. However, forage conditions are declining in the watershed due to introduced species and fire suppression. Brush and oak woodland thinning, prescribed burn treatments, and openings in forest stands should improve forage conditions for deer and elk.

The northern portion of the Deer Lake project, including the northern half of Section 15 is designated in the Medford District RMP as part of a Big Game Winter Range Area (BGWRA). The RMP recommends that new road construction be minimized in these areas. The Little Butte Creek WA (1997) recommends keeping road densities at, or below, 1.5 mile (of road) per square mile of land in BGWRA. ODFW also

recommends this density. "Open road density" refers to the amount of roads left open to traffic in the winter. This project would meet the open road density criteria. Wildlife would benefit from the road blocking and decommissioning proposed for existing roads in the BGWRA and other areas in this project (see Road Blocking/ Decommissioning).

The Medford District RMP directs that the BGWRA should have 20 percent of the project area in thermal cover, consisting of 70 percent canopy closure, with a canopy height of at least 40 feet, in areas large enough to avoid edge effects. In the Deer Lake project area, 1,962 acres of suitable owl habitat will be retained. This represents late-successional stands with a minimum of 60 percent canopy closure on 34 percent of the forest capable acres in the project area. This meets or exceeds the thermal cover recommendations for deer and elk.

Other effects associated with the proposed project, such as site preparation or planting, would have negligible impacts on wildlife.

Alternative C

Direct and Indirect Effects

Alternative C would treat the same amount of acres as Alternative B and have many of the same effects described above. However, Alternative C would accomplish the proposed treatments without adding new roads. Because no new road construction is proposed under Alternative C, adverse project effects related to road construction on spotted owls and other wildlife would not occur (see Alternative B road discussion above). Alternative C would be more consistent with one of the Little Butte Creek WA wildlife recommendations to "identify and protect, maintain, or improve dispersal corridors within the watershed and between adjacent watersheds."

Deer and Elk Winter Range

Alternative C would not increase the potential for harassment and poaching of deer and elk associated with roads (ODFW, 2002). This alternative would meet Medford District RMP recommendations to minimize new roads in a Big Game Winter Range Area.

Alternatives B & C

Cumulative Effects

In the 238,598 acre Little Butte Creek watershed area, approximately 13,000 acres are planned for treatments on federal land during the period from 2000 through 2005. Of that amount, approximately 5,000 acres are planned as pine, regeneration, or mistletoe prescriptions, which may result in canopy closure less than 40 percent. The overall result of the Little Butte Creek projects is the short-term loss of substantial canopy closure across the landscape. Canopy closure less than 40 percent is thought to impede spotted owl dispersal and would also have detrimental effects to some other species of wildlife. The majority of the treated areas are not expected to be thinned to the lowest level indicated in the canopy closure ranges for each prescription (Appendix B). The low canopy closure ranges are indications of openings in the larger landscape of thinning. Although the quantity of spotted owl habitat is reduced in the short-term, the overall quality of habitat is expected to improve over the long-term due to these projects.

In the long-term, density thinning treatments are expected to improve forest health, encourage late-successional characteristics, and reduce fire hazard. Treatments are designed to make it possible to reintroduce prescribed fire into the ecosystem. When wildfires do occur in treated stands, they should be less severe. The long-term effect of thinning and the reintroduction of fire is to move the forest landscape toward larger trees and healthier forests.

The exclusion of fire has resulted in a loss of habitat diversity across the landscape from historic conditions. Special habitats such as meadows, oak woodlands, open pine stands, and other plant communities have been declining due to lack of fire. Treatments are designed to improve forest health and restore habitats to historic conditions. In the long-term, overall species richness would improve with the retention of habitat diversity.

An overall net decrease in existing roads is planned in upcoming projects when accounting for roads planned for closure or decommissioning. Approximately 28 miles of roads are planned for closure or decommissioning in the watershed, which would result in less disturbance to wildlife. Although new road construction has been minimized, the cumulative effects of new road construction would be detrimental to wildlife when added to the existing high road density in the watershed.

Northern Spotted Owl Habitat Loss
Other projects in the Little Butte Creek Watershed would adversely affect spotted owl habitat in the Little Butte Creek Watershed (Table 4- 2). Of the projects listed below, only Indian Soda is currently being implemented.

Table 4-2. Recent Ashland Resource Area Projects Affecting Spotted Owl Habitat in the Little Butte Creek Watershed

Spotted Owl Habitat	Amt. Suitable & Dispersal	Loss as Suitable or Dispersal	Percent Loss in project area
Deer Lake - 2002	4,642 ac	1,527 ac	33%
Conde Shell - 2001	3,357 ac	212 ac	6%
Indian Soda - 2000	3,579 ac	721 ac	20%
(Cumulative Effect) Total	**11,578 ac**	**2,460 ac**	**21%**

Fifteen Percent Retention
The NFP provides direction to retain fifteen percent of the federal forest capable lands in each 5th field watershed in late-successional forest conditions. The BLM analysis of late-successional habitat in this watershed was performed for the third year review of the NFP. This analysis concluded that this watershed currently meets the 15 percent Standard and Guideline. Current BLM reserves contain 10,589 acres of late-successional habitat, or 34.1 % of the BLM forest lands. Under a comprehensive harvest scenario, 8,255 acres of late seral vegetation on BLM land would be modified over a 10 year time period, leaving 22 percent of the forested landscape in a late-successional condition.

The analysis indicates that the 5th field watershed will continue to meet the fifteen percent retention Standard and Guideline after harvest of the planned timber sales in the Little Butte planning area. The federal lands in the watershed are mostly USFS (75%) with the remainder being BLM lands. There is a large Late Successional Reserve on the USFS portion of the watershed, which provides a significant portion of the late-successional habitat in the watershed. Other reserves, such as spotted and great gray owl nest cores, and some Riparian Reserves dispersed throughout the landscape contribute late-successional habitat toward the fifteen percent Standard and Guideline. Late-successional stands occurring in existing reserves in the Little Butte planning area are well distributed throughout the planned harvest areas.

BOTANY

Alternative A

Direct, Indirect, and Cumulative Effects

The no action alternative would have no direct effect on the continued persistence of the Bureau special status plants or NFP Survey and Manage species within the confines of the Deer Lake project area. Detrimental indirect and cumulative effects might result if management activities allow fuel levels to accumulate to the point that a stand destroying fire occurs.

At least three noxious weed species occur within the project area in open disturbed sites. Noxious weeds can out-compete the native flora, and rare plants, for water, light and space. If left untreated, noxious weeds can reduce habitat suitability for the Bureau special status plants adapted to those habitats. With the no action alternative, noxious weeds will continue to spread.

Alternatives B and C

Direct, Indirect, and Cumulative Effects

With the exception of *Cimcifuga elata*, Bureau Special Status and Survey and Manage Vascular plants will be buffered with a 150 radius buffer and NFP species will be buffered with a 100 ft radius buffer. This buffering provides protection from physical disturbance and microclimate alterations associated with timber harvest activities. Reduction of the canopy outside these buffers may prevent many of these species from spreading beyond their current sites (Appendix G).

The special status species *Cimcifuga elata* appears to be a shade-tolerant herb but it also appears to respond favorably to additional sunlight (Kaye and Kirkland 1994). According to Kaye and Kirkland, populations of *Cimcifuga elata* in old growth forests and second growth stands tend to have smaller plants and a lower proportion of reproductive individuals than managed sites, such as thinned stands, clearcuts, or boundaries between cut and uncut stands. At this time, the short-term effect of timber harvest on *Cimcifuga elata* appears to be positive, but population viability in the long-term, after regrowth of conifers shades the forest floor and competes for resources, may be low. Habitat management techniques that lead to canopy thinning with minimal disturbance of the forest floor may be optimal. Even if the harvest units containing *Cimcifuga elata* populations were thinned to the maximum harvest prescription level (40% canopy closure), *Cimcifuga elata* should continue to persist on the site and may actually be enhanced by the additional sunlight.

None of these sites would be directly impacted from the proposed road construction under Alternative B. The primary effects of road construction on the existing sites would be an increase in off road vehicle use, an increase in foot traffic, and an increased likelihood of camper or hunter caused fire. Any or all of these factors could lead to damage or loss of sites in the vicinity of the proposed road construction.

CRITICAL ELEMENTS
The following elements of the human environment are subject to requirements specified in statute, regulation, or executive order and must be considered in all EAs.

Critical Elements

Critical Element	Affected Yes	Affected No	Critical Element	Affected Yes	Affected No
Air Quality		✔ **	T & E Species		✔ **
ACECs		✔	Wastes, Hazardous/Solid		✔
Cultural Resources		✔	Water Quality		✔ **
Farmlands, Prime/Unique		✔	Wetlands/Riparian Zones		✔ **
Floodplains		✔	Wild & Scenic Rivers		✔
Nat. Amer. Rel. Concerns		✔	Wilderness		✔
Invasive, Nonnative Species		✔**	Energy Resources (EO 13212)		✔
			Environmental Justice		✔

*These affected critical elements could be impacted by the implementing the proposed action. Impacts are being avoided by project design.

**These affected critical elements would be impacted by implementing the proposed action. The impacts are being reduced by designing the proposed action with Best Management Practices, Management Action/Direction, Standard and Guidelines as outlined in the Environmental Impact Statements (EIS)/Record of Decisions *(RMP) (USDI BLM 1995)(USDA FS; USDI BLM 1994*) tiered to in Chapter 1. The impacts are not affected beyond those already analyzed by the above mentioned documents.

CHAPTER V
List of Agencies and Persons Consulted

SUMMARY OF PUBLIC INVOLVEMENT

A letter regarding proposed management activities in the Deer Lake project area was mailed to interested organizations and individuals on August 2, 2001. The letter listed potential issues of concern and solicited public input during the planning phase of this project.

Upon completion of this EA, a legal notification was placed in the Medford Mail Tribune offering a 30-day public review and comment period. For additional information, please contact Bill Yocum or Lorie List at (541) 618-2384.

DISTRIBUTION LIST AND AVAILABILITY ON THE INTERNET

This EA was distributed to the following agencies and organizations.

Association of O&C Counties
Audubon Society
Cascade Ranch
Friends of the Greenspring
Department of Forestry
Headwaters
Jackson County Commissioners
Jackson Co. Soil and Water Conservation District
Jackson County Stockman's Association
Klamath Siskiyou Wildlands Center
Little Butte Creek Watershed Council
Medford Water Commission
Northwest Environmental Defense Center
Oregon Department Forestry
Oregon Natural Resources Council
Oregon Department of Fish and Wildlife
The Pacific Rivers Council
Rogue River National Forest
Southern Oregon University
Southern Oregon Timber Industry Assoc.

TRIBES

The Confederated Tribes
Cow Creek Band of Umpqua Indians
Confederated Tribes of the Grand Ronde
Confederated Tribes of Siletz
Klamath Tribe
Quartz Valley Indian Reservation (Shasta Tribe)
Shasta Nation
Confederated Bands (Shasta), Shasta Upper Klamath Indians
Confederated Tribes of the Rogue-Table Rock and Associated Tribes

AGENCIES CONSULTED

U.S. Fish and Wildlife Service
U.S. National Marine Fisheries Service

REFERENCES

Agee, James K. 1993. Fire Ecology of Pacific Northwest Forest. Island Press, Washington D.C.

Dolph, Robert E. 1985. Growth and vigor information in thinned second-growth ponderosa pine stands on the Deschutes and Ochoco National Forests. 10pp.

Meehan, William, ed. 1991. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19. Bethesda, MD.

Meehan W. R. And T.C. Bjornn. 1991. Salmonid distributions and life histories. Chapter 3 in W. R. Meehan, ed. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication #19, Bethesda, MD.

Oregon Department of Agriculture (ODA). 1995. *ORS 570.505.* Oregon State Weed Board, Salem, OR.

ODFW. 2002. Letter to BLM Interdisciplinary Team from Merv Wolfer, Assistant Wildlife Biologist, Jan. 24, 2002.

ODFW. 2002. Letter to BLM, Field Manager, Rich Drehobl, from Merv Wolfer, Assistant Wildlife Biologist, March 8, 2002.

Perry, D.A., Meurisse R., Thomas B., Miller R., Boyle J., Means J., Perry C.R., and Powers R.F. 1989. Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems. Timber Press, Portland, OR.

Rosgen, D.L. 1994. A classification of natural rivers. *Catena* 22(3): 169-199.

Smith, R.B. 1979. Steep slopes logging. Journal of Logging Management. 10(1):1794-1796, 1821.

Strittholt, James R. and Dellasala, Dominick A., 2001. Importance of Roadless Areas in Biodiversity Conservation in Forested Ecosystems: Case Study of the Klamath-Siskiyou Ecoregion of the United States. Conservation Biology, Vol. 15, No. 6, Dec. 2001, pp. 1742-1754.

Tappeiner, John and Penelope Latham. 1999. Thinning to increase vigor of old-growth trees. The Cooperative Forest Ecosystem Research Program Annual Report. Corvallis, OR.

USDA Forest Service 1999. Water Erosion Prediction Project Model. Technical Documentation.

USDA Forest Service. 1996. Field guide to the forested plant associations of Southwestern Oregon. Pacific Northwest Region, Tech Paper R6-NR-ECOL-TP-17-96. Corvallis, OR.

USDA Forest Service; USDI Bureau of Land Management. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and the Standards and Guidelines for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. Portland, OR.

USDA Forest Service; USDI Bureau of Land Management. 1997. Little Butte Creek Watershed Analysis.
USDA. Natural Resource Conservation Service 1989. Soil Survey of Jackson County Area, Oregon.

USDI Bureau of Land Management. 1998. Medford District Integrated Weed Management Plan and Environmental Assessment. Medford District, Medford, OR.

USDI Bureau of Land Management. 1995. Medford District Record of Decision and Resource Management Plan (RMP). Medford, OR.

Warring, R.H. 1980. Vigor index.

Wemple, B. 1994. Hydrologic integration of forest roads with stream networks in two basins, western Cascades, Oregon. M.S. Thesis, Oregon State University, Corvallis, OR.

Whitson, T.D., ed. 1992. Weeds of the west. Western Society of Weed Science. Newark, CA.

Ypsilantis W. 1990. Techniques for Reducing Slope Stability Problems, Erosion and Sedimentation Due to Road Construction – An Annotated Bibliography. Idaho BLM Technical Bulletin 90-4.

Appendix A

Proposed Treatments and Harvest Systems

TABLE A-1.
Alternative B: Estimated Acres, Silviculture Methods, Yarding Systems, Fuels Mgmt, and Volume

UNIT	UNIT ACRES	SILVI. METHOD 1/	YARDING SYSTEM 2/	FUELS MGT 3/	VOLUME CUT/ACRE (range)(MBF)	VOLUME CUT/UNIT (range)(MBF)
1	31	DDF	CR	HP/UB/SL	6 - 10	186 - 310
2	4	DDF	H	HP/UB/SL	6 - 10	24 - 40
3	22	DDF	H	HP/UB/SL	6 - 10	132 - 220
4	6	P	H	HP/UB/SL	4 - 8	24 - 48
5	16	DDF	H	HP/UB/SL	6 - 10	96 - 160
6	3	P	H	HP/UB/SL	5 - 10	15 - 30
7	8	DDF	PS	HP/UB/SL	6 - 10	48 - 80
8	8	DDF	H	HP/UB/SL	6 - 10	48 - 80
9	3	DDF	CR	HP/UB/SL	6 - 10	18 - 30
10	16	P	CR	HP/UB/SL	4 - 8	64 - 128
11	17	P	CR	HP/UB/SL	5 - 10	85 - 170
12	4	P	CR	HP/UB/SL	5 - 10	20 - 40
13	11	P	CR	HP/UB/SL	5 - 10	55 - 110
14	71	DDF	CR	HP/UB/SL	4 - 7	284 - 497
15	6	DDF	CR	HP/UB/SL	6 - 10	36 - 60
16	2	M	PS	HP/UB/SL	5 - 10	10 - 20
17	23	M	CR/PS/H	HP/UB/SL	5 - 10	115 - 230
18	24	M	H	HP/UB/SL	5 - 10	120 - 240
19	17	DDF	PS/H	HP/UB/SL	6 - 10	102 - 170
20	11	WDF	PS/H	HP/UB/SL	5 - 9	55 - 99
21	64	WDF	H	HP/UB/SL	5 - 9	320 - 576
22	18	WDF/DDF	CR/PS	HP/UB/SL	6 - 10	108 - 180
23	7	WDF	CR	HP/UB/SL	6 - 10	42 - 70

24	37	WDF	CR/PS	HP/UB/SL	6 - 10	222 - 370
25	4	P	CR	HP/UB/SL	4 - 8	16 - 32
26	12	P	CR	HP/UB/SL	4 - 8	48 - 96
27	4	P	CR	HP/UB/SL	5 - 10	20 - 40
28	9	P	CR	HP/UB/SL	4 - 8	36 - 72
29	6	P	CR	HP/UB/SL	5 - 10	30 - 60
30	8	P	CR	HP/UB/SL	5 - 10	40 - 80
31	5	REG	CR	HP/UB/SL	5 - 10	25 - 50
32	3	P	CR	HP/UB/SL	4 - 8	12 - 24
33	28	P	CR	HP/UB/SL	5 - 10	140 - 280
34	6	P	H	HP/UB/SL	4 - 8	24 - 48
35	23	P	CR/H	HP/UB/SL	4 - 8	92 - 184
36	101	P	CR/H	HP/UB/SL	4 - 8	404 - 808
37	9	P	H	HP/UB/SL	4 - 8	36 - 72
38	3	M	H	HP/UB/SL	5 - 10	15 - 30
39	18	M	CR/H	HP/UB/SL	5 - 10	90 - 180
40	132	M	PS/H	HP/UB/SL	5 - 10	660 - 1320
41	22	M	PS/H	HP/UB/SL	8 - 12	176 - 264
42	107	M/P	CR/PS/H	HP/UB/SL	5 - 10	535 - 1070
43	37	WDF	CR/PS/H	HP/UB/SL	6 - 10	222 - 370
44	16	WDF	PS/H	HP/UB/SL	5 - 10	80 - 160
45	5	WDF	H	HP/UB/SL	4 - 8	20 - 40
46	6	M	H	HP/UB/SL	6 - 10	36 - 60
47	7	WDF	CR	HP/UB/SL	5 - 9	35 - 63
48	7	M	PS	HP/UB/SL	5 - 8	35 - 56
49	30	M	PS	HP/UB/SL	8 - 12	240 - 360

50	34	M	PS/H	HP/UB/SL	8 - 12	272 - 408
51	31	M	CR/PS/H	HP/UB/SL	6 - 10	186 - 310
52	100	DDF	CR/H	HP/UB/SL	6 - 10	600 - 1000
53	65	DDF	H	HP/UB/SL	8 - 12	520 - 780
54	48	DDF	H	HP/UB/SL	8 - 12	384 - 576
55	4	DDF	H	HP/UB/SL	6 - 10	24 - 40
56	2	DDF	H	HP/UB/SL	6 - 10	12 - 20
57	8	DDF	H	HP/UB/SL	6 - 10	48 - 80
58	50	MC	CR/PS	HP/UB/SL	3 - 6	150 - 300
59	26	MC/M	PS	HP/UB/SL	4 - 7	104 - 182
60	2	M	CR	HP/UB/SL	5 - 10	10 - 20
61	78	M	CR/PS/H	HP/UB/SL	5 - 10	390 - 780
62	5	M	PS	HP/UB/SL	5 - 10	25 - 50
63	4	M	H	HP/UB/SL	5 - 10	20 - 40
64	64	MC/M	CR/PS	HP/UB/SL	3 - 6	192 - 384
65	5	M	CR	HP/UB/SL	5 - 10	25 - 50
66	9	M	CR	HP/UB/SL	5 - 10	45 - 90
67	2	M	CR	HP/UB/SL	5 - 10	10 - 20
68	9	M	CR	HP/UB/SL	5 - 10	45 - 90
69	121	M	CR/PS	HP/UB/SL	5 - 10	605 - 1210
70	98	M	CR/PS	HP/UB/SL	5 - 10	490 - 980
71	1	DDF	CR	HP/UB/SL	5 - 10	5 - 10
72	2	MC	CR	HP/UB/SL	2 - 5	4 - 10
73	1	MC	CR	HP/UB/SL	2 - 5	2 - 5
74	1	MC	CR	HP/UB/SL	2 - 5	2 - 5
75	42	MC	CR	HP/UB/SL	2 - 5	84 - 210

76	3	DDF	CR	HP/UB/SL	3 - 7	9 - 21
77	18	MC	H	HP/UB/SL	3 - 6	54 - 108
78	62	WDF/REG	PS/H	HP/UB/SL	2 - 4	124 - 248
79	7	MC	H	HP/UB/SL	3 - 6	21 - 42
80	41	WDF	CR	HP/UB/SL	2 - 4	82 - 164
81	29	MC	CR	HP/UB/SL	3 - 5	87 - 145
82	6	MC	CR	HP/UB/SL	3 - 6	18 - 36
83	3	REG	H	HP/UB/SL	6 - 10	18 - 30
84	206	REG	CR/PS	HP/UB/SL	6 - 10	1236 - 2060
85	84	M	CR/PS	HP/UB/SL	6 - 10	504 - 840
86	5	MC	CR	HP/UB/SL	2 - 4	10 - 20
87	6	MC	CR	HP/UB/SL	2 - 4	12 - 24
88	55	M	CR/PS	HP/UB/SL	2 - 4	110 - 220
	2374					11,835 to 21,385

1/Silvicultural Methods: DDF = Dry Douglas-fir; WDF = Wet Douglas-fir; P = pine; M = Mistletoe; MC = Mixed Conifer; REG = Regeneration Cut

2/Yarding Systems: CR = Crawler (1022 ac.)
PS = Cable (739 ac.)
H = Helicopter (613 ac.)

3/Fuels Management: HP = Handpile, cover, and burn; UB = Underburn; SL = Slashing

Table A-2.
Alternative C: Estimated Acres, Silviculture Methods, Yarding Systems, Fuels Mgmt, and Volume

UNIT	UNIT ACRES	SILVI. METHOD 1/	YARDING SYSTEM 2/	FUELS MGT 3/	VOLUME CUT/ACRE (range)(MBF)	VOLUME CUT/UNIT (range)(MBF)
1	31	DDF	CR	HP/UB/SL	6 - 10	186 - 310
2	4	DDF	H	HP/UB/SL	6 - 10	24 - 40
3	22	DDF	H	HP/UB/SL	6 - 10	132 - 220
4	6	P	H	HP/UB/SL	4 - 8	24 - 48
5	16	DDF	H	HP/UB/SL	6 - 10	96 - 160
6	3	P	H	HP/UB/SL	5 - 10	15 - 30
7	8	DDF	PS	HP/UB/SL	6 - 10	48 - 80
8	8	DDF	H	HP/UB/SL	6 - 10	48 - 80
9	3	DDF	H	HP/UB/SL	6 - 10	18 - 30
10	16	P	CR	HP/UB/SL	4 - 8	64 - 128
11	17	P	CR	HP/UB/SL	5 - 10	85 - 170
12	4	P	CR	HP/UB/SL	5 - 10	20 - 40
13	11	P	CR	HP/UB/SL	5 - 10	55 - 110
14	71	DDF	H	HP/UB/SL	4 - 7	284 - 497
15	6	DDF	CR	HP/UB/SL	6 - 10	36 - 60
16	2	M	PS	HP/UB/SL	5 - 10	10 - 20
17	23	M	H	HP/UB/SL	5 - 10	115 - 230
18	24	M	H	HP/UB/SL	5 - 10	120 - 240
19	17	DDF	PS/H	HP/UB/SL	6 - 10	102 - 170
20	11	WDF	PS/H	HP/UB/SL	5 - 9	55 - 99
21	64	WDF	H	HP/UB/SL	5 - 9	320 - 576
22	18	WDF/DDF	CR/PS	HP/UB/SL	6 - 10	108 - 180
23	7	WDF	CR	HP/UB/SL	6 - 10	42 - 70

24	37	WDF	CR/PS	HP/UB/SL	6 - 10	222 - 370
25	4	P	CR	HP/UB/SL	4 - 8	16 - 32
26	12	P	CR	HP/UB/SL	4 - 8	48 - 96
27	4	P	CR	HP/UB/SL	5 - 10	20 - 40
28	9	P	CR	HP/UB/SL	4 - 8	36 - 72
29	6	P	CR	HP/UB/SL	5 - 10	30 - 60
30	8	P	CR	HP/UB/SL	5 - 10	40 - 80
31	5	REG	CR	HP/UB/SL	5 - 10	25 - 50
32	3	P	CR	HP/UB/SL	4 - 8	12 - 24
33	28	P	CR	HP/UB/SL	5 - 10	140 - 280
34	6	P	H	HP/UB/SL	4 - 8	24 - 48
35	23	P	CR/H	HP/UB/SL	4 - 8	92 - 184
36	101	P	H	HP/UB/SL	4 - 8	404 - 808
37	9	P	H	HP/UB/SL	4 - 8	36 - 72
38	3	M	H	HP/UB/SL	5 - 10	15 - 30
39	18	M	H	HP/UB/SL	5 - 10	90 - 180
40	132	M	H	HP/UB/SL	5 - 10	660 - 1320
41	22	M	H	HP/UB/SL	8 - 12	176 - 264
42	107	M/P	CR/PS/H	HP/UB/SL	5 - 10	535 - 1070
43	37	WDF	CR/PS/H	HP/UB/SL	6 - 10	222 - 370
44	16	WDF	PS/H	HP/UB/SL	5 - 10	80 - 160
45	5	WDF	H	HP/UB/SL	4 - 8	20 - 40
46	6	M	H	HP/UB/SL	6 - 10	36 - 60
47	7	WDF	CR	HP/UB/SL	5 - 9	35 - 63
48	7	M	PS	HP/UB/SL	5 - 8	35 - 56
49	30	M	PS	HP/UB/SL	8 - 12	240 - 360

50	34	M	PS/H	HP/UB/SL	8 - 12	272 - 408
51	31	M	CR/PS/H	HP/UB/SL	6 - 10	186 - 310
52	100	DDF	H	HP/UB/SL	6 - 10	600 - 1000
53	65	DDF	H	HP/UB/SL	8 - 12	520 - 780
54	48	DDF	H	HP/UB/SL	8 - 12	384 - 576
55	4	DDF	H	HP/UB/SL	6 - 10	24 - 40
56	2	DDF	H	HP/UB/SL	6 - 10	12 - 20
57	8	DDF	H	HP/UB/SL	6 - 10	48 - 80
58	50	MC	CR/PS	HP/UB/SL	3 - 6	150 - 300
59	26	MC/M	PS	HP/UB/SL	4 - 7	104 - 182
60	2	M	CR	HP/UB/SL	5 - 10	10 - 20
61	78	M	CR/PS/H	HP/UB/SL	5 - 10	390 - 780
62	5	M	PS	HP/UB/SL	5 - 10	25 - 50
63	4	M	H	HP/UB/SL	5 - 10	20 - 40
64	64	MC/M	CR/PS	HP/UB/SL	3 - 6	192 - 384
65	5	M	CR	HP/UB/SL	5 - 10	25 - 50
66	9	M	CR	HP/UB/SL	5 - 10	45 - 90
67	2	M	CR	HP/UB/SL	5 - 10	10 - 20
68	9	M	CR	HP/UB/SL	5 - 10	45 - 90
69	121	M	CR/PS	HP/UB/SL	5 - 10	605 - 1210
70	98	M	CR/PS	HP/UB/SL	5 - 10	490 - 980
71	1	DDF	CR	HP/UB/SL	5 - 10	5 - 10
72	2	MC	CR	HP/UB/SL	2 - 5	4 - 10
73	1	MC	CR	HP/UB/SL	2 - 5	2 - 5
74	1	MC	CR	HP/UB/SL	2 - 5	2 - 5
75	42	MC	CR	HP/UB/SL	2 - 5	84 - 210

76	3	DDF	CR	HP/UB/SL	3 - 7	9 - 21
77	18	MC	H	HP/UB/SL	3 - 6	54 - 108
78	62	WDF/REG	PS/H	HP/UB/SL	2 - 4	124 - 248
79	7	MC	H	HP/UB/SL	3 - 6	21 - 42
80	41	WDF	CR	HP/UB/SL	2 - 4	82 - 164
81	29	MC	CR	HP/UB/SL	3 - 5	87 - 145
82	6	MC	CR	HP/UB/SL	3 - 6	18 - 36
83	3	REG	H	HP/UB/SL	6 - 10	18 - 30
84	206	REG	CR/PS	HP/UB/SL	6 - 10	1236 - 2060
85	84	M	CR/PS	HP/UB/SL	6 - 10	504 - 840
86	5	MC	CR	HP/UB/SL	2 - 4	10 - 20
87	6	MC	CR	HP/UB/SL	2 - 4	12 - 24
88	55	M	CR/PS	HP/UB/SL	2 - 4	110 - 220
	2374					11,835 to 21,385

1/Silvicultural Methods: DDF = Dry Douglas-fir; WDF = Wet Douglas-fir; P = pine; M = Mistletoe; MC = Mixed Conifer; REG = Regeneration Cut

2/Yarding Systems: CR = Crawler (780 ac.)
PS = Cable (694 ac.)
H = Helicopter (900 ac.)

3/Fuels Management: HP = Handpile, cover, and burn; UB = Underburn; SL = Slashing

TABLE A-3. Alternative B: Percent acres by logging system

Prescription	% Canopy Closure	Tractor	Cable	Helicopter
Pine	20-50*	196 ac.(70%)	0 ac.	85 ac. (30%)
Mistletoe	20-50*	278 ac. (32%)	383 ac. (45%)	201 ac. (23%)
Dry DF	45	212 ac. (50%)	30 ac. (7%)	182 ac. (43%)
Wet DF	55	104 ac.(31%)	107 ac. (32%)	125 ac. (37%)
Mixed Conifer	55	98 ac. (41%)	136 ac. (56%)	7 ac (3%)

Regeneration	40	134 ac. (58%)	83 ac (36%)	13 ac (6%)
Sum		1022 ac (43%).	739 ac. (31%)	613 ac. (26%)

* Canopy closures after treatment will be a minimum of 30% in the transient snow zone.

TABLE A-4. Alternative C: Percent acres by logging system

Prescription	% Canopy Closure	Tractor	Cable	Helicopter
Pine	20-50*	146 ac. (52%)	0	135 ac. (48%)
Mistletoe	20-50*	257 ac. (30%)	338 ac. (39%)	267 ac (31%).
Dry DF	45	41 ac. (10%)	30 ac. (7%)	353 ac. (83%)
Wet DF	55	104 ac. (33%)	107 ac. (33%)	125 ac. (34%)
Mixed Conifer	55	98 ac (41%).	136 ac. (56%)	7 ac. (3%)
Regeneration	40	134 ac. (58%)	83 ac. (36%)	13 ac. (6%)
Sum		780 ac. (33%)	694 ac. (29%)	900 ac. (38%)

* Canopy closures after treatment will be a minimum of 30% in the transient snow zone.

Appendix B

Summary of Silvicultural Prescription
South Fork Little Butte Project Timber Sales (FY 2000-2003)

This appendix contains a summary of the silvicultural prescription for all of the South Fork Little Butte Project. Silvicultural prescriptions are designed on larger scale than individual projects in order to address issues across the landscape. Projects addressed in this prescription include the Indian Soda, Poole Hill, Heppsie, Antelope and Deer Lake projects.

TABLE OF CONTENTS

Silvicultural Prescription Summary
South Fork Little Butte Project Timber Sales (FY- 2000-2003)

Management Direction and Objectives
The prescribed vegetation treatments in this document are designed to comply with both the Record of Decision (ROD) and the Medford District Approved Resource Management Plan (RMP) (U.S.D.I., 1995), the Final Supplemental Environmental Impact Statement (FEIS - the President's "Forest Plan for a Sustainable Economy and Environment") on Management of Habitat of Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (U.S.D.A. et.al., 1994) as well as the April 1994 interagency Record of Decision of the Northern Spotted Owl (ROD) (U.S.D.A. and U.S.D.I., 1994), the Western Oregon Program-Management of Competing Vegetation Record of Decision (ROD) (U.S.D.I., 1992), and the Little Butte Creek Watershed Analysis(U.S.D.A. and U.S.D.I., 1997).

The Ashland Resource Area ID team and area manager developed and considered certain objectives for this silvicultural prescription. The objectives are as follows:

- Reduce the density of all vegetation condition classes across the landscape to improve vegetation vigor and reduce the fire hazard while creating desired vegetation structural characteristics.

- Maintain and restore natural functions and processes necessary for the stability of ecosystem health and productivity.

- For the commercial forest stands, create stands with trees of varying size and age (diverse stand structure), and with various seral patterns across the landscape to promote mature/old-growth stand characteristics.

- Manage mature/old-growth timber stands to maintain their existence, structure, and function.

- Increase the species composition of pine species, incense cedar (these species are more fire and drought tolerant than Douglas-fir or true fir), and even Douglas-fir where appropriate into forest stands.

- Create a favorable microenvironment for the natural establishment of seedlings (especially pine species and incense cedar) by providing adequate available growing space and woody debris of various size classes.

- Reduce timber stand basal area to increase individual tree vigor, growth, and quality.

- Minimize impacts to the northern spotted owl and other sensitive species and their habitat.

- Maintain stream condition and stability in effected watersheds by maintaining appropriate stream buffers, by leaving trees in nonbuffered draw bottoms, and by avoiding slumps or slide areas.

- Minimize soil compaction to maintain site productivity.

- Maximize the yield of merchantable wood from the stands by utilizing dead and dying timber while

still meeting or exceeding the habitat requirements of snag/cavity dependent species.

- Address Douglas-fir dwarf mistletoe infection within the project area and control where appropriate.

Site/Stand Description

Legal Description

The South Fork of Little Butte Creek landscape design project area is comprised of 12 full and 50 partial sections within Townships 36, 37, and 38 South, Ranges 2 and 3 East of the Willamette Meridian. The project area is approximately 16 miles east of Medford, Oregon and is in the Lower Little Butte Creek and North and South Fork Little Butte Creek subwatersheds within the Little Butte Creek Watershed. The project area is located south of Highway 140.

Drainage/Watershed

The seven major drainage areas (Lake Creek, Coon Creek, Charley Creek, Lost Creek, Deer Creek, Soda Creek, and Dead Indian Creek) within the project area are delineated by a series of inter-connecting ridges. Lake Creek is on the western boundary of the project area and Soda Creek on the eastern boundary. State Highway 140 is the northern boundary, and BLM road 38-3E-19 the approximate southern boundary of the project area.

Tree Series/Plant Associations

This project area is extremely diverse, and is being broken into four timber sale areas (Deer Lake, Heppsie Mountain, Indian Soda, and Conde Shell). The Deer Lake sale area has low elevation, mixed conifer sites with rocky soils, and some high elevation white fir tree series stands. The Heppsie Mountain sale area has productive Douglas-fir stands on the north slopes and dry pine sites on the south slopes. The Indian Soda sale area is extremely variable with moist Douglas-fir sites, dry pine sites, and Douglas-fir, mixed conifer stands gradually giving way to white fir as the elevation increases. Lastly, the Conde Shell sale area has mostly white fir tree series stands with some moist mixed conifer sites.

There are four tree series in the Little Butte Creek project area: Douglas-fir, ponderosa pine, white fir, and white oak. Plant association descriptions within these series can be found in Preliminary Plant Associations of the Siskiyou Mountain Province (Atzet and Wheeler 1984) and Field Guide to the Forested Plant Associations of Southwestern Oregon (Atzet et. al., 1996; see Table 1).

The PSME(Douglas-fir)/RHDI(poison oak) and PSME/RHDI-BEPI (Piper's Oregongrape) plant associations are most prevalent at lower elevations and on dry ridges (northern Deer Lake, south Heppsie Mt., and Indian Soda areas). As the elevation increases and rainfall is more abundant, or the aspect is more conducive to cooler temperatures, plant associations most often found include PSME-PIPO (ponderosa pine), PSME-ABCO(white fir)-HODI(Creambrush oceanspray), and PSME/BENE (dwarf Oregongrape).

The pine and white oak tree series are found mostly in the Deer Lake and Heppsie Mountain sale areas. These are low elevation or southerly facing aspect areas.

The Conde Shell sale area, in the southern portion of the project, is predominantly the white fir tree series with scattered Douglas-fir in the stands. These are high elevation stands with over 30 inches of rainfall.

Table B-1. Tree Series/Plant Associations Common to the South Fork of Little Butte Creek Project Area.

Douglas-fir Series/Plant Associations	Ponderosa Pine Series/Plant Associations	White Oak Series/Plant Associations	White Fir Series/Plant Associations
PSME (Douglas-fir)/BENE (dwarf Oregon grape)	PIPO (Ponderosa pine)-PSME (Douglas-fir)	QUGA (Oregon white oak)/CYEC (Hedgehog dogtail)	ABCO (White fir) - PSME (Douglas-fir)
PSME/RHDI (Poison oak)-BEPI (Piper's Oregongrape)	PIPO -QUKE (California black oak)	QUGA-PSME/RHDI	ABCO - TABR (Pacific Yew)
PSME/RHDI			
PSME-PIPO (Ponderosa pine)			
PSME-ABCO (White fir)			
PSME/Depauperate			
PSME/ABCO-HODI (Creambrush oceanspray)			
PSME-QUGA (Oregon white oak)/RHDI			

Stand History

The vegetation native to the watershed is a result of time, the unique geology of the area, and anthropogenic influences. Over the coarse of thousands of years, native inhabitants regularly used fire on the landscape for a wide variety of purposes. Natural disturbance such as lightning fires, windstorms and drought contributed to the variation. The lower elevation areas would have been dominated by grassland, oak savanna, and open oak/pine woodland. In the upper valley/canyon area prime black oak woodland probably existed. Many mixed-conifer stands of the canyon and high plateau sections were comparatively open, with a higher proportion of mature ponderosa and sugar pine than at present. Infrequent, stand-replacing natural fires on the high plateau may have played a dominant role overall. After pioneer settlement, the density of endemic tree and shrub species was reduced as a result of anthropogenic disturbances (human-caused fires for land clearing, hunting, mining, grazing, protection and food; mining, logging, and other factors related to urbanization). Due to the frequent disturbance regime, historic forestlands were generally more open, had fewer trees per acre, trees of larger diameter, and a different species composition. These stands generally had more large diameter ponderosa pine, oak species, incense cedar, and native grasses. In the moist microsites where Douglas-fir is better adapted, it probably never reached the climax stage because of the frequent disturbance regime. Disturbances were probably as frequent as every 1 to 25 years. In the project area, many of the commercial forest stands originated between 1854 and 1929. Most of the forest stands became established within 10 years after a fire although the harsher sites may have taken 30 to 40 years

to become forested. Because the last fires were forest-replacing in nature, individual timber stands tend to be fine grained. This means that there are many trees of the same age class and almost equal in height with some older trees scattered throughout the stand. The majority of the trees in the project area are between 70 and 145 years old. However, there are 146 to 200 year old trees in fewer numbers. The oldest trees found were 341 and 363 years old. The age classes greater than 200 years are most frequently found in the Conde Shell project area.

Structure Description

The next level of dichotomy from tree series/plant associations is vegetation condition class. The Medford District Watershed Analysis Committee (1994) has designated the following classes: Grass, Forbs, Herbaceous; Shrubs, Non-forest Land; Hardwood/Woodland; Early (0 to 5 years) and Seedlings/Saplings (0 to 4.9 inches DBH); Poles (5 to 11 inches DBH); Mid (11 to 21 inches DBH); and Mature/Old-growth (21 inches + DBH). The following is a description of the stand development and structure of each vegetation condition class:

Grass, Forbs, Herbaceous

During the nineteenth century the area of open grassland was also more extensive because of frequent disturbance. Since that time the ecological processes of relay and initial floristics have occurred and areas that may have been grasslands have given way to shrubs and tree species. There are 1,809 acres of grassland in the project area. The grasslands near Heppsie Mountain, Lost Lake and on the Dead Indian Plateau are limited to areas with severe environmental conditions such as south to west aspects with shallow, rocky soils. Mixtures of grasses, shrubs, and multi-layered tree stands can occur here. Common grasses include California fescue, blue wildrye, and hedgehog dogtail.

Common herbs in moist areas include western twinflower, woods strawberry, Oregon fairybell, star flower, pathfinder, catchweed bedstraw, rattlesnake plantain, miner's lettuce, wild ginger, columbine, trillium, starry false solomon's seal, and bleeding heart. In the dry Douglas-fir and pine sites, hairy honeysuckle, lupine, Pacific hound's tongue, thicket milk-vetch, common yarrow, and hedge parsley are the common herbs.

Shrubs/Non-forest Land

The shrublands have been influenced by a lack of fire disturbance. As a result, extremely dense stands of shrubs and tree species are common. Most of the shrublands are heterogeneous in species composition, arrangement of species, and structure. The vegetation tends to be late seral with a lack of early seral stages. There are approximately 271 acres of shrubland in the project area.

Whiteleaf manzanita is the most abundant species and is tree-like in form. Scattered throughout the manzanita patches are clumps of wedgeleaf ceanothus, deerbrush ceanothus, poison oak, mountain mahogany, hardwood trees, and various size classes of conifer species. Conifer tree species migrate into the shrublands during wet climatic cycles but retreat when harsh climatic conditions occur. Five layers of vegetation are possible. Other dry land shrubs include Piper's Oregongrape and silk tassel. Moist microenvironment shrubs, most frequently found on northerly aspects, include snowberry, California hazel, creambrush oceanspray, dwarf Oregongrape, serviceberry, Indian plum, thimbleberry, black raspberry, trailing blackberry, ribes species, vine maple, and Pacific yew.

Hardwood/Woodland

Oak woodlands are the lower elevation limit for forest vegetation and are transitional to savanna and

grasslands. Oregon white oak occupies sites where available soil moisture is between that supporting grass or ponderosa pine and the greater amount required to support Douglas-fir. The floristic composition and structure of the woodlands have also been disturbed by fire suppression, livestock grazing, the introduction of exotic species, and firewood harvest. Common plant associations include QUGA/CYEC (hedgehog dogtail) and QUGA-PSME/RHDI. Other plant species common to the associations include Pacific madrone, California black oak, ponderosa pine, whiteleaf manzanita, wedgeleaf and deerbrush ceanothus, poison oak, snowberry, hairy honeysuckle, woodland strawberry, wild carrot, and *Torilis arvensis*. There are 2,131 acres of woodland in the project area.

The oak woodlands commonly have 3 to 4 layers of vegetation; the mature oaks, dominate ponderosa pine or Douglas-fir, grass, and the fourth layer sometimes being conifer or oak regeneration. When shrubs are present, the stands can have 5 or more layers of vegetation. It is common for whiteleaf manzanita to be tree-like in form.

Early (0 to 5 years) and Seedlings/Saplings (0 to 4.9 inches DBH)
These two condition classes are grouped together because both classes are usually tree plantations established after logging. The predominant species in the plantations are Douglas-fir, ponderosa pine, and Jeffrey pine. Douglas-fir is planted on cool, moist sites with northwest to northeast aspects where frost and gophers are not a problem. Pine species and incense cedar are planted on low elevation sites with hot, dry aspects (northwest, west, southwest, south, and southeast aspects), or on high elevation sites where frost is a problem. Many plantations are a mixture of conifer and hardwood species, with Pacific madrone being the most abundant. If residual conifer trees from the previous stand were left standing, as many as 4 layers of vegetation can exist: newly planted seedlings, hardwood sprouts overtopping the planted seedlings, residual saplings to poles, and residual overstory trees. Most often just two layers are present, the seedlings and overtopping hardwoods. There are 3,678 acres of plantations in the project area and these plantations are in the stand initiation stage of development.

Poles (5 to 11 inches DBH)
There are 304 acres of pole size trees in the project area and most of these stands are Jeffrey pine plantations under 40 years of age. These stands were planted after logging activity on very cold sites. Some pole size trees may be found on ridge tops or on poor sites. There is a wide range of stand densities and it is possible to find stands with almost 1,000 trees per acre. Pole stands will often be found on northerly aspects, are in the stem exclusion stage and are predominantly single layered. Sometimes older residual overstory trees are scattered throughout the pole stands and no understory vegetation is usually present except for scattered forbs.

Mid (11 to 21 inch DBH)
There are 6,073 acres in the mid-condition class. Douglas-fir and ponderosa pine are the most prevalent species, with sugar pine, incense cedar and white fir also present in the overstory. Pacific madrone and California black oak are often found in the understory. These stands became established over a 10 to 30 year period following a disturbance and most of the stands are now between 70 and 145 years of age. Many of these stands are beginning to enter the understory reinitiation stage. As mortality from wind damage, bark beetles, and pathogens create small openings in the crown canopy of the trees, regeneration begins to occur in the cleared area below. Although single story stands do exist, two to three canopy layers are present in most of the stands and four layers are present when old-growth trees are found in the overstory. Commonly found in these stands are suppressed and intermediate crown class conifers, suppressed hardwood trees, dominant and codominant crown class conifers, and old-growth trees.

Douglas-fir dwarf mistletoe occurs in stands throughout the project area. This pathogen reduces vigor and makes the trees susceptible to bark beetles and other pathogens. Although many of the heavily infested trees are still alive at this time, small patches of 100% mortality can be found and future mortality will probably increase. Douglas-fir that invaded the dry pine sites are experiencing moisture stress and are also being killed by Douglas-fir bark beetle. Pine series stands have experienced high levels of tree mortality due to stress caused by the competition from Douglas-fir trees and subsequent attacks by the western pine beetle. The pine engraver beetle *(Ips pini*) are now attacking trees in the Lake Creek area.

Mature/Old-growth (21 inches + DBH)
In the project area, small timber stands in this condition class are usually found in cool, moist microenvironments at higher elevations. Most of these stands are south of the Dead Indian Road. The oldest trees are found along streams and in topographic areas with favorable north to east aspects where protected from fire. According to stand inventory data, there are 7,917 acres of large sawlogs stands (21 inches DBH+) in the sale area. Most of these stands are in the mature seral stage with multiple canopy layers. Dominant crown class trees 361 years of age and younger, large diameter and large diameter limbed trees are present with a variety of other age class trees beneath (vertical structure, multi-cohort stand). A minimum of 4 canopy layers are present. Many of the mature stands in the project area have been infected by Douglas-fir dwarf mistletoe. In these stands, where many of the trees have a dwarf mistletoe rating (DMR) of 5 or 6, mortality is beginning to create openings in the canopy.

The ROD and RMP define the mature seral stage as the point when stand growth slows to the time when the forest develops structural diversity; approximately age 80 to 200. Old-growth is defined as the stage which constitutes the potential plant community capable of existing on a site given the frequency of natural disturbance events. This stage exists from approximately age 200 until stand replacement occurs and secondary succession begins again. For purposes of inventory, old-growth stands on BLM-administered lands are identified if they are at least 10% stocked with trees of 200 years or older and are 10 acres or more in size. For purposes of habitat or biological diversity, the BLM uses the appropriate minimum and average definitions as provided by PNW publications 447 (U.S.D.A., 1980) and GTR-285 (U.S.D.A., 1991). Franklin et.al. (1981) states that the size of old-growth units should be at least 300 acres in size to function as old-growth forests, and that the working definition emphasizes structural and compositional characteristics rather than the conceptually important functional features that are difficult to measure.

The landscape pattern of the project area can be considered "coarse-grained" because of the varying stand structure and species composition. This is a result of natural disturbances, timber harvesting and a highly dissected topography that creates diverse site conditions. However, at the stand level, the landscape pattern can be considered more fine-grained when compared to historic stands.

Subtle changes in species composition and stand structure are occurring over the landscape. Many trees with old-growth characteristics are dying as a result of increased competition with second growth trees for limited resources. Mortality is also occurring in mid to mature vegetation classes due to heavy Douglas-fir dwarf mistletoe infection. Douglas-fir, the climax species for the majority of the forested area, is replacing ponderosa pine, sugar pine and incense cedar because of its more shade-tolerant nature. In some areas white fir is migrating to lower elevations and encroaching upon the Douglas-fir tree series. Douglas-fir is also encroaching upon the edges of the oak woodlands, although mortality of Douglas-fir along these edges has been noticeable during the last few years. Whiteleaf manzanita and ceanothus

species are migrating into the oak woodlands and replacing the oaks, pines, and native grass species. In the mid-size vegetation condition class, suppressed shrubs and hardwood trees beneath the dominant tree canopy layer are dying. Pacific madrone and white and black oak have dropped out of conifer stands where light and water have become limiting. Dead whiteleaf manzanita may be found in the understory of some conifer stands and is indicative of a vegetation shift from shrubs to trees. This trend also indicates that whiteleaf manzanita is probably the species that will pioneer the site following future disturbance. Other shrub species dying out of the conifer stands include deerbrush ceanothus, creambrush oceanspray, and serviceberry.

It must be recognized that we are observing the landscape vegetation of today at one single point in time. Although current vegetation stem densities are high and are mostly in the late seral stage, the vegetation condition classes of today are atypical when compared to historic vegetation. This is due primarily to the effects of fire suppression on the landscape. It must also be recognized that with or without silvicultural management, the vegetation will be changing continuously because of natural succession. There is no single state of a forest that is the only natural state. The recommended prescriptions in this document will be cultivating late-successional characteristics such as variable stand structure and more vigorous growth within the stands. Ten to forty years from now most of the mature stands will be composed of trees larger than 20 inches DBH, although even-aged, mid size stands without residual old-growth trees may still require an additional 150 years to develop mature/old-growth characteristics.

Coarse Woody Material

The overall average amount of coarse woody material (CWM) is 5.7 tons per acre in the Indian Soda area. The coarse woody material stem diameters were concentrated in the 3 to 31 inch classes at the large end and averaged 28.5 feet in length. Coarse woody material was most often found to be in a decomposition class 3 which is characterized by very little bark, no twigs, but a solid stem.

Insects, Disease, Forest Health

Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*) is a significant pathogen throughout the project area with approximately 3,908 acres infected to some degree. The most heavily infected trees are found in the mature and mid vegetation classes but the smaller diameter classes are also becoming infected. Infections are sometimes systemic and form massive globose brooms. Heavy infections result in growth loss, wood quality reduction, top-killing and mortality. Although the spread of the infection is slow, as the trees lose vigor from the mistletoe infection the susceptiblity to attack from insects and pathogens increases. Mortality is evident in some stands.

Bark beetle infestations are occurring in the project area. Western pine beetles (*Dendroctonus brevicomis*) are attacking the large diameter pines while flatheaded fir borers (*Melanophila drummondi*) and Douglas-fir beetles (*Dendroctonus pseudotsugae*) are killing Douglas-fir. At the higher elevations the fir engraver beetle (*Scolytus ventralis*) is killing mistletoe and disease stressed true firs. In the Lake Creek area the pine engraver beetle *(Ips pini*) is killing small patches of trees. Drought conditions and high stocking levels are severely stressing the trees physiologically, enabling the beetles to enter and kill the trees. The average tree vigor rating as measured by leaf area index is 72 for Douglas-fir and 29 for ponderosa pine. Trees with vigor ratings below 30 will succumb to attack from bark beetles of relatively low intensity. Trees with vigor between 30-70 can withstand progressively higher attacks but are still in danger of mortality from the insect attacks. Trees with a vigor rating of between 70-100 can generally survive one or more years of relatively heavy attacks and trees with ratings above 100 cannot be killed by bark beetles.

Forest pathogens are also changing the forest stand structure and forest development pattern. Laminated

root rot (Phellinus weirii) is the most prevalent root disease. This is a disease of the site, and the fungus grows at a rate of about one foot per year. It can be identified by looking for rust colored mycelium between pitted layers of wood. Annosus root rot (Fomes annosus) is also found in the project area. Infection sites can be identified by pockets of dying trees. It looks much like laminated root rot but the wood laminations are only pitted on one side with no fungal material between layers. Conks are shelved, have a concentrically furrowed, dark-brown upper surface, an underside that is creamy white with minute pores, and a narrow poreless outer margin. Old conks look black.

On dry sites at lower elevations, Phellinus pini (red ring rot) is affecting Douglas-fir and ponderosa pine. It is apparent that the disease is most common in stressed trees. Some of the infected trees are beginning to die or are subject to stem breakage thus allowing light to reach the forest floor and the understory reinitiation to begin. Brown cubical butt rot (Phaelous schweinitzii) is also present.

Trees in the project area are growing at the lowest levels since stand establishment in the 1800s. Ten year radial growth is approximately .86 inches in the Conde Shell area and .70 inches in the Indian Soda area. Stand vigor is decreasing because timber stands are significantly overstocked. Relative density index ratings indicate that stands are at the point of imminent mortality and suppression (RDI of .55; crown closure occurs at a RDI of .15). Relative density index is the ratio of actual stand density to the maximum stand density attainable in a stand with the same mean tree volume. Many stands in the project area have a relative density of over .700, so in regard to stand growth and vigor the forest is not healthy (see attached figure which illustrates 10-year diameter increment tree growth). It should also be pointed out that even if some of the stands are thinned in the near future, mortality of some trees may continue due to prolonged stresses that they have been subjected to. Forest stands on good sites may release as soon as 2 years after thinning; 3 to 4 years on harsher sites. Decreases in tree vigor and growth have contributed to an overall decline in forest health.

Forest health is quantified by assessing the physical environment itself, the forest's resistance to catastrophic change, tree mortality, changes in tree growth and vigor, changes in species composition, erosion, water drainage, stream flow, and nutrient cycling.

A healthy forest ecosystem has the physical environment, biotic resources, and trophic networks necessary to sustain processes and viable populations of indigenous species. When these criteria are met, the ecosystem is able to maintain its productivity and resilience over time when exposed to drought, wildfire, insect attack, or human-induced changes. The South Fork Little Butte project area may not be resilient to catastrophic change. As mentioned earlier, vegetation densities are very high and ladder fuels are abundant. Vegetation mortality is already occurring because of dwarf mistletoe infection, root rot diseases, plant competition and expanding bark beetle populations, so the stage is being set for catastrophic stand replacement fires. Stand species composition and structure shifts previously discussed in the vegetation class description sections could also be considered unhealthy. The replacement of ponderosa pine by Douglas-fir increases the percentage of drought-susceptible trees in a stand, therefore, the risk of beetle infestation and/or wildfire also increases. The high species composition of true fir species increases the chances of mortality by root rot diseases.

Specific Stand Data

ORGANON (1992) was used to analyze data from 127 plots distributed throughout the project area. For individual stands, trees per acre ranged from 39 to 1,196; basal area per acre (BA/AC), 159 to 443 ft^2; and relative density index .271 to 1.283. Table 2 presents stand information for some of the Operations

Inventory (OI) units sampled in the South Fork of Little Butte project area.

Currently, the stocking levels of stands throughout the project area are high. This is primarily due to the lack of large-scale natural disturbance and fire suppression. The overall average for the project area is 279 trees per acre. Average radial growth for the past ten years is .76 inches. The average relative density for the area is .74 and indicates that physiologically the trees are at the point of suppression and mortality. **ANALYSIS IN SUPPORT OF PRESCRIPTION**

Desired Future Condition

A "coarse grained" landscape pattern should be the broad goal of forest management. Over time a wide range of stand densities, stand structural characteristics, age classes, species composition, and arrangement of stand components should be developed to create stands with late-successional characteristics (this implies uneven-aged management). A variety of species in various seral stages of development is important. The landscape must be managed so that connectivity of Mature/Old-growth stands is maintained where possible after considering anthropogenic influences. Ten to forty years from now most of the thinned stands will be composed of trees greater than 20 inches DBH. It must be reemphasized that the present day even-aged, single storied stands without residual mature/old-growth trees may still require an extended period of time to develop the desired characteristics. These stands must be shifted from the stem exclusion stage, to the understory reinitiation stage, and finally to the old-growth stage.

Due to the past drought conditions, cavitation of the tree sapwood may have occurred in the codominant and dominant tree classes. This, in combination with overstocked stand conditions, has resulted in severely stressed trees with small live crown ratios. Therefore, more tree mortality may occur before these trees can be released and some stand mortality may occur after timber harvesting. Some of the treated timber stands may only experience improved tree vigor with increased precipitation and time.

Stand densities should not be allowed to reach the point of imminent mortality and suppression. This point is reached when the relative density index is .55 or greater. The relative density index of Douglas-fir stands should range between .35 and .55. Table 3 shows the recommended stocking levels necessary to lower stand relative densities to an acceptable level. Harvesting greater amounts of basal area per acre would result in the removal of more growing stock than necessary.

Stand densities should be lower on pine sites, ridges, and droughty areas in order to maintain maximum health and stand resiliency. The Applegate Adaptive Management Area Ecosystem Health Assessment recommends 60 to 120 ft^2 BA/AC as an acceptable level of basal area in these areas. On these sites the relative density index may be below .35 because there is evidence that heavy thinning to a relative density index of .25 is necessary for the development of the understory and vertical diversity (Hayes et. al., 1997). In contrast, this is considered to be a heavy thinning in Douglas-fir stands and landscape designing should be used for locating the desired areas for heavily thinned stands.

Dense pole and small sawlog timber should be harvested from around the crowns of trees with old-growth characteristics to ensure their survival. Resulting stand densities should be lower than present levels though the stand densities will still be higher than historic levels as discussed in a previous section of the prescription. The ROD and RMP directs that stands must not have fewer than 16 trees per acre. Biologically, good sites in the Little Butte watershed may support approximately 44 healthy trees per acre that are 30 inches DBH.

On harsh sites the species composition of stands should contain at least 25% ponderosa pine, which is a drought resistant species. These species exhibit characteristics that allow them to avoid and tolerate desiccation. Hydration of the protoplasm and stomatal closure characteristics effect the rate of photosynthesis. Stomatal closure occurs at higher water stress levels in ponderosa pine than in Douglas-fir, grand fir or sugar pine. As stomata close, resistance to CO_2 transfer increases and rates of photosynthesis decrease. Closure of the stomata allows trees to conserve water. Ponderosa pine can maintain higher levels of photosynthesis as foliar stress builds up to -12 atmospheres and then drops as stress increases. On these harsh sites, hardwood species, especially large diameter trees, should also be maintained in stands. In some conifer stands, where Pacific madrone is the predominant species in the understory, prescribed fire will be needed to control the sprouts. Variety in the arrangement of species is also important.

Higher elevation mixed conifer stands should not have more than 10 percent true fir species. These sites are best suited for Douglas-fir and pine species. At the highest elevations northeast of Table Mountain, the predominantly white fir stands will remain at high stocking levels of white fir. Over time more Douglas-fir should be favored in natural and man-made openings.

Diverse stand structure (horizontal and vertical) is also necessary to support a wide variety of species. Wildlife species respond to ecological characteristics of trees regardless of forest age. Future stands should be multi-cohort stands with as many vertical layers of vegetation as the endemic species permits. Trees should develop large crowns, large diameter limbs, and deep fissures in the bark. A variety of seral stages will also add to the diversity. The end result should be a healthy forest ecosystem that has the physical environment, biotic resources, and trophic networks capable of sustaining processes and viable populations of indigenous species. An ecosystem that, when exposed to drought, wildlife, insect attack, and human-induced changes, remains productive and resilient over time.

Table B-2. Diameter Growth in Thinned vs. Unthinned Stands Grown For 20 Years

O.I.# POLES MID MATURE	STAND AGE (BREAST AGE)	PRESENT BA/AC (ft^2)	PRESENT TREES PER ACRE	PRESENT 10-YEAR INCREMENT (INCHES)	PRESENT AVG. DBH	PROJECTED DBH IN 20 YEARS (INCHES) UNTHINNED	PROJECTED DBH IN 20 YEARS (INCHES) THINNED
Poles							
122079	82	304	493	0.24	10.6	12.5	20.4
122704	22	159	1,196	1.65	4.9	6.9	12.2
122740	63	186	351	1.71	9.9	14.7	20.6
Mid							
120135	110	290	462	0.45	10.7	12.4	17.1
120140	92	216	239	0.80	12.9	15.9	16.3
120146	104	259	249	1.06	13.8	16.6	24.3

O.I.# POLES MID MATURE	STAND AGE (BREAST AGE)	PRESENT BA/AC (ft^2)	PRESENT TREES PER ACRE	PRESENT 10-YEAR INCREMENT (INCHES)	PRESENT AVG. DBH	PROJECTED DBH IN 20 YEARS (INCHES) UNTHINNED	PROJECTED DBH IN 20 YEARS (INCHES) THINNED
120179	91	304	208	1.02	16.4	19.1	26.5
120187	89	288	202	1.17	16.4	18.6	27.4
120214	131	222	280	0.60	12.1	14.3	19.7
120217	76	290	399	0.35	11.5	13.6	19.9
120221	94	257	332	0.75	11.9	13.7	18.3
120256	87	253	112	0.85	20.3	23.0	25.7
120412	94	228	300	1.00	11.8	13.7	19.7
120466	72	265	233	0.90	14.4	16.6	22.2
123105	98	240	179	1.50	15.7	17.9	30.9
124444	107	443	268	0.36	17.4	18.9	16.2
Mature							
120147	139	258	212	0.55	14.9	16.5	34.0
120201	87	327	336	0.70	13.4	17.6	25.5
120250	85	236	119	0.60	19.1	22.6	27.2
120482	79	199	273	1.05	11.6	13.6	12.7
120483	86	249	471	0.60	9.9	12.4	24.4
122760	123	229	184	0.55	15.1	16.7	20.2
122867	96	230	176	0.65	15.5	18.1	22.2
123548	149	163	105	0.95	16.9	19.4	20.8
124305	107	364	256	0.48	16.1	19.7	30.0
124469	103	286	339	0.80	12.4	15.5	24.8
124640	96	306	308	0.78	13.5	15.4	25.6

Table B-3. Recommended BA/AC (ft^2) to Lower Stand Relative Density to an Acceptable Level

O.I.#	PRESENT BA/AC (ft^2)	PRESENT RELATIVE DENSITY	RECOMMENDED BA/AC (ft^2)	RESULTING RELATIVE DENSITY
Poles				
122079	304	1.025	126	.349
122704	159	.726	95	.349
122740	186	.647	113	.348
Mid				
120135	290	.975	118	.349
120140	216	.677	124	.373
120146	259	.789	136	.349
20179	304	.866	140	.349
120187	288	.826	142	.349
120214	222	.714	126	.349
120217	290	.947	126	.349
120221	257	.830	78	.201
120256	253	.661	140	.349
120412	228	.740	122	.349
120466	265	.561	185	.350
123105	240	.697	150	.349
124444	443	1.232	118	.354
Mature				
120147	258	.762	159	.349
120201	327	1.010	148	.349
120250	236	.634	145	.349
120482	199	.526	134	.369
120483	249	.868	134	.349
122760	228	.546	128	.284

O.I.#	PRESENT BA/AC (ft^2)	PRESENT RELATIVE DENSITY	RECOMMENDED BA/AC (ft^2)	RESULTING RELATIVE DENSITY
122867	230	.669	128	.349
123548	163	.372	160	.354
124305	364	1.041	151	.349
124469	286	.909	138	.349
124640	306	.940	140	.352

Recommended Treatment or Action

In order to reduce the density of all vegetation over the landscape, reduce fuel loading, support ecosystem based management, and create structurally diverse forest stands. A combination of 3 silvicultural methods will be used to treat the landscape vegetation.

The recommended prescriptions can be considered conservative because only 5 OI units in the Douglas-fir tree series will be regeneration harvested, and a minimum number of group selection areas will be created across the landscape. More regeneration harvesting will be performed on ponderosa pine sites and in areas of severe mistletoe infection. All of the recommended prescriptions are designed to retain the largest tree DBH classes, restore the vigor of the forest lands, and keep silviculture options open for the future. The selection harvest treatments will help to promote vertical stand structure and encourage diversity in species.

Commercial Thinning of the Pole, Mid, and Mature/Old-growth Condition Classes

The majority of the commercial acreage would be commercially thinned. The areas to be thinned will have the highest stocking densities and will be located between the group selection and selection areas. The treatment will be a combination of crown spacing and basal area thinning. Homogeneous Douglas-fir stands with constant amounts of basal area that fall within the range of 160 to 443 ft^2 per acre will be treated using basal area guidelines to reduce basal area to between 100 and 180 ft^2 per acre. Crown spacing will be used to release old-growth trees and desired early seral species.

Moist commercial Douglas-fir timber stands will be thinned to a 3 to 15-foot crown spacing. On dry Douglas-fir and pine sites, trees will be thinned to a 10 to 20-foot crown spacing. Trees recommended for harvest include suppressed, intermediate, and some codominant crown class trees with live crown ratios of less than 30%, trees lacking branches on one or more sides of the bole that are not conical in shape, dying trees with pitch tubes, a portion of the dead trees with salvageable wood, and trees with broken or forked tops. Second growth trees will also be thinned from around trees with old-growth characteristics to assure the survival of the dominant, structurally unique, old-growth trees. Table 4 shows the benefits of commercial thinning in regard to the capture of future tree mortality and an increase in tree growth. Two OI units were chosen to represent the mid and mature vegetation classes and were modeled in ORGANON to provide the data for Table B-4. The stands resulting from thinning more closely resemble historical stands in that they have larger and fewer trees per acre.

Table B-4. Description of O.I. Units 120179 and 124640 With and Without Silvicultural Treatment.

Existing Stand: 120179 (Mid stand)

Stand Age	Trees/ Acre	Basal Area	Scribner Volume	10 Year Change in Volume
100	208	304	51,087	---------
Future Growth of Stand if Not Treated (note the decrease in trees/acre through natural mortality):				
110	185	318	59,591	8,504
120	165	329	67,896	8,305
130	148	338	75,559	7,663
140	135	346	82,647	7,088
150	124	354	89,075	6,428
Future Growth if Stand is Thinned to a Relative Density Index of .35 (140 ft^2 Basal Area/Acre):				
110	47	159	31,185	5,921
120	47	178	37,699	6,514
130	46	196	44,365	6,666
140	45	212	50,781	6,416
150	44	227	56,917	6,136

Existing Stand: 124640 (Mature stand)

Stand Age	Trees/ Acre	Basal Area	Scribner Volume	10 Year Change in Volume
105	308	306	63,686	------
Future Growth of Stand if Not Treated (note the decrease in trees/acre through natural mortality):				
115	289	326	74,273	10,587
125	264	340	83,534	9,261
135	240	351	91,860	8,326
145	218	360	99,344	7,484
155	199	368	106,216	6,872
Future Growth if Stand is Thinned to a Relative Density Index of .35 (140 ft^2 Basal Area/Acre):				
115	51	160	40,869	7,299
125	51	180	48,786	7,917
135	50	200	56,789	8,003
145	50	219	64,600	7,811
155	50	236	71,992	7,392

Fast growing pole stands should be marked to a 3 to 15-foot crown spacing but due to better site conditions and trees with high crown ratios, more basal area per acre will probably remain.

Table B-5 shows the benefits of commercial thinning in regard to the capture of future tree mortality and an increase in tree growth. OI unit 122704 was modeled in ORGANON to provide data for the table.

Table B-5. Description of O.I. Unit 122704 With and Without Silvicultural Treatment.

Existing Stand: 122704 (Pole stand)

Stand Age	Trees/ Acre	Basal Area	Scribner Volume	10Year Change in Volume
29	1,196	159	10,821	-------

Future Growth of Stand if Not Treated (note the decrease in trees/acre through natural mortality):

39	1,044	201	19,055	8,234
49	883	232	29,000	9,945
59	738	253	39,745	10,745
69	614	267	51,153	11,408
79	513	276	62,469	11,316

Future Growth if Stand is Thinned to a Relative Density of .35 (95 ft^2 Basal Area/Acre):

39	226	131	14,633	3,812
49	220	177	26,137	11,504
59	212	218	40,367	14,230

Future Stand Treated at Age 59 by Thinning to a Relative Density of .35 (130 ft^2 Basal Area/Acre):

59	65	130	29,584	-------
69	64	162	43,052	13,468
79	63	191	58,215	15,163

Group Selection Openings
On dry ponderosa pine or Douglas-fir sites, 1-acre or smaller group selection areas will be harvested adjacent to suitable pine and seed trees creating openings arranged in a random, natural pattern. These openings are needed to increase the stocking level of ponderosa pine (ponderosa pine needs 25% full sunlight to grow) and incense cedar. Eighty ft^2 BA/AC of timber will be left standing around the group selection areas to allow more light to enter the openings and to create spatial variability. Tree crown spacing will be tapered from 234 feet in the group selection openings to 3 feet in the commercially thinned areas. In areas with a cool, moist microenvironment 1/7 to 1/6-acre group selection areas (88 to 96-foot diameter openings) around suitable Douglas-fir seed trees will be created to establish Douglas-fir seedlings.

Selection Harvesting for the Purpose of Creating Vertical Stand Structure
Pine series sites with oak species and whiteleaf manzanita will be selection harvested in order to reduce stocking

levels of undesired species, thus improving the vigor of the remaining pine trees. This will also create diverse stand structure when a new age class of pine trees is established below the existing vegetation. 16 to 30 of the largest conifer trees per acre would remain as well as an additional 10 to 20 ft^2 BA/AC of 7 to 11 inch DBH trees. All hardwood trees would also remain on site.

Ponderosa pine/native grass plant associations are also present. These areas will be treated so that pine regeneration can be established beneath the existing pine trees. All of the Douglas-fir trees that have encroached upon the pine sites will be removed, except for 60 to 80 ft^2 BA/AC that will be left standing around these areas for a radius equal to the average height of the existing stand.

Selection Harvesting for the Purpose of Releasing Natural Douglas-fir Seedlings and Saplings
In areas where closely spaced Douglas-fir seedlings and saplings are found beneath an overstory of mature trees, selection harvesting can be employed to remove some of the mature trees. It is recommended that no less than 16 trees per acre of various crown classes be left over the Douglas-fir regeneration. The areas of regeneration must be 1/7-acre in size (88-foot diameter patch) or larger. By removing overstory trees, the seedlings will be released to grow and vertical stand structure will be enhanced over time.

Selection Harvesting of Dwarf Mistletoe Trees
The stands that will be treated with the Dwarf-Mistletoe prescription are single and multi-storied natural stands consisting of large poles (11 to 21 inches DBH) and/or mature/late-successional trees. Stand structure is mostly in the stem exclusion stage but some areas of understory reinitiation stage will be encountered. Basal area and species composition are variable. A large percentage of the trees are infected with dwarf mistletoe and have DMR ratings of 2-6. There are dead and dying trees in the stand with evidence of bark beetles attacking the less vigorous trees.

The objective of treating these stands is twofold. One objective is to insure the future health and growth of the existing regeneration and to prevent the spread of dwarf mistletoe to uninfected mature trees. The second objective is to increase the species composition of early seral species such as pine and incense cedar thus enhancing species diversity and species resistance to mistletoe.

These areas will be divided into three zones with different treatments in each. The first zone is within 150 feet of a ridge top. All trees with visible dwarf mistletoe shall be removed with the largest openings being created no greater than 1 acre. If areas of 100% infection greater than 1 acre are found, infected trees with the lowest DMR ratings, or trees with broom types 2 and 3, will have to be left. ZONE 2 prescriptions will then apply. Openings shall not exceed one-third of this zone. For example, there should be at least 360 feet of timber between 1-acre openings.

Zone 2 starts past 150 feet from the ridge top and extends to the draw bottom. In this zone the mistletoe will be managed in clumps. All trees with visible mistletoe shall be removed without creating openings larger than 1-acre. Uniform patches of mistletoe infected trees will be removed by the group selection method. Where possible, group selection areas up to 1-acre in size will be created by marking infected trees around or adjacent to resistant species. If resistant species are not present, the group selection areas will be created where the highest concentrations of dwarf mistletoe are found. Openings shall not exceed one-fifth of this zone. The remaining patches of uninfected trees will be thinned to no more than a 15-foot crown spacing.

In areas of 100% infection greater than 1 acre, infected trees with the lowest DMR ratings will be left, or trees with broom types 2 and 3. One 1/2-acre patch of infected trees will remain for every 20-acres. A 30-foot crown

spacing shall be created around remaining infected patches removing all susceptible species. If there is more than one patch in the 40 acres, the remaining infected trees will be thinned to a 15-foot crown spacing. Uniform patches of dwarf mistletoe trees up to 1/2-acre in size will be left every 660 feet. An effort will be made to create the leave patches around infected old-growth trees.

The third zone is in the riparian areas. If possible, infected areas adjacent to riparian zones (ZONE 3) will be left. Between all infected areas, a 30-foot crown spacing will be created with adjacent uninfected forest stands. Resistant species will not be removed in this canopy opening area and throughout all zones.

In all zones, all infected old-growth trees, and all trees 34 inches DBH and larger with a DMR rating of 1 and 2 shall remain. A 30-foot crown spacing will be created around these trees, by removing susceptible species. One 1/2-acre patch of infected trees will remain for every 20-acres. When infected trees remain, trees with broom types 2 or 3 will be favored. .

It is recognized that Douglas-fir dwarf mistletoe is a necessary and often beneficial part of a healthy landscape. Mistletoe brooms provide a unique microenvironment and tree mortality resulting from infection creates natural openings in the stands. These prescriptions are an effort to confine the mistletoe to the areas where it is most desirable for silviculture and wildlife.

Shrubland and Woodland Treatments
Selected noncommercial treatment areas (shrublands and woodlands) will be treated by intermediate treatments (precommercial and commercial thinning), the individual tree selection method, and prescribed burning.

The objectives for treating the woodlands are as follows: reduce the fire hazard by thinning all vegetation and eliminating all ladder fuels; restore oak/native grass plant associations; enhance the vigor and quality of the hardwood species (mainly oak to induce acorn crops); use the coppice method to introduce another age class of hardwood species; and decrease the abundance of Douglas-fir and shrub species.

Individual, merchantable Douglas-fir trees can be harvested if ponderosa pine trees are also present (this saves the possible habitat and woody debris component of the ecosystem). Strips or patches of merchantable conifers and hardwoods within the woodlands, where favorable aspects and microenvironments exist, should be thinned to approximately 36 trees per acre (1 to 10 of these trees being conifers). Douglas-fir seedlings through the pole timber size classes should be cut. An occasional Douglas-fir tree may be left if no pine or incense cedar are available to leave. All trees with old-growth characteristics should remain and all the vegetation beneath these trees should be cut to ensure their survival. Cut suppressed and intermediate crown class oak trees to establish stump sprouts. Old, tall whiteleaf manzanita shrubs should remain that produce large berry crops. All other whiteleaf manzanita should be cut. Wedgeleaf ceanothus is also desired, but should be thinned to stimulate sprouting. The wedgeleaf ceanothus shrubs should be cut to heights varying from 6 inches to 3 feet.

The objectives for treating the shrublands are as follows: increase wildlife forage production and quality, decrease fire hazard by reducing the stocking levels and ladder fuels of the shrub species, eliminate or reduce the abundance of noxious weeds, and prevent the encroachment of Douglas-fir.

Individual, merchantable Douglas-fir trees can be harvested if ponderosa pine trees are also present. Douglas-fir seedlings through the pole timber size classes should be cut. All trees with old-growth characteristics should remain and all the vegetation beneath these trees should be cut to ensure their survival. All ponderosa pine and incense cedar trees should be retained. All oak trees except for trees less than 6 inches DBH with crown ratios of

less than 10% shall remain. Leave old, tall whiteleaf manzanita shrubs (but prune the lower ladder fuel branches) that produce large berry crops at a 15 to 25-foot crown spacing. All other whiteleaf manzanita should also be cut to the 15 to 25-foot crown spacing. Wedgeleaf ceanothus should also be left, but cut the shrubs to various heights to stimulate sprouting. The wedgeleaf ceanothus shrubs should be cut to heights varying from 6 inches to 3 feet. Small patches of starthistle should be burned by piling slash on top of the patches and then burning them.

Dense manzanita patches can be thinned by cutting a series of trails to desired vegetation such as oak trees. Prescribed burning will also be used where understory fuels are light in the shrublands and woodlands.

Prevention/Avoidance Strategies

Competing vegetation can be shrub, tree, or herbaceous species. When the land management objective is timber production, shrub and herbaceous species are considered as "competing" for the available growing space. When the land management objective is forage production, tree species may be considered as the undesirable species. Because of the large area and the variable site conditions of the proposed project area, a variety of competing plant species are likely in all of the vegetation condition classes.

Competing vegetation may become a problem in the areas harvested by the single tree selection method. Here large openings in the crown canopy layer will be created. Openings as large as 20 to 35 feet between tree crowns may be created and heavy slash accumulations are anticipated. In the PSME/BENE plant association, California hazel, dwarf Oregongrape, thimbleberry, and creambrush oceanspray may become established, or resprout, at the same time as the conifer regeneration. Gravelly soils can compound this problem. It is recommended that prescribed fire (cool, fall underburning) be used in these areas to alleviate the fire hazard and for establishing Douglas-fir regeneration. As an alternative, slash could be handpiled on top of existing patches of shrubs and burned.

In the PSME/RHDI-BEPI or PSME/RHDI plant associations, poison oak, deerbrush ceanothus, whiteleaf manzanita and grass species are likely to invade. Prescribed burning may suppress these species long enough for conifers to become established, but fire will stimulate the growth of grass and ceanothus species. Fire may also kill desired tree species if their roots are too close to the soil surface (this may occur where the organic matter on the soil surface is 2 inches deep or greater). Prescribed underburning is appropriate for reducing areas of dense grass, shrubs, and herbaceous species for the purpose of reducing competition for available soil water. In the pine series forests, prescribed fire is also essential for preparing suitable seedbeds for the pine seed. Scalping is also an alternative for reducing the competing grass and ceanothus species. Deerbrush ceanothus and hardwood stump sprouts may also become a problem in these plant associations after the use of fire. Deerbrush ceanothus could be a severe problem in the Heppsie Mountain and Lake Creek areas. Prescribed burning can be used at a later time (2 to 5 years) to control competing vegetation. From an economics standpoint, prescribed underburning is less expensive than mechanical or manual methods. The prescribed fire must be cool to prevent the stressing of trees and tree mortality.

The same problems will probably be experienced in the group selection harvest areas and the same treatment is prescribed. Special logging slash prescriptions should be used in the Lake Creek area to prevent a population increase of *Ips* pine engraver bark beetles. The prescription will be discussed in the Recommended Design Features section.

After timber harvesting in the commercial thinning areas, shrub and grass species may become established after harvest, but this vegetation will again become suppressed when the crown canopy layer begins to close. Pacific madrone and oak tree species should not be a problem in regard to competing for available growing space in the

thinned areas. The majority of these species are suppressed, well below the height of the codominant and dominant conifer trees and will probably not release. The number of these small diameter trees in the understory (4 trees per acre) is not perceived to be a problem. Prescribed underburning would be appropriate where dense mats of grass and other herbaceous vegetation will compete for soil water with the tree species.

No competing vegetation problems are anticipated in the hardwood/woodlands and shrublands if future maintenance of these areas is performed with prescribed fire as planned. In some oak woodlands, whiteleaf manzanita and Douglas-fir will probably encroach again, but cool underburning every 3 to 10 years after the first manual treatment should control these species. The oak woodlands should also be seeded with native grass species and the grasses may out- compete the manzanita, Douglas-fir, and even noxious weed and non-native grass species. The same philosophy applies to the shrublands.

IMPLEMENTATION PLAN

Recommended Design Features

The following treatments should be applied to respective EA units:

Commercial Timber Harvest Units

In higher elevation mixed conifer and white fir units where the single tree and group selection methods are used, logging slash should be handpiled and burned (swamper burning). This site preparation treatment should also be used in the areas marked for heavy mistletoe mortality and in pine series areas where hardwoods may have been harvested so that early seral species can be planted. Prescribed, fall underburning is an option in the pine series forest stands in order to eliminate slash and prepare suitable seedbeds. The low quality, non-merchantable trees should be slashed prior to slash treatment. In areas where few trees are harvested, lopping and scattering of slash would be sufficient.

In all Lake Creek pine series stands and dry Douglas-fir stands, logging slash should not be handpiled because this is beneficial for *Ips pini*. Ips have several generations per year, so some small (preferably smaller than 4 inches in diameter) green slash should be available spring through summer to absorb populations. Logging slash should be as small as possible and scattered into openings if possible, which would allow the slash to dry and kill the beetle larvae. Slash should only be created through the end of December. The last emerging adults will overwinter in the duff, and if there is no fresh green slash available when they emerge in the spring, they will disperse. Cool, fall prescribed burning is an option for slash removal as long as tree roots are not damaged. Stressed trees are subject to beetle attack.

In moist and dry Douglas-fir units where only commercial thinning is performed, logging slash should be lopped and scattered if the tree tops are removed. If tops are not removed the slash should be handpiled and burned (swamper burning). Prescribed, cool underburning would benefit some Douglas-fir timber stands that have dense mats of grass or shrub species.

After timber harvest, non-merchantable trees with undesirable silvicultural characteristics should be slashed. In areas where precommercial thinning is prescribed, all non-merchantable trees should be cut except the largest live conifer trees that meet the following criteria:

1) Minimum 4-inch terminal leader with at least the top 40 % of the tree containing live limbs.
2) Non-chlorotic, light or dark green with very little or no yellowish tint.
3) Undamaged top.
4) Free of visible disease, cankers, fire damage, or blister rust.

5) Demonstrates good form and vigor.
6) No multiple tops or ramiforms.

In the absence of conifers that meet the above definition for an acceptable crop tree, include any live conifer seedling that is at least three (3) feet tall that falls within the spacing guidelines.

In the absence of conifer trees, hardwoods will be considered acceptable crop trees. The order of preference will be bigleaf maple, Oregon ash, willow species, any oak species, and Pacific madrone. Space the acceptable conifer and hardwood trees at a variable spacing (12 to 18 feet).

In all prescription areas, 1/7-acre in size and larger, where overstory trees were marked to release healthy, Douglas-fir seedlings through saplings, the natural regeneration would be precommercially thinned. Seedlings (0-2 inches DBH) should be thinned to a 12 x 12-foot spacing; saplings (2.1 to 4 inches DBH) to an 15 x 15-foot spacing; and poles (4.1 to 7 inches DBH to a 18 x 18-foot spacing.

Throughout the entire project area, all saplings through pole (7 inch DBH and smaller trees) timber should be slashed within the dripline of the old-growth trees that were released with the 15 to 25-foot crown space.

Noncommercial Hardwood/Woodland Units
- Seed native or suitable non-native grasses after treatment.
- Leave a 350 x 125-foot untreated area for every 10 acres in every unit.
- Harvest and yard specified merchantable conifer timber within shrublands and woodlands where stand densities are too high.

Coarse Woody Material
Information Bulletin No. OR-97-064 (1996) states that, "prescriptions should account for current habitat conditions and the timing and development of subsequent snags and coarse woody material (CWM) until the next stand once again begins to contribute CWM. Leaving green trees and felling to provide a source for CWM should be part of the partial harvest prescription."

Historically, much of the project area was very open with few old conifer trees per acre. On northerly and some east aspects with moist environments, uniform forest stands were found. The forests of today originated from the late 1800 and early 1900 fires and fire suppression. As a result of fire suppression the present day forests are now overstocked. Tree vigor began to decline approximately 30 to 50 years ago. Ponderosa pine shows signs of growth decline as long as 80 years. The overstocked stands along with the drought conditions of the 1980's through 1995 have allowed for extensive tree mortality. In some places there may be more snags today than in historic times. Therefore, the 5.4 tons/acre of CWM on site in the Indian Soda area may well reflect average conditions for mature seral stands on harsh sites.

Because of the unique habitat created by the large coarse wood and the surrounding vegetation it is recommended that the existing microenvironment remain intact. Where coarse woody material is found that is 20 inches in diameter at the small end, and a minimum of 8 feet long, all trees immediately surrounding this wood shall be left standing to provide shade. This recommendation will apply to all prescription areas.

The majority of the project area will receive intermediate type harvest methods (commercial thinning). It is suggested that all Stage 1 snags be left in the interior of homogeneous conifer stands. Homogeneous conifer stands should be inventoried after harvesting by wildlife biologists to see if snag requirements have been met. If not, damaged or diseased trees should be designated for girdling. In areas adjacent to shrublands and woodlands where tree mortality has been high, it is recommended that 25% of the snags less than 17 inches DBH and 66% of

the snags 17 inches DBH and larger be retained. Stand inventory data for Unit 120221 in the Indian Soda area indicates that there are 76.5 trees/acre with an average DBH of 10.5 inches that are damaged *(Fomes pini*, and physical defects). Some of these trees may also be retained as green tree retention. The information bulletin also states that 15 to 20% groundcover of downed woody debris or 4.5 to 10 tons of fresh downed woody debris is adequate after timber harvest. Therefore, the debris created by partial harvesting in combination with existing CWM and the recommended snags to be retained is sufficient to meet CWM requirements.

Subsequent Treatment Planned

The proposed silvicultural methods suggests uneven-aged management over very long periods of time (over 100 years) to create structurally diverse, multi-cohort mixed species timber stands as proposed in the Medford District RMP.

After the proposed treatments are performed, the options for future treatment are many. Future management objectives will determine when the commercial forest lands are harvested again. Landscape analysis and design should also determine which types of silvicultural treatments are applied and in what pattern across the landscape. ORGANON analysis shows that if the objective is to perform a regeneration harvest when there are 16 trees per acre, 20 inches DBH and larger available to leave, the large pole and mature vegetation condition classes can be entered in 10 to 40 years. For pole stands to reach this condition it would take approximately 40 years. If the management objective is to manage strictly by density levels (high RDI), pole stands through mature stands can be entered in 30 to 60 years.

At the time of the next stand entry, existing group selection areas can be released and additional group selection areas can be created.

The single tree selection, group selection, and regeneration harvested stands should be planted with the appropriate planting stock. The pine group selection areas should be planted with 1-0 or 1-1 ponderosa pine stock at a 16-foot spacing. The 1/6 and 1/7-acre Douglas-fir group selection areas should not have to be planted. Douglas-fir mistletoe sites will have to be planted.

Two year old or older planting stock should be used. The pine sites should be planted with 90% ponderosa pine and 10% incense cedar at a 16-foot spacing. Douglas-fir regeneration sites should be planted with 100% Douglas-fir at the same rate of stocking. Douglas-fir mistletoe sites should be planted with a mix of species. Around overstory trees still having mistletoe, pine species or incense cedar should be planted. Mistletoe free areas should be planted with Douglas-fir. The planted sites should have stocking surveys and maintenance performed as recommended by BLM standards.

After manually treating the hardwood/woodlands and shrublands, prescribed fire should be used for the maintenance of these areas. In the oak woodlands where the production of frequent acorn crops is desired, cool, prescribed burning should be performed every 3 to 5 years. The shrublands can be burned as necessary to develop the desired seral stages of vegetation.

Avoidance Strategies for Animal Damage and Forest Health

At this time no serious problems with animals are anticipated. After performing density management, more early seral stage vegetation will become established and blacktail deer populations may increase. Unburned slash piles may create habitat for rabbit species and isolated pockets of seedling damage may result. Tree tubing may be required at a later date.

After the trees respond to release, they should be more resilient to pathogens and insects. Density control of the forest stands is essential to prevent the occurrence of these biotic agents. Any heavily infected dwarf mistletoe stands should be managed over time to lower the rate of infection. In the group selection areas seedlings and saplings with mistletoe should be thinned out.

In the white fir series stands, all white fir stumps should be treated with borax to prevent the spread of *Fomes annosus*. CWM in the white fir area may also be critical for keeping gopher populations in check. This may provide habitat for essential predator species.

Monitoring Recommendations

The monitoring plan for the South Fork Little Butte Creek Project has been expatiated by an interdisciplinary team during the environmental analysis process. Monitoring will be focused on selected study areas. In general, site characteristics and trends will be described and measured before and after activities take place. Monitoring is necessary to validate proposed prescriptions and assumptions made about the prescriptions to see that stated objectives are attained. The following disciplines will be monitored as described:

1. Silviculture/Forest Health
   - Forest stands will be implementation and effectiveness monitored for the following characteristics:
   - Forest stands are being monitored for vigor by using relative density as an index, leaf area index and sapwood radial growth.
   - Individual tree growth is being measured over time in representative stands on permanent plots in a releasability study. Large and old-growth ponderosa pine and Douglas-fir are of particular interest.
   - Occurrence of natural regeneration and survival of planted seedlings in established group selection and regeneration harvest areas.
   - Oak woodlands will be monitored for vegetational response to fire and thinning.

2. Fuel Hazard and Risk
   - Fuel characteristics (loading) will be measured before and after treatments in all vegetation types. Size and composition of fuel related to structure will be assessed at regular intervals. The potential fire hazard and rate of spread will be evaluated for treated and untreated areas.
   - Particulate matter generation will be measured during selected prescribed burning episodes.

3. Soils
   - Soils will be monitored for erosion and compaction by type and location before and after prescribed treatments.

4. Wildlife
   - Wildlife populations and habitat will be inventoried on both treated and untreated areas. In addition, the layout of protection buffers, Siskyou salamander habitat, spotted owl sites, great grey owl sites, and caves used by bats will be monitored.

5. Air Quality
   - Particulate matter and air opacity are being monitored.

6. Contracts

- Contract work will be developed and performed to meet watershed analysis objectives. Contract work results will be monitored.

REFERENCES

Atzet, T. and David L. Wheeler. 1984. Preliminary plant associations of the Siskiyou Mountain province. U.S.D.A., Forest Service Pacific Northwest Region.

Hayes, John P., et. al. 1997. Wildlife response to thinning young forests in the Pacific Northwest. Journal of Forestry, Vol. 95, No. 8, p.28.

U.S. Department of Agriculture, Forest Service. 1981. Ecological characteristics of old-growth Douglas-fir forests. General Technical Report PNW-118, Pacific Northwest Forest and Range Exper. Sta..

Oregon State University, Department of Forest Resources. 1992. ORGANON user's manual. Corvallis, OR.

U.S. Department of Agriculture, Forest Service. 1986. Interin definitions for old-growth Douglas-fir and mixed-conifer forests in the Pacific Northwest and California. Research Note PNW-447, Pacific Northwest Research Station.

U.S. Department of Agriculture, Forest Service. 1991. Wildlife and vegetation of unmanaged Douglas-fir forests. General Technical Report PNW-GTR-285, Pacific Northwest Research Station.

U.S. Department of Agriculture, Soil Conservation Service. 1993. Soil survey of Jackson County area, Oregon. Portland, OR.

U.S. Department of Agiculture, Forest Service. 1996. Field guide to the forested plant associations of Southwestern Oregon. Technical Paper R6-NR-ECOL-TP-17-96.

U.S. Department of Agriculture, Forest Service, U.S. Department of the Interior, Fish and Wildlife Service, U.S. Department of the Interior, National Park Service, Environmental Protection Agency, U.S. De partment of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, and U.S. Department of Interior, Bureau of Land Management. 1994. 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. Portland, OR.

U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management. 1994. Record of decision (ROD) for amendments to Forest Service and Bureau of Land Management planning documents within the range of the Northern Spotted Owl and standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the Northern Spotted Owl. Portland, OR.

U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management. 1997. Little Butte Creek watershed analysis. Medford, OR.

U.S. Department of the Interior, Bureau of Land Management. 1992. Western Oregon program-management of competing vegetation (Final Record of Decision). Portland, OR.

U.S. Department of the Interior, Bureau of Land Management. 1994. Medford District watershed analysis guidelines. Medford, OR.

U.S. Department of the Interior, Bureau of Land Management, Medford District Office. 1995. Medford District

Record of Decision and Resource Management Plan. Medford, OR.

U.S. Department of the Interior, Bureau of Land Management. 1996. Implementation of coarse woody debris standards and guidelines. State Office Information Bulletin No. OR-97-064 (11/20/96). Oregon State Office. Portland, OR.

Appendix C

Project Design Features

The PDFs with an asterik (*) are Best Management Practices (BMPs) to reduce nonpoint source pollution to the maximum extent practicable. BMPs are considered the primary mechanisms to achieve Oregon Water Quality standards. Implementation of PDFs in addition to establishment of Riparian Reserves would equal or exceed Oregon State Forest Practice Rules. BMP effectiveness monitoring would be conducted and where necessary, BMPs modified to ensure compliance with Oregon Water Quality Standards. The following PDFs apply to Alternatives B and C.

Roads (See Appendix D for details)

Road Decommissioning

a. Roads would be decommissioned using both natural and mechanical methods (Table D-4).*

b. Road decommissioning would occur the final dry season (June 1 to Sept. 15) of the contract period, while road construction and renovation would occur the first year of the contract (June 1 to September 15) in order to distribute the total amount of road-related ground disturbance over the entire contract period.*

c. Stream crossings would be reestablished to the natural stream gradient. This would be accomplished by removing the culvert and the road fill within the stream crossing areas. Remove fill material to extent of bankfull width. Stream side slopes would be reestablished to natural contours then seeded (with native or approved seed) and mulched. Excavated material would be removed from stream crossing areas and placed at stable locations.*

d. Ground disturbed areas on all decommissioned roads would be seeded with native or approved seed, fertilized, and mulched. No fertilizer would be spread within Riparian Reserves.*

Road Construction and Renovation (Tables D-1, D-2, D-3)

a. A seasonal restriction for road construction and renovation of September 15 to June 1 would be placed in the contract. This restriction could be waived under dry conditions and a specific erosion control plan (eg. rocking, waterbarring, seeding, mulching, barricading).* Road construction and renovation would not occur during the winter months when the potential for soil erosion and water quality degradation may take place. All construction activities would be stopped during a rain event of 0.2 inches or more within a 24-hour period or if determined by the administrative officer that resource damage would occur if construction is not halted. If on-site information is inadequate, measurements from the nearest Remote Automated Weather Station would be used. Construction activities would not occur for at least 48 hours after rainfall has stopped or on approval by the Contract Administrator.

b. Bare soil due to road construction/renovation would be protected and stabilized prior to fall rains.*

c. The fill slopes on all new roads would be seeded with native or approved seed, fertilized and mulched. No fertilizer would be spread within Riparian Reserves.*

d. Where possible, rolling grades and outsloping would be used on road grades that are less than 8%. These design features would be used to reduce concentration of flows and minimize accumulation of water from road drainage.*

e. Slash from road construction would be windrowed at the base of the fill slope to catch sediment.*

f. Temporary roads would be obliterated at the completion of log haul and site preparation. The roads would be waterbarred, mulched and barricaded if use is not competed by October 15.*

g. The old slide on road 37-2E-25.0 would be stabilized by insloping the road to route overland flow of water to the adjacent draw.*

h. The ingress and egress (approx. 300' on each side of the stream) to the reconstructed ford in Lost Creek (T.37S.,R2E.,Section 22) would have a bituminous surface treatment (BST).

Hauling Restrictions

A seasonal hauling restriction would be required on roads during the wet season (October 15 to May 15). This would protect the road from damage and decrease the amount of sedimentation that would occur. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions of the roads. Refer to Appendix D (Tables D-1, D-2, D-3, D-4) for all seasonal hauling restrictions.*

Quarries

Rock would be used to stabilize and minimize erosion on selected roads and landings.* Rock would be obtained from the existing quarry located in NE1/4 Section 13, T.37S., R.1E; NE1/4 and SW1/4 Section 23, T.37S., R2E; NW1/4 NE/4 Section 3, T.38S., R.2E.; and/or from the SW1/4SE1/4 Section 19, and SE1/4SW1/4 Section29, T.37S., R.3E. Rock encountered during construction activities could be used for road stabilization.

Culvert Installation/Replacement and Ford Installation

a. Instream work period on fish-bearing streams would be from July 1 - September 15.*

b. At all stream crossings the approach would be as near a right angle to the stream as possible to minimize disturbance to streambanks and riparian habitat.*

c. Road crossings on all fish-bearing streams would be designed to maintain natural streambed substrate and site gradient where feasible, while minimizing long-term maintenance needs; the specific design would also be based on expected longevity and economics.*

d. Stream crossing culverts that are replaced would be sized to accommodate 100-year flood events. The width of a crossing structure would be at least as wide as the mean bankfull width at the crossing site. Deviation to this general rule would be approved by the Hydrologist and Fisheries Biologist on a case-by-case basis.*

e. All perennial streams would be diverted around the work area in a manner (e.g. a pipe or lined ditch) that would minimize stream sedimentation. The contractor would be required to submit a plan for water diversion before instream work begins. Fish screens would be used on all diversions occurring in fish bearing streams. The diverted stream would not be returned to the channel through the project area until all instream work had been completed. The resource area fish biologist would be consulted before deviating from this practice. If it is impractical to dewater a stream channel, the work would be scheduled toward the end of the instream work

period.*

f. The use of settling ponds, straw bales, geotextile fabric or coconut fiber logs/bales immediately downstream of the instream work area would be used to reduce movement of sediment downstream from the project site.*

g. To restore streambed habitat complexity inside new crossing structures, lining the bottom of the crossing structure with 1-3 foot diameter boulders may be used. (The streambed is usually uniform following preparation of a new site or when replacing an existing pipe. Boulders that are placed in replacement pipes must be large (high) enough so that they are not buried by streambed substrate that may have been deposited immediately upstream of the inlet of the original pipe.) A prediction model would be used to determine the size of boulder needed to ensure stability at the estimated 100 year peak flow.*

h. Projects would be designed to ensure upstream movement of other aquatic species.*

i. Fill material over stream crossing structures would be stabilized as soon as possible after construction, before October 15. Exposed soils would be seeded and mulched. Work would be temporarily suspended if rain saturates soils to the extent that there is potential for environmental damage, including movement of sediment from the road to the stream.*

j. Location of waste stockpile and borrow sites would not be located within Riparian Reserves.*

k. The contractor would be responsible for meeting all state and federal requirements for maintaining water quality. Standard contract stipulations would include the following:
   - Heavy equipment would be inspected and cleaned before moving onto the project site in order to remove oil and grease, noxious weeds and excessive soil.*
   - Hydraulic fluid and fuel lines on heavy mechanized equipment must be in proper working condition in order to avoid leakage into streams.*
   - Waste diesel, oil, hydraulic fluid and other hazardous materials and contaminated soil would be removed from the site and disposed of in accordance with DEQ regulations. Areas that have been saturated with toxic materials would be excavated to a depth of 12 inches beyond the contaminated material or as required by DEQ.*
   - Equipment refueling would be conducted within a confined area outside Riparian Reserves.*
   - Use spill containment booms or other equipment as required by DEQ.*
   - Equipment containing toxic fluids would not be stored in or near (within 300') a stream channel anytime.*

Dust Abatement

Dust abatement would enhance driver safety and protect the road surface by stabilizing and binding the aggregate road surface. Water, lignin, magnesium chloride, road oil, or bituminous surface treatment (BST) would be used. Oil or BST may appear to be a permanent surface improvement. After log and rock haul, however, the road may be allowed to return to a rocked road.*

Road Maintenance

BLM-administered roads would be maintained on a long-term basis. Minor improvements and design changes may be needed to stabilize and correct conditions that are causing erosion or unsafe situations.*

Road Closures

All natural surface roads would be closed during the wet season.*

Road Use Agreements
Existing road use agreements for access are between private companies and the BLM. Road use agreements with Boise Cascade Corporation (M-303,660,1006C), Cascade Ranch (M-1310), and Superior Lumber Company (M-2000F) would be used for access to BLM lands.

Helicopter Landings

a. The construction of helicopter landings would occur during the dry season (June 1 to Sept. 15). No construction of new landings or expansion of old landings would be allowed in Riparian Reserves.*

b. Helicopter landings would be treated to reduce soil erosion. Treatment of the running surface would be dependent on site conditions and would include one of the following:
   - Subsoil/till or rip, then mulch and seed with native grasses or other approved seed.*
   - Surface with durable rock material.*
   - No treatment may be necessary where natural rock occurs.*

c. Fill slopes of helicopter landings would be seeded with native grasses or other approved seed mixes and mulched, except where rock occurs.*

Harvest and Logging Systems

a. Only logging systems which meet all of the project design features would be used for this project.*

b. When operationally feasible, all units would be yarded in such a way that the coarse woody debris remaining after logging would be maintained at or greater than current levels in order to protect the surface soil and maintain productivity.*

c. Wherever trees are cut to be removed, directional felling away from Riparian Reserves, dry draws and irrigation ditches would be practiced. Maximum operational suspension would be practiced to alleviate gouging and other disturbance on draw side slopes and headwalls. Trees would be felled to the lead in relation to the skid trails. The intent of falling to the lead is to minimize the yarding damage to leave trees and regeneration under a conventional yarding systems.*

d. Selective removal of overstory trees to a minimum of 40% canopy closure would be allowed within the population boundaries of the *Cimicifuga elata* populations in the project site. Logging systems would be laid out under the guidance of a botanist to minimize disturbance to individual plants and all logs will be removed from the site by helicopter.

e. All skid trail locations would be approved by BLM. Maximum area in skid trails would be less than 12%. Existing skid trails would be utilized when possible. No use of skid trails in Riparian Reserves. Tractors would be equipped with integral arches to obtain one end log suspension during skidding of the logs. Skid trail locations would avoid ground with slopes over 35 percent and areas with high water tables. The intent is to minimize areas affected by tractors and other mechanical equipment (disturbance, particle displacement, deflection, and compaction) and thus

minimize soil productivity loss.*

f. All skid trails would be waterbarred according to BLM standards. Main tractor skid trails would be blocked with an earth and log barricade where they intersect haul roads. The intent is to minimize erosion and routing of overland flow to streams by decreasing disturbance.*

g. Tractor yarding would occur between June 15 to October 1 or on approval by the Contract Administrator. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions. The intent is to minimize off-site erosion and sedimentation to local waterways.*

h. For all cable yarding, maximum operational suspension would be maintained on slopes greater than 50 percent. Minimum corridor widths (generally less than 15 feet in width) would be utilized to assure silvicultural prescriptions and objectives are met. No yarding corridors in Riparian Reserves.*

i. Skyline and tractor yarding would be avoided up and down dry draws. The intent is to minimize occurrence of erosion in existing areas of concentrated surface flow.*

j. No new cable/tractor landings to be constructed in Riparian Reserves. Existing landings should not be expanded and evaluated carefully before use.*

k. Irrigation ditches in the project area would be protected from damage and kept free from slash.*

Silviculture

Pre-commercial thinning of forested stands and non-commercial thinning of woodlands and brushlands.

a. Vegetation would be thinned using mechanical and manual techniques of cutting and chipping, such as the slashbuster, and/or using hand crews with chain saws. Slash created by the project would be chipped on site (if using slashbuster), or hand piled and burned if cut by hand crews. Some material may be removed from the site in the form of poles, firewood or other special forest products.

b. In order to provide for escape, hiding, thermal, and nesting cover for a variety of species, 15 to 20% of the proposed area would be left in an untreated condition. These deferral reserves would be at least 3.0 acres in size and cover a variety of vegetative conditions.

c. To minimize loss in soil productivity and surface erosion, the average unit slope for mechanical operations would be less than 35%. The maximum slope for the slashbuster would be 45%, but only on short pitches less than 300 feet.*

d. Old skid trails would not be opened or driven on without the approval of the authorized officer. Cut material or slashbuster material would be placed along old skid trails or jeep roads that are used. Old skidroads would not be treated near the intersections with system roads in order to provide a visual screen and discourage vehicular access.*

Riparian Reserve Treatments

Fish-bearing and Perennial Streams

- No treatment would occur within 50 feet (minimum) each side of stream. The no treatment area is 50 feet or the top of the slope break, whichever is greater.*
- Crossing channels with vehicles or equipment, including ATVs, is limited to existing system roads.*
- Areas that cannot be accessed without crossing the no-treatment area would be treated manually.*
- Treat only conifers.*
- Do not damage down large woody debris (LWD) over 16 inches diameter at breast height (DBH).*
- No mechanical treatments.*
- No handpiles within 100 feet each side of stream. Slashed vegetation between the no treatment zone and 100 feet would be lopped and scattered. *

Intermittent Streams

- No treatment would occur within a minimum of 25 feet each side of stream or the top of the slope break, whichever is greater.*
- Crossing channels with vehicles or equipment would be limited to existing system roads.*
- Areas that cannot be accessed without crossing the limited manual treatment area would be treated manually.*
- Individual trees that fall into channel bottoms would be left; large accumulations of cut trees would be moved onto the banks.*
- Large woody debris (LWD) over 16 inches DBH. would not be damaged.*
- No mechanical treatments.*
- No handpiles within 50 feet each side of stream. Slashed vegetation between the no treatment zone and 50 feet would be lopped and scattered.*

Dry Draws and Swales

- Piles would not be located in draw bottoms.*
- Crossings through dry draws would be limited and approved by authorized officer; mechanical equipment would not drive up the draw bottoms.*
- Crossings would not involve any soil disturbance.*

Lakes and Wetlands

- No treatment would occur within 50 feet (minimum) of lakes and wetlands. The no treatment area is 50 feet or the top of the slope break, whichever is greater.*
- Treat only conifers.*
- Do not damage down large woody debris (LWD) over 16 inches diameter at breast height (DBH).*
- No mechanical treatments.*
- No handpiles within 100 feet of lakes and wetlands. Slashed vegetation between the no treatment zone and 100 feet would be lopped and scattered. *

Commercial Timber Harvest Units

a. In higher elevation mixed conifer and regeneration harvest units where the single tree and group selection methods are used, logging slash would be handpiled and burned. This site preparation treatment would also be used in the areas marked for heavy mistletoe mortality and in pine series areas where hardwoods may have been harvested so that early seral species can be planted.

b. After timber harvest, non-merchantable trees with undesirable silvicultural characteristics would be slashed. In areas where pre-commercial thinning is prescribed, all non-merchantable trees would be cut except the largest live conifer trees that meet the following criteria:
   - Minimum 4-inch terminal leader with at least the top 40 % of the tree containing live limbs.
   - Non-chlorotic, light or dark green with very little or no yellowish tint.
   - Undamaged top.
   - Free of visible disease, cankers, fire damage, or blister rust.
   - Demonstrates good form and vigor.
   - No multiple tops or ramiforms.

c. Minimum canopy closure for pine and mistletoe prescriptions in the transient snow zone would be 30%.*

Fuels Treatments

An array of fuel treatments would be utilized in the project area to modify vegetative patterns and reduce high fuel levels. Factors such as existing and projected fuel loadings, existing vegetative conditions, slope, and access would be taken into consideration when prescribing the type of fuels management treatment that would be implemented. These treatments include mechanical methods, manual treatments, prescribed burning, or a combination of these treatments. All fuel management activities which would occur within the project area would meet Aquatic Conservation Strategy and riparian reserve objectives.

All harvest units would be re-evaluated following logging to ensure that the slash/fuel treatments are appropriate for the post harvest condition. The fuel treatments noted in Table A-1(Appendix A) reflect the current best estimate of slash treatment needs. At the discretion of resource specialists, planned treatments may be changed to better meet the objectives outlined in this EA. Proposed changes would be limited to treatments allowed under this EA or amendments to this EA.

Manual and Mechanical Treatments

a. Mechanical treatment would be limited to slopes less than 35 percent and on short pitches up to 45 percent. Manual treatment of fuels consists of hand cutting of existing ladder fuels and then hand piling this material so it can be burned. This type of treatment would be utilized in the majority of stands.*

b. No piling in dry draws would be allowed.*

c. When operationally possible, saw work would not be done in non-commercial hardwood and brush stands during the period of April - July to mitigate disturbance of nesting birds.

Prescribed Burning

a. Prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan. Prescribed burning would be managed in a manner consistent with the requirements of the Department of Forestry's Smoke Management Plan and the Department of Environmental Quality's Air Quality and Visibility Protection Program.

b. Prescribed burning in timber stands includes underburning and handpile burning. Handpile burning would be used as the initial entry for burning in the majority of stands. Handpile burning would take place in the late fall and winter.

c. Underburning is the preferred method of fuels reduction work in stands of conifers and hardwoods. Underburning is a low intensity surface fire which can be highly effective in reducing a large amount of surface fuels and some ladder fuels. Underburning would occur in late fall and spring to result in low intensity burns.

d. Additional measures to reduce the potential level of smoke emissions would include: mop-up to be completed as soon as practical after the fire, burning with lower fuel moisture in the smaller fuels to facilitate their quick and complete combustion, burning with higher fuel moisture in the larger fuels to minimize consumption and burn out time of those fuels, and covering handpiles to permit burning during the rainy season where there is a stronger possibility of atmospheric mixing and/or scrubbing.

Fuels Treatments in Riparian Reserves

a. When underburning, no ignition will occur within Riparian Reserves with the objective of minimizing disturbances to Riparian Reserves that may increase erosion.*

b. Fire lines would be avoided in Riparian Reserves in order to prevent the creation of "mini roads" that could route sediment into the creek.*

c. No mechanical treatments within Riparian Reserves.*

d. No manual treatments would occur within a minimum of 50 feet each side of fish-bearing or perennial streams or the top of the slope break, whichever is greater. The same no treatment restriction would apply to lakes and wetlands.*

e. No manual treatments would occur within a minimum of 25 feet each side of intermittent streams or the top of the slope break, whichever is greater.

f. Handpile burning would not take place within 100 feet each side of fish-bearing and perennial streams and 50 feet each side of intermittent streams.*

g. Vegetation slashed between the no treatment zone and the edge of the no handpile area would be lopped and scattered.*

h. Foam would not be used in Riparian Reserves.*

Wildlife

Threatened/Endangered Wildlife

The mandatory terms and conditions of the Biological Opinion require the implementation of project design criteria proposed in the Biological Assessment for the BLM, Rogue River and Siskiyou National Forests (BA). These criteria will be incorporated in the design of the timber sales.

Place a seasonal restriction on harvest activities within 0.25 miles of the center of activity for each of the

five known northern spotted owl nest sites. This restriction would be in effect from March 1 through June 15 for disturbance activities, such as hauling, and from March 1 through September 30 for removal of habitat within the restricted area. This restriction could be lifted on an annual basis if protocol surveys by the BLM indicate that the site is not reproductive in a given year.

Adopt the same seasonal restriction as outlined above for any new pairs of spotted owls found before or during the sale contract period.

Survey and Manage Species

Surveys for species identified under the Survey and Manage Guidelines of the NFP ROD/FSEIS have been conducted for the proposed project area. Surveys identified two great gray owl nests in the project area.

a. Protect the one known great gray owl nest. This site would receive 1/4 mile protection zone (approx. 125 acres). Designate a 1/4 mile protection zone around any additional great gray nest sites found before the sale date. A seasonal restriction would be in effect from March 1 through July 15 for any treatment activities and hauling within 1/4 mile of active nest sites. Provide no-harvest buffers of 300 feet around meadows and natural openings.

b. The only known historic goshawk nest site within the project area would be protected through its location within a spotted owl nest core area. Any identified northern goshawk nests or activity centers that are located would receive no treatment buffers of approximately 30 acres.

c. Bat roosting and hibernacula sites referred to in the NWFP, including caves, mines, wooden bridges, and old buildings, are not known to occur within the project area. Any mines, mine adits and shafts found that serve as roosts, maternity colonies or hibernacula for any of the five species of bats listed as Survey and Manage/Buffer Protection Species, would be protected with 250 foot protection zones.

d. No survey and manage molluscs have been found in the project area. Any Survey and Manage mollusc species which are located prior to the sale date would receive protection as outlined in the Management Recommendations for Survey and Manage Terrestrial Molluscs, version 2.0, dated, Oct., 1999.

Wildlife Trees and Dead and Down Material

a. Where possible, reserve from harvest all snags greater than 17 inches DBH in order to mitigate impacts to woodpeckers, saw-whet owls, and several of the bat species that use large snags as roosts.

b. Where possible, retain and protect large, broken-top trees and large snags with loose bark on ridgetops.

c. In order to provide coarse woody debris well distributed across the landscape, a minimum 60 linear feet of logs per acre in decay class 1 or 2 shall be retained in all commercial harvest units. The diameter of the logs should be equal to or greater than the average size of the trees (dbh) being harvested and the length shall be greater than or equal to 16 feet long.

Big Game Winter Range Area

All roads in the Big Game Winter Range Area except major collectors and arterials would be closed between November 15 and April 1. Restrict activities to avoid disturbance in this area during the same period.

Botany

Special Status Plant Species

Known sites of *Cypripedium fasciculatum, Cypripedium montanum, Plagiobotrys glyptocarpus,* and *Scirpus pendulus* would be buffered with a 150 ft radius buffer. Any additional sites found would be protected with a 150 ft radius buffer.

Selective removal of overstory trees to a minimum of 40% canopy closure would be allowed within the population boundaries of the *Cimicifuga elata* populations in the project area. Logging systems will be laid out under the guidance of a botanist to minimize disturbance to individual plants. Trees that can be felled away from individual Cimicifuga plants and removed without damage to such plants, will be removed by conventional skidding methods. Any trees that cannot be felled under these two criteria will be removed from the site via helicopter. All of these managment activities will be conducted with the intention of providing additional sunlight to the *Cimicifuga populations* in question.

Northwest Forest Plan Species

Known sites of *Buxbaumia viridis*, *Dendriscocaulon intricatulum*, *Helvella maculata, Pithya vulgaris, Plectania milleri, Ramaria rubrievancescens, Sarcosphaera coronaria (eximia)* would be buffered with a 100 ft. radius buffer in accordance with district protocol established by Medford BLM District Office Instruction Memorandum OR110-2000-8 dated 23, June, 2000.
Any additional sites found would be protected with a 100 ft radius buffer.

Appendix D

Road Construction, Renovation, Decommission

Table D-1.
Alternatives B & C: Proposed improvements on existing roads.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control[2]	Possible Improvements: Depth (inches) and Type[3]	Seasonal Restriction[4] (for log hauling)
37-2E-3.0A	0.90	NAT	PVT	DI/SR	1
37-2E-3.0B	0.52	NAT	BLM	DI/SR	1
37-2E-3.0D	0.48	NAT	BLM	DI/SR/Gate	1
37-2E-3.0E	0.50	NAT	PVT	4" ASC/DI	1
37-2E-7.2	8.41	7"ASC	BLM	-	1
37-2E-11.0A	0.46	NAT	BLM	DI/SR	1
37-2E-11.0B	0.10	NAT	PVT	DI/SR	1
37-2E-11.0C	0.41	NAT	BLM	DI/SR	1
37-2E-13.0 seg. A1-D2	3.29	4"ASC	PB	4" ASC	1
37-2E-13.0E	0.61	4"ASC	BLM	4" ASC	1
37-2E-13.0 seg. F1-F3	0.74	NAT	PVT	8" ASC /DI	1
37-2E-13.0 seg. F4-G	0.81	4"ABC	PB	4" ASC	1
37-2E-13.0H	0.58	4"ASC	BLM	4"ASC	1
37-2E-14.0A	0.30	NAT	PVT	8" ASC	1
37-2E-14.0B	0.10	NAT	BLM	8" ASC	1
37-2E-14.0C	0.90	NAT	PVT	8" ASC	1
37-2E-15.0A	0.11	NAT	BLM	8"ASC/DI	1
37-2E-15.0B	0.30	NAT	BCC	8"ASC/DI	1
37-2E-15.0C	0.17	NAT	PVT	8"ASC/DI	1
37-2E-15.0D	0.42	NAT	BCC	8"ASC/DI	1
37-2E-15.0E	0.09	NAT	BLM	8"ASC/DI	1
37-2E-15.0F	0.50	NAT	BCC	8"ASC/DI	1
37-2E-17.0B3	0.14	NAT	PVT	8" GRR/ASC/DI	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control[2]	Possible Improvements: Depth (inches) and Type[3]	Seasonal Restriction[4] (for log hauling)
37-2E-17.0 seg. C-D	0.73	NAT	BLM	Gate 8" GRR/ASC/DI	1
37-2E-17.0E	1.73	NAT	PVT	8" ASC/DI	1
37-2E-21.0	0.55	NAT	BLM	4" ASC/DI	1
37-2E-22.0A	0.12	NAT	PVT	8" ASC	1
37-2E-22.1A	0.23	NAT	PVT	8" ASC	1
37-2E-23.0	1.70	8"ABC	BLM	-	1
37-2E-23.2	0.72	4"ASC	BLM	DI/SP - Block	1
37-2E-23.3	0.17	8"ABC	BLM	-	1
37-2E-23.4	0.96	8"ABC	BLM	-	1
37-2E-24.1	3.39	4"ASC	BLM	4" ASC	1
37-2E-24.1	2.00	NAT	PVT	DI/SR	1
37-2E-25.0	0.85	4"ASC	BLM	DI	1
37-2E-25.3	0.25	NAT	BLM	4" ASC	1
37-2E-25.5	0.37	8"PRR	BLM	SR	1
37-2E-28.0A	0.63	NAT	PVT	8"ASC	1
37-2E-28.0B	0.38	NAT	BLM	8" ASC	1
37-2E-33.0	1.36	10"ABC	BLM	-	1
37-2E-33.1A	0.50	NAT	BLM	4" ASC	1
37-2E-33.1B	1.85	NAT	PVT	DI/SR	1
37-2E-33.2	0.69	6"ABC	BLM	-	1
37-2E-33.4A	0.60	10"ABC	BLM	-	1
37-2E-33.6	0.73	10"ABC	BLM	-	1
37-2E-36.0	0.60	8"PRR	BLM	-	1
37-2E-36.1	0.78	NAT	BLM	4" ASC/DI	1
37-2E-36.2	0.25	NAT	BLM	4" ASC/DI	1
37-2E-36.3	0.60	NAT	BLM	4" ASC/DI	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control[2]	Possible Improvements: Depth (inches) and Type[3]	Seasonal Restriction[4] (for log hauling)
37-2E-36.4A	0.58	NAT	PVT	DI	1
37-2E-36.4B	0.05	NAT	BLM	DI	1
37-3E-18.1	1.97	6"ASC	BLM	-	1
37-3E-18.4A	0.58	8"ABC	BLM	-	1
37-3E-18.4B	0.01	NAT	PVT	-	1
37-3E-19.1	1.55	6"ASC	BLM	-	1
37-3E-30.4	0.50	8"ABC	BLM	-	1
37-3E-30.6	0.56	8"ABC	BLM	-	1
37-3E-31.0	2.09	4"ASC	BLM	-	1
37-3E-31.1	1.28	6"PRR	BLM	-	1
37-3E-32.0	0.29	4"ASC	BLM	-	1
38-2E-1.5	0.40	NAT	BLM	-	1
38-2E-3.0	0.16	8"GRR	BLM	-	1
38-2E-3.1	0.95	8"ABC	BLM	-	1
38-2E-3.3	0.25	6"ASC	BLM	-	1
38-2E-3.8A	0.11	6"PRR	BLM	DI/SR	1
38-2E-3.8B	0.20	6"PRR	PB	DI/SR	1
38-2E-3.8C	0.71	6"PRR	BLM	DI/SR	1
38-2E-11.0	6.84	4"ASC	BLM	DI/SR	1
38-2E-27.0 seg. A1-C1	4.59	2"BST	BLM	-	0
38-2E-27.0 seg. C2-D3	5.84	6"ASC	BLM	-	1
38-3E-17.0	11.34	2"BST	BLM	-	0
Total Mileage:	84.43				

1) NAT = natural; ASC = aggregate surface course; ABC = aggregate base course; PRR = pit run rock; GRR = grid rolled.

2) BLM = Bureau of Land Management; USFS = United States Forest Service
3) - = no improvement; ASC = aggregate surface course; ABC = aggregate base course; PRR = pit run rock; GRR = grid rolled; BST = bituminous surface treatment; DI= Drainage Improvement; SR=Spot Rock
4) 0 = no restrictions; 1 = hauling restricted between 10/15 and 5/15.

Table D-2.
Alternative B Only: Proposed new road construction in the Deer Lake project area.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control [2]	Possible Improve-ments: Depth (inches) and Type[3]	Seasonal Restriction[4] (for log hauling)
37-2E-15.0	0.2	NAT	BLM	8"GRR/ASC	1
37-2E-15.1	0.5	NAT	BLM	8"GRR/ASC	1
37-2E-15.2	0.4	NAT	BLM	8"GRR/ASC	1
37-2E-22.0	0.1	NAT	BLM	8" GRR/ASC	1
37-2E-22.1	0.2	NAT	BLM	8" GRR/ASC	1
37-2E-3.0F	0.8	NAT	BLM	8" GRR/ASC	1
Total Mileage:	2.2				

Table D-3.
Alternative B Only: Proposed temporary road construction in the Deer Lake project area.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control [2]	Possible Improve-ments: Depth (inches) and Type[3]	Seasonal Restriction[4] (for log hauling)
37-2E-5.0	0.50	NAT	BLM	-	1
37-2E-17.2	0.80	NAT	BLM	-	1
Total Mileage:	1.3				

2) BLM = Bureau of Land Management.
3) ASC = aggregate surface course; ABC = aggregate base course; PRR = pit run rock; GRR = grid rolled; BST = bituminous surface treatment; Decom = Decommission (rip, waterbar, seed, and mulch)
4) 0 = no restrictions; 1 = hauling restricted between 10/15 and 5/15.

Table D-4.
Alternative B & C: Proposed road decommissioning[a] in the Deer Lake project area.

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control[2]	Possible Improvements: Depth (inches) and Type[3]	Seasonal Restriction[4] (for log hauling)
SE¼ Sec.9 37-2E	0.50	NAT	BLM	-	1
E½NE, & NE¼NW¼, Sec.15 37-2E	0.10	NAT	BLM	-	1
W½W½ Sec.21 37-2E	0.90	NAT	BLM	-	1
W½ SE¼ Sec.21 37-2E	0.30	NAT	BLM	-	1
37-2E-15.0 **(Alt B. Only)**	0.50	NAT	BLM	-	1
SW¼SW¼, Sec.22,SE¼SE¼, 23 37-2E	0.15	NAT	PVT & BLM	-	1
37-2E-23.1	0.50	6"ABC	BLM	-	1
37-2E-24.0	0.20	NAT	BLM	-	1
37-2E-24.2	0.09	NAT	BLM	-	1
37-2E-24.3	0.20	NAT	BLM	-	1
37-2E-25.2	0.40	NAT	BLM	-	1
37-2E-25.4	0.80	4"ASC	BLM	-	1
37-2E-25.6	0.10	NAT	BLM	-	1
37-2E-33.3	0.40	NAT	BLM	-	1
37-2E-33.4	0.40	10"ABC	BLM	-	1
37-2E-33.5	0.30	NAT	BLM	-	1
38-2E-1.0	0.10	NAT	BLM	-	1
38-2E-1.2	0.40	NAT	BLM	-	1

Road Number	Approximate Length (miles)	Existing Surface: Depth (inches) and Type[1]	Control[2]	Possible Improvements: Depth (inches) and Type[3]	Seasonal Restriction[4] (for log hauling)
38-2E-1.3	0.10	NAT	BLM	-	1
38-2E-1.4	0.80	NAT	BLM	-	1
38-2E-1.6	0.30	NAT	BLM	-	1
SW¼, NE¼ Sec.3 38-2E	0.20	NAT	BLM	-	1
38-2E-3.2 from the quarry to the end of road	0.20	8"ABC	BLM	-	1
38-2E-3.3	0.20	NAT	BLM	-	1
38-3E-6.0	0.50	NAT	BLM	-	1
38-3E-6.1	0.40	NAT	BLM	-	1
Total Mileage:	9.04				

a)

- Natural Decommission - Some roads are presently well drained and have vegetation growing on them. They may also have trees and brush encroaching from the sides and trees that have fallen across them. Sections of these roads would be allowed to decommission naturally but may include some selective ripping, removal of drainage structures, construction of water bars and barricades.

- Mechanical Decommission - Roads would be decommissioned mechanically. This would include ripping, removing drainage structures, seeding and/or planting, mulching, constructing water bars and barricades.

1. NAT = natural
2. BLM = Bureau of Land Management.
3. - = no improvement

4) 0 = no restrictions; 1 = hauling restricted between 10/15 and 5/15.

Appendix E

Soils

Table E-1. Soil Characteristics

Map Unit #	Soil Series Name	Soil Depth	Surface Texture	Subsoil Texture(s)
18	Bybee	60"+	loam	clay
56/58	Farva	20-40"	very cobbly loam	extremely cobbly loam
110/113/117	McMullin	<20"	gravelly loam	gravelly clay loam
114/115/117/119	McNull	40-60"	clay loam	cobbly clay
119/123/124	Medco	20-40"	cobbly clay loam	clay
142/143/144	Pinehurst	60"+	loam	clay loam
184/185	Shippa	<20"	extremely gravelly loam	extremely cobbly loam
184/185	Straight	20-20"	gravelly loam	very cobbly clay loam
19/20/190/191	Tatouche	60"+	gravelly loam	clay

Table E-2. Soils Identified in the Deer Lake Project Area

Soil Mapping Unit Number	Soil Mapping Unit Name	Approximate Acres in Project Area	Soil Hazards
19/20	Bybee (55%)-Tatouche (30%) Complex	407	Bybee soil has seasonal perched water table; slumping Tatouvhe has high erosion on steep slopes; risk of debris flow
56/57	Farva very cobbly loam	122	runoff is rapid; erosion hazard is high
112	McMullin (50%)-Medco (30%) Complex	3	Medco has seasonal perched water table; high erosion hazard on steep slopes.
114/115	McNull loam	712	tree windthrow; road cutbank slumping; high erosion hazard on steep slopes
116	McNull (55%)-McMullin (30%) complex	10	McNull has tree windthrow; road cutbank slumping; high erosion hazard on steep slopes. McMullin is very droughty

119	McNull (50%)-Medco (35%) complex, high precipitation	434	McNull has tree windthrow; road cutbank slumping; high erosion hazard on steep slopes. Medco has seasonal perched water table; high erosion hazard on steep slopes.
123	Medco clay loam, high precipitation	149	seasonal wetness
125	Medco-McMullin Complex	16	Medco has seasonal wetness
142/144	Pinehurst loam	87	rilling and gullying hazard on steeper slopes
184/185	Straight (60%)-Shippa (20%) extremely gravelly loams	87	Straight soil has high erosion on steeper slopes; cutbanks slump when saturated
190	Tatouche gravelly loam	347	high erosion on steep slopes; risk of debris flow
	total	**2374 acres**	

Appendix F

Wildlife

Table F-1. Special Status Species.

Species	Status[1]	Primary Reason(s) for Status
Western Pond Turtle (*Clemmys marmaorata*)	BS	Habitat loss/degradation, predation
Bald Eagle (*Hailaeetus leucocephalus*)	FT	Shooting, pesticides, disturbance
Northern Goshawk (*Accipiter gentilis*)	BS	Timber harvest
American Peregrine Falcon *(Falco peregrinus anatum)*	BS	Shooting, pesticides, disturbance
Northern Spotted Owl (*Strix occidentalis caurina*)	FT	Timber harvest
Great Gray Owl (*Strix nebulosa*)	S&M	Timber harvest
Lewis' Woodpecker (*Asyndesmus lewis)*	BS	Fire suppression, conifer encroachment of oak woodland habitat
White-headed Woodpecker *(Picoides albolarvatus)*	BS	Timber harvest, removal of snags
Streaked Horned Lark *(Eremophila alpestris strigata)*	BS	Ground nesting in farm fields
Fisher *(Martes pennanti)*	BS	Fur trapping, loss of extensive wilderness habitat
Townsend's Big-eared Bat (*Corynorhinus townsendii*)	BS/S&M	General rarity, lack of information
Brazilian Free-tailed bat *(Tadarida braziliensis)*	BA	General rarity, lack of information
Papillose Tail Dropper *(Prophysaon dubium)*	BA	lack of information
Siskiyou sideband (snail) *(Monadenia chaceana)*	S&M	Endemic, rare, lack of information

1/ Status:
FT Listed as threatened under the ESA **BS** Bureau sensitive **BA** Bureau assessment
S&M Designated for protection in the NWFP under Survey and Manage guidelines

Most species have been identified in the watershed or on immediately surrounding lands. No systematic surveys have been conducted for the avian species. Cameras have been placed in limited locations for verification of marten and fisher occurrence. To date, only marten have been verified; reliable anecdotal information places fishers within the Little Butte Creek watershed within the past 20 years.

Appendix G

Botany

Table G-1. Special Status Plant Species

Species	Status	Occurrences	Buffer
Cimcifuga elata	BSO	32	Selective harvest
Cypripedium fasciculatum	BSO & S&M (C)	1	150 ft radius
Cypripedium montanum	BTO & S&M (C)	3	150 ft radius
Perideridia howellii	BTO	3	no buffer
Plagiobotrys glyptocarpus	BAO	1	150 ft radius
Scirpus pendulus	BAO	2	150 ft radius
Scribneria bolanderi	BTO	1	no buffer
Smilax californica	BTO	1	no buffer

Table G-2. Survey and Manage Species

Species	Status	Occurrences	Buffer
Buxbaumia viridis	1D	58	100 ft. radius
Dendriscocaulon intricatulum	1B	1	100 ft. radius
Helvella maculata	1B	9	100 ft. radius
Pithya vulgaris	1B	10	100 ft. radius
Plectania milleri	1B	7	100 ft. radius
Ramaria rubrievancescens	1B	1	100 ft. radius
Sarcosphaera coronaria (eximia)	1B	11	100 ft. radius

Bureau Special Status and Survey and Manage Vascular Plants

Cypripedium fasciculatum occurs in one proposed harvest unit. This species occurs in a variety of habitats all of which seem to have a filtered light condition in common and most frequently occurs on steep slopes at mid elevations. It is most often associated with Douglas fir and is usually tucked under some type of hardwood tree or senescent shrub such as manzanita, in areas with relatively little competition from other understory plants. This species is seldom found in areas with a canopy closure of less than 60%. The 150 foot radius buffer should allow for the continued persistence of *Cypripedium fasciculatum* on the immediate site, however, thinning the adjacent stand to a canopy closure of less than 60% would most likely reduce or even eliminate the possibility that this species could spread to other parts of the stand in the future.

Cypripedium montanum This species occurs in moist woods below 5000 ft elevation in mixed evergreen and yellow pine forests. The action alternative would have no direct affect on the continued persistence of *Cypripedium montanum* within the confines of the Deer Lake Timber Sale area. The 150 ft. radius buffers around the three known sites should allow for their continued persistence. However, reduction of canopy closure to less than 50 percent in the surrounding stand will greatly reduce or completely

eliminate the possibility that this species will spread to other parts of the stand in the foreseeable future.

If the canopy cover is reduced to the maximum harvest prescription of 40%, *Plagiobotrys glyptocarpus, Scirpus pendulus, Scibneria bolanderi, and Smilax californica* should continue to persist in those units they currently occupy.

Buxbaumia viridis (58 sites) occurs on very well rotted logs (decay class three, four, and five) as well as peaty soil and humus, in coniferous forests, from low elevation to subalpine. On the Medford BLM District, it is usually associated with very moist drainages and typically occurs on north facing slopes under a canopy closure of 60% or greater. The 100 ft. radius buffer around the known sites should allow for their continued persistence. However, reduction of canopy closure to less than 60 percent in the adjacent stands will greatly reduce or completely eliminate the possibility that this species will spread to other parts of the stand in the foreseeable future.

Dendriscocaulon intricatulum typically occurs on black oak stems less than 100 years of age under fairly dense (60 -100% canopy closure) stand conditions on ridges exposed to winter fog or in riparian areas. The 100 ft. radius buffer around the one known site should allow for the continued persistence of the species at this site. However, reduction of canopy closure to less than 60 percent in the surrounding stand will greatly reduce or completely eliminate the possibility that this species will spread to other parts of the stand in the foreseeable future.

The action alternative would have no direct affect on the continued persistence of *Helvella maculata* (9 sites), *Pithya vulgaris (10* sites), *Plectania milleri* (7 sites) *Ramaria rubrievancescens* (1 site), or *Sarcosphaera eximia* (11 sites) within the confines of the Deer Lake Timber Sale harvest units. Indirect effects would include a decrease in canopy cover accompanied by an increase in light and a decrease in moisture retention. All of these species are associated with relatively moist stands and a decrease in moisture retention might be detrimental to their continued persistence on the site. However, selective removal of some trees from the site could help to reduce the accumulation of ground fuels that might result in a stand destroying fire and the potential extirpation of these species from their respective sites.

Appendix H

Lost Creek Ford

Specific Road/Stream Crossing Information

Stream Ford Reconstruction

Road 37-2E-28.1 at Stream Reach 1770

Location is on Boise Cascade land in 37S-02E-22 SWSW. This is the main stem of Lost Creek, a perennial tributary to South Fork Little Butte Creek. An existing natural surface road crosses the stream at an unimproved stream ford. The toe of the slope entering the ford erodes continuously, and combined with runoff coming down the road, provides a steady input of sediment to Lost Creek. This condition will not recover on its own in the foreseeable future. When the road is used, streambanks are eroded by vehicles as they drop off the bank into the stream over the vertical bank created wintertime erosion of the toe slope of the road.

Figure 1 *Lost Creek ford, typical winter baseflow conditions, January 14, 2001.*

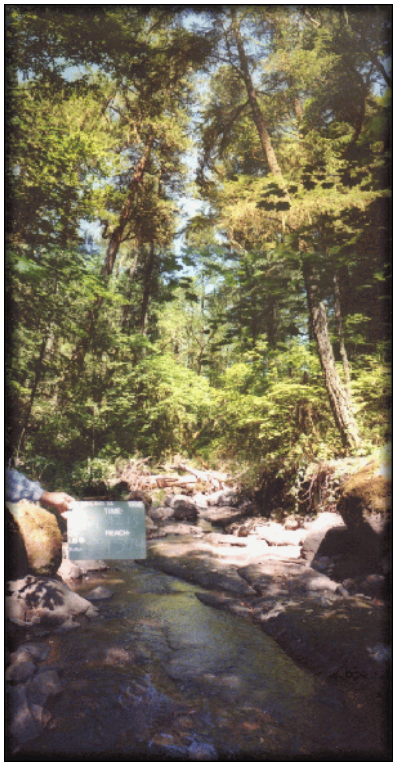


Figure 3 *Lost Creek Reach 1594 on BLM approximately 1/3 mile below proposed ford, typical late summer flow, August 19, 1998.*

Figure 2 *Lost Creek ford, typical winter baseflow conditions, January 14, 2001.*

Based on stream survey data collected in 1998 for Reach 1922 on BLM land above the crossing, and for Reach 1594 on BLM land below the crossing, bankfull width in this section of Lost Creek ranges from 14 to 22 feet and maximum bankfull depths (riffle depth at bankfull) are about 1.5 feet. Floodprone area widths (common return interval flood, approx. 20-year) measured at locations on BLM above and below the crossing ranged from 27-30 feet, with corresponding floodprone depths of 3 feet. This location has significant summer flows (see pictures from late summer 1998 taken on BLM lands above and below the private land on which the proposed crossing is to be built).

An improved stream ford is proposed for this location, utilizing a “concrete grid” substrate (Figure 6)

Figure 4 *Lost Creek Reach 1922 on BLM land just upstream of the proposed ford, typical late summer flow, September 2, 1998.*

Figure 5 *Lost Creek Reach 1706 approximately 1/3 mile below proposed ford, typical late summer flow, August 20, 1998.*

for the stream ford bottom (Figure 7), surfaced approaches for at least 300 feet on each side of the stream (Figure 8), and armored rolling waterdips on up the hill beyond the approaches. All of these measures will reduce the road-related sediment input to the stream at this location, eliminate the streambank erosion that is occurring, and minimize sediment being tracked into the stream by vehicles. The road would be closed to vehicle access using gates and barricades, although this would not eliminate all OHV use. Hauling for commercial activities would be limited to the dry portion of the year (generally late spring through fall) to prevent tracking of mud into the ford. The concrete grid portion of the stream ford would at a minimum include the entire flood-prone width of the stream, plus an additional 5 feet on either side. This ford would be installed at the same level as the existing stream bottom, so it would neither constrict, widen, scour or impound the stream channel as compared to the existing condition. The biggest advantage of this type of stream crossing is the extremely low risk of failure of the structure during major floods. The structure allows the stream to function naturally, passing flow, bedload and woody material without creating the maintenance, structure failure, and channel modification problems often associated with forest bridges and culverts during flood events.

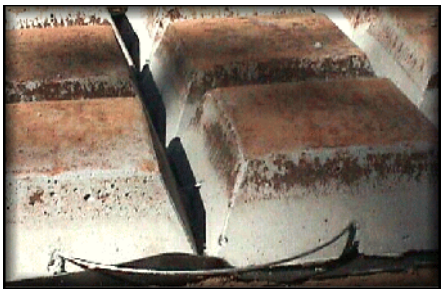


Figure 6 *Concrete grid ford is constructed of 12 x 12" blocks, cabled together. The space in between the blocks is filled with gravel.*

Figure 7 *Similar installation to proposed ford on Lost Creek. The ford is stable at all flow stages, providing fish passage, and accomodating flow, bedload and wood even in major floods.*

Figure 8 *Similar installation to proposed ford on Lost Creek. Concrete grid extends beyond the flood-prone level of the stream; BST-surfaced road approaches eliminate road-surface erosion, further reducing sediment delivery.*

Appendix I

Hydrology

Water Quality- Common to all Alternatives

The BLM in cooperation with the Forest Service, ODEQ, and the Environmental Protection Agency (EPA) is implementing the *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (USDA and USDI 1999). The Water Quality section in Chapter 3 of this E.A. identifies 303(d) listed waters in the project area. Under the Protocol, the BLM will protect and maintain water quality where standards are met or surpassed, and restore water quality limited waterbodies within their jurisdiction to conditions that meet or surpass standards for designated beneficial uses. The BLM will also adhere to the State Antidegradation Policy (ODEQ 1992; 340-041-0026) under all alternatives. The BLM will continue supporting ODEQ's efforts to work with land managers and designated management agencies in total maximum daily load (TMDL) development (scheduled for 2002) and implementation plans (e.g., water quality management plans (WQMPs)). The Protocol serves as a framework for developing water quality restoration plans, specific to BLM-administered lands, which are used to guide and can be incorporated by reference into ODEQ's WQMPs. In areas where BLM management actions have either short- or long-term effects on BLM-administered lands and adjacent waters, the BLM will work toward water quality improvement. Under all alternatives, necessary federal and state permits would be obtained for instream work. Restoration aimed at improving water quality is described under Alternatives B and C. Alternatives B and C would include road renovation to reduce sedimentation on private lands as well as BLM-administered lands. Under Alternative A, special funding for restoration work would be required and no BLM-funded road renovation would occur on private lands. Best Management Practices (BMPs) and effectiveness monitoring as described in the Medford District RMP would ensure that TMDLs are being met on BLM-administered lands.

Private forest lands in the project area would be managed according to the Oregon Forest Practices Act. These lands as well as private agricultural lands would be addressed in the Little Butte Creek Water Quality Management Plan.

Table I-1. Watershed Risk Rating - Alternative B

Drainage Area	Road Density (mi./sq. mi.)		Percent of Drainage Area with Stands < 30 years old		Watershed Risk Rating
	Existing	Alternative B	Existing	Alternative B	
LB 0621 Deer	5.4	4.9	46	50	High
LB 0624 S. Fk. Little Butte 1	4.0	4.1	14	14	High
LB 0627 Upr Lost	4.8	4.2	37	41	High
LB 0630 Mid Lost	3.0	3.2	46	50	High
LB 0633 Charley	5.6	5.3	17	22	High
LB 0636 Lwr Lost	3.9	3.7	11	13	High

Drainage Area	Road Density (mi./sq. mi.)		Percent of Drainage Area with Stands < 30 years old		Watershed Risk Rating
	Existing	Alternative B	Existing	Alternative B	
LB 0639 S. Fk. Little Butte 2	2.0	2.0	6	6	Low

Table I-2. Watershed Risk Rating - Alternative C

Drainage Area	Road Density (mi./sq. mi.)		Percent of Drainage Area with Stands < 30 years old		Watershed Risk Rating
	Existing	Alternative C	Existing	Alternative C	
LB 0621 Deer	5.4	4.9	46	50	High
LB 0624 S. Fk. Little Butte 1	4.0	4.0	14	14	High
LB 0627 Upr Lost	4.8	4.2	37	41	High
LB 0630 Mid Lost	3.0	2.9	46	50	High
LB 0633 Charley	5.6	5.3	17	22	High
LB 0636 Lwr Lost	3.9	3.6	11	13	High
LB 0639 S. Fk. Little Butte 2	2.0	2.0	6	6	Low

Table I-3. Cumulative Watershed Risk Rating - Alternative A and Projected Harvest on Private Land

Drainage Area	Road Density (mi./sq. mi.)		Percent of Drainage Area with Stands < 30 years old		Watershed Risk Rating
	Existing	Alternative A	Existing	Alternative A	
LB 0621 Deer	5.4	5.4	46	57	High
LB 0624 S. Fk. Little Butte 1	4.0	4.0	14	22	High
LB 0627 Upr Lost	4.8	4.8	37	50	High

Drainage Area	Road Density (mi./sq. mi.)		Percent of Drainage Area with Stands < 30 years old		Watershed Risk Rating
	Existing	Alternative A	Existing	Alternative A	
LB 0630 Mid Lost	3.0	3.0	46	51	High
LB 0633 Charley	5.6	5.6	17	44	High
LB 0636 Lwr Lost	3.9	3.9	11	17	High
LB 0639 S. Fk. Little Butte 2	2.0	2.0	6	6	Low

Table I-4. Cumulative Risk of Peak Flow Enhancement - Alternative A and Projected Harvest on Private Land

Drainage Area	Percent of Transient Snow Zone Area with Less than 30% Crown Closure		Risk of Peak Flow Enhancement
	Existing	Alternative A	
LB 0621 Deer	63	63	Low
LB 0627 Upr Lost	41	50	Potential
LB 0630 Mid Lost	58	64	Low
LB 0633 Charley	16	48	Low

Table I-5. Cumulative Watershed Risk Rating - Alternative B and Projected Harvest on Private Land

Drainage Area	Road Density (mi./sq. mi.)		Percent of Drainage Area with Stands < 30 years old		Watershed Risk Rating
	Existing	Alternative B	Existing	Alternative B	
LB 0621 Deer	5.4	4.9	46	62	High
LB 0624 S. Fk. Little Butte 1	4.0	4.1	14	22	High
LB 0627 Upr Lost	4.8	4.2	37	53	High

Drainage Area	Road Density (mi./sq. mi.)		Percent of Drainage Area with Stands < 30 years old		Watershed Risk Rating
	Existing	Alternative B	Existing	Alternative B	
LB 0630 Mid Lost	3.0	3.2	46	55	High
LB 0633 Charley	5.6	5.3	17	48	High
LB 0636 Lwr Lost	3.9	3.7	11	19	High
LB 0639 S. Fk. Little Butte 2	2.0	2.0	6	6	Low

Table I-6. Present and Reasonably Foreseeable Future Harvest Actions on Federal Lands in South Fork Little Butte Creek Analysis Area

Project Name	Administrative Unit	Total Acres of Commercial Harvest	Percent Canopy Closure Remaining Post Harvest	Sale Date	
				Actual	Projected
Indian Soda[1]	BLM-Ashland R.A.	714	20-50	2000	--
Fire Pit	BLM-Ashland R.A.	10	20-50	2000	--
Lost Cow	BLM-Ashland R.A.	36	20-50	2000	--
Carbonated Soda	BLM-Ashland R.A.	32	20-50	2000	--
Deer Conde	BLM-Ashland R.A.	20	20-50	2000	--
Poole Hill	BLM-Ashland R.A.	609	20-50	2001[2]	--
Far Piece	BLM-Ashland R.A.	15	20-50	2001	--
Flat Top	BLM-Ashland R.A.	12	20-50	2001	--
Rock Top	BLM-Ashland R.A.	9	20-50	2001	--
Conde Shell[1]	BLM-Ashland R.A.	1,680	20-50	--	2002
Deer Lake	BLM-Ashland R.A.	2,374	20-55	--	2002
Heppsie[3]	BLM-Ashland R.A.	659	unknown	--	2004
TOTAL		6,170	7% of the South Fork Little Butte Creek analysis area		

1/ Actual project acres from contract rather than acres from Environmental Assessment
2/ Sold but not awarded
3/ Estimated acres without subtracting out Riparian Reserves and other reserves - actual amount will be less

Table I-7. Present and Reasonably Foreseeable Future Road Construction/Decommissioning on Federal Lands in South Fork Little Butte Creek Analysis Area

Project Name	New Permanent Road Miles	New Temporary Road Miles	Road Miles to be Decommissioned	Net Change in Road Miles
USFS road decommissioning since 1997	0.0	0.0	0.6	-0.6
Indian Soda	0.9	0.0	4.1	-3.2
Poole Hill	0.0	0.0	2.1	-2.1
Conde Shell	0.0	0.0	5.5	-5.5
Deer Lake	2.2	1.3	10.0	-6.5
Heppsie[2]	--	--	--	--
TOTAL	3.1	1.3	22.3	-17.9

1/ Sold but not awarded

2/ Proposed road work has not been determined

Table I-8. Present and Reasonably Foreseeable Future Harvest Actions on Federal Lands in South Fork/North Fork Little Butte Creek Key Watershed

Project Name	Administrative Unit	Total Acres of Commercial Harvest	Percent Canopy Closure Remaining Post Harvest	Sale Date	
				Actual	Projected
S. Fk. from Table I-6		6,170	20-55	--	--
Bibbits	USFS-Butte Falls R.D.	176	35-70	1999[1]	--
Double Salt	BLM-Butte Falls R.A.	5	60-70	2000	--
Bieber Wasson	BLM-Butte Falls R.A.	682	10-70	2001	--
Heppsie[2]	BLM-Ashland R.A.	988	unknown	--	2004
TOTAL		8,021	6% of the Key Watershed		

1/ Sold but not awarded

2/ Estimated acres without subtracting out Riparian Reserves and other reserves - actual amount will be less

Table I-9. Present and Reasonably Foreseeable Future Road Construction/Decommissioning on Federal Lands in South Fork/North Fork Little Butte Creek Key Watershed

Project Name	New Permanent Road Miles	New Temporary Road Miles	Road Miles to be Decommissioned	Net Change in Road Miles
S. Fk. from Table I-7	3.1	1.3	22.3	-17.9
USFS road decommissioning since 1997	0	0	1.14	-1.14
Bibbits	0.7	0	0.78	-0.08
Double Salt	0	0	0	0
Bieber Wasson	0	0.25	1.69	-1.44
Heppsie[1]	--	--	--	--
TOTAL	3.8	1.6	25.9	-20.6

1/ Proposed road work has not been determined

Table I-10. Present and Reasonably Foreseeable Future Harvest Actions on Federal Lands in Little Butte Creek Watershed

Project Name	Administrative Unit	Total Acres of Commercial Harvest	Percent Canopy Closure Remaining Post Harvest	Sale Date	
				Actual	Projected
N. & S. Forks from Table I-8		8,021	10-70	--	--
Ginger Springs	BLM-Butte Falls R.A.	44	60-70	2000	--
Double Salt	BLM-Butte Falls R.A.	512	10-70	2000	--
Bieber Wasson	BLM-Butte Falls R.A.	164	25-70	2001	--
Antelope[1]	BLM-Ashland R.A.	4,564	unknown	--	2007
TOTAL		13,305	6% of the Little Butte Creek Watershed		

1/ Estimated acres without subtracting out Riparian Reserves and other reserves - actual amount will be less

Table I-11. Present and Reasonably Foreseeable Future Road Construction/Decommissioning on Federal Lands in Little Butte Creek Watershed

Project Name	New Permanent Road Miles	New Temporary Road Miles	Road Miles to be Decommissioned	Net Change in Road Miles
N. & S. Forks from Table I-9	3.8	1.55	25.91	-20.56
Ginger Springs	0	0	0.11	-0.11
Double Salt	0	0	1.97	-1.97
Bieber Wasson	0	0	0.45	-0.45
Antelope[1]	--	--	--	--
TOTAL	3.8	1.6	28.4	-23.1

1/ Proposed road work has not been determined