United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Medford District Office
3040 Biddle Road
Medford, Oregon 97504
email address: Medford_Mail@blm.gov

IN REPLY REFER TO:

1792 (OR-115)

JUL 25 2008

Dear Sir or Madam:

Enclosed is the recently completed Butte Falls Blowdown Salvage Environmental Assessment (EA) #OR-115-08-02. This EA evaluates the Butte Falls Resource Area, Medford District Bureau of Land Management (BLM) proposal for salvaging trees blown down during the January 2008 windstorms. Salvage operations would occur on a maximum of 6,100 acres located in various portions of the following areas.

- Township 33 South, Ranges 1, 2, and 3 East;
- Township 34 South, Ranges 1, 2, and 3 East;
- Township 35 South, Ranges 1, 2, and 3 East;
- Township 36 South, Ranges 2 and 3 East.

The project area is located in four 5th field watersheds: Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek. Trees proposed for salvage would include windthrown trees, damaged trees that are not likely to survive, insect-killed trees, and trees hazardous to workers or the public. The timber would be salvaged using helicopter, tractor, shovel, or cable yarding systems. Site preparation or slash disposal activities such as lop and scatter, piling and burning, and underburning would be used to treat logging slash and damaged residual conifers. Road work associated with the proposed salvage activities would consist of road renovation, landing construction, permanent road construction, and temporary spur road construction. This project is proposed within matrix (including connectivity/diversity block), 100-acre northern spotted owl activity center, and riparian reserve land use allocations. The timber sale would contribute to the Medford District annual sale quantity goals established through the Medford District Resource Management Plan and the Northwest Forest Plan.

This document is available for public review and comment for a period of 30 days. The effective date for the beginning of the comment period will be the date of publication of the notice of the EA availability in the *Medford Mail Tribune*.

As I make my decisions regarding this project, I will consider all pertinent site-specific comments. The most useful comments are those that clearly articulate site-specific issues or concerns. Any new information that would affect the analysis or evidence of flawed or incomplete analysis would be most useful. **Comments are due by 4:30 PM, August 26, 2008.**

If you have questions or comments concerning this project, please contact Jean Williams or John Bergin, at 541-618-2385 or 541-618-2265 respectively. Comments may also be mailed to Bureau of Land Management, 3040 Biddle Road, Medford, OR 97504 or e-mailed to Medford_Mail@blm.gov (be sure to include "Attention: Jean Williams").

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 at the beginning of your written comment. Your request 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. We appreciate your interest and involvement in this project.

Sincerely,

Christopher J. McAlear
Field Manager
Butte Falls Resource Area

Enclosure:

Butte Falls Blowdown Salvage Environmental Assessment

BLM

Medford District Office

July 2008

US Department of the Interior
Bureau of Land Management
Medford District
Butte Falls Resource Area

Butte Falls Blowdown Salvage
Environmental Assessment

EA Number: OR115-08-02

Project Location: T33S, R1E, R2E, R3E;
T34S, R1E, R2E, R3E;
T35S, R1E, R2E, R3E; and
T36S, R2E, R3E.

The Butte Falls Resource Area is proposing to salvage trees blown down during January 2008 winter storms. Salvage would occur on up to 6,100 acres located in the Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek 5th field watersheds. Trees proposed for salvage would include windthrown trees, damaged trees not likely to survive, insect-killed trees, and trees hazardous to workers or the public. Timber would be salvaged using helicopter, tractor, shovel, or cable yarding systems. Site preparation or slash disposal activities such as lop and scatter, piling and burning, and underburning would be used to treat logging slash and damaged residual conifers 1 inch to 12 inches in diameter. Road work associated with the proposed salvage activities is road renovation, landing construction, permanent road construction, and temporary spur road construction. This project is proposed within matrix (including connectivity/diversity block), 100-acre northern spotted owl activity center, and riparian reserve land use allocations. The timber sale would help meet the Medford District annual sale quantity goals established through the Medford District Resource Management Plan and the Northwest Forest Plan.

7/25/08

Christopher J. McAlear — Date
Butte Falls Resource Area Field Manager

Table of Contents

1.0 What Action is Proposed and Why?

Chapter 1
• provides a context for what will be analyzed in the EA,
• describes the kinds of action we will be considering,
• defines the Project Area,
• describes what the proposed actions need to accomplish, and
• identifies the criteria we will use for choosing the alternative
• to best meet the purpose and need for this proposal.

1.1 Definitions

The following definitions are for terms used in Chapter 1.

Allowable sale quantity: The gross amount of timber volume, including salvage, that may be sold annually from a specified area over a stated period of time in accordance with the management plan. (ROD/RMP, p. 101)

Damaged trees: For purposes of this analysis, damaged trees are trees standing and partially uprooted, snapped-off with few or no remaining green limbs, or defoliated (less than 25 percent crown ratio remaining) by the January 2008 windstorm.

Interdisciplinary (ID) Team: A group of individuals with different training, representing the physical sciences, social sciences, and environmental design arts, assembled to solve a problem or perform a task.

Project Area: The area where the action is proposed.

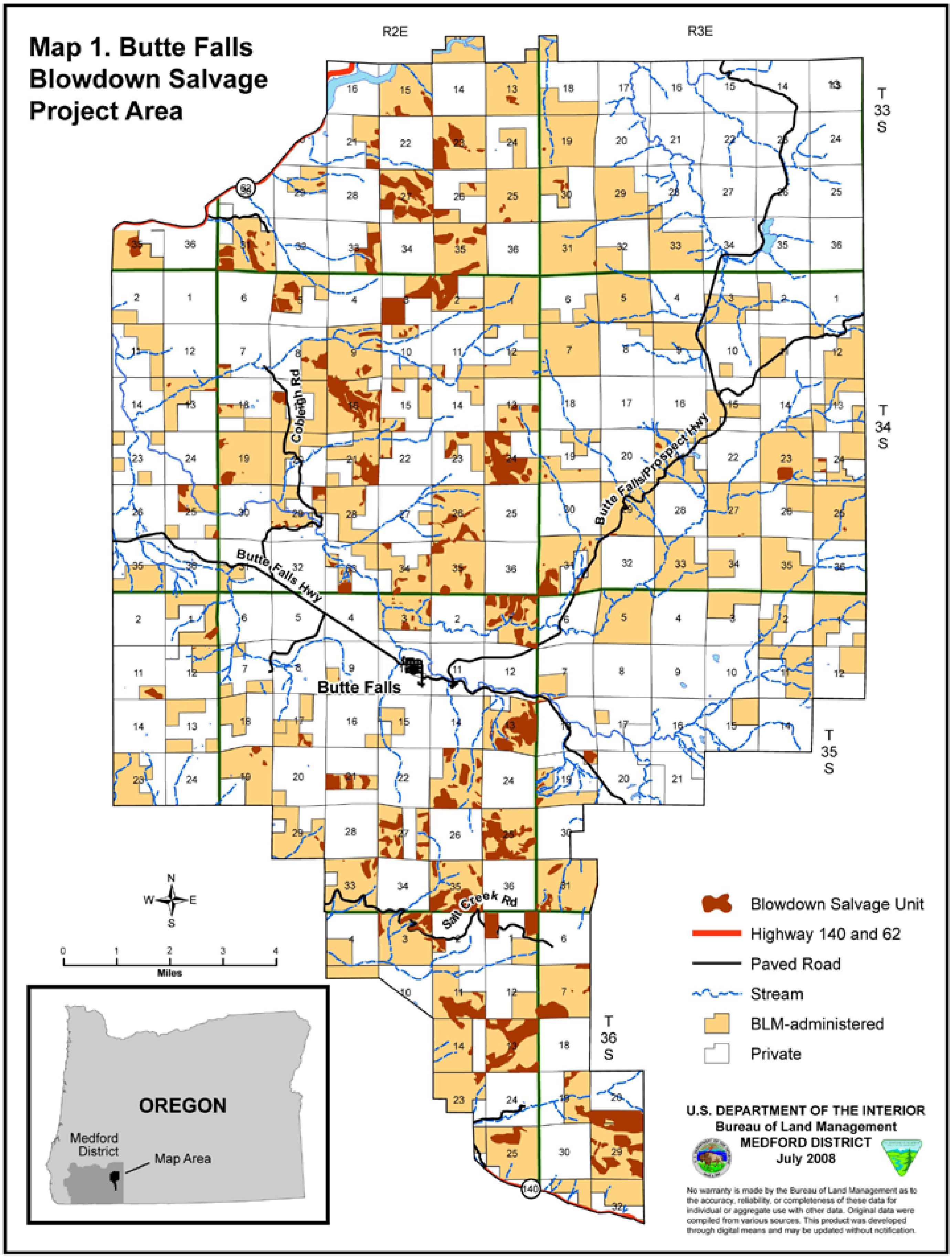
Salvage: The removal of trees either killed or severely injured from a disturbance event such as fire, disease, insect infestation, or wind.

1.2 Introduction

This EA will analyze the impacts of proposed salvage on the human environment. The EA will provide the decision-maker, the Butte Falls Field Manager, with current information to aid in the decision-making process. It will also assist the decision-maker in determining if there are significant impacts not already analyzed in the Environmental Impact Statement for the Medford District's Resource Management Plan and whether a supplement to that Environmental Impact Statement is needed or if a Finding of No Additional Significant Impact is appropriate.

1.2.1 What Action is the BLM Proposing?

The Butte Falls Resource Area, Medford District Bureau of Land Management (BLM), proposes to implement the following activities: salvage a portion of the dead and damaged trees in the Project Area and site preparation or slash disposal activities such as underburning, piling and burning, or lopping and


Map 1. Butte Falls Blowdown Salvage Project Area
R2E
R3E
T 33 S
T 34 S
T 35 S
T 36 S
Cobleigh Rd
Butte Falls/Prospect Hwy
Butte Falls Hwy
Butte Falls
Salt Creek Rd
N
S
W
E
0 1 2 3 4
Miles
OREGON
Medford District
Map Area
Blowdown Salvage Unit
Highway 140 and 62
Paved Road
Stream
BLM-administered
Private
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This product was developed through digital means and may be updated without notification.

scattering to treat salvage slash and residual damaged conifers 1 to 12 inches in diameter. Road projects proposed to support salvage activities are road renovation and temporary and permanent road construction.

1.2.2 Where is the Action Proposed to Occur?

The Butte Falls Blowdown Salvage Project Area is located south of Highway 62 near Lost Creek Lake, east of Crowfoot Road, west of the BLM-Forest Service boundary, and north of Highway 140 in Jackson County, Oregon (Map 1). Salvage would occur in the following 5th field watersheds: Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek. The Project Area contains 137,700 acres; the BLM administers 48,000 (35 percent) of those acres. BLM-administered land is intermixed with privately-owned land, creating an assortment of ownership patterns (Table 1-1).

Table 1-1. Land Ownership/Jurisdiction within the Butte Falls Blowdown Salvage Project Area

Land Owner/Jurisdiction	Acres	Percent
Bureau of Land Management	48,010	35
US Forest Service	11	<1
State of Oregon	86	<1
City of Medford	660	<1
Industrial Forest Land	79,110	57
Private Land	9,869	7
Totals	**137,746**	**100**

After the windstorm, the BLM inventoried over 28,000 acres and found blowdown scattered across more than 6,800 acres of BLM-administered land; approximately 6,100 acres are proposed for salvage in this EA (Figure 1-1).

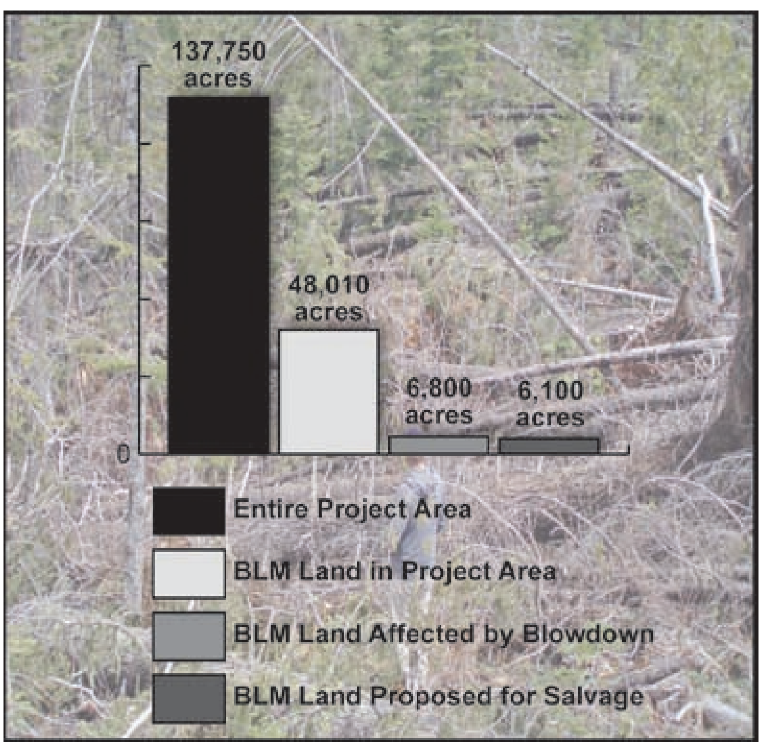


Figure 1-1. Amount of BLM-administered land proposed for salvage in relation to total acres in Project Area, acres of BLM-administered land in the Project Area, and acres affected by blowdown.

1.3 Why is the BLM Proposing this Project?

1.3.1 Need for the Project

In early January 2008, a series of winter storms hit the West Coast. The storms brought strong winds and heavy rain and snow to southern Oregon and northern California. Wind gusts up to 90 miles per hour downed power lines and uprooted trees throughout the Rogue Valley. Across the Butte Falls and Ashland Resource Areas in the Medford District BLM, stands contain patches of trees blown down and residual standing trees damaged by these storms. The Project Area contains the forest stands in the Butte Falls Resource Area that were the most damaged during those winter storms and are in need of immediate salvage to prevent loss of timber volume to decay or potential fire.

The lands in the Project Area are subject to the requirements of the O&C Lands Act which directs that O&C lands be managed for "permanent forest production . . . in accord with sustained-yield principles" (USDI 1995a, p. 17). The Medford District Record of Decision and Resource Management Plan (ROD/RMP) established certain land use allocations designed to address "the need for a sustainable supply of timber and other forest products that will help maintain the stability of the local and regional economies and contribute valuable resources to the national economy on a predictable and long-term basis" (USDI 1995a, p. 16-17). The ROD/RMP allocated matrix lands for "produc[ing] a sustainable supply of timber" (USDI 1995a, p. 38). Matrix lands are divided into northern general forest management area (NGFMA), which is to be "managed to assure a high level of sustained timber productivity" (USDI 1995a, 187), and southern general forest management area (SGFMA), which is to be "managed to assure a moderately high level of sustained timber productivity" (USDI 1995a, 192).

The ROD/RMP also allocates lands as late-successional reserves, which include known northern spotted owl activity centers. Primary management objectives in late-successional reserves are to "protect and enhance conditions of late-successional and old-growth forest ecosystems" (USDI 1995a, 32). Interspersed throughout both matrix and late-successional reserves are riparian reserves in which the primary management objectives are "to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and corridors for many terrestrial animals and plants, and provide greater connectivity of the watershed" (USDI 1995a, p. 26). The ROD/RMP allows for salvage of mortality volume in matrix lands (p. 186), late-successional reserves (p. 33), and riparian reserves (p. 27).

The winter storms in 2008 created an opportunity for the BLM to provide a significant majority of the Medford District BLM's 2008 Allowable Sale Quantity through substituting salvaged dead and damaged trees for regular green volume (USDI 1994, p. 4-101). Immediate salvage is needed to allow the BLM to recover as much of the economic value of the dead and damaged trees as possible before natural rot and bug infestation destroys the timber value.

In addition, dead and damaged trees provide potential breeding habitat for bark beetles, wood borers, and other insects (Flowers 2006). The two primary problems involving insects after the blowdown event are the degradation of downed timber from bark beetles and wood borers and the threat to standing timber by insects attracted to or emerging from the downed timber. The downed timber needs to be removed before insects emerge in the spring (ODF 2007).

The community of Butte Falls was listed in the *Federal Register* (66 FR 160:43417) as a community within the vicinity of Federal lands that are at high risk from wildfire. Residential density is high in the Project Area, with most homes located along the Butte Falls Highway. Fuel accumulations and vegetation conditions combined with residential densities, increased recreation use, limited local fire district protection, and continued development in the Project Area contributed to increased wildfire risk within the wildland-urban interface before the windstorm. The majority of the trees blown down during the storms were green trees. As these down trees begin to dry, the fuel loadings will increase until the fine fuels decay. Down trees would also make suppression activity more difficult in the event of a fire. There is a need to mitigate the risk to the local neighborhood communities, individuals, fire fighters, and the environment from severe, unwanted, stand-replacing wildfire events.

In areas severely damaged by the windstorm, debris is piled up to 6 feet deep. In those areas, natural reforestation may be delayed for decades until decomposition opens up enough space for seedlings to establish and grow. Deep piles of blown down trees need to be removed to improve accessibility for replanting and aid in the recovery of the forest stands.

1.3.2 Purpose (Objectives) of the Project

To be given serious consideration as a reasonable alternative, any action alternative must meet the objectives provided in the ROD/RMP for projects to be implemented in the Project Area. The ROD/RMP specifies the following objectives to be accomplished in managing the lands in the Project Area:

1.3.2.1 Salvage

- Design salvage timber sales on BLM lands in the Butte Falls Resource Area affected by the windstorm in the Big Butte Creek, South Fork Rogue River, Rogue River/Lost Creek, and Little Butte Creek 5th field watersheds. The proposed timber sales would produce revenue for the Federal government and contribute approximately 35 million board feet of timber toward the Medford District's 2008 Allowable Sale Quantity of 57 million board feet. In addition, the management actions considered in the design of the salvage timber sale must be economically feasible (USDI 1995a, 179-180).

  The ROD/RMP allows salvage harvest on BLM lands, "Mortality in established stands results either from competition and self thinning or from disturbance events such as fire, windstorms, disease, or insect attack. . . . Mortality of entire stands or of scattered trees that results from disturbance would be harvested in salvage operations. Only mortality above the level needed to meet snag retention and other habitat goals and provide desired levels of coarse woody debris would be harvested" (USDI 1995a, p. 186). The ROD/RMP allows salvage in late-successional reserves if "stand-replacing events exceed ten acres in size and canopy closure has been reduced to less than 40 percent" (USDI 1995a 33). The ROD/RMP allows salvage in riparian reserves "if required to attain Aquatic Conservation Strategy and riparian reserve objectives" (USDI 1995a, 27).

1.3.2.2 Road Work associated with the Timber Sales

- Reduce the potential for sediment production on up to 230 miles of roads that would be used to haul timber. Poorly surfaced roads in the Project Area are chronic sources of sediment to streams. Before timber is hauled on these roads, the timber sale purchaser must apply crushed rock to roads with depleted surface rock. The ROD/RMP specifies minimizing sediment delivery to streams from roads by surfacing of inadequately surfaced roads (USDI 1995a, 163).

- Reduce the risk of sediment delivery into streams by replacing up to 38 undersized or badly rusted culverts. In addition, up to five armored water dips will be installed where spacing between existing structures is excessive. Undersized or badly rusted culverts have the potential to plug, causing failure of the road prism and the input of large quantities of fine sediment directly to the stream system. The ROD/RMP specifies the maintenance of roads to minimize sediment production and water quality degradation by replacing undersized culverts and adding new culverts to accommodate at least a 100-year flood event (USDI 1995a, 28 and 163).
- Provide vehicular access to proposed salvage units on BLM-administered lands in the Project Area that are not accessible by existing roads by constructing approximately 3.5 miles of new permanent road and 4.3 miles of temporary spur roads. The ROD/RMP directs roads to be located to minimize soil erosion, water quality degradation, and disturbance to riparian vegetation by minimizing road locations in riparian reserves and locating roads on stable positions such as ridge tops (USDI 1995a, 28 and 157).

1.3.2.3 Fuels Treatment

- Decrease the amount of slash and additional fuel hazard (fire intensity and rate of spread) created by the windstorm. ROD/RMP direction is to lower the risk of high intensity, stand-replacing fires which can damage natural resources and homes and threaten the safety of individuals and fire fighters by reducing natural fuel hazards on BLM-administered lands in rural interface areas (USDI 1995a, 89) and reducing both natural and activity-based fuel hazards (USDI 1995a, 91). The greatest potential for extreme fire behavior exists during the first 5 years after the blowdown.

1.4 What Factors will the BLM use to Make a Decision?

Prior to deciding which alternative to select for the proposed project, the authorized officer must first make a finding of whether the alternatives analyzed in the EA have a significant impact. In making that determination, the authorized officer will consider both the context of the action and the intensity of the impacts, including the 10 factors outlined in 40 CFR 1508.27(b) (see Table 2-2).

In choosing the alternative that best meets the purpose and need for this project, the authorized officer, the Butte Falls Resource Area Field Manager, will consider the extent to which each alternative would:

1. provide timber resources and provide revenue to the government from the sale of those resources;
2. provide an economically feasible project;
3. reduce the potential for an insect epidemic;
4. reduce the increased fire danger from the dead and damaged trees;
5. accelerate the recovery of forest stands in riparian reserves, known northern spotted owl activity centers, and severely damaged matrix lands;
6. reduce erosion and subsequent sedimentation from roads;
7. accommodate at least a 100-year flood and provide and maintain fish passage at road crossings of existing and potential fish-bearing streams; and
8. reduce the costs both short-term and long-term of managing the lands in the Project Area.

1.5 Does the Proposed Project Conform with Land Use Plans and Other Documents?

The actions proposed and analyzed in this EA were developed to be consistent with the management objectives for public lands identified in the following documents. The EA analysis here tiers to that of the Northwest Forest Plan and supporting environmental impact statements in effect on the date of the EA decision.

1.5.1 Medford District Record of Decision and Resource Management Plan (ROD/RMP), June 1995

The *Medford District Record of Decision and Resource Management Plan* responds to the need for a healthy forest and rangeland ecosystem with habitat that will contribute toward and support populations of native species, particularly those associated with late-successional and old growth forests. The RMP responds to the need for a sustainable supply of timber and other forest products that will help maintain the stability of local and regional economies, and contribute valuable resources to the national economy on a predictable and long-term basis. The RMP contains the same land use allocations and standards and guidelines as the NWFP, but also responds to issues specific to the Medford District.

1.5.2 Northwest Forest Plan (NWFP), April 1994

The *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl* (also known as the Northwest Forest Plan) provides extensive standards and guidelines, including land allocations, which comprise a comprehensive ecosystem management strategy. The Medford District ROD/RMP of June 1995 incorporated the standards and guidelines of the NWFP and superseded the NWFP. Since the NWFP is commonly referenced as a shorthand description of this coordinated set of standards and guidelines common to the various Federal management units throughout the range of the northern spotted owl, we may make reference to the NWFP, even though it was replaced by the later adopted ROD/RMP. Wherever we refer to the "NWFP," we are actually referring to the 1995 ROD/RMP which incorporated the conservation strategy of the 1994 decision.

1.5.3 Survey and Manage (S&M), January 2007

This project conforms with the 2007 *Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl* (also known as Survey and Manage).

1.5.4 Medford District Integrated Weed Management Plan (IWMP), June 1998

Medford District Integrated Weed Management Plan and Environmental Assessment (IWMP) provides a proactive ecosystem-based approach to reduce populations of alien plant species to a level which will allow for the restoration of native plant species, and provide for overall ecosystem health. Control measures may include cultural or preventative (seed testing, vehicle washing), physical (hand pulling, competitive planting, burning), biological (insects), and chemical (herbicide), and may be found in greater detail in the *Northwest Area Noxious Weed Control Program EIS*, December 1985.

1.5.5 National Fire Plan (NFP), September 2000

In response to the wildland fires of 2000, the Secretaries of the Interior and Agriculture submitted a report, *Managing the Impact of Wildfires on Communities and the Environment, A Report to the President In Response to the Wildfires of 2000,* to President Clinton. This report, its accompanying budget request, Congressional direction for substantial new appropriations for wildland fire management, resulting action plans and agency strategies, and the Western Governor's Association's *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment - A 10-Year Comprehensive Strategy - Implementation Plan* have collectively become known as the National Fire Plan.

The National Fire Plan (NFP) is an interagency plan that was designed to ensure sufficient firefighting resources for wildland fires; restore landscapes and rebuild communities damaged by wildland fire; reduce hazardous fuels in forests; work with local residents to reduce fire risk and improve fire protection; and ensure accountability.

1.5.6 Relevant Statutes

- **Oregon and California Act** (O&C) 1937 - Requires the BLM to manage O&C lands for permanent forest production, in accord with sustained-yield principles. Management of O&C lands must also protect watersheds, regulate streamflow, provide for recreational facilities, and contribute to the economic stability of local communities and industries.
- **Federal Land Policy and Management Act** (FLPMA) 1976 - Defines BLM's organization and provides the basic policy guidance for BLM's management of public lands.
- **National Environmental Policy Act** (NEPA) 1969 - Requires the preparation of environmental impact statements for Federal projects which may have a significant effect on the environment.
- **Endangered Species Act** (ESA) 1973 - Directs Federal agencies to ensure their actions do not jeopardize threatened and endangered species.
- **Clean Air Act** (CAA) 1990 - Provides the principal framework for national, state, and local efforts to protect air quality.
- **Archaeological Resources Protection Act** (ARPA) 1979 - Protects archeological resources and sites on federally-administered lands. Imposes criminal and civil penalties for removing archaeological items from federal lands without a permit.
- **Clean Water Act** (CWA) 1987 - Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.
- **Healthy Forests Initiative** (HFI) 2002 - Focuses on reducing the risk of catastrophic fire by thinning dense undergrowth and brush in priority locations that are identified on a collaborative basis with selected Federal, state, tribal, and local officials and communities. The initiative also provides for more timely responses to disease and insect infestations.

1.6 What are the Relevant Issues and How were the Issues Identified?

1.6.1 Public Outreach

1.6.1.1 Scoping

Scoping is the process used to identify the range of issues, management concerns, preliminary alternatives, and other components of a NEPA document. It involves internal and public viewpoints. The Butte Falls Resource Area mailed a scoping letter to a total of 90 individuals, businesses, organizations, tribes, and government agencies on May 28, 2008 to initiate scoping for the Butte Falls Blowdown Salvage Project. The letter requested comments concerning issues to be addressed within the Project Area.

The Butte Falls Resource Area held a public meeting on June 12 in the City of Butte Falls. The information sharing meeting was advertised in the Medford *Mail Tribune* and was attended by about 20 people.

A total of 15 comment letters, public meeting comment forms, and e-mails were received from adjacent land owners, private citizens, timber companies, organizations, and environmental groups. These letters are available for review at the Medford District BLM Office, 3040 Biddle Road, Medford, Oregon.

1.6.1.2 Meetings

The Butte Falls Field Manager and members of the Interdisciplinary Team (ID Team) met with the following groups or individuals to apprise them of the BLM blowdown salvage:

- May 7, 2008 - Klamath Siskiyou Wildlands Center representative George Sexton.
- May 13, 2008 - 8 members of the Southern Oregon Timber Industry Association (SOTIA).
- June 17, 2008 - 10 members of the Jackson County Natural Resource Advisory Committee.

1.6.2 Relevant Issues

Based on input from the public and the project's ID Team plus information contained in the ROD/RMP, the following issues were identified. These issues provide a basis for comparing the environmental effects of the alternatives and aid in the decision-making process. The major issues brought forward were used to identify appropriate project design features or analyze environmental effects. The following major issues were identified:

1.6.2.1 Economics

The windstorm in January 2008 killed and damaged a large number of trees that could be salvaged. The majority of the Butte Falls Blowdown Salvage Project Area is located on matrix lands which are allocated to timber production. These stands were intended to provide a sustainable supply of timber that would contribute dollars to the Federal treasury on a continuing basis. Salvage harvest would allow the BLM to recover the economic value of some of the blown down trees before natural rot and insect infestation cause the value to decline. In addition, an evaluation of the economic feasibility of the management actions is considered.

1.6.2.2 Potential Insect Epidemic

Insects, such as the Douglas-fir bark beetle and the flatheaded fir borer, are present in healthy forests at natural low levels. The January windstorm created an abundance of dead and damaged trees that provide food and habitat for these insects. As a result, the insect population can rapidly increase and may potentially spread to adjacent green, standing trees.

1.6.2.3 Increased Fuels

The windstorm substantially increased surface fuel loading throughout the Project Area. An increase of surface fuels, especially those smaller than 3 inches in diameter such as twigs, small branches, and needles contribute to increased spread rates and burn intensities of a wildfire.

1.6.2.4 Recovery of Severely Damaged Riparian Reserves, Known Northern Spotted Owl Activity Centers, and Matrix Land

In the areas that suffered severe damage from the windstorm, down trees up to six feet deep cover the ground. The depth of the debris in these areas slows the development of mature forest stands that provide stream shade, suitable habitat for spotted owls, and harvest volume.

1.6.3 Issues Considered But Eliminated From Further Analysis

The following issue was brought forward during scoping. This issue was reviewed by the project's ID Team. It was determined this issue would be considered or discussed under the relevant resources during the environmental analysis process.

1.6.3.1 Conflicts over Salvage

Salvage harvest on public lands generates considerable discussion because of differences in philosophy over salvage and in the interpretation of science related to salvage. Some believe salvage allows the recovery of a resource that would otherwise be wasted. Others believe salvage causes an inappropriate level of additional harm to the environment. Research is limited, highly variable, and results are subject to different interpretations. Scientific differences of opinion over salvage logging that are pertinent to this project are discussed in this document. The impacts and controversy associated with salvage logging were addressed during the preparation of the environmental impact statements for the Northwest Forest Plan (p. 1-3, 3&4-261 to 3&4-319, and Appendix H) and the Medford District RMP (p. 3-105, 3-115 to 3-119, 4-115, 5-6 to 5-11).

1.7 What Decisions will be Made?

The following decisions will be made through this analysis:

- To determine if a Supplemental Environmental Impact Statement (SEIS) should be prepared based on whether the proposed action would result in significant impacts to the human environment not already analyzed in the EIS prepared for the Medford District RMP and its amendments. If there are any such additional impacts that are significant, the BLM will determine whether the project proposals could be modified to mitigate the impacts so an SEIS would not be necessary. If we determine there is no need to prepare an SEIS, we will document this determination in a Finding of No Additional Significant Impacts (FONASI).
- To determine at what level and where to salvage trees on BLM-administered lands within the Project Area.

2.0 What are the Alternative Ways of Accomplishing the Objectives?

Chapter 2 provides
- a description of the proposed projects,
- alternative ways for meeting the objectives identified in Chapter 1,
- Project Design Features that serve as the basis for resource protection during project implementation,
- a definition of the alternatives, and
- a comparison between the alternatives.

2.1 Definitions

The following definitions are for terms used in Chapter 2:

Decay class: A method used by BLM foresters to rank the state of decomposition of a dead tree or down log. Decay classes range from class 1 (least amount of decay) to class 5 (most advanced deterioration).

Landing: Any designated place where logs are laid after being yarded, and are awaiting subsequent handling, loading, and hauling.

Permanent road: Roads constructed and not decommissioned. Roads may be temporarily blocked, but remain in the road record inventory for future use.

Road renovation: Work done to an existing road which restores it to its original design. Work may include blading, cleaning ditch lines, adding crushed rock, or improving drainage.

Scarify: Loosening or breaking up the surface layer of soil or road, usually to a specified depth.

Slash: The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging.

Temporary spur roads: Roads constructed, used, then decommissioned. These roads are decommissioned by scarifying, seeding, mulching, and blocking.

2.1.1 Blowdown Stand Damage Definitions

The following definitions were used by BLM Foresters to categorize areas damaged by the windstorm. Trees within these categories occur in patches 1 acre or more in size and are
- completely uprooted and laying on the ground,
- standing and partially uprooted,
- snapped off with few or no remaining green limbs, or
- exhibiting very little crown and at risk of mortality due to pruning action when adjacent trees fell.

- **Scattered damage** occurs when a few trees are blown over here and there. The density of scattered trees is about 5 trees per acre or less. These areas have approximately 10 percent of the ground covered with blowdown and are generally easy to walk through.

- **Moderate damage** occurs in stands which exhibit substantial damage. About 50 to 80 trees per acre remain standing and the canopy closure is 40 to 60 percent. These areas have between 10 and 40 percent of the ground covered and walking is generally difficult due to logs and root wads.

- **Severe damage** occurs in stands showing catastrophic impact. Stands now resemble clear-cuts with less than 40 percent canopy closure. These areas have approximately 40 to 95 percent of the ground covered and are very difficult to walk through.

2.2 Introduction

The project ID Team developed two action alternatives that meet the objectives of the proposed action. These alternatives vary in their response to the issues identified in Chapter 1. In addition, we have included a No Action Alternative (Alternative 1) to provide a baseline for comparison. The two action alternatives explore a range of options for forest management.

2.3 Proposed Projects

2.3.1 Salvage Harvest

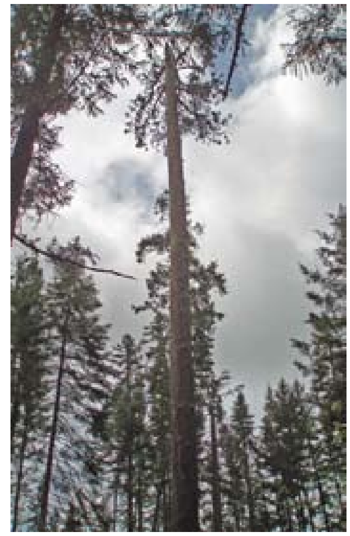


Figure 2-1. A tree damaged during the windstorm with less than 25% live crown remaining.

The BLM is considering salvage harvest on approximately 6,800 acres within the Medford District affected by a windstorm in January 2008. Salvage would include trees blown down during the storm, storm-damaged trees not likely to survive, insect-killed trees, and trees hazardous to the public or workers. Trees proposed for salvage would be in excess of those needed to meet the requirements for coarse woody debris and snags as established in the Northwest Forest Plan (p. C-40-43 and D-10) and the Medford District ROD/RMP (p. 39-40). In addition to the trees on the ground, damaged or insect-infested trees with no or very little green live crown (less than 25 percent live crown) would be salvaged (see Appendix A, Marking Guidelines).

In scattered and moderately damaged areas, windthrown and damaged trees in excess of those needed to meet snag and coarse woody debris requirements would be salvaged. Large coarse woody debris would be well-distributed across matrix lands at levels that are reflective of the stage of stand development (USDI 1995s, 47). For stands 100 years or older, at least 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long would be left. Snags and future sources of snags would be left at a rate of two trees per acre that are at least 20 inches in diameter.

In severe windthrown areas, all standing trees 20 inches in diameter having any green needles in the crown would be left. Damaged trees less than 20 inches in diameter that have less than a 25 percent crown ratio and thin or sparse foliage may be salvaged. Snags would be either live trees or decay class 1 or 2 and at least 20 inches in diameter leaving an average of 2 snags per acre. Coarse woody debris would be left with a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long. Only decay class 1 and 2 logs would be counted towards the total of coarse woody debris. Canopy closure would be approximately 10 to 25 percent. Retained overstory trees, snags, and down logs would provide for structural and biological legacies (Franklin 1992; Hansen et al. 1991; Hunter 1995) necessary to maintain ecosystem processes throughout the management cycle (USDI 1995a, 188).

Tractor (including shovel), skyline/cable, and helicopter yarding methods will be considered for removing the salvaged trees.

Salvage will be considered in lands designated as riparian reserve and known northern spotted owl activity center and on matrix lands designated as NGFMA, SGFMA, and connectivity/diversity block. Proposed salvage areas are also located in northern spotted owl critical habitat unit OR-36.

Salvage in riparian reserves and known northern spotted owl activity centers would be considered only in areas that sustained severe damage during the windstorm. Only windthrown and root sprung trees would be removed. All snags, broken top trees and damaged green trees would be left. Only windthrown trees in excess of the minimum required to meet coarse woody debris levels would be salvaged.

Salvage is proposed in previously regeneration harvested areas where the number of green trees retained in those areas exceeded the levels required by the ROD/RMP. Areas where the number of green trees retained exceeds seven trees per acre would be considered for salvage.

Salvage in northern spotted owl critical habitat unit OR-36 would be considered in areas that no longer provide northern spotted owl suitable habitat. These are areas where the windstorm resulted in stands with less than 40 percent canopy cover. Salvage would also be considered in portions of the critical habitat unit where more than 40 percent canopy closure remained after the storm if salvage would not alter the function of the northern spotted owl suitable habitat.

2.3.1.7 Road Work Associated with Salvage Harvest

Road renovation would occur before roads are used for salvage activities. Road surfaces would be bladed and ditch lines cleaned where needed; catch basins would be cleaned or enlarged; brush growing near culvert inlets and outlets would be cleaned; and brush, limbs, and trees would be removed along roadways to improve sight distance and allow for proper road maintenance. All drainage structures, including corrugated metal culverts, water dips, and ditch relief outlets, would be inspected and required work performed so water flow would not be impeded. Crushed rock would be added in spots where surfacing has been depleted. Culverts would be replaced where they have deteriorated and may be upsized, if needed, to meet 100-year flood standards. Additional drainage structures (culverts, water dips, etc.) may be added to existing roads to reduce spacing between culverts for improved drainage.

Temporary spur road construction would allow operator access to harvest units. These temporary roads would be constructed on or near ridge tops. After harvest is complete, the roads would be decommissioned in the same season as used.

Permanent road construction would allow the BLM access to proposed and future harvest units. Roads would be built on ridge tops where feasible and outside of riparian reserves.

Landing construction would provide locations for the salvaged logs to be gathered before future transport. Landing construction would occur adjacent to roads and would require clearing of trees and vegetation. Landings are generally located on level ground but some leveling would likely be needed. Landings need to provide an area large enough to safely allow equipment to deliver logs to the landing, deck the logs, and load logs on trucks. These landings can range in size from 0.25 acres for tractor landings to 1.0 acre for helicopter landings. Skyline/cable landings are generally located on roads and only require smaller clearings for decking of logs and no leveling. New landings would only be constructed where existing landings or openings are not available for use. New landings would be constructed outside of riparian reserves and known northern spotted owl activity centers.

2.3.1.8 Fuels Treatment associated with Salvage Harvest

Lop and scatter would be used when the slash (live and dead material nine inches or less) remaining in the units after salvage is less than 15 tons per acre. All stems and branches would be cut from the central stem and scattered. Central stems 7 inches in diameter and less would be cut to 3-foot lengths and left on the ground. The depth of the slash would not exceed 18 inches.

Hand piling and burning would occur when the slash (live and dead material nine inches in diameter or less) remaining in the units after harvest is greater than 15 tons per acre or the unit is adjacent to a main road system or private property. If hand piled, material between one and seven inches in diameter and two feet long would be piled by hand. The piles would be a minimum of four feet high and six feet in diameter. The number of piles per acre would range from 45 to 70. Piles would be burned in the fall to winter after one or more inches of precipitation has fallen.

Mechanical piling and pile burning would occur when the slash (live and dead material 9 inches in diameter or less) remaining in the units after harvest is greater than 15 tons per acre and the slope is less than 35 percent. If machine piled, material between 2 and 12 inches in diameter and 2 feet long would be piled. The piles would be a minimum of 8 feet high and 10 feet in diameter. The number of piles per acre would range from 25 to 45. Piles would be burned in the fall to winter after one or more inches of precipitation has fallen.

Underburning would occur in units where it is operationally feasible based on access and the ability to minimize the potential of an escape and limit fireline construction. The actual area burned may be greater than the original salvage unit if existing roads and topographic features can be used to enhance the tactical fire holding opportunities. Underburning would occur in the spring, after snow melt and prior to fire season.

2.3.1.9 Yarding Systems

Windthrown trees designated for removal would be moved to landing areas using a combination of tractor, shovel, cable, or helicopter yarding methods.

Tractor yarding uses tractors to drag trees to landing locations. Tractor yarding only occurs on lands with less than 35 percent slope. This method requires narrow skid trails (about 9 to 12 feet wide). Skid trail locations are approximately 150 feet apart but vary depending on the site-specific terrain. Existing skid trails would be used to the extent practical. Skid trails are prelocated and approved by the BLM sale administrator.

Shovel yarding may be used in a tractor yarding units to assist in untangling the blowdown trees. Shovel yarding uses a track mounted shovel to lift the logs and pass or “leap-frog” logs toward the skid road or landing. Lifting the logs will result in less ground skidding of logs to the skid trails.

Cable yarding uses a stationary machine, or yarder, to pulls the logs to the landing or road by means of steel cables

Helicopter yarding lifts trees bunched together by a cable, moving the trees from the treatment unit to a landing area near a road. Helicopter yarding allows for full suspension of the trees from the treatment unit to the landing area and does not create skid trails or corridors

2.4 Description of the Alternatives

Table 2-1 provides a comparison of the proposed projects between the action alternatives.

2.4.1 Alternative 1 - No Action

The No Action Alternative describes the baseline against which the effects of the action alternatives can be compared, the existing conditions in the Project Area, and the continuing trends.

2.4.2 Alternative 2 (see Alternative 2 Map and Table 2-1)

In Alternative 2, salvage would be considered only on matrix lands. A minimum of 2 snags and 120 linear feet of coarse woody debris would remain after salvage, on average, across the salvage acres.

In scattered and moderately damaged areas, windthrown and damaged trees in excess of those needed to meet snag and coarse woody debris requirements would be salvaged. In severe windthrown area, all standing trees 20 inches in diameter having any green needles in the crown would be left. Damaged trees less than 20 inches in diameter that have less than a 25 percent crown ratio and thin or sparse foliage may be salvaged.

Salvage would be considered on matrix lands in northern spotted owl critical habitat units no longer providing nesting, roosting, foraging habitat (suitable habitat). Locations where the storm resulted in a stand having less than 40 percent canopy cover no longer provide suitable habitat. Salvage operations would require 3.5 miles of new permanent road construction, 4.0 miles of temporary road construction, and 229 miles of road renovation to accommodate timber hauling. Fuels reduction activities would include slashing damaged residual conifers 1 to 7 inches in diameter, lopping and scattering areas with fuel loads less than 15 tons per acre, hand piling and burning areas with fuel loads more than 15 tons per acre, and machine piling and burning areas with fuel loads more than 15 tons per acre or a slope less than 35 percent.

2.4.3 Alternative 3 (see Alternative 3 Map and Table 2-1)

In Alternative 3, salvage would be considered in riparian reserves and known northern spotted owl activity centers, in addition to the matrix lands in Alternative 2. Only riparian reserves and known northern spotted owl activity centers that were severely damaged by the windstorm would be considered for salvage. All snags, broken top trees, and damaged green trees would be left. Only those windthrown trees in excess of coarse woody debris requirements would be salvaged. Requirements are to retain 9 to 10 pieces of down wood greater than 20 inches in diameter and more than 20 feet long for a total of 205 linear feet per acre in the salvage area.

In known northern spotted owl activity centers, salvage would only occur where the windstorm reduced the canopy to less than 40 percent and the area of disturbance is 10 acres or more in size. Equipment would be restricted to the severely damaged portion of the activity center. Designated skid trails would be used and ripped following use.

Only severely damaged riparian reserves located adjacent to severely damaged matrix land would be considered for salvage. No ground-based equipment would enter riparian reserves.

2.5 Project Design Features

The following Project Design Features (PDFs) are included in the design of the salvage activities in Alternatives 2 and 3. These PDFs are a combination of applicable Best Management Practices (BMPs) identified in the Medford District ROD/RMP and resource protection measures identified by the project ID team. The PDFs serve as a basis for resource protection in the implementation of any projects and will be considered in the analysis of impacts in Chapter 3.

The scope of this proposed action is for a single entry into any given area. Should additional salvage trees be discovered after this EA is approved, the harvest of that material could occur after a determination of NEPA adequacy or additional NEPA analysis is completed, and the following criteria are met:

1. Newly discovered material must be located on matrix lands within the Project Area, which is defined as BLM-administered lands in
   - T33S, R1E, R2E, R3E
   - T34S, R1E, R2E, R3E
   - T35S, R1E, R2E, R3E
   - T36S, R2E, R3E
2. Inventories and surveys for cultural resources, Special Status Species, and Threatened and Endangered plants must be undertaken at the same levels as they were for the salvage units identified in this EA.
3. Harvest systems must be essentially the same as those previously described.

Riparian Reserves and Northern Spotted Owl Activity Centers

- Salvage only in areas with severe levels of blowdown. Areas of scattered or moderate windthrow will not be salvaged.
- Remove only windthrown and root sprung trees. All snags, broken top trees, and damaged green trees will be left, unless identified as a hazard to workers or the public. Hazardous trees will be felled and left on-site.
- Salvage only windthrown trees in excess of those trees needed to meet coarse woody debris levels of 9 pieces greater than 20 inches in diameter and more than 20 feet long (White 2000). The tree species preferred for coarse woody debris have the lowest susceptibility to insect build-up: incense cedar, ponderosa pine, sugar pine, and white fir. The most susceptible to insect build-up is Douglas-fir.
- Treat logging slash (pile and burn or lop and scatter) following salvage activities to minimize wildfire risk and to create planting spots. Conifer trees would be planted and associated silvicultural treatments would be applied to ensure seedling survival and establishment.
- Construct new landings and roads outside riparian reserves and northern spotted owl activity centers.

Northern Spotted Owl Activity Centers

- Salvage only where the windstorm reduced the canopy to less than 40 percent and the area of disturbance is 10 acres or greater.

- Restrict harvest equipment to the severely damaged portion of the owl activity center. Use designated skid trails to minimize soil compaction and potential damage to the remaining trees. Rip skid trails following use.

Riparian Reserves

- Prohibit the operation of ground-based equipment within riparian reserves and bull-line all salvage trees on ground suited for tractor yarding (generally less than 35 percent slope) to adjacent matrix lands.
- Salvage only in severely damaged riparian reserves located adjacent to severely damaged matrix lands. "Stand alone" riparian reserves that sustained severe damage would not be salvaged.
- For salvage on ground suited for tractor yarding, the outermost 100 feet of the riparian reserve will be available for salvage. In riparian reserves on intermittent and non-fish-bearing streams, a 75- to 100-foot no salvage area will be maintained on each side of the stream channel. On fish-bearing streams, a 220- to 320-foot no salvage area will be maintained. The buffer width varies based on the 5th field watershed and the site-potential tree length for that watershed.
  - Big Butte Creek 5th field watershed - 190 feet
  - Rogue River/Lost Creek 5th field watershed -185 feet
  - South Fork Rogue River 5th field watershed - 208 feet
  - Little Butte Creek 5th field watershed -163 feet
- For salvage harvest on ground suited for cable yarding, a 75-foot no salvage area will be maintained on each side of the stream channel in riparian reserves on intermittent and non-fish-bearing streams; the remaining riparian reserve will be available for salvage. On fish-bearing streams, the first site-potential tree length will be maintained as a buffer on each side of the stream channel. Salvage will be permitted within the second site-potential tree length located the furthest upslope from the stream.
- Construct new landings and roads outside riparian reserves.
- Water bar all yarding corridors within riparian reserves.
- Require one-end log suspension, full suspension over streams, and no streambank disturbance for cable yarding.
- Salvage above the slope break within riparian reserves.
- No salvage within coho critical habitat riparian reserves.
- Harden natural-surface road approaches where they cross streams containing coho critical habitat by applying base coarse material at stream crossings. Install drain dips, where feasible, to intercept water run-off from road surfaces and divert away from stream courses.

Soil and Hydrology

- Limit any construction to the dry season (generally May 15 to October 15). Landing or spur road construction will be located outside of riparian reserves and away from unstable soil conditions and headwalls.
- Limit landings to 1 acre or less.
- Meet 100-year flood design standards for road construction and improvement activities such as culvert upgrades.

- Predesignate intermittent and ephemeral stream crossings for heavy equipment operations. Stream crossings will be designated by a BLM authorized officer.
- Install and remove culvert crossings, as needed, where existing operator spurs cross intermittent or ephemeral streams. Culverts will be removed during the same operating season and prior to fall rains Apply native plant seed and weed-free mulch to disturbed soils after culvert removal.
- Replace existing road barricades upon completion of salvage activities. All drainage structures, including water bars, will be properly functioning prior to blocking. If no future access is needed, road decommissioning will be considered on all spur roads. If it is determined a spur road is needed for future access, it will either be adequately surfaced or decommissioned.
- Prohibit construction of new permanent roads or skid trails in the deferred watersheds (Clark Creek, Vine Maple, and Lost-Floras). Existing skid trails and temporary spur roads used for salvage harvest in the deferred watersheds will be ripped on completion of salvage in all areas with severe blowdown or in moderate blowdown areas where no short-term future access or entry is needed.
- Rip all temporary roads, apply native plant seed and weed-free mulch, and block upon completion of use. If log hauling on a temporary road is not completed in the same year the road is constructed, block the road before the rainy season, generally October 15.
- Rip all skid trails in areas with severe blowdown on completion of salvage activities.
- Seasonally restrict all rock hauling, log hauling, and landing operations on native surface or inadequately rocked roads whenever soil moisture conditions or rain events could result in road damage or the transport of sediment to nearby stream channels, generally October 15 to May 15.
- Restrict all rock hauling, log hauling, and landing operations on adequately rocked roads whenever soil moisture conditions or rain events could result in road damage or the transport of sediment to nearby stream channels, especially between the dates of October 15 and May 15. Allow road or landing use between those dates only during periods of dry weather.
- Limit cable yarding during wet weather conditions if gouging and channelized flow could occur.
- Water bar skid trails during the same operating season as used based on gradient and erosion class guidelines (see ROD/RMP, Appendix D-Best Management Practices, Erosion Control for Timber Harvest, p.167).
- Block skid trails leading off system roads upon completion of yarding by scattering large and small debris, such as rocks, logs, and slash, on the first 100 feet of the skid trails.
- In moderate or scattered blowdown areas, minimize the total number of skid roads by designating skid roads with an average spacing of 150 feet. Avoid creating new skid roads and use existing roads, where feasible, in order to minimize ground disturbance.
- When constructing temporary roads, use ridge tops wherever possible.
- Restrict all tractor yarding, soil ripping, and excavator piling operations from October 15 to May 15, or when soil moisture exceeds 25 percent.
- Restrict tractor and mechanical operations to slopes generally less than 35 percent. In areas where it is necessary to exceed these gradients, use ridge tops where possible.
- Rip areas identified for ripping (e.g., skid roads, landings, decommissioned roads) to a depth of 18 inches using a subsoiler or winged-toothed ripper.
- Scatter logging slash on exposed soil in all areas within riparian reserves where ground disturbance from log yarding has occurred.

Wildlife

- Seasonally restrict disturbance activities, such as tree felling and yarding, road construction, and log hauling on roads not normally used by the public, from March 1 to June 30 within 200 feet of known northern spotted owl sites.
- Seasonally restrict the use of type 1 or 2 helicopters from March 1 to June 30 within 0.25 miles of known northern spotted owl sites. The seasonal restriction will be waived if the BLM determines the site is not occupied or owls are not nesting.
- Seasonally restrict habitat removal activities from March 1 to September 30 within 0.25 miles of known northern spotted owl sites. The seasonal restriction will be waived if the BLM determines the site is not occupied or owls are not nesting.
- Limit road construction to areas outside of northern spotted owl nesting, roosting, and foraging habitat.
- Seasonally restrict salvage harvest activities from February 1 to August 15 within 0.5 miles of known, active peregrine falcon nest sites.
- Seasonally restrict salvage harvest activities from January 1 to August 31 within 0.25 miles of known, occupied bald eagle nests; 0.5 miles if the nest is within line-of-sight.
- Seasonally restrict salvage harvest activities from March 1 to July 15 within 0.25 miles of known, occupied nest sites of other raptors (e.g., goshawk, great gray owl, red-tailed hawk).
- Seasonally restrict salvage harvest activities from March 1 to August 1 within 0.25 miles of known, occupied osprey nest sites.
- Seasonally restrict salvage harvest activities from February 1 to May 30 where a fisher was detected in T35S, R3E, section 31.
- Restrict salvage harvest within 250 feet of any known Townsend's big-eared bat sites.

Roads and Quarries

- Restrict all road renovation and closure work from October 15 to May 15, or when soil moisture exceeds 25 percent.
- Restrict the application of dust abatement materials, such as lignin or Mag-Chloride, during or just before wet weather and at stream crossings or other locations that could result in direct delivery to a water body (typically not within 25 feet of a water body or stream channel).
- Place waste stockpile and borrow sites resulting from road construction or reconstruction in a location where sediment-laden runoff can be confined, at least one site potential tree length from a stream.
- When removing culverts, pull slopes back to the natural slope, or at least 1:1, to minimize sloughing, erosion, and the potential for the stream to undercut streambanks during periods of high streamflows.
- Apply native seed and weed-free mulch to all disturbed or exposed soils after stream culvert removal, replacement, and installation in the same operational season the work is completed.
- Dewater perennial streams during culvert replacement to minimize the movement of sediment downstream.
- Seasonally restrict (generally October 15 to May 15) all quarry development and rock crushing operations whenever soil moisture conditions or rainstorms could cause the transport of sediment resulting from quarry operations to nearby stream channels.

- Construct silt fences or other preventative structures (diversion ditches, settling ponds) as needed to prevent the potential for runoff from quarry operations into nearby stream channels.
- Plant native grass seed, native vegetation, or both within the same operating season to stabilize exposed soil in overburden areas from quarry operations.
- Require a detailed blasting plan to minimize the amount of rock material outside the designated quarry perimeter if explosives are necessary in quarry development.

Fuel Hazard Reduction

- Conduct a post-activity fuels assessment on all areas proposed for harvest activities. Modifications or additional treatment recommendations will be based on the fuels assessment and the amount of slash created during harvest activities. Slash disposal treatments will include one or more of the following: slash damage conifers or hardwoods 8 inch DBH or less, lop and scatter, hand pile and pile burn, machine pile and burn, or underburn.
- Locate hand piles or machine piles outside of ditch lines, cut banks above roads, or road corridors.
- Conduct hand pile and machine pile burns within one year of the completion of hand piling or machine piling. Conduct underburns within two years following harvest activities. Burn landing piles concurrently with adjacent (or within the same legal location) hand pile or machine pile burn units. All landing piles adjacent to underburn units will be burned prior to ignition of underburn unit.
- Provide an approved prescribed fire plan that complies with Prescribed Fire Handbook H-9214-1 prior to the ignition of all prescribed burns. The prescribed burn plan would contain measurable objectives, a predetermined prescription, and an escape fire plan to be implemented in the event of an escape.
- To prevent fire escapes and to minimize damage to residual vegetation and trees, schedule burning to occur when weather and fuel conditions allow for lower fire intensities (typically late fall through spring). In addition, patrol and mop-up burned areas to prevent areas from reburning and becoming escape fires.
- Use approved BLM water sources in prescribed burn activities
- Require the construction of firelines for underburning operations by hand using tools such as chainsaws, pulaskis, and shovels. When possible, use already existing barriers such as roads or spur roads as control lines (firelines). Most hand constructed firelines consist of removing all fuels down to mineral soil for a width of one to three feet. The line width is dependent on the fuel type present; narrower firelines are constructed in light fuels, such as grass or duff, and wider firelines are constructed in heavier fuels, such as high loadings of downed woody material and brush.
- Water bar all firelines where slope exceeds 15 percent to control water runoff and limit potential erosion.
- Use hoselines in conjunction with or independently of firelines. In riparian areas, hoselines may be used independently to establish a wet line that reduces the extent of the fire backing into identified areas.
- Conduct all prescribed burning in compliance with Oregon Department of Forestry's Smoke Management Plan. Smoke emission control could also include conducting mop-up as soon as possible after ignition is complete, covering hand piles to permit burning during the rainy season, and burning lighter fuels with lower fuel moistures to facilitate rapid and complete combustion, while burning larger fuels with higher moisture levels to minimize consumption.
- To reduce the amount of surface fuel loadings and emissions from prescribed burning, remove slash from the site, when feasible, by using whole tree harvesting, walking mechanized harvest equipment over the slash on skid roads, removing firewood at landing sites, or chipping slash at landing sites.

Special Status Plants

- Protect known Special Status vascular plant, lichen, bryophyte, and fungi sites using no entry buffers. Buffers will be determined based on species, proposed treatment, site-specific environmental conditions, and available management recommendations.

Noxious Weeds

- Wash logging and construction equipment, including undercarriages, before initial move-in and prior to all subsequent move-ins into the Project Area to remove soil and plant parts and prevent the spread of invasive and noxious weeds.
- Cleaning shall be defined as removal of dirt, grease, plant parts, and material that may carry noxious weed seeds and parts onto BLM lands. Cleaning prior to entry onto BLM lands may be accomplished by use of a pressure hose.
- Only logging and construction equipment visually inspected by a qualified BLM specialist, to verify that equipment has been cleaned, will be allowed to operate within the Project Area, or in the immediate vicinity of the Project Area. All subsequent move-ins of logging and construction equipment will be treated the same as the initial move-in.
- Apply native plant seed and weed-free straw mulch to areas disturbed by temporary road construction to minimize the introduction of noxious weeds.

Archaeology

- Apply mitigating measures to areas containing known archaeological sites. Buffers will be determined based on proposed treatment, site-specific environmental conditions, and protection recommendations.
- Stop work and notify the BLM within 12 hours if an archaeological site is discovered during the project.

Table 2-1. Comparison of Action Alternatives

	Alternative 2	Alternative 3
Salvage Harvest	5,910	6,010
Harvest Systems		
Tractor (acres)	4,840	4,870
Skyline (acres)	900	910
Bull Lining (acres)	0	60
Helicopter (acres)	170	170
Road Work associated with Salvage		
Renovation (miles)	224	224
Temporary Construction (miles)	4.3	4.3
Permanent Construction (miles)	3.5	3.5
Fuel Treatments associated with Salvage		
Lop and Scatter (acres)	2,190	2,200
Hand Pile and Burn (acres)	600	650
Machine Pile and Burn (acres)	2,920	2,960
Underburn	200	200
NOTE: Estimated acres.		

Table 2-2. Effects on Critical Elements of the Human Environment

Element	Effect and Rationale
Air Quality	The Project Area is not located within a Class I designated airshed or Smoke Sensitive Receptor Area. Dust created from vehicle traffic on gravel or natural-surfaced roads, road construction, and logging operations would be localized and of short duration. Current air quality and visibility conditions are not monitored within the Big Butte Creek 5th field watershed. Because no permanent sources of particulate matter production exists, and based on findings from the Shady Cove monitoring site, the air quality and visibility throughout the watershed is thought to be good. Activity fuels would be burned in accordance with the *Oregon State Implementation Plan*, *Oregon Smoke Management Plan,* and *Visibility Improvement Plan.* The impact of smoke on air quality is expected to be localized and of short duration. Particulate matter would not be of a magnitude to harm human health, affect the environment, or result in property damage. As such, the Proposed Action is consistent with the provisions of the Federal Clean Air Act.
Area of Critical Environmental Concern	No effect on an Area of Critical Environmental Concern (ACEC). The Poverty Flat ACEC, on the Butte Falls Highway in T34S, R2E, section 31, is located approximately 0.75 miles from the nearest Butte Falls Blowdown Salvage unit. The project, by design, does not enter an ACEC. Logs may be hauled on the Butte Falls Highway which passes the northern boundary of the ACEC. The highway is a well-used paved county road. The project would not introduce any vectors for noxious weed transport beyond those that currently exist.
Cultural Resources	The BLM completed a cultural survey following Oregon BLM/SHPO protocol in July 2008 (Cultural Project Number OR110-08-36). The Medford District Archaeologist assessed the project as “No Effect Determination, No Resources.” The following PDFs are included in the EA to avoid impacts to cultural resources: • Apply mitigating measures to areas containing known archaeological sites. Buffers will be determined based on proposed treatment, site-specific environmental conditions, and protection recommendations. • Stop work and notify the BLM within 12 hours if an archaeological site is discovered during the project.
Environmental Justice	The Butte Falls Blowdown Salvage project is not expected to have substantial effects on minority or low-income individuals. Based on past projects in the Butte Falls Resource Area, implementation of the proposed project is expected to provide job opportunities in communities such as Butte Falls, Eagle Point, Shady Cove, White City, and Medford. Minority or low income populations may benefit from the economic effects of the Butte Falls Blowdown Salvage project. Small or minority-owned businesses would have the opportunity to compete for projects generated by the salvage sales.
Farm Lands (unique or prime)	No farm lands will be affected. Salvage would occur on BLM-administered forest lands.
Floodplains	There would be no salvage or road construction on floodplains within the Project Area. The Proposed Action does not involve occupancy and modification of floodplains, and would not increase the risk of flood loss. As such, the Proposed Action is consistent with Executive Order 11988, Floodplain Management.

Table 2-2. Effects on Critical Elements of the Human Environment

Element	Effect and Rationale
Invasive, Nonnative Species	Several noxious weed species (Canada thistle, yellow star-thistle, diffuse knapweed, spotted knapweed) are known to occur within the Project Area, but no populations are located in the proposed salvage units or areas proposed for road or landing construction (as of May 2008). Invasive, nonnative plant species are spread as a result of human and wildlife activities and natural processes. The rate of spread is undeterminable as it depends on numerous factors, including the presence of source seed or plant parts as well as random acts that introduce invasive, nonnative plant species into uninfested areas. The activities proposed in the action alternatives that create the greatest potential for introducing or spreading invasive, nonnative species are activities that disturb soil, remove vegetation, or provide a vector for transport of noxious weed seeds. These activities include tractor yarding, road or landing construction, road decommissioning, slash pile burning, and vehicular or equipment traffic off system roads. To minimize the risk of introducing or spreading invasive, nonnative plant species during salvage harvest operations, Project Design Features (PDFs) would be implemented and the BLM would conduct ongoing monitoring and treatment of noxious weeds throughout the Butte Falls Resource Area. The use of PDFs, which are widely accepted as effective preventative measures, would prevent salvage operations from creating a risk of spreading invasive, nonnative species beyond existing threats.
Native American Religious Concerns	The Project Area contains no known sites that are sacred to Native Americans. The BLM sent scoping letters to the Confederated Tribes of Siletz, Cow Creek Band of Umpqua Tribe of Indians, and The Confederated Tribes of Grand Ronde. No responses were received to identify concerns.
Threatened or Endangered Species	No effect on T&E plant species. Of the three T&E plant species with ranges in the Butte Falls Resource Area, only *Fritillaria gentneri* has potential habitat in the proposed salvage units. All salvage units and areas proposed for new road or landing construction were surveyed and no T&E sites were discovered. Therefore, the salvage operations proposed in the action alternatives would be no effect to T&E plant species. The proposed action may affect Southern Oregon/Northern California coho salmon (*Oncorhynchus kisutch*), listed as a “threatened” species under the Endangered Species Act (ESA). The BLM consulted with NOAA Fisheries Service and requested a Letter of Concurrence that this project is Not Likely to Adversely Affect Southern Oregon/Northern California coho salmon. The proposal to salvage in known northern spotted owl activity centers would be “no effect” to spotted owls because salvage would only occur in severe blowdown areas that no longer provide suitable spotted owl habitat. A seasonal restriction would be implemented to avoid disturbance to spotted owls if they are present in the part of the activity center which still provides spotted owl nesting, roosting, and foraging habitat. Proposed salvage outside known northern spotted owl activity centers in spotted owl nesting, roosting, foraging and dispersal habitat “may affect, not likely adversely affect” northern spotted owl or designated spotted owl critical habitat. On July 10, 2008, the US Fish and Wildlife Service issued a Letter of Concurrence [LOC #8330. I0101(08)] to the Medford BLM that agreed with the BLM’s effects determination for the proposed action. Proposed salvage operations in nesting, roosting, and foraging and dispersal habitat would treat, but maintain the current (post-storm) function of the forest as owl habitat.

Table 2-2. Effects on Critical Elements of the Human Environment

Element	Effect and Rationale
Wastes, Hazardous or Solid	The Project Area contains no known historical sites with the potential to contain hazardous materials. BLM employees conducting field work in the Project Area have not encountered any illegal dumping of hazardous materials. If hazardous materials are discovered during the project implementation, applicable State and Federal laws would be followed to protect human health and the environment.
Water Quality	The Oregon Department of Environmental Quality has listed 21 streams as water quality limited in two of the four 5th field watersheds (Big Butte Creek and Little Butte Creek) the Project Area lies within. No proposed salvage units are located adjacent to any of these streams. As such, the proposed action would not alter water quality. The overall effects of the proposed action on water quality are expected to be neutral in the short-term and long-term. The State of Oregon water quality standards would not be exceeded.
Wetlands/Riparian Zones	The proposed action would not result in the destruction, loss, or degradation of any wetland. As such, the proposed action is consistent with Executive Order 11990, Protection of Wetlands.
Wild and Scenic Rivers	The Butte Falls Blowdown Salvage project would have no effect on Wild and Scenic Rivers because the Project Area does not contain any segments of a wild and scenic river.
Wilderness	No designated wilderness areas are located within or near the Project Area.

3.0 What are the Consequences on the Affected Environment, Changes to Existing Conditions, and Trends for the Alternatives Under Consideration?

Chapter 3

- describes land use allocations and restrictions found within the Project Area,
- describes the current condition of the environment within the Project Area, and
- provides an analysis of the potential impacts of projects proposed in each alternative.

3.1 Definitions

The following definitions are for terms used in the first portion of Chapter 3:

Analysis area: The area used to assess the effects to resources from the proposed project. The analysis area may differ from the Project Area and may vary by resource.

Site-potential trees: Trees that have attained the average maximum height possible given site conditions where they occur (USDA, USDI 1994b, 16).

3.2 Introduction

This chapter is organized by the resources most relevant to the issues identified in Chapter 1. After the affected environment description for each resource, the impacts of the actions proposed in each alternative are analyzed under the same resource heading.

3.2.1 Land Use Allocations and Restrictions

The Medford District ROD/RMP derived the following land use allocations from the major land allocations described in the Northwest Forest Plan: Designated Areas and Matrix. Designated Areas include riparian reserves and late-successional reserves, which include known northern spotted owl activity centers. Forest areas outside these Designated Areas and not set aside for other resource values are designated as matrix lands and are primarily managed to produce a sustainable supply of timber (USDI 1995a, p. 38).

BLM lands proposed for management activities within the Butte Falls Blowdown Salvage Project Area have been designated as matrix, riparian reserve, key watershed, 100-acre northern spotted owl activity center, and deferred watershed. Management activities are also planned within the Ginger Springs Municipal Watershed (see Map 2). Following is a summary of pertinent management direction contained within the Medford District ROD/RMP as it applies to the Project Area.

3.2.1.1 Matrix

The Medford District ROD/RMP objectives on matrix lands are to “produce a sustainable supply of timber and other forest commodities to provide jobs and contribute to community stability; provide connectivity (along with other allocations such as riparian reserves) between late-successional reserves; provide habitat for a variety of organisms associated with both late-successional and younger forests; provide for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees; and provide early-successional habitat” (USDI 1995a, 39). Matrix lands are divided into NGFMA, SGFMA, and Connectivity/Diversity Blocks. The proposed salvage project lies primarily on lands allocated as matrix.

Connectivity/Diversity Blocks are spaced throughout the matrix lands in the NGFMA allocation. The Medford District ROD/RMP directs each block to be maintained in at least 25 to 30 percent late-successional forest condition. Riparian reserves and other allocations with late-successional forest count toward this percentage. The Project Area contains seven connectivity/diversity blocks located throughout the area. The BLM proposes salvage in the connectivity/diversity blocks located in T33S, R2E, section 15; T34S, R2E, sections 21, 22, and 35; and T35S, R2E, section 25.

3.2.1.2 Riparian Reserves

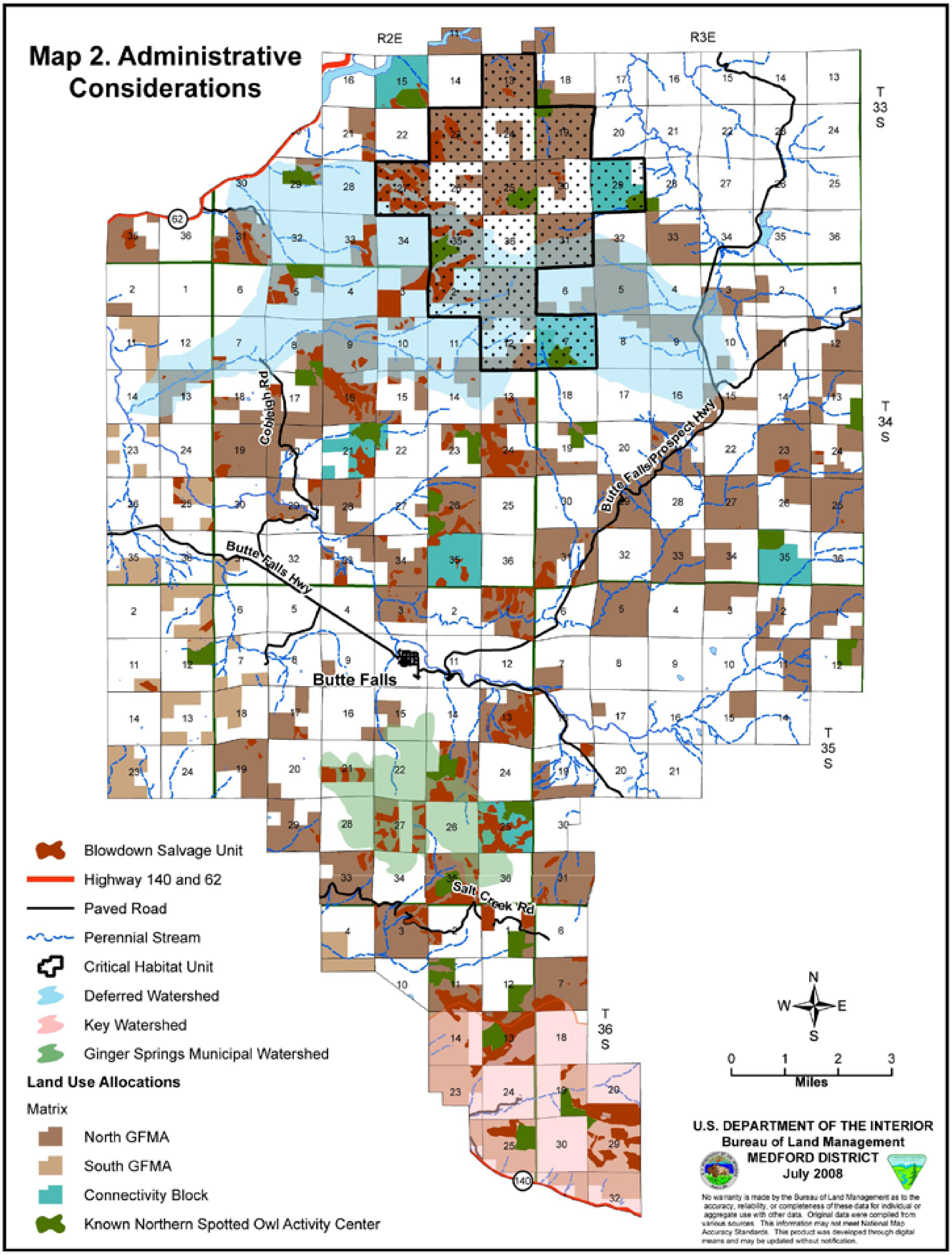
Riparian reserves were designated under the Medford District ROD/RMP and the Northwest Forest Plan as “areas along all streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis” (USDA, USDI 1994b, 7). Riparian reserves are managed to provide benefits to riparian-associated species, enhance habitat conservation for organisms dependent on the transition zone between upslope and riparian areas, improve travel and dispersal for many terrestrial animals and plants, and provide habitat connectivity within the watershed. Riparian reserve widths are set during watershed analysis and the boundaries may vary based on site-specific elements and characteristics, including the size of a site-potential tree.

The buffer width varies based on the 5th field watershed and the site-potential tree length for that watershed. The following riparian reserve widths apply to this project:

- Big Butte Creek 5th field watershed .... 190 feet
- Rogue River/Lost Creek 5th field watershed .... 185 feet
- South Fork Rogue River 5th field watershed .... 208 feet
- Little Butte Creek 5th field watershed .... 163 feet

3.2.1.3 Key Watershed

South Fork/North Fork Little Butte Creek was designated a Tier 1 key watershed in the Medford District ROD/RMP and the NWFP. Key watersheds are a component of the Aquatic Conservation Strategy and contribute directly to conservation of at-risk anadromous salmonids and resident fish species. Tier 1 key


Map 2. Administrative Considerations
R2E
R3E
T 33 S
T 34 S
T 35 S
T 36 S
Cobleigh Rd
Butte Falls Hwy
Butte Falls/Prospect Hwy
Butte Falls
Salt Creek Rd
62
140
Blowdown Salvage Unit
Highway 140 and 62
Paved Road
Perennial Stream
Critical Habitat Unit
Deferred Watershed
Key Watershed
Ginger Springs Municipal Watershed
Land Use Allocations
Matrix
North GFMA
South GFMA
Connectivity Block
Known Northern Spotted Owl Activity Center
N
W
E
S
0
1
2
3
Miles
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

watersheds have a “high potential of being restored as part of a watershed restoration program” (USDI 1995a, p. 22). The ROD/RMP (p. 23) directs there will be no net increase in the amount of roads in a key watershed. Key watersheds overlay portions of all land use allocations in the District and place additional management requirements or emphasis on activities in those areas.

3.2.1.4 100-acre Northern Spotted Owl Activity Centers

Late-successional reserves were designated in the Medford District ROD/RMP as areas set aside “to protect and enhance conditions of late-successional and old-growth forest ecosystems, which serve as habitat for late-successional and old-growth related species including the northern spotted owl” (USDA, USDI 1994b, C-9). The Butte Falls Blowdown Salvage Project Area contains one of the five components of the late-successional reserve system–known spotted owl activity centers. Known spotted owl activity centers are defined as “one hundred acres of the best northern spotted owl habitat as close as possible to a nest site or owl activity center for all known (as of January 1, 1994) northern spotted owl activity centers” (USDI 1995a, 32). The Project Area contains 27 known spotted owl activity centers. The BLM proposes salvage in one spotted owl activity center located in T35S, R2E, section 35.

3.2.1.5 Deferred Watershed

The Medford District ROD/RMP identified areas in the Medford District with high watershed cumulative effects that would be deferred “from management activities, including timber harvest and other surface-disturbing activities for ten years, starting from January 1993” (USDI 1995a, p. 42). The following deferred watersheds are located in the Project Area: Clark Creek, Vine Maple, and Lost-Floras. No projects are proposed in the Vine Maple deferred watershed.

3.2.1.6 Ginger Springs Municipal Watershed

The Ginger Springs Municipal Watershed is a geologically derived watershed that supplies water for the community of Butte Falls. The Medford District ROD/RMP directed a watershed plan should be prepared for this “community water system” for the city of Butte Falls (USDI 1995a, 42). The Butte Falls Resource Area prepared *A Watershed Analysis and Management Plan for BLM Lands within the Ginger Springs Recharge Area* in September 1998. This watershed plan provides management recommendations for the BLM-administered lands within the municipal watershed. These recommendations are *not* management decisions and the impacts of these recommendations were not assessed. BLM management decisions for the municipal watershed must be analyzed in project-specific NEPA analyses.

3.2.2 Other Actions in the Watersheds containing the Project Area

The Butte Falls Blowdown Salvage Project Area covers approximately 137,750 acres located in portions of the Big Butte Creek, Little Butte Creek, Rogue River/Lost Creek, and South Fork Rogue River 5th field watersheds in Jackson County, Oregon. The landscape pattern in the Project Area is largely determined by the checkerboard ownership (Figure 3-1). Blocks of BLM-administered lands intermingle with privately owned lands.

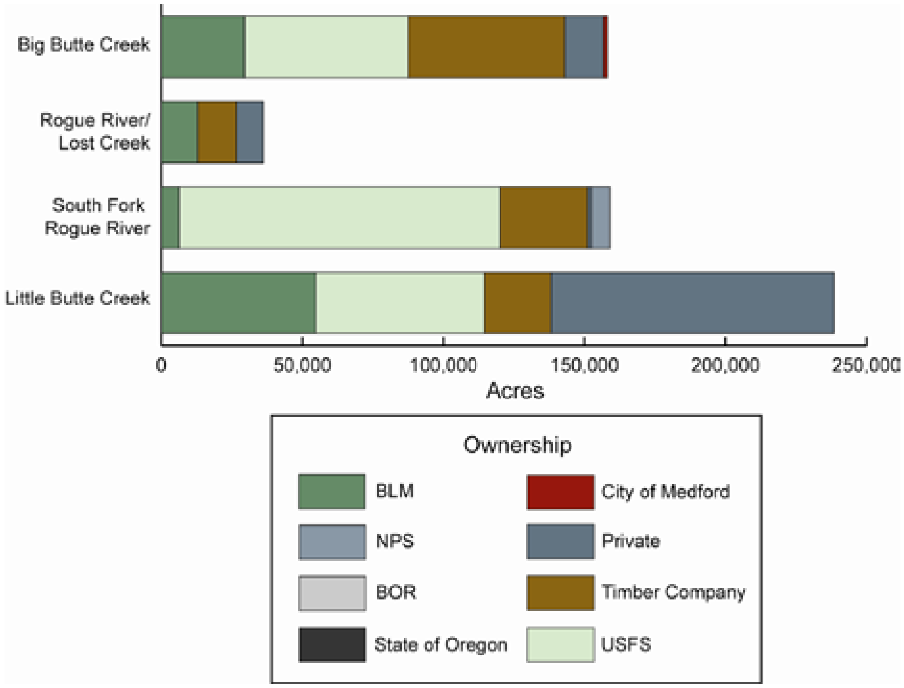


Figure 3-1. Land ownership in the four 5th field watersheds containing the Project Area.

3.2.2.3 Past Actions

Field observation and review of aerial photographs indicates most industrial timberlands within the watersheds have been harvested. The majority of merchantable overstory trees were removed, leaving a younger stand of Douglas-fir with lesser amounts of ponderosa pine, incense cedar, and scattered hardwoods. Most of these harvested acres have been planted and are now plantations of ponderosa pine or Douglas-fir of varied sizes and ages.

"The nonfederal forests within the range of the northern spotted owl are predominantly forests that have grown back since harvest and are generally even-aged stands. They are typically managed as commercial forests. . . . harvest generally occurs in a stand's fifth or sixth decade" (USDA, USDI 1994b, 3&4-6). The NWFP states "these forests generally are now in early and mid-successional stages, with many at or approaching ages and sizes that will predictably result in harvest."

In April 1994, the Record of Decision for the NWFP was signed. The Medford District ROD/RMP was completed in June 1995 and incorporated the standards and guidelines of NWFP. Under the ROD/RMP and NWFP, direction for timber management includes regeneration harvest, commercial thinning, density management, and selection harvest. Since implementation of the ROD/RMP, timber harvest in these four 5th field watersheds has included approximately 8,200 acres of harvest on BLM-administered lands (Table 3-1). Density reduction (e.g., commercial thinning, density management, and individual tree selection) occurred on approximately 5,560 acres, mortality salvage on 1,900 acres, and regeneration harvest on 740 acres within the watersheds in the past 14 years. These harvest activities occurred on matrix lands and identified riparian reserve buffers, retained larger remnant green trees in regeneration harvest units, and applied coarse woody debris retention guidelines, as directed by the ROD/RMP.

Table 3-1. Completed Projects within the Four 5th Field Watersheds containing the Project Area

Project Name	5th Field Watershed	Year Completed	Yarding System			Total Acres
			Tractor	Cable	Helicopter	
Lower Dudley	Big Butte Creek	1998	15	45	0	60
Tokyo Ginger	Big Butte Creek	1998	330	14	0	344
Rancheria	Big Butte Creek	1999	950	0	0	950
Fred-N-Jack	Big Butte Creek	2000	1,116	273	0	1,389
Ginger Springs	Big Butte Creek	2003	91	36	86	213
	Little Butte Creek	2003	50	0	0	50
Lower Big Butte	Big Butte Creek	2006	351	10	425	786
Titanic	Big Butte Creek	2006	322	0	0	322
	South Fork Rogue River	2006	107	0	0	107
Double Salt	Little Butte Creek	2004	322	42	145	509
Wasson Fire Salvage	Little Butte Creek	2006	1	41	0	42
Bieber Wasson	Little Butte Creek	2007	571	155	162	888
Round Forks	Little Butte Creek	2003	72	2	0	74
	South Fork Rogue River	2003	377	171	0	548
“B” Lost	Rogue River/Lost Creek	2005	192	8	0	200
	South Fork Rogue River	2005	6	28	0	34
Flying Lost	Rogue River/Lost Creek	2006	133	64	135	332
Ground Round	Big Butte Creek	1997	638	60	0	698
	Rogue River/Lost Creek	1997	518	10	0	528
	South Fork Rogue River	1997	108	10	0	118
		Total	**6,270**	**969**	**953**	**8,192**

3.2.2.4 Current Actions

Camp Stew is an on-going stewardship project within the Big Butte Creek 5th field watershed. The following components of the stewardship project are completed: spring development, fence removal, stock tank removal, stream channel restoration, and pine plantation pruning. Work remaining and expected to be completed by September 2008 includes thinning, planting root rot resistant tree species within a root rot infected area, chipping unmerchantable thinned material, and road decommissioning.

The Forest Service is currently implementing the Big Butte Springs Timber Sale located in the Big Butte Creek and Little Butte Creek 5th field watersheds. This timber sale is located east of the Butte Falls Blowdown Salvage Project Area. The Big Butte Springs Timber Sale includes proposed timber harvest on 6,184 acres. Approximately 5,900 acres will be harvested using ground-based logging systems and 200 acres using skyline cable systems. Reconstruction of 3.2 miles of existing road, construction of 2.0 mile of temporary roads, decommissioning of 32 miles of existing roads, and road maintenance on 20.7 miles of existing roads will occur. The Forest Service began project implementation in 2006 and expects to continue implementation for three to five years.

Since the January 2008 windstorm, the Butte Falls Resource Area has completed Categorical Exclusion Reviews for six small salvage projects located in the four 5th field watersheds containing the Project Area. In addition, the Ashland Resource Area has completed two Categorical Exclusion Reviews for salvage projects within the Little Butte Creek 5th field watershed (Table 3-2).

Table 3-2. Additional Salvage Projects within the 5th Field Watersheds containing the Project Area

Project Name	5th Field Watershed	Description
3 Links Blowdown Removal CE #OR115-08-09	Big Butte Creek	Removal of 10 blown down trees that fell onto an adjacent landowner's fence.
Blowdown Road Salvage CE #OR115-08-12	All	Removal of trees blocking BLM system roads and hazardous trees that could fall onto BLM roads in the Butte Falls Resource Area.
Butte Falls/Prospect Highway Blowdown Salvage CE #OR115-08-14	Big Butte Creek	Removal of approximately 40 blown down and hazard trees on 1.5 acres of BLM land adjacent to the Butte Falls/ Prospect Highway.
T36S, R2E, Section 2 Blowdown Removal CE #OR115-08-15	Little Butte Creek	Removal of 39 blown down trees that originated on BLM land and fell on top of trees belonging to an adjacent landowner. The trees were removed along the property line to facilitate access to the landowner's trees.
North Line Blowdown Salvage CE #OR115-08-20	Little Butte Creek	Removal of blown down trees that originated on BLM land and fell on top of trees belonging to an adjacent landowner. The trees were removed to facilitate access to the landowner's trees.
Bowen Over Salvage CE #OR115-08-27	Big Butte Creek	Salvage of wind thrown trees, damaged trees (trees with no green), and trees hazardous to workers and the public. Salvage harvest systems include tractor (144 acres), cable (1 acre) and skyline yarding (21 acres). Existing designated skid trails will be used. There will be no new road construction. Salvage harvest on matrix lands. No salvage under this project will occur in late-successional or riparian reserves.
Conde Blow Down Roadside Salvage CE #OR116-08-20	Little Butte Creek	Salvage along Lower Conde Creek Road within 80 acres of previously harvested areas.
Ashland Resource Area Road Clearing and Roadside Hazard Removal CE #OR116-08-31	Little Butte Creek	Removal of trees blocking BLM system roads and hazardous trees that could fall onto BLM roads in the Ashland Resource Area, excluding the Cascade-Siskiyou National Monument.

The Ashland Resource Area is conducting NEPA analysis for the Windy Soda Salvage project. The project proposes salvage on about 400 acres of matrix land located in the Little Butte Creek 5th field watershed. Salvage harvest systems include tractor (270 acres) and cable (130 acres) yarding. No salvage would occur in late-successional or riparian reserves. The BLM anticipates more small salvage projects could be coordinated with private landowners throughout the Project Area as the full scope of the windstorm damage is determined.

Taggarts Creek Fire in Project Area in July 2008.

In addition to the blowdown, a thunderstorm hit the Project Area on Saturday, June 28, 2008. On Wednesday, July 2, 2008, a hold-over fire that resulted from a lightning strike during the thunderstorm was discovered in the vicinity of Taggart's Creek. The fire was located at the end of BLM road 33-2E-27.3 in T33S, R2E, Section 27. The fire burned 8 acres in the middle of a stand of timber which had received a moderate to severe level of blowdown in the January 2008 windstorm (McCarty 2008).

3.2.2.5 Future Actions

The BLM anticipates future activities in the watersheds containing the Project Area will include continued forest management on private industrial lands. Future proposed harvest on BLM lands within the next five years would continue to implement the existing ROD/RMP and includes the following:

- South Fork Little Butte Timber Sale (2009) - 4,800 acres in the Little Butte Creek 5th field watershed. This sale will likely be a combination of regeneration harvest, mortality salvage, and thinning treatments on matrix lands. Tractor, cable, and helicopter yarding is likely to be used.
- Eighty Acre Creek Timber Sale (2010) - 700 acres in the Big Butte Creek 5th field watershed. This sale will likely be a combination of regeneration, selection harvest, and thinning treatments on matrix lands. Riparian thinning will be considered in riparian reserves within the thinned timber stands. Since the slope in most of the area is less than 35 percent, tractor yarding is likely to be the primary logging system used.
- Double Bowen Timber Sale (2010) - 700 acres in the Big Butte Creek 5th field watershed. This sale will likely be a combination of regeneration, selection harvest, and thinning treatments on matrix lands. Riparian thinning will be considered in riparian reserves within the thinned timber stands. Since the slope in most of the area is less than 35 percent, tractor yarding is likely to be the primary logging system used.
- Twin Ranch Timber Sale (2010) - 785 acres in the Big Butte Creek 5th field watershed. This sale will likely be a combination of regeneration and thinning treatments on matrix lands. Since the slope in most of the area is less than 35 percent, tractor yarding is likely to be the primary logging system used.
- Lost Clark Timber Sale (2012) - 350 acres in the Big Butte Creek 5th field watershed and 100 acres in the Rogue River/Lost Creek 5th field watershed. This sale will likely be a combination of regeneration and thinning treatments on matrix lands. Since the slope in most of the area is less than 35 percent, tractor yarding is likely to be the primary logging system used.

The BLM offered the Camp Cur Timber Sale for bid in 2005 and we expect harvesting will be completed in two to four years. The Camp Cur Timber Sale includes 800 acres; approximately 760 acres are located in the Big Butte Creek 5th field watershed.

The BLM offered the Flounce Around Timber Sale for bid in 2005 and we expect harvesting will be completed in two to four years. The Camp Cur Timber Sale includes 503 acres located in the Big Butte Creek and Rogue River/Lost Creek 5th field watersheds.

The Ranch Stew Young Stand Thinning project would thin 800 acres of ponderosa pine plantations and stands created after previous harvest entries. The project would be located in the Big Butte Creek 5th field watershed.

The Pacific Connector Gas Pipeline is proposed to pass through the Big Butte Creek and Little Butte Creek 5th field watersheds in the southwest corner of the Project Area. The pipeline would cross 5.3 miles of the Big Butte Creek 5th field watershed and 32.4 miles of the Little Butte Creek 5th field watershed.

The BLM is revising the Medford District Resource Management Plan through the Western Oregon Plan Revisions (WOPR) process. The EIS associated with the WOPR effort contains a cumulative effects analysis that incorporates these implementation actions in a manner appropriate to the land use planning scale. Any potential cumulative effects of the salvage proposal at the programmatic level that would be relevant to the proposed plan revision will be considered in that process. This EA will determine if any significant environmental effects of the salvage proposal would be substantially greater than what has already been analyzed in the existing RMP's programmatic EIS.

3.3 Forest Condition

3.3.1 Definitions

The following definitions are for terms used in the Forest Condition section:

Crown ratio: The length in feet of the live crown divided by the total tree height. When determining the base of the live crown, ignore short branches less than 3 feet long. For trees of uneven crown length, visually transfer lower branches on the longer side to fill holes in the upper portion of the shorter side to generate a full, even crown. Thin "see through" foliage should be "bunched" to created dense foliage.

Decay class: A method used by BLM foresters to rank the state of decomposition of a dead tree or down log. Decay classes range from class 1 (least amount of decay) to class 5 (most advanced deterioration).

Endemic insect populations: The variability of insect populations is relatively constant in forest stands. Insect mortality is generally limited to scattered individual trees under stress (drought, root disease, crown or root damage). At endemic levels, the insect population is within the natural range of variability.

Epidemic insect populations: A rapid increase of insect populations that causes mortality above normal levels. In addition to weakened trees, healthy green trees are attacked and killed. At epidemic levels, the insect population is outside of the natural range of variability.

Forest stand: An aggregation of trees occupying a specific area that is sufficiently uniform in composition, age arrangement, and condition that creates conditions distinguishable from the forest in adjoining areas.

Severe damage: Stand-replacing event in which the majority of the trees within an area had trees uprooted, tops snapped off and crowns defoliated by the loss of branches and needles. Stands now resemble clear-cuts with less than 40 percent canopy closure.

Salvage: Removal of trees either killed or severely injured from a disturbance event (e.g., fire, insects, or wind).

Wind damaged tree - A tree with less than 25 percent crown ratio and thin/sparse foliage remaining in the crown. The tree crown has a skeletal transparent appearance. Application of this guideline varies; refer to the marking guidelines, Appendix A.

3.3.2 Methodology

The Medford District's 1994 Proposed Resource Management Plan/Environmental Impact Statement (PRMP/EIS) determined a planned sustainable harvest level and assessed the effects of forest management, including salvage and insect management, on conifer growth and timber yield based on the standard and guidelines and land use allocations defined in the plan.

The PRMP/EIS used 5th field analytical watersheds for project purposes to describe existing watershed conditions (USDI 1994, 3-10). Consistent with the PRMP/EIS, four 5th field watersheds, Big Butte Creek, Rogue/Lost Creek, South Fork Rogue River, and Little Butte Creek, were used as the scale for this analysis. The majority of the damaged forest stands are within a 3- to 5-mile wide north/south strip located in Ranges 2 and 3 East from Township 33 South to Township 36 South. The windstorm damaged approximately 6,800 acres of forest stands covering portions of the four 5th field watersheds, see Table 3-3.

Table 3-3. Land Ownership in the 5th Field Watersheds containing the Project Area

Land Ownership/Jurisdiction	Big Butte Creek	Rogue River/ Lost Creek	South Fork Rogue River	Little Butte Creek
Bureau of Land Management	29,521	12,875	6,385	54,794
Forest Service	58,125	52	113,714	59,876
Industrial Forest Land	55,415	13,643	31,033	23,582
Private	13,683	9,675	1,344	100,337
City of Medford	1,426	0	0	0
State of Oregon	40	46	0	1
Bureau of Reclamation	0	0	0	5
National Park Service	0	0	6,538	0
Total Acres	**158,210**	**36,291**	**159,014**	**238,595**
Percent Administered by BLM	**19**	**35**	**4**	**23**
Percent of Salvage Area in Watershed	**54**	**16**	**1**	**29**

3.3.3 Assumptions

- Timber management activities, including salvage, will occur on BLM-administered lands allocated to planned, sustainable harvest (Matrix) to maximize volume growth and timber yield. The Medford District PRMP/EIS analyzed the impacts of these timber management activities on forest health and vegetation and the effects on biological diversity, in both the short- (10 years) and long-term (decades) (USDI 1994, 4-24 to 4-42).
- Salvage activities on BLM-administered lands are to be designed to ensure that such actions meet the requirements of the ROD/RMP land allocation (USDI 1995a, 72 and 186).
- Most commercial-sized (8 inches in diameter or greater) windthrown trees on private forestlands have been or will be salvaged by the end of the spring of 2009.
- Silvicultural treatments would be designed so that within-stand endemic levels of insects do not increase (USDI 1995a, 194).

3.3.4 Affected Environment

Unmanaged and recently harvested forest stands generally 80 years or older were impacted by the windstorm in January 2008. These stands contain taller trees that, when exposed to extreme winds, are more prone to uprooting, bole and lateral branch breakage, and loss of foliage. The damage to forest stands was intensified by extreme wind speeds (70 miles per hour or more) and a landscape with a highly fragmented canopy layer that reduced wind protection. Harvesting over the past 40 to 50 years across a "checkerboard" ownership pattern has created an alternating mix of young (shorter trees) and old (taller trees) forest stands with abrupt vertical edges. These edges provide for greater wind penetration and turbulence into the stand and increase the potential for wind damage. Forest stands across all topographic positions from low riparian areas to the upper ridge tops were affected by the windstorm.

The overstories of the damaged stands are dominated by Douglas-fir, with lesser amounts of white fir, incense-cedar, ponderosa pine, and sugar pine. Understory species include Douglas-fir, white fir, and incense cedar. Approximately 13 percent of stands 80 years and older on BLM-administered lands within the four 5th field watersheds were affected. The impacts varied from scattered individual trees that were uprooted to large areas that sustained moderate to severe damage. Stands that sustained moderate damage had 40 to 60 percent of the canopy removed and have 50 to 80 trees per acre left standing. Severe damage occurred when the majority of the stand had trees uprooted, tops snapped off, and crowns defoliated by the loss of branches and needles. Canopy closure declined from approximately 80 to100 percent to less than 30 percent. In these areas, windthrown trees typically cover the ground surface for a depth of 2 to 6 feet.

Although many forest stands were damaged, the windstorm provided an episodic "pulse" of small and large coarse woody debris that is beneficial to long-term site productivity and forest health. The windstorm added nutrient rich small branches and needles to the forest floor. As this small debris decomposes, an increased level of nutrients will become available for enhanced conifer growth. Windthrown trees and snapped off trees have increased the amount of large coarse woody debris on the forest floor. Large coarse woody debris that persists for decades is an essential structural and biological component of healthy forests. Coarse woody debris provides habitat for wildlife, invertebrate, microbial, and fungal species, as well as important ecological functions such as moisture retention, soil stabilization, and nutrient recycling.

Prior to the windstorm, Douglas-fir bark beetles (*Dendroctonus pseudotsugae*) and flatheaded fir borers (*Melanophila drummondi)* were present at natural low levels. The Oregon Department of Forestry and USFS conducted aerial surveys during 2006 and 2007 and no significant areas of Douglas-fir bark beetles or flatheaded fir borers were detected in or adjacent to the windthrown area (USDA 2006; USDA 2007). At low levels, insect populations play an essential role in properly functioning forest environments. Insects help decompose and recycle nutrients, create snags for wildlife habitat, thin unhealthy trees, enhance stand structure, and regulate tree species composition.

Adult Douglas-fir bark beetle.

Flatheaded fir borer larvae.

The January windstorm created an abundance of favorable breeding habitat for the development of large populations of the Douglas-fir bark beetle and the flatheaded fir borer. The beetles have the ability to rapidly increase their populations and there is a strong likelihood the insects will begin to build up in the downed or damaged trees during May and June of 2008. After one year the beetles will emerge and, at high population levels, beetles are likely to attack and cause the mortality of healthy green trees. Typically, epidemic population levels will continue for two to four years before declining back to natural levels.

3.3.5 Environmental Consequences

A comment letter received during project scoping presented two studies to the BLM for consideration. The first study, *Biogeochemical Consequences of Wind and Salvage-Logging Disturbances in a Spruce-Fir Forest Ecosystem* (Rumbaitis-del Rio and Wessman unpublished), documents the compound effects of three disturbance events on subalpine forests: catastrophic windthrow in 1997, followed by salvage logging in 1998 to 2001, and finally a large wildfire in 2002. The hypothesis of the study was that "compound disturbances have the potential to fundamentally alter an ecosystem structure and function." A comparison of this study to the anticipated effects of the BLM proposed action is not appropriate as the level of disturbance events (absence of wildfire) is different and the environmental and vegetative conditions of the two areas are significantly different.

The second research paper, *Changes in Understory Composition Following Catastrophic Windthrow and Salvage Logging in a Subalpine Forest Ecosystem* (Rumbaitis-del Rio 2006), focused on salvage logging in a 25,000-acre blowdown area in high elevation subalpine forests in Colorado's Routt National Forest. del Rio established 15 plots: five 0.1-acre plots in blowdown patches that were not salvaged, five 0.1-acre plots in salvaged-logged blowdown, and five 0.1-acre plots in intact forest stands. Over a two year period she measured seedling establishment, density, composition, and growth on each of the 15 plots. The study was prematurely ended after two seasons (standard study length is 4 to 5 years) after a wildfire consumed all of the salvaged-logged plots and four of the control plots.

The data collected for the first two seasons of the study indicated that on the three replicates of five 0.1-acre plots, the understory species cover and diversity was greater in blowdown areas than in salvaged-logged or control areas, with the caveat that some of the differences may be attributed to sampling the salvage-logged areas sooner (2 to 3 years) after disturbance than the blowdown area (4 to 5 years). The Rumbaitis-del Rio study concluded that "more research is needed on the long term dynamics . . . to determine if salvage logging will result in different patterns of succession" and that the long-term effects of salvage logging are unknown and difficult to predict.

Comparison of the Colorado study area to the proposed BLM salvage area is unpractical as the environmental and vegetative conditions of the proposed salvage area are vastly different from the area studied by Rumbaitis-del Rio. The blowdown study area in Colorado is a high elevation (8,400 to 9,400 feet), slow growing, subalpine forest dominated by shade-tolerant (trees with the capacity to become established and persist under the shade of a canopy) Engelmann spruce and subalpine fir that have a low tolerance to high temperatures and periods of moisture stress. The salvage Project Area under this environmental assessment is at lower elevations (2,100 to 4,800 feet) with mixed conifer stands dominated by intermediate- to shade-intolerant (trees unable to tolerate low light or shaded forest conditions) conifers that have a higher tolerance to high temperatures and moisture stress. Furthermore, the inherent variability of conditions across 25,000 acres of blowdown would suggest a need to sample more than 0.5 acres each (five 0.1-acre plots) of salvage-logged blowdown, intact stands, and unsalvaged blowdown to reach statistically valid conclusions. It is not clear how the conclusions of a shorten study combined with a limited sample size would apply to areas beyond the sample plots.

3.3.5.1 Effects of Alternative 1 (No Action) on Forest Condition

Direct and Indirect Effects

Under Alternative 1, no forest stands on BLM-administered lands would be salvaged. Not salvaging in areas where scattered small amounts of trees were uprooted or damaged and the crown canopy is generally intact would not have a substantial impact on RMP/ROD stand growth and yield objectives or the potential build-up of bark beetle populations. The windthrown and damaged trees would contribute to snags and coarse woody debris needs and would provide habitat for wildlife, invertebrate, microbial, and fungal species. The trees would also provide important ecological functions such as moisture retention, soil stabilization, and nutrient recycling.

Not salvaging in stands with moderate or severe damage would affect the growth and yield potential of the stand and would not meet the sustained yield objectives of the RMP/ROD. Windthrown and damaged trees would be left on-site. Trees in excess of those necessary for snags and coarse woody debris contain timber volume that is part of the timber yield calculation for matrix lands allowed for and expected in the ROD/RMP.

No site preparation would occur to create planting sites for the establishment of conifer seedlings. Where trees blanket the ground surface, substantial decomposition (decades) would need to occur to create sufficient space for seedling establishment and growth. Decomposition rates vary by temperature, bole size, moisture, and tree species. With the overstory tree canopy cover reduced to less than 30 percent, shrub species are expected to increase and limit conifer establishment and growth. These conditions would slow the development and growth of a new forest stand for at least 10 to 20 years. Without a fully stocked conifer stand occupying the site, growth rates within these stands would be less than those planned for and expected on matrix lands under the sustained yield objectives of the PRMP/EIS (USDI 1994, Volume II, 207).

Based on past windstorm events that created a large amount of windthrown trees (Schmitz and Gibson 1996), it is highly likely populations of bark beetles and wood borers would increase considerably and mortality of healthy trees would occur over the next two to four years. Beetles and bark borers are attracted to injured or recently downed trees because these trees lack the ability or have a reduced ability to produce defensive compounds to resist attack. Moderate and severe areas of windthrown and damaged trees provide large and widespread areas for beetles and bark borers to reproduce and expand populations toward epidemic levels.

Of specific concern is the Douglas-fir bark beetle; at epidemic levels, this beetle has the potential of killing a substantial number of large, healthy Douglas-fir. At high population levels, the beetles not only attack stressed trees but also healthy trees. Instead of a selective loss of weakened trees, large amounts of healthy, green trees are attacked. Douglas-fir bark beetles typically target large, if not the largest, Douglas-fir trees for attack (Schmitz and Gibson 1996). Within mature stands near moderate and severe windthrown areas, the risk of mortality for live, standing Douglas-fir would be high for three to four years.

Bark dust from Douglas-fir bark beetle in windthrown tree. Photo taken July 2008.

Generally, for every 10 infested, down Douglas-fir trees at least 10 inches in diameter, 4 standing green trees can be expected to be infested (Goheen 2008). The volume loss of standing trees can approach 30 to 60 percent of the windthrown volume (ODF 2007). Volume losses at these levels would affect the growth and yield objectives and assumptions of the RMP/ROD.

At epidemic population levels, the potential for forest stand structure to change is greater. The mortality of individual or clusters of Douglas-fir in pockets of 0.25 to 2 acres would result in the loss of vertical stand structure, stand density, and canopy cover. The flatheaded fir borer, although not as aggressive as the Douglas-fir bark beetle, may also cause scattered mortality of older Douglas-fir on drier sites adjacent to windthrown pockets. Other host specific insects (pine engraver, fir engraver, red turpentine beetle, western pine beetle, and mountain pine beetle) will be active with elevated populations, but are of less concern because they do not affect Douglas-fir. Douglas-fir is the dominant tree species and generally represents 60 to 80 percent of all trees greater than 8 inches in diameter.

At endemic insect population levels, insect predators, such as birds, wasps, spiders, and flies, feed on bark beetles and borers and naturally regulate insect numbers to keep populations low. When epidemic insect levels build-up, predators are unable to increase in numbers fast enough to keep up with the rapidly expanding insect population (Perry 1988). Subsequently, natural predators are overwhelmed when insect populations are at epidemic levels; predators are unable to effectively regulate insect populations.

In the wind damaged areas increased fuel loads would allow fires to start more easily, spread more quickly, and become difficult to control. Wildfire could reduce or eliminate the remaining standing trees and may spread to adjacent undamaged stands causing additional tree mortality. Forest stands that are subjected to stand replacing wildfires would shift from stands with varying levels of structural diversity and biological legacies to more simplified, less complex early seral forest stands. In matrix stands less than 100 years old, a stand-replacing wildfire would cause a loss of future conifer growth potential and would not allow the stand to meet the growth and yield expectations planned for in the RMP. In matrix stands older than 100 years, conifer growth has been maximized and the majority of the expected RMP volume would be available for salvage.

Cumulative Effects

Past Actions

Since the implementation of the Medford District ROD/RMP in 1995, approximately 8,200 acres of BLM-administered lands have been harvested within the Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek 5th field watersheds. Density reduction treatments (e.g., commercial thinning, density management, and individual tree selection) occurred on approximately 68 percent of the treatment acres, regeneration harvest on approximately 9 percent, and mortality salvage on the remaining 23 percent. Density management has redistributed growth from many small trees to fewer large, healthy trees. The remaining trees have adequate site resources to maintain good growth rates with tree vigor at levels necessary to minimize mortality due to competition or insects and disease. Regeneration harvest has replaced stands that have passed the point of optimum wood production with young, fast-growing conifer stands, maximizing the volume growth capability of the site. Because of tree size, there is a negligible risk of mortality from bark beetles or borers. Mortality salvage has removed individual, poor vigor trees and used the volume that otherwise would have been lost to competition related or insect mortality.

Of the 8,200 acres logged on BLM-administered land since the implementation of the RMP in 1995, approximately 2,665 acres (32 percent) experienced scattered (692 acres), moderate (1,064 acres) or severe (909 acres) wind damage during the January 2008 windstorm and are proposed for salvage. Some of this damage can be attributed to management actions on BLM administered and private lands, particularly in stands or adjacent to stands that were harvested within the past 5 years. For the first 5 years, trees that have grown in protected stands are vulnerable to windthrow when neighboring trees are removed (Busby et al. 2001).

Since the implementation of the Northwest Forest Plan in 1994, timber harvesting on Forest Service-administered lands within the Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek 5th field watersheds has been primarily commercial thinning with a smaller amount of pine tree release and sanitation harvesting. These types of silvicultural treatments would have maximized conifer growth rates and reduced stand susceptibility to insects by increasing stand and tree vigor.

On private industrial lands, past harvest activities have ranged from partial harvests to clear-cuts. Most of the 124,000 acres of private industrial land within the four 5th field watersheds have been logged over the past 60 years. In these stands, management objectives are designed to maximize volume growth per acre and maintain fast growing conifer trees. Under these conditions the risk of bark beetles or borers causing tree mortality is very low. Only when populations of Douglas-fir bark beetles and flatheaded fir borers reach epidemic levels are vigorous, fast growing Douglas-fir trees at risk of insect attack.

Of the 125,000 acres of privately owned lands within the four 5th field watersheds, there is a mix of agricultural and forest lands. On the forest lands, varying levels of harvest have occurred over the past 60 to 80 years. Conifer growth and timber yield rates for these lands are unknown. The level of risk of these forest stands to insect infestation is also unknown

This alternative (No Action) would not meet the timber management assumptions and conifer growth and timber yield projections provided for and expected in the Medford District PRMP/EIS. Silvicultural treatments would not be planned so that within-stand endemic levels of insects do not increase (USDI 1995a, 194).

Present Actions

On BLM-administered lands, roadside salvage of windthrown trees is occurring on approximately 170 miles of road. On matrix lands, the BLM is removing hazardous trees leaning toward the road and trees lying fully or partially within the road prism. Salvage of these trees would allow the recovery of a small portion of the expected matrix timber volume. In riparian reserves and northern spotted owl activity centers, the BLM is removing only the portion of the tree within the road prism. Removal of the roadside salvage trees across all land allocations would reduce the breeding areas for bark beetles and wood borers, but would have a negligible effect on the potential build-up of insect populations because of the substantial amount and widespread extent of the remaining windthrown trees.

The Forest Service is currently implementing the Big Butte Springs timber sale within the Big Butte Creek 5th field watershed within the 5-year planning cycle. The Big Butte Springs timber sale is approximately 6,200 acres; commercial thinning is the primary treatment. Thinning increases tree vigor by reducing inter-tree competition for limited site resources. More vigorous trees are less susceptible to insect infestation. In addition to these timber sales, noncommercial treatments such as protection, maintenance, precommercial thinning, and release may occur. These treatments would enhance seedling survival, reduce vegetative competition, and allow for increased conifer growth.

On private industrial lands, salvage logging of recent windthrown trees is occurring at this time. It is expected most of the concentrated and scattered windthrown trees on private industrial lands would be salvaged by the spring of 2009. This would reduce the amount of breeding habitat for the Douglas-fir bark beetle and flatheaded fir borer in the Project Area. As a general rule, forest lands that have less than 4 recently windthrown Douglas-fir trees (greater than 14″ dbh) per acre would have insufficient numbers of beetles to cause the mortality of healthy trees (ODF 2007). The BLM expects that the majority of private industrial lands would be below this level by spring 2009 and would not be a source of large populations of bark beetles or borers.

On lands owned by private individuals, the amount of logging is unknown, but harvesting is generally limited to small areas and individual trees are used for lumber or firewood. Windthrown and damaged trees would be expected to be salvaged by spring 2009 and would not contribute to the build-up of insect populations.

Future Actions

In the Big Butte Creek 5th field watershed, seven commercial timber sales, Bowen Over, Flounce Around, Camp Cur, Double Bowen, Twin Ranch, Lost Clark, and Eighty Acre, are proposed by the BLM within the 5-year planning cycle. Approximately 170 acres of the Bowen Over timber salvage, 60 acres of the Flounce Around timber sale, 800 acres of the Camp Cur timber sale, 700 acres of the Double Bowen timber sale, 700 acres of the Eighty Acre timber sale, and 350 acres of the Lost Clark timber sale are located within the Big Butte Creek 5th field watershed. The silvicultural treatments would be a combination of commercial thinning and individual tree selection in stands less than 100 years old and regeneration harvesting in stands 100 years or greater. The BLM expects post-harvest conifer growth rates to increase with tree vigor at levels less favorable for successful insect attack. These sales would contribute towards the annual and decadal timber sale volume analyzed for in the ROD/RMP. The Ranch Stew Young Stand Thinning project would thin approximately 800 acres of plantations and stands created after previous harvest entries.

In the Rogue River/Lost Creek 5th field watershed, the BLM is planning to harvest approximately 290 acres in the Flounce Around timber sale within the next 5-year planning cycle. In the Little Butte Creek 5th field watershed, the BLM (Ashland Resource Area) is planning to harvest nearly 4,800 acres in the South Fork Little Butte timber sale. The BLM expects post-harvest conifer growth rate to increase with tree vigor at levels less favorable for successful insect attack. This sale would contribute toward the annual and decadal timber sale volume analyzed for in the ROD/RMP within the 5-year planning cycle. The BLM has no timber sale activity planned within the South Fork Rogue River 5th field watershed within the 5-year planning cycle.

Wind damage occurred in some of the future timber sale areas. A post-salvage inventory will be necessary to determine the acres that no longer meet the RMP direction for timber management (USDI 1995a, 72). Acres not meeting the standard and guidelines for timber management would be dropped from the 5-year timber sale planning cycle.

The Forest Service has no known timber sales planned in the Rogue River/Lost Creek, Little Butte Creek, or South Fork Rogue River 5th field watersheds within the 5-year planning cycle.

On private industrial forest lands, harvest plans are unknown. However, in stands with an average diameter of 8 inches and greater at breast height, the BLM reasonably expects commercial logging within the next 5 to 10 years. Industrial landowners would most likely use silvicultural methods (e.g., clear-cutting and overstory removal) creating early seral stands. Post logging activities, such as conifer planting, application of herbicides to control brush and hardwoods, and precommercial thinning, would be scheduled to ensure survival, establishment, and maximum growth per acre of conifers. In stands less than 8 inches in diameter at breast height, little commercial logging is expected in the next 15 to 20 years. Within such stands, brush and hardwood control and precommercial thinning are the two primary management activities most likely to occur, both of which would reduce stand densities and increase conifer growth and timber yield. The BLM expects management activities on private industrial forest lands to create or maintain conditions that keep insect populations at endemic levels.

On privately owned lands, limited harvesting activities are expected. Occasional logging of large individual trees would occur and would most likely be limited to small areas. Impacts to conifer growth are unknown. Insect populations would most likely remain at endemic levels causing occasional mortality of weaken trees.

3.3.5.2 Effects of Alternative 2 on Forest Condition

Table 3-4. Proposed Salvage on Windstorm Damaged Lands in Alternative 2 (Matrix Only)

Stand Damage	Acres
Severe	1,380
Moderate	2,110
Scattered	2,420
Total	**5,910**

Direct and Indirect Effects

The acres proposed for salvage in Alternative 2 are consistent with the objectives of the ROD/RMP for salvage (USDI 1995a, 186) and insect and disease management (USDI 1995a, 189, 191, 194) criteria for matrix lands. Damaged and windthrown trees above the level needed to meet any green tree, snag, and coarse woody debris requirements would be salvaged. Salvaging the excess trees would meet the planned timber yield assumptions on matrix lands prescribed for in the ROD/RMP.

In scattered and moderately damaged areas, windthrown and damaged trees in excess of those needed to meet snag and coarse woody debris requirements would be salvaged. Large coarse woody debris would be well-distributed across matrix lands at levels that are reflective of the stage of stand development (USDI 1995a, 47). For stands 100 years or older, at least 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long would be left. Snags and future sources of snags would be left at a rate of 2 trees per acre that are at least 20 inches in diameter.

In severe windthrown areas, all standing trees 20 inches or more in diameter having any green needles in the crown would be left. Damaged trees less than 20 inches in diameter that have less than a 25 percent crown ratio and thin or sparse foliage may be salvaged. Snags would be either live trees or decay class 1 or 2 and at least 20 inches in diameter leaving an average of 2 snags per acre. Coarse woody debris would be left with a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long. Only decay class 1 and 2 logs would be counted towards the total of coarse woody debris. Canopy closure would be approximately 10 to 25 percent. Retained overstory trees, snags, and down logs would provide for structural and biological legacies (Franklin 1992; Hansen, et al. 1991; Hunter 1995) necessary to maintain ecosystem processes throughout the management cycle (USDI 1995a, 188). These structural components would also provide habitat for parasites and predators (birds, wasps, spiders) that naturally regulate insect populations.

Salvaging on matrix lands would reduce but not eliminate the potential for the build-up of insect populations. With the reduced amount of breeding habitat, it is expected there would be a corresponding reduction of insects and potential for green tree mortality in areas salvaged prior to beetle emergence. In other areas, such as riparian reserves and northern spotted owl activity centers where no salvage is proposed, insect populations are expected to increase. With the increased amount of beetles and borers, the BLM expects mortality of large, healthy green trees would occur in and adjacent to riparian reserves and northern spotted owl activity centers that sustained moderate to severe wind damage. Generally, for every 10 infested down Douglas-fir trees at least 10 inches in diameter, 4 standing green trees can be expected to be infested (Goheen 2008). The volume loss of standing trees can approach 30 to 60 percent of the windthrown volume (ODF 2007).

Following salvage of wind damage areas, logging slash would be treated (lop and scattered, excavator piled, underburned, or hand piled and burned) to minimize wildfire risk. The fuels treatments would benefit forest condition by reducing the fuel loading. In the event of wildfire, reduced fuel loadings would reduce the intensity of the fire. A lower intensity fire would reduce the potential loss of any remaining live or down trees and risk of the fire spreading to adjacent undamaged stands. In areas of severe damage conifer seedlings would be planted to establish a fully stocked stand with growth rates at levels expected under the sustained yield objectives of the PRMP/EIS (USDI 1994, Volume II, 203-208). In areas of scattered or moderate wind damage, the logging slash treatment would be lop and scatter or hand pile and burn. Because of the existing number of undamaged trees in these stands, the BLM does not expect conifer seedling planting would be necessary. A post salvage tree stocking evaluation would be done to determine if any planting is needed.

Permanent and temporary road construction would remove all vegetation within the road prism. The permanent roads would be converted from conifer forests to nonforested lands and would no longer contribute to future conifer growth or yield. Approximately 3.5 miles of permanent road construction would convert less than 13 acres of forested land to nonforested lands. Approximately 4.3 miles of temporary road construction would remove all vegetation on approximately 10 acres of forested land. Following harvest activities, temporary roads would have the road bed tilled, mulched, and planted to reestablish conifer species. Removal of the compacted surface would restore site productivity and provide suitable growing conditions for planted conifers.

This alternative would implement the guidelines for salvage on matrix lands but would not implement the salvage guidelines for riparian reserves or northern spotted owl activity centers. Endemic levels of insects may increase in or near riparian reserves, northern spotted owl activity centers, and on Matrix lands not salvaged prior to beetle emergence.

Cumulative Effects

See section 3.3.5.1, Effects of Alternative 1 (No Action) on Forest Condition, Cumulative Effects.

Salvage would occur on matrix lands and would follow the timber salvage guidelines in the Medford District ROD/RMP (USDI 1995a, 186). The cumulative effects of salvaging wind damaged trees have been anticipated and were analyzed (USDI 1994, 4-101). The proposed salvage of matrix lands when added to other past, present, and future actions on both BLM-administered and private industrial lands, would trend the forest stands towards a lower risk of epidemic insect population levels. Past, present, and future silvicultural treatments were and are intended to keep insect populations at endemic levels (USDI 1995a, 194) by reducing the amount of insect habitat and increasing tree vigor to levels less favorable to insect infestation. Salvaging windthrown and damaged trees would also allow the recovery of timber volume from matrix lands that is part of the planned and expected annual and decadal timber sale quantity.

This alternative would not implement the ROD/RMP guidelines for salvage in riparian reserves or northern spotted owl activity centers. Not salvaging in riparian reserves and northern spotted owl activity centers would maintain high levels of favorable insect habitat conducive to a build-up of insect populations. The probability of the mortality of healthy green trees in and adjacent to riparian reserves and northern spotted owl activity centers would not be reduced. Restoration of species composition and structural diversity in severely damaged riparian reserves and northern spotted owl activity centers would take decades to return to prestorm conditions. The speed of recovery would be dependent on the decomposition rates of the large windthrown trees, amount of early seral shrub competition, size of openings on the forest floor, amount of sunlight available for seedling growth, and the amount and location of overstory trees to provide a natural seed source.

3.3.5.3 Effects of Alternative 3 on Forest Condition

Table 3-5. Proposed Salvage on Windstorm Damaged Lands in Alternative 3

Land Use Allocation	Stand Damage	Acres
Matrix	Severe	1,380
	Moderate	2,110
	Scattered	2,420
Riparian Reserve	Severe	70
Northern Spotted Owl Activity Center	Severe	30
	Total	6,010

Direct and Indirect Effects

For direct and indirect effects of salvage on matrix lands, see section 3.3.5.2, Effects of Alternative 2 on Forest Conditions, Direct and Indirect Effects.

In addition to matrix lands, a limited amount of severely damaged riparian reserves (less than 100 acres) and northern spotted owl activity centers (less than 50 acres) would be salvaged. Only windthrown and root sprung trees would be removed; all snags, broken top trees, and damaged green trees would be left. The salvage would comply with the ROD/RMP riparian reserve and northern spotted owl activity centers salvage guidelines (USDI 1995a, 72 and 195).

Riparian reserves and northern spotted owl activity centers with scattered or moderate levels of wind damage would not be salvaged.

In severe areas, windthrown trees typically cover the ground surface for a depth of 2 to 6 feet and few openings remain for the establishment and growth of conifer seedlings. Where openings do occur, the BLM expects early seral brush species would rapidly expand into the openings and limit conifer growth. Salvaging severe windthrown areas would reduce the amount and depth of trees covering the ground while maintaining sufficient amounts of coarse woody debris to sustain the necessary physical complexity and stability of riparian areas and northern spotted owl activity centers. Openings on the forest floor would be created and would allow for the planting and establishment of conifer seedlings. Stand development and the restoration of species composition, structural diversity, and canopy cover would be accelerated by at least 10 to 20 years.

Salvaging would reduce the amount of windthrown trees providing insect habitat. With the reduced amount of breeding habitat, the BLM expects a corresponding reduction of insects and the reduced potential for green tree mortality in areas salvaged prior to beetle emergence. Generally, for every 10 down, infested Douglas-fir trees at least 10 inches in diameter, 4 standing green trees can be expected to be infested (Goheen 2008). The volume loss of standing trees can approach 30 to 60 percent of the windthrown volume if there are more than 3 down trees per acre greater than 14 inches in diameter (ODF 2007).

On ground suited for tractor yarding (slopes less than 35 percent), the outermost 100 feet of riparian reserves would be available for salvage. On intermittent and non-fish-bearing riparian reserves, a 75- to 100-foot no salvage area would be maintained on each side of the channel. Within fish-bearing streams, a variable width (225 feet minimum) no salvage area would be maintained. The buffer width varies based on the 5th field watershed and the site-potential tree (SPT) for that watershed (Big Butte Creek, SPT-190 feet; Rogue River/Lost Creek, SPT-185 feet; South Fork Rogue River, SPT-208 feet; and Little Butte Creek, SPT-163 feet).

On ground suited for cable yarding (slopes greater than 35 percent), a 75-foot no salvage area would be maintained on each side of intermittent and non-fish-bearing riparian reserves, with the remaining reserve available for salvage. On fish-bearing streams, the first SPT width would be maintained as a buffer on each side of the stream channel. Salvage would be permitted within the second site-potential tree width of the reserve.

Only windthrown trees in excess of those trees needed to meet coarse woody debris objectives would be salvaged. Coarse woody debris provides habitat for wildlife, invertebrate (insect predators), microbial, and fungal species, as well as, providing for important ecological functions such as moisture retention, soil stabilization and nutrient recycling. The species preference for coarse woody debris would be the trees with the lowest susceptibility to insect build-up. The least susceptible tree species are incense cedar, ponderosa pine, sugar pine, and white fir. The most susceptible to insect build-up is Douglas-fir. To minimize breeding areas for the Douglas-fir bark beetle and the flatheaded fir borer, efforts would be made to limit the number of windthrown Douglas-fir trees left for coarse woody debris.

Following salvage activities in riparian reserves and northern spotted owl activity centers, slash would be treated (hand piled or lopped and scattered) to minimize wildfire risk. The fuels treatments would benefit forest condition by reducing the fuel loading. In the event of wildfire, reduced fuel loadings would reduce the intensity of the fire. A lower intensity fire would reduce the potential loss of any remaining live or down trees and risk of the fire spreading to adjacent undamaged stands. Following salvage activities, conifer trees would be planted and associated silvicultural treatments would be applied to ensure seedling survival and establishment. The growth and vigor of planted trees would be maximized due to low vegetative competition and trees with crown ratios greater than 35 percent.

Cumulative Effects

See section 3.3.5.2, Effects of Alternative 2 on Forest Conditions, Cumulative Effects.

Salvage would occur on Matrix lands and would follow the Medford District ROD/RMP timber salvage guidelines (USDI 1995a, 186). The cumulative effects of salvaging wind damaged trees were anticipated and analyzed in the PRMP/EIS (p. 4-101). This alternative would also implement the ROD/RMP guidelines for salvage in riparian reserves or known northern spotted owl activity centers that sustained severe wind damage (USDI 1995a, 72 and 195). Salvage in riparian reserves is permitted when the extent of wind damage has resulted in degraded conditions and salvage is necessary to attain Aquatic Conservation Strategy objectives (USDI 1995a, 27). Within northern spotted owl activity centers, salvage is permitted when a stand-replacing event of at least 10 acres has occurred or when it is essential to reduce the risk of future insect damage to late-successional conditions (USDI 1995a, 33). In both the riparian reserve and northern spotted owl activity centers land allocations, these prerequisite conditions for salvage are present in areas that sustained severe wind damage.

The proposed salvage of matrix, riparian reserve, and northern spotted owl activity centers when added to other past, present, and future actions on both BLM-administered and private industrial lands would trend the forest stands towards a lower risk of epidemic insect population levels. This action along with past, present, and future silvicultural treatments is intended to keep insect population at endemic levels (USDI 1995, 194) by reducing the amount of insect habitat and increasing tree vigor to levels less favorable to successful insect infestation.

3.4 Fire and Fuels

3.4.1 Definitions

The following definitions are for terms used in the Fire and Fuels section:

Needle drape: Needles falling from overstory trees that become lodged in or draped over understory vegetation (Knapp 2007).

Canopy bulk density: Determines whether crown fire spread, or the horizontal transfer of fire between crowns, can occur (Keyes and O’Hare 2002). Measured in kilogram/square meter.

Fire behavior characteristics: The following definitions are from the FMAPlus CrownMass User’s Guide.

- Rate of spread (ROS) is the speed the fire travels through the surface fuels. The ROS is the rate the head of the fire spreads uphill with the wind blowing straight uphill. The ROS predictions use the Rothermal (1972) surface spread model, which assumes the weather, topography, and fuels remain uniform for an elapsed period of time. Measured in chains/acre. One chain equals 66 feet.
- Flame length is the length of the flame in a spreading surface fire within the fire front. Flame length is measured from midway in the combustion zone to the average tip of the flames. Good indicator

of intensity. Wildfires with flame lengths less than 4 feet can be controlled by hand. Flame lengths greater than 4 feet are considered too intense to attack by hand and should be controlled with mechanical equipment. Measured in feet.

- Fireline intensity is the heat energy release per unit time from a 1 foot wide section of the fuel bed extending from the fire front to the rear of the flaming front. Fireline intensity is a function of rate of spread and heat per unit area, and is directly related to flame length. Fireline intensity and the flame length are related to the heat felt by a person standing next to the flames. Measure in btu/feet/second.

Fire intensity: The rate at which fuel is consumed.

Fire severity: The effect fire has on vegetation, soils, wildlife, and the landscape.

Fire types:

- Surface fire burns on the surface of the ground in needles, leaves, grasses and forbs, dead and down branches and boles, stumps, shrubs, and short trees (Scott and Reinhardt 2000).
- Passive crown fire (also called torching) is one in which individual tree or small groups of trees torch out, but solid flame is not consistently maintained in the canopy. Passive crowning encompasses a wide range of fire behavior, from individual tree torching to nearly active crown fire (Scott and Reinhardt 2000).
- Crown fire flames spread from crown to crown, surface and crown fire elements advance together as an interdependently linked unit, and firebrands from the burning crowns creates spot fires that advance the surface fire beyond its normal rate (Keyes and O’Hare 2002)

Flaming front: The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. Also called fire front.

Fuel bed depth: The average height of surface fuel that is contained in the combustion zone of a spreading fire front.

Fuel moisture (fuel moisture content): The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 ºFahrenheit.

Horizontal continuity: The horizontal distribution of fuels at various levels or planes. These characteristics influence where a fire will spread, how fast it will spread, and whether the fire travels through surface fuels, aerial fuels, or both.

Ladder fuel: Fuels which provide continuity between layers, thereby allowing fire to carry from surface fuels into the crowns of trees or shrubs.

Moisture of extinction: The fuel moisture content at which the fire will not spread.

Plume dominated fire: A fire whose behavior is governed primarily by the local wind circulation produced in response to the strong convection above the fire rather than by the general wind. In other words, plume domination is when the intensity of the fire is so strong it overcomes the influence of the local winds and topography. Fire behavior becomes very unpredictable because winds are drawn into the strong convention column (smoke and heat rising) creating its own weather. As the smoke column starts to collapse, strong downdraft winds can result producing erratic extreme fire behavior.

Surface fuels: Grasses, shrubs, litter, and woody material lying on, or in contact with the ground surface (Graham et al. 2004).

Surface fuel loading: The weight of fuels in a given area (weight per unit area), usually expressed in tons per acre, pounds per acre, or kilograms per square meter (NWCG 2004).

3.4.2 Methodology

The scale used for the fuels analysis includes the Big Butte Creek 5th Field Watershed, and the areas within the identified blowdown Project Area boundaries which include portions of the following 5th field watersheds: South Fork Rogue River, Rogue River/Lost Creek, and Little Butte Creek. This area will be referred as the Fire and Fuels analysis area.

The following sources and models were used to complete the analysis on the proposed projects and their affect on the watershed:

- Fire history and fire risk analyses were completed using GIS-generated spatial analysis based on information provided by Oregon Department of Forestry (ODF) and the Rogue River-Siskiyou National Forest wildfire databases from 1967 to 2006.
- A 7-year analysis of weather patterns recorded at the Zimms Remote Automated Weather Station was evaluated using FireFamily Plus software to determine the 90th percentile fuels moistures and weather conditions that were used in fire behavior models to help predict the potential fire behaviors.
- Fuel models (Scott and Burgan 2005) and photo series were used to estimate current and predicted surface fuels loadings and profiles of all size classes of identified severe, moderate, and scattered blowdown sites within the analysis area. Description of fuel models and photo series used can be found in Appendix D, Fuels Management.
- Fire behavior characteristics were analyzed using the fire behavior model BehavePlus.

For more detail information on this analysis and model assumptions used to determine fire behavior calculations, please see Appendix D, Fuels Management and Appendix E, Air Quality.

3.4.3 Assumptions

- Modeling results are static. The results are not intended to be precise predictions of an ever-changing and dynamic environment, but rather as a method for comparing alternatives and to facilitate the user’s understanding of the process.
- The coarse scale of the data used for fire behavior model inputs does not reflect the variability found within some of the analysis area. Such fine scale variability could be important and may have important consequences to fire growth over the landscape; the fuels data tends to smooth out variation in order to represent the average condition that is possible based on set weather and fuels parameters.

3.4.4 Affected Environment

3.4.4.1 Introduction

Fuels, fire and other disturbances, topography, and weather are fundamental factors influencing wildfire intensity and severity which shape the stand structure and function of forests across the landscape (Graham, et al. 2004). The recent blowdown event modified the forest structure and composition, increasing surface fuel loads throughout the Fire and Fuels analysis area. However, the amount and distribution of the blowdown varies. The potential increase in fire behavior is not only dependent on the increased surface fuels (e.g., composition, moisture content, amount, and structure) but is also influenced by the physical settings (e.g., slope, aspect, elevation), and potential weather (e.g., relative humidity, winds). These factors combined influence how a fire burns and its affects on the environment. In addition, the risk or the potential of a fire starting (the when, where, and how the fire starts) can influence the ability to attack and suppress a wildfire which could influence the intensity, severity, and final size of a wildfire.

3.4.4.2 Desired Conditions

The desired condition within the blowdown sites can best be described by analyzing conditions based on the following indicators: (1) surface fuel loads (amount and distribution of fuels) and (2) fire behavior (flame lengths, rate of spread, and intensity as it affects risk to life, property, natural resources, and firefighter effectiveness).

The desired condition is for predicted fire behavior to decrease following salvage and slash disposal activities in the blowdown areas. This will allow fire suppression resources to effectively suppress most wildfires during initial attack with hand tools, minimizing the final fire size and the effects on natural resources.

3.4.4.3 Fire History and Risk

Wildfires in the Fire and Fuels analysis area predominately occur from mid-July through mid-October, due to low relative humidity, low precipitation, and high ambient temperatures. Fire history analysis shows a total of 628 wildfires occurred throughout the Fire and Fuels analysis area from 1967 to 2006 (see Map 3). More than 85 percent of the fires were controlled to less than 0.25 acres in size. Nearly 99 percent of the fires were suppressed at less than 9 acres and burned less than 1,000 acres total. The remaining 1 percent includes 11 wildfires; 9 of these fires ranged from 17 to 39 acres in size. Of the two remaining fires, a fire in 1990 burned 132 acres and the 2005 wind-driven Wasson Fire burned 1,510 acres.

In the Fire and Fuels analysis area, fire risk reflects the probability of an ignition due to humans or lightning. Human-caused fires account for 46 percent of all fires starts in the Project Area while 54 percent were lightning-related (Table 3-6).

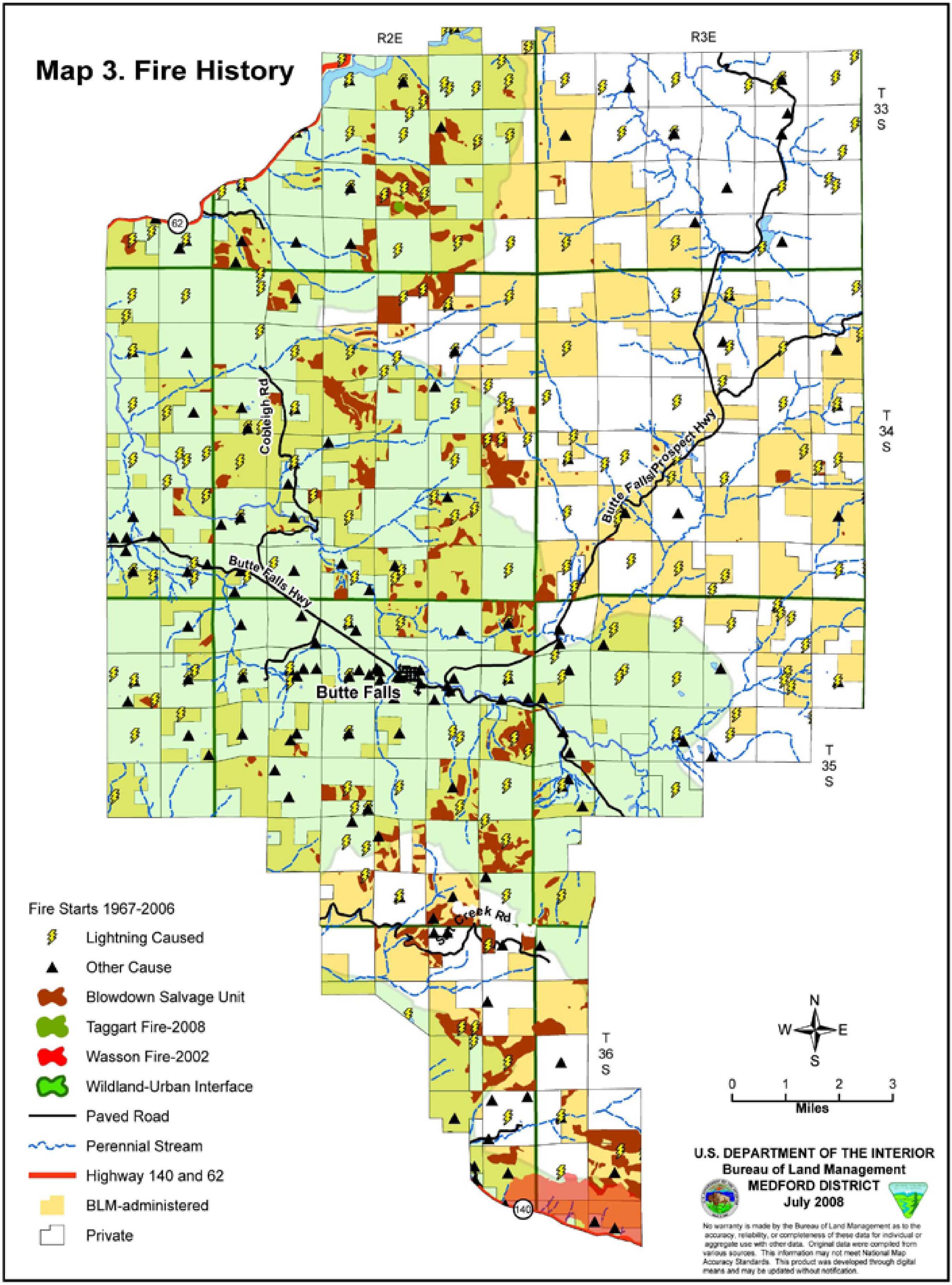

Map 3. Fire History
R2E
R3E
T 33 S
T 34 S
T 35 S
T 36 S
62
140
Cobleigh Rd
Butte Falls Hwy
Butte Falls/Prospect Hwy
Butte Falls
Fire Starts 1967-2006
Lightning Caused
Other Cause
Blowdown Salvage Unit
Taggart Fire-2008
Wasson Fire-2002
Wildland-Urban Interface
Paved Road
Perennial Stream
Highway 140 and 62
BLM-administered
Private
N
W
E
S
0 1 2 3
Miles
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Table 3-6. Number of Wildfires in the Fire and Fuels Analysis Area by Size Class, Cause, and Land Ownership at Point of Origin

Cause	Ownership	Wildfire Size Class						Total
		A 0 to 0.25 acres	B 0.26 to 9 acres	C 10 to 99 acres	D 100 to 299 acres	E 300 to 999 acres	F 1,000 to 4,999 acres	
Human	Private	161	45	5	0	0	1	212
	BLM	36	9	1	0	0	0	46
	USFS	28	4	1	0	0	0	33
	Total	225	58	7	0	0	1	291
Lightning	Private	148	14	1	1	0	0	164
	BLM	88	10	1	0	0	0	99
	USFS	70	4	0	0	0	0	74
	Total	306	28	2	1	0	0	337
	Grand Total	**531**	**86**	**9**	**1**	**0**	**1**	**628**

Taggarts Creek Fire in Project Area in July 2008.

Of the 628 wildfires, 40 percent of the fires occurred on federally-administered lands and nearly 60 percent of the fires occurred on private lands. On BLM-administered lands, 24 percent of the wildfires were human-caused and generally started along roads or abandoned campsites, while more than 75 percent of the fires were started by lightning, usually in higher elevations and along ridgelines.

On Saturday, June 28, 2008, the Project Area experienced thunderstorm activity with lightning strikes. On Wednesday, July 2, 2008, a hold-over fire that began during the thunderstorm was discovered in the vicinity of Taggarts Creek in T33S, R2E, section 27. The fire burned 8 acres in the middle of a stand of timber that had received a moderate to severe level of blowdown in the January 2008 windstorm.

This fire occurred early in the fire season at an elevation of approximately 4,000 feet in gently sloping (less than 20 percent slope) terrain. The area had snow as recently as the end of April. Ordinarily, due to the time of year, topography, and location of the fire, it is reasonable to expect that fire behavior should not have been extreme. It is reasonable to expect that handline would have been effective; however, due to the extraordinarily high fuel loading from the blowdown, increased fire behavior, limited access, and safety concerns, fireline construction with a bulldozer was the only option. Observed flame lengths were sustained 4 to 6 feet with torching occurring in the heavier pockets of fuel.

Helicopters and D-6 bulldozers were ordered for the suppression efforts. Two light helicopters worked the fire until nightfall (approximately 2 hours). Two D-6 bulldozers were used to line the fire. The blown down logs were so numerous and tangled, the D-6s could not push their way through, so sawyers were brought in to cut the logs to allow passage. Actual fireline construction took approximately 5 hours. Prior to the blowdown event, two dozers could construct a fireline around an 8-acre fire in less than 40 minutes.

Taggarts Creek Fire in Project Area in July 2008.

Overall, it is reasonable to say that due to the blowdown, this fire was larger, more difficult to control, and considerably more costly. In general, a lightning fire in this location, at this time of the year, should have been fairly easy for local engines to handle. As a rule, these fires are hand-lined and contained at less than an acre. This fire burned 8 acres and required air support and heavy machinery. The cost for controlling the fire was approximately $55,000 (McCarty 2008).

On private lands, nearly 60 percent of the wildfires were human-caused. The main causes of the fires on private lands include debris burning or fire use, smoking, and equipment use. Most of the fires on private land occurred in the Wildland Urban Interface or more populated residential areas, and were generally caused by debris burning. To a lesser degree, fires caused by equipment use most often occur on private timber lands away from populated areas.

The Wildland Urban Interface boundary, which encompasses a little over 40 percent of the analysis area, was originally defined in the *Southwest Oregon Fire Management Plan* in September 2004 and then again in the *Jackson County Community Wildfire Protection Plan* (CWPP) in July 2006. The community of Butte Falls is located within the Wildland Urban Interface boundary and was identified in the *Federal Register* as a Community at Risk from wildfire (66 FR 160:43417). Within the Fire and Fuels analysis area, the Jackson County CWPP identified the Wildland Urban Interface, which includes the Ginger Spring Municipal Watershed, as areas at high risk from wildfires, partially based on the number of human-caused fire starts and partially because most of the area is outside rural fire department boundaries.

3.5.4.4 Fuels

Fuel models are sets of parameters that describe physical fuels properties, including fuel loads, fuel bed depth, and moisture of extinction (Anderson 1982). Each model is typically used to represent a range of conditions in which fire behavior may be expected to respond similarly to changes in fuel moisture, wind, and slope. Fuel models are one element used as input in fire behavior models to predict potential fire behavior.

Table 3-7 shows the total acres and percent of each fuel model found throughout the Fire and Fuels analysis area across all land ownerships and the percent of each fuel model found on BLM-administered lands. This table also shows the stand characteristics generally associated with each fuel model. Fuel models which occur on less than 0.05 percent of the total land coverage are not listed and account for approximately 8 percent of the analysis area.

Table 3-7. Current Fuel Models found throughout the Fire and Fuels Analysis Area outside of the Blowdown Areas

Fuel Model	Fuel Model Code	All Ownerships Acres	All Ownerships Percent	BLM Percent	Stand Characteristics or Stand Age
Grass	GS2	5,184	2	2	Meadows, oak woodlands with moderate shrub component.
Shrub	SH4	14,393	7	6	Conifer stands less than 40 years with heavy shrub component; pine plantations 20 to 60 years with shrub component and heavy pine needle cast in the understory.
Timber-Understory	TU1	3,146	1	<1	Douglas-fir dominant stands greater than 120 years; canopy closure greater than 60 percent.
	TU2	52,825	24	21	Conifer stands 60 to 80 years with moderate shrub component in the understory.
	TU3	8,619	4	3	Conifer stands 40 to 60 years with heavy fuel loading, and/or shrub component in understory.
	TU5	96,246	44	47	Douglas-fir dominant stands 80 to 120 years with moderate fuel loading, understory conifers, and shrubs.
Timber Litter	TL4	988	<1	<0.05	Past commercial thin or density management areas, or Douglas-fir dominant stands 80 to 120 with fine litter layer and little to no understory.
	TL5	7,562	3	4	Past regeneration or select cut areas with light to moderate levels of slash, harvested less than 10 years ago.
	TL7	7,647	4	2	Higher elevation Shasta fir or red fir stands with high fuel loading of large woody material.
	TL8	4,470	2	2	Young pine and conifer plantations less than 10 years with moderate fine fuels loading and/or light shrub component.

SOURCE: Scott and Burgan 2005

Fuels profiles changed dramatically following the blowdown. The impacts varied from scattered individual trees that were uprooted to large areas that sustained moderate to severe damage. The diameters of the trees that fell across the area varies. Fuel model TL4 best represents nearly 40 percent of the areas affected by the blowdown which were harvested within the last 14 years. While fuel models TU2, TU3, and TU5 best represent the blowdown areas 40 to 200 years old or more, fuel model SH4 best represents the fuels profile in stands less than 40 years old, prior to the blowdown event. Approximately 43 percent of the area with low or scattered blowdown stand damage, or moderate and severe damage in stands less than 40 years would have scattered areas of increased fuel loading but the majority of the fuels profile would continue to be within the fuel model identified before the blowdown event.

Debris from wind damage falls into the Slash-Blowdown (SB) Fuel Models (see Appendix D, Fire and Fuels). Fuel model SB2 best represents stands 40 to 80 years old with moderate and severe damage and accounts for less than 5 percent of the affected area. Approximately 81 percent of the blowdown occurred in stands greater than 80 years. Of these, just over 50 percent had moderate or severe damage. SB3 and SB4 best represent the current fuel profiles in these respective areas. Table 3-8 shows the affected acres by age class and associated fuel model for areas of moderate and severe stand damage on BLM-administered lands. For definitions of stand damage categories, see section 2.1.1, Blowdown Stand Damage Definitions.

Table 3-8. Best Representative Fuel Model for Blowdown Acres on BLM-administered Land by Stand Age and Damage

Stand Damage	Stand Age 40 to 80 years		Stand Age 80 to 200 years		Stand Age 200+ years	
	Fuel Model	Acres	Fuel Model	Acres	Fuel Model	Acres
Moderate	SB2	425	SB3	1,168	SB3	800
Severe	SB2	398	SB4	848	SB4	618

The fuel models associated with the blowdown would likely underestimate the total fuel loading and associated fire behavior. The fuel loading is the total amount of fuel in an area (measured in tons per acre) that could burn under the most extreme conditions. The fuel loading for 1- to 100-hour fuel size classes are identified with each fuel model (Scott and Burgan 2005). Fuel size classes are based on the diameter of the fuels. The 1- to 100-hour fuel size class contains materials from 0 to 3 inches in diameter. Fire behavior predictions are based on a continual fuel bed of material less than 3 inches in diameter in the 1- to 100-hour size fuel classes. The fire danger implications from fuels smaller than 100-hour is greater because these fuels can release a substantial amount of energy during forest fires; more extreme fire behavior and intensity would be expected in the blowdown areas (Woodall and Nagel 2007).

Large quantities of fuels greater than 3 inches in diameter are present in the blowdown area. Fires spread quickly through fine fuels and intensity builds up more slowly as the large fuels start burning (Leuschen et al. 2000). Active flaming is sustained for long periods and a wide variety of firebrands from burning debris can be generated causing more spotting (Leuschen et al. 2000). In addition, the size, amount, and distribution of the downed trees could decrease the ability of suppression resources to directly attack a wildfire, possibly resulting in a larger final size. The more fuel burning, the more heat produced. Generally, the greater the volume of fuel, the more intense the fire will be (ACES 2008). The increase in surface fuel loadings of size classes larger than 100-hour (material greater than 3 inches) is not reflected in the fuel models, however, estimated ranges of size classes greater than 100-hour were established using a photo series based on the level of stand damage (low, moderate, and severe). Table 3-9 shows the range of current fuel loading for all age classes and each level of stand damage on BLM-administered lands in the Fire and Fuels analysis area.

Table 3-9. Fuel Loading by Fuel Size Class for each Level of Stand Damage

Stand Damage	Acres	Fuel Loading (tons/acre) 1- to 100-hour (0-3 inch)	Fuel Loading (tons/acre) 1,000-hour plus (>3 inch)
Severe	1,790	>14	120-200+
Moderate	2,420	11.25	40-120
Scattered	2,590	<12.75	20-40

3.4.4.5 Fire Behavior

Firefighter effectiveness or the ease with which firefighter's are able to suppress a fire, is based on the flame lengths, rate of spread, intensities, torching, and spotting.

A wildfire's potential to burn is attributable to certain environmental characteristics such as surface fuel loading (horizontal and vertical continuity), fuel moisture, vegetation, ladder fuels, canopy density or closure, slope, aspect, weather, and elevation. These characteristics combine to determine the potential intensity and severity of a wildfire. The risk of undesirable fire can best be described by examining predicted fire behavior from existing stand conditions.

Historically, fires burned throughout the Fire and Fuels analysis area with varying degrees of intensity and severity. Fires likely burned in a mosaic pattern with the majority of fires remaining on the surface burning with low intensities close to the ground (surface fire). On occasion, fires burned with greater intensity allowing the fire to burn into the overstory canopy, burning single trees or small groups of trees (torching fire). During extreme conditions, such as high wind events or drought, fires burned into the crown with very high intensities and stand-replacement severity (crown fire). These fires reduced the surface fuel loading, promoted fire-tolerant species (ponderosa pine and Douglas-fir), reduced regeneration of fire-intolerant species (plants unable to physiologically withstand high fire intensities), and maintained an open forest structure providing habitat for species which require more open stand structure (Peterson et al. 2005; Graham et al. 2004).

Table 3-10 depicts the potential fire behavior for the fuel models covering more than 1 percent of the Fire and Fuels analysis area during high to extreme fire season conditions with mid-flame wind speeds of 5 miles per hour. Under dry burning conditions, much of the area has predicted flame lengths greater than 4 feet. With flame lengths of 0 to 4 feet, firefighters with hand tools are generally successful and hand lines should hold the fire (Andrews 1986). Flame lengths of 4 to 8 feet require mechanized equipment for successful suppression operations, and hand line cannot be relied on to hold the fire (Andrews 1986). Flame lengths of 8 feet or greater may present serious control problems, such as torching, crowning, and spotting, and control efforts at the fire head will be ineffective (Andrews 1986).

Table 3-10. Potential Fire Behavior during High to Extreme Fire Season Conditions

Fuel Model	Potential Fire Behavior		
	Rate of Spread (chain/hour)	Flame Length (feet)	Intensity (btu/foot/second)
GS2	37	7	351
SH4	47	9	704
TU1	5	2	37
TU2	17	4	142
TU3	47	10	772
TU5	14	9	707
TL4	3	2	17
TL5	6	3	44
TL7	4	2	39
TL8	8	4	121
SB2	21	7	439
SB3	38	11	1,063
SB4	74	16	2,180

One chain equals 66 feet.

Rate of spread is an indicator of how fast a fire can grow once it is started. However, it does not indicate the final size of a fire or the ability of firefighters to build a hand line around the fire. The fuel loading (vertical and horizontal continuity, and depth of the fuel bed) and the amount of large, down, woody material plays a much larger role in determining the capability of suppression resources to build fire line at a rate fast enough to contain a wildfire before it becomes too large and escapes initial attack forces. Intensity is the amount of heat released and is related to the difficulty of containment of a fire, as well as, the possible effects to other resources.

During the past 80 years, logging has replaced fire as the primary event shaping stand condition and structure in the Fire and Fuels analysis area. Past commercial thinning or density management areas where harvest was completed within the past 5 to 10 years with little to no understory component remaining would likely exhibit surface fire behavior similar to those predicted with fuel model TL4.

Stands where regeneration, connectivity, or select cut harvest activities occurred within the past 10 years, followed by slash disposal treatments, and prior to the establishment of seedlings, would likely exhibit fire behavior characteristics similar to fuel model TL5. Increased fire behavior would be possible in these stands when surface wind speeds exceed 10 miles per hour. If the seedlings are established and harvest activities were not followed by slash disposal, or the stands have a moderate to light shrub component, these stands have the potential to experience greater rates of spread and flame lengths similar to those predicted with fuel model types GS2 and GS4.

Stands 10 to 60 years old which have been modified by past harvest include the mixed-conifer plantations found throughout the Fire and Fuels analysis area. These stands show potential for very high intensity fires with the likelihood of higher mortality of the existing stand following a wildfire event; this is likely due to the large amount of fine fuels, such as grasses and needle cast, as well as a high shrub component. The potential fire behavior is best represented by fuel model TU3.

Pine plantations 20 to 60 years old could exhibit greater rates of spread, increased flame lengths, and greater fireline intensities than those predicted with fuel model SH4. Most, if not all, of the overstory canopy would be consumed, especially when a heavy shrub component and needle drape are present. These stands would burn more intensely and uniformly throughout the unit if no site preparation treatment occurred prior to planting or if several precommercial thins occurred without slash treatment (Weatherspoon and Skinner 1995). The current expected fire behavior of these stands would make suppression of a fire by initial attack resources very difficult. Hand attack would not be feasible. Containment of a fire at a smaller size would be unlikely; the ladder fuel component found in these stands would carry the fire into the canopies very quickly, creating the high flame lengths and intensities predicted. Containment of a wildfire within these stands during initial attack would be more difficult during high wind events, increasing the potential of an escape fire.

Surface fire activity for stands 60 to 80 years old is very limited and very dependent on environmental conditions such as fuel moisture, wind speeds, slope, and physical setting. The ability of fire suppression forces to continue to contain the fire during initial attack would be decreased during high winds, as rates of spread and flame lengths would increase more rapidly. Surface fire behavior is best represented by fuel model TU2; however, the ability for the fire to move into the crowns exists when there is a heavy understory, shrub component, or both.

In 80 to 120 year old stands which are more even-sized or even-aged, a surface fire would likely occur most of the fire season. Due to the structural complexity of these stands, fire behavior would vary throughout the stand. Additional surface fuel loads would produce longer duration heat intensity (residence time) which in turn affects the severity with which the site burns. Stands with greater canopy closure along with the dense understories would allow for more scorching in the canopy. When environmental conditions are conducive, predicted flame lengths using fuel model TU5 indicate that a transition to crown fire may occur under high to extreme conditions. Initial attack fire suppression resources should be able to successfully and safely contain a wildfire within these stands throughout most of the fire season. However, surface fire would be limited under high to extreme conditions, especially within stands with high surface fuel loading and ladder fuels.

The multi-layered, mixed-conifer stands in age classes greater than 120 years with more open stand structure have lower surface fuels and higher canopy heights. These stands would likely have single or group tree torching with low rates of spread and short flame lengths. These stands would be expected to exhibit a surface fire or lower intensity burn similar to historical behaviors or those represented by fuel model TU1. A fire started within these stands would likely be easily suppressed.

All the stands represented could experience single tree to large group torching in high weather conditions, such as high wind speeds or during periods of drought. In stands not affected by the blowdown event, the elimination of the natural periodic thinning processes and the reduction of surface fuels from fire exclusion have contributed to increased vertical and horizontal fuels, increasing the potential for higher severity wildfire events (Graham et al. 2004). Surface fires that were more common historically could burn with higher intensities and could result in greater severities when they escape initial attack efforts. However, because of the relatively flat terrain and the number of roads available for use during initial attack, initial attack fire suppression efforts in areas not affected by the blowdown event are likely to continue to keep the majority of fires to less than 9 acres (Class Sizes A and B) through most of the fire season.

The areas with low or scattered blowdown would likely exhibit faster rates of spread and flame lengths for short durations in the areas of concentrated fuel loadings or where the trees have fallen. Once the fire burned through these areas, fire behavior would be comparable to the surrounding fuel model. The areas with moderate and severe blowdown have the potential to experience extreme rates of spread and flame lengths with heavy spotting. The ability for fire crews to suppress wildfires started within these areas during high and extreme conditions by direct attack would likely not be possible. Containment would likely only be possible with the use of dozers or aerial support (helicopters and air tankers). These areas have the ability to experience rapid fire growth, pushing suppression resources further back to contain the fire, possibly resulting in larger acres burned. Fires greater than 100 acres in size (Class Sizes C and D) could become more common if fires start in moderate and severe blowdown areas during high and extreme conditions.

3.4.5 Environmental Consequences

The amount, distribution, and horizontal and vertical continuity of surface fuels are important elements to consider in reducing undesirable fire behavior. Direct effects of fire result from the intensity in which the fire burns and the amount of heat produced. Predicted fire behavior (flame lengths, rate of spread, and intensity) is an important element to consider when determining the effectiveness of proposed management actions. The ability of fire suppression resources to contain and eventually control a wildfire is partially dependent on the amount, size, and arrangement of fuels, as well as, the resultant fire behavior. Managing fuel quantity and arrangement across the landscape can help moderate fire behavior. Additionally, treated areas could provide locations where fire suppression resources can safely and more effectively initiate fire control measures.

3.4.5.1 Effects on Fire and Fuels Common to All Alternatives

Direct and Indirect Effects

Immediate suppression and control of all wildfires, human- or lightning-caused, would continue. The BLM has a master cooperative fire protection agreement with the Oregon Department of Forestry (ODF). This agreement gives the responsibility for fire protection of all lands within the Project Area to the ODF. This contract directs the ODF to take immediate action to control and suppress all fires. Their primary objective is to minimize total acres burned while providing for firefighter and public safety. The agreement requires ODF to control 94 percent of all fires before they exceed 10 acres in size.

Immediate suppression action and containment of all wildfires would continue; however, as the population continues to grow within the Wildland Urban Interface, and more individuals take advantage of recreational opportunities in the Fire and Fuels analysis area, human-caused fires are likely to increase on both Federal and private lands throughout the analysis area. Lightning, which is unpredictable and dependent on weather conditions, would continue to be a source of ignition. Lightning in the blowdown areas may prove to be more successful in initiating wildfires than in the past due to an increase of fine fuels and a significant decrease in shading. Less shade increases the wind and average temperatures, drying fuels quicker and making them more readily available to burn (Leuschen et al. 2000). The ability of the ODF to meet the required suppression objectives within the areas of moderate and severe blowdown during high to extreme weather conditions could decrease.

This salvage project proposes to reduce the increased fuel load and the sequential increase in fire behavior at a minimum of two scales: individual site scale and analysis area scale.

At an individual site scale, treating the fuels is important and critically needed to address reducing wildland fire intensities within and adjacent to the blowdown sites. Salvaging downed trees followed by the appropriate slash disposal treatments would reduce the amount and distribution of the current surface fuels in all size classes. This would also reduce the horizontal continuity of fuels within the existing blowdown sites that can promote and support large wildland fire growth and increase the resistance to control. In the areas proposed for fuels treatment, the current conditions that support longer flame lengths, faster rates of spread, and increased intensities and spotting potential would change to conditions that would moderate fire behavior and more likely restrict the wildfire growth.

At the analysis area scale, the reduction of the widely scattered and variable amount of blowdown and increased fuel loads could create a fuels pattern that would restrict the potential for wildland fires to become large, landscape-scale events which might threaten communities, road infrastructures, and critical resources. The treatment areas could have the effect of modifying severe fire behavior during high to extreme weather conditions, especially within the first 10 years after treatment, within blowdown areas having the potential to produce large, intense fires.

These areas of modified fire behavior provide fire suppression resources opportunities to safely initiate fire control efforts. Firefighters would have anchor points and areas with less intense burning characteristics to work from. This allows for a better chance to safely reduce the risk of large fires to the town of Butte Falls and other neighboring communities within the Wildland Urban Interface, Ginger Springs Municipal Watershed, road infrastructure, and critical resource areas.

The reduction of the surface fuel loads from the blowdown event through the proposed salvage activities and subsequent slash disposal treatments serves several purposes. Treating the fuels created during the blowdown changes the probability that wildland fires move across the landscape, and whether they ultimately impinge on urban areas containing structures, or result in fires of different sizes and ecological effects (Finney and Cohen 2003). Proposed treatments would break up the continuity of existing heavy fuel loads both horizontally and vertically that can support high intensity wildland fires moving through surface vegetation and into tree crowns during periods of high fire danger. Periods of high fire danger generally occur within the months of July, August, and September, when relative humidity is very low, and high winds and drought conditions are present.

In accordance with ROD/RMP objectives (USDI 1995a, 91), slash would be reduced on all proposed salvage units through a combination of slashing damaged residual conifers 1 inch to 7 inches dbh, hand-piling slash and burning the piles, excavator piling slash and burning the piles, underburning, or lopping-and-scattering slash.

Cumulative Effects

Past Actions

Over the past 60 years, approximately 16 percent (22,040 acres) of the Fire and Fuels analysis area has been planted on BLM-administered matrix lands and approximately 7 percent (10,000 acres) have been planted on Forest Service-administered lands. In addition, more than 120,000 acres of private industrial lands have been logged over the past 60 years; logging activities ranged from partial salvage to clear-cuts and may have involved more than one entry into a forest stand. The number and acres of plantations currently on private industrial lands is unknown; however, industrial landowners' management objectives are to maximize volume growth per acre and silvicultural methods (e.g., clear-cutting and overstory removal) which create early seral stands are used. The assumption is a large portion of these acres logged on industrial private lands are plantations or pole stands less than 60 years old.

In these younger stands, removal of the overstory exposes surface fuels to increased solar radiation and intensified winds (Omi, Martinson, and Chong 2006). The effects would be lower fuels moistures and an increase in fine herbaceous fuel, resulting in high rates of spread, flame lengths, and fireline intensities. During a wildfire event in the mixed conifer plantations 10 to 60 years old, most, if not all, of the overstory canopy would be consumed, especially when a heavy shrub component and needle drape are present. These stands would burn more intensely and uniformly throughout the unit if no site preparation treatment occurred prior to planting or if several precommercial thinning operations occurred without slash treatment (Weatherspoon and Skinner 1995). The current expected fire behavior of these stands would make suppression of a fire by initial attack resources very difficult. Hand attack would not be feasible. Fuel models SH4 or TU3 would best represent the potential fire behavior at the high to extreme fire weather conditions. Containment of a fire at a smaller size would be difficult; the ladder fuel component found in these stands would carry the fire into the canopies very quickly, creating the high flame lengths and intensities predicted. Containment of a wildfire within these stands during initial attack could be more difficult during high wind events, increasing the potential of an escape.

The City of Medford manages 3,700 acres within the Big Butte Creek 5th field watershed. Approximately 800 acres have had timber stand improvements. Based on personal observations during a site visit in 2006, a wildfire started in these areas would likely remain a surface fire throughout the majority of the fire season. This is mostly due to the reduction in the understory ladder fuels and surface fuel loadings. Only during extreme conditions would a surface fire have the potential to affect the residual overstory. Fuel model TL4 would best represent the potential fire behavior expected in these treated areas. Initial attack resources would likely be successful in containing a wildfire in these treated stands.

Since the implementation of the PRMP/EIS in 1994, approximately 8,200 acres of BLM-administered lands have been harvested within the Fire and Fuels analysis area. Density reduction treatments (e.g., commercial thinning, density management, and individual tree selection) occurred on 68 percent of the treatment acres, with regeneration salvage on about 9 percent and mortality salvage on the remaining 23 percent. Density reduction treatments receiving post-harvest fuels treatments such as hand piling, hand pile burning, or lop and scatter had a reduction in the surface fuel loading and canopy densities. If a wildfire were to start in these stands, it would likely remain a surface fire throughout most of the fire season. Like the treatments on the City of Medford lands, initial attack resources would likely be successful in containing a wildfire throughout the fire season. However, after 10 to 20 years, without further treatments to maintain these conditions, increase in the surface fuels loads and ladder fuels from shrub and conifer regeneration would continue, increasing the risk of higher intensity surface fires that could produce flame lengths high enough to scorch and damage the overstory trees. This could reduce the number of days during the fire season suppression resources would be initially able to contain a wildfire. Regeneration salvage and mortality salvage treatments which altered the stand age or structure and have been planted would have fire behavior characteristics similar to stands less than 60 years old.

Since the implementation of the Northwest Forest Plan in 1994, timber harvest on Forest Service-administered lands within the Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek 5th field watersheds has primarily been commercial thinning. The potential fire behavior in these areas could be comparable to similarly harvested BLM-administered lands.

From 2000 to 2006, the Lower Big Butte fuels reduction project treated 3,099 acres of BLM-administered lands located in ponderosa pine and dry-site Douglas-fir stands, oak woodlands, and shrub fields. These treatments occurred in the lower elevations within close proximity or adjacent to private residential lands. Initial attack resources would be successful in containing a wildfire starting within these treated areas.

On privately owned lands, varying levels of timber harvest have occurred over the past 60 to 80 years. In addition, hazardous fuel reduction projects have occurred on residential properties within the WUI areas. All are small projects within the WUI and assist in creating a dispersed pattern of fuels reduction on private land, which helps to expand upon the fuels reduction work completed by the BLM. It is recognized that fuels management extending away from urban locations reduced the likelihood wildfires will spread to urbanized areas and pose ignition threats (Finney and Cohen 2003). The risk of a wildfire starting in these areas is the greatest, due to the number of fires started by debris burning, increasing the risk to firefighters and the local communities.

Present Actions

On BLM-administered lands, roadside salvage of windthrown trees is currently being implemented on 170 miles of BLM system roads through out the blowdown area. On matrix lands, hazardous trees leaning toward the road and trees lying fully or partially within the road prism are being removed. Salvage of these trees would allow the recovery of a small portion of the expected matrix timber volume. In riparian reserves and northern spotted owl activity centers, only the portions of the trees within the road prism are being removed. The needles, branches, limbs, and unmerchantable material will either be removed to a landing site, if the whole tree is yarded, or lopped and scattered. The roads and adjacent ditch lines will be cleared of slash where the salvage is occurring. This will open roads currently blocked by down trees, allowing quicker response time to fires throughout the area. In addition, this would reduce the risk of a roadside fire starting within these areas only, however, there would be little to no change in the current fuel loading of material less than the 100-hour fuel size class. Once a fire moved away from the road prism, it would quickly exhibit fire behavior characteristics similar to those analyzed for the surrounding damaged stand. The road side salvage would allow a very short window of opportunity for suppression resources to respond and initially contain a fire started along the treated road corridor. Successful suppression would be dependent on response time, surrounding fuels, and weather conditions.

The Forest Service completed the *Big Butte Springs Timber Sales Environmental Impact Statement* for commercial harvest activities on 6,200 acres of Forest Service lands within the Fire and Fuels analysis area within the 5-year planning cycle. Commercial thinning is the primary silvicultural treatment. The actual effect on fire behavior is unknown, but the proposed treatments would likely exhibit fire behavior similar to commercial thinned areas on BLM-administered lands.

Although the windstorm affected USFS lands, the extent of the blowdown and the amount of salvage that is going to occur is unknown.

On private industrial lands, salvage logging of recent windthrown trees is presently occurring. The BLM expects that most of the concentrated and scattered windthrown trees on private industrial lands will be salvaged by spring 2009. Potential fire behavior would be dependent on whether or not slash disposal work was completed, and to what extent.

On lands owned by private individuals, the amount of logging is unknown, but salvage removal is generally limited to small areas and individual trees are used for lumber or firewood. Again, potential fire behavior would be dependent on the amount of large trees removed, whether or not slash disposal work was completed, and to what extent.

Future Actions

The BLM plans seven commercial timber sales within the 5-year planning cycle in the Fire and Fuels analysis area: Bowen Over, Flounce Around, Camp Cur, Double Bowen, Twin Ranch, Lost Clark, and Eighty Acre. About 170 acres of the Bowen Over timber salvage, 60 acres of the Flounce Around timber sale, 800 acres of the Camp Cur timber sale, 785 acres of the Twin Ranch, 700 acres of the Double Bowen timber sale, 700 acres of the Eighty Acre timber sale, and 350 acres of the Lost Clark timber would occur in the analysis area. Commercial thinning is the primary silvicultural treatment. The Ranch Stew Young Stand Thinning project is also planned and would thin 800 acres. The change in the potential fire behavior within these stands would depend on the amount and type of slash disposal treatments completed following the harvest activities. It is likely the potential fire behavior would be initially reduced in all harvested stands within the first 10 years, with a gradual increase in the potential fire behavior over time.

On private industrial lands, logging is occurring at this time. Future logging plans, including harvest types, are unknown. It is reasonable to assume the treatment objective would be to maximize volume growth per acre. The salvage types associated with this objective would include clear-cutting and overstory removal, creating early seral stands (less than 60 years). In stands less than 8″ DBH, little commercial logging is expected in the next 15 to 20 years. Within these stands, brush and hardwood control and precommercial thinning are the two primary management activities to occur and would reduce stand densities and increase conifer growth and timber yield. These stands would have potential fire behavior characteristics similar to stands less than 60 years.

On privately-owned lands, limited salvage or harvest activities are expected to continue. Occasional salvage or harvest of large individual trees would occur and would be limited to small areas. Areas immediately surrounding residential homes, the defensible space, would continue to be treated to reduce fire and fuels hazards closest to the homes which would help to reduce structural loss or damage in a wildfire situation. With the completion of the Jackson County CWPP, Federal, state, and county agencies will continue to promote the National Fire Plan and fuels reduction throughout the WUI to reduce the risk of fire to residents living within the Fire and Fuels analysis area. Part of this outreach effort would be to promote larger scale fuels reduction and forest restoration treatments on private lands, as well as, large-scale strategic treatments which result in a positive effect to the potential fire behavior and the risk of fire starts by individuals.

3.4.5.2 Effects of Alternative 1 (No Action) on Fire and Fuels

Direct and Indirect Effects

Under the No Action Alternative, forest management actions to remove the blowdown would not occur. The effects described for this alternative would reflect current conditions and trends shaped by natural events. The fuel loading, both live and dead, would continue to increase. In the areas with no blowdown, the absence of fire on the landscape would continue to increase surface fuel loadings from downed logs; ladder fuels due to the influx of more shade-tolerant, fire-intolerant species; shrub species; and stem densities or basal area contributing to higher canopy densities. This in turn would lead to a decrease in healthy, fire-tolerant species and an increase in unhealthy, suppressed trees. This would move the less volatile fuel models toward fuel models which exhibit greater rates of spread and flame lengths and burn with greater intensities. In addition, as the amount of homogeneous, even-sized stands increase in the understory, the potential for the initiation and sustainability of crown fire activity would likewise increase.

Fires in blowdown will start more easily, spread more quickly, and become difficult to control more quickly than fires in areas with no blowdown. The greatest potential for the extreme fire behavior exists during the first 5 years, during high to extreme weather conditions within the moderate to severe blowdown areas. This is due to the increased amount and arrangement of the 1- to 100-hour fuels, or the needles, twig, and small branches that are continuous and still attached to the fallen logs. As these fuels cure or dry out, and before falling to the ground, they become readily available to burn, contributing to the increase in fire behavior. Loosely arranged and continuous fuels will ignite quicker and burn more intensely because fuels moistures are lower, and more oxygen is available for the combustion process and movement of fire (ACES 2008). In the areas where low or scattered blowdown has occurred or the spacing between the smaller fuels is larger or noncontinuous, the fire may not continue to burn at intense rates except on the most extreme days when the heat produced from the fire is intense enough to preheat the fuel across open areas or into surrounding fuels.

Fires occurring in the blowdown area within the first couple years would spread quickly through the fine fuels and build intensity as the larger fuels such as large limbs, branches, and down and dead shrubs and small diameter trees start burning. Active flaming would be sustained for longer periods, especially as these larger fuels begin to cure or dry out, start burning, and contribute to the duration of heat transferred to the ground once the fire front has passed and they continue to burn or smolder. Initially, the green, large down logs with intact bark would likely not contribute to the fire spread or intensity. However, these large logs would inhibit the ability of suppression resources to construct handline or dozer line at a rate fast enough to contain a fire spread. This would be especially true in the moderate to severe areas where multiple large logs have fallen on top of one another, or “jackstrawed.” Fire line would likely require the use of dozers or heavy equipment in conjunction with hand crews using chainsaws to safely cut and remove large logs impeding the construction of a control line. This could result in more fires with larger final sizes than have occurred within the last 40 years.

The remnant standing, hinged or damaged trees in the blowdown areas could provide additional firebrand sources for spotting. Intact stands immediately adjacent to moderate or severe blowdown areas could experience higher fire behavior characteristics than would normally occur. An increase in individual tree torching and the initiation of crown fire could be expected due to the increased intensities of a fire coming from blowdown areas. However, the dead needles may not appreciably change the likelihood of a crown fire spreading from tree to tree, because crown fire spread is controlled not just by dead fuel quantity, but also by live fuel moisture, wind speed, and canopy bulk density (total amount of live and dead fuels in the canopy). The standing dead could contribute to additional spotting into the surrounding live stands. The amount and distance of spotting would be dependent on whether the fire is plume dominated or wind driven, as well as, type and amount of fuels burning.

A high intensity fire burning from the blowdown area into surrounding forest could increase potential fire behavior and the likelihood of crown initiation. In addition, the amount of mortality from the bug infestations could further compound the problem but would be dependent on the extent of infestation.

Colorado State University provided an analysis of research related to insect outbreaks and fire risk in forests in Colorado (Romme et al. unpublished). The analysis included the following theories on the effects of bug infestation on fire behavior:

> "Tree-killing insects do not really increase the amount of fuels in a forest stand; what they do is shift some of the live fuels into the dead fuel category. Both live and dead fuels can carry fire under very dry weather conditions. Post-outbreak stand development and associated fire risk may proceed through three stages. (i) Immediately following an outbreak, when trees are dead and dry needles remain on the trees, the chance of a crown fire getting started may be greater than for live trees. However, the dead needles may not significantly change the likelihood of a crown fire spreading from tree to tree, because crown fire spread is controlled not just by dead fuel quantity, but also by live fuel moisture, wind speed, and canopy bulk density (total amount of live and dead fuels in the canopy). This first stage lasts a relatively short time, because the dead needles usually fall within about two years of a tree's death. (ii) Once the needles fall off the dead trees, the likelihood of both crown fire initiation and spread actually may be reduced in comparison to an unaffected stand, since the dead trees create gaps in the canopy and reduce canopy bulk density. It is known that reducing canopy continuity and bulk density through mechanical thinning or salvaging can reduce crown fire risk (Graham et al. 2004), and it is likely that reductions in canopy continuity and bulk density resulting from insect caused mortality would have a similar effect. (iii) After the dead snags fall, typically one to several decades after the insect outbreak, it is expected that the risk of crown fire initiation and spread may increase once again through two mechanisms. First, the fallen snags may fuel an intense surface fire, with heat and flame lengths that reach into the crowns of the trees. Second, small trees, which generally survived the outbreak and grew more rapidly in the more open conditions resulting from death of canopy trees, create "ladder fuels" that can carry a surface fire into the canopy. In sum, crown fire risk may be elevated for a brief time during and immediately after the peak of the outbreak, while the trees retain their dead needles; then fall to lower levels for the next few decades while the bare snags remain standing; and finally return to pre-outbreak levels some 20-50 years after

> the outbreak when the snags have fallen and a fast growing understory has created ladder fuels between the heavy surface fuels and the canopy. The impact on subsequent fire behavior will be different depending on the proportion of the trees killed in the stand. Moreover, it is important to recognize that a large forest landscape is composed of many individual stands. Substantial changes in stand structure and fire behavior within just one or a few stands may have little influence on fire spread and fire severity across the entire landscape."

A fuels risk assessment after a blowdown event in the Boundary Waters Canoe Area Wilderness was completed in 2000 (Leuschen, et al., 2000). The blowdown in the Boundary Waters was more widespread and continuous than the event which occurred in the southern Oregon; however, their findings are useful in demonstrating the potential fire behavior within stands with moderate and severe damage. The following is a summary of some of the findings as they relate to fire behavior and suppression at the moderate to extreme weather conditions (Leuschen, et al., 2000):

- Suppression and containment actions would likely be unsuccessful at the heads and flanks of a fire. It maybe possible to establish anchor points to the rear of the fire. Heat transfer through radiation will play a large part in increasing containment difficulties for suppression resources. Resistance to control is very high due to the amount of hand work required to separate the abundance of large fuels.
- If winds are greater than 10 mph, even in moderate fire weather conditions, the fires in the blowdown can be expected to quickly move to plume dominated fire behavior, possibly increasing long range spotting.
- The blowdown fuels produce substantially greater spread rates and intensities, resulting from higher fuel loads and depth of slash-like fuel complex and the relatively greater wind speeds affecting fire in those fuels. Lack of canopy cover greatly increases the mid-flame wind speed for fires burning in the blowdown fuels compared to the understory fuels in the intact forest.
- Much larger and more consistent spread was observed in the blowdown fuels, even during moderate periods, than in areas not affected by the blowdown.

A steady fire growth can be expected during the majority of the fire season within blowdown, especially within the first 5 years. Wildfires that occur within the moderate and severe blowdown areas would offer tremendous resistance to control due to greater flame lengths, rates of spread, and fire line intensities characteristic of fuel models SB3 and SB4. There would be an increased risk to firefighter and public safety due to fire behavior conditions exhibiting a higher resistance to control.

Cumulative Effects

Throughout the Fire and Fuels analysis area, past and continued fire suppression efforts have reduced or eliminated the regular occurrence of low to moderate severity fires. The exclusion of fire results in the buildup of surface fuel loadings, increased ladder fuels, and denser forest canopies which contribute to an increase in wildfire intensities (Grahman et al. 2004). On all lands, areas not previously managed outside of the blowdown or those with low to scattered blowdown would continue to have initial rates of spread, flame lengths, and fire intensities that would make it difficult for fire suppression resources to initially contain a wildfire in these areas. The number of days during the fire season that initial attack suppression resources would be successful would decrease. Fire would have the potential to grow faster and larger than historically throughout the Fire and Fuels analysis area in all untreated stands. In addition, a previously managed or treated stand may have reduced fire behavior characteristics. With no further management or maintenance, surface fuel loading and ladder fuels would increase and these stands would eventually start to exhibit fire behavior characteristics similar to unmanaged stands. The time frame for these changes would be variable and dependent on the current stand characteristics, type and extent of initial treatment or management action, topographic location, and microclimate of each site and how this effects the stand growth.

The 2008 wind event drastically changed the fuels profile in over 3,700 acres within the moderate to severe stand damaged areas. The fuels profile has changed due to the increase of horizontal continuity of noncompacted, continuous fine fuels, either attached to fallen trees or on the ground, and an increase of vertical continuity or fuel bed depth of fine and large fuels because of the large areas of "jack straw" fallen trees. Increases in the surface fuel loading vary; however, in some of the worst areas, the fuel loading increased to more than 10 times the loads that existed before the wind event. The overstory in most of the affected stands is either nonexistent, or less than 40 percent of the canopy cover remains intact. The fuels that would be most available to start a fire and burn most of the fire season are the fine fuels, 0 to 3 inches in diameter. These fuels would contribute to increased fire spread, flame lengths, and fire front intensities. Larger fuels and down trees would contribute less to the flaming front than material less than 3 inches in diameter; however, these fuels could ignite and burn for hours after the fire front has passed increasing the amount of heat released in concentrated areas.

In the early parts of the fire season, the large logs lying on the ground could provide some shading and increased moistures immediately adjacent to the down logs. However, the open canopies would allow incoming solar radiation to penetrate down to the forest floor, increasing surface temperatures and decreasing relative humidities and fine fuels moisture quicker. These areas would become available to burn earlier in the summer and would likely burn with more intensity even when fire conditions in surroundings intact stands are at moderate levels. A steady fire growth can be expected during the majority of the fire season within the blowdown area, especially within the first 5 years.

After 5 years or after the fine fuels have dropped off the larger limbs and become compacted and the larger fuels start to decay, fire behavior would be modified. Compaction of the fine fuels would be dependent on the elevation of the area, the amount of snowfall, and the rate of decay. Fuels that are compacted take longer to dry and become less available to burn. The fuel loading would decrease slightly in the fuels less than 100-hour size class and would remain the same in the larger fuels. However, the regeneration of grasses, shrubs, and trees is occurring at the same time which would likely contribute to the flaming fire front during the high to extreme weather conditions. The fire behavior characteristics would begin to take on those exhibited by grass-shrub fuels models, with high rates of spread and flame lengths. In addition, as the large logs and snags begin to decay they would contribute to increased spotting, higher intensities as far as the amount of heat released during and after the flaming front has past, and continue to hinder direct fire line construction.

Fire behavior would maintain its trend away from historic condition, creating an increasing challenge to fire suppression forces. With the reduced ability to directly attack a wildfire, initial attack fire suppression resources would be less successful, resulting in more Size Class C (10 to 99 acres) and D (100 to 299 acres) and larger fire events. Larger numbers of acres burned would increase the impacts and damage to mature stands, riparian reserves, soils, wildlife habitat, and air and water quality within the Fire and Fuels analysis area. Fires would continue to be more intense and therefore more dangerous to firefighters. Larger fires could place firefighters and the public at greater risk and would increase suppression and rehabilitation costs. The increase in the fire behavior overtime could decrease fire suppression resources' effectiveness to contain wildfires quickly, limit the strategic options, and possibly change priorities from wildfire suppression to structure protection as the fire passes through the WUI.

3.4.5.3 Effects of Alternatives 2 and 3 on Fire and Fuels

Direct and Indirect Effects

Under Alternatives 2 and 3, proposed forest management actions include salvage and slash disposal activities in the areas of low, moderate, and severe blowdown within matrix lands. In Alternative 3, additional salvage and slash disposal activities would occur within riparian reserves and northern spotted owl activity centers that sustained severe stand damage. Approximately 3.5 miles of new road construction are proposed in Alternatives 2 and 3.

Salvage and Slash Disposal

The ROD/RMP objective is to reduce both natural and activity-based fuels hazards through methods such as prescribed burning, mechanical or manual manipulation of forest vegetation and debris, removal of forest vegetation and debris, or combinations of these methods (USDI 1995a, p. 91). All slash disposal treatments would begin within 30 days after the completion of salvage.

In Alternatives 2 and 3, the proposed salvage and slash disposal activities would reduce fuel loading and continuity within the salvaged treatment areas. Alternative 3 would also include 70 acres of riparian reserves and 30 acres of northern spotted owl activity centers that were severely damaged. Both alternatives would reduce the flame lengths, rates of spread, and intensities within the treatment areas and improve the likelihood of successful fire suppression and an increase in firefighter and public safety.

Based on expected fuel loadings and potential fire behavior within the low or scattered blowdown areas following salvage activities, the proposed slash disposal treatment is lop and scatter. All salvage activities in riparian reserves would be followed by hand piling and pile burning. Mechanical piling and pile burning would be conducted in the northern spotted owl activity centers proposed for salvage.

For all moderate and severe blowdown areas, a fuels assessment would be conducted within each salvage unit following salvage activity. This assessment would determine the fuel hazard and fire risk based on aspect, slope, surface fuel loading, access, and location of each unit. Post-salvage slash disposal treatments would be based on the harvest system and amount of slash left following the removal of the windthrown or damaged trees. Those units assessed as a high fire risk would receive priority for slash disposal treatment and the appropriate slash disposal treatment would be conducted. Post-salvage slash treatments would consist of either underburning, lop and scatter, hand piling and burning, or machine piling and burning.

Table 3-11 shows the change in the predicted fire behavior during a wildfire event and fuel loading expected 1 to 5 years following salvage and slash disposal treatments compared to the current fuel model with a mid-flame wind speed of 5 miles per hour and a 30 percent slope, in the low, moderate, and severe blowdown areas.

Table 3-11. Change in Predicted Fire Behavior and Fuel Loading in Blowdown Areas after Salvage and Slash Disposal

Current Fire Behavior Attributes and Fuels Loading						
		Potential Fire Behavior			**Fuel Loading**	
Stand Damage	**Fuel Model**	**Rate of Spread (chains/hour)**	**Flame Length (feet)**	**Intensity (btu/ft/sec)**	**1- to 100-hour (tons/acre)**	**100+ hour (tons/acre)**
Severe	SB4	74	16	2180	14+	120-200+
Moderate	SB3	38	11	1063	11.25-14	40-120
Low	SB2	21	7	439	<12.75	20-40
Predicted Fuel Model, Fire Behavior, and Fuel Loadings following Salvage and Slash Disposal Activities in Fuel Model SB4, Severe Blowdown Areas						
		Predicted Fire Behavior			**Predicted Fuel Loading**	
Slash Disposal	**Fuel Model**	**Rate of Spread (chains/hour)**	**Flame Length (feet)**	**Intensity (btu/ft/sec)**	**1- to 100-hour (tons/acre)**	**100-hour+ (tons/acre)**
Lop and Scatter	SB3	38	11	1063	14+	30-50
Hand Pile Burn	TL5	6	3	44	4-6	18-30
Machine Pile Burn	TL4	3	2	17	4-8	12-20
Underburn	TL3	2	1	10	1-5	24-40
Predicted Fuel Model, Fire Behavior, and Fuel Loading following Salvage and Slash Disposal Activities in Fuel Model SB3, Moderate Blow Down Areas						
Lop and Scatter	SB2	21	7	439	11.25-14	10-30
Hand Pile Burn	TL5	6	3	17	2-6	6-18
Machine Pile Burn	TL4	3	2	17	2-8	4-12
Underburn	TL1	1	1	3	1-2	8-24
Predicted Fuel Model, Fire Behavior, and Fuel Loading Following Salvage and Slash Disposal Activities in Fuel Model SB2, Low Blow Down Areas						
Lop and Scatter	SB1	9	4	101	<12.75	5-10
NOTE: One chain equals 66 feet.						

The BLM expects 75 to 85 percent of the merchantable logs greater than 7.5 inches in diameter would be removed during salvage activities. This reduction of the larger fuels would help to reduce the burn duration and wildfire intensity. The fuels loading of the fine fuels and those smaller than 7.5 inches would remain the same; however, the depth or vertical continuity would decrease, the horizontal continuity would become patchy or more dispersed, and compaction of fine fuels would increase. If a wildfire started within a salvage unit before slash disposal treatment, fire suppression resource's ability to quickly contain the fire would be hampered. The containment time would depend on the amount of surface fuels remaining following salvage. Treatment of the slash after salvage activities, as well as a reduction of surface fuels, is essential in order to further reduce the potential for increased fire behavior and sequential damage.

Lopping and scattering the fuels would not change the fuel loading of the remaining fuels following salvage, but would further reduce the vertical and horizontal continuity. Flame lengths and rate of spread can be expected to decrease; however, within the moderate and severe areas, enough fuel would still be present to contribute to an increase in fire behavior over what would have historically occurred. Within scattered blowdown areas, a wildfire would likely exhibit faster rates of spread and flame lengths for short durations in the areas of concentrated fuel loading or where the tree had fallen and been removed.

Once the fire burned through these areas, fire behavior and spread would continue through, and be comparable to, the existing surrounding fuel model.

Underburning would be the most effective slash disposal method for reducing the existing surface fuel loadings and reducing fuels less than 3 inches in diameter. Fuels greater than 3 inches would be reduced slightly and would be dependent on how much material was consumed during the underburn. The majority of the fuels greater than 3 inches would remain. Weatherspoon (1996) indicates that by using a prescribed understory burn, the fire behavior would almost certainly be reduced within the stand. In addition, in the moderate blowdown areas where the understory conifers and shrub species are still intact, underburning would reduce the ladder fuel component further reducing the intensity and severity of potential wildfires (Graham et al. 2004). The underburned areas would exhibit fire behavior activity similar to that of a fuel models TL1 following salvage in moderate blowdown and TL3 in severe blowdown. Omi et al. (2006) found treatment of the surface fuels appears to be of primary importance for reducing the intensity and severity of subsequent wildfire. Underburning may be effective for as long as 10 years.

Hand piling and burning would decrease fuel loading of material 1 to 6 inches in diameter and would be effective in reducing the rates of spread and flame lengths. Hand piling and burning further reduces the fuels less than 6 inches in diameter by 85 to 95 percent; however, fuels greater than 6 inches in diameter left on the surface would contribute to the current surface fuels loads. This is due to contractual specifications allowing material from two inches to six inches in diameter and longer than 2 feet to be hand piled. In addition, hand piling does not reduce the surface fuel loads that existed prior to the blowdown, and hand pile burning would only reduce the fuels in the pile and directly beneath the pile. Hand piles would cover 2 to 3 percent of the surface area. Hand piling would be less effective in reducing fire intensities and the amount of heat released after the fire front has passed in the severe areas due to the higher levels of fuels greater than 6 inches in diameter.

Machine piling and pile burning would be the most effective in addressing the total fuel loading and the vertical and horizontal continuity of all fuel size classes. Approximately 80 to 90 percent of material 2 to 12 inches not removed during salvage operations would be piled and burned. To decrease soil compaction during piling operations, the equipment would be required to move over existing slash. This would further compact the smaller fuels throughout the unit. Larger areas of existing surface fuels would be burned because the larger size piles would cover approximately 4 to 6 percent of the surface area. Flame lengths and rate of spread would be greatly reduced. Machine piling would reduce the overall intensity and the duration of the fire burning after the fire front has passed.

In the moderate and severe blowdown areas, the opportunity for successful fire suppression within the salvaged areas where salvage is followed by underburning, hand piling and pile burning, or machine piling and pile burning would improve, providing greater opportunity for suppression resources to directly attack and contain fires at smaller sizes, and provide for more strategic opportunities for containment of larger landscape fires than salvage followed by lop and scatter. When a fire occurs within the first 5 years, it would likely remain a surface fire within the moderate and severe salvaged stands throughout the summer, and initial direct attack would likely be successful. In addition, these areas could be used tactically in the containment of larger wildfires. However, canopy closure would be very limited in these areas, creating open areas which allow more solar radiation and wind to reach the forest floor. The effect is usually reduced fuel moisture and increased flammability, increasing the availability of fuels to ignite for longer periods during the fire season, than those areas where the canopy closure provides shading.

Areas that are salvaged then lopped and scattered would continue to exhibit fire behavior characteristics similar to those described in the No Action Alternative after the first five years.

New Road Construction

Any new road construction would allow for greater accessibility of fire fighting resources to response quicker to areas which previously did not have road access.

Cumulative Effects

The cumulative effects on stands not identified for treatment on all lands in the Fire and Fuels analysis area would continue to be shaped by events described in the No Action Alternative. The contribution to the cumulative effects of the proposed actions in Alternatives 2 and 3 is further discussed here.

Immediately following the salvage activities and prior to slash disposal, the potential fire behavior would decrease only slightly from the current potential fire behavior within the moderate and severe blowdown areas. The greatest reduction in the potential fire behavior would occur within 1 to 5 years following the salvage and slash disposal treatments prior to the establishment of regeneration of shrubs, grasses, and planted trees. Salvage logging followed by either mechanical piling and pile burning, hand piling and pile burning, and underburning would be the most effective in reducing all size class fuel loadings. The change in the fuels profile within the first 5 years would enable suppression resources to directly attack a fire without the use of mechanized equipment; likely increasing the number of days initial attack resources would be successful at immediately containing a wildfire. The areas with less vegetation would be less intense and provide opportunities for fire suppression resources to contain a fire. These younger stands could be used during fire suppression as fuel breaks, safety zones, and possible strategic holding locations for large, landscape fires.

Salvage logging followed by lopping and scattering would only be effective in reducing the larger fuels, potentially leaving behind the fine fuels which contribute to increasing spread rate and flame lengths. The resultant fire behavior would likely still produce flame lengths, rates of spread, and intensities requiring the use of mechanized equipment or aerial support. However, by removing the large logs, fire suppression resources could build a containment line quicker, and possibly more directly reducing the final fire size throughout most of the fire season.

Stands having moderate or severe stand damage, less than 40 percent canopy after salvage, and planted, would become more volatile over time, exhibiting increased fire behavior intensities, becoming more susceptible to high rates of mortality of the reestablished stand throughout the summer. After 20 years, all stands harvested could exhibit increased rates of spread, flame lengths, and intensities similar to those discussed in the No Action Alternative due to increased fuel loads, ladder fuels, and canopy cover.

The number of acres proposed for salvage logging in the owl cores and riparian reserves in Alternative 3 would not change the overall effect to the watershed but would reduce the direct effect to the those additional areas treated. However, Alternative 2 and 3 would provide for the greatest benefit in reducing extreme potential fire behavior within the first 5 years following the salvage logging. Decreasing the potential rate of spread, flame lengths, and fireline intensities would decrease damage to soils, organic material, and overstory trees during a wildfire event. Firefighter ability to gain control of a wildfire within the salvaged areas would increase and provide for increase protection of firefighters, public, and natural resources. Fire suppression opportunities would be the greatest in Alternative 2 and 3.

3.5 Economics

3.5.1 Definitions

The following definitions are for terms used in the Economics section:

Full-time equivalent: The time of one-full time employee working for one year.

Sawlog: A log of suitable size for sawing into lumber.

Stocking: The number and spacing of trees in a stand (USDI 1995a, p.115).

3.5.2 Methodology

- Economics focuses on the project objectives of economic recovery of dead and dying trees, contributing toward a sustainable supply of forest commodities from matrix lands to provide jobs and contribute to community stability (USDI 1995a, p.38). In addition to commodity supply, evaluation of the economic feasibility of management actions is a consideration in project design (USDI 1995a, p.179-180).
- Economic values which are assessed include total commodity output (wood fiber harvested), total dollar return to the Federal Treasury, and the dollar value per unit of output. Units of output are measured as thousand board feet of harvest (mbf) for sawlog material. The values used per thousand board feet of harvest are based on May 2008 prices for Douglas-fir. Level of commodity output provides the basis for assessing commodity supply, resultant employment levels, and estimates of net revenue and revenue/unit of output to the Federal Treasury. Positive net revenue serves as an indicator of economic feasibility and revenue per unit of output indicates the level of economic efficiency.
- The area of analysis for Economics is the Project Area.

3.5.3 Assumptions

- For affected employment levels per million board feet processed, we used the same assumption used in the analysis of the NWFP: 9.07 jobs in the solid wood products industry (USDA, USDI 1994a, 3&4-293).
- In choosing among alternatives, it is the relative economic effects that are considered. Recognizing costs and product values may rise and fall over time, we assumed economic values to remain static in order to simplify the comparative analysis between alternatives.
- Harvest levels are from a sample of proposed salvage units in the Project Area. The BLM assumed harvest levels range from 15 thousand board feet per acre, for high volume, severe blowdown areas, to 4 thousand board feet per acre for lower volume scattered blowdown harvest areas.
- Salvage volume occurring on matrix lands will contribute to the Medford District's allowable sale quantity (ASQ) of 57 million board feet (mmbf).
- Salvage in riparian reserve and northern spotted owl activity center acres are not included in the calculations for the allowable sale quantity.

3.5.4 Affected Environment

3.5.4.1 Economic Setting

A regional perspective of the economic setting is provided in the NWFP (USDA, USDI 1994a, 3&4 261-319). "Federal agencies control large portions of many counties within the range of the northern spotted owl. In lieu of the property taxes which local governments would collect if the land were privately owned, the U.S. Treasury returns 25 percent (50 percent on O&C lands) of gross timber sale (and other) receipts to the counties . . ." (USDA, USDI 1994a, 3&4-309). The majority of the BLM-administered lands in the Project Area are O&C lands.

With implementation of the ROD/RMP in 1995, approximately 191,000 acres are currently designated as lands allocated for timber production (matrix) on the Medford District. Merchantable timber stands on matrix land are dispersed and variable in stocking levels. Individual tracts of BLM ownership within in the Project Area are fragmented by a mixed ownership pattern with private lands. Individual BLM tracts range from 40 acres to 640 acres. Matrix lands within each tract are further fragmented by varying land allocations under the ROD/RMP. The mixed ownership pattern coupled with intermingled land allocations and past harvest activity has resulted in the existing stages of development with respect to potential timber supply. The wind and snow storm produced widespread blowdown of trees across all land allocations (Figure 3-2).

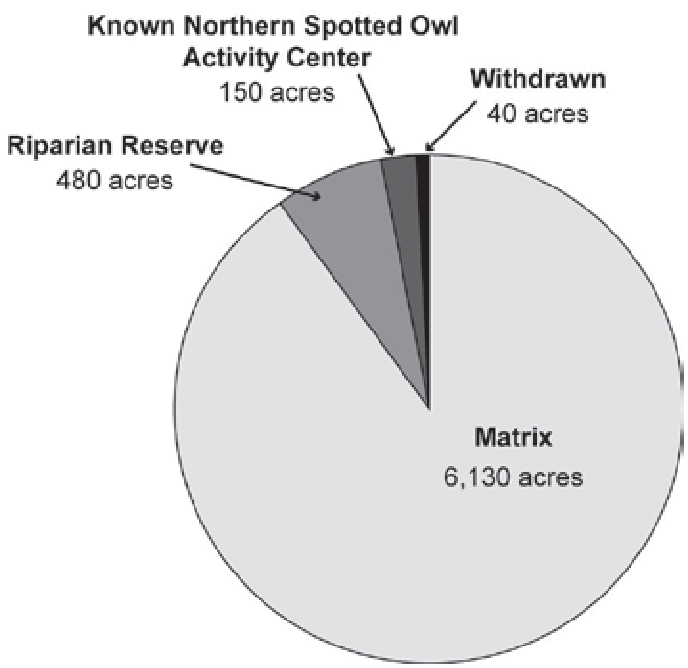


Figure 3-2. Blowdown acres by land allocation identified during the inventory process. The inventory process was generally focused on matrix lands.

3.5.4.2 Economic Factors

Economic factors which affect the supply of forest commodities in an economically feasible manner are the amount and distribution of material available for harvest, the method of harvest, access to harvest areas, and associated costs to mitigate the effects of harvest, such as post salvage slash treatment. An additional factor related to the salvaging of dead and dying trees is the timeliness of the harvest activities. These factors considered individually or collectively have an effect on the economic feasibility (positive net revenue) and economic efficiency (revenue per unit of harvest) of harvest proposals.

The amount and distribution of commercial forest products existing on matrix lands is interrelated with access and methods of harvest. Harvest of timber stands with a relatively higher harvest volume per acre in a concentrated area will result in lower access and removal costs compared to stands with relatively lower harvest volumes located in a more dispersed pattern. The blowdown resulted in a mixture of conditions ranging from highly concentrated volume to a low level of scattered volume.

Common methods of harvest (yarding trees from stump to truck) are primary factors affecting actual harvest costs. Tractor yarding is the least cost method of removal and, depending on conditions, may range from $50 per thousand board feet to $150 per thousand board feet in cost. Cable yarding incurs a higher removal cost and can generally range from $100 per thousand board feet to $200 per thousand board feet. Helicopter yarding is the most costly removal method with costs ranging from $250 per thousand board feet to $450 per thousand board feet. Appropriate harvest methods vary and are generally based on management objectives in conjunction with site conditions such as access, topography, and available harvest volume. Where lower cost harvest methods can be used, economic efficiency is increased. Economic feasibility is affected when relatively lower harvest volumes or values are associated with higher cost yarding methods.

Access to harvest areas is a factor with respect to the number of road systems being used and the condition of those roads. Cost factors include the level of road improvement needed for hauling logs, road surface condition with respect to operating season, use restrictions during wet conditions and move-in and move-out costs of equipment where multiple road systems are used for access. Economic feasibility and efficiency is reduced where road improvement costs and the number of road miles or road systems needed for harvest access increase.

Mitigation of harvest effects includes costs such as ripping compacted soils, decommissioning or closing roads, slash treatment, and seasonal operating restrictions. The cost and level of mitigation needed depends on the situation. The more mitigation measures applied, the greater the reduction in economic feasibility and efficiency.

Volume and value recovered is affected by the timeliness of salvage harvest activities. Dependent on the length of time and species, delay in salvaging dead trees can lead to both reduced value and reduced volume. A 2006 study completed on the Okanogan and Wenatchee National Forests estimated the wood changes in trees killed by 1994 wildfires (Hadfield and Magelssen 2006). The study documented the loss in volume levels in various species from stain, cracking and decay over five years. The study found Douglas-fir showed almost no wood affected by stain, cracks, and decay in the first year while in pine species almost all trees had sapwood bluestain and most trees were infested by wood borers. After 5 years, over 40 percent of Douglas-fir wood volume was affected by cracks and over 16 percent was decayed. In ponderosa pine, over 76 percent of wood volume had decayed and very little salvageable volume remained.

3.5.5 Environmental Consequences

3.5.5.1 Effects of Alternative 1 (No Action) on Economics

Direct and Indirect Effects

Under the No Action Alternative, management action would not occur. There would be no timber volume provided from the Project Area in 2008 and 2009 timber sale offerings to contribute toward the

District's annual allowable sale quantity, no forestry-related jobs would be created, and there would be no return to the Federal Treasury. The current estimated timber value of $6.125 million from the dead trees would not be recovered. This equates to approximately $3 million of timber revenue receipts to western Oregon counties. Due to the decaying process, recovery of this timber value would be completely lost in an estimated 5 years.

The cost of reestablishing a new forest stand within the severely damaged stands would be increased due to feasibility and the difficulty in accessing planting areas. In these areas where blowdown trees are strewn across all acres and often stacked on top of each other, areas open for planting would be limited. This would reduce the number of trees that would be planted and increase the cost per acre for planting. The reduced planting levels would delay full stocking of the new forest stand and reduce the volume anticipated to be available for future harvest under the current Medford District ROD/RMP on these matrix acres.

As described in the section 3.4, Fire and Fuels, the blowdown has resulted in higher fuel loadings and potential for extreme fire behavior. These conditions would result in increased difficulty in controlling wildfires. If a wildfire occurred, higher fire suppression costs and greater loss of resource values across public and private lands is expected.

Cumulative Effects

Under the No Action Alternative, there would be no contribution from the existing dead and damaged trees on these matrix lands to the Medford District's Annual ASQ of 57 million board feet for fiscal years 2008 or 2009. Given the management direction to produce a sustainable supply of timber from matrix lands, the supply and resulting economic effects would fall short of projected levels. An estimated 35 million board feet of available timber on matrix land would be lost, with no opportunity in the future to recover the current value of these trees.

In order to meet the Medford District's ASQ levels, the loss of the opportunity to salvage dead and damaged trees would need to be offset by the harvest of green trees in the Medford District's planned timber sales for fiscal years 2008 and 2009. Currently awarded or offered road salvage timber sales and the Bowen Over Salvage sale would contribute approximately 3.2 million board feet to the District's fiscal year 2008 ASQ. The planned Double Bowen timber sale in the Project Area would need to be brought forward to sell in fiscal years 2008 and 2009. These sales along with the future planned Eighty Acre and Lost Clark timber sales within the Project Area have had proposed harvest units altered by the blowdown event. While the overall impact of the blowdown on these proposed timber sales is still to be assessed, it appears stands receiving severe or moderate damage would no longer be considered for treatment within the planned timber sales. The economic value of the timber remaining in these units would be lost and remaining harvest levels in the planned timber sales would be reduced.

3.5.5.2 Effects of Alternative 2 on Economics

Direct and Indirect Effects

Under Alternative 2, approximately 35 million board feet of dead and dying trees would be salvaged. Direct employment as a result of timber harvest and processing a commodity would result in approximately 315 full-time equivalent jobs. The estimated return to the Federal Treasury for timber harvest would be approximately $175.00 per thousand board feet for a total value of approximately $6.125 million.

All salvage available within the Medford Districts ROD/RMP guidelines on matrix lands would be recovered except those areas the BLM determine are not commercially feasible to harvest due to the low volume per acre and high logging cost. These areas are generally isolated areas requiring helicopter logging or extensive road building.

Post-salvage slash treatment would provide additional employment for people classified as Forest and Conservation workers by Oregon Employment Department. The cost of completing this work for approximately 35 million board feet is around $1.1 million. Oregon Employment Department figures show average salaries for Forest and Conservation Workers at $27,015 per year (Oregon Employment Department 2008, 35). Based on this annual salary, Alternative 2 would provide approximately 40 Forest and Conservation workers jobs.

Planting costs within the severely damaged areas which have been salvaged and have received the associated slash treatment would be less expensive than in unsalvaged, severely damaged stands. By removing the blowdown trees stacked across these areas and piling the logging slash, salvaged units would be more accessible and areas open for planting would be more feasible to find. This would provide a higher stocking level within these new established stands. Full stocking along with future treatments designed to maintain survival and growth in these stands would provide a harvest level anticipated by the Medford District ROD/RMP for these matrix lands.

Cumulative Effects

Alternative 2 would provide for recovery of salvage material on all available matrix stands where blowdown trees exist within the Project Area. This would maximize available harvest volume and net revenue to the Treasury from these matrix lands. Salvaging the blowdown would substitute the harvest of 35 million board feet of green (live) trees in planned timber sales with the salvage of 35 million board feet of dead and dying timber to contribute to the Medford District's annual ASQ of 57 million board feet for fiscal years 2008 and 2009.

Future timber supply from the 1,380 acres of severely damaged stands would not be provided again until a new stand has been established and developed into a commercially viable thinning stand in approximately 40 to 60 years. In the 2,110 acres of moderately damaged stands, the effect of blowdown to the residual stand is similar to a thinning harvest and increase growth to the residual trees is anticipated. It is expected that these moderately damaged stands could be available for harvest again in 10 to 20 years. The 2,420 acres identified as having scattered damage could be available sooner depending on the extent of blowdown and the remaining stand condition.

Currently awarded or offered road salvage timber sales and the Bowen Over Salvage sale would contribute approximately 3.2 million board feet to the District's fiscal year 2008 ASQ. Known future actions within the Project Area include previously sold Flounce Around and Camp Cur timber sales; planned Double Bowen, Twin Ranch, Eighty Acre, and Lost Clark timber sales; and Ranch Stew Young Stand thinning (Stewardship) project. With the implementation of Alternative 2, previously planned timber harvest projects would be delayed in the Project Area. Planned Double Bowen, Twin Ranch, Eighty Acre, and Lost Clark timber sales would be delayed to fiscal year 2010 or later. While the overall impact of the blowdown on these proposed timber sales is still to be assessed, it appears stands receiving severe or moderate damage would no longer be considered for treatment within the planned timber sales. Alternative 2 would also shift future planned timber sales in the Butte Falls Resource Area, such as the proposed Evans Creek timber sales, to fiscal year 2011 or later.

3.5.5.3 Effects of Alternative 3 on Economics

Direct and Indirect Effects

Under Alternative 3, approximately 36.5 million board feet would be harvested. Direct employment as a result of timber harvest and processing a commodity would result in approximately 330 full-time equivalent jobs. The estimated return to the Federal Treasury for timber harvest would be $175.00 per thousand board feet for a total value of approximately $6.4 million.

All salvage available within the Medford District's ROD/RMP guidelines for matrix would be recovered except those areas the BLM determines are not commercially feasible to harvest due to the low volume per acre and high logging cost. These areas are generally isolated areas requiring helicopter yarding or extensive road building. Only the riparian reserve and northern spotted owl activity center acres identified for restoration would be recovered.

Post-salvage slash treatment would provide additional employment for Forest and Conservation workers. The cost of completing this work for 36.5 million board feet is approximately $1.14 million. Oregon Employment Department figures show average salaries for Forest and Conservation Workers at $27,015 per year. Based on this annual salary, Alternative 3 would provide approximately 42 Forest and Conservation workers jobs (Oregon Employment Department 2008, 35).

Planting cost within the severely damaged areas which have been salvaged and received the associated slash treatment would be less expensive then unsalvaged, severely damaged stands. By removing the available blowdown trees stacked across these areas and piling the logging slash, units would be more accessible and planting spots more feasible to find. This would provide a higher stocking level within these new established stands. Full stocking along with future treatments designed to maintain survival and growth on these stands would provide a harvest level anticipated by the Medford District ROD/RMP for these matrix lands.

Cumulative Effects

Alternative 3 would provide for recovery of salvage material on all available matrix stands where blowdown trees exist and on approximately 100 acres of severely damaged stands within riparian reserves (70 acres) and northern spotted owl activity centers (30 acres) in the Project Area. Blowdown salvage would substitute the harvest of 35 million board feet of green (live) in planned timber sales with the salvage of 35 million board feet of dead and dying timber from matrix lands to contribute to the Medford District's ASQ of 57 million board feet for fiscal years 2008 and 2009. The salvage material recovered from riparian reserves and northern spotted owl activity centers is not included in the calculation for ASQ.

Future timber supply from the 1,380 acres of severely damaged stands on matrix lands would not be provided again until a new stand has been established and developed into a commercially viable thinning stand in approximately 40 to 60 years. Under the current Medford District ROD/RMP, the 100 acres of severely damaged stands within the riparian reserves and owl core would not contribute to the timber supply again until a new stand has been established and density management treatments are considered in 50 to 80 years. In the 2,110 acres of moderately damaged stands, the effect of blowdown to the residual stand is similar to a thinning harvest and increased growth to the residual trees is anticipated. The BLM expects these moderately damaged stands could be available for harvest again in 10 to 20 years. The 2,420 acres identified as having scattered damage could be available sooner depending on the extent of blowdown and the remaining stand condition.

Currently awarded or offered road salvage timber sales and the Bowen Over salvage sale would contribute approximately 3.2 million board feet to the District's fiscal year 2008 ASQ. Known future actions within the Project Area include previously sold Flounce Around and Camp Cur timber sales; planned Double Bowen, Twin Ranch, Eighty Acre, and Lost Clark timber sales; and the Ranch Stew Young Stand thinning (Stewardship) project. With the implementation of Alternative 3, previously planned timber harvest projects would be delayed. Proposed timber sales Double Bowen, Twin Ranch, Eighty Acre, and Lost Clark would be delayed to fiscal year 2010 or later. While the overall impact of the blowdown on these proposed timber sales is still to be assessed, it appears stands receiving severe or moderate damage would no longer be considered for treatment within the planned timber sales. Alternative 3 would also shift future planned timber sales in the BLM's Butte Falls Resource Area, such as the proposed Evans Creek timber sales, out to fiscal year 2011 or later.

3.6 Soil

3.6.1 Definitions

The following definitions are for terms used in the Soil section:

Colluvium: Rock and soil that accumulates at the foot of a slope from gravitational forces.

Residuum: Material resulting from the disintegration, decomposition, and weathering of bedrock.

Ripping: a method of aerating the surface and subsurface material of a road, landing, or skid trail to allow water infiltration by tilling the soil with a piece of machinery equipped with ripper bars.

3.62 Methodology

The project soil scientist used the following sources for analysis:

- GIS to analyze the existing conditions of the Big Butte Creek, Little Butte Creek, Rogue River/Lost Creek, and South Fork Rogue River 5th field watersheds and to compile acreage of the individual soils in the Project Area.
- The scale used for the cumulative effects analysis is the 5th field watershed. The four 5th field watersheds are Big Butte Creek, Little Butte Creek, Rogue River/Lost Creek, and South Fork Rogue River. This is the scale used to compare and contrast acreages of present, past, and future actions.
- The Soil Survey of Jackson County, Oregon (USDA 1993) and professional soil science experience was used to identify, characterize, and describe the soils in found within the proposed salvage harvest units.

3.6.3 Assumptions

- The majority of the Project Area is within the Big Butte Creek 5th field watershed (see Table 3-3). The Central Big Butte and Lower Big Butte Analytical Watershed areas are very similar to the topography, parent material, soils, and effects from past timber harvest activities as the portions of the Little Butte Creek, Rogue River/Lost Creek, and South Fork Rogue River 5th field watersheds within the Project Area. For the purposes of cumulative effect analysis, all watersheds within the Project Area were considered to have relatively the same magnitude and frequency of effects from past timber harvest activity on the soil resource.

- The Medford District PRMP/EIS (Vol. I, p. 4-12 through 4-13) analyzes the effects of soil compaction from tractor yarding and mechanized site preparation on a unit-by-unit basis for BLM-administered lands. The stated objective to keep soil productivity losses to 5 percent or less is expected to be met by limiting the areal extent to which mechanized equipment can impact a given harvest unit to less than 12 percent by requiring an average 150-foot spacing between designated skid trails. The assumption is that this will address the direct and cumulative effects of soil compaction and the associated soil productivity losses at all scales.
- For this analysis, short-term effects for soil impacts are 5 years or less and long-term effects are greater than 5 years.
- All proposed PDFs will be appropriately implemented and will mitigate soil impacts to standards identified in the Medford District RMP/ROD (p. 44).

3.6.4 Affected Environment

3.6.4.1 Introduction

- The blowdown area and the proposed salvage units are widely distributed across four 5th field watersheds. This is expected to keep cumulative effects on the 5th field watershed scale at less intensive levels than planned conventional timber harvest projects. It should also be noted that BLM administers only 17.5 percent of the total acres in all four 5th field watersheds. Therefore at this scale, BLM has little effect from its management activities on increasing or decreasing the overall cumulative effects in these watersheds.
- No soil types classified as fragile (USDI 1995a) are located within proposed salvage units.
- Many of the blowdown trees in the Project Area still had the root wads attached as they blew over. This created many small depressions of bare soil and, in some cases, left 2 to 3 cubic yards of soil still attached to the roots suspended off the ground. This loose and exposed soil could be subject to erosion and, where they are in or adjacent to stream channels, could become a minor source (5th field scale) of sedimentation for 2 to 3 years until these areas revegetate.
- The Project Area soils have low erosion rates. The Freezner, Geppert , and Dumont-Coyata soils have moderate to moderately slow permeability, low runoff rates, and only a slight hazard of water erosion (USDA 1993). These determinations take into consideration the surface soil texture; amount of coarse fragments and organic matter in the surface layer; structure of soil aggregates in the surface layer; and soil pore size, distribution, and configuration throughout the soil profile. These low erosion rates have also been observed in the field by the project soil scientist.

3.6.4.2 Soil Types

The dominant soil types (see Table 3-12) located throughout the proposed Project Area are the Freezner soil series, Geppert soils series, and Dumont-Coyata soil complex. These soils are typically very productive and support commercial conifer forestlands. The topography is relatively gentle with broad ridgetops, expansive flat benches, sideslopes commonly less than 35 percent, and wide shallow drainage ways. The overall slope stability is considered by the project soil scientist to be at low level of risk primarily due to these stable landforms. Currently, there are few observable slumps or landslides in the Project Area as determined by aerial photo interpretation and numerous informal field investigations by the project soil scientist, although several smaller (less than 10 cubic yards) road cutbank slumps have been observed throughout the Project Area (USDI 2005).

Table 3-12. Soil Types in Proposed Butte Falls Blowdown Salvage Units (in order of Predominance)

Soil Mapping Unit	Percent of Total Project Acres	Soil Number	Percent Slope	Parent Material
Freezener gravelly loam	31	63E,64E	12-35	Igneous/Andesite
Dumont-Coyata gravelly loam	10	54E,53E	1-12	Igneous/Andesite
Geppert very cobbly loams	8	69E,70E	12-35	Igneous/Andesite
Freezner gravelly loam	7	62C	1-12	Igneous/Andesite
Hukill gravelly loam	6	86C	1-12	Igneous/Andesite
Freezener-Geppert complex	4	65C	1-12	Igneous/Andesite
Donegan-Killet gravelly loam	4	49E	12-35	Igneous/Andesite
Farva very cobbly loam	4	56C	2-12	Igneous/Andesite
Freezener-Geppert complex	3	67G	35-60 South	Igneous/Andesite
Freezener –Geppert complex	2	66G	35-60 North	Igneous/Andesite
Geppert very cobbly loam	2	70G	35-60 South	Igneous/Andesite
Donegan-Killet gravelly loam	2	47C	3-12	Igneous/Andesite
Dumont-Coyata gravelly loam	2	52C	1-12	Igneous/Andesite
Farva very cobbly loam	2	58E	12-35	Igneous/Andesite
McNull-McMullin gravelly loam	1	116E	12-35	Igneous/Andesite
McNull gravelly loam	1	115E	12-35	Igneous/Andesite
Dumont-Coyata gravelly loam	1	53G	35-60 North	Igneous/Andesite
Pinehurst loam	1	142C	3-12	Igneous/Basalt
Geppert very cobbly loam	1	68C	1-12	Igneous/Andesite

All other individual soil types equal less than 1% and account for the remaining 8% of the total acres.
SOURCE: Soil Survey of Jackson County (USDA 1993)

The Freezner soil is very deep (60 inches or more) and has formed in colluvium and residuum from andesitic rocks. This soil type is well drained and has a clay loam subsoil. Freezner soil is normally found on the tops of plateaus and gentle, sloping hillsides.

The Geppert soil is moderately deep (20 to 40 inches) to weathered volcanic rocks and is skeletal (greater than 35 percent rock fragments in the subsoil). The subsoil consists of an extremely cobbly clay loam which can make possible tillage operations very difficult.

Both the Freezner and Geppert soil types have formed in colluvium from andesitic rocks and are typically found on valley sideslopes. High clay content (25 to 35 percent) in the subsoil of both soil types can increase the potential for compaction from heavy equipment

The Dumont-Coyata gravelly loam complex is very similar to the Freezner-Geppert soil complex. The Dumont soil series has the same physical properties as the Freeezner soil series and the Coyata soil series has the same physical properties as the Geppert soil series. The distinguishing difference is that the Dumont-Coyata complex is found at higher elevations (2,000 to 4,000 feet) and in higher precipitation zones (40 to 50 inches) than the Freezner and Geppert soils.

Table 3-13 shows the amount of soil compaction that has occurred as a result of past timber harvest and road construction activities on all lands by 5th field watershed. The values in Table 3-13 illustrate the amount of soil compaction created by tractor yarding relative to other actions occurring in these watersheds. This is indicative of the need to rip compacted skid trails in these watersheds in order to improve soil productivity.

Table 3-13. Existing Soil Compaction by 5th Field Watershed

5th Field Watershed	Acres	Acres Compacted				Total Percent Compacted
		Tractor	Cable/ Skyline	Road Area	Total	
Big Butte Creek	158,211	24,220	193	880	25,293	16.0
Little Butte Creek	238,594	51,795	116	2,134	54,045	22.7
South Fork Rogue River	159,014	5,123	109	473	5,705	15.7
Rogue River/Lost Creek	36,292	16,457	196	1,027	17,680	11.1
Total	**592,111**	**97,595**	**614**	**4,514**	**102,723**	**20.4**

See Appendix G for compilation methodology.

The following assumptions were used to calculate the compacted area resulting from roads and past treatments:

- Roads are assumed to be permanently compacted at a width of 7 feet for jeep roads and 12 feet for natural or unknown surfaced roads.
- 25 percent of the tractor yarded acres on BLM-administered land are considered compacted for all areas tractor yarded before 1983 (Swanston and Dyrness 1973, 266; Adams and Froehlich 1981, 10).
- 12 percent of the tractor yarded acres on BLM-administered land are considered compacted for all areas tractor yarded after 1983 (USDI 1979) and in all proposed tractor units.
- 4 percent of the cable yarded acres are compacted (Dyrness 1967, 266).
- 25 percent of the tractor yarded acres on private lands are considered compacted.

See Appendix G, Water Resources, for methodology used for acreage computations.

3.6.5 Environmental Consequences

Soil compaction (increase in soil bulk density) adversely affects tree growth in forest stands (Froelich 1979; Wert and Thomas 1981). Roads, skid trails, and landings have the most adverse effect on soils because of the long-lasting (often several decades or permanent in the case of roads), effect on soil compaction and subsequent loss of soil productivity. The roads were constructed to provide access for timber sales over the last several decades.

The amount of site productivity loss from soil compaction depends on the size of the area disturbed by logging machinery. McNabb and Froelich (1984) concluded that the loss in site productivity is approximately equal to one-half of the areal extent of disturbance and has a long-term effect. Soil tillage with a wing-toothed ripper or subsoiler can ameliorate 85 to 95 percent of the compaction under proper soil moisture condition (USDI 1995a). Although there is variability and even some controversy with research findings over the quantification of effects of soil compaction and soil tillage on site productivity, such as plant and tree growth rates, the major body of research published indicates soil compaction has an adverse impact on most plant growth parameters most of the time. It should be noted that most research studies with findings that showed soil compaction benefiting plant growth were conducted on soil types with natural low bulk densities (less than 1.0 gram/centimeter), low clay content (less than 20 percent), and low organic matter content. Bulk densities of the soils in this Project Area are typically 1.2 to 1.5 grams/centimeter with clay content over 25 percent in the subsoil. Organic matter contents range from 2 to 4 percent in the surface layer (USDA 1993). Limiting the amount of area impacted by soil compaction (i.e., well-spaced designated skid trails) can minimize the need for tillage and limit the effects of soil compaction.

Loss of soil productivity may also result from soil displacement. Displacement occurs most frequently when the soil surface is disturbed by the manipulation of heavy equipment during logging and site preparation activities. This can remove topsoil where the majority of available plant nutrients are located and can ultimately reduce soil productivity in the long-term. Limiting the area disturbed by these actions (e.g., using well-spaced designated skid trails, limiting machine size, and operating machinery over logging slash) can effectively minimize these impacts.

Disturbance from activities such as tractor yarding, cable yarding, and road and landing construction can also cause soil erosion. The loosened and bare soil created from these activities has the potential for moving off-site by channelized water flow if left unmitigated. The resulting rill and gully erosion and ditchline scour may become conduits for sediment to enter streams. The effects of these processes are typically short-term and diminish over time as the areas reestablish vegetative cover. The relatively flat terrain with low stream and road gradients within the Project Area also moderates the potential for sediments to move off-site and reach stream channels. Seasonal restrictions to dry soil periods, waterbarring, grass seeding, and mulching can effectively minimize these impacts.

During public scoping, the BLM was asked to consider the results of one particular portion of a research study (*Ecosystem Properties and Processes in a Wind-Disturbed and Salvage-Logged Subalpine Forest*, Rumbaitis-del Rio 2004, a thesis submitted to the University of Colorado, Boulder). This portion of the research documents the effects of salvage logging versus no salvage logging on the soil resource in a catastrophic windthrow area in the Rocky Mountains of Colorado. The qualitative soil effects disclosed in this study are fundamentally sound and are not in dispute. However, from a quantitative perspective, this study was conducted on an ecological area (elevation range from 8,000 to 9,000 feet) so very different from those found on BLM-administered forest lands in southern Oregon (elevation ranges from 2,000 to 5,000 feet), that it would be impractical to compare these results with those in this Project. Soil depth, development, texture, organic matter, parent material, temperature, moisture supplying capacity, decomposition rates, and biota vary substantially between the study site and the soils found within the Project Area that the data cannot be effectively correlated to aid in the quantification of the anticipated effects.

This environmental assessment readily identifies and describes the anticipated adverse effects on soil productivity from compaction and erosion. What is in question is to what magnitude, temporal scale, and extent these impacts will occur as a result of this proposed salvage logging after the implementation of the mitigation? Unfortunately, the study's author did not provide information about the logging systems used past and present (e.g., size of tractors, areal extent of soil compaction), what mitigation was applied (e.g., well-spaced designated skid trails, seasonally restricted by soil moisture content, and whether soil tillage was implemented), and how soil erosion was evaluated to compare the results of that study with those actions proposed in this project.

The Medford District PRMP/EIS 1994 (p. 4-12 through 4-15) discloses that adverse soil impacts such as compaction, displacement, and erosion will occur as a result of salvage activities as proposed in this project. The PRMP/EIS also states, "Although management prescriptions, mitigation, and amelioration measures have been designed to keep the extent and duration of adverse effects on soils within acceptable limits, adverse effects cannot be completely avoided" (USDI 1994, 4-16).

3.6.5.1 Effects of Alternative 1 (No Action) on Soil

Direct and Indirect Effects

Under the No Action Alternative, no timber salvage, fuels treatments, or road work would occur. Under this alternative, there would be no direct effects from ground disturbance to soils.

Proposed improvements to roads (e.g., culvert replacement, surface rocking, grading, and culvert cleaning) would not occur under the No Action Alternative. The roads identified for these actions would not be improved and would continue to degrade over time and indirectly could become sources for sedimentation in localized areas. Existing soil compaction on the salvage tractor units and roads proposed for ripping or decommissioning would not be ameliorated and would remain at current compacted levels.

Cumulative Effects

The past actions that have resulted in the current conditions to soils in the Project Area include ground-based timber harvest, road building, landings constructed for timber harvest, and OHV use (USDI 1995a; USDI 1999). These land uses cause soil compaction, erosion, and a subsequent loss of soil productivity (Elliot 1999). Ground-based timber harvest (tractor yarding) has had the greatest impact on soil productivity in the Project Area by increasing soil compaction through ground pressure and vibration. Due to the relatively flat terrain in the Project Area, ground-based logging is the most logical and economical logging method. This has resulted in a relatively large amount of tractor yarding throughout the Project Area (see Table 3-33) and has contributed to the current level of soil compaction.

Present actions on BLM-administered lands include roadside salvage of windthrown trees along approximately 170 miles of roads throughout the area affected by the windstorm. This entails removing windthrown trees that are fully or partially within the road prism or are leaning toward the road prism. Logs will be bull-lined to the road way. These actions are expected to create small areas of soil disturbance within the road prism as the logs are lined to the road. PDFs are incorporated into this project to minimize these effects by requiring road maintenance after logging to return the roads to predisturbance conditions.

On adjacent private industrial timberlands, salvage logging has already begun on the windthrow areas. Although exact acreages and logging methods are not known at this time, past practices indicate that tractor yarding is the most common logging method used on private timberlands in the Project Area. Typically, no ripping or designated skid trails are implemented on private industrial timberlands. For these reasons, soil compaction, soil displacement, and soil erosion are expected to increase from these actions. This will contribute to the adverse cumulative effects on the soil resource in all 5th field watersheds.

Soil compaction on a 5th field watershed scale would neither increase nor decrease as a result of BLM activities under the No Action Alternative because actions that would increase compaction, such as constructing roads, skid trails, or landings, and actions that would decrease compaction through ripping would not occur. Changes in soil productivity are not expected for these same reasons. Soil compaction would continue to occur on private lands as units are harvested.

Under the No Action Alternative, large areas of extensive fuel loadings would be left untreated. (section 3.4, Fires and Fuels). This could ultimately lead to the possibility of more frequent and intense wildfires in the Project Area. If a wildfire were to occur, the damage to the soil resources is expected to be severe under the current fuel loading condition.

Future timber sale projects planned on BLM-administered lands within the next 5 years are Bowen Over, Windy Soda, Flounce Around, Camp Cur, Double Bowen, Twin Ranch, Lost Clark, and Eighty Acre in the Soil analysis area. These proposed actions on BLM-administered lands are expected to contribute to increases in soil compaction, displacement, and soil erosion. It is also expected that the PDFs proposed for mitigation in the Medford District RMP/ROD (p. 149-175) would maintain or improve soil compaction levels to the acceptable levels of less than 12 percent for these projects.

3.6.5.2 Effects of Alternative 2 on Soils

Direct and Indirect Effects

Tractor yarding, cable yarding, helicopter yarding, and road and landing construction proposed under Alternative 2 would create soil compaction, soil displacement, and bare soil areas with increased potential for soil erosion on the 5,910 acres proposed for salvage. However, with the implementation of PDFs designed to minimize these effects (e.g., well-spaced designated skid trails, ripping or subsoiling, walking machinery over logging slash, seasonal restrictions to dry soil periods, restricting heavy equipment to slopes less than 35 percent, grass seeding and mulching, and waterbarring), the project soil scientist expects these identified impacts would be within the scope of what is anticipated in the Medford District PRMP/EIS (p. 4-12 through 4-15).

In addition, potential increases in soil erosion from the activities proposed in Alternative 2 are expected to be low due to the stable soil types found in the Project Area. The Freezner, Geppert , and Dumont-Coyata soils have moderate to moderately slow permeability, low runoff rates, and only a slight hazard of water erosion (USDA 1993). The physical properties of the soil are expected to reduce the potential for erosion, keep impacts localized, and minimize recovery time.

Ripping skid trails and temporary spur roads could, in the short-term under certain circumstances (i.e., intense rainstorms), increase erosion and subsequent sedimentation in localized areas. However, these areas are expected to reestablish vegetative cover with 1 to 2 years with the aid of PDFs (i.e., grass seeding and mulching and waterbarring) and diminish over time to background levels. Straw mulching bare soil areas created by the proposed actions provides protection to the soil surface until the native grasses and plants can reestablish cover.

The direct effect of ripping skid trails and temporary spur roads would be to ameliorate most soil compaction, redistribute displaced topsoil, increase soil infiltration, reduce runoff, and aid in the recovery of site soil productivity in the areas proposed for these treatments. Soil compaction would be reduced or ameliorated on all tractor harvest units not planned for future entries directly resulting in a net decrease of soil compaction and a net increase in soil productivity.

The direct effect of cable and helicopter yarding would slightly increase soil compaction and potential erosion on the 1,018 acres proposed for these treatments. This is primarily due to the small amount of compaction created from these logging methods – 4 percent of total unit acreage for cable yarding (Dyrness 1967, 266) and 1 percent for helicopter yarding (Clayton 1981).

Cumulative Effects

The project soil scientist expects the cumulative effect of cable and helicopter yarding on the soil compaction, displacement, and erosion from Alternative 2 to be negligible on a 5th field scale. (Table 3-14). This is expected because only a small percentage (less than 0.1 percent) of the total 5th field watershed acres are proposed for these yarding methods and these methods create relatively small amounts of soil disturbance.

Table 3-14. Proposed Yarding Systems in Alternative 2 by 5th Field Watershed (includes Bowen Over Salvage)

5th Field Watershed	Acres	Acres by Yarding System			Total Salvage Acres	Percent of Area Proposed for Salvage
		Tractor	Cable/Skyline	Helicopter		
Big Butte Creek	158,211	2,360	500	70	2,930	1.8
Little Butte Creek	238,594	1,420	280	80	1,780	0.75
Rogue River/Lost Creek	36,292	1,020	120	20	1,160	3.2
South Fork Rogue River	159,014	40	0	0	40	0.0
Total	**592,111**	**4,840**	**900**	**170**	**5,910**	**1.0**

Soil erosion and subsequent sedimentation from tractor yarding would be minimized by restricting mechanized equipment

1. from entering riparian reserves,
2. to slopes less than 35 percent, and
3. to dry (less than 25 percent by weight) soil moisture conditions.

On a 5th field scale, the BLM expects to limit erosion and sediment production to very low cumulative levels from implementation of Alternative 2. Ripping the skid trails and roads with winged-toothed rippers or subsoilers on the 252 acres in Alternative 2 is expected to effectively reduce compaction from past and proposed actions to meet soil productivity objectives outlined in the Medford District ROD/RMP (p. 166-168). Soil compaction will increase by 326 acres, or 0.17 percent of the four 5th field watersheds under this alternative (see Table 3-15). This is the amount of residual compaction that will be left unmitigated under this alternative until these areas are proposed for final treatment.

Table 3-15. Estimated Compacted Acres resulting from Alternative 2 for the Project Area

	Estimated Acres Compacted
Existing Compaction in Project Area	113,560*
Proposed Treatments	
Tractor Yarding	578
Cable/Skyline Yarding	35
Landings (new)	23
Roads (New Temporary and Permanent)	11
Skid Trails Ripped**	-525
Net Increase in Compaction from Alternative 2	53
Total Residual Compaction after Project Completion	113,613
Increase in Compacted Acres from Alternative 2	**0.05%**

*Actual acres impacted by tractors (assumes 12% of proposed tractor units).

**Acres for skid trail ripping were estimated by adding all tractor yarding for severe and moderate blowdown acres (where future access or entries are not needed). Approximately half of all moderate blowdown units were estimated for ripping. Existing skid trails densities were estimated to be at 25% of all proposed tractor units to be ripped. Cable/Skyline yarded acres are estimated at 4% compaction (Dyrness 1967, 266).

The proposed culvert replacement, drainage improvement, rock surfacing, and road grading would improve local access and is expected to reduce road-related erosion in the Project Area. Although, some of these actions could slightly increase sedimentation of nearby streams during implementation, the overall beneficial effects would reduce road-related sedimentation to a much greater degree in the long-term in all watersheds.

3.6.5.3 Effects of Alternative 3 on Soil

Direct and Indirect Effects

The main difference between Alternative 2 and Alternative 3 is the proposal to salvage log and treat fuel loadings in the riparian reserves and northern spotted owl activity centers (Table 3-16).

Table 3-16. Proposed Yarding Systems in Alternative 3 by 5th Field Watershed

5th Field Watershed	Acres	Acres by Yarding System: Tractor	Cable/Skyline	Helicopter	Total Salvage Acres	Percent of Area Proposed for Salvage
Big Butte Creek	158,211	2,360	570	70	3,000	1.9
Little Butte Creek	238,594	1,450	280	80	1,810	0.8
Rogue River/Lost Creek	36,292	1,020	120	20	1,160	3.2
South Fork Rogue River	159,014	40	0	0	40	0.0
Totals	**592,771**	**4,870**	**970**	**170**	**6,010**	**1.0**

Of the approximately 70 acres in the outer 100 feet of riparian reserves where the blowdown is determined to be severe, 60 acres are proposed for bull-lining by tractors and 10 acres are proposed for cable/skyline yarding. The amount of soil disturbance created from bull-lining logs would vary depending on the size of log, the slope and distance lined, and the amount of logging slash on the ground. Bull-lining could create areas of bare soil where the topsoil is displaced. These areas would be subject to erosion and productivity losses. The PDF to scatter logging slash on all soil disturbance created by bull-lining within the riparian reserve is expected to provide surface protection and add future nutrient sources to these disturbed soil areas. This alternative also proposes to tractor yard approximately 40 acres in severe blowdown LSR (northern spotted owl activity center). All skid trails and landings are proposed for ripping which is expected to meet soil compaction and soil productivity objectives as previously stated in Alternative 2.

The remaining 5,910 acres would have the same proposed logging methods, and proposed mitigation, and are expected to have the same effects as Alternative 2. For this reason, soil erosion and sedimentation are expected to be low for this alternative.

Table 3-17. Estimated Compacted Area Resulting from Alternative 3

	Acres Compacted
Existing Compaction in Project Area	113,560*
Proposed Treatments	
Tractor Yarding	584
Cable/Skyline Yarding	39
Landings (new)	23
Roads (new temporary and permanent)	11
Skid Trail Ripping**	-533
Total Compaction from Alternative 2	51
Total Compaction after Project Completion	113,611
Increase in Compacted Acres from Alternative 3	**0.04%**

* Actual acres impacted by tractors (assumes 12% of proposed tractor unit).

**Acres for skid trail ripping were estimated by adding all severe and moderate blowdown acres (where future access or entries are not needed) proposed for tractor logging. Approximately half of all moderate blowdown units were estimated for ripping. Existing skid trails densities were estimated to be at 25% of all proposed tractor units to be ripped. Cable/Skyline acres estimated at 4% compaction.

Cumulative Effects

The difference in the cumulative effects between Alternative 2 and Alternative 3 is negligible. The difference of approximately 60 acres of bull-lining logs and 10 acres of skyline/cable yarding in the outer riparian reserves and logging 40 acres in the northern spotted owl activity center would create approximately 30 acres of total soil disturbance (e.g., compaction, displacement, and bare soil). As stated in Alternative 2, the proposed ripping or subsoiling is expected to adequately mitigate soil compaction to levels describe in the Medford District PRMP/EIS (p. 4-12 through 4-15).

Stream sedimentation would have a slight potential increase because of logging in closer proximity to stream channels under Alternative 3. The PDF requiring logging slash as cover in disturbed soil areas is expected to reduce this potential.

Proposed fuel treatments are expected to reduce the potential of high intensity wildland fires in riparian reserves (see section 3.4, Fire and Fuels). This ultimately could prevent soil damage from the adverse effects of a wildfire.

3.7 Water Resources

3.7.1 Definitions

The following definitions are for terms used in the Water Resources section:

Intermittent stream: Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral stream if they meet these two criteria.

Perennial stream: A stream that has running water on a year-round basis under normal climatic conditions.

Transient Snow Zone: A winter precipitation band from about 3,500 feet to 5,000 feet in elevation where a mixture of snow and rain occurs. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. Snow packs in this elevation range are often shallow and are quickly melted by rain and warm winds.

Turbidity: A measure of the amount of particle matter suspended in the water or the cloudiness of the water. Higher turbidity levels are often associated with higher levels of disease-causing organisms, such as viruses, parasites, and some bacteria.

3.7.2 Methodology

The project hydrologist and hydrologic technician used the following sources for analysis:

- The *Little Butte Creek* (USDA, USDI 1997)*, Lost Creek* (USDI 1998a)*, Lower Big Butte* (USDI 1999)*, and Central Big Butte* (USDI 1995b) watershed analyses provided general water resources background information for the Project Area.
- Geographic Information System to analyze the existing condition of the Project Area.
- Stream types on BLM-administered lands were identified through site visits; Forest Service and nonfederal land stream types were estimated using aerial photo interpretation and information on adjacent BLM-administered lands.
- The scale for analysis for Water Resources will be the following 5th field watersheds containing the Project Area: Rogue River/Lost Creek, Big Butte Creek, Little Butte Creek, and South Fork Rogue River. This will be referred to as the Water Resources analysis area.

3.7.3 Assumptions

- 60-year harvest rotation for private timber lands (USDI 1994, 4-5).
- 25 percent of BLM-administered land tractor yarded prior to 1983 and all tractor yarded acreage on private lands is considered compacted (Swanston and Dyrness 1973, 266; Adams and Froehlich 1981, 10).

- 12 percent of BLM-administered land tractor yarded in 1983 or later is considered compacted (USDI 1979).
- 4 percent of the cable yarded acreage is considered compacted (Dyrness 1967, 266).
- 1 percent of helicopter units are compacted (Clayton 1981, 6)
- Short-term effects are 10 years or less; long-term effects last more than 10 years (USDI 1994, 4-4).

3.7.4 Affected Environment

3.7.4.1 Introduction

The proposed blowdown salvage project is contained within four of the eight 5th field watersheds located in the 1,032,530-acre Upper Rogue River 4th field subbasin. The four 5th field watersheds are Rogue River/Lost Creek, Big Butte Creek, Little Butte Creek, and South Fork Rogue River (see Map 4). The four 5th field watersheds where the blowdown occurred total 592,111 acres, about 57 percent of the 4th field. General characteristics of 5th field watersheds within the 4th field subbasin will be described rather than detailed descriptions at the watershed scale. Detailed descriptions at a smaller scale will be addressed where appropriate, such as in key and deferred watersheds.

The South Fork/North Fork Little Butte Creek Tier 1 key watershed is composed of three 6th field watersheds. A portion of the key watershed affected by the blowdown, the Lower North Fork Little Butte Creek 6th field, is located in the Project Area.

Three deferred watersheds are located within the Project Area. The Clark Creek deferred watershed is a 7th field drainage within the Big Butte Creek 5th field watershed. Lost Floras and Vine Maple deferred watersheds are 7th field drainages within the Rogue River/Lost Creek 5th field watershed (Table 3-18). No salvage is proposed in the Vine Maple deferred watershed.

Table 3-18. 5th Field, Key, and Deferred Watersheds within the Water Resources Analysis Area

Watershed	Acres
Big Butte Creek 5th Field	158,210
Clark Creek Deferred	7,391
Little Butte Creek 5th Field	238,595
Lower North Fork Little Butte Creek Key	15,586
Rogue River/Lost Creek 5th Field	36,292
Lost Floras Deferred	5,847
Vine Maple Deferred	5,294
South Fork Rogue River 5th Field	159,014
5th Field Totals	**592,111**

Blowdown was scattered across portions of the four 5th field watersheds with nearly half of the damage occurring in the Big Butte Creek 5th field watershed (Table 3-19).

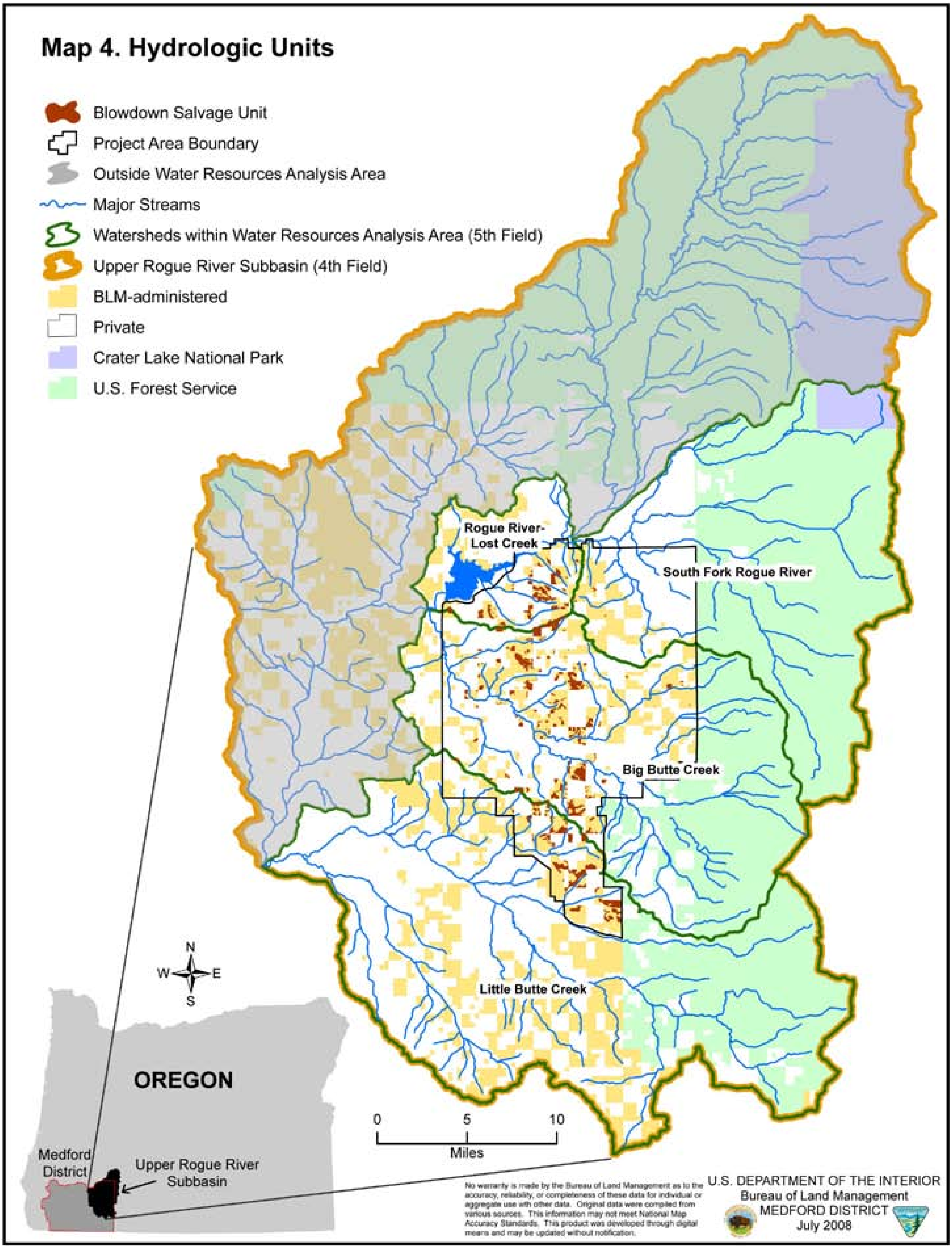

Map 4. Hydrologic Units
Blowdown Salvage Unit
Project Area Boundary
Outside Water Resources Analysis Area
Major Streams
Watersheds within Water Resources Analysis Area (5th Field)
Upper Rogue River Subbasin (4th Field)
BLM-administered
Private
Crater Lake National Park
U.S. Forest Service
Rogue River-
Lost Creek
South Fork Rogue River
Big Butte Creek
Little Butte Creek
N
W
E
S
OREGON
Medford
District
Upper Rogue River
Subbasin
0
5
10
Miles
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008

Table 3-19. Blowdown Distribution (acres) in the 5th Field Watersheds containing the Water Resources Analysis Area

Watershed	Blowdown Damage			Total
	Scattered	Moderate	Severe	
Big Butte Creek	1,179	1,002	1,168	3,361
Little Butte Creek	701	683	455	1,843
Rogue River/Lost Creek	410	450	237	1,097
South Fork Rogue River	3	24	3	30
Total	**2,293**	**2,159**	**1,863**	**6,331**

Table 3-20 shows the distribution of land ownership throughout the four 5th field watersheds in the Water Resources analysis area. The BLM-administered land ranges from a low of 4 percent in the South Fork Rogue River 5th field watershed to a high of 35 percent in the Rogue River/Lost Creek 5th field watershed.

Table 3-20. Land Ownership in the Water Resources Analysis Area by 5th Field Watershed

Watershed	BLM		USFS		Other*		Total Acres
	Acres	Percent	Acres	Percent	Acres	Percent	
Big Butte Creek	29,521	19	58,125	37	70,564	44	158,210
Little Butte Creek	54,794	23	59,876	25	123,925	52	238,595
Rogue River/Lost Creek	12,875	35	52	1	23,365	64	36,292
South Fork Rogue River	6,385	4	113,714	70	38,915	25	159,014
Total	103,575	18	231,767	39	256,769	43	592,111

* “Other” equals Private, Industrial Forest Land, City of Medford, State of Oregon, National Park Service, or Bureau of Reclamation.

For a detailed description of each watershed, please see the following watershed analyses: Lost Creek, Lower Big Butte Creek, Central Big Butte Creek, Little Butte Creek, and the Ginger Springs Municipal Watershed Analysis (located within the Big Butte Creek 5th field watershed).

A portion of the blowdown occurred in the of South Fork/North Fork Little Butte Creek Tier 1 key watershed which is made up of three 6th field subwatersheds. Within this Tier 1 key watershed, blowdown was limited to the Lower North Fork Little Butte Creek 6th field subwatershed. Tier 1 key watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program (USDI 1995a, 22). Management direction in the ROD/RMP for key watersheds include preparing watershed analysis prior to resource management (Little Butte Creek Watershed Analysis), reduce existing system and nonsystem road mileage, and, if funding is not available, then no net increase of roads in key watersheds. Highest priority is given to watershed restoration in key watersheds (USDI 1995a, 23). The ROD/RMP states, “The non-interchangeable component of the annual allowable sale quantity, attributable to key watersheds, is 1.5 million cubic feet (9.0 million board feet). Identification of this component was required be the SEIS ROD, pages E-18 and E-20” (USDI 1995a, 23).

Approximately 1,012 acres of blowdown occur in the Vine Maple and Lost-Floras deferred watersheds within the Rogue River/Lost Creek 5th field watershed and the Clark Creek deferred watershed in the Big Butte Creek 5th field watershed. These watersheds were deferred from management activities for 10 years when the Medford District ROD/RMP (1995) was written due to high cumulative effects resulting from compaction and openings in the transient snow zone (TSZ). “Management activities of a limited nature (e.g., riparian, fish, or wildlife enhancement, salvage, etc.) could be permitted in these areas if the effects will not increase the cumulative effects” (USDI 1995a, 42). Specific PDFs for these areas would be used to mitigate potential additional cumulative effects.

The climate of the Project Area is generally warm and dry with typically cool, wet winters and hot, dry summers. Summer temperatures range from the high 70s to the low 90s. Occasional daytime temperatures in the summer may reach 100 °Fahrenheit (F). Winter lows drop regularly to 10 °F to 20 °F. Annual precipitation ranges from 35 inches to 50 inches in the Water Resource analysis area. Most of the precipitation occurs between mid-October and mid-April as rain or snow.

Surface water in the proposed Butte Falls Blowdown Salvage Project Area includes streams, irrigation ditches, springs, wetlands, and reservoirs. The main waterbodies are Little Butte Creek, Big Butte Creek, Rogue River, and Lost Creek reservoir. The BLM classified streams in the planning area as perennial, intermittent with seasonal flow (long duration intermittent), intermittent with ephemeral flow (short duration intermittent), and dry draws with ephemeral flow. Stream types on BLM-managed lands were identified through site visits; USFS and non-Federal land stream types were estimated using aerial photo interpretation and extrapolation from information on adjacent BLM-managed lands (Table 3-21). Streams categorized as perennial or intermittent on Federal lands are required to have riparian reserves as defined in the Northwest Forest Plan (USDA, USDI 1994b). Dry draws do not meet requirements for streams needing riparian reserves because they lack the combination of a defined channel and annual scour and deposition (USDI 1995a, 27). Streams on industrial forest lands are managed according to the Oregon Forest Practices Act, which classifies and protects streams based on three beneficial use categories (fish use, domestic water use without fish use, and all other streams).

Table 3-21. Miles of Streams by Stream Types for the 5th Field Watersheds in the Water Resources Analysis Area

Watershed	Intermittent	Perennial	Other*	Total
Big Butte Creek	292	246	44	688
Little Butte Creek	1,019	363	186	1,966
Rogue River/Lost Creek	139	58	4	261
South Fork Rogue River	191	202	8	429
Total	1,641	869	242	3,344

* “Other” includes groundwater, pipelines, ditches, and canals.

3.7.4.2 Water Quality

Water quality is the measure of the suitability of water for a particular use based on the chemical, physical, and biological characteristics of the water. To determine water quality, characteristics of the water, such as temperature, dissolved mineral content, and number of bacteria, are measured and analyzed. Selected characteristics are then compared to numeric standards and guidelines to decide if the water is suitable for a particular use.

The Oregon Environmental Quality Commission has adopted water quality standards to protect designated beneficial uses. In practice, water quality standards have been set at a level to protect the most sensitive uses. Cold water aquatic life such as salmon and trout are the most sensitive beneficial uses in the Rogue River and its tributaries (ODEQ 2004, 5). The Department of Environmental Quality (DEQ) is required by the Federal Clean Water Act to maintain a list of stream segments that do not meet water quality standards for one or more beneficial uses. This list is called the 303(d) list because of the section of the Clean Water Act that makes the requirement. DEQ's 2004/2006 303(d) list is the most recent listing of these streams (ODEQ 2006).

Within the Butte Falls Blowdown Salvage Project Area, 21 streams (Table 3-22) are included on DEQ's 2004/2006 303(d) list for exceeding one or more of the following water quality criteria: stream temperature, *Escherichia coli* (E. coli), sediment, dissolved oxygen, fecal coliform, and pH.

Table 3-22. 303(d) Streams in the Water Resources Analysis Area by 5th Field Watershed

5th Field Watershed	Stream Name	Listing Parameter	Stream Miles Listed	Amount on BLM	
				Miles	Percent
Big Butte Creek	Big Butte Creek	Dissolved oxygen E. coli Temperature	0 to 11.6	2.0	17
	Clark Creek	Temperature	0 to 7.7	3.0	39
	Dog Creek	Temperature	0 to 4.7	1.3	28
	Doubleday Creek	Temperature	0 to 3.4	1.5	44
	Hukill Creek	Temperature	0 to 3.6	0.5	14
	Jackass Creek	Temperature	0 to 4.8	2.4	50
	North Fork Big Butte Creek	Temperature	0 to 13.9	6.4	46
	Willow Creek	Temperature	0 to 4.5	0.0	0
Little Butte Creek	Antelope Creek	E. coli Temperature	0 to 19.7	1.1	6
	Burnt Canyon Creek	Temperature	0 to 3.2	1.4	44
	Conde Creek	Temperature	0 to 4.4	1.1	25
	Dead Indian Creek	Temperature	0 to 9.6	0.4	4
	Lake Creek	E. coli Sediment Temperature	0 to 7.8	1.7	22
	Lick Creek	Dissolved oxygen E. coli	0 to 6.8	3.3	49
	Little Butte Creek	Dissolved oxygen E. coli Fecal coliform Sediment Temperature	0 to 16.7	0.0	0
	Lost Creek	Sediment Temperature	0 to 8.4	4.5	54
	Nichols Branch	E. coli	0 to 2.7	0.0	0
	North Fork Little Butte Creek	E. coli pH Temperature	0 to 17.8	0.8	5
	Salt Creek	E. coli	0 to 9.0	2.6	28
	Soda Creek	Sediment Temperature	0 to 5.6	5.3	95
	South Fork Little Butte Creek	E. coli Sediment Temperature	0 to 16.4	1.4	9

The BLM is recognized by Oregon DEQ as a Designated Management Agency for implementing the Clean Water Act on BLM-administered lands in Oregon. The BLM and DEQ have a Memorandum of Agreement that defines the process by which the BLM will cooperatively meet State and Federal water quality rules and regulations. In accordance with the memorandum, the BLM, in cooperation with the Forest Service, DEQ, and Environmental Protection Agency, is implementing the *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (USDA, USDI 1999). Under the Protocol, the BLM will protect and maintain water quality where standards are met or surpassed, and restore water quality limited water bodies within their jurisdiction to conditions that meet or surpass standards for designated beneficial uses. The BLM will also adhere to the State Antidegradation Policy (OAR 2005; 340-041-0004) under any proposed actions.

Stream temperature has direct and indirect effects on water quality. For example, the amount of oxygen that can be dissolved in water is partly governed by temperature. Riparian (streamside) vegetation helps shade streams and hence helps maintain a lower temperature than a nonvegetated stream. Shading of streams by riparian (riverbank) vegetation can reduce stream temperatures and the daily and seasonal variation in temperature that would occur if the stream were unshaded. This variation is particularly important during low flows in summer, because unshaded streams can become so warm that many invertebrates and fish are badly stressed or killed.

In order to address water quality problems, the DEQ looks at the water quality of an entire river and watershed. The DEQ calculates the pollution load limits, or Total Maximum Daily Loads (TMDL) for each pollutant that enters a body of water. TMDLs describe the amount of pollutants a water body can receive and still not violate water quality standards. The DEQ has not determined the TMDL for listed streams within the Project Area.

In advance of a TMDL setting specific numeric targets for streams in the Project Area, the Oregon statewide criteria found in OAR 340-041-0007(1) is the water quality criteria that applies to BLM management.

> *(1) Notwithstanding the water quality standards contained in this Division, the highest and best practicable treatment and/or control of wastes, activities, and flows must in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels.*

In the absence of a completed TMDL, DEQ provided loading capacities for the listed parameters, land management guidance, and shade targets to assist the BLM in the development of a Water Quality Restoration Plan (WQRP) (ODEQ 2004). Estimated loading capacities, load allocations, and management targets provided in advance of the TMDL will be examined as part of the TMDL development. DEQ may modify the targets and goals set for BLM if they are found to be insufficient to meet water quality standards.

The advent of the NWFP in 1994 followed by the Medford District ROD/RMP in 1995 resulted in major improvements for stream and watershed protection and restoration on Federal lands. The NWFP and Medford District ROD/RMP allocated lands to be managed as "Riparian Reserves." Riparian reserves establish protection for all fish-bearing streams as well as non-fish-bearing perennial and intermittent streams, wetlands, lakes, and ponds. Riparian reserves are adequate to maintain riparian conditions necessary to protect stream shade and restore water temperature over time (USDA, USDI 2005).

Riparian reserve implementation would maintain or reduce water temperatures of perennial streams (USDI 1994; USDA, USDI 2005).

Stream temperatures in the Project Area are expected to increase due to the loss of riparian vegetation from the windstorm. The amount of increase depends on site-specific variables such as aspect, side slopes, remaining canopy, stream size, and source of flows. As vegetation recovers and stream canopy closes, stream temperatures would be expected to return to prestorm levels in the long-term.

Stream temperatures would increase locally on perennial stream channels where blowdown occurred. Severe and moderate blowdown has removed streamside canopies on approximately 2 miles of perennial streams on BLM lands; the greatest amount was removed in the Big Butte Creek 5th field watershed (Table 3-23). Intermittent stream channels do not flow with a substantial volume of water during the summer when stream temperatures would rise as a result of high summer temperatures.

Table 3-23. Miles of Riparian Reserves Affected by Blowdown by Stream Classification for 5th Field Watersheds in the Water Resources Analysis Area

Watershed	Stream Classification	Blowdown Stand Damage				Total
		Scattered	Moderate	Severe	Unknown	
Big Butte Creek	Intermittent	0.6	0.9	1.3	0.8	3.6
	Perennial	0.2	0.8	1.0	0	2.1
	Other*	0	0.2	0	0	0.2
Little Butte Creek	Intermittent	0.3	0.3	0	0.01	0.7
	Perennial	0.1	0	0	0	0.1
	Other*	0	0	0	0	0
Rogue River/Lost Creek	Intermittent	0	0.02	0.9	0	0.9
	Perennial	0	0	0.1	0	0.1
	Other*	0	0	0	0	0
South Fork Rogue River	Intermittent	0	0	0	0	0
	Perennial	0	0	0	0	0
	Other*	0	0	0	0	0

* Other "streams" include groundwater, pipelines, ditches, and canals.

Stream channels with severe and moderate blowdown could take up to a decade or longer for stream canopy to recover and allow local stream temperatures to return to conditions that existed before the blowdown. Temperatures would begin to recover as shrubs and trees grow back where blowdown occurred. The storm did not affect any riparian reserves within the South Fork Rogue River 5th field watershed.

Large woody debris (LWD) is important for water quality because it dissipates stream energy and retains stream sediment (see section 3.7, Fisheries). As a result of the 2008 windstorm, severe blowdown along streams contributed large amounts of LWD to local stream channels and riparian areas throughout portions of the Upper Rogue 4th field subbasin. However, the majority of stream channels in the Upper Rogue 4th field subbasin are generally lacking LWD. All streams in the Water Resource analysis area are lacking LWD (USDI 1995b; USDI 1998a; USDI 1999).

The short-term recruitment of LWD in stream channels has increased due to the dramatic increase in dead riparian trees. Long-term LWD recruitment will be limited in severe blowdown area for many decades until new trees reach maturity. The size of LWD required for effectively dissipating stream energy and capture sediment is dependent on stream flow.

Natural or unsurfaced roads are generally more likely than surfaced roads (rocked or paved) to contribute sediment to streams. A study of soil loss from forest roads in the southern Appalachian Mountains (Swift 1984) concluded that soil loss rates from an unsurfaced roadbed were eight times greater than from roadbeds with six to eight inches of gravel. New fill slopes, although uncompacted and unvegetated, eroded only where storm runoff from culverts or dips flowed over loose soil. Vegetation on the cutslope and ditch was shown to be effective in reducing erosion from forest roads in the Oregon Coast Range (Luce and Black 1999). Road segments where vegetation was cleared from the cutslope and ditch produced about seven times as much sediment as road segments where vegetation was retained. Closure of unsurfaced roads during the wet season can also help to reduce erosion (Kattelmann 1996). Table 3-24 shows BLM-controlled roads by surface type and the percentage of roads that are natural surface in each watershed.

Table 3-24. Miles of BLM-Controlled Roads by Road Surface Type in 5th Field Watershed, Deferred Watershed, and Key Watershed in the Water Resources Analysis Area

Watershed	Road Surface Type			Total	Percent with Natural Surface
	Natural	Rocked	Paved		
Big Butte Creek 5th Field	66	115	0	181	36
Little Butte Creek 5th Field	78	151	28	257	30
Rogue River/Lost Creek 5th Field	22	39	1	62	35
South Fork Rogue River 5th Field	19	35	0	54	35
5th Field Totals	**185**	**340**	**29**	**554**	**33**
Clark Creek Deferred	9	16	0	25	36
Lost Floras Deferred	3	13	1	17	18
Vine Maple Creek Deferred	7	16	0	23	30
Deferred Total	**19**	**45**	**1**	**75**	**25**
Lower North Fork Little Butte Creek Key	13	20	2	35	37
Key Total	**13**	**20**	**2**	**35**	**37**

Over the past 10 years, road construction has declined and road decommissioning and upgrading has increased. Implementation of Best Management Practices (BMPs) during road and logging operations has reduced impacts on water quality. A review of forest management impacts on water quality concluded that the use of BMPs in forest operations was generally effective in avoiding significant water quality problems; however, the report noted that proper implementation of BMPs was essential to minimizing nonpoint source pollution (Kattelmann 1996). Water quality on Federal lands is on an upward trend with reductions in summer stream temperatures and sediment input.

3.7.4.3 Water Quantity

Water quantity is a function of natural and human-caused factors. Natural factors include climate, geology, and geographic location. Natural processes that affect water quantity include floods, wildfires, and drought. Human activities that have altered water quantity in the Water Resources analysis area consist of land clearing (for agricultural and residential use), timber harvest, road operations, water withdrawals, and fire suppression.

Within in the Project Area, rain dominates in the lower elevations (below 3,500 feet). Winter precipitation in the higher elevations (above 5,000 feet) usually occurs as snow which melts during the spring runoff season from April through June. A mixture of snow and rain falls between the 3,500-foot and 5,000-foot elevation in an area referred to as the transient snow zone. When the canopy cover is reduced in the transient snow zone, more snow accumulates and the snow melt rate increases. This may lead to an increase in the frequency and magnitude of peak flows in streams. Altered peak flows may affect stream channel conditions by eroding streambanks, scouring streambeds, and transporting and depositing sediments if the flow reaches the level required for sediment transport. Removal of the vegetation canopy can increase the annual water yield and discharge during the normal low-flow period.

Roads constructed in riparian areas have three primary effects on hydrologic processes: (1) they intercept rainfall directly on the road surface and road cutbanks and affect subsurface water moving down the hillslope; (2) they concentrate flow, either on the surface or in an adjacent ditch or channel; and (3) they divert or reroute water from paths it otherwise would take if the road was not present (Gucinski et al. 2001). The majority of road miles are located on private lands (61 percent), followed by BLM-administered lands (17 percent), USFS-administered lands (14 percent), and Jackson County (8 percent).

Roads connected to stream channels through ditch lines effectively extend the stream channel network, changing runoff timing and ultimately increasing the magnitude of peak flows (Wemple et al. 1996). The effect of roads on peak stream flows depends strongly on the size of the watershed; for example, capture and rerouting of water can remove water from one small stream while causing major channel adjustments in another stream receiving the additional water (Gucinski et al. 2001). Roads have relatively insignificant effects on peak flow in large watersheds where they constitute a small proportion of the land surface, they do not seem to change annual water yields, and no studies have evaluated their effect on low flows (Gucinski et al. 2001). Peak flows for small, headwater streams appear to be increased where at least 12 percent of a watershed was severely compacted by road building, tractor skidding, or tractor windrowing of slash (Harr 1976).

Well-designed roads with a properly functioning drainage system attempt to mimic the local natural drainage pattern by keeping the local downslope movement of water similar to conditions that existed before the road was built. However, during extreme events (drought or peak flow) any hydrologic differences between the artificial drainage associated with the road system and the natural system become more critical and can cause noticeable effects to the local environment.

Road density provides a general index of the relative amount of road in the 5th field watersheds and the deferred watersheds (Table 3-25) within the Project Area. Areas with higher road densities will generally experience more road-related effects; however, many other factors such as design, location, maintenance, use, surface type, gradient, and geology can influence the effect of any particular road. The BLM obtained road miles from the BLM GIS database. The BLM acknowledges there are roads that are hidden by tree canopy, OHV trails, and private roads not included in the GIS data. Based on GIS, high road densities (greater than 4.0 miles/square mile, USDI and USDA 1997) are found in the Big Butte Creek and Rogue River/Lost Creek 5th field watersheds.

Table 3-25. Road Density for 5th Field and Deferred Watersheds in the Water Resources Analysis Area

Watershed	Area (square miles)	Road Miles	Road Density (miles/ square mile)
Big Butte Creek 5th field	247	1,090	4.4
Little Butte Creek 5th field	373	1,312	3.5
Rogue River/Lost Creek 5th field	57	254	4.5
South Fork Rogue River 5th field	248	638	2.6
Clark Creek Deferred	11.5	63	5.5
Lost Floras Deferred	9.1	51	5.6
Vine Maple Deferred	8.3	48	5.8

The percentage of the drainage area in roads is a similar index of the relative amount of road in the analysis area. The Oregon Watershed Assessment Manual (OWAM) (WPN 2001, IV-16) states that rural drainages with more than 8 percent roads have a high potential of experiencing more than a 10 percent increase in peak flows. Drainages with 4 to 8 percent roaded area have a moderate risk and those with less than 4 percent roads have a low risk. All 5th field, deferred and key watersheds in the Water Resources analysis area have less than 4 percent roaded area (Table 3-26) and thus have a low risk of peak flow increases due to roads.

Table 3-26. Road Miles, Road Density, and Percent Roaded Area for 5th Field, Deferred, and Key Watersheds in the Water Resources Analysis Area

Watershed	Road Miles			Total Road Length (miles)	Road Density (miles/square mile)	Roaded Area (percent)
	BLM	USFS	Private			
Big Butte Creek 5th Field	180	315	595	1,090	4.4	1.3
Little Butte Creek 5th Field	257	116	939	1,312	3.5	0.9
Rogue River/Lost Creek 5th Field	62	0	192	254	4.5	1.3
South Fork Rogue River 5th Field	53	312	273	638	2.6	0.7
5th Field Totals	**552**	**743**	**1,999**	**3,294**	**3.6**	**1.0**
Clark Creek Deferred	25	0	38	63	5.5	1.5
Lost Floras Deferred	17	0	34	51	5.6	1.7
Lower North Fork Little Butte Creek Key	35	7	52	95	3.96	1.1

The proposed action to salvage windblown trees would not affect canopy closure inside the transient snow zone or reduce canopy cover below historic levels because any changes in water quantity resulting from changes in canopy closure occurred as a result of the windstorm. Therefore, changes to water quantity as a result of the proposed project will not be analyzed in detail but will be discussed as part of this EA.

Project design features including designated skid trails, ripping skid trails upon final entry, and building new temporary and permanent roads outside of riparian reserves would minimize additional compaction to prevent changes in water quantity or water delivery to stream channels. There would be no new stream crossings which are used as an indicator for road connectivity to stream channels.

3.7.4.4 Ginger Springs Municipal Watershed

The Ginger Springs municipal watershed, or recharge area, lies primarily within the Big Butte Creek 5th field watershed with geologic interfaces extending into the neighboring Little Butte Creek 5th field watershed. This watershed is not defined by traditional landform patterns, although many of its processes are quite similar. The Ginger Springs municipal watershed intercepts, infiltrates, and transports precipitation through the soil mantle and along impermeable geologic constraints and bedrock into Ginger Springs, forming a recharge area that crosses watershed boundaries. The recharge area covers 3,991 acres with 2,625 acres in the Big Butte Creek 5th field watershed and 1,366 acres in the Little Butte Creek 5th field watershed. The majority (66 percent) of land ownership in the Ginger Springs municipal watershed is private, industrial forest land. The remaining 34 percent of the area is BLM-administered land (USDI 1998b).

Ginger Springs municipal watershed supplies water for the community of Butte Falls. The spring is located approximately one mile southeast of the town center. Two spring box structures protect the spring source and form the water intake. Water flows from the water intake by gravity through an 8-inch diameter pipe to a chlorine contact building. Three reservoirs, located on a hill above town, store the water which supplies Butte Fall's distribution system, originally installed in 1934 (HGE Inc. Engineers and Planners 1993). Butte Fall's water distribution system and reservoirs have since been upgraded to reduce the amount of water leaking from the original pipes.

Butte Fall's water source, Ginger Springs, is currently classified as groundwater by the Oregon Department of Human Services' Drinking Water Program (DWP). As a result, turbidity measurements are required by Oregon Administrative Rules [OAR333-016-0032(4)] and measurements in excess of 1 nephelometric turbidity unit (NTU) require the community to monitor fecal coliform levels. Monitoring for turbidity began in October 1983 after construction of the spring boxes. Since 1987, monthly averages for turbidity have remained below 1 NTU. Prior to 1987, turbidity averages ranged from less than 0.1 to 1.86 NTU. Data for turbidity and precipitation compiled and correlated by the community of Butte Falls suggests that peaks in turbidity are associated with rainfall events (HGE Inc. Engineers and Planners 1993).

The geology of the recharge area is characterized by volcanic rocks, primarily basalt and andesite, of the Western Cascade Geologic Province. The geologic boundary of the recharge area is defined by the contact between Tertiary pyroclastic rocks and Tertiary basalt of the Western Cascades. The pyroclastic rocks form a waterproof layer that concentrates the groundwater flow to Ginger Springs. The stratigraphically lower pyroclastic layer concentrates and carries groundwater in ancient, buried stream channels. Springs occur where the more recent drainages cut into these old stream channels, or at joints or fractures that intersect the old channels (USDI 1998b).

Ferrero Geologic identified three zones of influence (high, moderate, and low) in their 1991 *Ginger Springs Geohydrologic Study*. A "zone of influence" is an area, due to a geologic contact between the older or newer geologic formations, which may provide an opportunity for surface disturbances or contamination to influence the subsurface groundwater. One high influence zone occurs directly above the Ginger Springs collection boxes on 144 acres of private land. Ferrero Geologic identified moderate influence zones near modern stream channels (902 acres in the Big Butte Creek 5th field watershed; 230 acres on BLM lands). They assessed the remainder of the watershed as low influence (2,945 acres in the watershed; 1,125 acres on BLM lands) (USDI 1998b).

3.6.5 Environmental Consequences

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management, reasonably foreseeable future actions, and events unrelated to the Butte Falls Blowdown Salvage project. Discussion for Alternatives 2 and 3 reflects the direct and indirect impacts of the proposed action. Effects discussion also includes cumulative impacts of those direct and indirect actions when added incrementally to actions past, present, and reasonably foreseeable. Short-term effects are defined as those lasting 10 years or less and long-term effects last more than 10 years (USDI 1994, 4-4).

3.6.5.1 Effects of Alternative 1 (No Action) on Water Resources

Direct and Indirect Effects

No actions are proposed under Alternative 1 (No Action); therefore, direct and indirect effects include the current conditions in the Project Area which are the result of the windstorm event and past actions not related to the Butte Falls Blowdown Salvage project. Alternative 1 describes anticipated effects of not implementing an action at this time.

Water Quality

Under Alternative 1, there would be no change in existing water quality on BLM-administered lands. Streams in the Water Resources analysis area that are on the DEQ’s 2004/2006 303(d) list would continue to exceed water quality standards in the short-term. Over the long-term, shade would increase on the temperature listed segments on BLM-administered lands. Surface erosion from roads would be expected to remain, especially from private forest lands, and the risk of sediment inputs to streams would be expected to remain relatively constant. BLM road maintenance would occur to prevent major sediment input or to repair drainage failures. There would be no action to decrease overall road densities or decrease road interactions with streams.

In the short-term, with no salvage harvest on BLM-administered lands and the subsequent increase in fuel loading, there is a high probability a severe stand-replacing fire could burn across the Project Area (see section 3.4, Fire and Fuels). A high severity fire could reduce or eliminate riparian vegetation, resulting in increased stream temperatures, and expose large areas of bare soil to the erosive forces of rainfall, potentially increasing soil erosion and sedimentation.

Additionally, no salvage harvest within the riparian reserves would increase the risk of insect infestation in the green trees. The death of the green trees from insect infestation would reduce the future sources of potential LWD. The risk of infestation would decrease over time as the insect populations decline.

Water Quantity

Under Alternative 1, there would be no short-term changes in percentage of forest lands with crown closures less than the historic level, percentage of area in nonrecovered openings within the transient snow zone, areas of compacted soil, road densities, percentage of area in roads, or number of road-stream crossings. There would, therefore, be no change to the potential risk of increasing the magnitude and frequency of peak flows.

Older roads in the area would be maintained but not upgraded or decommissioned and would continue to influence local runoff and groundwater flow. In the long-term, older roads with limited drainage capability are more likely to experience a road failure during an extreme precipitation event causing subsequent adjustments to local flow and groundwater conditions. For example, a channel may become diverted and an alternative drainage developed.

In the long-term, with no salvage harvest on BLM-administered lands, the potential for the initiation and sustainability of crown fire activity would likewise increase and it could drastically alter the surface water and groundwater regime. Immediately after a severe fire, the loss of vegetation would make more groundwater available for streamflow and low summer flows would likely increase. However, the absence of vegetation would also result in an increased risk of higher peak flows. In a relatively short time, vegetation would reestablish and less water would be available for summer flow. It would take a longer period of time for vegetation to recover sufficiently for peak flows to return to their normal range.

Ginger Springs Municipal Watershed

Salvage operations and road construction would not occur within the Ginger Springs Municipal Watershed so there would be no direct effects from ground-disturbing activities. Activities that would influence water quality would not take place within any of the zones of influence in this watershed so water quality in the Ginger Springs Municipal Watershed would not be degraded.

Cumulative Effects

Water Quality

Past actions on both private and Federal lands throughout the four 5th field watersheds contributed to water quality degradation, specifically summer stream temperature and sediment increases. The main actions that have contributed to these conditions are agriculture, timber harvest, and road building. With the cessation of some activities, such as cattle grazing, and the moderation of impacts from other activities, such as logging and road building, water quality conditions are improving.

Future timber sale projects planned on BLM-administered lands within the next 5 years are Bowen Over, Windy Soda, Flounce Around, Camp Cur, Double Bowen, Twin Ranch, Lost Clark, and Eighty Acre in the Water Resources analysis area. These proposed actions on BLM-administered lands are expected to contribute to increased in soil erosion and the potential for stream sedimentation. It is also expected that the PDFs proposed for mitigation in the Medford District RMP/ROD (p. 149-175) would maintain or improve stream sedimentation levels to acceptable levels for these projects.

On private industrial forest lands, harvest of riparian vegetation along non-fish-bearing and small fish-bearing streams would continue to contribute to increased stream temperatures. Natural surface roads that are used during the wet season and ground skidding on steep slopes would likely continue to have erosion concerns and contribute sediment to nearby streams. On private industrial lands, salvage logging of recent windthrown trees is occurring at this time. It is expected most of the concentrated and scattered windthrown trees on private industrial lands would be salvaged by the spring of 2009. Future actions on private lands would be required to adhere to the TMDLs and WQMP (Water Quality Management Plan) upon their completion by DEQ and water quality in the analysis area would be expected to continue to improve. Reasonably foreseeable future livestock grazing would likely continue to cause increases in turbidity/sedimentation and stream temperatures. The lack of salvage harvest on BLM-administered lands could lead to a high intensity fire that would likely set-back the shade recovery and expose large areas of bare soil, thus increasing stream temperatures and sedimentation.

Water Quantity

Past events in the Project Area that currently have the potential to influence peak streamflows include timber harvest, wildfire, road construction, and land development. These activities influence peak streamflows through canopy removal, soil compaction, or drainage networks alteration. For a detailed description of the past, current, and future actions in the Project Area see the section 3.3, Forest Condition. Several wildfires have occurred in the Project Area within the past 30 years. For a detailed description of wildfires that occurred in the Project Area, see section 3.4, Fire and Fuels. Roads constructed for past activities (i.e., private land development, timber harvest) are included in the percent of an area in roads (Table 3-26) for the OWAM's determination of potential for peak flow increases due to roads.

Future timber sale projects planned on BLM-administered lands within the next 5 years are Bowen Over, Windy Soda, Flounce Around, Camp Cur, Double Bowen, Twin Ranch, Lost Clark, and Eighty Acre in the Water Resources analysis area. These proposed actions on BLM-administered lands are expected to contribute to increases in soil compaction and canopy removal. It is also expected that the PDFs proposed for mitigation in the Medford District RMP/ROD (p. 149-175) would maintain stream flows for these projects.

Private forest lands would continue to be intensively managed for timber production on an approximately 60-year rotation (USDI 1994, 4-5). The actual timing of timber harvest on private lands is dependent on many factors, including ownership and valuations based on supply and demand.

Under Alternative 1, there would be no short-term changes to the potential risk of increasing the magnitude and frequency of peak flows. In the long-term, with no salvage harvest on BLM-administered lands, the potential for the initiation and sustainability of crown fire activity would likewise increase and it could drastically alter the surface water and groundwater regime.

3.6.5.2 Effects of Alternative 2 on Water Resources

Direct and Indirect Effects

Water Quality

Alternative 2 would have no direct or indirect adverse effects on summer stream temperature for any stream in the four 5th field watersheds because shade on perennial streams would be maintained.

The proposed salvage for Alternative 2 includes approximately 5,910 acres. The percent of 5th field watershed treated ranges from a low of 0.02 percent of the South Fork Rogue River to a high of 2.9 percent of the Rogue River/Lost Creek 5th field watershed. The Big Butte Creek 5th field watershed has the highest total acres of blowdown and therefore has the greatest number of acres (3,212) proposed for salvage. The South Fork Rogue River which has the lowest percentage of watershed treated also has the fewest acres (35) of proposed salvage.

The Clark Creek deferred watershed, a 7th field drainage area within the Big Butte Creek 5th field watershed would have 473 acres of salvage under Alternative 2. This equates to approximately 6.4 percent of the Clark Creek deferred watershed. In the Lost Floras deferred watershed, a 7th field drainage within the Rogue River/Lost Creek 5th field watershed, about 8.7 percent (516 acres) of the Lost Floras deferred watershed would be salvaged. The Vine Maple deferred watershed, a 7th field drainage area that lies within the Rogue River/Lost Creek 5th field watershed, contains no proposed salvage harvest or road projects.

The Lower North Fork Little Butte Creek key watershed, a 6th field subwatershed within the Little Butte Creek 5th field watershed, would have 886 acres of salvage under Alternative 2. This level of salvage equates to approximately 5.7 percent of the Lower North Fork Little Butte Creek key watershed.

Under Alternative 2, proposed road-related actions would have the greatest potential for increasing the amount of sediment delivered to streams in the Project Area. Road operations proposed under Alternative 2 include permanent and temporary road construction, and road renovation. The primary sediment source would be from short-term, on-site soil disturbance caused by installing, replacing, or removing culverts at road-stream crossings.

All road work would be completed during the dry season to prevent or minimize sediment delivery to streams to the maximum extent practicable. The timing of road operations would reduce the amount of sediment that would enter streams at one time; new road construction and renovation would occur during the first year of the timber sale contract. Temporary spur roads would be constructed and decommissioned during the same year.

The net change in roads over the entire Project Area is an increase of 3.5 miles of road. This change in roaded area represents a very low level of change at the 5th field watershed level (Table 3-27). There would be no net gain in the key watershed or the deferred watersheds. Temporary spur roads constructed in the Lost Floras and Clark Creek deferred watersheds would be decommissioned the same season as used or winterized if not able to complete salvage during the same season.

Table 3-27. Changes in Road Miles and Percent of Area in Roads by 5th Field, Deferred, and Key Watersheds under Alternative 2

Watershed	Existing Roads (miles)	Proposed Road (miles[1])	Decommissioned Spur Roads (miles)	Net Change (miles)	Roaded Area in Alternative 2[2] (percent)
Big Butte Creek 5th Field	1,090	5.3	2.8	2.5	1.3
Little Butte Creek 5th Field	1,344	0.9	0.5	0.4	0.9
Rogue River/Lost Creek 5th Field	280	1.6	1.0	0.6	1.3
South Fork Rogue River 5th Field	637	0	0	0	0.7
5th Field Totals	**3,351**	**7.4**	**4.3**	**3.1**	**1.00**
Clark Creek Deferred	63	0.2	0.2	0	1.5
Lost Floras Deferred	52	0.8	0.8	0	1.7
Lower North Fork Little Butte Creek Key	95	0	0	0	1.1

[1] "Proposed road miles" includes all temporary and permanent proposed roads and spurs under Alternative 2.

[2] Values represent the aerial summation of existing roads in addition to proposed roads as a function of the watershed.

There would be no new roads constructed within riparian reserves in any of the watersheds inside the Project Area. There would be no increase in the total road mileage in riparian reserves.

The change in road density is negligible at both the project level and the 5th field watershed scale. The proposal under Alternative 2 is to build approximately 1.0 mile of temporary spur road in the Clark Creek (0.2 miles) and Lost Floras (0.8 miles) deferred watersheds. These temporary roads would be ripped and revegetated upon completion of salvage harvest. This would mitigate compaction from road building within the deferred watersheds. Ripping the temporary spur roads and establishing vegetation on these areas would allow infiltration to occur and minimize the potential for runoff.

Proposed actions due to salvage harvest would include log yarding (Table 3-28). Research has found that the amount of ground disturbance from yarding varies by logging system with 21 percent for tractor, 7 percent for skyline cable, and 2 percent for helicopter (Landsberg 2003; Clayton 1981) (see section 3.6, Soil).

Table 3-28. Proposed Yarding Systems by 5th Field, Deferred, and Key Watershed under Alternative 2

Watershed	Tractor Yarding (acres)	Cable/Skyline Yarding (acres)	Helicopter Yarding (acres)	Total
Big Butte Creek 5th Field	2,360	500	70	2,930
Little Butte Creek 5th Field	1,420	280	80	1,780
Rogue River/Lost Creek 5th Field	1,020	120	20	1,160
South Fork Rogue River 5th Field	40	0	0	40
5th Field Totals	**4,840**	**900**	**170**	**5,910**
Clark Creek Deferred	466	2	4	472
Lost Floras Deferred	474	42	1	517
Lower North Fork Little Butte Creek Key	708	150	27	885
*NOTE: Vine Maple Creek deferred watershed contains no proposed salvage or road projects.				

Estimated area disturbed by yarding would be greatest in the Big Butte Creek 5th field watershed with 0.3 percent of its total area being disturbed (Table 3-29). Approximately 7 acres would be disturbed by yarding in the South Fork Rogue River 5th field watershed. The potential for sediment from salvage harvest units reaching stream channels is very low due to implementation of erosion prevention PDFs (section 2.5, Project Design Features) such as no harvest or yarding in riparian reserves and limiting the extent of skid trails (see section 3.6, Soil). Waterbars on tractor skid trails would prevent water from concentrating on bare, compacted ground and move it to adjacent vegetated or slash covered slopes. Soil that moves on cable yarding corridors during storm events would be trapped by logging slash or by ground cover on undisturbed ground at the bottom of or adjacent to yarding corridors.

Table 3-29. Estimated Acres of Soil Disturbance by Yarding System for 5th Field, Deferred, and Key Watersheds across All Ownerships under Alternative 2

Watershed	Tractor Yarding	Cable/Skyline Yarding	Helicopter Yarding	Total
Big Butte Creek 5th Field	496	35	1	532
Little Butte Creek 5th Field	298	20	2	320
Rogue River/Lost Creek 5th Field	214	8	<1	222
South Fork Rogue River 5th Field	8	0	0	8
5th Field Totals	**1,016**	**63**	**3**	**1,082**
Clark Creek Deferred	98	0	0	98
Lost Floras Deferred	103	4	0	107
Lower North Fork Little Butte Creek Key	144	12	1	157
*NOTE: Vine Maple Creek deferred watershed contains no proposed salvage or road projects.				

Alternative 2 would have no direct or indirect effects on stream temperature and minimal effects on sedimentation because

1. shade on perennial streams would be maintained with all salvage treatments and proposed road work;
2. proposed road construction would occur in stable locations, thus minimizing the risk of road failure due to mass wasting;

3. adding rock to the existing base, ditch relief culverts, and armored water dips would decrease sediment delivery;
4. replacing existing stream crossing culverts with larger diameter culverts would reduce the potential for road failure at stream crossings;
5. sediment control PDFs governing instream culvert removals would reduce the amount of sediment reaching downstream water sources to the maximum extent practicable;
6. total road miles in riparian reserves would remain the same, which would not change sediment sources over the long-term;
7. the potential for sediment from salvage units to reach stream channels is very low due to the use of PDFs and riparian reserves; and
8. landings would be constructed outside riparian reserves and PDFs would greatly limit any sediment moving off-site.

The Medford District PRMP/EIS acknowledges that surface-disturbing activities could result in increased turbidity and sediment levels and that these increases would adversely effect water quality and could impair beneficial uses such as fish and domestic water use (USDI 1994, 4-18). Any effects of turbidity or sedimentation on water quality resulting from Alternative 2 would be within the scope of what was analyzed in the PRMP/EIS.

Water Quantity

Peak streamflows are not expected to be affected by soil compaction resulting from this project because there would not be any connectivity from the yarding activities to stream channels. Implementation of PDFs, such as no tractor yarding in riparian reserves, water barring tractor skid trails, ripping skid trails in severe and moderate units, 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 proposed action to salvage windblown trees would not affect canopy closure inside the transient snow zone or reduce canopy cover below historic levels therefore changes to water quantity from canopy removal would not occur. The use of PDFs, including designated skid trails, ripping skid trails upon final entry, and building new temporary and permanent roads outside of riparian reserves, would minimize additional compaction to prevent changes in water quantity or water delivery to stream channels. There would be no new stream crossings which are used as an indicator for road connectivity to stream channels.

In conclusion, the project hydrologist does not expect Alternative 2 to noticeably increase peak flows in the Project Area because

1. the proposed action would not change the current crown closure;
2. soil compaction increases resulting in a compacted area of 12 percent in analysis areas would be primarily due to tractor yarding with no connectivity to stream channels;
3. road densities and percent of area in roads would essentially remain the same in the Project Area;
4. the percentage of the area in roads would remain below OWAM's low potential for increases in peak flows from roads of 4 percent (Table 3-26); and

5. proposed rock surfacing would reduce the likelihood of runoff concentrating on the road surface and forming gullies, road drainage improvements would further disperse road runoff and decrease the rapid, concentrated routing of water to streams during storm events, and culvert upgrades would reduce the likelihood of streams being routed down roads during high flows.

Under Alternative 2, proposed actions result in no change in risk of peak flow increases based on current conditions because of an increase in compacted area. Designing units with skid trails outside of riparian reserves would minimize runoff to streams from this project to maintain the current peak flow regime. Ripping skid trails inside severe units and moderate units where future access is not needed would decrease the overall compaction in these watersheds.

Ginger Springs Municipal Watershed

Approximately 1.3 miles of permanent road would be constructed on and near ridgetops in a stable location within the Ginger Springs Municipal Watershed. This road would be located away from intermittent or perennial stream channels which would minimize the likelihood of sediment reaching streams. The road would provide for long-term management within the Ginger Springs Municipal Watershed. One culvert would be installed at a dry draw stream crossing as part of this road construction. The permanent road would not cross any headwalls, which are steep concave features on the landscape, or unstable areas so the risk for road failure is low. Roads that fail at headwalls or unstable areas transport large amounts of sediment very rapidly causing an increase in sedimentation that affects water quality and stream habitat.

Cumulative Effects

Water Quality

The effects of Alternative 2 on summer stream temperature when added to the past, present, and reasonably foreseeable future actions would result in a slight improvement over Alternative 1. There would be no direct or indirect adverse effects from Alternative 2 on shade for perennial streams. The implementation of Alternative 2 would reduce the risk of a high intensity wildfire so stream shade would more likely continue to be maintained in the long-term under Alternative 2 than under Alternative 1.

Existing human-caused sediment sources in the Project Area are primarily related to the road network created by past actions. The incremental impact of Alternative 2 on sedimentation in the Project Area would be minute compared to the sedimentation contributed from past, present, and reasonably foreseeable actions as described under Alternative 1. The primary sediment source resulting from Alternative 2 would be from short-term on-site soil disturbance caused by installing, replacing, or removing culverts at road-stream crossings. Implementation of proposed erosion prevention and sediment control PDFs would reduce to the maximum extent practicable the amount of sediment moving off-site and into a stream channel. The long-term cumulative benefits to water quality from road improvements and decommissioning proposed under Alternative 2 would be greater than under Alternative 1 for the Water Resources analysis area.

Fuels treatments on salvage units would be beneficial to water quality by reducing the intensity of a wildfire, if one were to occur on the acres treated. Reducing the intensity would minimize the amount of soil erosion and subsequent sedimentation thereby reducing the cumulative effect of sedimentation.

The cumulative effects are within the scope of anticipated effects to aquatic resources determined in the Medford District PRMP/EIS (p. 4-66).

Water Quantity

The analysis of the direct and indirect effects of Alternative 2 on water quantity incorporates past and present actions that may affect watershed conditions. For the cumulative effects analysis, the direct and indirect effects of Alternative 2 need to be added to the reasonably foreseeable future actions. Reasonably foreseeable future actions in the analysis area are assumed to be the same as under Alternative 1.

Under Alternative 2, proposed actions would not result in a risk of peak flow increases based on current conditions because the overall compacted area would decrease as a result of ripping skid trails in severe blowdown and in moderate blowdown where future access is not needed. Designing units with skid trails outside of riparian reserves would minimize runoff to streams from this project to maintain the current peak flow regime.

3.6.5.3 Effects of Alternative 3 on Water Resources

Direct and Indirect Effects

Water Quality

Riparian reserves that sustained severe damage will be considered for salvage to increase the rate of recovery by creating openings to plant conifer seedlings to help achieve ACS objectives sooner than by allowing to recover without planting, which would take several decades. Salvaging inside riparian reserves would reduce the spread of insects to adjacent healthy trees thereby reducing green tree mortality. Salvage would also reduce the amount of fine fuels and the risk of wildfire. Moderate and scattered windblown areas within riparian reserves would not be entered because these areas can be planted and pose less risk for insects and wildfire.

The differences between Alternative 2 and Alternative 3 at the 5th field watershed scales are negligible. The largest difference occurs in the Lost Floras deferred watershed. In Alternative 2 approximately 8.7 percent of this watershed would be treated whereas in Alternative 3 approximately 9.3 percent would be treated. All the other watersheds have a treatment difference of less than 0.1 percent. The main difference between Alternative 2 and alternative 3 is treating within riparian reserves and owl cores which will be analyzed for direct and indirect effects.

The proposed salvage in Alternative 3 includes approximately 6,010 acres. The percent of 5th field watershed treated ranges from a low of 0.02 percent of the South Fork Rogue River to a high of 3 percent of the Rogue River/Lost Creek 5th field watershed. The Big Butte Creek 5th field watershed has the highest total acres of blowdown and therefore has the greatest number of acres (3,000) proposed for salvage. The South Fork Rogue River which has the lowest percentage of watershed treated also has the fewest acres (40) of proposed salvage.

In Alternative 3, the Clark Creek deferred watershed, within the Big Butte Creek 5th field watershed would have 474 acres of salvage. This equates to approximately 6.4 percent of the Clark Creek deferred watershed. In the Lost Floras deferred watershed, within the Rogue River/Lost Creek 5th field watershed, 9.0 percent (525 acres) of the Lost Floras deferred watershed would be salvage harvested. In the Vine Maple deferred watershed, within the Rogue River/Lost Creek 5th field watershed, no salvage harvest or road projects are proposed in this alternative.

The Lower North Fork Little Butte Creek key watershed (15,586 acres) is a 6th field subwatershed that lies within the Little Butte Creek 5th field watershed. The proposal under Alternative 3 is to harvest approximately 903 acres of blowdown inside the Lower North Fork Little Butte key watershed. No salvage is proposed within riparian reserves in this watershed. This level of salvage equates to approximately 5.8 percent of the Lower North Fork Little Butte Creek key watershed.

The proposal under Alternative 3 is to harvest the outer portions of riparian reserves that contain severe areas of blowdown where the establishment of conifers would be delayed several decades (see section 3.3, Forest Condition). No ground-based equipment would enter the riparian reserve and on "tractor ground," all salvage trees would be bull-lined to adjacent roads or matrix lands.

On intermittent and non-fish-bearing riparian reserves, a minimum 75-foot no salvage buffer would be maintained on each side of the channel above the slope break. On fish-bearing streams, a no salvage buffer of at least one site-potential tree would be maintained. The riparian reserve width varies based upon the 5th field watershed and the site-potential tree for that watershed.

Alternative 3 would have no direct or indirect adverse effects on summer stream temperature for any stream in the Project Area because the shade level on perennial streams would be maintained through the use of no salvage buffers.

Alternative 3 salvage harvest units would include approximately 70 acres inside riparian reserves that sustained severe blowdown across the four 5th field watersheds. Of the 70 acres, 60 acres would be bull-lined and 10 acres would be cable/skyline yarded. On the tractor yarded ground, a minimum of 75 feet on each side of stream would be left untreated to minimize the potential for sediment to enter stream channels from ground disturbance caused by bull-lining. On cable ground, a minimum of 75 feet would be left untreated to minimize the potential for sediment from reaching stream channels from ground disturbance caused by cable yarding logs.

Under Alternative 3, proposed road-related actions would have the greatest potential for increasing the amount of sediment delivered to streams in the Project Area. Road work proposed under Alternative 3 includes permanent and temporary road construction, and road renovation.

The net change in roads over the entire Project Area is a net increase of approximately 0.1 miles of road. This change in roaded area essentially stays the same at the 5th field watershed level under Alternative 3. There would be no net gain in the key watershed or the deferred watersheds (Table 3-29). Temporary spur roads constructed in the Lost Floras deferred watershed would be decommissioned the same season as used or winterized if salvage is not completed during the same season.

Table 3-29. Changes in Road Miles and Percent of Area in Roads by 5th Field, Deferred, and Key Watersheds under Alternative 3

Watershed	Existing Roads (miles)	Proposed Road (miles[1])	Decommissioned Spur Road (miles)	Net Change (miles)	Roaded Area with Alternative 3[2] (%)
Big Butte Creek 5th Field	1,090	3.4	3.5	(0.1)	1.31
Little Butte Creek 5th Field	1,344	1.9	1.4	0.5	0.91
Rogue River-Lost Creek 5th Field	280	1.1	1.0	0.1	1.33
South Fork Rogue River 5th Field	637	0	0	0	0.74
5th Field Totals	**3,351**	**6.4**	**5.9**	**0.5**	**1.00**
Clark Creek Deferred	63	0.2	0.2	0	1.52
Lost Floras Deferred	52	0.8	0.8	0	1.67
Lower North Fork Little Butte Creek Key	95	0.7	0.8	(0.1)	1.06

[1] "Proposed road miles" includes all temporary and permanent proposed roads and spurs under Alternative 3.
[2] Values represent the summation of existing roads in addition to net change of roads as a function of the watershed.

No new roads are proposed to be constructed within riparian reserves under Alternative 3.

Proposed actions due to salvage harvest would include log yarding (Table 3-30). Research has found that the amount of ground disturbance from yarding varies by logging system with 21 percent for tractor, 7 percent for skyline cable, and 2 percent for helicopter (Landsberg 2003; Clayton 1981).

Table 3-30. Proposed Yarding Systems by 5th Field, Deferred, and Key Watersheds under Alternative 3

Watershed	Tractor Yarding (acres)	Cable/Skyline Yarding* (acres)	Helicopter Yarding (acres)	Total
Big Butte Creek 5th Field	2,360	570	70	3,000
Little Butte Creek 5th Field	1,450	290	80	1,820
Rogue River/Lost Creek 5th Field	1,020	130	20	1,170
South Fork Rogue River 5th Field	40	0	0	40
5th Field Totals	**4,877**	**763**	**243**	**6,030**
Clark Creek Deferred	467	3	4	474
Lost Floras Deferred	474	51	1	525
Vine Maple Creek Deferred	0	0	0	0
Lower North Fork Little Butte Creek Key	708	150	27	885

* Includes bull-lining.

Estimated area disturbed by yarding would be greatest in the Big Butte Creek 5th field watershed with 0.3 percent (544 acres) of its total area being disturbed (Table 3-31). The least disturbance would occur in the South Fork Rogue River 5th field watershed with less than 0.1 percent (7 acres) of the total area disturbed. The potential for sediment in salvage harvest units to reach stream channels is very low due to the implementation of erosion prevention PDFs (section 2.5, Project Design Features) such as no harvest or yarding in riparian reserves and limiting the extent of skid trails (see section 3.7, Soil). Water bars on tractor skid trails would prevent water from concentrating on bare, compacted ground and move it to adjacent vegetated or slash covered slopes. Soil that moves on cable yarding corridors during storm events would be trapped by logging slash or by ground cover on undisturbed ground at the bottom of or adjacent to yarding corridors.

Table 3-31. Estimated Acres of Soil Disturbance by Yarding System for 5th Field, Deferred, and Key Watersheds under Alternative 3

Watershed	Tractor Yarding	Cable/Skyline Yarding	Helicopter Yarding	Total
Big Butte Creek 5th Field	496	40	2	538
Little Butte Creek 5th Field	305	20	1	326
Rogue River/Lost Creek 5th Field	214	9	<1	223
South Fork Rogue River 5th Field	8	0	0	8
5th Field Totals	**1,023**	**69**	**3**	**1,095**
Clark Creek Deferred	98	0	0	98
Lost Floras Deferred	103	4	0	107
Lower North Fork Little Butte Creek Key	144	12	<1	157

Alternative 3 would have no direct or indirect effects on stream temperature and minimal effects on sedimentation because:

1. shade on perennial streams would be maintained at current levels with all salvage treatments and proposed road work;
2. proposed road construction would occur in stable locations, thus minimizing the risk of road failure due to mass wasting;
3. adding rock to the existing base, ditch relief culverts, and armored water dips would decrease sediment delivery;
4. replacing existing stream crossing culverts with larger diameter culverts would reduce the potential for road failure at stream crossings;
5. sediment control PDFs governing instream culvert removals would reduce the amount of sediment reaching downstream water sources to the maximum extent practicable;
6. total road miles in riparian reserves would remain the same, which would not change sediment sources over the long-term;
7. the potential for sediment from salvage harvest units to reach stream channels is very low due to PDFs, including riparian reserves; and
8. landings would be constructed outside riparian reserves and PDFs would greatly limit any sediment moving off-site.

The Medford District PRMP/EIS acknowledges that surface-disturbing activities could result in increased turbidity and sediment levels and that these increases would adversely effect water quality and could impair beneficial uses such as fish and domestic water use (USDI 1994, 4-18). Any effects of turbidity or sedimentation on water quality resulting from Alternative 3 would be within the scope of what was analyzed in the PRMP/EIS.

Water Quantity

Peak streamflows are not expected to be affected by soil compaction resulting from this project because there would not be any connectivity from the yarding activities to stream channels**.** Implementation of PDFs, such as no tractor yarding in riparian reserves, water barring 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 proposal to salvage windblown trees would not affect canopy closure inside the transient snow zone or reduce canopy cover below historic levels therefore changes to water quantity from canopy removal would not occur. Implementation of PDFs including designated skid trails, ripping skid trails upon final entry, and building new temporary and permanent roads outside of riparian reserves would minimize additional compaction to prevent changes in water quantity or water delivery to stream channels. There would be no new stream crossings which are used as an indicator for road connectivity to stream channels.

In conclusion, the project hydrologist does not expect Alternative 3 to noticeably increase peak flows in any of the analysis areas affected by the proposed project because

1. the proposed action would not change the current crown closure;
2. soil compaction increases resulting in a compacted area of 12 percent in the Water Resources analysis area would be primarily due to tractor yarding with no connectivity to stream channels;
3. road densities and percent of area in roads would essentially remain the same in the Project Area;
4. the percentage of the area in roads would remain below OWAM's low potential for increases in peak flows from roads of 4 percent (Table 3-28); and
5. proposed rock surfacing would reduce the likelihood of runoff concentrating on the road surface and forming gullies, road drainage improvements would further disperse road runoff and decrease the rapid, concentrated routing of water to streams during storm events, and culvert upgrades would reduce the likelihood of streams being routed down roads during high flows.

Under Alternative 3, the proposed actions result in no change in risk of peak flow increases based on current conditions because of an increase in compacted area. Designing units with skid trails outside of riparian reserves would minimize runoff to streams from this project to maintain the current peak flow regime. Ripping skid trails inside severe and moderate units where future access is not needed would decrease the overall compaction in these watersheds.

Ginger Springs Municipal Watershed

Approximately 1.3 miles of permanent road would be constructed on and near ridgetops in a stable location within the Ginger Springs Municipal Watershed. This road would be located away from intermittent or perennial stream channels which would minimize the likelihood of sediment reaching streams. The road would provide for long-term management within the Ginger Springs Municipal Watershed. One culvert would be installed at a dry draw stream crossing as part of this road construction. The permanent road would not cross any headwalls, which are steep concave features on the landscape, or unstable areas so the risk for road failure is low. Roads that fail at headwalls or unstable areas transport large amounts of sediment very rapidly causing an increase in sedimentation that affects water quality and stream habitat.

Cumulative Effects

Water Quality

The cumulative effects of Alternative 3 on summer stream temperature when added to the past, present, and reasonably foreseeable actions would result in a slight improvement over Alternative 1. The implementation of Alternative 3 would reduce the risk of a high intensity wildfire so stream shade would more likely continue to be maintained in the long-term under Alternative 3 than under Alternative 1. There would be no direct or indirect adverse effects from Alternative 3 on shade for perennial streams.

Existing human-caused sediment sources in the Project Area are primarily related to the road network created by past actions. The incremental impact of Alternative 3 on sedimentation in the Project Area would be minute compared to the sedimentation contributed from past, present, and reasonably foreseeable actions as described under Alternative 1. The primary sediment source resulting from Alternative 3 would be on-site soil disturbance caused by installing, replacing, or removing culverts at road-stream crossings. Implementation of proposed erosion prevention and sediment control PDFs would reduce to the maximum extent practicable the amount of sediment moving off-site and into a stream channel. The long-term cumulative benefits to water quality from road improvements and decommissioning proposed under Alternative 3 would be greater than under Alternative 1 for the Water Resources analysis area.

Fuels treatments on salvage units would be beneficial to water quality by reducing the intensity of a wildfire, if one were to occur on the acres treated. Reducing the intensity would minimize the amount of soil erosion and subsequent sedimentation thereby reducing the cumulative effect of sedimentation.

The cumulative effects are within the scope of anticipated effects to aquatic resources determined in the Medford District PRMP/EIS (p. 4-66).

Water Quantity

The analysis of the direct and indirect effects of Alternative 3 on water quantity incorporates past and present actions that may affect watershed conditions. For the cumulative effects analysis, the direct and indirect effects of Alternative 3 need to be added to the reasonably foreseeable future actions. Reasonably foreseeable future actions in the Water Resources analysis area are assumed to be the same as under Alternative 1.

Under Alternative 3, proposed actions would not result in a risk of peak flow increases based on current conditions because the overall compacted area would decrease as a result of ripping all skid trails in severe blowdown and in moderate blowdown where future access is not needed. Designing units with skid trails outside of riparian reserves would minimize runoff to streams from this project to maintain the current peak flow regime.

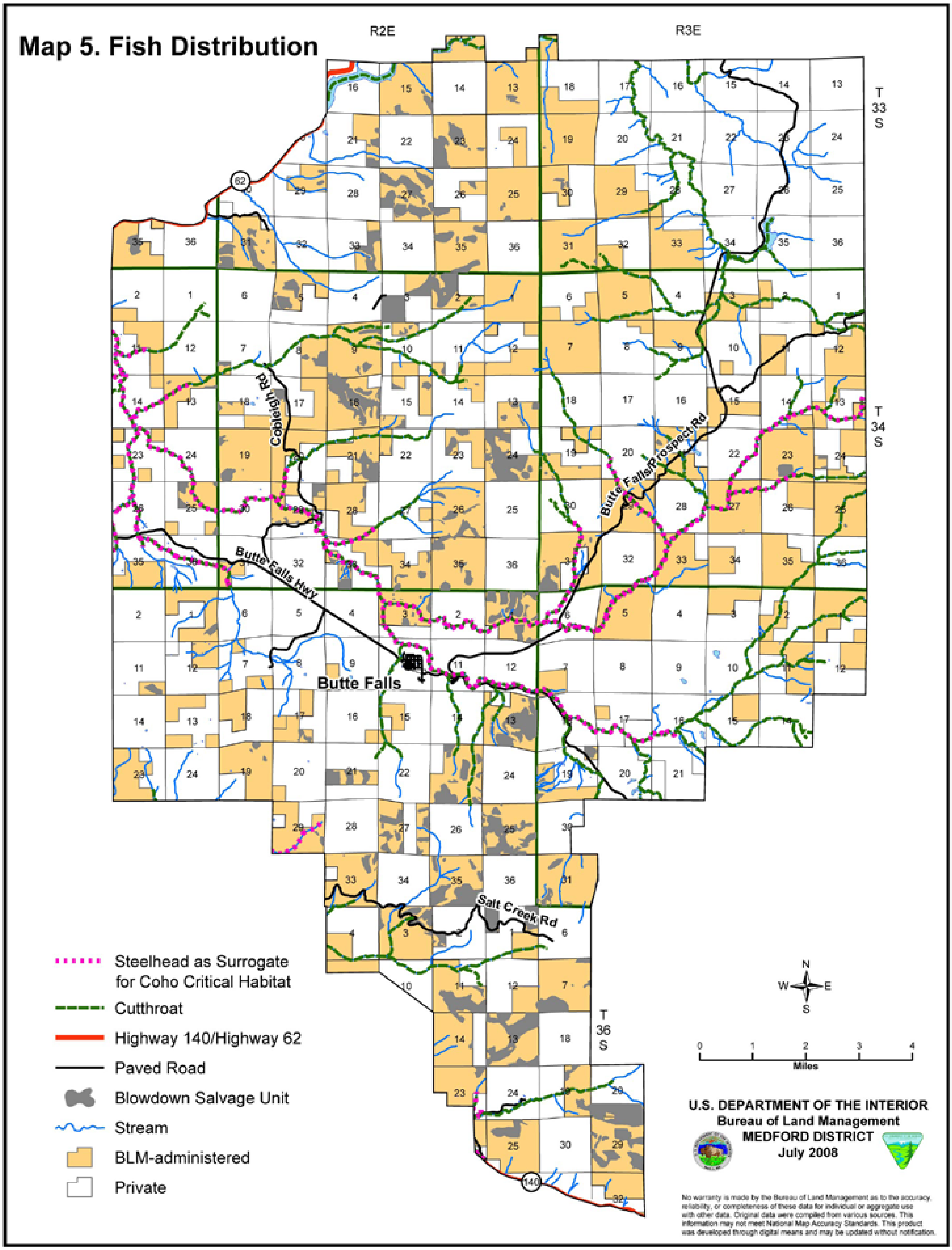
3.8 Fisheries

3.8.1 Definitions

The following definitions are for terms used in the Fisheries section:

Anadromous: Species that live their adult lives in the ocean but move into freshwater streams to reproduce or spawn.

Evolutionarily Significant Unit: A population or group of populations of salmon that 1) is substantially reproductively isolated from other populations and 2) contributes substantially to the evolutionary legacy of the biological species.


Map 5. Fish Distribution
R2E
R3E
T 33 S
T 34 S
T 36 S
Cobleigh Rd
Butte Falls/Prospect Rd
Butte Falls Hwy
Butte Falls
Salt Creek Rd
62
140
Steelhead as Surrogate for Coho Critical Habitat
Cutthroat
Highway 140/Highway 62
Paved Road
Blowdown Salvage Unit
Stream
BLM-administered
Private
N
W
E
S
0
1
2
3
4
Miles
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

3.8.2 Methodology

- Information used in this analysis includes GIS, Aquatic Habitat Inventories (ODFW), Aquatic Habitat Benchmarks (Moore 1997), and BLM Field Observations (2008). *The Watershed Analysis of Central Big Butte Creek*, *The Watershed Analysis of Lost Creek*, and *Lower Big Butte Creek Watershed Analysis* were used for background information. Literature related to fisheries, streams, hydrology, timber harvest, road activities, and wildfires were also used for the analysis of this project (see references).
- The Fisheries analysis area is composed of the Big Butte Creek, Rogue River/Lost Creek, and Little Butte Creek 5th field watersheds. These 5th field watersheds are three of the eight 5th field watersheds located in the Upper Rogue 4th field subbasin. Minor salvage harvest (30 acres) is proposed in the South Fork Rogue River 5th field watershed; therefore, this analysis will focus on the three 5th field watersheds where the majority of the salvage would occur.

3.8.3 Assumptions

- Riparian reserves are successful in protecting aquatic ecosystems during timber harvest (Hall and Lantz 1969; Newbold et al. 1980; Murphy et al. 1986; Meehan 1991).
- Fish are dynamic and adaptive and move throughout the stream systems (Bramblett et al. 2002, Kahler et al. 2001; Hilderbrand and Kershner 2000) to avoid short-term increases in sediment levels (Kahler et al. 2001).

3.8.4 Affected Environment

The Blowdown Salvage Project Area is located in the Big Butte Creek, Rogue River/Lost Creek, Little Butte Creek, and South Fork Rogue River 5th field watersheds. These 5th field watersheds are within the Upper Rogue River 4th field subbasin. Minor salvage harvest work (40 acres) would be conducted within the South Fork Rogue River 5th field watershed, therefore this analysis will focus on the other 5th field watersheds where the majority of salvage would occur.

3.8.4.1 Fish Populations

Major fish species found within the Project Area include coho salmon (*Oncorhynchus kisutch*), steelhead trout (*O. mykiss*), cutthroat trout (*O. clarki*), and Chinook salmon (*O. tshawytscha*). Cutthroat trout have the widest distribution, followed by steelhead, and coho salmon. Chinook salmon are found lower in Little Butte Creek and Big Butte Creek. See Map 5, Fish Distribution in the Project Area.

Table 3-33 displays fish habitat available in the three main 5th field watersheds. Cutthroat trout habitat is probably much higher in all watersheds and especially in the Rogue River/Lost Creek 5th field; however, this information is only where fish presence has been verified.

Table 3-33. Fish Habitat Available by 5th Field Watershed

Watershed	Mileage	Species
Big Butte Creek	54.6	coho
	177.2	cutthroat
Little Butte Creek	118.6	coho
	168.4	cutthroat
Rogue River/Lost Creek	3	coho
	16	cutthroat

NOAA Fisheries Service listed the Southern Oregon/Northern California (SO/NC) Coho Salmon Evolutionarily Significant Unit (ESU) as "threatened" under the Endangered Species Act (ESA) in May 1997. As directed under ESA, NOAA Fisheries Service designated SO/NC coho salmon critical habitat (CCH) and Essential Fish Habitat (EFH), which are defined as areas within the geographical area currently or historically occupied by the species that have the physical or biological features essential to the conservation of the species and requires special management and protection.

Fish populations are influenced by natural and human-caused disturbances. Factors such as habitat loss or degradation, commercial fishing, and variable ocean conditions are primarily responsible for the depressed status of most fish species (Nehlsen et al. 1991). Primary concerns for fish in the Fisheries analysis area include road-related sediment and lack of large woody debris (USDI 1995a). When high, fine sediment levels occur in spawning gravels, less spawning occurs, eggs tend to suffocate, and emerging fry become trapped, resulting in mortality and reduced production (Philips et al. 1975; Tappel and Bjornn 1983; Chapman 1988; Meehan 1991). Hausle and Coble (1976) reviewed studies on coho salmon and steelhead fry emergence in gravels with concentrations of sand exceeding 20 percent. When concentrations of sand exceed 20 percent in spawning beds, emergence success declined.

3.8.4.2 Population Trends

Limited information is available on fish populations within the Big Butte Creek, Rogue River/Lost Creek, and Little Butte Creek 5th field watersheds relating to current and historic populations.

Table 3-34 shows the estimated number of juvenile coho salmon in the Project Area.

Table 3-34. Estimated Number of Juvenile Coho Salmon in the Project Area

	Population Estimate					
Stream	1998	1999	2000	2001	2002	2003
Little Butte Creek	3,531	26,939	11,211	10,500	35,131	68,321
Big Butte Creek*	4,130	12,587	14,206	Discontinued	Discontinued	Discontinued

* The fish trap was pulled in 2001 (no available data for this year).

Figure 3-3 displays estimated coho salmon smolt populations within Little Butte Creek and Big Butte Creek from 1998 to 2003.

BLM and ODFW trap data concluded that Big Butte Creek produced more (estimate) coho smolts in 2000 than any other stream in the Rogue basin. When the number of miles of spawning and rearing habitat in each basin are considered, Big Butte Creek produced the highest number of both coho and

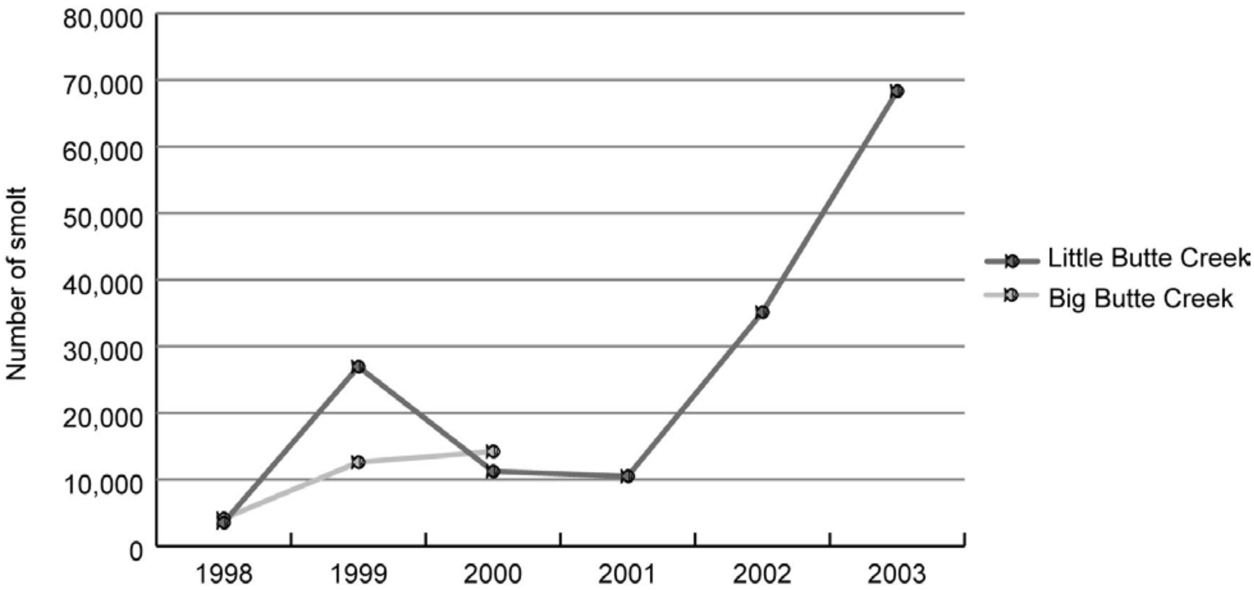


Figure 3-3. Estimated coho salmon smolt populations within Little Butte Creek and Big Butte Creek from 1998 through 2003.

steelhead smolts per mile of spawning and rearing habitat. Little Butte produced the second highest number of steelhead and coho smolts per mile of habitat. This is consistent with the results from trapping conducted in 1998 and 1999. It should be noted that the number of smolts per mile of habitat could be overestimated for the Little Butte and Big Butte Creek basins, since these basins have not been fully surveyed to determine the exact number of miles of habitat used by each species.

The Draft 2005 Oregon Native Fish Status Report (ODFW 2005) assessed production and abundance of coho salmon, spring chinook salmon, and steelhead within the Upper Rogue River basin. All three species met ODFW production and abundance goals, indicating short-term (5 to 10 years) sustainability for these species is not at risk.

The four 5th field watersheds in the Fisheries analysis area are above Gold Ray Dam on the Rogue River. The coho salmon numbers over the dam reflect the overall population trends for the entire Rogue River and ESU. Figure 3-4 shows the population trend for the coho salmon within the Rogue River Basin which includes the four 5th field watersheds containing the Project Area.

The coho salmon population for the Upper Rogue subbasin (all 5th fields in the Project Area) has been monitored by ODFW at Gold Ray Dam since 1942. The wild adult coho salmon population was on an upward trend since the extremely low years of 1965 to 1979, when numbers were as low as 12 returning adults (Satterthwaite 2002). Since 2002, however, the wild adult population has been dropping. The 2007 returns are among the lowest of the last 10 years (ODFW Gold Ray Counts 1997-2007) and their coho populations remain low throughout their range (see Figure 3-4).

3.8.4.3 Fish Passage/Barriers

Connectivity or the ability of organisms to freely move in and out of habitat areas, is important for fish production and restoring fish passage is an effective way to increase the availability of habitat (Roni et al. 2002). It is common for fish to move within streams and between stream systems throughout the year (Kahler et al. 2001). The historic distribution of fish was likely not much different than today since most

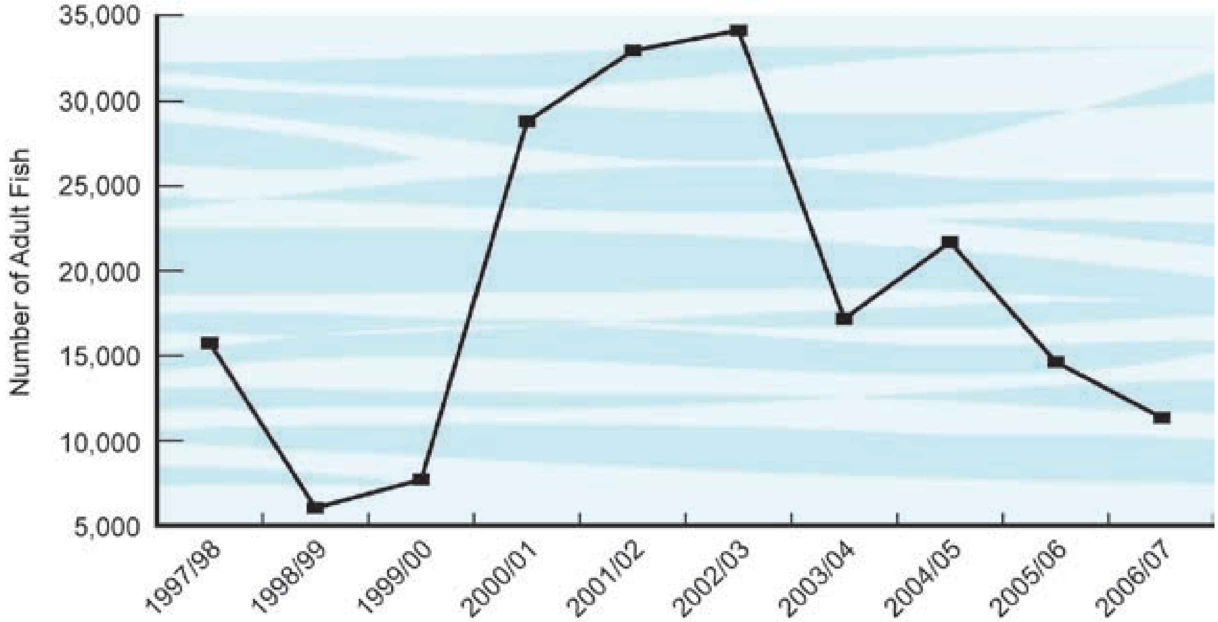


Figure 3-4. Number of coho salmon returning to the upper Rogue River from 1997 to 2006.

fish distribution ends where gradients get steep or at natural waterfalls. The Butte Falls waterfall, at river mile 1.4 on South Fork Big Butte Creek, is a barrier to Chinook salmon, coho salmon, and steelhead on most years. ODFW monitored steelhead and coho smolt populations in South Fork Big Butte Creek, above Butte Falls, from 1999 to 2001. Surveys indicate coho salmon and steelhead migrate above the falls but passage and fish use is limited (Vogt 1999; Vogt 2000; Vogt 2001). NOAA Fisheries Service designated South Fork Big Butte Creek as SO/NC CCH. The Lost Creek reservoir is a complete fish barrier to all fish species.

Streams and aquatic habitat presently or historically accessible to Chinook salmon and coho salmon are considered EFH. EFH is designated for fish species of commercial importance by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (67 FR 12:2343-2383). This designation includes Big Butte Creek and Little Butte Creek within the Fisheries analysis area.

Fish Hatcheries

Two fish hatcheries are located with the Rogue Basin; Cole Rivers Hatchery and Butte Falls Hatchery. Cole Rivers Hatchery began operation in 1975 and was built to mitigate for loss of anadromous salmonid habitat above Lost Creek Dam (USDI 1998a, 71)

3.8.4.4 Aquatic Habitat

Salmon and trout species need cool water temperatures, hiding cover, clean spawning gravels, rearing pools, and an adequate food supply for good fish production. Fish production is largely determined by habitat quantity and quality (Meehan 1991).

Water temperature is one of the most important variables controlling habitat suitability for salmonids. Optimum temperatures for coho salmon, steelhead, and cutthroat trout are 55 °F to 60 °F; temperatures over 84 °F are considered lethal (Meehan 1991). The absorption of solar radiation is the largest cause of increasing stream temperatures. Factors such as climate, stream size, elevation, and groundwater flows influence stream temperatures. Timber harvest in riparian areas that removed shade trees has also been shown to increase stream temperatures (Beschta et al. 1987). See section 3.7, Water Resources, for more information on stream temperatures.

LWD is important for providing cover for fish, forming pools, stabilizing channels, and trapping and sorting fine sediment (Meehan 1991). LWD is composed of large and small pieces of wood that accumulate naturally within the stream channel and helps shape channel function and complexity. LWD also provides channel roughness to dissipate stream energy which causes bank erosion and increases channel width (Montgomery and Buffington 1997). Reductions in LWD through past practices of wood removal and riparian timber harvest have led to channel simplification and reduced cover for fish. The effect of this throughout the Pacific Northwest is declining fish production (Meehan 1991).

Desired LWD levels in the Project Area are 50+ key pieces per mile (ODFW); less than 17 pieces per mile is considered low (Moore 1997). A key piece of LWD is greater than 24 inches in diameter and longer than 10 feet. All streams in the Project Area are lacking LWD (USDI 1995b; USDI 1998a; USDI 1999). The LWD deficiency has resulted in few pools existing in most streams and excessive amounts of fine sediment distributed throughout most streams. The recent blowdown has improved LWD in Project Area stream reaches and will continue to trap debris and material; however, the amount of LWD in Project Area streams remains low.

Clean gravel is important for spawning fish. Spawning gravel for salmon and trout ranges in size from 0.5 to 4 inches (Meehan 1991). When high, fine sediment levels occur in spawning gravels, less spawning occurs, eggs tend to suffocate, and emerging fry become trapped resulting in mortality and reduced production (Philips et al. 1975; Tappel and Bjornn 1983; Chapman 1988; Meehan 1991). Hausle and Coble (1976) reviewed studies on coho salmon and steelhead fry emergence in gravels with concentrations of sand exceeding 20 percent. When concentrations of sand exceed 20 percent in spawning beds, emergence success declined. Fine sediment levels in most streams were high. Substrates are predominately gravel and cobble with a high percentage of fine sediment (on average, approximately 20 percent silt/organic and about 15 percent sand) in most stream reaches (ODFW 1995-2000). Properly functioning substrates have less than 20 percent fines, sands, or sediment.

Pools provide important rearing habitat for juvenile salmon and trout (Nickelson et al. 1992; Rosenfeld et al. 2000) and winter holding habitat for adult fish (Cunjak 1996). Streams with high levels of fine sediments tend to have shallow pools because sediment deposits fill in these areas (Meehan 1991).

Big Butte Creek 5th Field Watershed

Mainstem Big Butte Creek begins at the confluence of North and South Fork Big Butte Creek below the community of Butte Falls. The lower reaches of this creek near the Rogue River provide important salmon spawning and rearing habitat. The importance of the upper tributary streams should be noted as a source of cold, clean water, nutrient cycling, large woody debris input, spawning gravel, and macroinvertebrates which are necessary for healthy functioning stream systems.

In general, habitat features found to be in an impaired condition within this watershed are pool quality, quality and quantity of spawning habitat, large wood volume, and stream temperature. The major identified causes for aquatic habitat degradation were rural development, logging, roads, and grazing.

In 1997, ODFW surveyed fish habitat in South Fork Big Butte Creek. Survey data indicated sand and silt levels were low (average 10 percent silt and sand) and stream bank stability was high (more than

95 percent stable banks). Pool area was fair (32 percent of the streams comprised of pools) with only 3 percent below optimal conditions of 35 percent. LWD levels were low with 0.11 pieces of LWD and 2.4 total pieces of wood per 100 meters. Riffle habitat had low gravel quantities (12 percent) available as spawning habitat. Overall, South Fork Big Butte Creek habitat quality is fair. Due to the lack of spawning gravels, most spawning activity would occur higher up on South Fork Big Butte Creek, Willow Creek, and Four Bit Creek. More recent data on habitat quality in South Fork Big Butte Creek is unavailable, but conditions are likely the same or slightly improved due to the slow rate of recovery in riparian and aquatic ecosystems. Since 1997, 11 years of stream buffer protection have been implemented on public lands.

Rogue River/Lost Creek 5th Field Watershed

Historically, anadromous salmonids used areas above Lost Creek Dam. However, upon completion of the dam this historic range was eliminated. Overall, there is limited information about the full distribution of native and introduced resident species which occur within the Project Area. Native fish species such as cutthroat trout, rainbow trout, sculpin species and Klamath smallscale suckers are present within the Project Area. Rainbow trout have been found in Beaver Dam Creek and Lost Creek (north side of reservoir) and are the dominant salmonid in these reaches. Cutthroat trout are found primarily in small headwater tributaries where they are the dominant fish species. Though there is some overlap in the distribution of rainbow and cutthroat trout, there appears to be a relatively well defined zone where rainbow trout occurrence decreases and cutthroat trout occurrence increases. Sculpins appear to have a distribution similar to rainbow trout. Klamath smallscale suckers have been documented only in Lost Creek Lake (USDI 1998a, p. 68).

In general, habitat features found to be in an impaired condition were quality and quantity of spawning habitat, amount of riparian area in an early successional condition, and pool quality. The major identified causes for degradation of aquatic habitat were logging, roads and railroad grades, and cattle grazing. Although the majority of surveyed stream segments within the watershed are considered to be in good condition, two of the largest streams, Beaver Dam Creek and Parsnip Creek, are in fair condition. Additionally, most streams in the watershed are in an “At Risk” functional condition primarily due to high sedimentation and riparian vegetation impacts.

Little Butte Creek 5th Field Watershed

In general, streams in this watershed have high levels of silt, sands, and organics within the substrate of streams and low levels of LWD. These two factors reduce fish production and habitat complexity within the mainstem Little Butte Creek (ODFW 1994). Other factors limiting fish production include stream temperatures and lack of water from irrigation diversions.

Aquatic and Riparian Habitat Trend

Aquatic habitat is improving in the Fisheries analysis area because road decommissioning, road improvement, and renovation continue to reduce the amount of chronic erosion and improve hydrologic function. Culverts have been upgraded to accommodate 100-year flood events resulting in less risk of major washouts and fill failure. LWD levels, including localized contributions from recent blowdown, have increased habitat complexity and cover for fish. As a result, fine sediment levels have lowered and LWD levels are higher than observed in previous ODFW surveys; however the upward trend for the entire Project Area is at a slow rate of recovery.

Riparian areas are improving throughout the Fisheries analysis area because they are no longer managed for timber production on BLM-administered lands. As a result, younger stands are recovering and will eventually provide a good supply of LWD and increased shade levels. Thinning of overstocked riparian areas can help recover riparian health and function by accelerating tree growth for future LWD recruitment and increased canopy structure. Full recovery of riparian functionality that would benefit fisheries will likely take 100 plus years. Private lands are still being managed for timber production and limited riparian areas remain after harvest, which keeps riparian areas in a fractured state.

3.8.4 Environmental Consequences

3.8.4.1 Effects of Alternative 1 (No Action) on Fisheries

Direct and Indirect Effects

The No Action Alternative would have no direct effect on fish populations or aquatic habitats. Existing conditions in both aquatic and riparian habitats would continue to recover at a slow rate. Road improvements would not occur and road drainage would not be improved. Forgoing the road renovation and drainage improvements would continue the production of road-related sediment at road sites which would continue to keep fish production low around these chronic sites.

The risk of catastrophic wildfire in the area would be high due to high levels of fine fuels for the next few years. If a wildfire began in the blowdown area, it would most likely burn fast and hot throughout the area due to high levels of dry fine fuels. This would most likely cause forest stands in the vicinity to also burn, which could adversely affect riparian and aquatic habitat and their recovery. Wildland forest fires can remove vegetation and forest duff that filters water run off, which can increase sediment levels in area streams.

Insect infestations would also be at high risk of increasing to epidemic levels due to large amounts of downed woody material. High insect populations spreading to area forests would slow the recovery of riparian areas and retard the recovery of the adjacent aquatic habitat.

The blowdown areas would not be replanted and would recover slowly as natural seedlings begin to be established in the blowdown area. Riparian areas that have severe blowdown would continue to be openings and would not produce shade for area streams for decades.

3.8.4.2 Effects of Alternative 2 on Fisheries

Direct and Indirect Effects

Under Alternative 2, 5,910 acres of salvage is proposed: 1,380 acres of severe blowdown, 2,110 acres of moderate blowdown, and 2,420 acres of scattered blowdown. Yarding systems for these acres include 4,840 acres of tractor yarding, 900 acres of skyline/cable yarding, and 170 acres of helicopter yarding. Road work would entail road renovation. The 129 miles of renovation are dispersed over the entire Project Area. Road renovation and log hauling would introduce small amounts of sediment to streams. Blading roads and cleaning ditches, catch basins, and culverts all have the potential to leave fine material behind which could be transported by precipitation and the collection of water. Some roads would cross CCH and trout habitat (see Project Area map) and some portions of the roads are connected to streams; therefore, it is reasonable to assume some sediment would reach CCH and fish habitat. Only a few miles of roads proposed for renovation and log hauling are within close proximity to CCH. Ditch lines near CCH were inventoried (BLM 2008) and the majority of roads near CCH are on flat surfaces where material is more difficult to transport. Any sediment moving off roads would be an inconsequential amount and would likely be assimilated into background conditions. All road renovation would occur during the dry season. Most streams are intermittent so most sediment transport would occur during the winter flows and would occur slowly, in small amounts, rather than large pulses of sediment. Small pulses would occur during larger rain events when ditch lines would have enough water to transport the available sediment. Furthermore, renovation would also improve road runoff and minimize road-related sediment. Because of these factors, if sediment were to reach area streams it would be a discountable amount.

All salvage acres would have the resulting slash treated by piling with an excavator, hand piling and burning, or lopping and scattering. All salvage would be outside riparian reserves; therefore, with existing buffers in place, impacts to fish and the aquatic environment would be very limited. Implementation of PDFs, such as seasonal restrictions and full riparian buffers, would limit impacts to the aquatic system to immeasurable pulses of sediment. Pulses of sediment that could reach the aquatic environment due to hydrologic connectivity from tractor yarding near roads, road renovation, and log hauling are expected to be immeasurable and would not affect fish or other aquatic organisms. Areas within riparian reserves that have large areas of downed trees would take a longer time period to recover because the blowdown trees limit natural seedling space. These areas would also have a high risk for catastrophic fire due to large levels of fuels and the potential for epidemic insect outbreaks. Both of these increased risks could affect the surrounding forest and aquatic system.

3.8.4.3 Effects of Alternative 3 on Fisheries

Direct and Indirect Effects

Under Alternative 3, 6,010 acres is proposed for salvage. Salvage is proposed in 5,910 acres of matrix land, 70 acres from the riparian reserves, and 30 acres of northern spotted owl activity center. Logging systems for these acres include 4,870 acres of tractor yarding, 910 acres of skyline/cable yarding, 60 acres of bull-lining, and 170 acres of helicopter yarding. Road work would consist of the same renovation activities that would be conducted under Alternative 2 and would cause the same effects from road renovation and log hauling. Most salvage acres would have the resulting slash piled and burned. Only 10 riparian acres would be skyline yarded. All riparian salvage acres would have the resulting slash hand piled and burned. Implementation of PDFs for riparian reserves such as applying minimum no touch buffers of at least 75 feet, conducting all salvage activities above the inner slope breaks of the channel, and keeping equipment outside riparian reserves. Effects on fish and the aquatic environment are expected to be similar to effects in Alternative 2. LWD levels within the riparian reserves would be maintained for future terrestrial and aquatic benefits. A reduced risk of fire and insect infestations would occur within salvaged riparian reserves due to the removal of severe riparian blowdown and reduced fine fuels.

Salvaged riparian areas would be replanted with a mix of conifers and would recover faster than unsalvaged areas. Salvaged areas would grow larger trees faster for future LWD recruitment and shade for lower stream temperatures.

3.8.4.4 Effects on Fisheries Common to All Alternatives

Cumulative Effects

All three alternatives would have very little difference in cumulative effects to riparian and aquatic habitats because only 70 acres of riparian reserves would be salvaged across all the 5th field watersheds in the entire Project Area. Since the Northwest Forest Plans inception in 1994, the aquatic habitats have been recovering and continue to recover on Federal land. Riparian reserves have been maintained or improved for aquatic and terrestrial habitats. Future Federal timber sales will include thinning overstocked stands in riparian areas to maximize conifer growth rates and reduce stand susceptibility to insects by increasing stand and tree vigor. This improves LWD potential, provides shade and continues to allow the riparian areas to recover from previous timber management. Future Federal actions include timber sales, stewardship contracts, improved road maintenance and drainage, and restoration of disturbed areas. All of these actions will implement PDFs and BMPs to minimize impacts and improve riparian and aquatic function. Therefore, future aquatic conditions should have higher LWD levels, reduced fine sediment levels, and more complex pools.

On private or industrial forest lands, most land will continue to be used for timber production with a relatively short rotation. This causes riparian and aquatic habitat to be fragmented across the landscape. In general, riparian and aquatic habitats on Federal land should continue to recover and riparian and aquatic habitat on private land would continue to be kept in a fragmented condition.

3.9 Wildlife

3.9.1 Definitions

The following definitions are for terms used in the Wildlife section:

Blowdown/windthrown: Completely uprooted and laying on the ground.

Provincial radius: The average home range for northern spotted owls in different physiographic provinces.

Sprung: Partially uprooted trees, standing and/or leaning.

Snap top: Snapped-off trees with few or no remaining green limbs.

Severely damaged: Standing trees exhibiting very little crown and at risk of mortality due to pruning action caused by falling adjacent trees (generally these trees have less than 25 percent of their foliage remaining and are unlikely to survive).

3.9.2 Methodology

The Wildlife analysis area encompasses the sections containing units proposed for salvage harvest. The project wildlife biologist considers the effects of the proposed actions on the wildlife occurring in or near salvage units.

3.9.3 Assumptions

- Late-successional forest is forested habitat 80 years or older. Late-successional forest usually, but not always, provides suitable habitat for spotted owls. Suitable spotted owl habitat is generally 80 years and older and contains other attributes such as multiple layers. Spotted owl habitat is specifically rated for its suitability for spotted owls, while late-successional forest not rated as suitable spotted owl habitat may provide habitat for other species such as fishers.

- Disturbance-only activities are activities that may disturb a spotted owl (e.g., noise, equipment operation, etc.), but do not remove spotted owl nesting, roosting, foraging (NRF) habitat or dispersal habitat. Disturbance-only actions would be seasonally restricted from March 1 through June 30, following the mandatory distances established by USFWS in the Biological Opinion.
- Salvage activities would be designed to treat and maintain spotted owl dispersal and nesting, roosting, and foraging habitat. There would be no change from current habitat ratings. Nesting, roosting and foraging habitat would retain at least 60 percent canopy and continue to provide nesting, roosting and foraging habitat after salvage of dead and dying trees. Spotted owl dispersal habitat would maintain at least 40 percent canopy after the salvage. Habitat removal would be seasonally restricted within 0.25 miles of known or suspected northern spotted owl sites from March 1 through September 30, unless surveys by BLM biologists indicate the sites are vacant or the resident owls are not nesting that year. The seasonal restriction would be waived if the owls are not nesting or after the young have fledged.
- If no Threatened and Endangered (T&E) or special status species habitat is known or suspected to be present in the Project Area or the area is outside the range for the species, then no further analysis is needed. If habitat is present, but no activities are planned for that habitat or the project would not impact the population, no further analysis is needed. If a T&E or special status species is known or suspected to be present and habitat is proposed to be disturbed, then the species will be analyzed. Appendix I, Wildlife, contains a list of the current T&E and special status species that were analyzed for the proposed action.
- Meadows would be buffered according to ROD/RMP standards (USDI 1995a). Roads would avoid special habitats. Meadows and natural openings larger than 5 acres would be buffered with a 100- to 300-foot buffer.

3.9.4 Affected Environment

3.9.4.1 Threatened and Endangered Species

Northern Spotted Owl - Federally Threatened

The northern spotted owl, listed as threatened under the Endangered Species Act, may be associated with the existing suitable habitats found within the proposed Butte Falls Blowdown Salvage Project Area.

Northern spotted owls prefer coniferous forest with multiple vertical layers of vegetation, a variety of tree species and age classes, and the presence of large logs and large diameter live and dead trees (snags) for NRF habitat. Spotted owls may also be found in younger stands with multi-layered closed canopies, large diameter trees, and abundance of dead and down woody material. Based on studies of owl habitat selection, including habitat structure and use and prey preference throughout the range of the owl, spotted owl habitat consists of four components: nesting, roosting, foraging, and dispersal (Thomas et al. 1990) (see Table 3-35).

Table 3-35. Northern Spotted Owl Habitat Types

Habitat Type	Description
Suitable Nesting, Roosting, Foraging (NRF)	NRF habitat meets all spotted owl life requirements. These forests have a high canopy closure (greater than 60 percent), a multi-layered structure, and large overstory trees. Deformed, diseased, and broken-top trees, as well as large snags and down logs, are also present.
Dispersal	Dispersal habitat is not suitable for nesting, but provides spotted owls with roosting, foraging, and dispersal habitat. Canopy closure is usually greater than 40 percent but with a more uniform structure and moderately-sized overstory trees. Deformed trees, snags, and down wood are less prevalent than in NRF.
Capable	Capable habitat does not presently meet spotted owl needs but has the potential to grow into dispersal and NRF habitat.
Noncapable	Noncapable habitat does not have the potential of developing into late-successional forest or supporting old growth dependent species.

U.S. Fish and Wildlife Service (USFWS) released the "Final Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*)" in May 2008. The plan provides guidance to bring about recovery through prescribed management actions and supplies criteria to determine when recovery has been achieved. Recovery of the spotted owl may depend, in part, on restoration of habitat lost to catastrophic disturbances, including windstorms (USDI 2008c). The Society for Ecological Restoration Primer on Ecological Restoration (SERPER) states, "Ecological restoration is an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity, and sustainability" (USDI 2008c).

The Northwest Forest Plan designated 100 acres of the best habitat on Federal lands to be retained as close as possible to the spotted owl nest site, or owl activity center, for all sites known as of January 1, 1994. This was intended to preserve an intensively used portion of the breeding season home range close to a nest site or center of activity (USDI 1995a; USDA, USDI 1994b).

Proposed salvage units are within 1.2 miles (northern spotted owl provincial radius for the Cascades West physiographic province) of 27 northern spotted owl 100-acre activity centers and 3 sites without a designated activity center. Some of the activity centers were impacted by blowdown of various degrees, ranging from scattered blowdown, snap top, and damaged trees to areas with patches of severe blowdown. The activity centers continue to provide nesting, roosting and foraging habitat as well as dispersal habitat for spotted owls.

However, one 100-acre activity center experienced severe blowdown on approximately 40 acres and almost all large overstory trees were windthrown or severely damaged. Prior to the windstorm, the stand structure of the 100-acre spotted owl activity center was a late-successional, multi-layered stand with a 90 to 100 percent canopy closure. Douglas-fir was the dominant overstory tree species with lesser amounts of white fir, sugar pine, ponderosa pine, and incense cedar. The majority of the overstory trees were between 24 to 36 inches in diameter with the oldest approaching 200 years of age. The middle layer was predominantly Douglas-fir and white fir with diameters ranging from 8 to 16 inches. The lowest layer was occupied by seedling and sapling sized Douglas-fir and white fir. Before the windstorm, 58 acres in the 100-acre activity center were classified as spotted owl nesting,


Windstorm damage in the northern spotted owl activity center.

roosting, foraging habitat and 32 acres were dispersal habitat (nesting, roosting, foraging habitat also functions as dispersal habitat). The storm affected approximately 30 acres of spotted owl nesting, roosting, foraging and dispersal habitat and 10 acres of dispersal habitat. Forest cover in these areas was converted from northern spotted owl nesting roosting, foraging suitable habitat to nonhabitat by the storm. The wind created a large opening in the entire southern part of the activity center with almost 100 percent of the large trees blown down. The area with severe blowdown no longer provides suitable or dispersal spotted owl habitat due to windthrow of nearly all large overstory trees. Canopy closure changed from 90-100 percent to 0-20 percent in the activity center area where severe damage occurred. Within this blowdown area, pockets of windthrown trees are 2 to 6 feet deep on the ground. The remainder of the activity center has small blowdown pockets and individual windthrown trees and continues to provide spotted owl nesting, roosting, and foraging habitat.

Windstorm damage in the northern spotted owl activity center.

Barred owls have been detected by BLM biologists at 10 different locations in the four 5th field watersheds. The barred owls were detected by biologists doing spotted owl surveys; no surveys have been conducted specifically for barred owls in the watershed. USFWS identified barred owl as an extremely pressing and complex threat to spotted owl (USDI 2008c). There is great uncertainty associated with the actual and potential effects of the barred owl on spotted owl (Courtney et al. 2004). Although “barred owls are having a negative impact on spotted owls at least in some areas, the extent of this impact and its ultimate outcome is uncertain” (Courtney et al. 2004). There is a perceived threat because barred owls use habitats typical of spotted owl habitat. They may be able to coexist through habitat segregation. Whether this will occur is unclear (Courtney et al. 2004). The cause of the barred owl invasion is not clear.

Barred owls may be more of a habitat generalist and occupy a wider diversity of habitat types than spotted owl. Spotted owl may respond to barred owls by avoidance. Displacement of spotted owls by barred owls is likely occurring, but the rate and extent of this are unknown, and, further, whether this effect is exacerbated by other confounding issues is uncertain (Courtney et al. 2004).

Prior to the windstorm, Douglas-fir bark beetles (*Dendroctonus pseudotsugae*) and flatheaded fir borers (*Melanophila drummondi)* were present at naturally low levels. Aerial surveys by ODF and USFS in 2006 and 2007 did not detect any major areas of Douglas-fir bark beetles or flatheaded fir borer in or adjacent to the windthrown area (USDA 2006; USDA 2007). At low levels, insect populations play an essential role in properly functioning forest environments. Insects help to decompose and recycle nutrients, create snags for wildlife habitat, thin unhealthy trees, enhance stand structure, and regulate tree species composition.

The windstorm created an abundance of favorable breeding habitat for the development of large populations of the Douglas-fir bark beetle and the flatheaded fir borer. The beetles have the ability to rapidly increase their populations. There is a strong likelihood the insect populations will begin to build-up in the downed or damaged trees during May and June of this year (2008). After one year the beetles will emerge and, if there are not enough stressed or suitable windthrown trees available to sustain the population, the beetles will infest nearby healthy green trees. Beetle and borer populations may increase to levels outside the range of natural variability and result in the mortality of healthy trees in older dense stands near concentrated areas of windthrown trees. Typically, epidemic population levels will continue for 2 to 4 years before declining back to naturally low levels.

Northern Spotted Owl Critical Habitat Units

Critical habitat has been designated by USFWS on Medford BLM lands (USFWS 1992). Critical habitat identifies geographic areas that contain features essential for the conservation of the spotted owl and may require special management considerations. Critical habitat for spotted owls on BLM-administered lands is present in the Project Area south of Lost Creek Lake in Townships 33 and 34 South, Ranges 2 and 3 East. The USFWS designated Critical Habitat Unit (CHU) OR-36 as an area with essential habitat features to focus conservation activities for the northern spotted owl (USFWS 1992). CHU OR-36 was established to facilitate dispersal of the northern spotted owl between the larger LSRs. For the northern spotted owl, the CHU includes particular forest types of sufficient area, quality, and configuration to support the needs of territorial owl pairs throughout the year. CHU is distributed across the species' range, and includes habitat for nesting, roosting, foraging and dispersal. Before the windstorm, there were 2,508 acres of nesting, roosting, foraging habitat and 2,554 acres of dispersal habitat in the CHU. The windstorm blew down 23 acres of nesting, roosting, foraging habitat and 15 acres of dispersal habitat and changed the spotted owl habitat (NRF and dispersal) to nonhabitat.

Connectivity/Diversity Blocks

There are four Connectivity/Diversity blocks within the proposed salvage area. Connectivity blocks are designated areas in matrix lands which provide connectivity for late-successional species and have management requirements to retain at least 25 to 30 percent of each Connectivity/Diversity block in late-successional forest (USDI 1995a). Riparian reserves and other allocations with late-successional forest count toward this percentage. The size and arrangement of habitat within a block will provide effective habitat to the extent possible.

3.9.4.2 Special Status Species

Special status species are those species designated by the BLM as Bureau Sensitive.

- Bureau Sensitive (BLM) - species that have appeared in the *Federal Register* as proposed for sensitive classification or are under consideration for official listing as endangered or threatened species, are on the official state list, or are recognized by the implementing agencies as needing special management to prevent being placed on Federal or state lists. Generally these species are restricted in range and have natural or human caused threats to their survival.
- The list of special status species known to be present in the Medford District BLM was updated in July 2007 with the latest Oregon Natural Heritage Program information. The updated Oregon State Director's Special Status Species list was reviewed by BLM wildlife biologists to identify the impacts of the proposed actions and provide mitigation measures.
- In April 2008, birds identified by the USFWS as Neotropical migratory birds of concern and game birds below desired conditions were added to the list (USFWS Migratory Bird Program Strategic Plan 2004-2014). Biological evaluations were conducted by the project biologist using a review of existing records, field reconnaissance, field surveys, aerial photos, and analysis of potential impacts.

The project wildlife biologist completed a review of the special status species identified in the Butte Falls Resource Area (Appendix I, Wildlife, Table I-1). The table includes a list of special status species considered but eliminated as an issue in the Project Area. This list contains species which were not detected during surveys, species not present in the watershed, or historic sites which are vacant or would not be impacted by the action. Only the species known or suspected to be present in the Project Area are discussed (see Table 3-36).

Table 3-36. Known or Suspected Special Status Species located in the Butte Falls Blowdown Salvage Area

Common Name	Scientific Name	Status	Presence
Flammulated owl	*Otus flammeolus*	Bureau Sensitive	Present
Pacific fisher	*Martes pennanti*	Federal Candidate/Bureau Sensitive	Present
Pallid bat	*Antrozous pallidus*	Bureau Sensitive	Present
Fringed myotis (bat)	*Myotis thysanodes*	Bureau Sensitive	Present
Townsend's big-eared bat	*Corynorhinus townsendii*	Bureau Sensitive	Present
Chace sideband (snail)	*Monadenia chaceana*	Bureau Sensitive	Present

Fisher

A known population of fisher is present in the southern Cascades near the communities of Prospect and Butte Falls. A research project by Pacific Northwest Research Station Olympia Forestry Services Laboratory (PNW) and Rogue River National Forest (RRNF) documented fishers in the Rogue River/Lost Creek, Big Butte Creek, and South Fork Rogue River 5th field watersheds on BLM lands near RRNF lands. Protocol surveys for fishers were conducted in the Big Butte Creek 5th field watershed in 2008 by a Medford BLM fisher biological survey team. A fisher was detected in the Project Area at two camera stations approximately 1.5 miles apart in the Bowen Creek area. It is unknown whether this is the same fisher or two different individuals. The size of the fisher population on Butte Falls Resource Area and RRNF lands is unknown, although 22 fishers were captured from 1995 and 2001 in the PNW study (Aubry and Raley 2002).

Fishers are closely associated with low to mid-elevation (generally less than 4,100 feet) forests with a coniferous component, large snags or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor to support adequate prey populations (Aubry and Lewis 2002).

In general, the habitats used by fishers are forest woodland landscape mosaics that include conifer-dominated stands. They use a variety of habitats, including 5 to 10 year old regeneration harvest and heavily thinned stands which have large residual trees associated with them, either within the stands or at the edge. Forest type is not as important to fishers as the vegetative and structural aspects that lead to abundant prey populations.

Fishers may select forests with low and closed canopies (69 FR 68:18770-18792). They will use harvested areas if patches of habitat with residual components (e.g., logs, hardwoods) and areas where patches of larger trees are left in the landscape (Diller 2004). Important features include canopy closure and denning sites with snags and downed wood.

Fishers travel over large areas. The average home range for females was approximately 6,200 acres (25 square kilometers). Male home ranges varied from approximately 36,300 acres (147 square kilometers) during breeding season to 15,300 acres (62 square kilometers) during the nonbreeding season (Aubry and Raley 2006). One male dispersed approximately 34 miles (55 kilometers) (Aubrey and Raley 2002).

Females usually give birth in cavities in large live or dead trees. These cavities are in trees with openings that access hollows created by heartwood decay (Aubrey and Raley 2002). After the kits become more active, the females move them to a larger den on or near the forest floor. These dens are primarily cavities in the lower bole or butt of live or dead large trees. Fishers also use mistletoe brooms and rodent nests for rest sites (Aubrey and Raley 2002). Connectivity of late-successional forests is important. Only 1 percent of the radio telemetry locations in the RRNF South Cascade study area were found in nonforested habitats (Aubry and Raley 2006).

No habitat management guidelines relative to stand characteristics and the amount of each stand type to be maintained have been established for fisher. Patches of older seral habitat are present in the Project Area within riparian reserves, spotted owl activity centers, and connectivity blocks. Fishers will use managed second growth forests for denning, resting, and foraging, even resting in debris piles created during timber harvest operations (Aubry and Raley 2006). Most of the forested land could be used by fishers for their life activities (traveling, foraging, and resting). Older forests would provide habitat which could also be used for breeding and denning. Second growth private lands in the watershed also provide habitat for fisher (traveling, foraging, and resting) in the areas where the canopy is recovering.

A study in northern California found fisher were present on extensively managed private forest lands. They were found to be associated with large, residual forest structures (snags, logs, and live trees). They had more fisher detections in areas of logs and hardwoods and areas where patches of larger trees were left on the landscape (Diller 2004). Fishers use areas that have been harvested if patches of habitat with residual components are left in the landscape.

USFWS published a finding in April 2004 that a petition to list fishers as a "Federally Threatened" species was warranted but precluded by higher priority listing actions. The species remains a USFWS candidate species (69 FR 68:18770-18792). An interagency team of Federal and state biologists from British Columbia, Washington, Oregon, and California is currently working to develop a Fisher Conservation Assessment and Strategy. The work is ongoing and is not available at this time, but is estimated to be available by the end of 2008. Fishers remain a BLM Bureau Sensitive species.

Flammulated Owl

Flammulated owl (also a Neotropical migratory bird of concern) habitat is coniferous woodlands and forest edges, especially oak and pine ecosystems in drier forests with limited understory at mid-elevations (Marshall et al. 2003). They are mostly associated with ponderosa pine forests, but also nest in mixed conifer stands dominated by ponderosa pine, but which include Douglas-fir, grand fir, Shasta red fir, mountain hemlock, and lodgepole pine. Flammulated owls nest in forest stands which tend to have moderate to high levels of canopy with rather open understory or an adjacent open area. They nest in abandoned woodpecker holes, especially those of flickers (Erlich 1988). A flammulated owl response was heard during bird surveys (Appendix I, Wildlife, Birds in Big Butte Creek Watershed). Although flammulated owls have been heard during surveys for great gray owls and spotted owls on two other occasions, follow-up visits have not located any flammulated owls. Nesting flammulated owls have never been located on Butte Falls Resource Area administered lands. The nearest confirmed nest location is on USFS High Cascades Ranger District lands near Crater Lake National Park.

Bats

Townsend's big-eared bats are associated with a wide variety of habitats, including coniferous forests in western Oregon. They are commonly considered a cave-dwelling species, using abandoned mines, caves, or cave-like roosting habitat. They may use rock outcrops or buildings for roost sites. Townsend's big eared bats were captured in mist net surveys at two ponds, one in the Big Butte Creek 5th field watershed at a cinder pit pond in 2005 and the other in the Rogue River/Lost Creek 5th field watershed at a small pond in the Smith Creek drainage in 2006. A suspected roost site is located in a large rock outcrop in a cliff near the south shore of Lost Creek Lake.

Fringed myotis appear adapted to live in areas with diverse vegetative substrates. They are associated with a variety of habitats including conifer forests and oak woodlands. They roost in buildings, caves, mines, and crevices and cavities in large trees. Fringed myotis have been captured in mist net surveys in a pond in the Big Butte Creek 5th field watershed.

Pallid bats are usually associated with drier areas. West of the Cascade Range, pallid bats are restricted to the drier interior valleys of the southern portion of the state. They are usually found in brushy rocky terrain, but have been observed at edges of coniferous and deciduous woods and open farmland (Verts and Carraway 1998). Historical records indicate a pallid bat was captured in mist net surveys in two locations in the Big Butte Creek 5th field watershed in 1995 and 1997.

Chase Sideband Snail

The proposed salvage project conforms with the 2007 *Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl* (S&M ROD 2007). Mollusk surveys were completed on 9,308 acres within the four 5th field watersheds by BLM biologists and biological contracts. Chase sideband snails, *Monadenia chaceana*, were found in rocky talus outcrops in two locations near Lost Creek Lake. One site is approximately 0.5 miles from a unit proposed for salvage. The proposed salvage unit was surveyed for *Monadenia chaceana* with negative results.

3.9.4.3 Neotropical Migratory Bird Species of Conservation Concern and Game Birds below Desired Condition

BLM management direction states that NEPA analysis would occur for actions having the potential to negatively or positively affect birds identified by USFWS in the Migratory Bird Program Strategic Plan 2004-2014 (USDI 2008b). This publication includes a list of "Western BLM Bird Species of Conservation Concern" (Migratory Birds of Concern) and "Game Birds below Desired Condition" which were compiled from historical records and surveys. Bird species determined to be of concern for the lands in the region where Medford BLM is located (Bird Conservation Region 5, USFWS Region 1) were reviewed and a list of Migratory Birds of Concern and Game Birds below Desired Condition was compiled by BLM biologists.

BLM biologists also conferred with local bird groups and knowledgeable individuals to identify which birds on the list are present within Medford BLM lands. See Appendix I, Wildlife, for a list of the Migratory Birds of Concern and Game Birds below Desired Condition in the Medford District. Past bird surveys in the Big Butte Creek 5th field watershed were reviewed to see if birds on the Medford BLM Migratory Birds of Concern and Game Birds below Desired Condition list were found in the watershed (Appendix I, Wildlife).

The following birds on the USFWS Migratory Birds of Concern and Game Birds below Desired Condition list are known to occur in the four 5th field watersheds containing the Butte Falls Salvage project and could be impacted by proposed salvage operations:

- Band-tailed pigeon
- Flammulated owl (see Bureau Sensitive)
- Mourning dove
- Olive-sided flycatcher
- Rufous hummingbird

Band-tailed pigeons (USFWS Game Birds Below Desired Conditions) inhabit coniferous forests. They are a common summer resident in forested areas west of the Cascade crest and typically nest in forested mountain areas below 4,000 feet (Marshall et al. 2003). Their abundance increases from east to west with higher abundance in the Coast range. The Project Area is at the eastern edge of the known range in Oregon (Marshall et al. 2003).

Closed canopy conifer or mixed hardwood and conifer forests are the primary nesting habitat. Their nests are mainly in Douglas-fir, but they also will nest in hardwoods and shrubs, within closed-canopy conifer, or mixed hardwood and conifer stands. Band-tailed pigeon build loosely constructed nests in the forks and horizontal branches or near the trunk of conifer or oak trees (Erlich 1988). Band-tailed pigeons visit mineral springs at least once per week while nesting (Marshall et al. 2003). There are no known mineral springs near the proposed Project Area. Although band-tailed pigeons were not detected during bird surveys, they are suspected to be present in the four 5th field watersheds, at least during spring and fall migration.

Mourning doves (USFWS Game Birds Below desired Conditions) are abundant in spring, summer, and early fall in open landscapes statewide. Doves are fairly common in valleys in the winter. Doves are adapted to a wide variety of habitats ranging from open forests and clear-cuts, to urban and agricultural areas. They are not found in densely forested sites and alpine areas. Mourning doves feed on the ground and eat mostly grass and tree seeds. They are prolific breeders and in the Rogue Valley have been found to produce as many as four clutches in a year (Marshall et al. 2003). Mourning doves are present in the open grasslands and woodlands in the four 5th field watersheds where the salvage is proposed.

Olive-sided flycatchers are Neotropical migratory birds associated with large green trees within early-successional forests. They use coniferous woodlands, burns, and clearings. Retention of large trees increases structural variety within the developing forest and may provide habitat for some species associated with late-successional forest structure within early-successional habitat (PIF, version 2.0). They breed primarily within forest burns and edges where snags and scattered tall live trees are present, near shores of streams and wet areas, and at the edge between late-successional and early successional forests such as meadows and harvest units. They build their nests high in conifer trees on horizontal branches away from the trunk (Ehrlich 1988). Olive-sided flycatchers are present in the four 5th field watersheds where the salvage is proposed.

Rufous hummingbirds, a Neotropical migratory bird species, are the most common and widespread of the Oregon hummingbirds. It may also be the most wide-ranging hummingbird in North America, occurring in every state and most Canadian provinces (Marshall et al. 2003). Rufous hummingbirds are positively associated with nectar produced by flowering plants, deciduous shrubs, and trees in early successional habitats (PIF, version 2.0). Rufous hummingbirds are present in the four 5th field watersheds where salvage is proposed.

3.9.4.4 Other Wildlife Species

Northern Goshawk

A petition to list the northern goshawk in the western United States as a threatened species was considered by USFWS in 1998. The final conclusion was published in the *Federal Register* on June 29, 1998. The decision stated "After review of all available scientific and commercial information, the Service finds that listing this population as endangered or threatened is not warranted" (63 FR 124:35183-35184). USFWS found no evidence to support the contention goshawks are in danger of extinction; nor is the species likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

Goshawks were removed from the BLM special status species list in July 2007. ROD/RMP guidelines are to continue with the prescribed conservation actions if it will contribute to avoiding relisting (USDI 1995a, p. 52). BLM guidance is to protect all known raptor (birds of prey) nests with a protection buffer, a seasonal restriction, or both (USDI 2008a). Goshawks have large home ranges, approximately 6,000 acres (Reynolds et al. 1992). They nest in mature conifer forests in the western USA (USDA 2006). The nest areas contain one or more stands of large old trees. The area surrounding the nest area typically includes a variety of forest types and conditions. These areas provide patches of trees, herbaceous, and shrub understory with snags, down logs, and small openings that goshawk prey use. One or more goshawk nests are known to be present in each of the four 5th field watersheds. The known nests are monitored by BLM biologists and will have a seasonal restriction for harvest activities around active nests.

Big Game Winter Range and Elk Management Area

Most of the Salt Creek/Wasson Canyon area, in the southern part of the Project Area, was designated in the Medford District RMP as "Big Game Winter Range and Elk Management Area." Deer and elk also migrate through the affected area during the spring and fall. Many historic game trails are present and used annually. ROD/RMP guidelines recommend closing all roads except major collectors and arterials during the seasonal restriction (November 15 to April 1) and minimizing new road construction. However, due to high public use of roads in the area, requirements to provide access to adjacent private lands, vandalism to gates and road barricades, and disregard of road closures, this cannot always be achieved.

3.9.5 Environmental Consequences

3.9.5.1 Effects of Alternative 1 (No Action) on Wildlife

Direct and Indirect Effects

Threatened and Endangered Species

Northern Spotted Owl – Federally Threatened

The No Action Alternative would have no effect on the Northern spotted owl from noise and associated disturbance from proposed salvage operations. In severe blowdown areas where windthrown trees cover the ground surface for a depth of 2 to 6 feet, few openings remain for the establishment of new conifer seedlings. Recovery and stand development would be delayed at least 10 to 20 years with no salvage in these areas. There would be a delay in restoration of species composition, structural diversity, and canopy cover, resulting in a longer amount of time needed for the stand to provide spotted owl dispersal and nesting, roosting, foraging habitat.

USDA research entomologists that have worked in the forests of southern Oregon reported a high potential for green tree mortality due to insect infestations affecting green trees adjacent to areas with high mortality from the windstorm (Goheen 2008). Generally, for every 10 down beetle-infested Douglas-fir trees at least 10 inches in diameter, we can expect 4 standing green trees to become infested (Goheen 2008). The volume loss of standing trees can approach 30 to 60 percent of the windthrown volume if there are more than 3 down trees per acre greater than 14 inches in diameter (ODF 2007). Spotted owls can be affected if an insect infestation moves from the windthrown and standing dead trees into large Douglas-fir trees in adjacent suitable owl habitat and causes large patches of mortality.

Leaving all windthrown material on the ground would create a greater risk of high intensity fire, which could impact spotted owl habitat. If a wildfire starts in the untreated blowdown, the fire could move into adjacent intact green stands and cause loss of large areas of suitable spotted owl habitat.

In the short-term, with no action, the remaining spotted owl habitat in the spotted owl activity center would be at greater risk of loss of green trees due to insect infestation. The green stands are also at higher risk from a high intensity wildfire due to increased amounts of dead wood and small fuels on the ground. These risks would decrease over time as the insects decline and smaller, more flammable materials deteriorate in about 3 to 5 years.

In the long-term, new stand establishment would be expected to take 10 to 20 years longer to reach late-successional stages. The high levels of blowdown on the ground would prevent replanting and would delay recovery of natural seedlings.

Critical Habitat Units

The storm caused loss of spotted owl habitat in the CHU. In the severe blowdown areas where windthrown trees cover the ground surface for a depth of 2 to 6 feet deep, few openings remain for the establishment and new growth of conifer seedlings. Where openings do occur we expect early seral brush species would rapidly expand into the openings and limit conifer growth. In these areas, with no salvage, there would be no reduction of the amount and depth of trees that cover the ground. Openings on the forest floor would not be created. Recovery and stand development with the restoration of species composition, structural diversity, and canopy cover would be delayed.

There is potential for green tree mortality in areas not salvaged prior to beetle emergence. Generally, for every 10 down Douglas-fir trees at least 10 inches in diameter and beetle infested, we can expect 4 standing green trees to be infested (Goheen 2008). The volume loss of standing trees can approach 30 to 60 percent of the windthrown volume if there are more than 3 down trees per acre greater than 14 inches in diameter (ODF 2007). This can affect spotted owl nesting, roosting, foraging and dispersal habitat suitability if a large insect infestation causes the death of patches of large Douglas-fir trees.

In the short-term, with no salvage, there is a higher risk of catastrophic wildfire and a greater potential for an outbreak of insects infesting intact adjacent green stands. In CHU with severe blowdown, long-term recovery of mature forests may be delayed 10 to 20 years due to the high amount of ground cover.

This could delay reestablishment of the new seedlings due to large accumulations of woody debris on the ground. There would be a delay in the recovery of future spotted owl nesting, roosting, foraging and dispersal habitat in the CHU. If fire or a large insect outbreak were to occur, loss of spotted owl habitat would affect the function of the CHU.

Connectivity/Diversity Blocks

The effects of no salvage on connectivity/diversity blocks would be the same as those listed for CHU.

Special Status Species

Fisher

With no salvage proposed in Alternative 1, fishers would continue to use the areas with no disturbance from equipment and salvage activities, including temporary road construction and associated noise. Trees on the ground would provide cover.

The risk to intact forest from intense wildfire and insect infestation, and the slower recovery of the forests would be the same as discussed for spotted owls and CHU.

Flammulated Owl

Snag habitat for flammulated owls and other cavity nesters would increase as decay occurs and additional snag habitat would be created through natural tree mortality. Future snag numbers would increase with no salvage, due to storm damaged standing trees (e.g., snapped tops, crown damage, and sprung trees) remaining in the forest.

In the short-term (3 to 5 years), with no salvage, there is an increased risk of loss of existing trees with cavities used as nests by flammulated owls if a fire were to occur. This is due to the high levels of fuels on the ground. In the long-term (80 to 100+ years), more suitable snags with cavities would be available for flammulated owls to use as nest trees. Trees with severely damaged crowns and trees infested by insects would continue to die and the number of snags in the landscape available for use by flammulated owls would increase.

Bats

Bats roost in cavities in snags and live trees, and under sloughing bark on injured, dead, or dying trees. Snag habitat for bats would increase as down and dead wood decays and bark begins to loosen, increasing roost sites. Future snag numbers would increase with no salvage, due to storm damaged standing trees (e.g., snapped tops, crown damage, and sprung trees) remaining in the forest.

In the short-term (3 to 5 years), with no salvage, there is an increased risk of loss of existing habitat from fire. In the long-term (80 to 100+ years), snags created by the windstorm and insects could be excavated by woodpeckers, which may increase the future number of cavities for bat roosts. As standing dead trees decay, loose bark would create roosting sites until the bark drops off the trees.

Chase Sideband Snail

This snail species is associated with forested and open talus or rocky areas. They may be associated with down wood where few rock substrates occur. Large amounts of big trees on the forest floor may increase potential habitat.

There may be a short-term increased risk from wildfire, but seasonal deep refugia (rock talus) provide these snails with protection from fire during their inactive periods.

Other Wildlife Species

Northern Goshawk

Alternative 1 would have no impacts to northern goshawk nesting habitat because dead and dying trees do not provide nesting substrate for goshawks. Increased risk from insects and high intensity fire to green stands which currently provide nesting habitat for goshawks would be the same as spotted owl habitat.

Big Game Winter Range and Elk Management Area

No new roads would be constructed in big game winter range and elk management areas. Therefore, there would be no change from current conditions.

Neotropical Migratory Bird Species of Conservation Concern and Game Birds below Desired Condition

Alternative 1 would have no effect to any Neotropical migratory bird species of conservation concern or game birds below desired condition because there would be no disturbance activity and no change from current conditions.

3.9.5.2 Effects on Wildlife Common to Alternatives 2 and 3

Proposed salvage activities in Alternatives 2 and 3 would not differ in their affects on the following wildlife concerns.

Direct and Indirect Effects

Northern Spotted Owl – Federally Threatened

Critical Habitat Units (CHU)

Salvage is proposed on approximately 600 acres of matrix lands in CHU OR-36. Salvage within approximately 40 acres of nonhabitat CHU lands would have “no effect” on the function of critical habitat. Salvage is proposed in approximately 275 acres of nesting, roosting, and foraging habitat and approximately 290 acres of dispersal habitat. All proposed salvage actions in nesting, roosting, foraging and dispersal spotted owl habitat in the CHU “may affect, not likely adversely affect” critical habitat for the northern spotted owl. Proposed salvage operations in nesting, roosting, and foraging and dispersal habitat in the CHU would treat but maintain the current function (post-storm) of the forest as owl habitat.

Salvage activities (removal of windthrown, sprung, snap top severely damaged trees and some hazard trees) are designed to ensure nesting, roosting, and foraging habitat will retain at least 60 percent canopy cover. Salvage in dispersal habitat will retain at least 40 percent canopy. Large trees, snags, large down wood, and structural diversity important to northern spotted owls will be maintained. No new road construction would occur in nesting, roosting, or foraging habitat. The BLM has determined the effects to spotted owls as a result of the implementation of salvage treatments within spotted owl habitat will not likely to adversely affect spotted owls for the following reasons:

1. Spotted owls would continue to use available nesting, roosting, and foraging, and dispersal habitat after implementation of the proposed action in the same manner as they did before.

2. Canopy cover would be maintained at 60 percent or greater in nesting, roosting, and foraging habitat.
3. Canopy cover would be maintained at 40 percent or greater in dispersal habitat.
4. Decadent woody material, such as large snags and down wood, would remain after treatment.
5. All multi-canopy, uneven-aged tree structure that was present pretreatment would remain post-treatment.
6. No nest trees would be removed.

In the short-term, salvage in severe blowdown areas may reduce future green tree mortality from a potential increase in insect populations and increased opportunities to reforest the areas where the regeneration may be slowed by the large amount of material on the ground. In the long-term, removing excess material and replanting would accelerate the reestablishment of a new stand of conifers, which would provide future habitat for spotted owls.

Connectivity/Diversity Blocks

Salvage logging would not reduce late-successional forest habitat in the connectivity/diversity blocks because only windthrown and standing damaged trees would be removed. There would be no change in the amount of late-successional habitat available to spotted owls and other late-successional dependent species.

Special Status Species

Fisher

Salvage is proposed on approximately 6,000 acres of matrix lands. No known fisher dens are in the proposed salvage area. The proposed action would not change fisher habitat to nonsuitable because canopy would not be changed in green stands. Snags and trees with holes and cracks which could be used for denning that were present prestorm would not be harvested, unless BLM identifies them as a hazard.

One fisher was detected during BLM surveys in 2008 near an area where salvage is proposed. A seasonal restriction from February 1 through May 30 would be in effect for proposed salvage operations in T35S, R3E, section 31 where the fisher was detected. Although no den was found and it is unknown if the fisher detected in 2008 was male or female, a seasonal restriction would be implemented to reduce the risk of impacting an active den during the time when the kits would be most vulnerable. Work activities would not begin until after young were mobile and could move away from the proposed salvage units. The proposal is to salvage windthrown trees on 59 of the 640 acres in the section. Fishers could continue to use the areas away from the proposed action.

The proposed salvage would leave root wads and coarse wood on the forest floor. Fisher habitat within the proposed salvage units would remain after the salvage is completed, because canopy would be maintained, large snags and wood would meet or exceed matrix requirements, and the multi-canopy, uneven-aged tree structure that was present pretreatment would remain post-treatment.

Fishers travel over large areas. Disruption due to equipment operation and associated noise would occur in different parts of the Project Area over time while the salvage is occurring. If fishers are present, they could move out of the area while the operation was occurring. Snags, hardwoods, and down logs that were present prior to the storm would not be harvested unless they were determined to be a hazard or need to be removed for operational activities. Root wads, large broken limbs, and broken trees would be left in the stands and there would be an increased amount coarse wood available due to the windstorm. Only windthrown and severely damaged standing trees would be salvaged.

Due to the scattered nature of the windthrow and the number of acres affected by the storm, many acres would not be salvaged. Although proposed salvage would remove down logs and storm damaged trees, these habitat structures would remain in the landscape after salvage. Fisher habitat within the proposed salvage units would remain after the salvage is completed. Canopy would be maintained, large snags and wood would meet or exceed matrix requirements and the multi-canopy, uneven-aged tree structure that was present pretreatment would remain post-treatment. Existing green trees would not be harvested unless they are a hazard or have severely damaged crowns and have been determined to be mortally injured. These areas would still meet fisher habitat needs for denning, resting, and foraging.

Trees with obvious pileated woodpecker holes would not be harvested. Fishers in southwestern Oregon primarily use pileated woodpecker cavities for birthing dens. Constituent elements (e.g., snags, hardwoods, and CWD) would remain in the units at current levels. Due to the scattered nature of the windthrown trees, the salvage project design would leave all green trees and scattered pockets of blowdown. Fishers could use these areas after salvage is completed. There is no evidence that salvage would impact prey available to fishers. Less than 1 percent of the lands in the four 5th field watersheds would be impacted by salvage.

The proposed action would not be expected to reduce the persistence of the fisher population in the four 5th field watersheds, although they would be expected to remain at naturally at low numbers.

Flammulated Owl

Flammulated owls use cavities in snags and live trees created by woodpeckers or disease. Existing snag habitat for flammulated owls would not be affected, as existing (prestorm) snags with holes suitable for flammulated owls would not be salvaged. Standards and guidelines for snags and green tree replacements for woodpeckers and other primary cavity-nesting species would provide for spotted owls (USDA, USDI 1994b, C-47). Snag numbers in the four 5th field watersheds would meet or exceed matrix requirements.

Existing (prestorm) snags would not be salvaged. There would be no short-term effect from salvage, as only sprung trees or trees severely damaged by the windstorm would be salvaged. In the long-term, there would be fewer standing snags due to proposed salvage of some standing dead trees. The action meets NWFP requirements for snags on matrix lands. Not all areas affected by the storm would be salvaged. Snags would be present in greater number in these areas. Impacts to flammulated owl population would be negligible.

Bats

Salvage would have no known impacts to bats. Salvage of windthrown trees would not remove bat habitat.

Chace Sideband Snail

No impacts from the proposed salvage have been identified for Monadenia chaceana. The nearest population is 0.5 miles from a proposed salvage unit in the Rogue River/Lost Creek 5th field watershed. The proposed salvage unit was surveyed for mollusks by BLM contract biologists and no Monadenia were found. Due to the patchy nature of the proposed salvage, the retention of forest cover in forested areas, and not entering known habitat areas, the species is expected to persist in the Rogue River/Lost Creek Watershed.

Neotropical Migratory Bird Species of Conservation Concern and Game Birds below Desired Condition

Proposed salvage of windthrown trees would not affect any of the Neotropical migratory bird species of conservation concern or game birds below desired condition because windthrown trees do not provide habitat for the birds of concern identified as present in the Butte Falls Resource Area. Felling hazard trees and some green trees for operations could impact a nest, if present in the green tree. Due to the low numbers of green trees that would be felled, the chance of damaging an active nest for the five birds of concern (band-tailed pigeon, flammulated owl, mourning dove, olive-sided flycatcher, and rufous hummingbird) is very low. Therefore, the impact to populations would be negligible. The proposed action would not affect persistence of any of the identified birds of concern in the Project Area.

Other Wildlife Species

Northern Goshawk

Nesting goshawk could be present in the green stands where salvage is proposed. Areas near known goshawk sites would be surveyed prior to the action and a seasonal restriction would be implemented from March 1 to July 15 within 0.25 miles of any active goshawk nest. Salvage would not remove any known goshawk nests. With a seasonal restriction, there would be no impacts to the goshawk population in the four 5th field watersheds.

Big Game Winter Range and Elk Management Area

Approximately 0.25 miles of new road construction is proposed on lands designated in the ROD/RMP as Big Game Winter Range and Elk Management Area in T35S, R2E, section 11 to extend an existing road. An existing gate on this road is scheduled to be closed during the fall and winter to prevent disturbance to deer and elk. Closing roads would meet ROD/RMP management direction and impacts to big game would be negligible.

Cumulative Effects

Salvage operations are proposed in four 5th field watersheds: Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek. There would be no cumulative effects to northern spotted owl populations within these watersheds from actions proposed in this environmental assessment.

Salvage proposed in severe blowdown areas would not affect spotted owls because the storm blew down the majority of the overstory trees and the areas no longer provide habitat for spotted owls. Salvage of windthrown and severely damaged trees in green stands that provide spotted owl nesting, roosting, foraging and dispersal habitat would not change the function of the spotted owl habitat in these stands. A seasonal restriction would be in effect to reduce disturbance from noise. There is no incremental increase to past, present or future action impacts to spotted owls.

The proposed action is not expected to affect long-term population viability of any Bureau Sensitive wildlife species known to be in the area. Activities under both alternatives would not lead to the need to list sensitive wildlife species as T&E. The proposed action has environmental impacts on certain species that do not extend beyond the Project Area or are so insignificant they cannot be reasonably measured beyond the Project Area. In these instances, there is no incremental increase to past, present, or future actions. Appendix I, Wildlife, Table I-1 contains a discussion of the impacts of the proposed actions. Seasonal restrictions would be implemented to reduce any impacts from disturbance.

3.9.5.3 Effects of Alternative 2 on Wildlife

Direct and Indirect Effects

Threatened and Endangered Species

Northern Spotted Owl – Federally Threatened

Alternative 2 proposes salvage of windthrown and severely damaged trees on approximately 5,910 acres of matrix lands. The storm changed northern spotted owl habitat to the conditions that exist today. Proposed salvage operations would maintain the function of spotted owl habitat as it currently exists after the storm. Stands with severe blowdown no longer provide nesting, roosting, and foraging or dispersal habitat due to the loss of overstory canopy.

Salvage in severe blowdown with 0 to 30 percent canopy cover would not affect spotted owls, because these areas no longer provide spotted owl habitat (e.g., nesting, roosting, foraging or dispersal). Disturbance from noise associated with work in nonhabitat areas adjacent to suitable spotted owl habitat could occur. Some green trees may need to be felled if BLM identifies them as a hazard to humans, or if needed to facilitate salvage operations. Approximately 1,380 acres of stands with severe damage are proposed for salvage.

The BLM would survey to locate known owls near proposed salvage units. A seasonal restriction for disturbance from work activities that produce loud noises above ambient levels or produce thick smoke that would enter the stand, will not occur within 65 yards of any nest site or activity center of known pairs and resident singles between March 1 and June 30 (or until two weeks after the fledging period). Activities will be allowed if protocol surveys determine the activity center is not occupied, nesting is not occurring, or the owls failed in their nesting attempt. Actions in these areas would have “no effect” to the spotted owl because suitable habitat is not being removed and the seasonal restriction would protect nesting spotted owls during the critical-breeding period.

Salvage in areas with moderate and scattered blowdown would remove windthrown and sprung or severely damaged trees within matrix lands in areas which currently provide dispersal and nesting, roosting, and foraging habitat. Only dead and severely damaged trees are proposed for salvage. Green trees would only be felled if the BLM identified them as a hazard, or if they need to be felled for operational purposes. Spotted owls would continue to use available nesting, roosting, foraging, and dispersal habitat after the proposed action in the same manner as they did before.

Salvaging would reduce the risk of the loss of spotted owl nesting, roosting, foraging and dispersal habitat to fire and insects. Natural regeneration could occur in the salvage areas where the large piles of windthrown trees are removed, because the removal of the biomass provides openings for natural seedlings and planting, if needed. This would decrease the length of time for the mature forest to become reestablished.

The spotted owl activity center would not be salvaged under Alternative 2. Effects would be the same as the No Action Alternative. Recovery of the areas in the activity center with severe blowdown would be delayed by 10 to 20 years. This is due to longer amount of time it would take for green trees to reestablish in the areas with high levels of ground cover from blowdown. The area would not be replanted due to the high levels of windthrown trees covering the ground which would not be removed. Spotted owl habitat in the activity center which continues to provide nesting, roosting, foraging and dispersal spotted owl habitat would be at higher risk from insect outbreaks and high intensity fire than Alternative 3 because high levels of dead material would be left on the ground.

Residual trees, snag, and down wood that are retained in the salvage areas will provide cover for prey species over time and will minimize salvage impacts to those species. Northern spotted owls seldom venture far into nonforested stands to hunt. However, edges can be areas of good prey availability and potentially increased vulnerability (i.e., better hunting for owls) (Zabel 1995).

The proposed action is designed to maintain existing owl habitat. Treatments would retain habitat for prey. Prey animals may be more exposed in the disturbed area or may move away from the disturbed area over the short-term. Some minor changes in prey availability may occur as cover is disturbed or removed and animals move around in the understory. They may become more vulnerable and exposed. This may increase competition among owls for prey in the treatment area, but the exposure of prey may also improve prey availability for northern spotted owls. The spacing, timing, and standards and guidelines for the proposed projects are designed to ensure there would be no adverse impacts on northern spotted owls.

Salvage of dead and severely damaged trees with less than 25 percent live crown is not expected to change overstory canopy. Some disturbance of habitat may improve forage conditions, provided understory structure and cover are retained. Once the initial impact of disturbance recovers (6 months to 2 years), the understory habitat conditions for prey food will increase over the next few years as shrubs and residual trees again close in the stand. Snag and coarse woody debris standards (2 snags per acre and 120 linear feet 16″ by 16′) would minimize impacts to spotted owl prey species that use these habitat features.

Proposed salvage in nonhabitat units would not affect spotted owls. Proposed salvage in units which currently provide spotted owl habitat (after the storm) would maintain the current spotted owl habitat function. Salvage activities proposed under Alternative 2 "may affect, but are not likely to adversely affect" spotted owl habitat. The proposed action was consulted with USFWS and is covered under a letter of concurrence (LOC) 8330.I0101(08) issued July 10, 2008.

3.9.5.4 Effects of Alternative 3 on Wildlife

Direct and Indirect Effects

Threatened and Endangered Species

Northern Spotted Owl – Federally Threatened

Proposed activities on matrix lands in Alternative 3 would be the same as Alternative 2.

In addition, Alternative 3 proposes salvage in riparian reserves with severe blowdown. Canopy less than 30 percent is no longer spotted owl nesting, roosting, foraging or dispersal habitat. There would be no additional affect to spotted owls because no habitat would be removed. Any salvage in a riparian area within 200 feet of a known spotted owl site would have a seasonal restriction from March 1 through June 30 to avoid disturbance to spotted owls.

Alternative 3 proposes risk reduction and restoration on approximately 30 acres within a 100-acre spotted owl activity center (LSR) severely damaged by the January windstorm. Restoration would only occur in areas no longer providing spotted owl habitat. The project is designed to implement treatments to reduce the potential for epidemic levels of bark beetles; reduce the fire risk to remaining nesting, roosting, foraging, and dispersal habitat; and accelerate the reestablishment and growth of conifer seedlings in severely damaged stands within the 100-acre northern spotted owl activity center. Risk reduction and restoration in the 100-acre spotted owl activity center (LSR) is designed to meet the requirements outlined in the NWFP Standards and Guidelines (p. C-11 through C-13). The NWFP states that any action in a late-successional reserve is subject to review by the Regional Ecosystem Office (REO). The REO has been replaced by the Interagency Late-Successional Reserve Working Group. The BLM prepared a Late-Successional Reserve Assessment for this 100-acre activity center and it is under review by the Interagency LSR Working Group.

Removal of the windthrown trees in the severely damaged areas would reduce the amount of trees that provide insect habitat. With the reduced amount of breeding habitat, it is expected there would be a corresponding reduction of insects and the reduced potential for green tree mortality in those areas salvaged prior to beetle emergence. Generally, for every 10 down Douglas-fir trees at least 10 inches in diameter and infested, 4 standing green trees can be expected to be infested (Goheen 2008). The volume loss of standing trees can approach 30 to 60 percent of the windthrown volume if there are more than 3 down trees per acre greater than 14 inches in diameter (ODF 2007). The proposed action would reduce the risk of insects moving into the intact spotted owl habitat adjacent to the areas of severe blowdown.

Risk of increased fire hazard would be reduced with the removal of windthrown trees in 40 acres of severely damaged areas. Under Alternative 3, stands which were only lightly affected by the blowdown and continue to provide spotted owl nesting, roosting, foraging and dispersal habitat would have a lower risk to a severe wildfire burning through the area into the intact green stands, due to removal of fuels.

Windthrown trees in the severe blowdown areas in the 100-acre spotted owl activity center typically cover the ground surface for a depth of 2 to 6 feet deep and few openings remain for the establishment and growth of conifer seedlings. Where openings do occur, it is expected that early seral brush species would rapidly expand into the openings and limit conifer growth. Removing windthrown trees within the severe damage areas would reduce the amount and depth of trees that cover the ground while maintaining sufficient amounts of coarse woody debris to sustain the necessary physical complexity and stability of late successional owl cores. Openings on the forest floor would be created and would allow for the planting and rapid growth of conifer seedlings. Stand development and the restoration of species composition, structural diversity, and canopy cover would be accelerated by at least 10 to 20 years under Alternative 3 proposed treatments.

The proposal for restoration in areas with severe blowdown would be “no effect” to spotted owls because windthrown trees would only be removed in areas that no longer provide suitable spotted owl habitat. A seasonal restriction would be implemented to avoid disturbance to spotted owls if they are present in the part of the activity center which still provides spotted owl nesting, roosting, and foraging habitat. Impacts to prey would be the same as discussed in Alternative 2.

Actions within stands where the habitat has adequate canopy and structure to be classified as nesting, roosting, foraging, or dispersal for spotted owls “may affect, but are not likely to adversely affect” spotted owls, due to disturbance from noise.

All proposed timber harvest actions in nesting, roosting, foraging and dispersal spotted owl habitat “may affect, not likely adversely affect” northern spotted owl. The proposed action is covered under

LOC #8330.I0101(08) July 10, 2008. Proposed salvage operations in nesting, roosting, and foraging and dispersal habitat would treat but maintain the current (post-storm) function of the forest as owl habitat.

3.10 Summary of Effects on Other Resources

The following resources did not pertain to the issues identified and analyzed in this EA. Possible effects from each alternative were analyzed and the analyses are included in the appendices for this document. A summary of these effects in included below. See the appendices for the complete discussion.

3.10.1 Effects of Alternatives on Botany

Required surveys for Threatened and Endangered (T&E) and Sensitive vascular plants, lichens, and bryophytes will be completed in proposed salvage harvest units and road and landing construction prior to signing the Decision Record. The action alternatives would be "**no affect**" to T&E plant species because no populations occur in areas that would be impacted by salvage operations. As of July 1, 2008, five Bureau Sensitive plant species with eight sites (see Appendix B, Botany, Table B-2) are located within or adjacent to salvage harvest units and proposed new road or landing construction. The proposed activities in the action alternatives would not trend Sensitive vascular plants, lichens, or bryophytes toward listing because surveys will be completed and documented sites would be protected from direct and indirect effects. The BLM expects landscape level strategic surveys, suitable habitat in late-successional reserves, and protection of known sites throughout the Northwest Forest Plan area to prevent Sensitive fungi from trending toward listing as a result of the proposed salvage activities in the action alternatives. The magnitude and scale of harvest activities proposed in reserves in Alternative 3 is small enough that they would not trend Sensitive fungi toward listing.

For a complete discussion of existing conditions and analysis of possible impacts from the proposed project, please see Appendix B, Botany.

3.10.2 Effects of Alternatives on Noxious Weeds

As of July 1, 2008, populations of Canada thistle, yellow star-thistle, diffuse knapweed, and spotted knapweed (see Appendix C, Noxious weeds, Table C-3) have been documented within the Butte Falls Blowdown Salvage Project Area. Although the two action alternatives create risk of introducing or spreading noxious weeds during salvage harvest operations, the implementation of PDFs and on-going treatment and monitoring of noxious weed populations in the Butte Falls Resource Area reduce those risks and prevent the proposed actions from contributing additional cumulative effects to noxious weeds in the Project Area.

For a complete discussion of existing conditions and analysis of possible impacts from the proposed project, please see Appendix C, Noxious Weeds.

3.10.3 Effects of Alternatives on Air Quality

Air Quality is not an issue because the current air quality and visibility conditions are not monitored within the Big Butte Creek 5th field watershed and there are no areas within the Project Area that have been designated air quality nonattainment areas. Grants Pass and Medford are the closest designated air quality nonattainment area. Grants Pass is classified as a nonattainment area for fine particulate (PM10) and carbon monoxide standards.

For a complete discussion of existing conditions and analysis of possible impacts from the proposed project, please see Appendix E, Air Quality.

3.10.4 Effects of Alternatives on Visual Resources

The January 2008 windstorm caused major changes to the visual resources in the Project Area. Trees were blown down in random patterns and storm damage ranged from scattered to severe. The impacts to the visual quality of the Project Area occurred as a result of the windstorm.

The majority of the Project Area is classified as Visual Resource Management Class IV in which major modifications to the existing landscape may be made. Visual Resource Management Class II lands are present along the Butte Falls/Prospect Highway, in the Cobleigh bridge area, and in the Lost Creek Lake viewshed.

Visual evidence of salvage harvest would be most evident immediately adjacent to minor roads and would be short-term until the remaining vegetation greens up or the trees planted after salvage activities grow. Most salvage units are not visible from the major travel routes in the Project Area (Highway 62, Cobleigh Road, Butte Falls Highway, and Butte Falls/Prospect Highway). Proposed salvage units are out of sight because trees along the roads screen the view, units are located too far from the roads to be seen, or the steep topography hides the salvage units.

For a complete discussion of Visual Resources, please see Appendix F.

3.11 Unavoidable, Irretrievable, and Irreversible Effects

3.11.1 Environmental Effects that cannot be Avoided

Implementing any alternative would result in some degree of environmental effects that cannot be avoided. While standards, guidelines, PDFs, BMPs, and mitigation measures are intended to keep the extent and duration of these effects within acceptable levels, effects cannot be completely eliminated. Although standards, guidelines, PDFs, and BMPs are designed to prevent effects to soil, water, wildlife, fish and plants, the potential for impacts does exist.

Air quality would be affected by smoke from prescribed fires and burning slash piles. The impacts would be lessened by following the ODF's Smoke Management Plan and implementing mitigation measures such as covering hand piles to permit burning during the rainy season, conducting mop-up as soon as possible after ignition is complete, and burning lighter fuels with lower fuel moistures to facilitate rapid and complete burning.

Sediment could be produced by surface erosion and channel erosion. Ground-disturbing activities have the potential to temporarily increase sediment loads in some streams. Mitigation measures for ground-disturbing activities would include using existing skid trails, operating ground-based equipment outside riparian reserves, restricting mechanical operations to slopes less than 35 percent, limiting construction to the dry season (generally May 15 to October 15) and waterbarring skid trails.

3.11.2 Relationship between Short-term Uses and Long-Term Productivity

Short-term use of the land includes day-to-day and even year-to-year activities that affect the landscape. It includes activities that remove resources from the land, such as fishing and hunting, as well as activities that do not, such as photography, sightseeing, and hiking. Short-term actions include management activities, such as vegetation management and harvesting of trees. As a renewable resource, trees and vegetation can reestablish and grow again if the productivity of the land is not impaired. Maintaining the productivity of the land is a complex, long-term objective. All action alternatives protect the long-term productivity of the project area through the use of specific standards and guidelines, mitigation measures, PDFs, and BMPs.

Long-term productivity could change as a result of various management activities. Soil and water are two key factors in ecosystem productivity and these resources would be protected in all action alternatives to avoid damage that could take decades to rectify. Timber, wildlife habitat, and other renewable resources all rely on maintaining long-term soil productivity. Quality and quantity of water from the Project Area may fluctuate as a result of short-term uses, but no long-term effects to the water resources are expected to occur as a result of actions proposed in the alternatives.

4.0 List of Preparers

List of Preparers	
Name	**Position/Responsibility**
Management Guidance	
Christopher McAlear	Butte Falls Field Manager/Management Guidance
Matt Azhocar	Natural Resource Staff Administrator/Management Guidance
Jared Nichol	Planning and Environmental Coordinator/Management Guidance
Interdisciplinary Team	
John Bergin	Forest Manager/Team Lead
Jean Williams	Environmental Specialist/NEPA Compliance
Randy Bryan	Engineer/Transportation Systems
Linda Hale	Wildlife Biologist/Wildlife; Biological Assessment; LSRA
Dianne Keller	GIS Specialist/Maps and Data
Mike Korn	Forester/Layout Design
Steve Liebhardt	Fisheries Biologist/Fisheries; Biological Assessment
Trish Lindaman	Outdoor Recreation Planner/Visual Resources
Leanne Mruzik	Fuels Specialist/Fire and Fuels; Air Quality
John Osmanski	Forester/Forest Conditions; Silvicultural Prescriptions
Ann Ramage	Archaeologist/Cultural Resources
Shawn Simpson	Hydrologist/Water Resources
Ken Van Etten	Soil Scientist/Soil
Robyn Wicks	Natural Resource Specialist/Writer-Editor; Document Layout
Marcia Wineteer	Botanist/Botany; Noxious Weeds
EA Support	
Daryl Jackson	Fisheries Technician/Fisheries Support
Jonas Parker	Hydrologic Technician/Hydrology and Soil Support
Phil Ritter	Forester/Planning

References

General References

Flowers, R. 2006. Managing Blowdown Following Major Windstorms (PowerPoint Presentation). Oregon Department of Forestry [Online]http://www.oregon.gov/ODF/Private_Forest/docs/fh/ManagingBlowdownfollowingMajorWindstorms.pps

McCarty. 2008. Personal communication from Tyler McCarty. Oregon Department of Forestry, Protection Supervisor, Central Point, OR.

Oregon Department of Forestry. 2007. Recent Blowdown in Western Oregon. Forest Health and Monitoring Unit. 2p. [Online] http://www.oregon.gov/ODF/Private_Forest/docs/fh/BlowdownWestOR.pdf.

U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management. 1994a. *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. 1994b. *Record of Decision 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, Version 1.2* Medford, OR.

U.S. Department of the Interior, Bureau of Land Management, Medford District. 1994. *Medford District Proposed Resource Management Plan/Environmental Impact Statement* Medford, OR.

U.S. Department of the Interior, Bureau of Land Management, Medford District. 1995a. *Medford District Record of Decision and Resource Management Plan* Medford, OR.

U.S. Department of the Interior, Bureau of Land Management, Medford District, Butte Falls Resource Area. 1995b. *Central Big Butte Creek Watershed Analysis* Medford, OR. 73 pp.

U.S. Department of the Interior, Bureau of Land Management, Medford District, Butte Falls Resource Area. 1998a. *Lost Creek Watershed Analysis* Medford, OR. 128 pp.

U.S. Department of the Interior, Bureau of Land Management, Medford District, Butte Falls Resource Area. 1998b. *A Watershed Analysis and Management Plan for BLM Lands Within the Ginger Springs Recharge Area* Medford, OR.

U.S. Department of the Interior, Bureau of Land Management, Medford District, Butte Falls Resource Area. 1999. *Lower Big Butte Watershed Analysis* Medford, OR.

Forest Condition References

Busby, P. P. Adler, T.L. Warren, and F.J. Swanson. 2001. A survey of the fates of residual trees in green tree retention units, western Cascades, Oregon. [Online] http://www.fsl.orst.edu/lter

Flowers, R. 2006. Managing Blowdown Following Major Windstorms (PowerPoint Presentation). Oregon Department of Forestry [Online]http://www.oregon.gov/ODF/Private_Forest/docs/fh/ManagingBlowdownfollowingMajorWindstorms.pps

Franklin, J.F. 1992. Scientific basis for new perspectives in forest and streams. In: *Watershed Management - Balancing Sustainability and Environmental Change* R.J. Naiman [editor], Springer-Verlag, New York, NY. p. 27-72.

Goheen, D. 2008. Personal Communication. Don Goheen, Entomologist/Plant Pathologist. US Forest Service, Southwest Oregon Forest Insect and Disease Service Center, Central Point, OR.

Hansen, A.J., T.A. Spies, F.J. Swanson, and J.L. Ohmann. 1991. Conserving biodiversity in managed forests, lessons from natural forests. *BioScience* 41(6):382-392.

Hunter, M. 1995. Residual trees as biological legacies. In: Communiqué Number 2. Cascade Center for Ecosystem Management, Oregon State University and USDA Forest Service, Corvallis, OR. 27p.

Oregon Department of Forestry. 2007. Recent Blowdown in Western Oregon. Forest Health and Monitoring Unit. 2p. [Online] http://www.oregon.gov/ODF/Private_Forest/docs/fh/BlowdownWestOR.pdf.

Perry, D.A. 1988. Landscape pattern and forest pest. *Northwest Environmental Journal* 4:213-228.

Schmitz, R.F. and K.E. Gibson. 1996. Douglas-fir beetle. Forest Insect and Disease Leaflet 5. R1-96-87. USDA Forest Service.

USDA Forest Service. 2006. Forest Insect and Disease Aerial Survey Data. 2006 100K Survey Maps. [Online] http://www.fs.fed.us/r6/nr/fid/as/quad06/index.shtml

USDA Forest Service. 2007. Forest Insect and Disease Aerial Survey Data. 2007 100K Survey Maps. [Online] http://www.fs.fed.us/r6/nr/fid/as/quad07/index.shtml

Fire and Fuels References

Agee, J.K. 1993. *Fire Ecology of Pacific Northwest Forests* Island Press, Washington, DC.

Agee, J.K. and C.N. Skinner. 2005. Basic principles of forest fuel reduction treatments. *Forest Ecology and Management* 211(2005):83-96.

Alabama Cooperative Extension System. 2008. Fuel's Effect on Fire Behavior. [Online] http://www.pfmt.org/fire/fuels_effect.htm

Andrews, P.L. 1986. BEHAVE: fire behavior prediction and fuel modeling system – BURN subsystem, Part 1. General Technical Report INT-GTR-194. USDA Forest Service, Intermountain Research Station, Ogden, UT.

Andrews, P.L., C.D. Bevins, and R.C. Seli. 2005. BehavePlus fire modeling system, version 3.0: User's Guide. General Technical Report RMRS-GTR-106WWW. USDA Forest Service, Rocky Mountain Research Station. Ogden, UT.

Atzet, T. and D.L. Wheeler. 1982. Historical and ecological perspectives on fire activity in the Klamath geological province of the Rogue River and Siskiyou National Forests. Publication R-6-Range 102. USDA Forest Service, Pacific Northwest Region, Portland, OR. 16p.

Brown, J.K. 1995. Fire regimes and their relevance to ecosystem management. In: *Proceedings of the Society of American Foresters National Convention, September 18-22, 1995, Anchorage, Alaska* Society of American Foresters, Washington, D.C. p. 171-178.

Federal Register. 2001. Urban wildland interface communities within the vicinity of Federal lands that are at high risk from wildfire; Notice. *Federal Register* 66(160):43383-43435.

Fillis, B., Thorpe, D., Slack, S., and et al. 2006. *Jackson County Integrated Fire Plan* Jackson County. Medford, OR. [Online] http://www.co.jackson.or.us

Finney, M.A. and J.D. Cohen. 2003. Expectation and evaluation of fuel management objectives. In: *Fire, Fuel Treatments, and Ecological Restoration: Conference Proceedings, April 16-18, 2002, Fort Collins, Colorado* Proceedings RMRS-P-29. USDA Forest Service, Rocky Mountain Research Station, Ft. Collins, CO.

Graham, R.T., S. McCaffrey, and T.B. Jain (technical editors). 2004. Science basis for changing forest structure to modify wildfire behavior and severity. General Technical Report. RMRS-GTR-120. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 43 p.

Hann, W.J. and D.L. Bunnell. 2001. Fire and land management planning and implementation across multiple scales. *International Journal of Wildland Fire* 10:389-403.

Hann, W., D. Havlina, A. Shlisky, et al. 2003. Interagency and The Nature Conservancy Fire Regime Condition Class website. USDA Forest Service, US Department of the Interior, The Nature Conservancy, and Systems for Environmental Management.
[Online] http://www.frcc.gov

Hann, W., A. Shlisky, D. Havlina, K. Schon, S. Barrett, T. DeMeo, K. Pohl, J. Menakis, D. Hamilton, J. Jones, and M. Levesque. 2004. *Interagency Fire Regime Condition Class Guidebook* USDA Forest Service, US Department of the Interior, The Nature Conservancy, and Systems for Environmental Management.

Hardy, C.C., D.L. Bunnell, J.P. Menakis, K.M. Schmidt, D.G. Long, D.G. Simmerman, and C.M. Johnston. 1999. Coarse-scale spatial data for wildland fire and fuel management. USDA Forest Service, Rocky Mountain Research Station, Fire Science Laboratory, Prescribed Fire and Fire Effects Research Work Unit.
[Online] http://www.fs.fed.us/fire/fuelman

LANDFIRE. 2007. LANDFIRE Project, USDA Forest Service and USDI.
[Online] http:/www.landfire.gov

Leuschen, T., T. Wordell, M. Finney, D. Anderson, T. Aunan, and P. Tine. 2000. Fuel risk assessment of the blowdown in the Boundary Waters Canoe Wilderness Area and adjacent lands. USDA Forest Service, Superior National Forest, Duluth, MN.

McCarty, T. 2008. Personal communication from Tyler McCarty. Oregon Department of Forestry, Protection Supervisor, Central Point, OR.

National Wildlife Coordinating Group. 2001. Fire Effects Guide.
[Online] http://www.nwcg.gov/pms/RxFire/FEG.pdf

Omi, P.N. and E.J. Martinson. 2002. Effects of fuels treatments on wildfire severity. Final report. Joint Fire Sciences Program. Colorado State University, Fort Collins, CO.

Omi, P.N., E.J. Martinson, and G.W. Chong. 2002. Effectiveness of pre-fire fuel treatments. Joint Fire Sciences Program. Colorado State University, Fort Collins, CO.

Omi, P.N., E.J. Martinson, and G.W. Chong. 2006. Effectiveness of pre-fire fuel treatments. Final report. JFSP Project 03-2-1-07. Submitted to Joint Fire Science Program Governing Board.

Peterson, D.L., M.C. Johnson, J.K. Agee, T.B. Jain, D. McKenzie, and E.D. Reinhardt. 2005. Forest structure and fire hazard in dry forests of the western United States. General Technical Report PNW-GTR-628. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Rothermel, R.C. 1983. How to predict the spread and intensity of forest and range fires. Research Paper INT-RP-143. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. p. 13-14.

Rothermel, R.C. 1991. Predicting behavior and size of crown fires in the Northern Rocky Mountains. Research Paper INT-RP-438. USDA Forest Service, Intermountain Research Station, Ogden, UT. 46p.

Sandberg, D.V., C.C. Hardy, R.D. Ottmar, J.A.K. Snell, A. Acheson, J.L. Peterson, P. Seamon, P. Lahm, and D, Wade. 1999. National strategy plan: modeling and data systems for wildland fire and air quality. General Technical Report PNW-GTR-450. USDA Forest service, Pacific Northwest Research Station, Portland, OR.

Schmidt, K.M., J.P Menakism, C.C. Hardy, W.J. Hann, and D.L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. General Technical Report RMRS-GTR-87. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO. 41p.

Scott, J.H. and R.E. Burgan. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. General Technical Report RMRS-GTR-153. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Weatherspoon, C.P. 1996. Fire-silviculture relationships in Sierra forest. In: *Sierra Nevada Ecosystem Project: Final Report to Congress, Volume II, Assessments and Scientific Basis for Management Options* Water and Wildland Resources Center Report Number 37. Centers for Water and Wildland Resources, University of California, Davis, CA. p. 1167-1176.

Weatherspoon, C.P. and C.N. Skinner. 1995. An assessment of factors associated with damage to tree crowns from the 1987 wildfires in northern California. *Forest Science* 4(3):430-451.

Woodall, C.W. and L.M. Nagel. 2007. Downed woody fuel loading dynamics of a large-scale blowdown in northern Minnesota, U.S.A. *Forest Ecology and Management* 247(2007):194-199.

Economics References

Hadfield, J. and R. Magelssen. 2006. *Wood Changes in Fire-Killed Tree Species in Eastern Washington* USDA Forest Service, Wenatchee, WA.

Oregon Employment Department. 2008. 2008 Oregon Wage Information – Statewide and Regional. [Online] http://www.qualityinfo.org/pubs/owi/owi2008.pdf

Soil References

Adams, P.W. and H.A. Froehlich. 1981. *Compaction of Forest Soils* Pacific Northwest Extension Publication, PNW 217, Oregon State University Extension Service, Corvallis, OR.

Clayton, J.L. 1981. Soil disturbance caused by clearcutting and helicopter yarding in the Idaho batholith. Research Note INT-305. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 6p.

Dyrness, C.T. 1967. Soil surface conditions following skyline logging. Research Note. PNW-55. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR. 8p.

Elliot, W.J., D. Page-Dumroese, and P.R. Robichaud. 1999. The effects of forest management on erosion and soil productivity. In: *Proceedings of the Symposium on Soil Quality and Erosion Interaction, Keystone, CO, July 7, 1996*. Soil and Water Conservation Society, Ankeney, IA. 16 p.

Froehlich, H.A. 1979. Soil compaction from logging equipment: effects on growth of young ponderosa pine. *Journal of Soil Water Conservation* 34:276-278.

Swanston, D.N. and C.T. Dyrness. 1973. Stability of steep land. *Journal of Forestry* 71(5):264-269.

USDA NRCS. 1993. The Soil Survey of Jackson County, Oregon. [Online] http://www.or.nrcs.usda.gov/pnw_soil/or_data.html

U.S. Department of the Interior, Bureau of Land Management. 1979. *Final Timber Management Environmental Statement, Jackson-Klamath* Oregon State Office. Portland, OR.

U.S. Department of the Interior, Bureau of Land Management, Butte Falls Resource Area. 2005. Road Inventory.

Wert, S. and B.R. Thomas. 1981. Effects of skid roads on diameter heights and volume growth in Douglas-fir. *Soil Science Society of American Journal* 45(3):629-632.

Water Resource References

Adams, P.W. and H.A. Froehlich. 1981. *Compaction of forest soils.* Pacific Northwest Extension Publication, PNW 217. Oregon State University Extension Service, Corvallis, OR.

Clayton, J.L. 1981. Soil disturbance caused by clearcutting and helicopter yarding in the Idaho batholith. Research Note INT-305. USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT. 6p.

Dyrness, C.T. 1967. Soil surface conditions following skyline logging. Research Note. PNW-55. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR. 8p.

Ferrero, T. 1991. *Ginger Springs Watershed Geohydrologic Study* Ferrero Geologic. 17p.

Foltz, R.B. and K.A. Yanosek. 2005. Effects of road obliteration on stream water quality. In: *Managing watersheds for human and natural impacts: engineering, ecological, and economic challenges: Proceedings of the 2005 Watershed Management Conference, July 19-22, 2005, Williamsburg, VA* American Society of Civil Engineers, Alexandria, VA. 12p.

Gucinski, H., M. Furniss, R. Ziemer, and M. Brookes (editors). 2001. Forest Roads: A Synthesis of Scientific Information. General Technical Report PNW-GTR-509. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Harr, R.D. 1976. Forest practices and streamflow in western Oregon. General Technical Report GTR-PNW-49. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

H.G.E., INC. Engineers and Planners. 1993. Water System/Source Master Plan. Town of Butte Falls.

Kattelmann, R. 1996. Hydrology and water resources. In: *Sierra Nevada Ecosystem Project: Final Report to Congress, Volume II, Assessments and Scientific Basis for Management Options* Wildland Resources Center Report No. 39. Centers for Water and Wildland Resources, University of California, Davis, CA. p. 855-920.

Landsberg, J.D., R.E. Miller, H.W. Anderson, and J.S. Tepp. 2003. Bulk density and soil resistance to penetration as affected by commercial thinning in northeastern Washington. Research Paper PNW-RP-551. USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Luce, C.H. and T.A. Black. 1999. Sediment production from forest roads in western Oregon. *Water Resources Research* 35(8):2561-2570.

Oregon Administrative Rules (OAR) 340-041. 2005. Oregon Department of Environmental Quality, water pollution, division 41, water quality standards: beneficial uses, policies, and criteria for Oregon.
[Online] http://arcweb.sos.state.or.us/rules/OARs_300/OAR_340/340_041.html

Oregon Department of Environmental Quality. 2004. Draft Rogue basin riparian condition assessment report. Medford, OR.

Oregon Department of Environmental Quality. 2006. Oregon's 2004/2006 integrated report. [Online] http:www.deq.state.or.us/wq/303dlist/wq2004intgrrpt.htm

Swanston, D.N. and C.T. Dyrness. 1973. Stability of steep land. *Journal of Forestry* 71(5):264-269.

Swift, L.W., Jr. 1984. Gravel and grass surfacing reduces soil loss from mountain roads. *Forest Science* 30(3):658-670.

U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management. 1999. Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters. USDA Forest Service, Pacific Northwest Region, Regional Office, Portland, OR.

U.S. Department of Agriculture, Forest Service and U.S. Department of the Interior, Bureau of Land Management. 2005. Northwest Forest Plan temperature TMDL implementation strategies. Portland, OR.

U.S. Department of the Interior, Bureau of Land Management. 1979. *Final Timber Management Environmental Statement, Jackson-Klamath* Oregon State Office. Portland, OR.

Watershed Professionals Network. 2001. Appendix A - ecoregion descriptions. *Oregon Watershed Assessment Manual* Oregon Watershed Enhancement Board, Salem, OR.
[Online] http://www.oweb.state.or.us/OWEB/docs/pubs/wa_manual99/apdx1-ecoregions.pdf

Wemple, B.C., J.A. Jones, and G.E. Grant. 1996. Channel network extension by logging roads in two basins, western Cascades, Oregon. *Water Resources Bulletin* 32(6):1-13.

Fisheries References

Beschta, R.L., R.E. Bilby, G.W. Brown, L.B. Holtby, and T.D.Hofstra. 1987. Stream temperature and aquatic habitat: fisheries and forestry interactions. In: *Streamside Management: Forestry and Fishery Interactions* Edited by E.O. Salo and T.W. Cundy. College of Forest Resources, University of Washington, Seattle, WA. p. 191-232.

Bramblett, R.G., M.D. Bryant, E.W. Brenda, and R.G. White. 2002. Seasonal use of small tributary and main-stem habitats by juvenile steelhead, coho salmon, and dolly varden in a southeastern Alaska drainage basin. *Transactions of the American Fisheries Society* 131(3):498-506.

Chapman, D.W. 1988. Critical review of variables used to define effects of fines in redds of large salmonids. *Transactions of the American Fisheries Society* 117(1):1-21.

Cunjak, R.A. 1996. Winter habitat of selected stream fishes and potential impacts from land-use activity. *Canadian Journal of Fisheries and Aquatic Sciences* 53(Supplement 1):267-282.

Federal Register. 2002. Magnuson-Stevens Act Provision; Essential Fish Habitat (EFH); Final Rule. *Federal Register* 67(12):2343-2383.

Hall, J.D., and R.L. Lantz. 1969. Effects of logging on the habitat of coho salmon and cutthroat trout in coastal streams. In: *Symposium on Salmon and Trout in Streams*. T.G. Northcote [editor]. University of British Columbia, Vancouver, B.C. p. 355-375.

Hausle, D.A. and D.W. Coble. 1976. Influence of sand in redds on survival and emergence of brook trout (*Salvelinus fontinalis*). *Transactions of the American Fisheries Society* 105(1):57-63.

Hilderbrand, R.H. and J.L. Kershner. 2000. Movement patterns of stream-resident cutthroat trout in Beaver Creek, Idaho-Utah. *Transactions of the American Fisheries Society* 129(5):1160-1170.

Kahler, T.H., P. Roni, and T.P. Quinn. 2001. Summer movement and growth of juvenile anadromous salmonids in small western Washington streams. *Canadian Journal of Fisheries and Aquatic Sciences* 58:1947-1956.

Madej, M. 2001. Erosion and sediment delivery following removal of forest roads. *Earth Surface Processes and Landforms* 26(2):1-16.

Meehan, W.R., editor. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. *American Fisheries Society* Special Publication 19.

Montgomery, D.R. and J.M. Buffington. 1997. Channel-reach morphology in mountain drainage basins. *Geological Society of America Bulletin* 109(5):596-611.

Moore, K.M.S. 1997. Habitat benchmarks. Unpublished manuscript. Oregon Department of Fish and Wildlife, Portland, OR.

Murphy, M. L., J. Heifetz, S.W. Johnson, K.V. Koski, and J.F. Thedinga. 1986. Effects of clear-cut logging with and without buffer strips on juvenile salmonids in Alaskan streams. *Canadian Journal of Fisheries and Aquatic Sciences* 43:1521-1533.

Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. Pacific salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. *Fisheries* 16(2):4-21.

Newbold, J.D., D.C. Erman, and K.B. Roby. 1980. Effects of logging on macroinvertebrates in streams with and without buffer strips. *Canadian Journal of Fisheries and Aquatic Sciences* 37:1076-1085.

Nickelson, T.E., J.D. Rodgers, S.L. Johnson, , and M.F. Solazzi, 1992. Seasonal changes in habitat use by juvenile coho salmon (*Oncorhynchus kisutch*) in Oregon coastal stream. *Canadian Journal of Fisheries and Aquatic Sciences* 43:783-789.

Oregon Department of Fish and Wildlife. 1995-2000. Aquatic Habitat Inventories. Available at the Butte Falls Resource Area, Medford District, 3040 Biddle Road, Medford, OR 97504.

Oregon Department of Fish and Wildlife. 1994 and 1995. Aquatic Habitat Inventories. Available at the Butte Falls Resource Area, Medford District, 3040 Biddle Road, Medford, OR 97504.

Oregon Department of Fish and Wildlife. 1995. Native fish report.

Oregon Department of Fish and Wildlife. 1998-2000. Upper Rogue smolt trapping project, 1999-2004. Available at the Butte Falls Resource Area, Medford District, 3040 Biddle Road, Medford, OR 97504.

Oregon Department of Fish and Wildlife. 2005. Draft native fish report.

Phillips, R.W., R.L. Lantz, E.W. Claire, and J.R. Moring. 1975. Some effects of gravel mixtures on emergence of coho salmon and steelhead trout fry. *Transactions of the American Fisheries Society* 104(5):461-466.

Roni, P., T.J. Beechie, R.E. Bilby, F.E. Leonetti, M.M. Pollock, and G.R. Pess. 2002. A review of stream restoration techniques and a hierarchical strategy for prioritizing restoration in Pacific Northwest watersheds. *North American Journal of Fisheries Management* 22(1):1-20.

Rosenfeld, J.S., M. Porter, and E. Parkinson. 2000. Habitat factors affecting the abundance and distribution of juvenile cutthroat trout (*Oncorhynchus clarki*) and coho salmon (*Oncorhynchus kisutch*). *Canadian Journal of Fisheries and Aquatic Sciences* 5**7**:766–774.

Satterthwaite, T.D. 2002. Klamath Mountains Province Steelhead Project, 1999 Annual Report. Monitoring Program Report Number OPSW-ODFW-2002-09. Oregon Department of Fish and Wildlife, Portland, OR.

Switalski, T.A., J.A. Bissonette, T.H. Deluca, C.H. Luce, and M.A. Madej. 2004. Benefits and impacts of road removal. *Frontiers in Ecology and the Environment* 2(1):21-28.

Tappel, P.D. and T.C. Bjornn. 1983. A new method of relating size of spawning gravel to salmonid embryo survival. *North American Journal of Fisheries Management* 3(2):123-135.

Vogt, J. 1999-2001. Upper Rogue smolt trapping project, 1998. Oregon Department of Fish and Wildlife. Available at the Butte Falls Resource Area, Medford District, 3040 Biddle Road, Medford OR 97504.

Wildlife References

Aubry, K.B. and J.C. Lewis. 2002. Extirpation and reintroduction of fishers (*Martes pennanti*) in Oregon: implications for their conservation in the Pacific states. *Biological Conservation* 114(1):79-90.

Aubry, K.B. and C.M. Raley. 2002. Ecological characteristics of fishers in the southern Oregon Cascade Range. Final Progress Report: June 2002. USDA Forest Service, Pacific Northwest Research Station, Olympia Forestry Sciences Lab, Olympia, WA.

Aubry, K.B. and C.M. Raley. 2006. Ecological Characteristics of Fishers (*Martes pennanti*) in the Southern Oregon Cascade Range. Update July 2006. USDA Forest Service, Pacific Northwest Research Station, Olympia Forestry Sciences Lab, Olympia, WA.

Aubry, K., S. Wisely, C. Raley, and S. Buskirk. 2004. Zoogeography, spacing patterns, and dispersal in fishers: insights gained from combining field and genetic data. In: *Martens and Fishers (Martes) in Human-altered Environments: An International Perspective* D.J. Harrison, A.K. Fuller, and G. Proulx [editors]. Springer-Verlag, New York, NY. p. 201-220

Courtney, S.P., J.A. Blakesley, R.E. Bigley, M.L. Cody, J.P. Dumbacher, R.C. Fleischer, A.B. Franklin, R.J. Gutierrez, J.M. Marzluff, and L. Sztukowski. 2004. Scientific evaluation of the status of the Northern Spotted Owl. Sustainable Ecosystems Institute. Portland, OR

Diller, L. 2004. Notes from Fisher Meeting. Lowell Diller, Research Wildlife Biologist, Green Diamond (formerly Simpson) Timber Company.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. *The Birders Handbook, A Field Guide to the Natural History of North American Birds* Simon and Schuster. New York, NY.

Federal Register. 1992. US Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Northern Spotted Owl; Final Rule. *Federal Register* 57(10):1796-1838.

Federal Register. 1998. US Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; Notice of 12-month Finding on a Petition to List the Northern Goshawk in the Contiguous United States West of the 100th Meridian; Proposed Rule. *Federal Register* 63(124):35183-35184.

Federal Register. 2004. US Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants; 12-month Finding for a Petition to List the West Coast District Population Segment of the Fisher (*Martes pennanti)*; Proposed Rule. *Federal Register* 69(68):18770-18792.

Goheen, D. 2008. Personal Communication. Don Goheen, Entomologist/Plant Pathologist, US Forest Service, Southwest Oregon Forest Insect and Disease Service Center, Central Point, OR.

Marshall, D.B., M.G. Hunter and A.L. Contreras. 2003. *Birds of Oregon, A General Reference* Oregon State University Press, Corvallis, OR.

Oregon Department of Forestry. 2007. Recent Blowdown in Western Oregon. Forest Health and Monitoring Unit. 2p.
[Online] http://www.oregon.gov/ODF/Private_Forest/docs/fh/BlowdownWestOR.pdf.

Partners in Flight. Westside Coniferous Forests.
[Online] http://community.gorge.net/natres/pif/westside_page1.html.

Reynolds, R.T., R.T. Graham, and M.H. Reiser. 1992. Management recommendations for the northern goshawk in the southwestern United States. General Technical Report GTR-RM-217. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO. 90p.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. A conservation strategy for the northern spotted owl: a report of the Interagency Scientific committee to address the conservation of the northern spotted owl. USDA Forest Service and USDI Bureau of Land Management, US Fish and Wildlife Service, and National Park Service. Portland, OR. 427 pp.

USDA Forest Service. 2006. Forest Insect and Disease Aerial Survey Data. 2006 100K Survey Maps.
[Online] http://www.fs.fed.us/r6/nr/fid/as/quad06/index.shtml

USDA Forest Service. 2007. Forest Insect and Disease Aerial Survey Data. 2007 100K Survey Maps. [Online] http://www.fs.fed.us/r6/nr/fid/as/quad07/index.shtml

USDA Forest Service and USDI Bureau of Land Management. 2007. *Supplement to the July 2006 Draft Supplement to the 2004 Final Supplemental Environmental Impact Statement to Remove or Modify the Survey and Manage Mitigation Measure Standards and Guidelines* Government Printing Office.

USDI Bureau of Land Management, Washington Office. 2008a. Bureauwide Guidance for Raptor (Birds of Prey) Protection and Conservation. Instruction Memorandum No. 2008-086, March 11, 2008.

USDI Bureau of Land Management, Washington Office. 2008b. Migratory Bird Treaty Act - Interim Management Guidance. Instruction Memorandum No. 2008-050, December 18, 2007.

USDI US Fish and Wildlife Service. 2004. A Blueprint for the Future of Migratory Birds: Migratory Bird Program Strategic Plan 2004-2014. USFWS Migratory Birds and State Programs, Arlington, VA.

USDI US Fish and Wildlife Service. 2008a. Memorandum to Tim Reuwsaat, July 10, 2008. Informal consultation regarding blowdown salvage activities that may affect the northern spotted owl and their critical habitat on public lands administered by the Bureau of Land Management. Reference number 8330.10101 (08). U.S. Fish and Wildlife Service, Roseburg, OR.

USDI US Fish and Wildlife Service. 2008b. Final recovery plan for the northern spotted owl, *Strix occidentalis caurina*. U.S. Fish and Wildlife Service, Portland, OR. xii + 142 pp.

Verts, B.J. and L.N. Carraway. 1998. *Land Mammals of Oregon* University of California Press. Berkeley, CA.

Zabel, C.J., K. McKelvey, and J.P. Ward Jr. 1995. Influence of primary prey on home range size and habitat use patterns of Spotted Owls (*Strix occidentalis*). *Canadian Journal of Zoology* 73:433-439.

Appendix A - Blowdown Silvicultural Prescription and Marking Guidelines

A.1 Management Direction and Objectives

A.1.1 Definitions

Abiotic: Nonliving basic elements and compounds of the environment.

Apical dominance: A term used to describe the dominance of the main central stem of a plant over side stems.

Biotic: Living components of an ecosystem.

S**tomate:** An opening in the surface of a leaf through which water vapor, carbon dioxide, and oxygen pass.

A.1.2 Medford District RMP Management Direction

The management objectives as defined by the Medford District RMP are:

- Timber management activities, including salvage, will occur on BLM-administered lands allocated to planned, sustainable harvest (Matrix) to maximize volume growth and timber yield. The Medford District PRMP/EIS analyzed the impacts of these timber management activities on forest health and vegetation and the effects on biological diversity, in both the short- (10 years) and long-term (decades) (USDI 1994, 4-24 to 4-42).
- Salvage activities on BLM-administered lands are to be designed to ensure that such actions meet the requirements of the ROD/RMP land allocation (RMP, 72 & 186).
- Silvicultural treatments would be designed so that within-stand endemic levels of insects do not increase (RMP, 194).

A.1.3 Treatment Objectives

- To recover timber volume from windthrown and damaged trees in excess of green tree retention, CWD and snag requirements. The excess trees on Matrix lands are part of the timber yield analyzed and allowed for in the ROD/RMP.
- To implement silvicultural treatments that reduces the potential for epidemic levels of bark beetles.
- To accelerate the reestablishment and growth of conifer seedlings in stands that had severe damage with stocking less than the site potential. Slash and brush would be treated following salvage to ensure adequate planting spots. A mix of conifer species would be planted followed by maintenance treatments to ensure the growth potential of the stand is maximized.

A.2 Site and Stand Condition

A.2.1 General Site Description

The proposed treatment area is located in Jackson County approximately 20-25 air miles northeast of the city of Medford. The area is located in portions of section 30 in Township 33 South, Range 3 East and sections 13, 15, 21, 25, 27, 29, 31, 33 and 35 in Township 33 South, Range 2 East and sections 19, 23, 24, and in Township 34 South, Range 3 East and sections 3, 5, 7, 8, 9, 10, 11, 13, 15, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 28, 29, 33, and 35 in Township 34 South, Range 2 East and section 25 in Township 34 South, Range 1 East and sections 7, 19 and 31 in Township 35 South, Range 3 East and sections 1, 3, 13, 17, 19, 21, 23, 25, 27, 29, 33 and 35 in Township 35 South, Range 2 East and sections 7, 19, 20 and 29 in Township 36 South, Range 3 East and sections 1, 2, 3, 11, 13, 14, 23 and 25 in Township 36 South, Range 2 East.

A.2.2 Drainage/Watershed

The proposed salvage areas are located in portions of the Big Butte Creek, Rogue/Lost Creek, South Fork Rogue River and Little Butte Creek, 5th field watersheds. Approximately 54 percent of the salvage occurs in the Big Butte Creek watershed, about 29 percent in the Little Butte Creek watershed, 16 percent in the Rogue/Lost Creek watershed and less than 1 percent is in the South Fork Rogue River watershed.

A.2.3 Abiotic Conditions

A.2.3.1 Soil Type

The dominant soil types in the Big Butte Creek 5th field watershed are the Geppert and Freezner soil series. The Freezner-Geppert soil complex is defined as 60 percent Freezner soils and 35 percent Geppert soils with 5 percent inclusions. Freezner soils are very deep, well-drained, and have a clay loam subsoil. The Geppert soil is moderately deep and is skeletal (greater than 35 percent rock fragments in the subsoil) with an extreme cobbly clay subsoil.

In the Rogue/Lost Creek 5th field watershed south of the Lost Creek Reservoir the dominant soil type is the Dumont and Coyata association. Dumont soils are very deep, well drained and derived from andesite. Limiting management factors are erosion and compaction. Coyata soils are moderately deep, well drained and formed from andesite. The limiting management factors include slope, erosion, compaction and underlying bedrock. The Donegan soil association is also present in the transient snow zone of the watershed. These soils are moderately deep and well drained and occur on slopes of 35 to 65 percent.

In the Little Butte Creek 5th field watershed, soil type and productivity varies by elevation, aspect, topography and bedrock. On the plateau areas of the watershed soils are deep with fine to moderate texture. Top soils are thick with high porosity creating highly productive soils. On canyon side slopes soils are older as compared to the plateau area. Northerly aspects are deeper and more productive than the warmer rockier southerly aspects.

A.2.3.2 Site Index

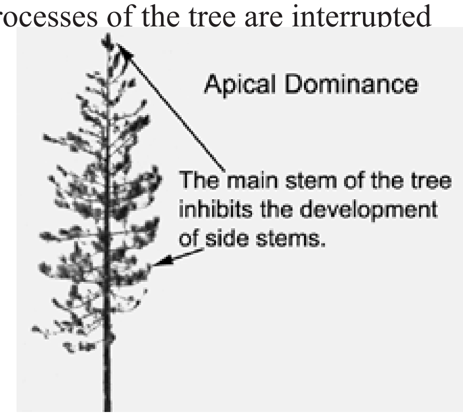
Site index is the average height of the dominant trees at 50 years. The average site index for Douglas-fir within the Big Butte Creek 5th field watershed is about 76, in the Rogue/Lost Creek 5th field watershed the average is 83, and in the Lower Big Butte Creek 5th field watershed the average is 81. Site index is based on the Hann-Scrivani site index equation (Hann and Scrivani, 1987). Height growth is relatively independent of stand density and provides a comparable measure of site productivity between different forest stands.

A.2.3.3 Topography/Precipitation

The land form within this area is variable from moderately steep slopes to flat to gentle slopes. The elevation ranges from 2,100 feet to 4,800 feet above sea level. Annual precipitation averages 45 inches, with approximately 7 inches of dry season precipitation.

A.2.3.4 Existing Site Problems

High growing season temperatures, high evaporative demands, and frequent frosts characterize the climate across the Project Area. The high demand for moisture during prolonged hot and dry summer periods increases tree stress, particularly in overstocked forest stands. During hot, dry periods, the uptake of moisture cannot keep up with the loss through transpiration. When this occurs, the plant closes leaf stomates to maintain adequate cell water content. Plants require at least 75 percent water content in functional cells (Bradford and Hsiao 1982). With the leaf stomates closed, carbon dioxide is not taken into the plant through photosynthesis and the conversion of carbon dioxide and water into carbohydrates, or “food,” does not occur. Without the creation of “food,” the life processes of the tree are interrupted resulting in increased tree stress and a higher risk of insect attack or disease infection. Reduced resin flow in water-stressed trees enables insects to successfully attack the tree (Kramer and Kozlowski 1979).



Frost can be a regeneration problem. Cold air often accumulates (puddles) in low lying areas with slopes less than 15 percent. Late frosts caused by excessive loss of heat through nighttime re-radiation are a common occurrence in areas. The degree of vegetative frost damage is influenced by terrain, soil moisture content, and the amount and kind of ground cover present.

A.2.4 Biotic Condition

A.2.4.1 Plant Series

The north/south orientation of the Cascade Mountains provides the environmental gradient that influences the presence and abundance of vegetative species. Slope, aspect, elevation, soil depth, and geology further define the extent and occurrence of various species. Within the proposed salvage area, white fir is the dominant plant series. The white fir series is one of the most widespread, diverse, and productive plant series of the southern Oregon Cascades. Ponderosa pine, sugar pine, incense cedar, and Douglas-fir represent the early seral tree component of this series. Douglas-fir generally dominates the overstory of most stands before being replaced by white fir.

The majority of the area occupies the warm and dry end of the environmental gradient, with moisture limitations late in the growing season limiting biomass production. The understory is dominated by white fir, with Douglas-fir common. White fir, Douglas-fir, incense cedar, and sugar pine will establish on the site following disturbance. Hardwoods include minor amounts of California black oak, madrone in areas of relatively recent fires, and golden chinquapin on shallow rocky soils. Shrub competition is generally moderate to severe following site disturbance in which the overstory canopy is opened (less than 60 percent crown closure). Vegetative management will be required to ensure successful establishment and growth of conifer regeneration. Shrub species which are present in varying amounts are deerbrush ceanothus, oceanspray, vine maple, hazel, red stem ceanothus, serviceberry, Oregon grape, and thimbleberry. Common herbaceous vegetation includes pathfinder, western starflower, western twinflower, and white inside-out flower.

A.2.4.2 Coarse Woody Debris

Coarse woody debris provides habitat for wildlife, invertebrate, microbial, and fungal species, as well as important ecological functions such as moisture retention, soil stabilization, and nutrient recycling. The amount and decay class of woody debris reflects the stage of stand development (see Table A-2). In a natural cycle, two stages (stand initiation and old growth) typically have the greatest amounts of coarse woody debris. Older decay classes (3, 4, and 5) are more common and reflect coarse woody debris created since stand initiation wildfires in the early 1900s. Older decay classes of coarse woody debris will be left on site and protected to the greatest extent possible from disturbance. In all salvaged forest stands on Matrix lands, decay class 1 or 2 coarse woody debris will be retained at 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long. In Riparian Reserves and late-successional owl activity centers that are salvaged, decay class 1 or 2 coarse woody debris will be retained at 205 linear feet of logs per acre greater than or equal to 20 inches in diameter and 20 feet long.

A.2.4.3 Snags

RMP standards and guidelines require that, over time, one to two snags per acre will be present to meet the requirement for cavity nesting birds at 40 percent of potential population levels. All deterioration stages of snags (see Table A-4) will be retained as part of the silvicultural prescription. During salvage operations, existing snags will be reserved from felling where they are not a safety hazard, and, where necessary, additional green trees will be reserved to meet the target levels. If a snag needs to be fallen for safety concerns, the snag will be left on-site to function as coarse woody debris.

A.2.4.4 Tree and Stand Health, Insects, and Disease

- Bark beetle activity is currently low within the watersheds. Douglas-fir bark beetle (*Dendroctonus pseudotsugae*), flatheaded wood borers (*Melanophila drummond*), western pine beetles (*Dendroctonus brevicomis*), and fir engraver beetles (*Scolytus ventralis* LeConte) are active at natural levels in and adjacent to the Project Area. Windthrown trees, high stocking levels and low moisture availability have created ideal environmental conditions favorable to the build-up of Douglas-fir bark beetles and flatheaded fir borer populations. High populations of these insects may cause the mortality of large healthy green trees over the next 2 to 4 years.
- Stem rots (*Phellinus pini, Oligoporus amarus*, and *Phaelos schweinitzii*) are present, but do not pose a serious concern for stand health. The trees infected with stem rots enhance forest diversity by providing trees with unique structural defects that serve as plant and wildlife habitat, as well as future coarse woody debris.
- Douglas-fir mistletoe is present and common in the southern portions of Township 35 South, Ranges 2 and 3 East and Township 36 South, Ranges 2 and 3 East. Mistletoe is host-specific and may cause tree mortality; growth loss; alteration of crown and canopy structure; increased fire hazard; and increased susceptibility to bark beetles, root rots, and drought stress. Mistletoe brooms, although detrimental to tree growth, provide habitat for mammals and birds

- Root rots (annosus, armillaria, and laminated) are present and are affecting white fir, ponderosa pine and Douglas-fir. Favor the retention of trees that appear to be the most disease resistant; disease virulence and tree species susceptibility can vary from location to location. Root rots create tree stress and can predispose trees to bark beetle attack.
- Pocket gophers populations are variable within the proposed salvage area and are dependant the availability of herbaceous food sources.
- High stand densities are affecting individual tree vigor and stand health. Overstocked stands contain more trees than the site has resources (e.g., moisture, nutrients, and growing space) to provide. This leads to increased tree stress, particularly during prolonged hot summer days without any precipitation. Decreased tree vigor is magnified during periodic drought years when the cumulative effects of below average amounts of precipitation causes the interruption of basic functional processes (e.g., photosynthesis, transpiration, respiration, translocation, and assimilation) over an extended period of time. Maintaining the relative density in forest stands between an upper end of 50 percent and a lower end of 25 percent prevents excessive tree loss from competition. As a point of reference, crowns begin to close when the relative density approaches 15 percent and the mortality of suppressed trees begins after the relative density reaches 65 percent (Perry 1994; Hann and Wang 1990).
- Tree senescence, or aging, also plays a role in the condition and vigor of individual trees. As a tree increases in size and builds up a complex branch system, it shows a decrease in metabolism; gradual reduction in growth of vegetative and reproductive tissues; loss of apical dominance; increase in dead branches; slow wound healing; heartwood formation; increased susceptibility to injury from certain insects, diseases, and unfavorable environmental conditions; and loss of geotrophic responses (growth of stems upward and of roots downward in response to gravity). There is also a decrease in the proportion of photosynthetic to non-photosynthetic tissue; this reduction results in the production of fewer carbohydrates (Kramer and Kozlowski 1979). Movement of food, water, and minerals becomes more difficult as the distance from the roots to the top of the tree increases. The problem is magnified when water becomes a limiting resource in tall trees. Water deficits may cause needle and stem mortality as evidence by snag tops or dead branches and needles in the upper part of the crowns
- In addition to tree aging and the high numbers of trees per acre, other factors contribute to individual tree health and vigor. Factors, such as the amount of understory shrub growth, soil type, precipitation, aspect, crown position in the canopy, topography, root pathogens, and insects, all combine to affect tree vigor and its ability to maintain basic functional processes.

A.3 Analysis in Support of the Prescription

The target stand reflects not only what is planned for the future but also what is expected immediately after treatment. The target stand represents optimum conditions to strive for through management.

A.3.1 Salvage - Present Conditions

Stand damage is rated as scattered, moderate, or severe.

- **Scattered:** The density of scattered windthrown trees is about five trees per acre or less. These areas have approximately 10 percent of the ground covered with windthrown trees.
- **Moderate:** Wind damage to the stand resembles a commercial thinning with 50 to 80 trees per acre left standing and a crown canopy closure of 40 to 60 percent. These areas have between 10 to 40 percent of the ground covered with windthrown trees.

- **Severe:** These stands resemble a NGFMA regeneration harvest. About 8 green trees per acre or less remain in the overstory. Canopy closure is between 10 to 30 percent. Between 40 to 95 percent of the ground is covered with windthrown trees.

A.3.1.2 Target Stand - Salvage

Table A-1. Salvage Treatment Schedule

Year	Salvage Treatment
0	**Salvage:** ▪ Variable amounts of green trees would be left based on the level and extent of wind damage. ▪ Matrix lands: Leave a minimum of 2 snags per acre, 20 inches in diameter or greater (stage 1 and 2) and 120 linear feet (7.5 pieces) of coarse woody debris (decay class 1 and 2, 16″ x 16′). ▪ Riparian reserves and late-successional owl activity centers: Leave a minimum of 2 snags, 20 inches in diameter or greater per acre (stage 1 and 2) and 205 linear feet (10 or more pieces) of coarse woody debris (decay class 1 and 2, 20″ x 20′). **Site preparation:** Scattered damage: Lop and scatter, limited hand-piling of slash concentrations. Moderate damage: Lop and scatter, hand-pile slash concentrations and burn. Severe damage: ▪ Slash trees 1 to 6″ DBH damaged from wind or logging activities. ▪ Leave all healthy, unmerchantable trees. ▪ Lop and scatter, underburn, hand pile and burn, or excavator pile and burn. ▪ Limit piling of logging slash to pieces less than 16″ DBH.
0-1	▪ In severely damaged stands, plant with a mix of ponderosa pine, Douglas-fir, sugar pine, and incense cedar. ▪ Stands with moderate damaged may have openings that may be spot planted. ▪ Apply appropriate maintenance (e.g., vexar tubing, mulching, shading, scalping, baiting) treatments to ensure planting success.
1	▪ Conduct 1st year survival survey in planted stands. ▪ Assess need for supplemental planting or additional maintenance treatment.
3	▪ Conduct 3rd year survey in planted stands. ▪ Assess need for replanting and/or additional maintenance needs.
5	▪ Conduct 5th year stocking survey in planted stands. ▪ Target stand will have a minimum of 280 well-spaced trees per acre. Competing vegetation will have been controlled, with trees growing rapidly.
10	▪ In planted stands, a precommercial thin may be necessary if the understory density is more than 400 trees per acre. Thin to approximately 200 trees per acre and favor pine species, Douglas-fir, and incense cedar.
10-30	Scattered or moderate damaged stands: ▪ If the stand is less than 100 years old, conduct a stand exam to determine density levels. Evaluate the health of the stand for excess tree mortality and reduced radial growth. If the relative density is 60 percent or greater, a commercial thinning is needed. ▪ If the stand is greater than 100 years old, the stand has met the RMP stand age for a regeneration harvest. Do a stand exam to evaluate stand conditions and to determine the number of trees per acre greater than 20″ dbh. Schedule a regeneration harvest if RMP green tree retention guidelines can be met.
35	▪ In planted stands, the average tree diameter is approximately 10 inches. Commercial thin if stand density is appropriate. Otherwise, delay until crown closure and competition reduces growth rates. Thin to approximately 200 trees per acre.
45-80	▪ In planted stands, commercial thin, if appropriate. Favor leaving the pines, Douglas-fir, and incense cedar.
100	▪ In planted stands, assess stand and watershed conditions for possible regeneration harvest.

A.4 Monitoring

Implementation of the standard and guidelines in the NWFP ROD and management direction contained within the Medford District ROD/RMP requires a monitoring system to ensure effective on-the-ground results. The NWFP ROD (p. E-1) states “Monitoring is an essential component of natural resource management because it provides information on the relative success of management strategies. The implementation of these standards and guidelines will be monitored to ensure that management actions are meeting the objectives of the prescribed standards and guidelines, and that they comply with laws and management policy. Monitoring will provide information to determine if the standards and guidelines are being followed (implementation monitoring), verify if they are achieving the desired results (effectiveness monitoring), and determine if underlying assumptions are sound (validation monitoring). Some effectiveness and most validation monitoring will be accomplished by formal research.”

Monitoring of the proposed actions will follow the outline in the Medford District ROD/RMP (p. 225-248). Monitoring will be specific to the land use allocations and resources affected in the Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek 5th field watersheds.

Monitoring should

- detect changes in ecological systems from both individual and cumulative management actions and natural events,
- provide a basis for natural resources policy decisions,
- provide standardized data,
- compile information systematically,
- link overall information management strategies for consistent implementation,
- ensure prompt analysis and application of data in the adaptive management process, and
- distribute results in a timely manner.

Silviculture References

Bradford, K.J. and T.C. Hsiao. 1982. "Physiological responses to moderate water stress." In: *Encyclopedia of Plant Physiology, Vol. 12B*. Edited by O.L. Lange, P.S. Nobel, C.B. Osmond, and H. Zeigler. Springer-Verlag, Berlin. p. 265-364.

Hann, D.W. and J.A. Scrivani. 1987. Dominant-Height-Growth and site index equations for Douglas-fir and ponderosa pine in southwest Oregon. Research Bulletin 59. Oregon State University, Forest Research Laboratory, Corvallis, OR. 36pp.

Hann, D.W. and C.H. Wang. 1990. Mortality equations for individual trees in the mixed conifer zone of southwest Oregon. Research Bulletin 67. Oregon State University, Forest Research Lab, Corvallis, OR. 17p.

Kramer,P.J. and J.W. Kozlowski. 1979. *Physiology of Woody Plants* Academic Press, Orlando, FL. p. 610 and 678.

Oliver, C.D. and B.C. Larson. 1996. F*orest Stand Dynamics* John Wiley and Sons, Toronto, Canada. pp. 77-78.

Perry, D.A. 1994. *Forest Ecosystems* The Johns Hopkins University Press, Baltimore and London. p. 256.

Ripley, K. 2008. Forest health issues associated with windthrown and flood damaged timber in western Washington. Washington Department of Natural Resources Forest Health Program Manager. [Online] http://ext.wsu.edu/documents/stormDamage.pdf

Taylor, E.L. and C.D. Foster. 2006. Can These Trees be Saved? ER-039, AgriLife Extension, Texas A&M System.
[Online] http://texashelp.tamu.edu/011-disaster-by-stage/recovery/ER-039-Can-These-Trees-Be-Saved.php

Marking Guidelines

Definitions

Tree Mortality: Windthrown and root sprung trees.

Damaged Trees: In many of the windthrown areas, widely scattered green trees of varying diameters remain standing. The majority of these trees, especially the taller dominant trees, suffered substantial crown damage. Strong winds, estimated at 70 miles per hour and greater, caused foliage and lateral branches to be blown out of the crown, with additional damage caused by adjacent falling trees that knocked off branches. One-sided crowns, "see through" crowns, snapped off and live crown ratios less than 10 to 25 percent are typical in the taller dominant trees.

Conifers are sensitive to heavy defoliation, and require a normal complement of foliage for photosynthesis. Conifers depend on several years (3 to 4) of foliage to maintain photosynthetic capacity. The most productive needles are in the upper crown, whereas the needles in the lowest part of the crown provide little to net photosynthesis. The probability of tree survival following the loss of 50 percent or more of the tree's crown is very low as trees generally have insufficient food reserves (carbohydrate/starch) for bud formation and refoliation. Prior to the windstorm, the average crown ratio for conifers greater than 8 inches in diameter was approximately 46 percent. The loss of 50 percent of the average crown ratio would leave a 23 percent crown (to simplify field implementation this was rounded up to less than 25 percent). Because photosynthesis is significantly impaired, the trees suffer serious physiological stress with recovery unlikely. Stressed trees are predisposed to insect attack as the tree's defense mechanisms are reduced and the trees have a high probability of being overwhelmed by bark beetles.

- For implementation in scattered and moderate wind damaged areas, a damaged tree has less than a 25 percent crown ratio *and* a thin/sparse crown.
- In stands that had severe wind damage, *all* standing trees 20 inches in diameter or greater with *any amount* of green needles in the crown would be left. Wind damaged trees less than 20 inches in diameter having less than a 25 percent crown ratio *and* a thin/sparse crown may be salvaged.

Salvage Criteria for Scattered and Moderate Wind Damaged Areas:

- Retain 2 snags per acre greater than 20 inches in diameter. These trees should be decay class 1 and 2 snags or standing green trees with desirable wildlife characteristics such as large diameter trees with broken tops, conks indicating heart rot, basal cavities, or main stems with a fork.
- Retain 120 linear feet of coarse woody debris per acre of decay class 1 and 2 logs. This is equivalent to 7.5 logs 16 inches in diameter at the large end and 16 feet in length. Refer to Table A-5 for conversion from tree diameter class to the number of qualifying 16 foot logs.
- All remaining trees, either windthrown, root sprung, or standing damaged trees (crown ratio less than 25 percent, thin foliage) in excess of CWD and snag needs are available for salvage.

Salvage Criteria for Severe Wind Damaged Matrix Lands:

- Leave all standing trees, 20 inches in diameter or greater, with *any amount* (one branch to a full crown) of green needles present.
- Trees blown down or damaged (trees less than 20″ dbh) by the windstorm in excess of those needed for coarse woody debris and snags are available for salvage.
- Retain 2 snags per acre greater than 20 inches in diameter. These trees should be decay class 1 and 2 snags or standing green trees with desirable wildlife characteristics such as large diameter trees with broken tops, conks indicating heart rot, basal cavities, or main stems with a fork.
- Retain a minimum of 120 linear feet of coarse woody debris per acre of decay class 1 and 2 logs. This is equivalent to 7.5 logs 16 inches in diameter at the large end and 16 feet in length. Refer to Table A-5 for conversion from tree diameter class to the number of qualifying 16-foot logs.

Salvage Criteria for Severe Wind Damaged Lands Designated as Riparian Reserve or Northern Spotted Owl Activity Center (LSR):

- Only *windthrown or root sprung* trees in excess of coarse woody debris needs are available for salvage.
- Retain 205 linear feet of coarse woody debris per acre of decay class 1 and 2 logs. This is equivalent to 10 or more logs 20 inches in diameter at the large end and 20 feet in length. Refer to Table A-5 for conversion from tree diameter class to the number of qualifying 20 foot logs.
- All snags, broken top trees, and damaged green trees would be left. These trees would provide for the minimum snag retention requirement of at least 2 snags per acre greater than 20 inches in diameter. These trees should be decay class 1 and 2 snags or standing green trees with desirable wildlife characteristics such as large diameter trees with broken tops, conks indicating heart rot, basal cavities, or main stems with a fork.

Coarse Woody Debris and Snags

Trees designated for coarse woody debris should have characteristics of decay class 1 and 2 (e.g., bark intact, limbs intact, texture mostly sound, round shape). To meet the ROD/RMP guidelines, leave a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter at the large end and 16 feet long (120 linear feet is equivalent to 7.5, 16-foot logs) (Information Bulletin OR-97-064 and Instruction Memorandum OR-95-028). In riparian reserves and northern spotted owl activity centers (LSR), retain 205 linear feet of logs per acre greater than or equal to 20 inches in diameter at the large end and 20 feet long (205 linear feet is equivalent to 10 or more, 20-foot logs).

Table A-2. Coarse Woody Debris Decay Classes

Log Characteristics	Decay Class				
	1	2	3	4	5
Bark	Intact	Intact	Trace	Absent	Absent
Twigs <3 cm.	Present	Absent	Absent	Absent	Absent
Texture	Intact	Intact to partly soft	Hard, large pieces	Small, soft blocky pieces	Soft and powdery
Shape	Round	Round	Round	Round to oval	Oval
Color of wood	Original color	Original color	Original color to faded	Light brown to reddish brown	Red brown to dark brown
Portion of log on ground	Tree elevated on support points	Tree elevated on support points but sagging slightly	Tree is sagging near ground	All of tree on ground	All of tree on ground
Invading roots	None	None	In sapwood	In heartwood	In heartwood

A-3. Number of 16-foot Logs Produced by Tree Diameter Class

Tree DBH	Number of 16″ by 16′ Logs per Tree
16″	1
20″	1
24″	3
28″	4
32″	5
36″	6
40″	6
44″	7
48″	7
52″	8
56″	8
60″	9
64″	9

Table A-4. Physical Characteristics of Snags by Deterioration Stage

Stage	Characteristics
1	• Limbs and branches all present • Pointed tree top • Tight bark • Recently dead
2	• Few limbs • No fine branches • Pointed or broken tree top • Variable level of bark remaining
3	• Limb stubs only • Decay in upper bole • Some decay at base of bole • Variable level of bark remaining
4	• Few or no stubs • No fine branches • Broken top • Loose or no bark
5	• No limbs or branches • No sapwood present • Broken top • 20 percent or less of bark remaining

A-5. Number of 20-foot Logs Produced by Tree Diameter Class

Tree DBH	Number of 20″ by 20′ Logs per Tree
20″	1
24″	1
28″	2
32″	4
36″	4
40″	5
44″	5
48″	6
52″	6
56″	7
60″	7
64″	8
68″	8

Appendix B - Botany

B.1 Definitions

The following definitions are for terms used in the Botany section:

Epiphytic: Any plant that grows above the ground and attaches to something else for support; nutrients are not taken from the supporting host but are derived instead from rain, air, and available debris.

Late-successional: Forest stands 80 years or more old (includes mature and old growth seral stages.

Mycelium: The mass of hyphae (threads) that form the vegetative part of a fungus.

Mycorrhizal: A symbiotic association of the mycelium of a fungus with the roots of certain plants, in which the hyphae of the mycelium form a closely woven mass around the outside or within the rootlets. Water and nutrients pass between the fungus and plants, benefiting both organisms.

Nonvascular plants: Plants that do not use a system of vessels to transport water and nutrients between different parts of the plant.

Vascular plants: higher plants, including flowering plants, conifers, and ferns.

B.2 Summary

- The action alternatives would be "**no affect**" to Threatened and Endangered (T&E) plant species because no populations occur in areas that would be impacted by salvage operations.
- The proposed activities in the action alternatives would not trend toward listing Sensitive vascular plants, lichens, or bryophytes because surveys will be completed and documented sites would be protected from direct and indirect effects.
- The BLM expects landscape level strategic surveys, late-successional reserves, and protection of known sites throughout the Northwest Forest Plan area to prevent Sensitive fungi from trending toward listing as a result of the proposed salvage activities in the action alternatives. The magnitude and scale of harvest activities proposed in reserves in Alternative 3 is small enough that they would not trend Sensitive fungi toward listing.

B.2 Introduction

Special Status plant categories include Federal Threatened and Endangered (T&E) and Bureau Sensitive vascular plants, lichens, bryophytes, and fungi. The Bureau of Land Management's policy for Special Status plants is to: 1) conserve, protect, and manage T&E and Special Status plants and the ecosystems on which they depend, and 2) ensure that actions authorized on BLM-administered lands do not contribute to the need to list Bureau Special Status species under the provisions of the Endangered Species Act (USDI 1995, 50-53).

B.3 Methodology

B.3.1 Predisturbance Surveys

The Medford District ROD/RMP gives management direction to conduct field surveys for Special Status plant species prior to management activities to determine if species are present or if habitat would be affected (USDI 1995, 51). Consultation for T&E plants (USDI FWS 2003) also requires surveys prior to signing a decision record for timber harvest activities in suitable habitat. Of the three T&E plants with ranges within the Butte Falls Resource Area – *Limnanthes floccosa* ssp. *grandiflora*, *Lomatium cookii*, and *Fritillaria gentneri* – only *Fritillaria gentneri*'s range is within the Project Area. Habitat for this species is variable and attempts to develop habitat prediction models have not proved useful. At a coarse scale, it is found in ecotones between forested sites and more open habitat (oak woodlands/grassland/chaparral), open-canopied woodlands and mixed evergreen forests (madrone and Douglas-fir), permanent openings in forest and woodlands, and riparian zone edges with canopy gaps and/or deciduous tree canopies (USDA and USDI 2003, BA-57). Surveys for *Fritillaria gentneri* in suitable habitat are valid for 5 years.

The BLM conducted preproject surveys for Special Status plants between 1997 and 2006 in many of the proposed salvage harvest areas. Those surveys searched for T&E; Bureau Special Status; and Survey and Manage (S&M) vascular plants, lichens, bryophytes, and fungi that were on the Medford District BLM Special Status Species lists at the time the surveys were conducted. Some of these areas are being resurveyed to meet current T&E and BLM policy requirements and direction. The BLM requires botanical surveys for projects initiated after February 6, 2008 for T&E and Sensitive plants on the Final State Director's Special Status Species List (USDI 2008).

The BLM resurveyed proposed salvage areas within the range of *Fritillaria gentneri* potentially containing suitable habitat where surveys were more than five years old. Surveys were conducted in spring 2008 for this species as well as other Special Status vascular plants. Some Special Status vascular plants have been added to the Medford District list since surveys were conducted in the late 1990s and early 2000s. Information about the distribution and habitats of these species indicate they are generally restricted to certain areas or habitats within the district. None of the species added to the Special Status vascular list within the last 10 or 11 years are expected to occur in the Blowdown Salvage Project Area. Therefore, proposed salvage areas outside the range of *Fritillaria gentneri* that were surveyed for previous timber sale projects were not resurveyed.

The BLM is conducting surveys for Special Status lichens and bryophytes in summer 2008 in all areas proposed for salvage harvest to meet BLM policy direction (USDI 2008, 2). Because the updated State Director's Special Status Species list added lichens and bryophytes that were not previously searched for, all salvage harvest areas are being surveyed, including areas that were previously surveyed, in order to meet BLM policy.

In addition, the BLM is surveying all salvage harvest areas that have never been surveyed for both Special Status vascular and nonvascular species in spring and summer 2008. It is anticipated surveys will be completed by July 31, 2008 and prior to signing the Decision Record for this project.

The BLM does not require predisturbance surveys for Special Status fungi (USDI 2004, Attachment 5, 1-2). However, some areas identified for salvage were surveyed for fungi in the past. Species discovered during those surveys on the current 2008 Special Status Species list that can be located again are considered known sites and would be protected.

B.3.2 Analysis Area

The analysis area for Special Status plants in this EA encompasses the sections containing units proposed for salvage harvest. The project botanist considers the effects of the proposed actions on Special Status plants occurring in the salvage units. Because the BLM protects Special Status vascular and nonvascular plant sites detected during surveys from impacts of the proposed activities, the status of these species across their ranges would not change as a result of implementing the proposed salvage. Therefore, analyzing the impacts of this project on these species across their ranges would add no additional information about their status.

B.4 Assumptions

- There are no legal directives for protecting T&E or Special Status plants on private lands. Although suitable habitat exists on private lands and rare plants may occur there, because they do not receive legal protection, we assume private lands do not contribute suitable habitat or protection for them.
- The amount of late-successional forest in the four 5th field watersheds would not noticeably change from the existing conditions as a result of the salvage harvest because the proposed salvage would remove downed trees or severely damaged standing trees with less than 25 percent live crown remaining and unlikely to survive.
- Surveys for Special Status plants are being conducted before salvage harvest or road or landing construction occurs. However, because the amount of downed trees is extensive in some locations and visibility of the ground is restricted, it is possible not all Special Status plant populations will be detected. If present and not buffered, it is assumed there could be damage to plants during tractor yarding, road or landing construction, road or landing ripping, mechanical slash piling, or slash pile burning.

B.5 Affected Environment

The Blowdown Salvage Project Area is located along the western slope of the Cascade Mountains. Blown down trees are spread across approximately 28,000 acres in four 5th field watersheds - Rogue River/Lost Creek, South Fork Rogue River, Big Butte Creek, and Little Butte Creek. The proposed units are located in conifer stands that were 80+ years old in the Douglas-fir and white fir plant series. Elevations range from approximately 2,000 to 5,000 feet. Units vary in aspect, slope, and plant associations. Stands at the lower elevations and southerly-facing aspects are in drier Douglas-fir and Douglas-fir/ponderosa pine plant associations. Northerly-facing stands and stands at higher elevations are in the moister Douglas-fir and Douglas-fir/white fir plant associations. Other habitats adjacent to salvage stands that could potentially be used during salvage operations include oak woodlands, chaparral, and dry or vernally wet meadows.

The windstorm that blew through the Project Area in January 2008 blew down or damaged thousands of acres of conifers. The storm reduced the amount of late-successional conifer forests on BLM-managed lands by 1 to 14 percent in each of the four 5th field watersheds, but they still remain above the 15 percent minimum required under the Northwest Forest Plan (USDA and USDI 1994, C-44) (see Table B-1).

Table B-1. Percent of Late-Successional Forest on BLM-Managed Lands in the Project Area by 5th Field Watersheds Before and After 2008 Windstorm

5th Field Watershed	Before	After
Big Butte Creek	71%	70%
Rogue/Lost Creek	75%	73%
South Fork Rogue	49%	36%
Little Butte Creek	53%	44%

Five Bureau Sensitive plant species, documented during past surveys, are located within or adjacent to salvage harvest units and proposed new road or landing construction (see Table B-2).

Table B-2. Special Status Plants Documented Within or Adjacent to Blowdown Salvage Harvest Areas *

Scientific and Common Names	Lifeform	Status	Number of Sites: In or Adjacent to Salvage Units	Number of Sites: Medford District BLM	Habitat Type
Cypripedium fasciculatum Clustered lady-slipper orchid	vascular	Bureau Sensitive	3	1008	1,000- to 5,300-foot elevation. Mostly northern aspects. In SW Oregon, found primarily in later seral Douglas-fir forests averaging 60-100 percent canopy cover (USDA and USDI 2005, 6-23).
Chaenotheca subroscida Lemondrop whiskers	lichen	Bureau Sensitive	1	5	1,860- to 3,400-foot elevation in Medford District BLM. Distribution is western North America and western Eurasia. In the Pacific Northwest, restricted to bark of old trees in humid, intermontane, old growth forests at lower to middle elevations (USDA and USDI 2007, p. 2-3).
Limnanthes flocossa ssp. *bellingeriana* Bellinger's wooly meadowfoam	vascular	Bureau Sensitive	2	95	1,000- to 4,000-foot elevation. Grows in heavy clay soils in seasonally wet, rocky meadows and vernal pools. Distribution is southwestern Oregon in the Cascade Range and its foothills and Shasta County, California.
Ranunculus austro-oreganus Southern Oregon buttercup	vascular	Bureau Sensitive	1	75	1,500- to 2,000-foot elevation. Grows in dry or vernally wet meadows and oak woodlands in the foothills of the Rogue Valley.

Table B-2. Special Status Plants Documented Within or Adjacent to Blowdown Salvage Harvest Areas *

Scientific and Common Names	Lifeform	Status	Number of Sites		Habitat Type
			In or Adjacent to Salvage Units	Medford District BLM	
Tayloria serrata Broad-leaved stink moss, Serrate dung moss	bryophyte	Bureau Sensitive	1	31	2,000- to 3,640-foot elevation in Medford District BLM. Ephemeral moss that grows on old dung or on soil enriched by dung, in peatlands and sometimes uplands (Christy and Wagner 1996, 73-74). In the Butte Falls Resource Area, occurs under partial canopy cover in later seral conifer stands or at the edges of conifer stands.
*As of June 23, 2008.					

The project is partially within the range of *Fritillaria gentneri*. This plant grows in the rural foothills of the Rogue and Illinois River valleys in Jackson and Josephine Counties with one population located in California just south of the Oregon border. It is often found in grassland and chaparral habitats within, or on the edge of dry, open woodlands. Within the Butte Falls Blowdown Salvage Project Area, 12 *Fritillaria gentneri* sites are known on BLM-managed or privately-owned lands. None of the sites are within proposed salvage units or road or landing construction areas.

The BLM has not conducted surveys for Special Status fungi in some of the proposed salvage harvest units because predisturbance surveys are not required. Where fungi surveys were conducted in the past in salvage units, the current Sensitive species may not have been detected because they fruit irregularly or knowledge about them was limited when the surveys were conducted. In the Medford District BLM, 20 Sensitive fungi have been documented or are suspected of occurring. Two of them, *Gomphus kauffmannii* (two sites) and *Sowerbyella rhenana* (four sites), are known to occur in the Project Area, although there are no documented sites in units proposed for salvage harvest or areas proposed for road or landing construction. Because most Sensitive fungi species grow in later successional conifer forests, habitat likely exists in the proposed salvage harvest units.

Limnanthes flocossa ssp. *bellingeriana* and *Ranunculus austro-oreganus* grow in open meadows or oak woodlands where few trees grow. These populations were not impacted by the storm. Sites of species that grow in forest habitats, *Cypripedium fasciculatum*, *Tayloria serrata*, *Chaenotheca subroscida,* and other Special Status species that may be present in the Project Area, were affected differently by the 2008 windstorm, depending on the intensity of the wind at each site. At some sites, almost all conifers were blown down and only scattered trees remain, leaving as little as 10 to 20 percent canopy cover. At other sites, little or no blowdown occurred and canopy closure is unchanged or only slightly changed. The consequences of opening up the canopy are increased light, higher air temperatures, decreased relative air humidity, and decreased capacity of soils to maintain moisture. Altered environmental conditions put stress on plants and fungi adapted to moister, cooler, shadier conditions and may result in loss of plant vigor and reproductive capacity. Population numbers may decline temporarily until canopy cover returns in 10 to 20 years. Although windstorms resulting in canopy openings are a natural process and Special Status plants can likely tolerate and persist through some natural disturbance, if numbers are naturally low, populations may disappear if some plants do not withstand the stresses until environmental conditions improve.

B.6 Environmental Consequences

B.6.1 Effects of Alternative 1 (No Action) on Special Status Plants and Fungi

B.6.1.1 Direct and Indirect Effects

Threatened and Endangered Plants

The Blowdown Salvage project is outside the ranges of the Endangered plants *Limnanthes floccosa* ssp. *grandiflora* and *Lomatium cookii*. The No Action Alternative would be **"no affect"** to these two T&E plant species because no populations occur in the Project Area. The Blowdown Salvage project is partially within the range of the Endangered plant *Fritillaria gentneri* and surveys were conducted in spring 2008 in all proposed salvage harvest units within the range of this species. *Fritillaria gentneri* populations occur within the Project Area. The No Action Alternative would result in **"no affect"** to *Fritillaria gentneri* because no activities would be implemented that would impact them directly or indirectly.

Sensitive Plants and Fungi

There would be no direct or indirect effects to Sensitive plants or fungi in the Butte Falls Blowdown Salvage Project Area under Alternative 1 because no physical disturbance would occur that could impact them.

On the other hand, under the No Action Alternative there would be no indirect benefits to Special Status plants or fungi from removing some of the downed trees. No dead or damaged downed trees would be removed and no conifer seedlings would be planted in severe blowdown areas. Left in their current condition, the deep piles of downed trees in those areas would obstruct and slow conifer seedling growth. Planting conifer seedlings would fast forward stand recovery by a couple of years. Removal of some downed trees would open up spaces for more conifer seedlings to grow and provide more canopy cover sooner than if downed trees were not removed. Under the No Action Alternative, the BLM would not implement activities to facilitate and expedite stand recovery. As the downed trees and their limbs and needles dry out, the risk of high severity fire would be greater in those "jack strawed" areas and the risk of damage to Sensitive plants and fungi would be greater than if the amount of downed trees was reduced.

B.6.1.2 Cumulative Effects

Threatened and Endangered and Sensitive Plants and Fungi

Past activities on both private and public lands in the Butte Falls Blowdown Salvage Project Area that have altered conditions on the land and may have affected rare plant species include, but are not limited to, road building, timber harvest, livestock grazing, wildfire, fire suppression, diversion dams and other changes to hydrological processes, and the introduction of noxious weeds. The severe windstorm that occurred in January 2008 could have negatively impacted some Special Status plants and fungi by exposing them to lighter, warmer, drier conditions, or could have benefited others by increasing light.

Present and foreseeable future actions in the Butte Falls Blowdown Project Area under the No Action Alternative include continued forest management on private industrial lands, grazing, recreation, ongoing thinning in plantations, and vehicle traffic on roads throughout the Project Area. Over the next 5 years, the BLM is proposing 8 commercial timber sales within the Project Area on 3,560 acres, including salvage harvest of blowdown trees along roads and private property lines and salvage harvest of up to 170 acres in the Bowen Over Salvage project.

Mid-seral stands will continue developing toward older seral stages. As they develop late-successional characteristics, these stands will provide habitat for Special Status plants and fungi associated with late-successional forest habitat. Over the next 5 years the downed trees and damaged understory vegetation in the blowdown areas would create hazardous fuels conditions, which could result in high intensity fire and damage to Special Status plants in the event of a wildfire.

Added to these past, present, and foreseeable future activities in the Butte Falls Blowdown Salvage Project Area, the cumulative effect of not removing downed trees would be a potential increased risk of damage to Special Status plants and fungi from wildfire. However, this risk would not trend Special Status plant or fungi species toward listing because the BLM has a policy of extinguishing wildfires and the likelihood of all sites in the Project Area being extirpated during a wildfire is low. All of the species known to occur in the Project Area also have populations outside the Project Area, but within the Medford District BLM.

B.6.2 Effects of Alternative 2 on Special Status Plants and Fungi

B.6.2.1 Direct and Indirect Effects

Threatened and Endangered Plants

The salvage harvest and road and landing construction proposed in Alternative 2 would have "**no affect**" on the three Endangered plants that occur in the Butte Falls Resource Area - *Fritillaria gentneri*, *Limnanthes floccosa* ssp *grandiflora,* and *Lomatium cookii* – because the BLM surveyed and did not detect any sites of these species in the salvage areas, or in areas where road or landing construction would occur. The *Fritillaria gentneri* sites in the Project Area are not located in salvage harvest units or road or landing construction sites.

Sensitive Plants and Fungi

The number of Sensitive plant sites in the Project Area is not yet known because surveys have not been completed for Sensitive vascular plants, lichens, and bryophytes in all areas proposed for salvage harvest. Surveys will be completed prior to signing the Decision Record for this project and known sites and sites detected during surveys would be protected to avoid impacts to Sensitive vascular plants, lichens, and bryophytes. Surveys for Sensitive fungi will not be conducted, but known sites would be protected. It is unknown if populations of Sensitive fungi species are present because predisturbance surveys for the current list of these species were not conducted. If present, there is a risk of impacting them during salvage harvest, road and landing construction, excavator slash piling, slash pile burning, and road ripping, although removing downed trees would not remove suitable habitat for them. Although all Sensitive plant and fungi sites are not currently known, potential effects of the proposed actions and mitigating measures can be anticipated, described, and analyzed.

In some areas the downed trees create continuous layers of woody debris that completely obstruct ground visibility. Surveyors were advised to avoid areas that were hazardous and a threat to their safety. Therefore, it is possible some Sensitive plants may not have been detected during predisturbance surveys. These sites could be impacted during salvage harvest operations. However, conducting surveys reduced the likelihood sites were undetected. Documented sites would be protected and the species that are likely to occur in the Project Area (see Table B-2) have populations outside the blowdown area. If some sites of these species' populations are impacted during the salvage harvest, they would not trend toward listing because other populations in the Project Area and populations outside the Project Area are secure.

Without protection or mitigation measures, potential direct effects of the salvage harvest operations and post-harvest slash treatments include damage to terrestrial species from tractors and other logging equipment, from limbs or trunks scraping or gouging the ground when trees are yarded out, or from post-harvest slash pile burning. Plant sites would be buffered or activities restricted within the area of the sites to protect plants from these direct impacts. Buffer sizes vary, but would be large enough to prevent direct impacts to plants during salvage operations.

Removal of conifers with epiphytic species would also remove those individuals from their sites. Even though canopy cover has been significantly reduced at some sites and environmental conditions altered as a result of the blowdown event, epiphytic species could persist and reproduce at a location if not removed. Blowdown trees would not be removed or standing trees cut for road construction or landings if epiphytic Sensitive lichens or bryophytes are detected on them. If they are detected on hazard trees, those trees would be felled but left on-site.

The salvage harvest activities could also potentially indirectly affect Sensitive species unless protection measures are implemented. Logging equipment could introduce or spread noxious weeds into or around the Project Area. Noxious weeds compete with Sensitive vascular plants for light, water, nutrients, and space. Activities that disturb soil or remove vegetation create conditions most susceptible to invasion by noxious weeds. Salvage activities that disturb soil or remove vegetation include construction of temporary or permanent roads or landings, driving equipment off system roads, and burning slash piles. Other actions that could potentially introduce noxious weeds into the Project Area without mitigation measures include rocking roads with gravel containing noxious weed seeds or using contaminated mulch or seed during post-treatment rehabilitation. To reduce the risk of introducing new noxious weeds or spreading existing populations during salvage harvest activities, the BLM would:

- Treat noxious weed populations if detected to the extent time and resources allow prior to salvage activities in proposed treatment units, areas proposed for landing and road construction, and existing roads proposed for decommissioning.
- Treat noxious weed populations in BLM rock quarries where gravel would be removed for use in road improvements.
- Implement project design features requiring logging equipment to be washed to remove soil and plant parts prior to initial move-in and prior to all subsequent move-ins into the planning area.
- Seed ripped roads and landings with native plants and mulch with weed-free straw.

Other potential indirect effects that could impact Sensitive terrestrial plants or fungi during the salvage operations are soil compaction and removal of coarse woody debris. Soil compaction could damage vascular plant roots, bulbs, or rhizomes resulting in mortality, reduced plant vigor, or decreased reproductive success. Coarse woody debris provides a nutrient source for fungi. As small and large woody debris decompose, they provide an increase in nutrient levels which benefit plant growth. Salvaging downed trees and burning small woody debris would remove some of these nutrient sources; however, the amount of coarse wood left in salvage units would satisfy Northwest Forest

Plan recommendations for providing habitat for wildlife, invertebrates, microbial, and fungal species. Because not all areas where blowdown occurred would be salvaged, there would also be abundant coarse woody debris in the Project Area outside salvage units.

Removing downed trees would not change canopy cover in the salvage units or reduce the amount of late-successional habitat in the Project Area. Therefore, Sensitive plants or fungi would not be indirectly affected by a reduction in late successional habitat resulting from salvage harvest. No Sensitive plant populations are located where road or landings would be constructed, so removal of standing trees at these locations would not affect Sensitive species.

Removing blowdown trees would indirectly benefit Sensitive plants and fungi by reducing the risk of high intensity fire effects around sites and facilitating stand recovery. At some plant sites many trees of various sizes blew down and created deep piles of woody debris. The branches and needles from these trees will dry out over the next five years or so. In the event of a wildfire, these dense pockets of woody debris would burn at a high intensity and result in damage to soil and vegetation at the site level, which could damage above or below ground plant parts, fungal mycelia, or spores. Removing some of the downed trees and treating post-harvest slash would reduce this risk.

In severe blowdown areas, the downed trees restrict the amount of conifer seedlings that can naturally regenerate. Decomposition of downed woody debris benefits soil productivity and vegetation recovery, invertebrates, and fungi. However, the current level of downed trees in the severe blowdown areas creates continuous layers that will inhibit growth of conifer seedlings by blocking available light and space. Removing some of these trees would open up space for conifer seedlings and facilitate recovery of the conifer stands. For Sensitive plants and fungi growing in conifer forest habitats, the sooner the stands develop canopy closure, the sooner conditions will become more suitable for them and improve their chances of persistence at the sites. Sensitive fungi that depend on mycorrhizal connections with conifer roots will also benefit as stands recover.

B.6.2.2 Cumulative Effects

Threatened and Endangered and Sensitive Plants and Fungi

Past, present, and foreseeable future actions in the Butte Falls Blowdown Salvage Project Area under Alternative 2 would be similar to those described in the No Action Alternative. Because the removal of downed trees would not reduce canopy cover of harvested conifer stands, Alternative 2 would not result in a cumulative effect of reducing the amount of late-successional forest in the Project Area or in the four 5th field watersheds containing the Project Area. Under the Northwest Forest Plan, at least 15 percent late-successional (80 years or more) conifer forest must be maintained in each 5th field watershed (USDA and USDI 1994a, C-44). Before the windstorm, late-successional forest stands on BLM-administered lands in the four 5th field watersheds ranged from 49 to 75 percent of conifer forest stands (see Table B-1). After the windstorm, late-successional forest stands range from 36 to 73 percent of BLM-administered conifer forests.

The actions proposed in Alternative 2 are not anticipated to impact most populations of T&E and Sensitive plants because surveys for T&E and Sensitive plants are being conducted and known sites would be protected from direct or indirect impacts. There is some risk of impacting sites not detected during surveys; however, protecting known sites inside and outside the Project Area is expected to prevent Sensitive vascular plants, lichens, and bryophytes from trending toward listing.

The potential of introducing or spreading noxious weeds in the Project Area during salvage operations, which could negatively impact T&E and Sensitive vascular plants, could contribute additional cumulative effects to Special Status plants. However, treatment of known noxious weed populations to the extent time and resources allow, the implementation of PDFs, and on-going monitoring of noxious weeds in the Butte Falls Resource Area are expected to reduce the likelihood of contributing additional cumulative effects to the threat of noxious weeds to Special Status vascular plants in the salvage Project Area.

Added to past, present, and reasonably foreseeable future activities in the Project Area, the salvage harvest operations proposed in Alternative 2 would affect Sensitive fungi if present in the Project Area because populations could be impacted. However, all proposed activities would occur on matrix lands, which are designated for timber production and harvest. Across the Northwest Forest Plan area, approximately 14 percent of the 8 million acres of late-successional forest are designated as matrix and are available for harvest, while 86 percent are designated as late-successional reserves, congressionally reserved areas, administratively withdrawn areas, or riparian reserves. This reserve system across the landscape is intended to provide protection and development of mature and old growth forests for the protection and expansion of late-successional associated rare plants, animals, and other organisms. The BLM and Forest Service assume that protecting known sites (current and future found), conducting large-scale inventories throughout the Pacific Northwest, and providing suitable habitat in reserves will ensure this project and future projects would not contribute to the need to list Sensitive fungi (USDI 2004, 5-2).

B.6.3 Effects of Alternative 3 on Special Status Plants and Fungi

B.6.3.1 Direct and Indirect Effects

Threatened and Endangered Plants

Potential direct and indirect effects to T&E plants would be the same in Alternative 3 as in Alternative 2. The proposed actions would be **“no affect”** to T&E plants because either the project is outside the ranges of the species or surveys were conducted in suitable habitat and no sites occur in the areas where salvage harvest operations would occur.

Sensitive Plants and Fungi

The only difference between Alternative 2 and Alternative 3 is that downed trees would be salvaged on approximately 100 acres in reserves (northern spotted owl activity centers and riparian areas) in Alternative 3. Potential direct and indirect effects to Sensitive plants and fungi from the proposed actions would be the same as described in Alternative 2. Surveys for Sensitive vascular plants, lichens, and bryophytes will be conducted in owl cores and riparian areas, as well as in all other proposed salvage areas, and known sites would be protected. Downed trees would be removed from the reserves via tractor yarding (30 acres), cable yarding (10 acres), and bull-lining (60 acres). If present, Sensitive fungi could be impacted during tractor yarding, excavator slash piling, road ripping, or post-logging slash pile burning. Equipment disturbs or compacts soil which could damage fungal mycelia. Burning slash piles could damage fungal mycelia or spores of Sensitive fungi if present, but the likelihood of Sensitive fungi being present on the 100 acres is very small. The risk of impacting Sensitive fungi if present or impacting Sensitive vascular plants, lichens, or bryophytes not detected during surveys due to the extensive amount of downed trees would also be similar in Alternative 3 as in Alternative 2. However, conducting surveys prior to salvage operations reduces the likelihood Sensitive plant sites are undetected. Documented sites would be protected and the species likely to occur in the Project Area (see Table B-2) have populations outside the blowdown area. If some sites of these species’ populations are impacted during the salvage harvest, they would not trend toward listing because documented populations would be protected and populations outside the salvage units are secure, both in the Project Area and in the Medford District BLM.

B.6.3.2 Cumulative Effects

Threatened and Endangered and Sensitive Plants and Fungi

Cumulative effects of actions proposed in Alternative 3 to T&E and Sensitive plants and fungi would be generally the same as in Alternative 2. The only difference in cumulative effects between the two alternatives would be potential impacts to Sensitive fungi during salvage logging or post-harvest slash pile burning, if fungi are present on 120 acres of reserves (northern spotted owl activity centers and riparian areas). The BLM assumes that providing habitat for Sensitive fungi in reserves, in addition to conducting landscape level surveys and protecting known sites, prevents them from trending toward listing. There would be no reduction in the amount of late-successional habitat or change in canopy cover in reserves as a result of salvaging downed trees. However, conducting activities in reserves that could potentially negatively impact Sensitive fungi creates a cumulative effect beyond past, present, and reasonably foreseeable future activities. Logging on private and matrix lands has or will remove late-successional forest habitat, as did the windstorm in severely impacted areas. However, the magnitude and scale of the impacts to late-successional forest habitat in the riparian reserves and known northern spotted owl activity center is very small in comparison to the amount of undisturbed and intact late-successional habitat present in the Project Area. Only 1 percent (120 acres out of 11,665 acres) of late-successional forest habitat in reserves in the four 5th field watersheds would be impacted from tractor yarding and slash pile burning. The additional impacts to fungi habitat in Alternative 3 would not trend Sensitive fungi species toward listing because the magnitude and scale of disturbance is small.

Botany References

Christy, J.A. and D.H. Wagner, PhD. 1996. *Guide for the Identification of Rare, Threatened or Sensitive Bryophytes in the Range of the Northern Spotted Owl, Western Washington, Western Oregon, and Northwestern California* BLM Oregon-Washington State Office, Portland, OR. 94 pp.

USDA Forest Service and USDI Bureau of Land Management. 2007. Species Fact Sheet for *Chaenotheca subroscida* (Eitner) Zahlbr. Revised March 19, 2007 by Richard Helliwell. Interagency Special Status and Sensitive Species Program. [Online] http:/www.fs.fed.us/r6/sfpnw/isssp/species-index/flora-lichens.shtml.

USDA Forest Service and 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 Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* Government Printing Office: 1994-589-111/00003 Region No. 10.

USDA Forest Service and USDI Bureau of Land Management. 2003. *Rogue River/South Coast Biological Assessment FY 04-08 for Activities that may affect listed species in the Rogue River/ South Coast Province for Medford District, Bureau of Land Management, Rogue River and Siskiyou National Forests* 93pp + Appendices.

USDA Forest Service and USDI Bureau of Land Management. 2005. Conservation Assessment for *Cypripedium fasciculatum* Kellogg ex S. Watson. 31pp.

USDI Bureau of Land Management. 1995. *Record of Decision and Resource Management Plan* 248pp.

USDI Bureau of Land Management. 2004. Project Evaluations for Former S&M Species in which Surveys are Not Feasible, Attachment 5. In: BLM Information Bulletin No. OR-2004-145. *Implementation of Special Status Species Policies for the Former Survey and Manage Species* 4pp.

USDI Bureau of Land Management. 2008. BLM Instruction Memorandum No. OR-2008-038. *Final State Director's Special Status Species List* Oregon State Office, Bureau of Land Management, Portland, Oregon. 4 pp. + Attachments.

USDI Fish and Wildlife Service. 2003. *Biological Opinion* (FWS) 1-14-03-F-511. Roseburg Field Office. 8330.05113(03). File Name RVB00408.doc. TS Number: 03-4483.

Appendix C – Noxious Weeds

C.1 Summary

Although the two action alternatives create risk of introducing or spreading noxious weeds during salvage harvest operations, the implementation of PDFs and ongoing treatment and monitoring of noxious weed populations in the Butte Falls Resource Area reduce those risks and prevent the proposed actions from contributing additional cumulative effects to noxious weeds in the Project Area.

C.2 Introduction

Noxious weeds are plants growing outside their native lands or habitats that are injurious to public health, agriculture, recreation, wildlife, or public or private property (ODA 2008, 3). The Oregon Department of Agriculture (ODA) designates and classifies noxious weeds according to their detrimental effects, reproductive strategies, distribution, and difficulty of control (see Table C-1).

Table C-1. ODA Noxious Weed Control Rating System

Category	Criteria	Recommended Action
A	Weeds that occur in the state in small enough infestations to make eradication or containment possible; or are not known to occur, but their presence in neighboring states makes future occurrence in Oregon seem imminent.	Infestations subject to eradication or intensive control when and where found.
B	Regionally abundant weed, but which may have limited distribution in some counties.	Limited to intensive control at the state, county, or regional level as determined on a case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control (when available) shall be the main control approach.
T	A select group of A or B designated weeds.	Identified by the Oregon State Weed Board as a priority target on which the Oregon Department of Agriculture will develop and implement a statewide management plan
Source: Oregon Department of Agriculture, Plant Division, Noxious Weed Control Program. May 2008. http://oregon.gov/ODA/PLANT/WEEDS/docs/weed_policy.pdf		

Weeds spread via seeds, which are carried from one location to another by air, water, animals, humans, or vehicles. Some weeds also spread when roots or other plant parts break off and resprout to create new plants. Newly disturbed areas are most vulnerable to noxious weed establishment. Roads are common avenues of invasion, as seeds lodge in tire treads and are carried from occupied areas into newly disturbed unoccupied areas. Road construction, logging, farming, over-grazing, recreation, and residential development are activities that contribute to the establishment and spread of noxious weeds (USDI 1985, p. 59) (see Table C-2).

Table C-2. Factors Affecting Noxious Weed Spread

Activity	Role in Dispersing Noxious Weed Seed
Private Lands	Private lands host a perpetual source for noxious weed seed, which can be dispersed when seeds attach to tires, feet, fur, feathers, or feces, or when natural processes such as wind and/or flooding events transport the seed from its source to another geographical vicinity.
Farming and Grazing	Farming creates soil disturbance and openings that noxious weeds can occupy. Farming equipment may move noxious weed seed from one area to another. Agricultural seed may be contaminated with noxious weed seed and spread during farming activities. Overgrazing of pastures or rangelands removes vegetation leaving bare, open spaces that noxious weeds could invade. If livestock are fed grain or hay containing noxious weed seed or parts, or consume noxious weeds, they may disperse them when they move to non-infested pastures or range.
Logging on Private Lands	Logging activity presents a key dispersal opportunity for noxious weed seeds. They may attach to tires or tracks of mechanized logging equipment, tires of log trucks, and various other logging-related substrates and be subsequently transported from their source to another geographic vicinity. Logging creates openings during ground disturbance and canopy removal which noxious weeds may colonize. Not using Project Design Features, such as equipment/vehicle washing, etc., also increases the risk of introducing or spreading noxious weed seed during logging operations.
Motor Vehicle Traffic (including Log Trucks)	Roads on public land are for public use, which results in a plethora of seed-dispersal activities occurring on a daily basis. Private landowners use public roads to haul logs, undertake recreational pursuits, and/or access their properties. This transportation often occurs along BLM-administered roads, which are situated within a checkerboard ownership arrangement. How or when seed detachment occurs is a random event and could take place within feet or miles from the work site/seed source, presenting a high likelihood of detachment on public lands.
Recreational Use	The public often recreates on BLM-managed lands and can spread seed from their residences or other areas to public lands in a variety of ways, including attachment to vehicle tires; recreational equipment; hikers' socks, shoes, or other clothing; fur of domestic animals, etc.
Rural and Urban Development	Because of BLM's checkerboard land ownership, BLM parcels are generally interspersed with private lands, many of which are used for homesites, businesses, or agricultural endeavors. Rural and Urban Development often involves ground disturbance during building or road construction which creates openings for noxious weeds to occupy. See "Motor Vehicle Traffic" and "Private Land" for additional information about how this affects the spread of noxious weeds from private to public lands.
Natural Processes	Wind, seasonal flooding, and migration patterns of birds or animals are a few of the natural processes that contribute to the spread of noxious weeds. Wind or water carry seeds or other plant parts and deposit them at new locations at random intervals.

The BLM documents and treats State of Oregon designated noxious weeds on BLM-administered lands in Oregon. They are detected during preproject botanical surveys or from incidental sightings. The BLM treats noxious weed populations on their lands under the Medford District Integrated Weed Management Plan and Environmental Assessment OR-110-98-14 (1998). In the Medford District ROD/RMP, the objectives for noxious weeds are to continue to survey for, avoid introducing or spreading, and contain and/or reduce infestations on BLM-administered land (USDI 1995, 92-93). The Medford District BLM Noxious Weed list is a subset of the state list. It contains category A and T (see Table C-1) species that occur in the District and are targeted for detection and control (USDI 1998, 1-2). The BLM treats weeds by manual, mechanical, chemical, or biological means.

C.3 Affected Environment

The blowdown salvage units on approximately 6,100 acres are scattered across approximately 28,000 acres in the eastern one-third of the Butte Falls Resource Area. Many of the areas proposed for salvage harvest in this EA were surveyed in the past for noxious weeds for timber sales, hazardous fuels reduction, silvicultural treatments, and other projects. Noxious weed populations detected during vascular plant surveys and during incidental sightings were documented. All proposed salvage units and areas proposed for road and landing construction that were not previously surveyed are being surveyed in summer 2008 for noxious weeds. As of May 2008 there are no known noxious weed populations in proposed salvage units or areas where roads or landings would be constructed. However, four noxious weed species are known within the Project Area along roads that would be used to haul logs (see Table C-3).

Table C-3. Known Noxious Weed Populations in the Butte Falls Blowdown Salvage Project Area*

Location	Species	Extent of Infestation	ODA Designation	Plant Description/ Habitat Requirements
T33S, R2E, sec 13	Canada thistle	5 plants	B	Establishes and develops best on open, moist, disturbed areas, including ditch banks, overgrazed pastures, meadows, tilled fields, open waste places, fence rows, roadsides, campgrounds; and after logging, road building, fire, and landslides in natural areas (Romme et al. 1995). An early seral species, susceptible to shading, and grows best when no competing vegetation is present (Donald 1994). Clonal species with vigorous growing rhizome and long roots from which new stems sprout.
T34S, R2E, sec 15 T35S, R2E, sec 33 T36S, R2E, sec 3	Yellow star-thistle	unknown; along roadsides	B	Annual or biennial thistle that primarily infests grasslands, pastures, shrub steppe, open woodlands, and disturbed habitats such as hayfields, orchards, vineyards, roadsides, and abandoned areas (Wilson et al. 2004, 5). The most susceptible rangelands in the Pacific Northwest are those with deep, loamy soils, south-facing slopes, and 12 to 25 inches of precipitation that peaks in winter or spring (Sheley et al. 1999a, 409). Reproduces from seeds.
T36S, R2E, sec 3	Diffuse knapweed	555 plants	B	Invasive in rangeland, noncropland, and nonirrigated pastures. Most prolific in dry soils and arid environments. Chemicals exuded by diffuse knapweed limit restoration of other species and may persist in soil for years. Reproduces by seeds which are spread primarily by wind (Colquhoun, 2003, 19).

Table C-3. Known Noxious Weed Populations in the Butte Falls Blowdown Salvage Project Area*

Location	Species	Extent of Infestation	ODA Designation	Plant Description/ Habitat Requirements
T35S, R2E, sec 13	Spotted knapweed	2 plants	B and T	Common in well-drained, light-textured soils that receive summer rainfall, and in foothill prairie habitats. Introduced originally in disturbed sites. Most aggressive in forest-grassland interface on deep, well-developed soils including gravel, and in drier sites where summer precipitation is supplemented by runoff. From 1,900- to 10,000-foot elevation; in precipitation zones ranging from 8 to 79 inches annually (Sheley et al. 1999b, 351). Reproduces by seed (Colquhoun, 2003, 21).
* As of May 23, 2008.				

Bull thistle (*Cirsium vulgare*) and Himalayan blackberry (*Rubus armeniacus*) are two other noxious weeds occurring in the Project Area, although they have been reported irregularly. Both are category "B" species the BLM does not treat because they are so widespread it would be impractical. Bull thistle grows in conifer stands where the canopy cover has been opened up, along roads, and in waste areas. When the canopy cover returns, it shades out this species. Himalayan blackberry grows along riparian areas or in wet areas. It is widespread in the Rogue Valley and foothills of the surrounding mountains. Although it displaces native vegetation, it provides forage and shelter for birds and animals. The BLM treats these two species in specific situations when they are a threat to other resources. For example, if they were crowding out Sensitive plants or impacting a riparian area scheduled for restoration.

C.4 Environmental Consequences

C.4.1 Effects of Alternative 1 (No Action) on Noxious Weeds

C.4.1.1 Direct and Indirect Effects

No activities would be implemented under the No Action Alternative that would contribute to the introduction or spread of noxious weeds within the Project Area. However, noxious weeds would continue to spread into the Project Area at an unknown rate due to ongoing activities that contribute to weed spread (Table C-2). The rate at which noxious weeds spread in a particular area is impossible to quantify, as it depends on a myriad of factors including, but not limited to, logging on private lands, motor vehicle traffic, recreational use, rural and urban development, and natural processes. The BLM will continue to treat noxious weeds on BLM-managed lands within the Project Area and the Medford District under the Medford District's *Integrated Weed Management Plan and Environmental Assessment OR-110-98-14* to the extent time and resources allow.

C.4.1.2 Cumulative Effects

Added to past, present, and foreseeable future actions, Alternative 1 would not contribute additional cumulative effects to noxious weeds in the Butte Falls Blowdown Salvage area beyond existing conditions because no physical disturbance would occur. The potential introduction and spread of noxious weeds due to external factors will continue to exist in the Project Area.

C.5.1 Effects of Alternative 2 on Noxious Weeds

C.5.1.1 Direct and Indirect Effects

In the short-term (approximately 1 to 5 years), proposed salvage harvest activities within the Project Area could result in the reasonable probability of introducing or spreading noxious weeds. Management activities which disturb soil and remove existing vegetation leave areas open for possible invasion by noxious weeds. Proposed activities under Alternative 2 that could contribute to the introduction or spread of noxious weeds in the Project Area include tractor yarding on approximately 4,800 acres, construction or decommissioning 7.8 miles of roads, construction or use of up to 50 landings 0.5 to 1 acre in size, and post-treatment slash pile burning on approximately 5,910 acres. Movement of vehicles and equipment off system roads and throughout the Project Area would also provides a vector for spreading weeds or bringing in new weeds from areas where vehicles and equipment last operated. However, the rate at which the potential spread would occur is unknown due to the indistinguishable causal effect of other activities and factors listed in Table C-2.

In order to reduce the risk of introducing or spreading noxious weeds in the Project Area, PDFs and additional BLM actions (see Table C-4) would be implemented. These measures are the recommended weed prevention strategies in the Action Plan developed by the western states BLM weed coordinators, with review and input by 30 individuals from agricultural research services, state agencies, universities, weed societies, and weed advisory councils with backgrounds in weed prevention and control (USDI 1996, 35-40). Although the immediate potential for weed spread under Alternative 2 would be greater than the No Action Alternative, the BLM considers the potential for introducing noxious weeds into the Project Area under Alternative 2 similar to the No Action Alternative because of the use of these preventative and monitoring strategies.

Table C-4. BLM Actions and Project Design Features for Noxious Weeds with Expected Implementation Results

PDFs and BLM Actions	Expected Results of Implementing PDF
Treat noxious weed populations, when detected prior to timber harvest activities, in proposed harvest units, areas proposed for landing and road construction, and existing roads proposed for decommissioning.	Reduce seed source and risk of spreading noxious weed seed during project implementation.
Prior to entry onto BLM-managed lands, pressure wash vehicles and equipment, including undercarriages.	Remove loose seeds and dirt that may contain viable noxious weed seeds, thereby reducing potential introduction of new noxious weeds into the Project Area and into newly disturbed sites.
Treat noxious weed populations in rock quarries where gravel would be removed for use in road work.	Reduce the risk of introducing noxious weed seed through contaminated rock.
Seed or plant areas disturbed during project implementation with native plant materials.	Introduce native vegetation to the site prior to noxious weed seed recruitment, allowing native plants an advantageous jump-start in reestablishment and reducing the risk of noxious weed infestation.
Mulch disturbed areas after treatment with weed-free straw or hay.	Prevent introduction of noxious weed seeds from straw or hay into Project Area during post-treatment restoration.
Monitor landings and decommissioned roads 1 to 3 years after harvest is complete and treat noxious weeds as detected.	Detect and treat noxious weeds that may become established in disturbed areas after project implementation.

C.5.1.2 Cumulative Effects

Past, present, and foreseeable future activities that contribute to the introduction and spread of noxious weeds in the Project Area are the same as those described under the No Action Alternative, including the windstorm event in January 2008 which reduced canopy cover in severely impacted areas and left those stands more susceptible to invasion by noxious weeds. Because few overstory trees would be removed during the salvage harvest, the proposed actions would not create additional canopy openings, except for removal of scattered hazard trees and trees where new road or landing construction would occur which would involve a very small percentage of the Project Area. The actions proposed in Alternative 2 could potentially introduce noxious weeds into the Project Area during salvage harvest operations. However, it is not possible to quantify with any degree of confidence the amount or to distinguish it from the background risk of introduction from ongoing activities in the Project Area. Treating noxious weed populations on BLM-administered lands as detected to the extent time and resources allow, implementing PDFs, and ongoing monitoring and treatment would reduce the risk that the proposed activities would introduce or spread noxious weeds. Therefore, Alternative 2 would not contribute additional cumulative effects to noxious weeds.

C.6.1 Effects of Alternative 3 on Noxious Weeds

C.6.1.1 Direct and Indirect Effects

In Alternative 3, the risk of introducing and spreading noxious weeds in the Project Area during project implementation would be similar to Alternative 2. Approximately 30 more acres would be tractor logged, approximately 100 more acres would have slash piles burned, but no additional roads or landings would be constructed or decommissioned. The differences between the two action alternatives are so small that the risk of introducing or spreading noxious weeds in Alternative 3 is considered similar to Alternative 2. The risk would be reduced by implementing PDFs (see Table C-3), by continuing to treat noxious weed populations as detected and to the extent time and resources allow under the *Medford District Integrated Weed Management Plan and Environmental Assessment* OR-110-98-14 (1998), and by monitoring the Project Area after completion of the project to detect and treat weeds if they appear.

C.6.1.2 Cumulative Effects

Cumulative effects of implementing Alternative 3 on noxious weeds would be similar to those described under Alternative 2. The actions proposed in Alternative 3 could potentially introduce noxious weeds into the Project Area during salvage harvest operations. However, it is not possible to quantify with any degree of confidence the amount or to distinguish it from the background risk of introduction from on-going activities in the Project Area. Because the BLM treats noxious weed populations on BLM-managed lands as detected to the extent time and resources allow, and implements PDFs and post-treatment monitoring, the risk is reduced that the proposed activities would introduce or spread noxious weeds. Therefore, Alternative 3 would not contribute additional cumulative effects to noxious weeds.

Noxious Weed References

Colquhoun, J. 2003. *Pacific Northwest's Least Wanted List: Invasive Weed Identification and Management* Oregon State University Extension Service. 44pp.

Donald, W.W. 1994. The biology of Canada thistle (*Cirsium arvense*). *Reviews of Weed Science* 6:77-101.

Oregon Department of Agriculture, Plant Division. May 2008. Noxious Weed Control Program. [Online] http://oregon.gov/ODA/PLANT/WEEDS/docs/weed_policy.pdf

Romme, W.H., L. Bohland, C. Persichetty, and T. Caruso. 1995. Germination ecology of some common forest herbs in Yellowstone National Park, Wyoming, U.S.A. *Arctic and Alpine Research* 27(4):407-412.

Sheley, R.L., L.L. Larson, and J.S. Jacobs. 1999a. "Yellow Starthistle." In *Biology and Management of Noxious Rangeland Weeds* Edited by R.L. Sheley and J.K. Petroff.. Oregon State University Press, Corvallis, OR. 438pp.

Sheley, R.L., J.S. Jacobs, and M.F. Carpinelli. 1999b. "Spotted Knapweed." In *Biology and Management of Noxious Rangeland Weeds* Edited by R.L. Sheley and J.K. Petroff. Oregon State University Press, Corvallis, OR. 438pp.

USDI Bureau of Land Management. 1996. *Partners Against Weeds: An Action Plan for the Bureau of Land Management* 43pp.

USDI Bureau of Land Management, Oregon State Office. 1985. *Northwest Area Noxious Weed Control Program EIS* Portland, OR.

USDI Bureau of Land Management, Medford District Office. 1995. *Medford District Record of Decision and Resource Management Plan* Medford, OR. 248pp.

USDI Bureau of Land Management, Medford District Office. 1998. *Medford District Integrated Weed Management Plan (IWMP) and Environmental Assessment (EA) OR-110-98-14.* Medford, OR.

Wilson, L.M., C. Jette, J. Connett, and J. McCaffrey. 2004. *Biology and Biological Control of Yellow Starthistle* University of Idaho, Department of Plant, Soil and Entomological Sciences, Moscow, ID; USDA Forest Service, Forest Health Protection, Coeur d'Alene, ID; Nez Pierce Biocontrol Center, Lapwai, ID; USDA Forest Service, Grangeville, ID. 61pp.

Appendix D - Fire and Fuels

D.1 Fuel Models

These fire behavior fuel models represent distinct distributions of fuel loadings found among surface fuel components (live and dead), size classes and fuel types. The fuel models are described by the most common fire carrying fuel type (grass, brush, timber litter or slash), loading and surface area-to-volume ratio by size class and component, fuel bed depth and moisture of extinction.

The following definitions are from Scott and Burgan, and depict fuel models (representing more than 1 percent of the area) found in the Fire and Fuels analysis area based on the 40 fuel models guide.

D.1.2 Grass/Shrub (GS) Fuel Models

The primary carrier of fire is grass and shrubs combined, with both components equal in value for determining fire behavior. These fuel models are also dynamic, with the effect of live herbaceous moisture content on spread rate and intensity dependent on the relative amount of grass and shrub loads.

- **GS2 (122):** Shrubs are 1-3 feet high, grass load is moderate. Spread rate high, flame lengths moderate.

D.1.3 Shrub (SH) Fuel Models

The primary carrier of fire is live and dead shrub twigs and foliage combined with dead and down shrub litter. A small amount of herbaceous fuel may be present. Most shrub fuel models are not dynamic, including those identified in the Evans Creek area.

- **SH4 (144):** Low to moderate shrub and litter load, possibly with a pine overstory. Fuel bed depth is about 3 feet. Spread rate high; flame length moderate.

D.1.4 Timber-Understory (TU) Fuel Models

The primary carrier of fire is forest litter in combination with herbaceous or shrub fuels. TU1 and TU3 are dynamic, containing a live herbaceous load with the effect of live herbaceous moisture content of spread rate and fire intensity strong, and dependent on the relative amount of grass and shrub load.

- **TU1 (161):** Low load of grass and/or shrub with litter. Spread rate and flame length low.
- **TU2 (162):** Moderate load of litter with a shrub component. Spread rate moderate; flame length low.
- **TU3 (163):** Moderate forest litter with grass and shrub components. Spread rate high; flame length moderate.
- **TU5 (165):** Heavy forest litter with a shrub or small tree understory. Spread rate and flame length is moderate.

D.1.5 Timber Litter (TL) Fuel Models

The primary carrier of fire is dead and down woody fuel. Any live fuel present has little effect on fire behavior.

- **TL4 (184):** A moderate load of fine litter and coarse fuels, including small-diameter downed logs. Spread rate and flame length is low.
- **TL5 (185):** High-load conifer litter with light slash or mortality fuel. Spread rate and flame length is low.
- **TL7 (187):** Heavy load forest litter, including larger diameter down logs. Spread rate and flame length is low.
- **TL8 (188):** Moderate load long-needle pine littler which may include a small amount of herbaceous load. Spread rate is moderate, flame length is low.

D.1.6 Slash-Blowdown (SB) Fuel Models

The primary carrier of fire is activity fuel or blowdown.

- **SB2(202):** A moderate dead and activity fuel or light blowdown. Blowdown is scattered, with many trees still standing. Spread rate is moderate: flame length moderate.
- **SB3 (203):** The primary carrier of fire is heavy dead and down activity fuel or moderate blowdown. Blowdown is moderate; trees compacted to near the ground. Spread is high; flame length high.
- **SB4 (204):** The primary carrier of fire is heavy blowdown fuel. Blowdown is total, fuelbed is not compacted, most foliage and fine fuel still attached to blowdown. Spread is very high; flame length very high.

The fuels model acres and locations (See Map XX. Fuels Models) throughout the Fire and Fuels analysis area were generated using LANDFIRE - Landscape Fire and Resource Management Planning Tools Project [Online] http://www.landfire.gov/index.php.

LANDFIRE is a five-year, multi-partner project producing consistent and comprehensive maps and data describing vegetation, wildland fuel, and fire regimes across the United States. It is a shared project between the wildland fire management programs of the U.S. Department of Agriculture Forest Service and U.S. Department of the Interior. The project has four components: LANDFIRE Prototype, LANDFIRE Rapid Assessment, LANDFIRE National, and Training/Technology Transfer.

LANDFIRE data products include layers of vegetation composition and structure, surface and canopy fuel characteristics, historical fire regimes, and ecosystem status. LANDFIRE National methodologies are based on the latest science and extensive field-referenced databases. Data products are created at a 30-meter grid spatial resolution raster data set.

D.2 Fire Behavior

D.2.1 BehavePlus

Predicted or estimated fire behavior characteristics were determined using the fire behavior model BehavePlus. The BehavePlus fire modeling system is based on a collection of models that describe fire behavior, fire effects, and the fire environment. For more information see *BehavePlus Fire Modeling System, Version 2: Overview* by Patricia L. Andrews and Collin D. Bevins (2003). Available online at http://ams.confex.com/ams/pdfpapers/65993.pdf.

D.2.2 Weather and Fuel Moistures

Dead fuels and the moisture within these fuels (fuel moisture) respond to weather conditions such as humidity, temperature, and wind. A unique system for classifying dead fuels uses the length of time required for a fuel particle to change moisture by a specified amount when subjected to a change in environment (Rothermel 1983). The 1-hour, 10-hour, and 100-hour time lag classes are the primary fuel sizes used to calculate fire behavior. Fuels moistures for live and dead fuels were estimated using FireFamily Plus software, which calculates the 90th Percentile fuels moistures used in BehavePlus and represent the probability that these conditions could occur 10 percent of the time during a 100-day period at the Evans RAWS station. With wind speed as a variable, temperature and fuels moistures were held constant to calculate the fire behavior during high and extreme fire season conditions.

Temperature and fuels moistures used for analysis in BehavePlus:

Temperature:	85 ºF
Fuels Moisture Time Lag:	1-Hour: 4 percent 10-Hour: 5 percent 100-Hour: 7 percent
Herbaceous Fuel Moisture:	31 percent
Woody Fuels Moisture:	70 percent
Live Fuels Moisture:	90 percent

Wind speed was also generated using FireFamily Plus. The 90th percentile daily average 20-foot wind speed (the wind speed 20 feet above the canopy) was 5 miles per hour. However, this is based on a daily average using calculated 10-minute averages and appears to be underestimated. Further review of the daily winds indicated that wind speeds exceeded 5 miles per hour approximately 30 percent of the time. Recorded 10-minute averages were as high as 13 miles per hour. For BehavePlus analysis, a 20-foot wind speed of 10 mph (98 percentile daily wind speed) was used. This leaves only 2 percent of the days within a 100-day period on which wind speeds would exceed the 10 miles per hour daily highs based on a 10-minute average. The calculated 10-minute average (the wind speed within a 10-minute time frame average throughout the day) is likely to underestimate wind gusts. The Evans Creek RAWS station was used to estimate hourly wind gusts based on recorded data from 1992 to 2005. The median wind gusts recorded at this station reach speeds as high as 36 miles per hour. This shows the potential for very high winds, especially during the afternoon hours, which could facilitate the propagation of crown fires in stands with high canopy bulk densities.

To determine the wind speed at ground level where the fire is burning, an adjustment must be made to the 20-foot wind speed to accommodate for friction loss and shelter from the overstory. BehavePlus provides the wind adjustment table developed by Albini and Baughman (1979).

D.3 Definitions

Aerial Fuels: (also referred to as canopy fuels) are those suspended above the ground in trees or vegetation. These fuels consist mostly of live and fine material less than .025 inch (Graham and others 2004)

Canopy Base Height: is the lowest height above the ground at which there is sufficient understory canopy fuel to propagate fire vertically through the canopy (Scott and Reinhardt 2001). Canopy base height determines whether surface fires can climb into tree crowns (Keyes and O'Hare 2002). Measured in feet.

Canopy Bulk Density: determines whether crown fire spread, or the hortizontal transfer of fire between crowns can occur (Keyes and O'Hare 2002). Measures in kg/m^3.

Fire Behavior Characteristics: The following definitions are from the FMA Plus CrownMass User's Guide.

- **Rate of Spread** (ROS) is the speed the fire travels through the surface fuels. The ROS is the spread rate of the head of the fire spreading uphill with the wind blowing straight uphill. The ROS predictions use the Rothermal (1972) surface spread model, which assumes the weather, topography and fuels remain uniform for an elapsed period of time. Measured in chains/acre. One chain equals 66 feet.
- **Flame Length** is the length of the flame in a spreading surface fire within the fire front. Flame length is measured from midway in the combustion zone to the average tip of the flames. Good indicator of intensity. Wildfires with flame lengths less than 4 feet can be controlled by hand. Flame lengths greater than 4 are considered too intense to attack by and should be controlled with mechanical equipment. Measured in feet.
- **Fireline Intensity** is the heat energy release per unit time from one-foot wide section of the fuel bed extending from the fire front to the rear of the flaming front. Fireline intensity is a function of rate of spread and heat per unit area, and is directly related to flame length. Fireline intensity and the flame length are related to the heat felt by a person standing next to the flames. Measure in BTU/ft/sec.

Fire intensity: The rate at which fuel is consumed.

Fire severity: The effect fire has on vegetation, soils, wildlife, and the landscape.

Fire types:

- **Surface Fire** burns on the surface of the ground in needles, leaves, grasses, and forbs, dead and down branches and boles, stumps, shrubs and short trees (Scott and Reinhardt 2000).
- **Passive Crown Fire** also called torching is one in which individual or small groups of trees torch out, but solid flame is not consistently maintained in the canopy. Passive crowning encompasses a wide range of fire behavior, from individual tree torching to nearly active crown fire (Scott and Reinhardt 2000).
- **Crown Fire** flames spread from crown to crown, surface and crown fire elements advance together as an interdependently linked unit, and firebrands from the burning crowns creates spot fires that advance the surface fire beyond its normal rate (Keyes and O'Hare 2002)

Flaming Front: The zone of a moving fire where the combustion is primarily flaming. Behind this flaming zone combustion is primarily glowing. Light fuels typically have a shallow flaming front, whereas heavy fuels have a deeper front. Also called fire front.

Fuel Bed Depth: The average height of surface fuel that is contained in the combustion zone of a spreading fire front.

Fuel Moisture (Fuel Moisture Content): The quantity of moisture in fuel expressed as a percentage of the weight when thoroughly dried at 212 degrees Fahrenheit.

Horizontal Continuity: Horizontal continuity is the horizontal distribution of fuels at various levels or planes. These characteristics influence where a fire will spread, how fast it will spread, and whether the fire travels through surface fuels, aerial fuels, or both.

Plume Dominated Fire: A fire whose behavior is governed primarily by the local wind circulation produced in response to the strong convection above the fire rather than by the general wind. In other words, plume domination is when the intensity of the fire is so strong it over comes the influence of the local winds and topography. Fire behavior becomes very unpredictable because winds are drawn into the strong convention column (smoke and heat rising) creating it's own weather. As the smoke column starts to collapse, strong downdraft winds can result producing erratic extreme fire behavior.

Surface Fuels: consist of grasses, shrubs, litter, and woody material lying on, or in contact with the ground surface (Graham et al. 2004)

Surface Fuel Loading: Surface fuel loading is the weight of fuels in a given area (weight per unit area), usually expressed in tons per acre, pounds per acre, or kilograms per square meter (Fire Effects Guide 2004).

Appendix E – Air Quality

E.1 Definitions

The following definitions are for terms used in the Air Quality section:

Biomass: The vegetative material leftover from stand treatments.

Convection: Atmospheric motions that are predominantly vertical in the absence of wind, resulting in vertical transport and mixing of atmospheric properties.

Inversion: A layer of warm air that prevents the rise of cooling air and traps pollutants beneath it; can cause an air pollution episode.

Mop up: Extinguishing or removing burning material near control lines, felling snags, and trenching logs to prevent rolling after an area has burned, to make a fire safe or to reduce residual smoke.

Nonattainment area: A geographic area that violates the National Ambient Air Quality Standards.

Prescribed fire: A fire burning under specified conditions that will accomplish certain planned objectives.

E.2 Affected Environment

The Oregon Department of Environmental Quality (DEQ) is a regulatory agency whose job is to protect and enhance the air quality. The Oregon DEQ monitors air pollutant levels through a network of monitoring and sampling equipment sites throughout Oregon. The closest site to the Big Butte Creek 5th field watershed is located in Shady Cove, Oregon. This site monitors particulate matter (PM) which is a fine particulate air pollutant that consists of solid particles or liquid droplets less than 10 microns in diameter (PM10) or less than 2.5 microns in diameter (PM 2.5). PM10 and PM2.5 have been identified as the particulate sizes of concern because they can be inhaled deeply into the lungs and remain for years. Federal and State standard exceedance levels have been set for PM2.5 and PM10 (Table E-1).

Table E-1. Federal and State Exceedance Levels for PM2.5 and PM10

Pollutant	Averaging Time	National Ambient Air Quality Standard	Standard Exceedance Level	
			Federal	Oregon
PM 2.5	24-hour	98th percentile of the 24-hour values determined for each year. 3-year average of the 98th percentile values.	65 ug/m^3	Same
	Annual Average	3-year average of the annual arithmetic mean	15ug/m^3	Same
PM 10	24-hour	The expected number of days per calendar year with 24-hour average concentrations above 150 ug/m^3 is equal to or less than 1 over a 3-year period	150 ug/m^3	Same
	Annual Average	3-year average of the annual arithmetic mean	50 ug/m^3	Same
NOTE: ug/m^3 = micrograms of pollutant per cubic meter of air.				

Samples taken from Shady Cove since 2001, indicate this area air quality index (AQI is computed hourly using the 24-hour average for PM2.5) remains below the Federal standards (Oregon DEQ 2008). The exception was during the summer months of 2002 when the Timbered Rock Fire was burning. The 24-hour average levels reached extreme levels of more than 200 ug/m^3 for a 2 week period (USDI 2003). Other high periods recorded during the winter months can be attributed to the use of wood burning stoves when the air is colder, more stagnate, and settles into the valley area of Shady Cove. However, these levels just exceed the standard levels. It should be noted that in 2006, the Environmental Protection Agency (EPA) placed tighter standards on PM2.5, moving the daily standard from 65 ug/m^3 to 35 ug/m^3. These standards could lower the number days the Shady Cove area is in compliance.

Current air quality and visibility conditions are not monitored within the Big Butte Creek 5th field watershed and no areas within the watershed have been designated air quality nonattainment areas. Grants Pass and Medford are the closest designated air quality nonattainment areas. Grants Pass is classified as a nonattainment area for fine particulate (PM10) and carbon monoxide standards.

From 2002 to 2006, the Medford BLM Butte Falls Resource Area has burned approximately 2,100 acres of hand piles. The Medford District BLM is required to be in compliance with the Oregon Smoke Management Plan (OAR 629-048-0010). Prior to conducting prescribed burning activities, registration of prescribed burn locations is required. The specific location, size of the burn, fuel loadings, ignition source, time, and duration of ignition are reported prior to ignition. Advisories or restrictions are generated on a daily basis by the State Meteorologist. This information is used to determine the appropriate time to conduct the planned prescribed burn. The burning of these hand piles occurred during the winter months from November to February. The burning was conducted during storm events when unstable atmospheric conditions were present in order to maximize mixing and lessen smoke impacts to localized areas. In addition, all piles are covered to facilitate rapid consumption of fuels and minimize the amount of residual smoke produced. Air quality and visibility impacts were light and the local drainages had the greatest concentrations of visible smoke; however, within one to two days following the burning, smoke was no longer visible.

Impacts from wildfire have been very light to nonexistent since 1967 within the Big Butte Creek 5th field watershed. This is due to the large number of Size Class A and B fires (less than 10 acres in size) that were contained quickly and rapidly mopped-up (no smokes visible). The greatest impact to the watershed likely occurred during the Timbered Rock Fire in 2002. The Timbered Rock Fire burned outside of the watershed but smoke impacts likely affected the residents in the lower portion of the watershed along Crowfoot Road. These areas would have had peak impacts similar to those recorded in Shady Cove.

Current air quality and visibility conditions are not monitored within the Big Butte Creek 5th field watershed. Because no permanent sources of particulate matter production exist, and based on findings from the Shady Cove monitoring site, the air quality and visibility throughout the watershed is thought to be good. The Big Butte Creek watershed is located just northeast of Shady Cove and generally has better air movement, larger valley areas, and a more scattered population than Shady Cove. The areas around the community of Butte Falls would likely experience times of higher smoke impacts during the winter months from wood burning stoves. Smoke from woodstoves and fireplaces can contribute to air pollution in the fall and winter, especially during periods of air stagnation. Existing sources of emissions include occasional construction and logging equipment, light industrial vehicles, road dust, residential wood burning, campfires, and prescribed fire.

E.2 Environmental Consequences

E.2.1 Effects of Alternative 1 (No Action) on Air Quality

Under Alternative 1, no prescribed burning treatments or forest management activities proposed under this EA would occur. The potential for future wildfire and the impacts of smoke from a large wildfire event would continue as the degree of departure from the reference fire regimes continues.

E.2.1.1 Direct and Indirect Impacts

Impacts to air quality from wildfires are closely related to the amount of biomass material consumed (surface and ladder fuel loads) and atmospheric conditions. Wildfires generally occur during the hot, dry summer months when atmospheric conditions are stable, and fuel moistures are low and readily available to burn. A high intensity wildfire with heavy fuel loading could cause a high level of emissions.

Particulate matter (PM) produced from wildfires limits visibility, absorbs harmful gasses, and aggravates respiratory conditions in susceptible individuals (Sandberg et al. 1999). Over 90 percent of the particulate matter produced is smaller PM10 and 70 percent is smaller than PM2.5 (Sandberg et al. 1999). These small particles can be most harmful to individuals because they have the ability to penetrate deep into the lungs. The carbon monoxide produced by a wildfire is more of a concern to firefighter health and safety when working on the fireline. Carbon monoxide becomes a concern for citizens when an inversion sets up and traps the carbon monoxide near communities. The level of exposure to firefighters and the public depends on the duration of exposure, carbon monoxide concentration, and the level of physical activity during exposure (Reinhardt 2000). If a wildfire were to occur, the emissions would present health concerns to those individuals living downwind and in nearby low lying areas. Symptoms from short-term smoke exposure can range from scratchy throat, cough, irritated sinuses, headaches, and stinging eyes. Persons with asthma, emphysema, congestive heart disease, and other existing medical conditions can have more serious reactions. The elderly and children are also high-risk groups (Oregon DEQ 2008).

E.2.1.2 Cumulative Effects

Evidence of impacts from past activities within the Big Butte 5th field watershed is unknown. No permanent sources of particulate matter production exist within the watershed and air quality and visibility is thought to be good. Activities such as residential wood burning, traffic exhaust, and road dust on private and public lands throughout the watershed may have localized impacts of short duration. Smoke created from wood burning would continue as a source of air pollution and may effect those individuals with asthma, respiratory or heart conditions, or other illnesses, especially during inversions or times of stagnate air. Oregon DEQ has developed a statewide woodstove program to promote the use of cleaner burning woodstoves and to help homeowners burn wood more efficiently and with less pollution.

Past wildfires, such as Timbered Rock, may have impacted rural residential areas along Crowfoot Road during the active fire period but have not presented any long-term impacts. The heaviest impacts likely occurred during the fire when stable atmospheric conditions created inversions in low lying areas. Past prescribed burning activities on private and BLM-administered forest lands are regulated and have had negligible impacts on air quality.

Impacts from a wildfire event would be dependent on the size, intensity, location, atmospheric conditions, and duration. Emissions from a small wildfire would be localized and short in duration and impacts would be within local drainages. The potential health hazards to individuals living in the vicinity or downwind from a large intense fire could be substantial. The duration of, amount of, and exposure to pollutant emissions would increase, impacting human health and public welfare. This would continue until the fire was out and atmospheric conditions allowed for sufficient dispersion of the smoke. Alternative 1 would have the greatest potential for large-scale smoke events from wildfires because no actions are being taken to reduce the current surface fuel loading.

E.2.2 Effects of Alternatives 2 and 3 on Air Quality

E.2.2.1 Direct and Indirect Effects

Under Alternatives 2 and 3, hand and machine piled slash burning, landing pile burning, and underburning would occur to reduce the surface fuel loading remaining after salvage logging activities.

Prescribed burning would affect air quality by the addition of carbon monoxide, PM10, and PM2.5. *Photo Series for Quantifying Forest Residues* would be used to determine the fuel loading for underburns and visual measurements would be used to determine fuel loading for pile burning. The project fuels specialist estimates that pile fuel loading would be less than 35 tons/acre. Underburning fuel loading would vary but would be between 12 and 35 tons/acre. At these levels and by following the prescribed fire management guidelines in the Oregon Smoke Management Plan, there would be negligible direct or indirect effects on air quality within the Project Area. A large portion of particulate matter emissions from prescribed burning is “lifted” by convection into the atmosphere where it is dissipated by horizontal and downward dispersion. At distances greater than 10 miles, the air concentrations for these emissions are expected to be small.

Prescribed burning would comply with the guidelines established by the Oregon Smoke Management Plan and the Visibility Protection Plan (OAR 340-200-0040, Section 5.2). Prescribed burning is not expected to affect visibility within the Crater Lake National Park and neighboring wilderness smoke sensitive Class I areas (Kalmiopsis and Rogue Wilderness Areas). Prescribed burning emissions are not expected to adversely effect annual PM10 attainment within the Grants Pass and Medford/Ashland nonattainment areas.

Pile burning would be scheduled primarily from October to March. Pile burning would take place during unstable atmospheric conditions (e.g., rain, snow, or storm events). All piles would be covered to facilitate rapid ignition and consumption of fuels to minimize residual smoke. Underburning would be scheduled from October to the end of April. Burning in the spring or after rain events reduces impacts to the soil, consumption of large woody materials and duff layer, and allows for rapid mop-up following ignition. Localized concentration of smoke may occur in adjacent drainages and low lying areas during prescribed burning operations. Timing of the all prescribed burning would be dependent on weather and wind conditions to help reduce the amount of residual smoke to the local communities. If residual smoke impacts exceed limits set by the Oregon Smoke Management Plan, additional burning would be stopped until given the notice to proceed by the ODF Forecaster.

E.2.2.2 Cumulative Effects

Short-term increase of particulates in the air, primarily from smoke, would be anticipated. Road construction, maintenance, and decommissioning; vehicle emissions; and dust, along with silvicultural practices, also contribute slightly to the temporary degradation of air quality in the Project Area.

The use of prescribed fire to reduce flammability and excess levels of fuels would affect long-term forest productivity by reducing the risks and consequences of a major wildfire. The temporary impacts of smoke from prescribed fire would have minor effects on the use of forest resources, such as recreation sites and scenic resources. Long-term benefits of using prescribed fire to reduce natural fuels would more than outweigh the short-term impacts to air quality.

Air Quality References

Oregon Department of Environmental Quality. 2008. Visibility Protection Plan for Class I Areas. Oregon Administrative Rules 340-200-0040, Section 5.2.

Oregon Department of Environmental Quality. 2008. Wildfire smoke and your health. [Online] http://www.deq.state.or.us/aq/burning/wildfires/index.htm

Oregon Department of Forestry. 2008. Oregon Smoke Management Plan. Oregon Administrative Rules 629-048-0100.

Sandberg, D.V., C.C. Hardy, R.D. Ottmar, J.A.K. Snell, A. Acheson, J.L. Peterson, P. Seamon, P. Lahm, and D. Wade. 1999. National strategy plan: modeling and data systems for wildland fire and air quality. General Technical Report, PNW-GTR-450USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

U.S. Department of the Interior, Bureau of Land Management, Medford District, Butte Falls Resource Area. 2003. *Timbered Rock Fire Salvage and Elk Creek Watershed Restoration Final Environmental Impact Statement* BLM/OR/WA/PL-04/06+1792. Government Printing Office.

Appendix F - Visual Resources

Introduction

Visual resources are defined as "the visible physical features of a landscape" (USDI 1995, 116). The BLM ensures the scenic values of the public lands are considered before allowing uses that may have negative visual impacts. BLM accomplishes this through its Visual Resource Management (VRM) system, a system which involves inventorying scenic values and establishing management objectives for those values through the resource management planning process, and then evaluating proposed activities to determine whether they conform with the management objectives.

The Medford ROD/RMP established VRM classifications for all BLM-administered lands in the Medford District. These lands are allocated to one of four VRM Classes that are managed to meet specific objectives. Visual resources in the Project Area are managed as VRM Class II and IV. The objectives for these classes are:

- **Class II Objective**: To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
- **Class IV Objectives**: To provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Three areas in the Project Area are managed as VRM Class II: Butte Falls-Prospect Highway, Cobleigh bridge area, and Lost Creek Lake viewshed (USDI 1995, 70). The remainder of the Project Area is managed as VRM Class IV.

Affects of Salvage on Visual Resources

The January 2008 windstorm caused major changes to the visual resources in the Project Area. Trees were blown down in random patterns and storm damage ranged from scattered to severe. The impacts to the visual quality of the Project Area occurred as a result of the windstorm.

Most of the proposed salvage units are not visible from the major travel routes in the Project Area (Highway 62, Cobleigh Road, Butte Falls Highway, and Butte Falls-Prospect Highway). They are out of sight due to trees along the roads which screen the view, they are located too far from the road to be seen, or they are hidden by the steep topography. Visual evidence of salvage would be most evident immediately adjacent to minor roads, and would be short-term until sufficient green-up of the remaining vegetation occurs. Salvaging the blown down trees and replanting the severely damaged areas would allow the area to return to the prewindstorm conditions faster than if left unsalvaged. Slash disposal soon after the salvage and the growth of new vegetation would help soften the impacts from the windstorm and the salvage activities.

The potential for the greatest visibility of the salvage units from major travel routes is from Cobleigh Road and Butte Fall-Prospect Highway. On Cobleigh Road, the valley opens up and longer views are possible. However, the areas of downed trees are currently not visible in the background, and it is anticipated that salvage activity would not alter that. Along Cobleigh Road there is also a wide variety of textures, colors, and lines in the landscape from buildings, powerlines, fencelines, open meadows, and trees screening the view from the road. Any changes in the background view due to salvage activity would be unnoticeable to the casual observer. Along the Butte Falls-Prospect Highway, checkerboard ownership patterns create a contrast in vegetative cover between industrial timber lands and BLM-administered lands. The blowdown varied from a few trees to large patches of blown down trees. Timber companies have already removed blown down trees on their lands which has accentuated the differences between the salvaged and unsalvaged lands. The visual impacts from salvage would be temporary and slash disposal on BLM lands soon after salvage harvest would help to reduce the effects. Regrowth of vegetation will occur and help soften the impacts from the windstorm and the salvage.

Appendix G – Water Resources

Steps and Assumptions

1. As part of the Bowen Arrow / Twin Ranch Timber Sale, extensively analyze three, 6th field subwatersheds (Central Big Butte) in the Big Butte 5th field watersheds.
2. Divide area into 15 analysis areas (57,818 acres)
3. Divide area into 863 polygons and assess the following:
    a. Date of last harvest
    b. Canopy cover
    c. Most recent logging system
    d. Presence of conifers greater than 60 years old
    e. Land ownership
        i. Assume no land management activities have occurred since 2005 (most current aerial photo series).
4. For the purposes of soil compaction, exempt Lost Creek Reservoir and portions of Sky Lakes Wilderness Area from soil compaction (60,451 acres).
5. Remaining area affected by blowdown includes Little Butte Creek, Rogue River/Lost Creek, South Fork Rogue River and the never-analyzed portions of Big Butte Creek 5th field watersheds (473,844 acres).
6. Divide 473,844 acres into 16 larger polygons based on an aerial photo assessment of the following:
    a. 5th field watershed boundaries
    b. General ground slope, topography and elevation
    c. Land ownership
    d. Most prevalent logging system
7. Assign each of the larger polygons a corresponding and similar, yet smaller, analysis area from the Central Big Butte HUC6 analysis
    a. Assume similar levels of compaction from the following:
        i. tractor yarding
        ii. cable yarding
        iii. roads
8. Summarize total soil compaction of 5th field watersheds and assess a percentage of compacted soils.

Table G-1. Existing Soil Compaction							
	Acres of Compaction				Compacted BLM Land		Total Watershed Compaction (Percent)
Watershed	Tractor Yarding	Cable Yarding	Road Area	Total	Acres	Percent	
Big Butte Creek	22,562	193	880	22,635	4,183	2.6	14.9
Little Butte Creek	57,213	116	2,143	59,472	15,503	6.5	24.9
Rogue River/Lost Creek	6,564	109	473	7,146	2,054	5.7	19.7
South Fork Rogue River	23,084	196	1,027	24,307	5,331	3.3	15.3

Timber harvest as segregated by different logging systems was determined based on topography, aerial photo interpretation, and extrapolation from previously studied areas. Percentages (right column) are a function of the watershed, regardless of land ownership. Note that total compacted area percentages exceed 12 percent (level of concern identified for potential increases in peak flow) in all watersheds.

Compacted BLM land is an approximation based on data extrapolation. The compacted area percentage is a function of the watershed's total acreage.

Extrapolation will tend to overestimate tractor compaction and underestimate cable compaction. The area where baseline data came from (Central Big Butte HUC6s) yields little topographic relief and logging is nearly entirely conducted by tractor.

Total soil compaction does seem to be reasonable, however. Little Butte Creek is the most compacted of the four watersheds, but also has the highest percentage of urban and rural development. South Fork Rogue River is largely forested and experiences proportionately less logging. Additionally, wilderness occupies the eastern edge of the South Fork Rogue River watershed. Big Butte Creek and Rogue River/ Lost Creek have both experienced significant logging.

All four watersheds are currently at risk to increases in peak flow from soil compaction.

Table G-2. Road-Stream Crossings						
Watershed	Dry Draw	Ephemeral	Seasonal	Perennial	Other	Total
Big Butte Creek	319	341	363	373	154	1,550
Little Butte Creek	743	659	1,161	392	316	3,271
Rogue River/Lost Creek	144	176	148	106	16	590
South Fork Rogue River	87	266	238	207	11	809

Ginger Springs Additional Information

The majority (85 percent) of the Ginger Springs Municipal Watershed, across all ownerships, lies within the transient snow zone, a zone ranging from 3,500 to 5,000 feet in elevation where precipitation frequently falls as snow and then melts a few days or weeks later. The transient snow zone can contribute to flooding if heavy rain and warm temperatures occur at the same time when snow has accumulated, so called rain-on-snow events. Peak flows in this watershed generally occur as a result of rain-on-snow events. In the Ginger Springs Municipal Watershed, 33 percent of the transient snow zone occurs on BLM-administered lands (USDI 1998).

Reference

U.S. Department of the Interior, Bureau of Land Management, Butte Falls Resource Area. 1998. *A Watershed Analysis and Management Plan for BLM Lands Within the Ginger Springs Recharge Area* Medford, OR.
[Online] http://www.blm.gov/or/districts/medford/plans/files/ginger_springs_wa_acc.pdf

Appendix H - Aquatic Conservation Strategy Consistency

Components of the Aquatic Conservation Strategy

The following are four main components of the Aquatic Conservation Strategy (ACS): Riparian Reserves, Key Watersheds, Watershed Analysis (WA), and Watershed Restoration.

Riparian Reserves

The Medford District Record of Decision and Resource Management Plan (/ROD/RMP) states, "As a general rule, management actions/direction for riparian reserves prohibits or regulates activities that retard or prevent attainment of Aquatic Conservation Strategy and riparian reserve objectives" (ROD/RMP, p. 27).

Riparian reserves are equal to the distance of one site-potential tree on non-fish-bearing streams and two site-potential trees on fish-bearing streams. All fish-bearing streams would maintain at least one site-potential tree as a no touch buffer. The riparian reserve width for the Butte Falls Blowdown Salvage timber sale varies based on the site-potential tree for each 5th field watershed. The following riparian reserve distances would be followed:

- Big Butte Creek - 190 feet
- Rogue River/Lost Creek - 185 feet
- South Fork Rogue River - 208 feet
- Little Butte Creek -163 feet

These buffers consist of the area on each side of the stream extending from the edges of the active stream channel to a distance that ranges from a minimum of 163 feet to a maximum of 380 feet slope distance for this project.

The proposed activities considered in the riparian reserves for this project include windblown timber salvage, culvert replacements, road renovation, log hauling, and fuels reduction. No salvage is proposed in the fish-bearing riparian reserves in the South Fork Rogue River 5th field watershed.

Key Watersheds

North Fork/South Fork Little Butte Creek is a Tier 1 Key Watershed. Projects are only proposed within the Lower North Fork Little Butte Creek 6th field subwatershed, a tributary drainage of the larger Key Watershed. Tier 1 Watersheds contribute directly to conservation of at-risk salmonids, bull trout, and resident fish species. These watersheds also have a high potential for being restored as part of a watershed restoration program (ROD/RMP, p. 22).

Watershed Analysis

The relevant watershed analyses for this project are:

- Lost Creek WA (USDI 1998)

- Lower Big Butte Creek WA (USDI 1999)
- Upper Big Butte Creek WA (USDI 1995)
- Central Big Butte WA (USDI 1995)
- Little Butte Creek WA (USDI 1997)

Watershed Analysis is intended to enable the planning of watershed or landscape scale projects which achieve ACS objectives. Watershed Analysis will serve as the basis for the design of Best Management Practices during project-specific planning (ROD/RMP, p. 152).

Watershed Restoration

The Northwest Forest Plan Record of Decision (p. B-31) listed the most important components of a watershed restoration program as "control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity."

Project Summary

The Butte Falls Resource Area is proposing to salvage trees blown down during the January 2008 windstorms. Salvage would occur on up to 6,100 acres located in the Big Butte Creek, Rogue River/Lost Creek, South Fork Rogue River, and Little Butte Creek 5th field watersheds.

This project is proposed within matrix (including connectivity/diversity blocks), 100-acre northern spotted owl activity centers, and riparian reserve land use allocations. Trees proposed for salvage would include windthrown trees, damaged trees not likely to survive, insect-killed trees, and trees determined hazardous to workers or the public. Timber would be salvaged using helicopter, tractor, shovel, or cable yarding systems. Salvage in riparian reserves would only occur in areas determined to be severely affected by blowdown for future resource protection and would include the application of site-specific Best Management Practices to meet ACS objectives.

The proposed work includes road renovation, landing construction, permanent road construction, and temporary spur road construction. Site preparation or slash disposal activities such as lop and scatter, piling and burning, and underburning would be used to treat logging slash and damaged residual conifers 1 inch to 12 inches in diameter.

Project Design Features (PDFs) that would Maintain or Restore ACS Objectives

Riparian Reserves and Northern Spotted Owl Activity Centers

- Salvage only in areas with severe levels of blowdown. Areas of scattered or moderate windthrow will not be salvaged.
- Salvage only windthrown trees in excess of those trees needed to meet coarse woody debris levels of 9 pieces greater than 20 inches in diameter and more than 20 feet long (White 2000). The tree species preferred for coarse woody debris have the lowest susceptibility to insect build-up: incense cedar, ponderosa pine, sugar pine, and white fir. The most susceptible to insect build-up is Douglas-fir.
- Treat logging slash (pile and burn or lop and scatter) following salvage activities to minimize

wildfire risk and to create planting spots. Conifer trees would be planted and associated silvicultural treatments would be applied to ensure seedling survival and establishment.

- Construct new landings and roads outside Riparian Reserves and northern spotted owl activity centers.

Riparian Reserves

- Prohibit the operation of ground-based equipment within Riparian Reserves and bull-line all salvage trees on ground suited for tractor yarding (generally less than 35 percent slope) to adjacent matrix lands.
- Salvage only in severely damaged Riparian Reserves located adjacent to severely damaged matrix lands. “Stand alone” Riparian Reserves that sustained severe damage would not be salvaged.
- For salvage on ground suited for tractor yarding, the outermost 100 feet of the Riparian Reserve will be available for salvage. In Riparian Reserves on intermittent and non-fish-bearing streams, a 75- to 100-foot no salvage area will be maintained on each side of the stream channel. On fish-bearing streams, a 220- to 320-foot no salvage area will be maintained. The buffer width varies based on the 5th field watershed and the site-potential tree length for that watershed.
  - Big Butte Creek 5th field watershed - 190 feet
  - Rogue River/Lost Creek 5th field watershed -185 feet
  - South Fork Rogue River 5th field watershed - 208 feet
  - Little Butte Creek 5th field watershed -163 feet
- For salvage harvest on ground suited for cable yarding, a 75-foot no salvage area will be maintained on each side of the stream channel in Riparian Reserves on intermittent and non-fish-bearing streams; the remaining Riparian Reserve will be available for salvage. On fish-bearing streams, the first site-potential tree length will be maintained as a buffer on each side of the stream channel. Salvage will be permitted within the second site-potential tree length located the furthest upslope from the stream.
- Construct new landings and roads outside Riparian Reserves.
- Water bar all yarding corridors within Riparian Reserves.
- Require one-end log suspension, full suspension over streams, and no streambank disturbance for cable yarding.
- Salvage above the slope break within Riparian Reserves.
- Harden natural-surface road approaches where they cross streams containing coho critical habitat by applying base coarse material at stream crossings. Install drain dips, where feasible, to intercept water run-off from road surfaces and divert away from stream courses.

Soil and Hydrology

- Limit any construction to the dry season (generally May 15 to October 15). Landing or spur road construction will be located outside of Riparian Reserves and away from unstable soil conditions and headwalls.
- Reblock all designed and blocked spur roads upon completion of salvage activities. All drainage structures, including water bars, will be properly functioning prior to blocking. If no future access is needed, road decommissioning will be considered on all spur roads. If it is determined a spur road is needed for future access, it will either be adequately surfaced or decommissioned.

- Rip all temporary roads, apply native plant seed and weed-free mulch, and block upon completion of use. If log hauling on a temporary road is not completed in the same year the road is constructed, block the road before the rainy season, generally October 15.
- Rip all skid trails in areas with severe blowdown on completion of salvage activities.
- Meet 100-year flood design standards for road construction and improvement activities such as culvert upgrades.
- Seasonally restrict all rock hauling, log hauling, and landing operations on native surface or inadequately rocked roads whenever soil moisture conditions or rain events could result in road damage or the transport of sediment to nearby stream channels, generally October 15 to May 15.
- Restrict all rock hauling, log hauling, and landing operations on adequately rocked roads whenever soil moisture conditions or rain events could result in road damage or the transport of sediment to nearby stream channels, especially between the dates of October 15 and May 15. Allow road or landing use between those dates only during periods of dry weather.
- Limit cable yarding during wet weather conditions if gouging and channelized flow could occur.
- Water bar skid trails during the same operating season as used based on gradient and erosion class guidelines (see ROD/RMP, Appendix D-Best Management Practices, Erosion Control for Timber Harvest, p.167).
- Block skid trails leading off system roads upon completion of yarding by scattering large and small debris, such as rocks, logs, and slash, on the first 100 feet of the skid trails.
- In moderate or scattered blowdown areas, minimize the total number of skid roads by designating skid roads with an average spacing of 150 feet. Avoid creating new skid roads and use existing roads, where feasible, in order to minimize ground disturbance.
- When constructing temporary roads, use ridge tops wherever possible.
- Restrict all tractor yarding, soil ripping, and excavator piling operations from October 15 to May 15, or when soil moisture exceeds 25 percent.
- Restrict tractor and mechanical operations to slopes generally less than 35 percent. In areas where it is necessary to exceed these gradients, use ridge tops where possible.
- Rip areas identified for ripping (e.g., skid roads, landings, decommissioned roads) to a depth of 18 inches using a subsoiler or winged-toothed ripper.
- Scatter logging slash on exposed soil in all areas within Riparian Reserves where ground disturbance from log yarding has occurred.

Fuel Hazard Reduction

- Locate hand piles or machine piles outside of ditch lines, cut banks above roads, or road corridors.
- Use approved BLM water sources in prescribed burn activities
- Water bar all firelines where slope exceeds 15 percent to control water runoff and limit potential erosion.
- Use hoselines in conjunction with or independently of firelines. In riparian areas, hoselines may be used independently to establish a wet line that reduces the extent of the fire backing into identified areas.

In general, the above PDFs will maintain or restore all Aquatic Conservation Strategy objectives. Due to the limited entry into riparian reserves, 70 acres dispersed across 48,010 acres of public land (four 5th field watersheds) and the inclusion of specific PDFs, all riparian areas will continue to function and protect the aquatic environment in the short- and long-term and at the site and watershed scales. The following discussion is based on the proposed project activities combined with specific PDFs that will maintain or restore each ACS objective. ACS objectives are analyzed based on short- (10 years or less) and long- (over 10 years) term effects of the project at the site (project) and watershed scales.

Aquatic Conservation Strategy Objectives

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations, and communities are uniquely adapted.

Site or Project Scale

Short-Term: The Butte Falls Blowdown Salvage Project would maintain the distribution, diversity, and complexity of the watershed and landscape-scale features for all essential habitat elements (off channel habitat and refugia, channel conditions/dynamics/floodplain connectivity). Only 70 acres (Alternative 3) would be salvaged within the Project Area (across four 5th field watersheds). In addition to the PDFs listed above, the proposed action would limit any affects to the aquatic environment. By staying outside topographic slope breaks, keeping equipment away from stream channels, retaining large amounts of coarse woody debris, and other PDFs listed above, riparian areas proposed for salvage would continue to function while maintaining the distribution, diversity, and complexity of watershed and landscape scale features.

Long-Term: The riparian reserve salvage areas cover approximately 70 acres out of the four 5th field watersheds containing the Project Area. No long-term impacts from salvage, yarding, or road and landing construction are expected. No road construction would take place inside riparian reserves. Riparian reserves would continue to function and maintain the distribution, diversity, and complexity of watershed and landscape-scale features. No project activities (e.g., salvage, road renovation, or log hauling) would have long-term negative impacts to aquatic or terrestrial ecosystems.

Fuels reductions in riparian reserves would not influence the distribution, diversity, and complexity of watershed and landscape-scale features because only the removal of slash piles derived from the windthrow would occur in about 70 acres of treatable areas outside riparian slope breaks. The remaining acres of riparian downed trees would not be salvaged in order to retain the diversity and complexity of windthrown riparian areas within the riparian reserve. Furthermore, a large amount of large woody debris (LWD) would be retained on-site (205 linear feet per acre) to ensure short- and long-term LWD supplies.

Watershed Scale

Short-Term: Riparian reserves throughout the entire Project Area are expected to maintain the distribution, diversity, and complexity of watershed and landscape-scale features primarily because only 70 acres of riparian reserve would be salvaged. The large amount of LWD retained on-site (205 linear feet per acre) in treated areas will ensure short- and long-term LWD storage. Therefore, at the watershed scale, this project would maintain the distribution, diversity, and complexity of all four 5th field watersheds.

Long-Term: There will be no long-term impacts from salvage , yarding, or road and landing construction (ground-disturbing activities). Fuels reductions in riparian reserves would not negatively influence the distribution, diversity, and complexity of watershed and landscape-scale features. At the watershed scale, PDFs will reduce potential negative impacts to distribution, diversity, and complexity of project area riparian features by reducing the risk from insect infestation and wildfire disturbance to riparian reserves.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependant species.

Site or Project Scale

Short-Term: Riparian reserves throughout the entire Project Area would continue to function and maintain temporal connectivity due to the relatively minute scale and the dispersal of treated areas across four 5th field watersheds. Within these riparian acres, all salvage would stay outside the topographic slope break in addition to retaining large amounts of coarse woody debris. Staying outside the topographic slope break and retaining large amounts of woody debris provides forest floor complexity, enhances habitat characteristics, and establishes a buffer to riparian chemical and physical processes. Furthermore, salvaged areas would be replanted and are expected to recover faster than unsalvaged areas.

Culvert replacements will immediately improve the hydrologic connectivity between existing road networks at the site level. In addition, culverts selected for replacement are damaged or have been failing and may not provide passage for aquatic species. Additional PDFs ensure culverts will be adequately sized to allow proper connectivity for upstream and downstream movement of aquatic species at all stream flows.

Long-Term: Riparian reserves throughout the Project Area would continue to function and maintain spatial and temporal connectivity as a result of this project. Culvert replacements will maintain or restore connectivity within the aquatic ecosystem for aquatic and riparian dependent species.

Watershed Scale

Short-Term/ Long-Term: Riparian reserves throughout the Project Area would continue to function and maintain spatial and temporal connectivity. Culvert replacements will increase connectivity of the aquatic ecosystem at the site level, thus increasing or maintaining connectivity at the watershed scale. Culvert replacements will increase connectivity within the aquatic ecosystem and at the site where the culvert is being replaced. However, at the watershed scale this increase in connectivity is expected to be relatively inconsequential.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Site or Project Scale

Short-Term: Riparian reserves throughout the Project Area would continue to function and protect the aquatic ecosystem. PDFs and no salvage buffers, as well as restricting salvage in riparian reserves to areas above and outside the inner slope breaks will maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configuration, by eliminating ground disturbance near streams and riparian areas.

Culvert replacements will alter bank and bottom configurations. All other banks and stream configurations would be unchanged. This small change of the stream site (where a culvert is being replaced) would not affect the overall physical integrity of the aquatic system within the Project Area, and would be a one time alteration (short-term). These culvert upgrades would improve the current condition of the stream crossings by allowing the passage of debris and reducing the risk of structural failure, stream diversion, and increased sedimentation of the stream.

Long-Term: Riparian reserves throughout the entire Project Area would continue to function and protect the aquatic system. No long-term impacts are expected in regard to the physical integrity of the aquatic system. Culvert replacement is not expected to create long-term alterations or change physical integrity at the project scale. At the site scale, culvert replacement would improve the physical integrity of the stream by reducing erosion from undersized culverts which would reduce stream sedimentation in the long-term.

Watershed Scale

Short-Term/Long-Term: Riparian reserves throughout the entire Project Area would continue to function and protect the aquatic system. Culvert replacements will alter bank and bottom configurations of the stream at the site.

The culvert replacements would not have long-term negative impact to stream banks and bottom configurations however the improved hydrologic connectivity would continue to provide benefits to aquatic systems. Riparian reserves throughout the entire project area would continue to function and protect the aquatic system in the long-term. At the watershed scale, all banks and stream bottoms would continue to be protected by riparian reserves. At the watershed scale, a one time small disturbance would be inconsequential and all banks and stream bottoms would continue to function naturally and would be protected from disturbance by the PDFs for managing riparian reserves.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Site or Project Scale

Short-Term/Long-Term: Fuels reduction activities would require the use of hand tools, so compaction or large areas of ground disturbance are not anticipated. Therefore, no biological, physical, and chemical water quality processes would be negatively impacted.

Riparian reserves throughout the entire Project Area would continue to maintain water quality. Stream temperatures would not be affected by the proposed project since the salvage of downed trees would not reduce canopy closure and other shade components. Some short-term inputs of sediment and turbidity may occur due to timber hauling, culvert replacements, and road renovations, but would be minor at the project site and would be within the natural range of variability. Road renovation and improvement activities would enhance or maintain water quality.

Fuel reduction would help to maintain and restore the biological, physical, and chemical integrity of the system by reducing the potential for wildfire and insect infestation. PDFs specific to restoration and maintenance of the biological, physical, and chemical integrity of the system are listed above.

Although salvage and yarding would occur in riparian reserves for this project, the effects of treating approximately 70 acres across the greater Project Area would be indiscernible. The management of riparian reserves throughout the entire Project Area would continue to meet the objectives of ACS for water quality. Long-term benefits would result from road renovations and culvert replacement and the subsequent improved road drainage and related decreases in sediment caused by degraded forest roads at the site scale.

Watershed Scale

Short-Term/Long-Term: Short-term, minute inputs of sediment are likely to occur from timber hauling, culvert replacements, and road renovations. However, these minor, short-term inputs of sediment would not influence the overall long-term sediment regime at the watershed scale. Furthermore, planned project road activities would improve road drainage (short-term and long-term) while decreasing the amount of sediment inputs from forest roads within the watershed.

Long-term effects of road renovations would improve road drainage and decrease the amount of sediment from forest roads within the Project Area and improve the overall hydrologic function of respective watersheds. Riparian reserves throughout the Project Area would continue to maintain water quality necessary to support healthy riparian, aquatic, and wetland ecosystems.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Site or Project Scale

Short-Term: Salvage and yarding would occur in limited areas of riparian reserves in this project. Riparian reserves throughout the Project Area would continue to maintain the sediment regime. Some short-term delivery of sediment may occur due to hauling, culvert replacements, and road renovations, but would be minor at the site scale. Road renovations would improve water drainage off area roads and would reduce sediment delivery from roads before hauling occurs. Moreover, seasonal restrictions for hauling on rocked and natural surface roads are in place to limit the amount of potential sedimentation from area roads. Other PDFs (listed above) include seasonal restrictions for mechanical disturbance during implementation of culvert upgrades, road renovations, and log hauling in order to minimize the risk for sediment delivery to streams.

Long-Term: No long-term impacts from salvage and yarding would occur due to the use of PDFs described above. Riparian reserves would continue to function and protect the aquatic system by providing a buffer to runoff and sediment delivery mechanisms. Long-term benefits would result from road renovations and subsequent upgrades to road drainage and decreased sediment from forest roads at the site scale.

Site-specific treatments such as fuels reduction would produce positive effects at the watershed scale since insect infestation and wildfire processes have the potential to operate at a larger scale and thus affect other adjacent riparian reserves throughout all watersheds.

Watershed Scale

Short-Term: Minor inputs of sediment may occur due to road renovations, culvert replacements, and log hauling. However, these small deliveries of sediment would not influence the sediment regime at the watershed scale.

Together, these small, short-term inputs of sediment would likely be of no consequence at the site level, would not alter the sediment regime at the site, and are expected to be within the natural range of variability.

Long-Term: Few impacts from salvage, yarding, or road and landing construction are expected because salvage and yarding would only occur within such a relatively small portion of the Project Area, less than 70 acres of the outer edges of riparian reserves. No road or landing construction would occur within riparian reserves. Riparian reserves would continue to function and protect the aquatic system. Long-term benefits would result from road renovations and the subsequent enhancement of road drainage and decreases in sediment from forest roads at the site scale. These benefits (increased water quality and natural hydrologic function) would be minor at the watershed scale. Fuels reduction would reduce the risks of catastrophic fire in these salvaged riparian areas, which can affect adjacent riparian reserves throughout all Project Area watersheds.

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetlands habitats to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Site or Project Scale

Short-Term: Salvage and yarding (ground-disturbing activities) would occur on approximately 70 acres of riparian reserves for this project. Riparian reserves throughout the Project Area would continue to function and retain patterns of sediment, nutrient, and wood routing. The project will not diminish LWD recruitment, alter the flow regime, reduce flood-prone areas, or impinge on its function. Some short-term inputs of sediment may occur due to timber hauling, culvert replacements, and road renovations, but would not alter the sediment regime at the project scale. Vegetative canopy removal, soil compaction, roads and stream crossings (all four risk assessment factors) would not increase or approach risk thresholds or peak or base flows. Therefore, this project would have no causal mechanism to alter flows.

Replacement of culverts has the potential to directly impact the aquatic system by disturbing stream banks, vegetation, and substrate at the project site level. During replacement, this action would result in short-term increases in turbidity at the site, but would not change the sediment regime. However, culvert replacements would improve wood routing by allowing LWD to pass through larger diameter designs. This would also help in sediment storage and routing within the stream network where the culvert is being placed. Road renovations would improve road drainage off forest roads to allow a more natural hydrologic function (timing, magnitude, duration, and spatial distribution of peak, high, and low flows).

Long-Term: Salvage (ground-disturbing activities) would occur in limited areas of riparian reserves for this project (70 acres across four 5th field watersheds). Riparian reserves would continue to function and protect the aquatic system. Long-term benefits would result from road renovation and subsequent return to functioning road drainage while decreasing sedimentation from forest roads at the site scale and improved wood and sediment routing from replacing undersized culverts.

Watershed Scale

Short-Term/Long-Term: Minor inputs of sediment may occur due to road renovations, culvert replacements, and log hauling. However, these small inputs of sediment would be short-term at the project site and would be insignificant at the watershed scale.

Riparian reserves throughout the Project Area would continue to maintain patterns of sediment, nutrient, wood routing, and the distribution of peak, high, and low flows. Long-term benefits would result from road renovation and the subsequent improved road drainage and decreases in sediment from forest roads. At the watershed scale, benefits would be negligible.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Site or Project Scale

Short-Term: The Butte Falls Blowdown Salvage project would maintain the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands because vegetation canopy removal, soil compaction, roads and stream crossings (all four risk assessment factors) would not increase or exceed risk thresholds for altering hydrology. Therefore the timing, variability, duration of floodplain inundation, and water table elevation would be maintained at the project site and watershed scales.

Long-Term: The Butte Falls Blowdown Salvage project would restore the timing, variability, duration of floodplain inundation, and water table elevation in meadows and wetlands because older compacted skid trails would be ripped to allow water infiltration, allowing natural hydrological functions to occur. Road renovations would improve the potential direct delivery of runoff to streams as well as avoid water accumulation which can cause channeling and sediment delivery to area streams.

Watershed Scale

Short-Term: The Butte Falls Blowdown Salvage project would maintain the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands because none of the project activities would increase the risk of peak flows or water accumulations. Furthermore, the small amount of project activities within riparian areas spread across the landscape would not affect the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands at the watershed scale.

Long-Term: The Butte Falls Salvage project would restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands because old compacted skid trails would be ripped to allow water infiltration and natural hydrological functions to occur.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Site or Project Scale

Short-Term: The Butte Falls Blowdown Salvage project would maintain species composition and structural diversity of plant communities in riparian areas and wetlands because PDFs would implement no disturbance buffers on all riparian areas to ensure nutrient filtering; appropriate rates of surface erosion, bank erosion, and channel migration; and supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability. Furthermore, all riparian salvage units have already been severely altered from blowdown and all trees to be removed are on the ground. Therefore, no standing green trees would be removed. All salvage within Riparian Reserves are above slope breaks and have large no touch buffers, which would maintain species composition and structural diversity of plant communities in riparian areas and wetlands.

Long-Term: The Butte Falls Salvage project would maintain the species composition and structural diversity of plant communities in riparian areas and wetlands because the salvage of downed trees would reduce the risk of catastrophic fires and insect infestations that could further damage riparian areas adjacent to salvage units.

Watershed Scale

Short-Term: The Butte Falls Salvage project would maintain species composition and structural diversity of plant communities in riparian areas and wetlands since there will be no disturbance to the plant communitites due to the small extent of the project, approximately 70 acres of riparian areas would be salvaged. This small amount of riparian acres across the four 5th field watersheds is an insignificant amount of small disturbances spread across the landscape. Therefore, species composition and structural diversity of plant communities in riparian areas and wetlands across all watersheds would be maintained.

Long-Term: The Butte Falls Blowdown Salvage project would maintain the species composition and structural diversity of plant communities in riparian areas and wetlands because the salvage of downed trees would reduce the risk of catastrophic fires and insect infestations that could further damage riparian areas adjacent to salvage units and across all Project Area watersheds.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Site or Project Scale

Short-Term: The Butte Falls Salvage project would maintain populations of native plant, invertebrate, and vertebrate riparian-dependent species throughout approximately 70 acres of riparian reserves proposed for salvage throughout four 5th field watersheds. All riparian areas would maintain a no salvage buffer that would be free of any ground-disturbing activity. PDFs such as staying above the slope break and seasonal restrictions to minimize disturbance and limits to the risk of ground compaction would further keep project activities (yarding) from causing large disturbances at the site.

Long-Term: The Butte Falls Blowdown Salvage project was designed to minimize future risk to riparian areas by reducing the risk of catastrophic fire and future insect infestation which could adversely affect riparian functions within and adjacent to salvage units. Salvage at individual sites within the riparian reserves would reduce the risk of fire and high insect infestation from fine fuels and reduce breeding habitat for insects. Without reducing the fuels and insect breeding habitat, the risk of affecting adjacent riparian areas would increase in the next few years. If an insect infestation or a catastrophic wildfire occurs, long-term disturbances could affect large areas of riparian reserves that could take decades to recover.

Watershed Scale

Short-Term: The Butte Falls Blowdown Salvage project would maintain populations of native plant, invertebrate, and vertebrate riparian-dependent species throughout approximately 70 acres of riparian reserves proposed for salvage throughout the four 5th field watersheds. All riparian areas would maintain a no salvage buffer that would be free of any ground-disturbing activity. Other PDFs, such as staying above the slope break, seasonal restrictions to minimize disturbance and limits to the risk of ground compaction, would further keep project activities (yarding) from causing large disturbances at the project site or watershed scales.

Long-Term: The Butte Falls Blowdown Salvage project would maintain long-term populations of native plant, invertebrate, and vertebrate riparian-dependent species in riparian reserves throughout four 5th field watersheds. Furthermore, all riparian areas would have a no salvage buffer that would be free of any ground-disturbing activity. Additionally, PDFs such as staying outside the topographic slope break, seasonal restrictions to minimize disturbance and limit ground compaction would keep project activities (yarding) from causing large disturbances from occurring at the site. Without reducing the fuels and insect breeding habitat the risk of affecting adjacent riparian areas would increase in the next few years. If an insect infestation or a catastrophic wildfire occurs, long-term disturbances could affect large areas of riparian reserves that could take decades to recover.

Conclusion

The Butte Falls Blowdown Salvage project would maintain all Aquatic Conservation Strategy objectives in the short- and long-term and at both the site and watershed scale. Due to limited acres of salvage within riparian reserves across four 5th field watersheds and the implementation of PDFs, this project would have very limited affects on the aquatic environment and would allow riparian reserves to continue to function and protect Project Area streams.

Appendix I – Wildlife

Table I-1. Butte Falls Blowdown Salvage Special Status Species Assessment

This table contains the USDI Bureau of Land Management Oregon/Washington Special Status Species List (updated July 2007) based on information from the Oregon Natural Heritage Program and BLM site-specific information. Each of these Bureau Sensitive species was considered and evaluated for this project. The methods used to assess and review the potential effects to these species followed the techniques described in the OR/WA Special Status Species Policy (IM OR-2003-054).

The following table documents the basic conclusions of this assessment by species. "Presence" refers to within a 1-mile radius of proposed salvage units.

Table I-1. Butte Falls Resource Area Special Status Species Butte Falls Blowdown Salvage Proposed Project Assessment

Species	Status	Range	Presence in Project Area	Conclusions
Amphibians				
Foothill yellow-legged frog	BS	Yes	Absent	Range is from sea level to about 1,800 feet. The units in the proposed Project Area are above 2,500 feet. No impacts from proposed projects.
Reptiles				
Northwestern pond turtle	BS	Yes	Absent	No pond habitat in or adjacent to units. Riparian buffers are 1 site-potential tree length from fish-bearing streams. Turtles may occur in the Big Butte Creek below Butte Falls. No detectable impacts from proposed projects.
Birds				
Bald eagle	BS	Yes	Absent	The nearest nest is approximately 4 miles from the nearest unit. Vagrant or migrating eagles could fly through. Bald eagles were removed from T&E status in 2007. No detectable impacts from proposed projects.
Lewis' Woodpecker	BS, NBC	Yes	Absent	Present in lower elevation private lands in Sam's Valley and Table Rocks. They are associated with open woodland habitat, primarily white oak, ponderosa pine, and riparian communities. No impacts.
Northern spotted owl	FT	Yes	Present	Historic sites near project units. Known sites would be surveyed prior to activity. Suitable habitat adjacent to known sites would be checked if NSO are not found in historic locations. Project "May Affect, Not Likely to Adversely Affect" due to some removal of live trees identified as hazards. Covered under Blowdown Salvage LOC# 8330.10101 (08).
Peregrine falcon	BS, NBC	Yes	Present	One active nest is located approximately 0.5 miles from the nearest proposed salvage unit. No impacts due to seasonal restriction for helicopter actions.

Table I-1. Butte Falls Resource Area Special Status Species
Butte Falls Blowdown Salvage Proposed Project Assessment

Species	Status	Range	Presence in Project Area	Conclusions
Streaked horned lark	BS	No	Absent	Habitat is open low elevation grasslands and farmlands. They are not present in the Project Area. No impacts.
Tri-colored blackbird	BS	No	Absent	Project Area is outside the range of the species. No impacts.
White-headed woodpecker	BS, NBC	No	Absent	Occasional visitor to Dead Indian Plateau. May be vagrant in Butte Falls Resource Area at higher elevation lands. Ample snags would be reserved. Adequate potential habitat exists within and adjacent to the Project Area. No impacts.
White-tailed kite	BS	No	Absent	White-tailed kites are present in Rogue Valley agriculture lands near Medford and Ashland. The Project Area is outside the known range. No impacts.
Mammals				
Fisher	FC	Yes	Present	Fishers use a variety of forested habitats. They use late-successional forests for denning and rearing young. Detections in the Big Butte Creek and Upper Rogue River 5th field watersheds. Wide-ranging individuals could occur in the Project Area. Analysis of salvage area indicates that habitat would remain after the action and they are expected to persist in the watershed.
Fringed myotis (bat)	BA	Yes	Present	Captured in a mist net surveys at a pond in the Big Butte Creek 5th field watershed. Fringed myotis appear adapted to live in areas with diverse vegetative substrates. Ample snags and coarse woody debris would be retained. Proposed activities would not affect persistence of the species in the watershed.
Pallid Bat	BA	Yes	Present	Captured in a mist net surveys over a pond in the Big Butte Creek 5th field watershed. Ample snags and coarse woody debris would be retained. Proposed activities are inconsequential to species or habitat. Proposed activities would not affect persistence of the species in the watershed.
Townsend's big-eared bat	BS	Yes	Present	Documented in salvage area at a pond near an old rock quarry. Nearest proposed action would is approximately 0.25 miles from the quarry. No caves or mines in area. Ample snags and coarse woody debris would be retained. Proposed activities would not affect persistence of the species in the watershed.
Mollusks				
Chace sideband (snail) (*Monadenia)*	BS	Yes	Present	9,308 acres have been surveyed within the Project Area. Refugia is provided by large scale rock talus piles. Deep refuge sites would be maintained. Two known locations within the Rogue River/Lost Creek 5th field watershed. The nearest known location is approximately 0.5 miles from any proposed salvage unit. Proposed activities would not affect persistence of the species in the watershed.

Table I-1. Butte Falls Resource Area Special Status Species
Butte Falls Blowdown Salvage Proposed Project Assessment

Species	Status	Range	Presence in Project Area	Conclusions
Crater Lake tightcoil (snail) (*Pristiloma*)	BS	No	Absent	9,308 acres have been surveyed within the proposed Project Area with no detections. Habitat is perennially moist situations within 10 meters of open water, in wetlands, springs, seeps, and streams. No-cut buffers within 50 feet of streams would assure no impacts.
Oregon shoulderband (snail) (*Helminthoglypta*)	BS	Yes	Absent	Oregon shoulderband snails are found in rocky areas, including talus deposits and outcrops with interstitial spaces large enough for snails to enter. Proposed projects would have no identified impacts.
Insects				
Siskiyou short-horned grasshopper	BS	Uncertain	Absent	No habitat information is available. They may be associated with elderberry and grasslands. They have not been documented in the Butte Falls Resource Area. No known effects identified from project.
Crustaceans				
Vernal pool fairy shrimp	FT	No	Absent	No Affects. Project is outside the range of the species.

STATUS:

FT (USFWS Threatened) - likely to become endangered species within the foreseeable future.
FC (USFWS Candidate) - proposed and being reviewed for listing as threatened or endangered
BS [Bureau (BLM) Sensitive] - eligible for addition to Federal Notice of Review, and known in advance of official publication. Generally these species are restricted in range and have natural or human-caused threats to their survival.
BA [Bureau (BLM) Assessment] - not presently eligible for official federal or state status, but of concern which may at a minimum need protection or mitigation in BLM activities.
NBC (Neotropical Birds of Concern) - on USFWS Birds of Conservation Concern published in 2003 to identify species and populations of migratory and nonmigratory birds which may need consideration in management actions.

Fiscal Year 2008 Butte Falls Resource Area Special Status Species List Review and Analysis

The following list of Bureau Sensitive species is compiled from two sources which identify species that are special status for BLM in southwestern Oregon. Species known or suspected to be present within the boundary of the Butte Falls Resource Area (BFRA) are addressed. Some species that occur on the list from US Fish and Wildlife Service (USFWS) which are not known to be present on BFRA-administered lands are also addressed.

The sources are the latest available information from the BLM Oregon State Office and USFWS. The BFRA list will be updated as new information becomes available. The following information was used in compilation:

- BLM Instruction Memorandum No. OR-2007-072. *Update to State Director's Special Status Species List* August 2007
- BLM Oregon State Office Sensitive Species List *BLM Oregon /Washington Special Status Species List Database Key* July 2007
- BLM Instruction Memorandum No. 2008-050. *Migratory Bird Treaty Act – Interim Guidance*

Abbreviations used in the Special Status Species List Review

FT *(Federal Threatened)*: "Threatened" under the Endangered Species Act. The BLM must consult with the USFWS and a Biological Opinion received prior to beginning an action which would impact these species.

FC *(Federal Candidate)*: Proposed and being reviewed for listing as "Threatened or Endangered."

ST *(State Threatened)*: Listed by the State of Oregon as likely to become endangered.

BS *[Bureau (BLM) Sensitive]*: Eligible for addition to Federal Notice of Review, and known in advance of official publication. Generally, these species are restricted in range and have natural or human-caused threats to their survival. Bureau 6840 policy requires that any Bureau action will not contribute to the need to list any of these species.

BA *[Bureau (BLM) Assessment]*: Not presently eligible for official Federal or state status, but of concern which may at a minimum need protection or mitigation in BLM activities. Impacts will be determined and recommendations for the species will be considered on a case by case basis through NEPA and in balance with other resource considerations.

NBC (Neotropical Birds of Concern): On USFWS Birds of Conservation Concern list published in 2003 to identify species and populations of migratory and nonmigratory birds which may need consideration in management actions.

Amphibians

Foothill yellow-legged frog *Rana boylii* BA
(Present)

Foothill yellow-legged frogs are present in various streams throughout the BFRA. They have been documented in Maple Gulch and Elk Creek. They are often observed by fish survey crews during surveys. No surveys have been conducted, but incidental sightings are reported. No surveys are planned. Expected impacts will be assessed in preproject planning.

These frogs are closely associated with water. Their habitat is permanent streams with rocky, gravelly bottoms. Their distribution is west of the Cascade crest from sea level to 1,800 feet (Leonard et al. 1993).

Oregon spotted frog *Rana pretiosa* FC (Absent)

Oregon spotted frog is not present in the BFRA. The closest known location for Oregon spotted frog is the Wood River in Klamath County. A breeding population of spotted frogs was found in the Cascade-Siskiyou National Monument (Parker 2004). Historical records of spotted frogs in Jackson County have been subsequently determined not to be spotted frogs (Arnold 2004).

Siskiyou Mountains salamander *Plethodon stormi* BA (Absent)

Lands administered by the BFRA are outside the range of the Siskiyou Mountains salamander. They occur in Oregon in the Applegate River drainage.

Reptiles

Northwestern pond turtle *Clemmys marmorata marmorata* BS (Present)

Northwestern pond turtles are present in the BFRA in Elk, Big Butte, East Evans, West Evans, and main stem Evans Creeks. They have not been found during surveys of the small pump chances on BFRA-administered lands. Most of these ponds are small and may not be large enough to provide the needed structures (aquatic vegetation and basking spots). The pump chances are small pools constructed for fire suppression use in headwater streams and springs. Two larger ponds on Forest Capital (formerly Boise) timber lands, which are surrounded by BFRA-administered lands, contain northwestern pond turtles. Pump chances are usually checked at least once every one to five years for presence of sensitive frogs and turtles.

Northwestern pond turtles live in most types of freshwater environments with abundant aquatic vegetation, basking spots, and terrestrial surroundings for nesting and over-wintering. Some northwestern pond turtles leave water in late October to mid-November to over-winter on land. They may travel up to 0.25 miles from water, bury themselves in duff, and remain dormant throughout winter. Turtles have been found to generally stay in one place in areas with heavy snow pack, but may move up to 5 or 6 times in a winter in areas with little or no snow. General habitat characteristics of over-wintering areas appear to be broad. There may be specific microhabitat requirements, which are poorly understood at this time.

Northwestern pond turtles are the only native turtle endemic to southern Oregon. They appear to be declining in number in the northernmost part of the range. They are more common in large river basins in southern Oregon. Major threat to native turtles is predation on young turtles by exotic bullfrogs and fish.

Birds

Bald eagle *Haliaeetus leucocephalus* FT (Present)

Five nesting pairs of bald eagles have been located within the BFRA boundaries. Three nests are on BLM lands: Elk Creek, Big Butte Creek, and Parsnip Creek. One of the other nests is on private lands (South Slough) and the second is on lands managed by US Army Corps of Engineers lands (Lost Creek). One historic nest on private lands near the Rogue River and Lower Table Rock was lost when the tree blew down in the winter of 2002-2003. An alternate replacement nest has not been found, although the eagles were present during the mid-winter eagle count in January 2003 and there were reports of adult bald eagles in the area in the summer of 2003. Observations will be tracked. Nest searches will continue until the eagles are absent from the area or a new nest is located. Known nests will be monitored annually.

In Oregon, the majority of nests (84 percent) are located within 1 mile of lakes, reservoirs, large rivers, and coast estuaries. Nest trees are larger, dominant or codominant trees in the stand and are usually components of old growth or older second growth forests. Prey of bald eagles is fish, waterfowl, small mammals (rabbits, etc.), and carrion.

Band-tailed pigeon *Columba fasciata* NBC (Present)

Band-tailed pigeons are occasionally observed in the BFRA. No nests have been observed or reported. The pigeons are common summer residents in forested areas west of the Cascade crest. They typically nest in forested mountain areas at elevations less than 4,000 feet. They are most abundant in the Coast Range with abundance increasing from east to west (Marshall et al. 2003). ONHP records will be checked periodically for any detection recorded on BFRA lands.

Band-tailed pigeons inhabit coniferous forests. They typically nest in closed canopy conifer or mixed hardwood and conifer forests. Their nests are primarily in Douglas-fir, but they also will nest in hardwoods and shrubs, within closed canopy conifer or mixed hardwood and conifer stands.

The pigeons use open canopy forests for foraging. Their diet includes buds, flowers, and fruits of deciduous trees and shrubs, especially oak, madrone, elderberry, cherry, cascara, huckleberry, and blackberry. Elderberry and cascara shrubs are naturally prevalent in early to intermediate forest successional stages. Pigeons also forage in cultivated crops.

Due to a diet that is low in minerals, they are often found near mineral springs and mineral sites. They may travel up to 32 miles for food or minerals (Marshall et al. 2003). Band-tailed pigeons are considered a game bird by USFWS.

Black-backed woodpecker *Picoides arcticus* BS (Absent)

There are no records of presence in the BFRA. The nearest known location is near Crater Lake National Park in the Rogue River National Forest (Barrett 2004). Black-backed woodpeckers have been documented in the Cascade Mountains in Jackson County and in the Siskiyou Mountains in Josephine County. They could be attracted to newly burned forests. Limited surveys of areas burned in the Timbered Rock Fire and in adjacent Morine Creek in 2003 were negative for black-backed woodpeckers. ONHP records will be checked periodically for any detections recorded on BFRA lands.

In Oregon, the black-backed woodpecker tends to occur in lower elevation forests of lodgepole pine, ponderosa pine, or mixed pine-conifer forests. Lodgepole pine forests are not present in BFRA-administered lands. Dead trees used for foraging have generally been dead 3 years or less.

Burrowing owl *Athene cunicularia* BS (Absent)

There are no breeding populations of burrowing owls in the Rogue Valley. A reintroduction attempt in the 1980s at Denman Wildlife Refuge failed.

At least one burrowing owl was documented wintering near the Rogue Valley Airport. There is no suitable habitat near the airport on lands administered by BLM and they are not considered to be present on BFRA land.

Flammulated owl *Otus flammeolus* BS (Present)

There are no known flammulated owl nests on BFRA-administered lands. Individual responses have been reported by field surveyors during other owl surveys, but no nests were found during follow-up visits. There are reports of their presence in Elk Creek from surveys on private timber lands. Surveys have been completed in the BFRA, with negative results. No surveys are currently planned.

Habitat is coniferous woodlands and forest edges, especially oak and pine ecosystems. They nest in abandoned woodpecker holes, especially those of flickers (Erlich et al. 1988).

Grasshopper sparrow *Ammodramus savannarum* NBC (Absent)

There are no known populations of grasshopper sparrows on BFRA-administered lands.

Throughout their range, grasshopper sparrows occur in grasslands and grain fields in relatively dry habitats. In Oregon, their distribution is restricted to grasslands. Grasshopper sparrows sing from elevated perches. In Morrow County in easter Oregon, this can be the flowering stalks of large velvet lupine (Marshall et al. 2003). They are rarely encountered in habitats with abundant woody shrubs. There is no information regarding the diet of Oregon birds, but elsewhere they feed on both seeds and insects usually gleaned from the ground.

Lewis' woodpecker *Melanerpes lewis* BS (Present)

Lewis' woodpeckers are present in some locations in the BFRA during the spring and summer but have not been documented nesting on BLM lands. They are observed during the summer on private, low elevation fields and oak woodlands in Sam's Valley. Lewis' woodpeckers migrate out of the Rogue Valley in the winter. Flocks of Lewis' woodpeckers have been observed wintering near Copco and Irongate Lakes in northern California, just south of the Oregon border (Hale 2004). ONHP records will be checked periodically for detections recorded on BFRA land.

Lewis' woodpeckers breed sparingly in the foothill areas of the Rogue and Umpqua River valleys in Douglas, Jackson, and Josephine counties. Habitat preference is hardwood oak stands with scattered pine near grassland shrub communities. Breeding areas in the Rogue valley are uncertain. In some locales, the woodpeckers breed in riparian areas containing large cottonwoods and in oak-conifer woodlands. They usually do not excavate nest cavities, but most often use cavities excavated by other woodpecker species. They winter in low elevation oak woodlands.

Mourning dove *Zenaida macroura* BMC (Present)

Mourning doves are abundant in spring, summer and early fall statewide in open landscapes. Doves are fairly common in valleys in the winter. It is not clear whether those that winter in Oregon are migrants from farther north, permanent residents, or both (Marshall et al. 2003). Doves are adapted to a wide variety of habitats ranging from open forests and clear-cuts to urban and agricultural areas. They are not found in densely forested sites and alpine areas.

Mourning doves feed on the ground and eat mostly seeds of grasses and trees. They are prolific breeders and in the Rogue Valley have been found to produce as many as four clutches (Marshall et al. 2003). Mourning doves are considered a game bird by USFWS.

Northern harrier *Circus cyaneus* BMC (Absent)

Northern harriers are present in the agriculture lands of the Rogue Valley.

Northern harriers are found in a variety of open habitats during the breeding seasons, including wetland complexes with wet meadows and freshwater or brackish marshes, grasslands, and steppe. Northern harriers nest on the ground in patches of dense vegetation.

Northern spotted owl *Strix occidentalis caurina* FT (Present)

Approximately 200 northern spotted owl "activity centers," 100-acres of the best habitat around known sites (as of January 1, 1994), have been designated and mapped as late-successional reserves (LSR) in the Medford District BLM. Critical habitat was designated on Medford BLM lands. Critical habitat for spotted owl on BFRA-administered lands is present south of Lost Creek Lake near the A and B roads. Critical habitat is also located near Elk Creek LSR 224 north of Lost Creek Lake and Trail Creek.

In 2002, approximately 70 known (presumed active) northern spotted owl sites were present in the BFRA. Approximately two-thirds of the known nests in the BFRA are monitored annually. Activity centers are maintained around sites known as of January 1, 1994. Currently, surveys are completed prior to habitat disturbing actions near a known site or activity center. A seasonal restriction may be established when a project is planned near a known nest site.

Old growth coniferous forest is preferred nesting, roosting, and foraging habitat. Spotted owls also use areas with some old growth characteristics such as multi-layered, closed canopies with large diameter trees and abundant dead and down woody material. Northern spotted owls commonly nest in cavities 50 or more feet above the ground in large, decadent old growth trees. Other nest sites include large mistletoe clumps, abandoned raptor nests, and platforms formed by whorls of large branches. Prey is primarily small arboreal mammals, such as flying squirrels, woodrats, and voles, and occasionally small birds.

Olive-sided flycatcher *Contopus cooperi* BS (Present)

Olive-sided flycatchers are present throughout BFRA-administered lands. They are often heard singing from the tops of snags and large conifer trees at the edge of openings.

Breeding habitat for olive-sided flycatchers is conifer habitat, especially within forest burns where snags and scattered tall, live trees remain. Habitat also includes areas near water along the wooded shores of streams, lakes, rivers, and wetlands, especially at the juxtaposition of late and early seral forests such as open or semi-open forest with a low percentage of canopy forest. Association with forest openings and

forests edge also has been documented at a landscape range.
Olive-sided flycatchers are more abundant in landscapes containing fragmented late-seral forests with high contrasted edges than in less fragmented landscapes. They forage mostly from high, prominent perches at the tops of snags or the dead tips or uppermost branches of live trees. They forage as an air-sallying insectivore and require exposed perches and unobstructed air space. Tall trees or snags provide a better foraging environment than a closed canopy forest (Marshall et al. 2003).

Oregon vesper sparrow *Pooecetes gramineus affinis* BS (Absent)

There are no records of presence in lands administered by BFRA. They are most likely to be present on private lands in the low elevations of the Rogue Valley. They are considered Sensitive in Oregon BLM for the Willamette Valley and Klamath Mountain Provinces. They are not known to be present on lands administered by BFRA. ONHP records will be checked periodically for any detections recorded on BFRA lands.

Abundance of the Oregon vesper sparrow is greatest in dry, grassy foothills of the Rogue Valley, where it is an uncommon to locally common breeding species (Marshall 2003). There may be a breeding population near Howard Prairie Lake. Occasional birds are reported to winter in the Rogue Valley. In the Rogue River basin, vesper sparrow were reported in open habitats of the mixed-conifer forest zone in the breeding season and throughout the valley during migration. No other data from southwestern Oregon are available.

Diet of the vesper sparrow consists of a mix of invertebrates and seeds, although it is primarily insectivorous during breeding season. During the winter months, it feeds mostly on arthropods and seeds. They nest on the ground, often with a nest placed against a clump of vegetation, crop residue, clod of dirt, or at the base of shrubs or small trees. In eastern Oregon, they nest in dry, open woodlands, and openings in forested habitat such as clear-cuts.

Peregrine falcon *Falco peregrinus* BS (Present)

Six peregrine falcon nesting territories are known to be present within BFRA boundaries. Only one nesting cliff is located on BFRA-administered lands. The others are on private timber company lands. These nests are monitored annually. Peregrine falcons are reported near the Medford sewage treatment plant and near the Table Rocks in the winter months. Other sightings are occasionally reported during the winter months, but these are thought to be migrating/wintering individuals. Other sightings and possible nesting locations have been reported, but no nests have been located on follow-up. Peregrine falcon nest sites are present on USFS lands in at least four known sites to the north of the BFRA boundary. Nests will be protected according to current management guidance. Suitable cliffs near any proposed disturbance action will be checked for peregrine falcon presence.

Primary nest habitat is tall cliffs. Forest lands provide habitat for prey species for peregrine falcons. Prey is mostly birds, especially doves and pigeons. Peregrines also prey on shorebirds, waterfowl, and passerine birds.

Prairie falcon *Falco mexicanus* BMC (Present)

Prairie falcons primarily breed throughout the country east of the Cascade Mountains. West of the Cascades, breeding has been documented at three locations in Jackson County. They are considered uncommon in Jackson County although they have been reported near the Table Rocks.

Prairie falcons prey mainly on ground squirrels. They also feed on birds, other small mammals, insects, and lizards. They have a mean home range of 88 miles.

Purple martin *Progne subis* BS (Absent)

Purple martins are not present on lands administered by the BFRA. Historically, a colony was present in the Hyatt Lake and Howard Prairie Lake region of the Medford BLM, but they are considered to be extirpated from these areas and are not considered to be present in Medford BLM-administered lands. No surveys are planned.

Rufous hummingbird *Selasphorus rufus* BS (Present)

The most common and widespread of the Oregon hummingbirds. Rufous hummingbirds are the most widespread hummingbirds in North America and has been found in every state and most Canadian Provinces (Marshall et al. 2003).

Rufous hummingbirds are found in a wide variety of habitats with a preference for wooded areas with a fairly high canopy and well-developed understory. They build nests between the ground and up to 16 feet from the ground in understory foliage or low branches of evergreen trees. They feed on flowering plants, such as current, salmonberry, and pacific madrone. They may also be dependent on insects gleaned from willow catkins and beneath leaves in the first few weeks after arriving from migration. The males arrive in western Oregon in mid-February, about 2 weeks before the females. Females and immature birds begin dispersal in July.

Streaked horned lark *Eremophila alpestris strigata* BS (Migrant)

The streaked horned lark has been extirpated from the Rogue Valley. They migrate through the area in the spring and fall.

Three-toed woodpecker *Picoides tridactylus* BS (Absent)

There are no records of three-toed woodpeckers on BFRA-administered land. The BFRA is outside the range and does not have spruce or lodgepole pine forests. Limited surveys of burned areas in the Timbered Rock Fire and in adjacent Morine Creek in 2003 were negative for three-toed woodpeckers. ONHP records will be checked periodically for any detections recorded on BFRA lands.

The range of the species overlaps the range of spruce trees (Marshall 2003). In eastern Oregon, three-toed woodpeckers nest and forage in lodgepole pine forests. Bark beetle larvae are the primary food source.

Their range is along the crest of the Cascade Range and eastward. They are generally found in higher elevation forests, above 4,000 feet. In Oregon, they are rare and local. There have been two reports from southwest Oregon, one near Roxy Anne Peak and one near Mt. Ashland.

Tri-colored blackbird *Agelaius tricolor* NBC (Absent)

The breeding population of tri-colored blackbird is BS in the Klamath Mountain Province.

Although tri-colored blackbirds are present near the Rogue River and along the marshes on Denman Wildlife Refuge as well as in Sam's Valley, they are not known to be nesting on lands administered by the BFRA. There is no suitable marsh habitat administered by the BFRA in the low elevations along the Rogue River. While most tri-colored blackbirds retreat south to California in winter, some remain in Oregon, mainly in the Rogue Valley (Marshall 2003). ONHP records will be checked periodically for any detections recorded on BFRA lands.

Tri-colored blackbirds are found in the lowland interior valleys of southern Oregon, near freshwater marshes and crop lands. Oregon breeding colonies occur in hardstem bulrush, cattail, nettles, willows, and Himalayan blackberry.

White-headed woodpecker *Picoides albolarvatus* BS (Absent)

White-headed woodpeckers may be rare migrants through the BFRA. A single bird was reported in the eastern part of the BFRA near the Rogue River National Forest boundary. This was likely a wandering or vagrant bird as preferred habitat is not present in the BFRA. The bird was not seen in subsequent visits to the area. They have not been documented nesting or present during the breeding season in the BFRA. ONHP records will be checked periodically for any detections recorded on BFRA lands.

White-headed woodpeckers occur in open ponderosa pine and mixed conifer forests dominated by ponderosa pine. They are present on the east side of the Cascades, but suitable habitat is restricted. A small population of white-headed woodpeckers is present in true firs in the Siskiyou Mountains southwest of Ashland (Marshall 2003). They forage mainly on trunks of living conifers for insects. Nest cavities are within 15 feet of the ground in dead trees which have heart rot. Standing and leaning snags and stumps are also used.

White-tailed kite *Elanus caeruleus* BA (Absent)

White-tailed kites are present in the farmlands and uncultivated open woodlands in the low elevation lands in the Rogue Valley. They are frequently seen during the mid-winter eagle counts along Kirtland Road. They may nest in the Rogue Valley, although no known nest sites have been identified. They have not been sighted on BFRA-administered lands.

They are not known to be present on BFRA-administered lands, but could hunt in the small isolated patches of BLM ground in the low elevations.

Williamson's sapsucker *Sphyrapicus thyroideus* BMC (Absent)

In Oregon, Williamson's sapsuckers are most often found in ponderosa pine forests during the breeding season. It is a summer resident on the east side of the western Cascades, with a few breeding in the high Cascades of eastern Jackson County (Barrett 2004).

They breed in mid to high elevation mature or old-growth conifer forests with fairly open canopy. In Klamath County, the principal requirement is simply a forest with large dead trees suitable for nest cavities.

Wood duck *Aix sponsa* BMC (Present)

Wood ducks are present near the slow reaches and backwaters of the Rogue River, larger creeks, lakes, and ponds. They winter throughout the breeding range. The breeding habitats are wooded swamps, wooded riparian areas along streams, marshes, sloughs, and lakes. They require cavities in trees for nesting and have been known to nest in cavities vacated by other species, such as the pileated woodpeckers.

Wood ducks feed on acorns, seeds of trees and shrubs, aquatic plants, berries, and wild grapes.

Mammals

Canada lynx *Lynx canadensis* FT (Absent)

Medford BLM was excluded from the known range due to the absence of lynx habitat characteristics (involving elevation and snow depth) and lack of historic sightings. Although lynx have been taken in Oregon, "available evidence suggests that the lynx has never been a part of the resident fauna of Oregon" (Bull et al. 2001). Lynx are known to disperse exceptionally long distances (as far as 300 km south of the known breeding range) as prey populations decline. Verts and Carraway found that collection dates of most lynxes in Oregon closely follow peaks in populations further north. Their conclusion was that "self-maintaining populations of lynxes likely have not existed in historic times in Oregon, but records of their occurrence here likely are of dispersers from within currently occupied areas farther north that immigrate and persist for a short time" (Verts and Carraway 1998).

Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare. In North America, the distribution of lynx is nearly coincident with that of snowshoe hares (Ruediger et al. 2000). Snowshoe hares are the primary prey of lynx, comprising 35 to 97 percent of their diet throughout the range of the lynx. Snowshoe hares are not found on BFRA-administered lands.

California wolverine *Gulo gulo luteus* ST (Absent)

Wolverines are not present in the BFRA. There are two historic reports of wolverine, which cannot be verified. The last report was in the 1960s near Dry Creek. Snow tracking surveys in the early 1990s in the BFRA were negative. Snow tracking surveys on adjacent lands administered by Rogue River National Forest were also negative. There are no surveys planned in the BFRA as the area is not considered to provide habitat.

Some helicopter surveys in the Rogue-Umpqua, Mt. Thielson, and Sky Lakes Wilderness Areas have been conducted. There have been some suspected wolverine sign in the high elevations above tree lines, but to date, there have been no confirmed wolverines in these wilderness areas.

Fisher *Martes pennanti pacifica* FC (Present)

Two fisher detections on BFRA lands occurred during a study on the Rogue River National Forest Fisher Study conducted from 1995 to 2001 by the Wildlife Ecology Team, USDA Forest Service Pacific Northwest Research Station (Aubrey and Raley 2002a). These sightings occurred near Red Rock Canyon above Lost Creek Lake, and between North Fork of Big Butte Creek and Cur Creek. Near Cur Creek, an adult female fisher was found using a pileated woodpecker nest for a natal den on BFRA-administered land.

A third detection occurred a few miles east of the BFRA on USFS Prospect Ranger District lands in the Bitterlick Creek drainage, a tributary of Elk Creek. Fishers are present in the eastern part of the BFRA and could occur across the resource area in limited numbers. Currently, there are no management requirements or recommendations in place for fisher and surveys are not planned. New regulations will be incorporated into management decisions as it becomes available.

Fisher habitat is mature and old growth forests. They appear to be closely associated with riparian areas in these forests. They seem to prefer 40 to 70 percent canopy cover. They mainly use large living trees, snags, and fallen logs for denning. In live trees, both female and male fishers use mistletoe brooms as resting platforms (Raley 2002). Little information is available about the distribution and density of fishers in southwestern Oregon. Preliminary information from the RRNF fisher study indicates that fisher home range for females was approximately 25 km^2 (6,200 acres). Male home range size was approximately 147 km^2 (36,325 acres) during the breeding season (Aubrey and Raley 2002).

Fringed myotis (bat) *Myotis thysanodes* BA (Present)

A fringed myotis was captured in a mist nets at Fredenberg pond. This is the only confirmed location of this species in the BFRA. Since 1993, wildlife biologists have mist netted 11 ponds in BFRA. Some sampling of ponds will continue as time and money allows, but there are no plans for annual surveys. Expected impacts will be assessed during preproject planning.

Fringed myotis is a crevice dweller and may be found in caves, mines, buildings, rock crevices, and large old growth trees. They have been captured in openings and in mid-seral forest habitats. Food consists of beetles, butterflies, and moths.

Pallid bat *Antrozous pallidus* BA (Present)

Pallid bats were captured at 2 of 11 ponds mist-netted in the BFRA between 1993 and 2003. They were found in ponds near Rancheria Road and Doubleday Road in the eastern part of the resource area near Rogue River National Forest lands. They do not appear to be common in the BFRA. Some sampling of ponds will continue as time and money allows, but there are no plans for annual surveys.

West of the Cascade Range, pallid bats are restricted to the drier interior valleys of the southern portion of the state. This bat is a crevice dweller. Rock crevices and human structures are used as day roosting sites. Recent radio telemetry studies indicate these bats also use interstitial spaces in the bark of large conifer trees as roost sites. One colony of pallid bats was observed roosting in a hollow tree. The species feeds mostly on beetles and moths, mostly by gleaning them from the ground.

Townsend's big-eared bat *Corynorhinus (=Plecotus) townsendii* BS (Present)

Two maternity colonies are known on BFRA-administered lands. One is located in a natural cave near Poverty Flat and another is located in a mine adit at Cinnabar Mines north of Meadows Road. Townsend's big-eared bats have been found roosting and hibernating in adits and caves throughout the BFRA. These bats are also known to use cavities in trees and attics of buildings. One big-eared bat was captured in a mist net in the Salt Creek area on the east side of the BFRA. Current management is to establish a 250-foot buffer around sites known to contain bats. Mine adits, shafts, and caves where human disturbance is determined to be impacting the bats or which are unsafe will be identified and closed using current guidelines and procedures, as funding allows. Mines will be assumed to contain bats if they cannot be inventoried due to safety concerns.

Townsend's big-eared bats have low tolerance to changes in temperature and humidity and removal of trees around sites where they are present may change airflow patterns to make the area less desirable as a hibernaculum, maternity, or roosting site. Food consists primarily of moths and other arthropods.

Mollusks

Chase sideband (snail) *Monadenia chaceana* BS (Present)

Monadenia were found in the higher elevations south of Lost Creek Lake in two locations during mollusk surveys. Another specimen was found in Clark Creek Quarry east of Big Butte Creek.

Crater Lake tightcoil (snail) *Pristiloma arcticum crateris* BS (Absent)

New evidence from surveys indicates Medford BLM is outside the range of the Crater Lake tightcoil. Survey and Manage surveys have not located this mollusk on BFRA lands. The closest location to the BFRA is at a high elevation spring in Crater Lake National Park. A review of survey predisturbance surveys in suitable habitat will continue in the short-term (in the next year) to determine if they are present in the BFRA. Due to the high number of acres surveyed with negative impacts, they will be recommended for removal from the list of mollusks suspected to be present in Medford BLM lands.

Crater Lake tightcoil have been found from Crater Lake to the Bull Run Watershed in northern Oregon (Burke et al. 1999). They may be found in perennial wet situations in the mature conifer forests, among rushes, mosses, and other surface vegetation or under rocks and woody debris within 10 meters of open water in wetlands, springs, seeps, and riparian areas. They are found generally in areas which remain under snow for long periods in the winter. Riparian habitats in eastern Oregon may be limited to the extent of permanent surface moisture, which is often much less than 10 meters from open water. Crater Lake tightcoil are found in moderate to high elevations, roughly 2,000 to 7,000 feet.

Oregon shoulderband (snail) *Helminthoglypta hertleini* BS (Present)

In the BFRA, Oregon shoulderbands were commonly encountered during surveys in oak woodlands, open dry conifer forests with grass and forbs, and in open grassland in rocky areas along streams. In the Glendale Resource Area, it has also been found at the edges of roads in roadside ditches where rocks have raveled off cut-banks. Oregon shoulderband were removed from Survey and Manage requirements in 2002 because it is not an old growth obligate. Currently, no predisturbance surveys are planned prior to habitat disturbing actions. Expected impacts will be assessed in preproject planning.

This species is known from rocky areas including talus deposits, but not necessarily restricted to these areas. Suspected to be found within its range wherever permanent ground cover or moisture is available. This may include rock fissures or large woody debris sites. They are adapted to somewhat xeric conditions during a part of the year.

Insects

Johnson's hairstreak (butterfly) *Mitoura johnsoni* BS (Unknown)

This butterfly has not been found in the BFRA or on Medford BLM. The nearest locations are near Conde Creek and at Hyatt Lake and Oregon Gulch in the Jenny Creek (Klamath River) drainage. The identified habitat is mostly old growth conifer forests with red firs, western hemlocks, or gray pines on which parasitic mistletoe, *Arceuthobium camplopodum,* is found.

Mardon skipper butterfly *Polites mardon* FC (Absent)

Mardon skipper butterflies are present in the Ashland Resource Area near Hyatt Lake and near Soda Mountain. They have not been found in the BFRA. The BFRA does not currently have plans to survey for butterflies.

Habitat in the southern Cascades is small, open grassland sites within the ponderosa pine savanna/woodland at elevations ranging from 1,900 to 5,100 feet. Site conditions range from dry, open ridgetops to areas associated with wetlands or riparian habitats (Potter 1999).

Siskiyou short-horned grasshopper *Chloealtis aspasma* BS (Unknown)

Little is known about the Siskiyou short-horned grasshopper's habitat needs. They are associated with elderberry and may lay their eggs in elderberry.

Historical records show that Siskiyou short-horned grasshoppers were found on the Rogue River National Forest near Woodruff Meadows. A second site was located near BLM land on the south side of Mount Ashland. No other information is available.

Crustaceans

Vernal pool fairy shrimp *Branchinecta lynchi* FT (Present)

Vernal pool fairy shrimp have been found in two places on lands administered by the BFRA, a vernal pool on Upper Table Rock and one on Lower Table Rock. Critical habitat, designated in 2003, is primarily on private and Jackson County lands in the Agate Desert just north of Medford near White City and Eagle Point. The BFRA administers 344 acres of Critical Habitat on the flat terrain on the top of both Table Rocks. In the short-term, recreation use will be monitored to determine if there are negative impacts to the vernal pools. A management plan for the Table Rock ACEC will be written. The timeframe for the management plan has not been determined.

Habitat for vernal pool fairy shrimp is vernal pools, small shallow pools that fill with water during the wet winter and early spring months and are dry during the remainder of the year. These pools are present in various locations where flat topography and soil types allow the development of the pools during the wet season. Most vernal pools occur on private or state/county owned lands in the Agate Desert. Some vernal pools may develop in a few isolated areas in the BFRA near Poverty Flat. Sampling of the vernal pools at Poverty Flat and near the settlement of Lincoln in the Ashland Resource area was negative for vernal pool fairy shrimp.

Wildlife Special Status Species Review Sources

Arnold, G. 2004. Personal communication. Medford District BLM Wildlife Biologist. Medford OR.

Aubry, K. and C.M. Raley. 2002a. The pileated woodpecker as a keystone habitat modifier in the Pacific Northwest. In: *Proceedings of the Symposium on the Ecology and Management of Dead Wood in Western Forests, November 2-4, 1999, Reno, NV*. General Technical Report PSW-GTR-181. USDA Forest Service, Pacific Southwest Research Station, Albany, CA.

Aubry, K. and C.M. Raley. 2002b. *Ecological Characteristics of Fishers in the Southern Oregon Cascade Range Final Progress Report: June 2002*. USDA Forest Service, Pacific Northwest Research Station, Olympia, WA.

Applegarth, J. 1992. Personal Communication., Eugene District BLM Herpetologist. Eugene, OR.

Applegarth, J.S. 1995. *Invertebrates of Special Status or Special concern in the Eugene District* USDI Department of Interior. Bureau of Land Management. Eugene, OR.

Barrett, N. 2004. Personal communication. Butte Falls/Prospect Ranger District Wildlife Biologist. Rogue River National Forest, Butte Falls, OR.

Brown, H.A., R.B. Bury, D.M. Darda, L.V. Diller, C.R. Peterson, and R.M. Storm. 1995. *Reptiles of Washington and Oregon* Seattle Audubon Society. Seattle, WA.

Bull, E., R.S. Holthausen, and M.G. Henjum. 1992. Roost trees used by pileated woodpeckers in northeastern Oregon. *Journal of Wildlife Management* 56(4):786-793.

Bull, E.L., K.B. Aubrey, and B.C. Wales. 2001. Effects of disturbance on forest carnivores of conservation concern in eastern Oregon and Washington. *Northwest Science* 75(Special Issue).

Burke, T., J.S. Applegarth, and T.R. Weasma. 1999. *Management Recommendations for Survey and Manage Terrestrial Mollusks Version 2.0*. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management.

Burt, W.H. and R.P. Grossenhider. 1976. *A Field Guide to the Mammals*, *the Peterson Field Guide Series* Houghton Mifflin Co., Boston, MA.

Corkran, C. and C. Thoms. 1996. *Amphibians of Oregon, Washington and British Columbia, a Field Identification Guide* Lone Pine Publishing, Redmond, WA.

Cross, S.P. 1992. Notes from Oregon Wildlife Society Bat Workshop. Southern Oregon State College Biology Professor. Ashland, OR.

Cross, S.P. 2004. Personal communication. Southern Oregon University Biology Professor (retired).

Csuti, B., T.A. O'Neil, M.M. Shaughnessy, E.P. Gaines, and J. C. Hak. 1997. *Atlas of Oregon Wildlife* Oregon State University Press, Corvallis, OR.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. *The Birders Handbook, a field guide to the Natural History of North American Birds* Simon & Schuster. New York, NY.

Hale, L. 2004. Personal communication., Medford District BLM Wildlife Biologist. Medford, OR.

Hammond, P. 1992. Special Status Butterfly Species List report.

Hammond, P. 1994. Rare Butterfly Assessment for the Columbia River Basin in the Pacific Northwest, Eastside Ecosystems Management Strategy Project.

Harper, J. 2004. Personal communication. Medford District BLM Wildlife Biologist. Medford OR.

Leonard, W.P., H.A. Brown, L.L. C. Jones, K.R. McAllister, and R.M. Storm. 1993. *Amphibians of Washington and Oregon* Seattle Audubon Society. Seattle, WA.

Marshall, D.B. 1992. *Sensitive Vertebrates of Oregon* Oregon Department of Fish and Wildlife.

Marshall, D.B., M.G. Hunter and A.L. Contreras. 2003. *Birds of Oregon, a General Reference* Oregon State University Press. Corvallis, OR.

Maser, C., B.R. Mate, J.F. Franklin, and C.T. Dyrness. 1981. *Natural History of Oregon Coast Mammals* General Technical Report GTR-PNW-133. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

Nussbaum, R.A., E.D. Brodie, Jr., and R.M. Storm. 1983. *Amphibians & Reptiles of the Pacific Northwest* University of Idaho Press. Moscow, ID.

Parker, Michael. 2004. Personal communication. Southern Oregon State University Biology Professor. Ashland, OR

Potter, A, J. Fleckenstein, and S. Richardson. 1999. *Draft Washington State Status Report for the Mardon Skipper* Washington Department of Fish and Wildlife, Olympia, WA.

Raley, C. 2001. Personal Communication. USDA Forest Service Pacific Northwestern Research Station Lead Wildlife Biologist, Wildlife Ecology Team. Olympia, WA.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton, T. Rinaldi, J. Tick, A. Vandehay, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada lynx conservation assessment and strategy. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Missoula, MT.

Runquist, E. 1999. Butterfly Community Surveys in the Soda Mountain Region, Jackson County, Oregon. Bureau of Land Management. Medford, OR.

USDA, US Forest Service and USDI, Bureau of Land Management. 1994. *Record of Decision for Amendments to Forest and Bureau of Land Management 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.* Government Printing Office.

U.S. Fish and Wildlife Service. 2008. Medford Bureau of Land Management Blowdown Letter of Concurrence. 8330.I0101 (08). U.S. Fish and Wildlife Service, Roseburg, OR.

Verts, B. J. and L.N. Carraway. 1998. *Land Mammals of Oregon*. University of California Press. Berkeley, CA.

Wineteer, M. 2004. Personal communication. Medford District BLM Botanist. Medford, OR.

Birds in Big Butte Watershed

American crow
American goldfinch
American robin
Bald eagle
Barred owl
Belted kingfisher
Black-headed grosbeak
Black-throated gray warbler
Brown creeper
Bushtit
California quail
Cassin's (formerly solitary) vireo
Cedar waxwing
Chestnut backed chickadee
Common nighthawk
Common raven
Cooper's hawk
Dark-eyed junco
Downy woodpecker
European starling
Evening grosbeak
Flammulated owl
Golden-crowned kinglet
Gray jay
Great gray owl
Great horned owl
Hairy woodpecker
Hammond's flycatcher
Hermit thrush
Hermit warbler
House wren
Hutton's vireo
Lazuli bunting
McGillivray's warbler
Mountain chickadee
Mountain quail
Mourning dove
Nashville warbler
Northern flicker
Northern goshawk
Northern spotted owl
Northern pygmy owl
Olive-sided flycatcher
Pacific-slope flycatcher
Pileated woodpecker
Pine siskin
Purple finch
Red-breasted nuthatch
Red-breasted sapsucker
Red crossbill
Robin
Ruby-crowned kinglet
Red-tailed hawk
Ruffed grouse
Rufous hummingbird
Sandhill crane
Sharp-shinned hawk
Spotted towhee
Steller's jay
Swainson's thrush
Townsend's solitaire
Tree swallow
Turkey vulture
Western flycatcher
Western tanager
Western wood peewee
Wilson's warbler
Winter wren
Yellow-rumped warbler

LATE-SUCESSIONAL RESERVE (LSR) ASSESSMENT

July 2008

Double Prentice
100-ACRE SPOTTED OWL ACTIVITY CENTER
Master Site No. 3256

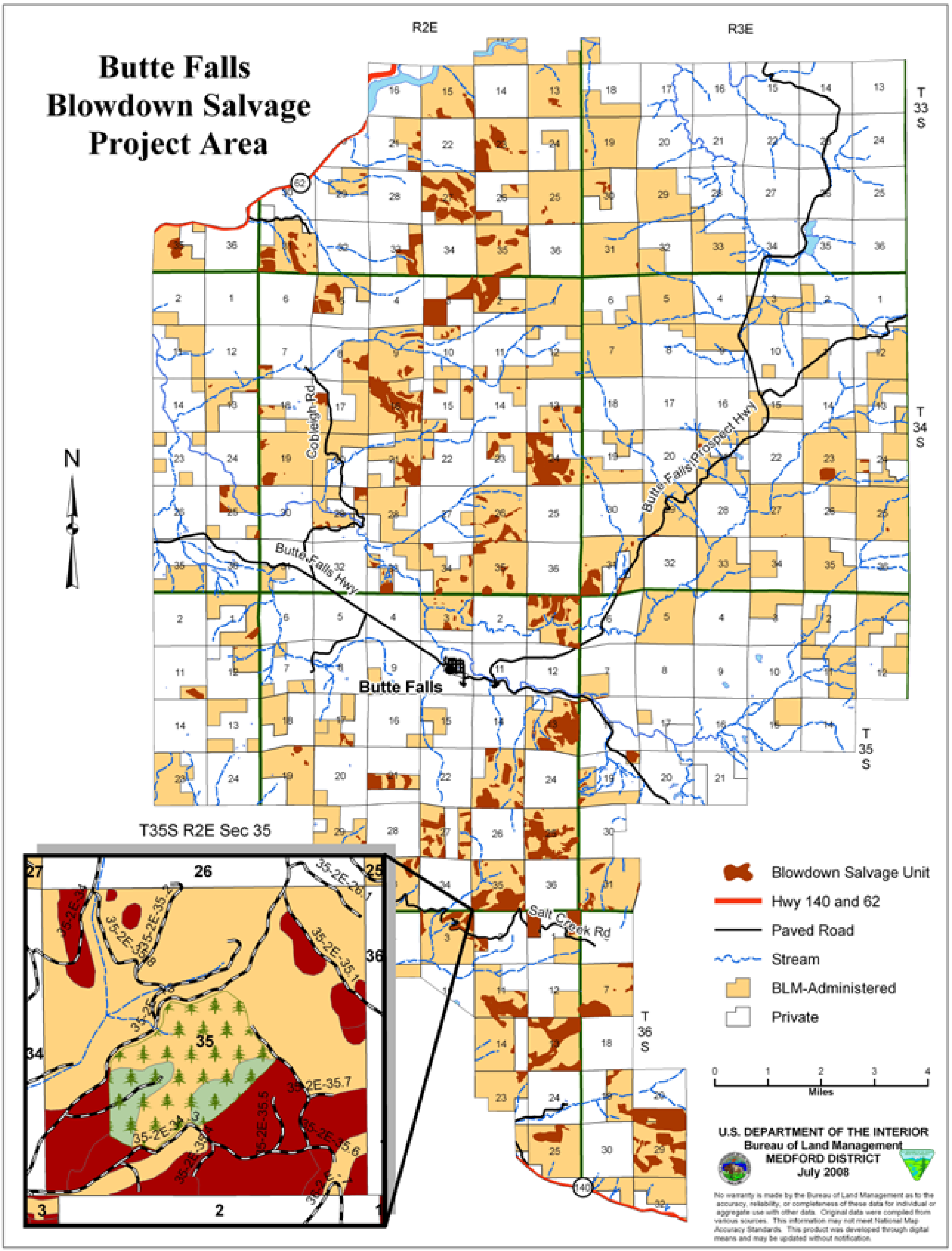
USDI Bureau of Land Management
Medford District
Butte Falls Resource Area

LATE-SUCESSIONAL RESERVE ASSESSMENT
DOUBLE PRENTICE

**This Late-successional Reserve Assessment was prepared by
Butte Falls Resource Area
Medford District Bureau of Land Management**

List of Contributors

PERSON	AGENCY	CONTRIBUTION
Linda Hale	BLM	Wildlife/ Assessment Preparation
John Bergin	BLM	Forest Manager
John Osmanski	BLM	Silviculture
Mike Korn	BLM	Forestry
Marcia Wineteer	BLM	Botany
Leanne Mruzik	BLM	Fire/Fuels


Butte Falls
Blowdown Salvage
Project Area
R2E
R3E
T 33 S
T 34 S
T 35 S
T 36 S
N
Cobleigh Rd
Butte Falls Prospect Hwy
Butte Falls Hwy
Butte Falls
Salt Creek Rd
T35S R2E Sec 35
Blowdown Salvage Unit
Hwy 140 and 62
Paved Road
Stream
BLM-Administered
Private
Miles
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008

I. INTRODUCTION

A series of severe winter storms hit Jackson County in early January, 2008. National Weather Service weather stations recorded peak winds up to 70 miles per hour in the Southern Oregon Cascades; wind speeds on ridgetops likely exceeded this. Over a foot of snow fell in the upper elevations following the storm, causing additional damage to trees damaged by the windstorm. The storm affected approximately 7,000 acres of lands administered by Medford Bureau of Land Management (BLM) in the foothills of the Southern Oregon Cascades.

Storm impacts varied from scattered individual windthrown trees that were uprooted and blown over to large areas that sustained severe damage. The severe damage occurred when the majority of the trees in a stand were uprooted, standing trees were damaged with tops snapped off and crowns defoliated by the loss of branches and needles. Blowdown occurred in forest stands across all topographic positions from low riparian areas to the upper ridges and included various land allocations: matrix, 100-acre spotted owl activity centers, riparian reserve, connectivity block, and critical habitat. Canopy cover in some areas prior to the windstorm was 80-100 percent. Following the windstorm, canopy in the stands which experienced severe blowdown was reduced to approximately 0-20 percent.

Severe blowdown occurred in several 100-acre spotted owl activity centers. Most of the activity centers had small pockets of severe blowdown, less than 10 acres in size. One 100-acre spotted owl activity center (Double Prentice) sustained severe blowdown[1] damage over a 35 percent of the core. This assessment applies only to the Double Prentice 100-acre spotted owl activity center. Approximately 35 acres of late-successional habitat in the 100-acre late successional reserve (LSR) was severely damaged by the windstorm. Within the severely impacted area, the storm blew down the majority of large trees. Other trees were damaged, but remain standing. Standing trees have snapped off tops, were sprung, or have less than 25 percent live crown remaining due to the pruning action of wind and falling trees. The remaining 65 acres were also affected by the windstorm. However, these acres had moderate[2] and scattered[3] amounts of blowdown, snap top, and crown damaged trees.

The severe blowdown area within the Double Prentice LSR no longer provides late-successional suitable (nesting, roosting, or foraging) or dispersal habitat for spotted owls due to windthrow of nearly all large overstory trees. Remaining canopy cover within the severe blowdown area is 0-30 percent. Within the severe blowdown area, pockets of windthrown trees are 2-6 feet deep on the ground. Fuel loading has been altered to where the primary carrier of fire is now the blowdown and any fire in these areas would result in very high spread rate and flame lengths. The remainder of the LSR with moderate and scattered blowdown has small blowdown pockets and individual windthrown trees and continues to provide suitable habitat for spotted owls and species and other species that use late successional forest (i.e. flying squirrels, fisher, pileated woodpeckers, invertebrates, etc.).

A. Purpose for Conducting this LSR Assessment

The need currently exists to reduce the risk from insect outbreaks and fire hazard to the remaining late-

[1] Severe - These stands resemble a NGFMA regeneration harvest. About 8 green trees per acre or less remain in the overstory. Canopy closure is between 10-30 percent. Between 40-95 percent of the ground is covered with windthrown trees.

[2] Moderate wind damage--the stand resembles a commercial thinning with 50-80 trees per acre left standing and a crown canopy closure of 40-60 percent. These areas have between 10-40 percent of the ground covered with windthrown trees.

[3] Scattered wind damage—the density of scattered windthrown trees is about 5 trees per acre or less. These areas have approximately 10 percent of the ground covered with windthrown trees.

successional habitat. The need also exists to restore the area within the LSR which no longer provides late-successional habitat by accelerating the re-establishment of a new stand in the severe blowdown impacted area.

The purpose of this LSR Assessment is to gain a better understanding of the current conditions related to the condition of the late-successional habitat in the LSR. This Assessment is also intended to provide guidance for risk reduction and restoration activities in a manner that will not negatively impact late-successional habitat, as well as guidance for the restoration of late-successional habitat components within the LSR affected by the storm.

The LSR Assessment is being conducted in compliance with Northwest Forest Plan Standards and Guidelines for Late-Successional Reserves; "A management assessment should be prepared for each large Late-Successional Reserve (or group of smaller Late-Successional Reserves) before habitat manipulation activities are designed and implemented" (USDA/USDI 1994).

The Northwest Forest Plan Standards and Guidelines (p. C-11) provide a general framework for conducting a Late-Successional Reserve Assessment; they should generally include: inventory of overall vegetative conditions within the reserve, a list of identified late-successional associated species known to exist within the reserve, a history and general description of current land uses within the reserve, a fire management plan, criteria for developing appropriate treatments, specific areas that could be treated under those criteria, a proposed implementation schedule, and proposed monitoring and evaluation.

The Northwest Forest Plan established a network of mapped LSRs across the Pacific Northwest designed to provide for a distribution of quality old-growth forest habitat for populations of species associated with late-successional forests. In addition, other Late-Successional Reserves were established by Standards and Guidelines of the Northwest Forest Plan to protect the best 100 acres of northern spotted owl habitat in the closest proximity of all northern spotted owl nest sites or activity centers, known to exist as of January 1, 1994, on Federal lands within matrix or AMA land allocations. The intent was to preserve the intensely used portion of the breeding season home range. These areas were also identified as important refugia habitat and centers for dispersal of species other than the northern spotted owl, such as plants, fungi, lichens, small vertebrates, and arthropods, and are to be maintained even if they become unoccupied by northern spotted owls (USDA/USDI 1994 p. C-10 and C-44).

The 100-acre LSRs combined with Riparian Reserves, other green tree retention areas, and retention of coarse woody material (at levels representative of historical range of variation), provide for dispersal of late-successional organisms across the landscape between mapped LSRs as well as source areas for maintenance and recovery of some late-successional organisms in the matrix and AMA.

LSRs are to be managed to maintain or enhance late-successional and old-growth forest ecosystems (USDA/USDI 1994 p. C-11). "Late-successional forest communities are the result of a unique interaction of disturbance, regeneration, succession and climate that can never be recreated in their entirety through management" (USDA/USDI 1994 p. B-5). However, forest stands can be managed using various silvicultural systems to create various structural and compositional characteristics of late-successional forest that could provide adequate habitat for many species over the long-term.

Desired late-successional and old growth forest characteristics include: multi-species and multi-layered forest stands, moderate to high accumulations of large downed wood and standing snags, moderate to high canopy closure, moderate to high numbers of trees with physical imperfections (broken tops, large deformed limbs, cavities, etc.), and moderate to high accumulations of fungi, lichens, and bryophytes (USDA/USDI 1994 p. B-5).

B. Analysis Area

The 100-acre Double Prentice LSR is the focus of this Assessment. The LSR is located in Jackson County, approximately 20 miles northeast of the city of Medford. The area is located in Section 35, Township 35 South, Range 2 East (see project area map).

The LSR is located in the Little Butte Creek 5th field watershed. Federal ownership in the 5th field watershed includes Medford BLM Butte Falls and Ashland Resource Areas and US Forest Service, High Cascades Ranger District. There are 75,057 acres of Federal commercial forest in the Little Butte Creek 5th field watershed, with 31,779 acres late-successional habitat (Table 1). Twenty eight percent of the Federal forest acres are late-successional habitat (20,971 acres) within reserves.

Table 1. Late Successional Habitat Analysis of Little Butte Creek 5th field Watershed

	BLM Lands		USFS Lands	Total Watershed (Federal)		
	Butte Falls RA	Ashland RA		Total	Reserve	Non-reserve
Federal Commercial Forest Acres	7,385	23,632	44,040	75,057		
Late Successional (LS) Habitat Acres	3,895	14,948	12,926	31,779	20,971	10,808
LS Habitat – Percent of forest acres	53%	63%	29%	42%	28%	14%

II. VEGETATION CONDITIONS

A. Ecological Classification

The classification in southwest Oregon is based on the concept of potential natural vegetation. The potential natural vegetation for a site is the vegetation that would be present under climax conditions. Climax would occur if the site were allowed to grow, undisturbed by fire, insects, diseases, flood, wind, erosion, or humans, in approximately 500 years. Theoretically, a steady state condition in vegetative composition would be reached after this time that is characteristic of the site potential. However, due to the frequent fire disturbance regimes (30-75 years), this is rarely reached in southwest Oregon.

The north/south orientation of the Cascade Mountains provides the environmental gradient that influences the presence and abundance of vegetative species. Slope, aspect, elevation, soil depth, and geology further define the extent and occurrence of various species. A wide range of environmental factors influence vegetation in the LSR. Elevation is about 3,700 feet. Average precipitation is estimated to range from 45 inches per year with approximately 7 inches of dry season precipitation.

B. Vegetation Composition

Within the LSR, white fir is the dominant plant series. The white fir series is one of the most widespread, diverse, and productive plant series of the southern Oregon Cascades. Ponderosa pine, sugar pine, incense cedar, and Douglas-fir represent the early seral tree component of this series. Douglas-fir generally dominates the overstory of most stands before being replaced by white fir.

The majority of the area occupies the warm and dry end of the environmental gradient, with moisture

limitations late in the growing season limiting biomass production. The understory is dominated by white fir, with Douglas-fir commonly occurring. White fir, Douglas-fir, incense cedar, and sugar pine will establish on the site following disturbance. Hardwoods include minor amounts of California black oak, Pacific madrone, and golden chinquapin on shallow rocky soils.
Shrub competition is generally moderate to severe following site disturbance in which the overstory canopy is opened (less than 60 percent crown closure).

Vegetative management will be required to ensure successful establishment and growth of conifer regeneration. Shrub species which are present in varying amounts are deerbrush ceanothus, oceanspray, vine maple, hazel, red stem ceanothus, serviceberry, Oregon grape, and thimbleberry. Common herbaceous vegetation includes pathfinder, western starflower, western twinflower, and white inside-out flower.

Coarse woody debris (CWD) and snags provide habitat for wildlife, invertebrate, microbial, and fungal species, as well as important ecological functions such as moisture retention, soil stabilization, and nutrient recycling. The amount and decay class of snags and woody debris reflects the stage of stand development. In a natural cycle, two stages (stand initiation and old growth) typically have the greatest amounts of coarse woody debris. Older decay classes (3, 4, and 5) are more common and reflect coarse woody debris created since stand initiation wildfires in the early 1900s.

C. Habitat Conditions within the LSR

1. Pre-storm Stand Structure

Prior to the windstorm, the stand structure of the LSR was late-successional, multi-layered stand with a canopy closure of 90 to 100 percent. Douglas-fir was the dominant overstory tree species with lesser amounts of white fir, sugar pine, ponderosa pine and incense cedar. The majority of the overstory trees were between 24 to 36 inches in diameter with the oldest approaching 200 years of age. The middle layer was predominantly Douglas-fir and white fir with diameters ranging from 8 to 16 inches. The lowest layer was occupied by seedling and sapling sized Douglas-fir and white fir.

Sixty acres were classified as spotted owl nesting, roosting, and foraging habitat (NRF). Nesting, roosting and foraging habitat also functions as dispersal habitat. Generally NRF habitat is at least 80 years of age or older (depending on stand type and structural condition), is multi-storied and has sufficient snags and down wood to provide opportunities for nesting, roosting and foraging. The canopy closure generally exceeds 60 percent, but canopy closure alone does not qualify a stand as NRF. The best quality suitable habitat has large old trees with cavities, broken tops or mistletoe platforms branches, dead standing and fallen decayed trees, and multiple canopies of shade-tolerant hardwoods and conifers that support prey base (Thomas et al. 1990).

Forty acres of the LSR were classified as dispersal-only habitat. This area had been logged in the 1960s and 1980s and had lower canopy cover with smaller Douglas-fir and white fir understory trees and scattered residual Douglas-fir overstory trees. Dispersal habitat is defined as forested habitat greater than 40 years old, with canopy closure 40 to 59 percent, average diameter greater than 11 inches, and has flying space for owls in the under story. Dispersal habitat provides temporary shelter for owls moving through the area between NRF habitats and provides some opportunity for owls to find prey, but does not provide all of the requirements to support an owl throughout its life (Zabel et al. 2003, Thomas et al. 1990).

a. Insects

Prior to the windstorm Douglas-fir bark beetles (*Dendroctonus pseudotsugae*) and the flatheaded fir borer (*Melanophila drummondi)* were present at natural low levels. Aerial surveys during 2006 and 2007 did not detect any significant areas of Douglas-fir bark beetles or flatheaded fir borer in or adjacent to the windthrown area (USDA 2006 & 2007). At low levels, insect populations play an essential role in properly functioning forest environments. Insects help to decompose and recycle nutrients, create snags for wildlife habitat, thin unhealthy trees, enhance stand structure and regulate tree species composition.

b. Fire

Fire historically was the dominant agent of change in the LSR, as it was in most of southern Oregon. Pre-storm the multi-layered, mixed-conifer stands in the LSR age classes greater than 120 years with more open stand structures. These stands have lower surface fuels, higher canopy heights, and lower canopy bulk densities. In a fire, the stands would likely have had single or group tree torching with low rates of spread and short flame lengths. Crown fire would have been limited to very extreme weather conditions. The stands would likely have exhibited a surface fire or lower intensity burn similar to historical behaviors. A fire started within these stands would likely have been easily suppressed.

Pre-fire, the open timber stands within the LSR were Fuel model TU1[4] and TU2 (Scott and Burgan 2005). TU1 is Douglas-fir dominant stands greater than 120 years with canopy closure greater than 60 percent and TU 2 is conifer stands 60-80 years with moderate shrub component in the understory. Most spotted owl NRF would have been TU1 and dispersal would have been TU2. NRF and dispersal late-successional habitat that had moderate or scattered storm effects remains in pre-storm condition.

Fire risk reflects the probability of an ignition due to humans or lightning. Within the blowdown analysis area which includes the Double Prentice LSR there has been a total of 628 fire starts between 1967 and 2006. Human-caused fires account for 46 percent of all fires starts and lightning caused accounts for 54 percent of fire starts (Federal and private) within this analysis area. On BLM lands within this area 75% of the fires were started by lightning.

c. Stand re-initiation

Pre-storm, there was little regeneration occurring within the areas with high canopy in approximately in 60 percent of the LSR. Douglas-fir mistletoe is present and common in the southern portion of the LSR and in the southeastern landscape immediately adjacent to the LSR. Mistletoe is host-specific and may cause tree mortality, growth loss and alteration of crown and canopy structure, increased fire hazard and increased susceptibility to bark beetles and drought stress. Mistletoe brooms, although detrimental to tree growth provide habitat for mammals and birds. Prior to the windstorm, high levels of mistletoe infestations were beginning to kill many large overstory trees in the southeast part of the LSR. Canopy gaps from mistletoe create small patches where natural regeneration occurs.

2. Post-storm Stand Structure

[4] **Timber-Understory (TU) Fuel Models**
The primary carrier of fire is forest litter in combination with herbaceous or shrub fuels. TU1 and TU3 are dynamic, containing a live herbaceous load with the effect of live herbaceous moisture content of spread rate and fire intensity strong, and dependent on the relative amount of grass and shrub load.
TU1 (161): Low load of grass and/or shrub with litter. Spread rate and flame length low.
TU2 (162): Moderate load of litter with a shrub component. Spread rate moderate; flame length low.

Severe blowdown occurred in 35 acres of the LSR. The majority of the trees within the severe blowdown area had trees uprooted, standing trees with roots sprung, trees with tops snapped off and crowns defoliated by the loss of branches and needles. Canopy closure declined from approximately 90-100 percent to less than 20 percent. Currently, pockets of windthrown trees cover the ground surface for a depth of 2-6 feet. Areas with large amounts of mistletoe in the crowns experienced severe blowdown.

The remaining standing trees are widely scattered, many with wind damaged crowns. The massive loss of late successional stand structure resulted in areas with severe blowdown, now functioning as early seral forest. After the storm, approximately 35 percent of the NRF and dispersal habitat was reduced to non-habitat due to loss of the overstory trees. The area no longer provides late-successional habitat, due to change in the overhead canopy.

The remaining 65 acres of the LSR continue to provide stand conditions that provide late-successional habitat. Scattered and moderate blowdown in these stands created more coarse wood on the ground, but the habitat remains suitable spotted owl habitat and provides late-successional species habitat.

The windstorm created new snags in the form of snap top, sprung trees, and trees with damaged crowns with <25 percent live crown remaining. Severely crown damaged trees with inadequate crown will continue to die due to inadequate green needles to provide the necessary nutrients to support the tree. Snag and standing damaged green tree levels average or exceed 3-5 per acre where severe blowdown occurred.

These snags will become future CWD. Fungi, insects and other vectors introduce decay into the snags. Tree bark begins to loosen and fall off. Woodpeckers create holes while foraging for insects and excavating nest cavities. Limbs break off, creating holes that can be used by mammals, birds, amphibians and reptiles. Additional snags are present within areas which had moderate and scattered blowdown damage and continue to provide late-successional forest habitat.

Blowdown also occurred in areas adjacent to the LSR. Stands along the southwest and southeast boundaries received moderate and severe blowdown. Various patches of severe, moderate, and scattered blowdown occurred throughout the remainder of Section 35 and in surrounding BLM lands. Adjacent private lands are generally in an early seral condition but had scattered blowdown, which has since been salvaged.

a. Insects

The windstorm created an abundance of favorable breeding habitat for the development of large populations of Douglas-fir bark beetle and flat-headed fir borer. Based upon past windstorm events which have created large amount of windthrow, it is expected the populations of bark beetles and wood borers would increase considerably, and mortality of healthy trees would occur (Flowers 2006).

Of specific concern is the Douglas-fir bark beetle; at epidemic levels this beetle has the potential of killing a substantial number of large healthy Douglas-fir. At high population levels the beetles not only attack stressed trees but also healthy trees. Instead of a selective loss of weak trees, large amounts of healthy green trees are attacked. Douglas-fir bark beetles typically target large (if not the largest) Douglas-fir trees for attack. Generally, for every 10 infested down Douglas-fir trees at least 10 inches in diameter, 4 standing green trees can be expected to be infested (Goheen 2008). Beetle infestations can affect late-successional forests that provide habitat for spotted owl and other late-successional species.

According to the Oregon Department of Forestry, Forest Health Note publication, flatheaded fir borers are considered less aggressive in attacking live trees (Flowers and Kanaskei 2007). Although this publication also notes "the beetle is particularly aggressive in southwest Oregon where it attacks Douglas-fir growing on the edge of stands or scattered patches of trees on dry sites."

b. Fire

Thirty five acres of late-successional forest was changed from large overstory trees over 120 years old, with high canopy cover and conifer stands 60-80 years with moderate fuel loading to a condition with low canopy where heavy blowdown is the primary carrier of fire. The severe blowdown changed the condition to fuel model SB4[5]. Large quantities of fuels greater than 3 inches are present. Fires spread quickly through fine fuels and intensity builds up more slowly as the large fuels start burning (Leuschen, et al. 2000). Active flaming is sustained for long periods and a wide variety of firebrands can be generated causing more spotting (Leuschen, et al. 2000).

Approximately 180 acres of moderate blowdown exist immediately adjacent to the LSR. The blowdown changed the condition to fuel model SB3. High fire spread and flame length is expected under these conditions.

In addition, the size, amount and distribution of the downed trees could decrease the ability of suppression resources to directly attack a wildfire possibly resulting in a larger final size. The more fuel burning, the more heat is produced. Fire lines and anchor points within the large blocks of blowdown would be hampered. There is an increased risk of fire moving into the adjacent intact late-successional stands and other critical resource areas (adjacent municipal watersheds).

Fires burning in the blowdown within the first 2-3 years, would spread quickly through the fine fuels and build intensity as the larger fuels such as large limbs, branches, and down and dead shrubs and small diameter trees start burning. Active flaming would be sustained for longer periods, especially as these larger fuels begin to cure or dry out, start burning and contribute to the duration of heat transferred to the ground once the fire front has passed and they continue to burn or smolder. Lethal soil temperature zones from wildfire are greater in areas with higher amounts of large logs (Monsanto and Agee 2008).

Initially, the green large down logs, with intact bark or those lying on the ground would likely not contribute to the fire spread or intensity. However, these large logs would inhibit the ability of suppression resources to construct hand line at a rate fast enough to contain a fire spread. This would

[5] **Slash-Blowdown (SB) Fuel Models**
The primary carrier of fire is activity fuel or blowdown.
SB4 (204): The primary carrier of fire is heavy blowdown fuel. Blowdown is total, fuel bed is not compacted, most foliage and fine fuel still attached to blowdown. Spread is very high; flame length very high.

be especially true in the moderate to severe areas where multiple large logs have fallen on top of one another or "jack-strawed". Fire line construction would likely require the use of dozers or heavy equipment, in conjunction with hand crews using chainsaws to safely cut and remove large logs that are in the way of completing a control line. This could result in more fires with larger final sizes than have occurred within the last 40 years.

An increase in individual tree torching and the initiation of crown fire could be expected due to the increased intensities of a fire coming from the blowdown areas. In addition, after the first two years when adjacent trees are affected by bug kill and have dead needles still attached. This could increase the potential initiation of a crown fire in the surrounding live trees. However, the dead needles may not significantly change the likelihood of a crown fire spreading from tree to tree, because crown fire spread is controlled not just by dead fuel quantity, but also by live fuel moisture, wind speed, and canopy bulk density (total amount of live and dead fuels in the canopy). The standing dead could contribute to additional spotting into the surrounding live stands. The amount and distance of spotting would be dependent on whether the fire is plume dominated or wind driven, as well as, type and amount of fuels burning.

A high intensity fire burning from a blowdown area into surrounding forest could increase potential fire behavior and the likelihood of crown initiation. In addition, the amount of mortality from the beetle mountain infestations could further compound the problem but would be dependent on the extent and the amount of time that has passed following the initial outbreak.

c. Stand re-initiation

Windthrown trees in the LSR typically cover the ground surface in patches to a depth of 2 to 6 feet and reduce openings for the establishment and growth of conifer seedlings. Where openings do occur it is expected that early seral brush species would rapidly expand into the openings and limit conifer growth.

III. LATE-SUCCESSIONAL SPECIES

A list of wildlife species, which utilize late-successional habitat, is included in Appendix A of this Assessment. Also included in Appendix A, are species known to be in the area; although they may or may not specifically need late-successional habitat to meet various life needs, many of them are opportunistic and utilize habitat as it occurs. Spotted owls have historically nested in the LSR. They were found in the LSR in 2008, but did not nest. Surveys for Bureau Sensitive mollusks were done adjacent to the LSR, but were not done inside the LSR boundary. No Bureau Sensitive mollusks associated with late-successional habitat were found.

Surveys for Survey and Manage and sensitive plant species were conducted in 1998 in the LSR. No T&E, sensitive or survey and manage plant species were found (Wineteer 2008). Surveys for T&E and BLM bureau sensitive plant species will be repeated in July 2008.

IV. MANAGEMENT DIRECTION AND LAND USES

A. Management Direction

The Northwest Forest Plan (NWFP) provided direction for the completion of the Bureau of Land Management's *Medford District Record of Decision and Resource Management Plan* (RMP). The

NWFP and Medford District's RMP provide direction for the management of the LSR. Management in the LSR will be designed to reduce risks of natural disturbance (see insects, fire and new stand establishment, above).

The action will meet the 2008 Recovery Plan for the Northern Spotted owl. Assuming continued implementation of the Northwest Forest Plan and its LSRs, or equivalent conservation strategy, recovery and maintenance of the spotted owl populations may well depend on, in part, restoration of habitat lost to natural catastrophic disturbances (USFWS 2008). Proposed management action is expected to help restore the ecosystem for continued development and stability so the restored lands functions in a state of development that will not create a loss of suitable habitat (USFWS 2008). The proposed restoration is not expected to have any effect on the expansion of barred owls.

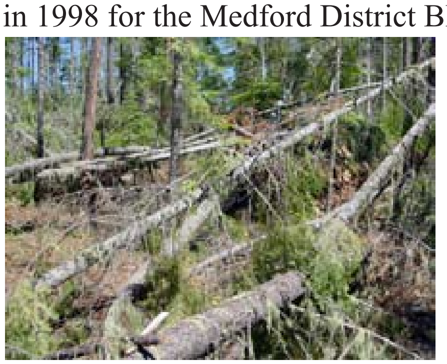
B. Land Uses

Federal land allocations direct land uses within the LSR. They are to be managed to protect and enhance late-successional and old-growth forest ecosystems. The 100-acre LSRs were delineated to provide the best 100 acres of habitat for all northern spotted owl activity centers identified as of January 1994. Most forest stands occupied by northern spotted owls, and delineated in 1994 as 100-acre LSR, tended to be mature or late-successional stands with little or no recent disturbances from timber harvest or human developments.

There are no system roads within the Double Prentice LSR. The area is bounded on the north by a mainline forest road and bounded on the southeast and east by a forest road that is seasonally closed by a gate. A blocked skid trail exists within the LSR.

V. FIRE MANAGEMENT PLANS

The 1995 Federal Wildland Fire Management Policy and Program Review and the 1998 Prescribed Fire Management Policy and Implementation Procedures Reference Guide, require the development of a Fire Management Plan for all federal lands subject to wildland fires. A Fire Management Plan was completed in 1998 for the Medford District BLM, which defines the Bureau's program to manage wildland and prescribed fire plan. The Fire Management Plan is not a decision document; rather, it provides operational guidance for implementing Land and Resource management plans, and is an aid to fire managers and line officers in the implementation of fire-related direction on-the-ground. These documents provide guidance for fire management activities in and around 100-acre Late-Successional Reserves. This LSR assessment tiers to the Bureau of Land Management's 1998 Medford District Fire Management Plan, for direction related to fire management activities.



VI. PROJECT PROPOSALS WITHIN LSRs, PROJECT DESIGN CRITERIA, AND IMPLEMENTATION SCHEDULE

A. Restoration Actions

Risk Reduction and restoration actions using salvage operations are proposed on 35 acres in the LSR with severe blowdown damage. The project is designed to implement treatments that reduce the potential for epidemic levels of bark beetles, to reduce the fire risk to remaining spotted owl NRF and dispersal habitat and to accelerate the re-establishment and growth of conifer seedlings in stands that had severe damage with stocking less than the site potential, followed by maintenance treatments to insure the growth potential of the stand is maximized.

Standards and Guidelines for LSRs allow for the salvage of dead trees based on a set of criteria (USDA/USDI 1994 p. C-12 through C-13). Salvage is defined as the removal of trees from an area following a stand-replacing event such as those caused by wind, fires, insect infestations, etc. Salvage will be used as a risk reduction and restoration tool in 35 acres of the LSR. Guidelines are intended to prevent negative effects on late-successional habitat while permitting some commercial wood volume removal. In some cases, operations may actually facilitate habitat recovery when excessive amounts of coarse wood debris may interfere with stand regeneration activities following some disturbances. Risk reduction is essential to reduce the future risk of fire or insect damage to remaining late-successional forest conditions within the LSR. However, operations must be implemented in a manner to prevent negative effects on late-successional habitat. The area where the severe blowdown occurred in the LSR is in need of reforestation to begin the restorative process of forest stand development. This section will outline project proposals specific to LSR (including project design criteria), location of area to be treated, and a tentative schedule for implementation.

Project design criteria were developed to address the protection and development of desired late-successional habitat characteristics specific to southwest Oregon. Project design criteria are described specific to each project proposal. The following activities are proposed within 100-acre LSR.

There are three objectives for the restoration proposal in the Double Prentice LSR:

►Reduce or control the spread of Douglas-fir bark beetle and flat-headed wood borer beetles from dead trees into adjacent healthy forest and late-successional habitat.

►Reduce the risk of high intensity fire in the event of a wildfire.

►Increase the rate of recovery of new seedlings where pockets of windthrown trees would impede establishment of seedlings in severe blowdown areas.

Removal of windthrown trees is proposed on 35 acres in the LSR. No action would occur in 65 acres of the LSR that currently provide spotted owl NRF and dispersal habitat. The windstorm blew down trees throughout these areas and snags and CWD created by the storm would be present throughout this area. Late-successional forest habitat conditions would remain in this area. CWD amounts would meet and exceed the amounts based on *"Guidelines for Snag and Down Wood Prescriptions in southwestern Oregon"* (White 2000). This paper considers the ecological processes to determine dead wood levels and landscape variation based on climate, soil and plant association groups and is specific to southwestern Oregon.

The CWD minimum to be left in the severe blowdown acres is 205 linear feet of CWD ≥ 20 inches. This would average 9-10 pieces of CWD per acre for the white fir plant series. BLM chose to use the guidelines from Snag and Down Wood Prescriptions in southwestern Oregon, because we felt it gave more accurate CWD amounts, based on the white fir plant association group in Southwestern Oregon.

All standing snags and damaged trees would be left standing in the LSR, unless they were determined to be a safety hazard. Hazard trees would be left on site to provide future CWD.

Restoration actions are not proposed for any other LSR at this time; however, project design criteria described below should be used for any future proposals to where restoration actions would be proposed within Late-Successional Reserves.

1. Insects

►Risk reduction actions would reduce the impact of epidemic insect infestations to intact stands and reduce the loss of available late-successional habitat (and suitable spotted owl habitat) to an insect outbreak.

Restoration actions would remove windthrown trees that provide insect habitat by reducing the amount of breeding habitat. With the reduced amount of breeding habitat it is expected there would be a corresponding reduction of insects and the reduced potential for green tree mortality in adjacent areas. Generally for every 10 down Douglas-fir trees that are at least 10 inches in diameter and infested, 4 standing green trees can be expected to be infested (personal communication, Goheen, 2008). The volume loss of standing trees can approach 30-60% of the windthrown volume if there are more than 3 down trees per acre greater than 14 inches in diameter (ODF, 2007).

2. Fire

►Restoration actions would reduce risk of high intensity fire in the event of a wildfire.

Proposed forest management actions include salvage and slash disposal activities within 35 acres affected by severe blowdown in the LSR. There would be a change in predicted fire behavior and fuel loading expected 1 to 5 years following salvage and slash disposal treatments during a wildfire event compared to the current fuel model with a mid-flame wind speed of 5mph and slope of 30 percent, in the severe blowdown.

Current Fire Behavior Attributes and Fuels Loading in the Blowdown						
		Potential Fire Behavior			Fuel Loading	
Stand Damage	Fuel Model	Rate of Spread ch/hr	Flame Length feet	Intensity Btu/ft/sec	1-100 hr tons/acre	100+ hr tons/acre
Severe	SB4	74	16	2180	14+	120-200+
Predicted Fuel Model, Fuel Loading, and Fire Behavior Following Salvage and Slash Disposal Activities in SB4						
		Predicted Fire Behavior			Predicted Fuel Loading	
Slash Disposal	Post Fuel Model	Rate of Spread ch/hr	Flame Length feet	Intensity Btu/ft/sec	1-100 hr tons/acre	100+ hr tons/acre
Machine Pile Burn	TL4	3	2	17	4-8	12-20

The treatment in the proposed project area would have the effect of modifying severe fire behavior during high to extreme weather conditions, especially within the first ten years of post-treatment, within blowdown areas having the potential to produce large intense fires.

Restoration actions in the blowdown area and sequential slash disposal treatments serves several purposes: 1) reduction in probability that wildland fires move across the landscape, burning through adjacent spotted owl habitat; 2) reduction in size and ecological effects of wildfires; 3) break up of the continuity of existing heavy fuel loads that support high intensity wildland fires; and 4) reduce conditions that would allow fire to move through surface vegetation and into tree crowns during periods of high fire danger.

Although salvage on matrix lands adjacent to the LSR would reduce fuels outside the activity center, fire hazard remains high in the severe blowdown area. Roads are present along three sides of the LSR and the possibility of a fire starting from public roads and moving into the severe blowdown and into the interior spotted owl/late-successional habitat is higher than in an unroaded area. On BLM lands within analysis area 75% of fires were started by lightning. If a fire were to begin in the severe blowdown area, there is a high possibility that it would be difficult to contain due to the presence of large windthrown trees preventing fire line construction as well as increased risk from high intensity fire carrying through the fuels on the ground from the blowdown.

This is a valid concern. In early July, 2008, a lightning strike started a wildfire in an area affected by severe blowdown several miles north of the LSR. Due to the large amount of windthrow on the ground, fire crews had difficulty putting a fire line around the fire. Fire personnel reported that due to the large amounts of blowdown, getting vehicle access to the fire and constructing a fire line (cutting the large trees and moving them) increased the amount of time needed to control the fire. A fire that likely could have been contained at less than one acre with a hand crew spread to 8 acres before the line was completed and required heavy equipment to establish fire lines (Murphy 2008).

3. Stand re-initiation

►Restoration actions would include planting (as needed) to increase the rate of recovery of new seedlings where pockets of windthrown trees would impede establishment of seedlings in severe blowdown areas.

Vegetative management may be required to ensure successful establishment and growth of conifer regeneration in some areas of severe windthrow. In severe blowdown areas, windthrown trees typically cover the ground surface for a depth of 2 to 6 feet and few openings remain for the establishment and growth of conifer seedlings. Where openings do occur, early seral brush species would rapidly expand into the openings and limit conifer growth. Salvaging severe windthrown areas would reduce the amount and depth of trees covering the ground while maintaining sufficient amounts of coarse woody debris to sustain the necessary physical complexity and stability of spotted owl habitat and other late-successional habitat in the LSR.

Openings on the forest floor would be created and would allow for the planting and establishment of conifer seedlings. Replanting would occur in natural patterns with microsite emphasis (planting next to logs, stumps, etc.). Stand development and the restoration of species composition, structural diversity, and canopy cover would be accelerated by at least 10 to 20 years with restoration actions.

Slash and brush would be treated following operations to ensure adequate planting spots. A mix of Douglas-fir, ponderosa pine, sugar pine, and incense cedar would be planted at variable densities (approximately 150 to 400 trees per acre) to enhance structural diversity, accelerate the development of late successional tree characteristics and provide a diversity of habitats for a variety of plant and animals. Adjacent to standing green trees, snags, and concentrations of coarse woody debris, higher densities of trees would be planted to promote vertical layers and structural complexity. In more open areas, lower densities of trees would be planted. Wider spacing would allow planted trees to keep more branches and overtime develop wider and deeper crowns. Wider spacing would also encourage increased plant cover, greater species diversity, and higher shrub densities that would provide continuity between the understory and the overstory.
All pre-blowdown CWD will be left on site and protected to the greatest extent possible from disturbance. This older wood would continue to provide some habitat for low mobility species, such as invertebrates, lichens and mosses, although with the loss of overhead cover due to the windstorm, it is expected that these would dry out and may not continue to provide moist conditions in the severe blowdown area. All standing snags, sprung and crown-damaged trees that are not determined to be a hazard to operations, would also be left in the area where restoration was proposed to reduce the amount of ground cover from windthrown logs.

B. Project Design Criteria:

The following project design criteria would be implemented to meet Standards and Guidelines designed to reduce risks of large scale disturbance and increase the rate of recovery of new seedlings:

a. Remove only windthrown trees.
b. Retain all suitable or dispersal spotted owl habitat.
c. Retain all standing live green trees, except trees determined to be a hazard to the safety of forest workers. Felled hazard trees would be left in the LSR.
d. Retain all down woody material in decay classes 3 through 5.
e. Retain 9-10 pieces of down wood greater than 20 inches diameter and greater than 20 feet long per acre for 205 linear feet of coarse wood left in the treated area.
f. Avoid placing new landing in the 100-acre LSR.
g. Rip landings and skid trails.

h. Seasonally restrict tractor and mechanical operations when moisture content of soil moisture exceeds 25 percent.
i. Seasonal restriction March 1 – June 30 adjacent to areas occupied by spotted owls.
j. Plant a mix of species (DF, SP, PP, IC) that reflect the species composition of the existing stand.
k. Plant with a natural spacing with microsite emphasis (planting next to logs, stumps, etc).
l. Piling and burning would occur when slash fuel loading 9" or less and is greater than 15 tons/acre. Only material less than 12 inches would be piled.

C. Retention of Coarse Woody Material and Snags

Using *Guidelines for down Wood in Southwestern Oregon* (White 2000), the recommended amounts of Coarse Woody Material and Snags by decay class and Plant Association Group were determined for the LSR. Guidelines for Down Wood in Southwestern Oregon outlines ecological processes that regulate abundance of down wood and snags; it also provides information on the range in levels of snags and down woody material by Plant Association Group. This guide was developed in response to a request by the Oregon Provincial Interagency Executive Committee (PIEC) that a province wide process be developed for use by interdisciplinary teams for determining amounts of snags and down woody material. Guidelines for Down Wood in Southwest Oregon was developed with an interdisciplinary process represented by a variety of resource specialists from the southwest Oregon province and using data from the southwest Oregon Ecology Program (White 2000). The process and concepts outlined in this guide were based upon a "live" system that has the capability to continually recruit new snags and downed woody material into the system over time.

Live trees with decay, downed woody material, and snags function to meet the life history needs of various wildlife species. Larger downed wood generally has more potential uses as wildlife habitat than smaller wood. Large wood provides denning and hiding cover, jack-straw piles of logs provide thermal cover, hiding cover and foraging areas for species such as fisher, martens, cougars, and other small mammals (Rose et al. 2001). Smaller wood generally functions for amphibians, reptiles, and small mammals as escape cover, shelter, and runways. "Interactions among wildlife, other organisms, and decaying wood substrates are essential to ecosystem processes and functions" (Rose et al. 2001). Recommended amounts of downed wood per acre are at 9-10 pieces greater than 20 inches diameter greater than 20 feet long as needed to meet 205 linear feet.

It is anticipated additional pieces above the 205 linear feet would remain within the unit post-salvage. Trees and logs which are not merchantable due to decay or breakage would be left on site. All pre-storm large CWD would remain. Large limbs over 12 inches (30.5 centimeters) as well as pre-storm CWD would contribute to ground cover. Overall ground cover is expected to range from 2 to 3 percent (or greater) post-treatment. Mortality of severely damaged or insect infected green trees is anticipated. These trees will not be salvaged and will contribute to future snag and CWD recruitment within the LSR.

All snags will be retained as part of the silvicultural prescription. The 2008 spotted owl recovery plan recommended methods for habitat restoration and salvage (USFW 2008). Two methods that will be applied in the severely damaged of the LSR are: retention of biological legacies and management of decadence processes, including maintaining dead and decadent trees, CWD, and maintenance of large old trees with significant decay.

Managing fuel loads in a fire-prone forest is a principal part of ecological restoration of natural patterns and processes to return those landscapes and ecosystems to states of resilience and sustainability. During restoration actions, existing snags will be reserved from felling where they are not a safety hazard. If a snag needs to be fallen for safety concerns, the snag will be left on-site to function as coarse woody debris. CWD will meet or exceed the ecological site CWD guidelines for southwestern Oregon in the area with severe blowdown. Within the LSR, all damaged trees and CWD will be retained on 65 acres.

VII. Criteria for Developing Treatments

A. Coarse Woody Debris

Only windthrown trees in excess of those trees needed to meet coarse woody debris objectives would be removed. Coarse woody debris provides habitat for wildlife, invertebrate (insect predators), microbial, and fungal species, as well as, providing for important ecological functions such as moisture retention, soil stabilization and nutrient recycling.

Guidelines for designating downed woody material incorporate concepts to meet multiple objectives, such as providing structure for wildlife habitat, accelerating biological processes, reducing fire hazard and providing for human safety. CWD would be left individually and in concentrations ("jack-straw piles") to increase diversity of CWD patterns for future habitat.

Concentrations of CWD would be left next to standing snags, green trees or existing large pieces of older CWD. The standing snags or green trees in combination with CWD would enhance vertical diversity and structural complexity. Leaving windthrown trees next to old large CWD would maintain the functional integrity of the older pieces by protecting them from disturbance.

B. Fire Hazard Reduction

Small diameter trees will be the first to begin accumulating and contribute to flashy fuels. It is preferred to protect 100-acre Late-Successional Reserves from wildfire by reducing fire hazard in areas outside of LSRs. However, due to the fuels buildup inside the LSR, as a result of the windthrown trees, broken branches and piles of wood, treating adjacent stands may not adequately reduce the threat of stand replacing events within the 100-acre Late-Successional Reserves if a fire starts in or immediately adjacent to the LSR. Forests on adjacent private timber lands near the LSR are dense conifer stands less than 40 years old with heavy shrub component.

VIII. MONITORING

The overall goal of the monitoring plan for the Late-Successional Reserves in the 100-acre LSR is to provide information and insight into the condition of these reserves as a result of the restoration management treatments. Monitoring the reserve is designed to help us understand the relationship between salvage and restoration, and land use practices and their effects on ecosystem integrity.

A. Use of Monitoring Data

Data and information collected from monitoring will be collated and analyzed in conjunction with existing databases and sources. Some of the information and data, as is often the case in effectiveness monitoring, may require several years and even decades before we can identify trends and patterns of significance.

B. Implementation Monitoring

Implementation monitoring would occur to determine if projects were implemented as planned. Evaluation questions include:

- Were treatments implemented according to design criteria outlined in this assessment?
- Were appropriate mitigation measures and management constraints developed during environmental analysis implemented as planned?
- If implementation deviated from design criteria and mitigation measures, monitoring would document how and why implementation deviated and whether the desired objectives as documented in this assessment and NEPA documents were achieved.
- Were standards and guidelines of appropriate planning documents met (Northwest Forest Plan and Medford District Resource Management Plan)?

C. Effectiveness and Trend Monitoring

Monitor activities to assess their effectiveness in accelerating the development of late-successional habitat characteristics (composition and structure). This information to be collected and tracked over time in order to adapt future activities to better reach desired results.

How well did treatments achieve the desired habitat characteristics?

- Do planted conifers exhibit a difference in growth rate and canopy closure versus natural regeneration?
- Were reforestation objectives met?
- How do the resultant patterns and composition of understory and overstory vegetation in treated stands compare with stands naturally regenerated?
- Was the desired amount of downed woody material achieved with treatments?
- How do the amounts of downed woody material in treated stands compare to untreated stands?
- After several decades, are there marked differences in vegetation structure and composition among the various treatments and natural regeneration?

Appendix A: Special Status Species Assessment (FY 2008)

Double Prentice LSR Assessment

This table shows the Butte Falls Resource Area special status species assessment. The list is compiled from the Bureau of Land Management OR/WA Special Status Species List, updated in July 2007, based on information from the Oregon Natural Heritage Program and BLM site-specific information. The table contains only the Bureau Sensitive Species known or suspected to be present in the Butte Falls Resource Area boundaries. The method(s) used to assess and review the potential effects to these species followed the techniques described in the OR/WA Special Status Species Policy (IM OR-2003-054). The list includes USFWS Migratory Birds of Concern which have been identified as possibly being present in the Butte Falls Resource Area. The species considered are taken from a list of Western BLM Bird Species of Conservation Concern, (source USFWS Migratory Bird Program Strategic Plan 2004-2014) and include birds on the Game Birds Below Desired Condition. Also included are 2 species that are not special status, but are closely associated with late-successional forests.

The following table documents the basic conclusions of this assessment by species.

Table A-1. Double Prentice LSR Species requiring special consideration because of special status or late-successional association

Species	Status	Range	LS	P/A	Conclusions
Amphibians					
Foothill yellow-legged frog	BS	Yes	No	A	Yellow-legged frogs are generally found in permanent slow-flowing streams from sea level to about 1800 feet. No permanent streams in LSR or nearby. Elevation is above 3,500 ft.
Reptiles					
Northwestern pond turtle	BS	Yes	No	A	A small nearby pond has been surveyed on numerous occasions (over several years) with no northwestern pond turtles observed. No impacts identified.
Birds					
Bald eagle	BS	Yes	No		Bald eagles generally nest near larger streams and lakes in the Rogue Basin. Nests are generally on ridges. LSR is not suitable nesting habitat (on a ridge or near large stream or lake).
Band-tailed pigeon	NBC / GBBDC	Yes	No	A	Occasionally observed in BFRA, usually near springs and seeps. Important habitat types are estuaries and mineral springs. Nests are primarily in Douglas-fir, but they also will nest in hardwoods and shrubs, within closed-canopy conifer or mixed hardwood and conifer stands.
Flammulated owl	NBC	Yes	No	U	No reports of flammulated owls in the Little Butte 5th field watershed. Habitat is conifer woodlands and forest edges, especially oak and pine ecosystems. Require small patches of dense thickets for roosting; small openings of grasslands or dry meadows for foraging. They nest in abandoned woodpecker holes and cavities in oak and pine woodlands. All snags would be reserved. Future habitat would remain and increase as standing snags decay and are excavated by woodpeckers.
Lewis' Woodpecker	BS, NBC	Yes	No	A	Lewis' woodpeckers are present in lower elevation lands in Sam's valley in the summer. They are not present in the LSR.
Mourning dove	NBC/ GBBDC	Yes	No	P	Widespread in BFRA throughout the year. Adapted to a wide range of habitats from open forests and clearcuts to urban and agricultural areas. They avoid dense forests. They can produce young in up to 4 nesting attempts per year.
Northern harrier	NBC	No	No	A	Present in the agriculture lands in the Rogue Valley. Not present in project area.
Northern spotted owl	FT	Yes	Yes	P	Known sites would be monitored annually. Project "May Affect, Not Likely to Adversely Affect" due to habitat disturbance. Area proposed for rehabilitation is no longer suitable habitat.
Olive- sided flycatcher	NBC	Yes	No	P	Large, older trees are used for nesting. They are not late-successional obligates. Forage in clear-cuts and other habitat types. Often forage from perches on tall snags and trees edges of openings. Snags and broken top trees would be available for hunting
Peregrine falcon	BS, NBC	Yes	No	A	Nearest nest is approximately 7 miles. No suitable cliff substrate is within the project area. No impacts.
Prairie falcon	NBC	Yes	No	A	Three breeding locations reported in Jackson Co. Breed on rim rock or other rock outcrops. No suitable cliff substrate is within the project area. No impacts.

Table A-1. Double Prentice LSR Species requiring special consideration because of special status or late-successional association

Species	Status	Range	LS	P/A	Conclusions
Pileated woodpecker	NA	Yes	No	P	Pileated woodpeckers are present in the area. They are not late-successional obligates, but require large trees for nesting. Pileated woodpecker holes are used by many different species, including fishers and flying squirrels which also use late-successional forests. Snags and existing snags would be left in place
Streaked horned lark	BS	No	No	A	May migrate through BFRA in the spring and fall. Open grassland species. Closest observation is Table Rocks and Lost Creek Lake. Project area is outside the range of the species No habitat.
Tri-colored blackbird	BS	No	No	A	Present in wetlands near White City. Project area is outside the range of the species. No habitat in area.
White-headed woodpecker	BS, NBC	No	Yes	A	Occasional visitor to Dead Indian Plateau. May be vagrant in BFRA at higher elevation lands. Ample snags would be reserved. Project area is outside the known range of the species.
Williamson's sapsucker	NBC	No	Yes	A	They breed in mid-to high elevations mature or old-growth conifer forests with fairly open canopy Project area is outside the known range.
Wood duck	NBC / GBBDC	Yes	No	A	Present near slow reaches and backwaters of the Rogue River, larger creeks and ponds. Nest in cavities in trees in riparian zones. No riparian zones of bodies of water in the LSR. No impacts.
White-tailed kite	BS	No	No	A	White-tailed kites are present in the Rogue Valley agriculture lands near Medford and Ashland. The project area is outside the known range. No impacts.
Mammals					
Fisher	FC	Yes	Yes/No	S	Fishers use a variety of forested habitats. They use attributes of late-successional forests for denning and rearing young. Nearest confirmed location is approximately 5 miles away. Fishers are wide-ranging individuals and could occur in the project area. Proposed activities would not affect persistence of the species in the watershed. Snags, snap top trees CWD would all be present in the LSR at current/increasing levels, due to damage from storm. Snags, snap top trees and piles of CWD would be left in area proposed for action to provide future habitat.
Fringed myotis (bat)	BA	Yes	No	S	No documented occurrence. Fringed myotis appear adapted to live in areas with diverse vegetative substrates. Ample snags and coarse woody debris would be retained with snags, snap top trees and trees with damage left in the proposed action area. Adjacent stands would not be entered and would continue to produce loose bark, woodpecker holes, etc.
Northern flying squirrel	NA	Yes	Yes	U	Area is within the range; however, there are no records of their present within the LSR. The proposed project would not remove snags or large decadent trees within the high canopy area of the LSR. No impacts identified. All standing snags would remain.
Pallid Bat	BA	Yes	No	S	No documented occurrence in the watershed, but could be present. All snags and other damaged trees would remain standing to provide loose bark, future habitat.
Townsend's big-eared bat	BS	Yes	No	S	One Townsend's big eared bat was captured during mist net sampling approximately 1 mile for the LSR. Townsend's big eared bats generally roost in adits and caves throughout BFRA. These bats are also known to use cavities in trees and attics of buildings. Snags and future snags will remain in the LSR in higher amounts than presently available.
Mollusks					
Chace sideband (snail) (Monadenia)	BS	Yes	Yes	A	Surveys in the surrounding areas on BLM lands have been negative. No Monadenia have been found within 17 miles.
Crater Lake tightcoil (snail) (Pristiloma)	BS	No	Yes	A	Pristiloma are found within 50 feet of streams. They may be associated with high elevation streams in SW OR. Nearest location is near Crater Lake NP. Pristiloma were not in Butte Falls Resource Area mollusk surveys throughout the entire RA. There are no riparian reserves within the LSR.
Oregon shoulderband (snail) (*Helminthoglypta*)	BS	Yes	No	A	*Helminthoglypta* are not LSR obligates. They are found in rocky outcrops in oak/mixed conifer sites. Surveys in the surrounding areas were negative. Nearest locations are over 15 miles northwest, near Lost Creek Lake.

Table A-1. Double Prentice LSR Species requiring special consideration because of special status or late-successional association

Species	Status	Range	LS	P/A	Conclusions
Insects					
Johnson's hairstreak butterfly	BS	Unknown	Yes	U	No records of presence on BFRA. Nearest location is in the Klamath River drainage. Identified habitat is mostly older forests with red fir, western hemlock or gray pine on which a parasitic mistletoe, *Arceuthobium camplopodum* is found. Douglas-fir mistletoe *(Arceuthobium douglasii)* is present in the LSR. Douglas-fir mistletoe has not been identified as a host.
Siskiyou short-horned grasshopper	BS	Unknown	N	A	They have been found associated with elderberry and grasslands and don't appear to be late-successional species. No grassland/elderberry in the LSR. Nearest known locations are Mt. Ashland and Woodruff Meadows (USFS).
Crustaceans					
Vernal pool fairy shrimp	FT	No	Absent		N/A. Project is outside the range of the species.

STATUS:

FT (USFWS Threatened) - likely to become endangered species within the foreseeable future.
FC (USFWS Candidate) - proposed and being reviewed for listing as threatened or endangered
BS [Bureau (BLM) Sensitive] - eligible for addition to Federal Notice of Review, and known in advance of official publication. Generally these species are restricted in range and have natural or human-caused threats to their survival.
NBC (Neotropical Birds of Concern) - on USFWS Birds of Conservation Concern published in 2003 to identify species and populations of migratory and non-migratory birds which may need consideration in management actions.
GBBDC (Game Birds Below Desired Conditions) - US FWS Migratory Bird Program Strategic Plan 2004-2014 list of species whose populations are below long-term averages or management goals (from draft list).
NA - Not applicable. Animal is not identified as sensitive.

NOTE: The FY 2008 Special Status Species List Review and Analysis for the Double Prentice 100-acre Spotted Owl Activity Center Late-Successional Reserve Assessment was removed in this EA. An identical list is included in this document in Appendix I, Wildlife.

References

Arnold, George. 2004. Wildlife Biologist, Medford BLM District. Medford OR. Personal communication.

Bull, Evelyn L, Keith B. Aubrey and Barbara C. Wales. 2001. "Effects of Disturbance on Forest Carnivores of Conservation Concern in Eastern Oregon and Washington". Northwest Science, Vol. 75, Special Issue.

Bull, E.L. and R.S. Holthausen. 1993. *Habitat use and management of Pileated Woodpeckers in northeastern Oregon*. Oregon Journal of Wildlife Management. 57: 335-345.

Burke, Thomas, John S. Applegarth and Ted R. Weasma. 1999. *Management Recommendations for Survey and Manage Terrestrial Mollusks Version 2.0*. USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management.

Corkran, Charlotte and Chris Thoms. 2006. *Amphibians of Oregon, Washington and British Columbia, a field identification guide.* Lone Pine Publishing. Redmond, WA.

Cross, Steven P. 2004. Southern Oregon University Biology Professor (retired). Personal communication.

Csuti, Blair, et al. 1997. *Atlas of Oregon Wildlife.* Oregon State University Press. Corvallis, OR.

Ehrlich, Paul R., David S. Dobkin, and Darryl Wheye. 1988. *The Birders Handbook, a field guide to the Natural History of North American birds.* Simon & Schuster. NY.

Duncan, J.R. Review of Technical Knowledge: Great Gray Owl. Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. Chapter 14, pp 159-175.

Flowers, R. 2006. Managing Blowdown Following Major Windstorms. www.oregon.gov/ODF/Private_Forest/docs/fh/ManagingBlowdownfollowingMajorWindstorms.pps.

Flowers, Rob and Alan Kanaskie. 2007. Forest Health Note. Douglas-Fir Beetle. Oregon Department of Forestry. July 2007.

Flowers, Rob and Alan Kanaskie. 2007. Forest Health Note. Flatheaded Fir Borer. Oregon Department of Forestry. July 2007.

Goheen, Don. 2008. USDA Entomologist. Personal Communication.

Leuschen, T, T. Wordell, M. Finney, D. Anderson, T. Aunan, P.Tine. 2000. Fuel risk assessment of the blowdown in the Boundary Waters Canoe Area Wilderness and adjacent lands. Duluth, MN: U.S. Department of Agriculture, Forest Service, Superior National Forest.

Marshall, David B., Matthew G. Hunter and Alan L. Contreras. 2003. *Birds of Oregon, a General Reference*, Oregon State University Press. Corvallis, OR.

Maser, Chris, Bruce R. Mate, Jerry F. Franklin and C.T. Dyrness. 1981. *Natural History of Oregon Coast Mammals*. Pacific Northwest Forest and Range Experiment Station. US Forest Service General Technical Report PNW-133.

Monsanto, Philip G. and James K. Agee. 2008. *Long-term post-wildfire dynamics of coarse woody debris after salvage logging and implications for soil heating in dry forests of the eastern Cascades, Washington*. Forest Ecology and Management 255 (2008) 3952-3961.

Nussbaum, Ronald A., Edmund D. Brodie, Jr., and Robert M. Storm. 1983. *Amphibians & Reptiles of the Pacific Northwest.* University of Idaho Press, Moscow, ID.

Rose, C. L., B.G. Marcot, T. K. Mellen, J. L. Ohmann, K. L. Waddell, D.L. Lindley, and B. Schreiber. 2001. Chapter 24: *Decaying Wood in Pacific Northwest Forests: Concepts and Tools for Habitat Management*. P. 580-623 in *Wildlife Habitat Relationships in Oregon and Washington*. D.H. Johnson and T. A. O'Neil, managing directors. Oregon State University Press, Corvallis OR.

Ruediger, Bill, Jim Claar, Steve Gniadek, Brian Holt, Lyle Lewis, Steve Mighton, Bob Naney, Gary Patton, Tony Rinaldi, Joel Tick, Ann Vandehay, Fred Wahl, Nancy Warren, Dick Wenger, and Al Williamson. 2000. "Canada lynx conservation assessment and strategy". USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management and USDI National Park Service. Missoula, MT.

Runquist, Erik. 1999. "Butterfly Community Surveys in the Soda Mountain Region", Jackson County, Oregon. Bureau of Land Management. Medford, OR.

Rothermel, R.C. 1983. How to predict the spread and intensity of forest and range firesRes. Pap. INT-143. Ogden, UT: U.S. Department of Agriculture, forest Service, Intermountain Forest and Range Experiment Station. 13-14 p.

Rothermal, R.C. 1991. Predicting behavior and size of crown fires in the Northern Rocky MountainsRes. Pap. INT-438. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.

Scott, Joe H., and Burgan, Robert E., *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model*, Research Paper RMRS-GTR-153, Rocky Mountain Research Station, Forest Service, United States Department of Agriculture, June 2005.

USDA, Forest Service 2006 & 2007Forest Insect and Disease Aerial Survey Data – 100K Survey Maps. www.fs.fed.us/r6/nr/fid/as/quad06/index.shtmal

USDA, US Forest Service and USDI, Bureau of Land Management. 1994. *Record of Decision for Amendments to Forest and Bureau of Land Management 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.* Government Printing Office.

U.S. Fish and Wildlife Service. 2008. Final Recovery Plan for the Northern Spotted owl, *Strix occidentalis caurina*. U.S. Fish and Wildlife Service, Portland, Oregon, xii + 142 pp.

U.S. Fish and Wildlife Service. July 10, 2008. MBLM Blowdown LOC. 8330.10101 (08). U.S. Fish and Wildlife Service, Roseburg, OR.

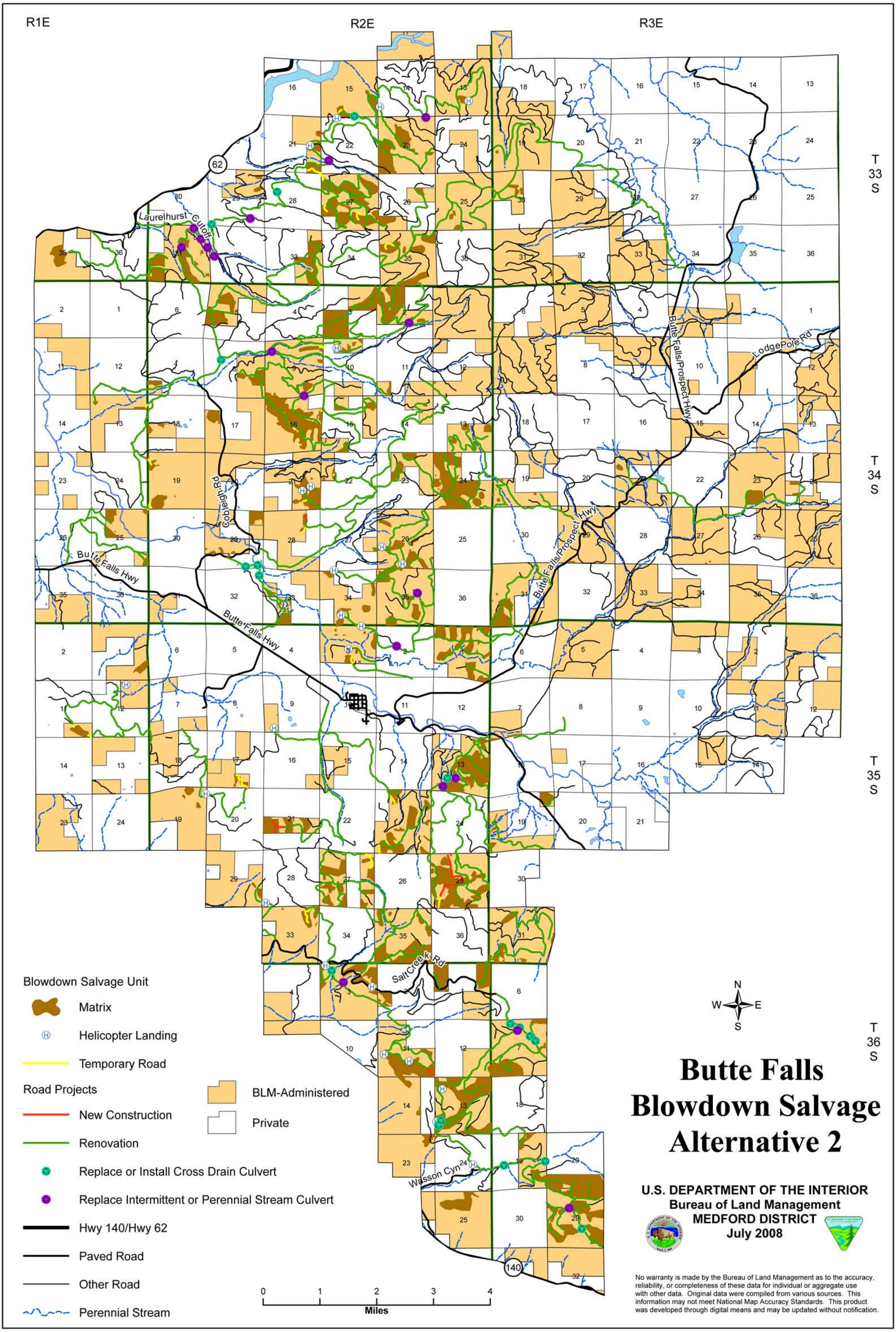
Verts, B. J. and Leslie N. Carraway. 1998. *Land Mammals of Oregon*. University of California Press. University of California Press. Berkeley, CA.

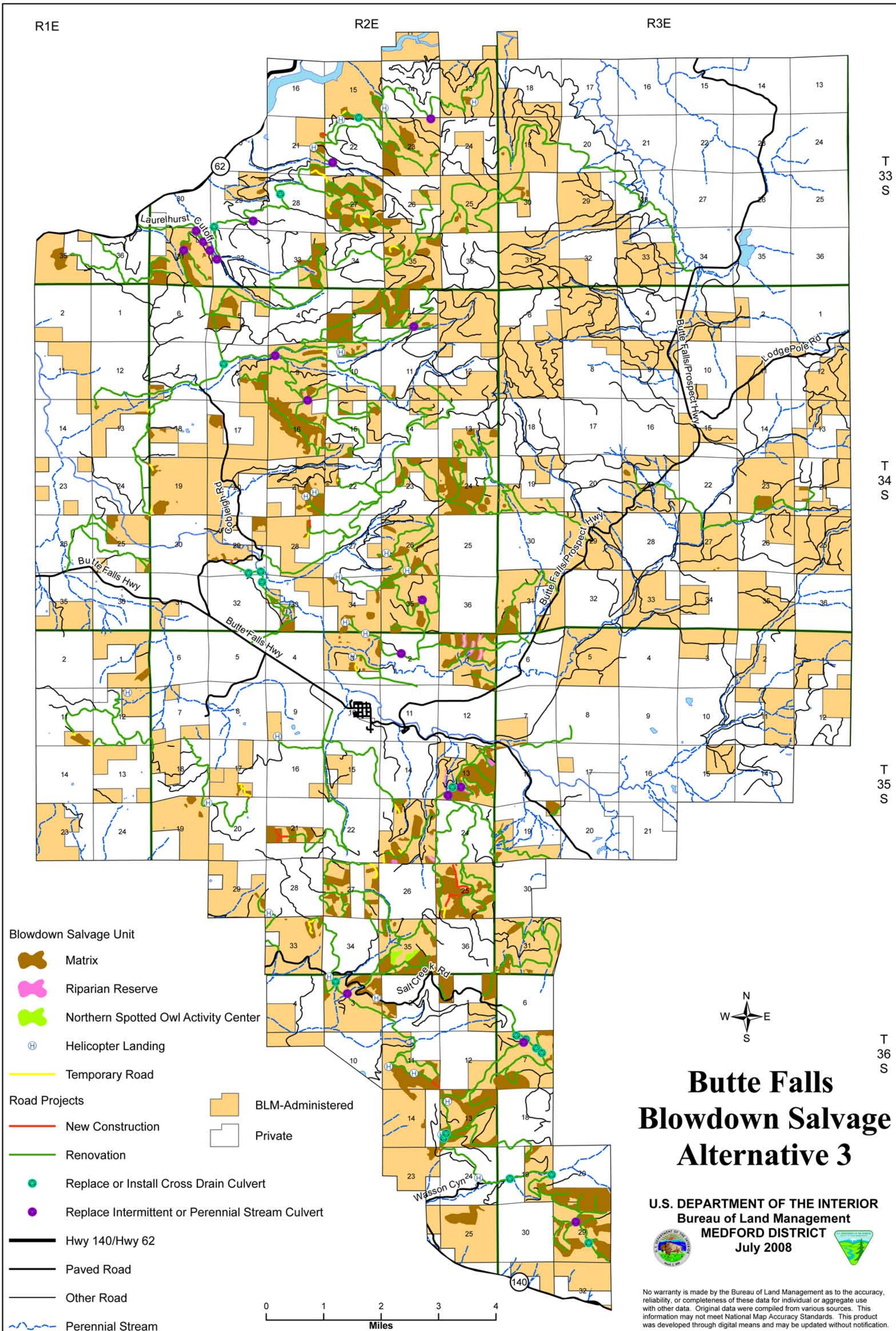
White, Diane. 2000. *Guidelines for Down Wood in Southwestern Oregon.* On file at the Applegate Ranger District.

Wineteer, Marcia. 2008. Personal communication.

Zabel, C. J., J.R. Dunk, H.B. Stauffer, L.M. Roberts, B.S. Mulder, AND A. Wright. 2003. Northern spotted owl habitat models for research and management application in California (USA). Ecological Applications 13(4):1027-1040.

BLM/OR/WA/AE-08/077+1792


R1E
R2E
R3E
T 33 S
T 34 S
T 35 S
T 36 S
Laurelhurst Cutoff
Cobleigh Rd
Butte Falls Hwy
Butte Falls/Prospect Hwy
LodgePole Rd
Salt Creek Rd
Wasson Cyn
62
140
Blowdown Salvage Unit
Matrix
Helicopter Landing
Temporary Road
Road Projects
New Construction
Renovation
Replace or Install Cross Drain Culvert
Replace Intermittent or Perennial Stream Culvert
Hwy 140/Hwy 62
Paved Road
Other Road
Perennial Stream
BLM-Administered
Private
0 1 2 3 4
Miles
N
S
E
W
Butte Falls
Blowdown Salvage
Alternative 2
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.


R1E
R2E
R3E
T 33 S
T 34 S
T 35 S
T 36 S
Laurelhurst Cutoff
Cobleigh Rd
Butte Falls Hwy
Butte Falls/Prospect Hwy
LodgePole Rd
Salt Creek Rd
Wasson Cyn
62
140
Blowdown Salvage Unit
Matrix
Riparian Reserve
Northern Spotted Owl Activity Center
Helicopter Landing
Temporary Road
Road Projects
New Construction
Renovation
Replace or Install Cross Drain Culvert
Replace Intermittent or Perennial Stream Culvert
Hwy 140/Hwy 62
Paved Road
Other Road
Perennial Stream
BLM-Administered
Private
0 1 2 3 4
Miles
N
W E
S
Butte Falls
Blowdown Salvage
Alternative 3
U.S. DEPARTMENT OF THE INTERIOR
Bureau of Land Management
MEDFORD DISTRICT
July 2008
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.