Doubleday Fire Salvage
Environmental Assessment
DOI-BLM-OR-M050-2009-0015-EA
Doubleday Fire Salvage Environmental Assessment

EA Number: DOI-BLM-OR-M050-2009-0015-EA
Project Location: Township 35 South, Range 2 East, Sections 23 and 27, Willamette Meridian, Jackson County, Oregon

Summary:
The Butte Falls Resource Area is proposing to salvage a portion of the trees burned in the 2008 Double-day Fire. Salvage would occur on up to 220 acres of BLM-administered lands in the Big Butte Creek and Little Butte Creek fifth field watersheds. Trees proposed for salvage would include trees either blown down during the 2008 windstorms or burned during the Doubleday Fire with more than 70 percent crown scorch (for Douglas-fir, ponderosa pine, sugar pine, and incense cedar) or more than 40 percent crown scorch (for white fir). Timber would be harvested using tractor and skyline yarding systems. Slash from the salvage activities would be lopped and scattered, hand piled and burned, or excavator piled and burned. Road work associated with the salvage harvest is road renovation, road improvement, temporary spur road construction and decommissioning, and road realignment. Salvage is proposed on matrix lands.

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Date
March 3, 2009
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Chapter 1 Purpose and Need

1.0 What Action is Proposed and Why?

1.1 Definitions

Dead Tree: A tree within the Project Area that was either blown down during the 2008 windstorms or a tree burned during the Doubleday Fire with more than 70 percent crown scorch (for Douglas-fir, ponderosa pine, sugar pine, and incense cedar) or more than 40 percent crown scorch (for white fir).

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 entire Doubleday Fire burn area - includes all land ownerships.

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 Environmental Assessment (EA) will analyze the impacts on the human environment of the proposed salvage of dead trees within the area burned by the 2008 Doubleday Fire. The EA will provide the Butte Falls Field Manager with current information to aid in the decision-making process. It will also assist the Field Manager in determining whether there are significant impacts beyond those already analyzed in the Final Environmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Management (2008 FEIS) and whether a supplement to that Environmental Impact Statement is needed, or if a Finding of No Additional Significant Impact is appropriate.

NOTE: The BLM began work on this project prior to the 2008 Medford District Record of Decision and Resource Management Plan (2008 ROD/RMP) and is consistent with management direction from the 1995 Medford District Resource Management Plan (1995 ROD/RMP). This project incorporates management direction from the 1995 ROD/RMP, which in almost all cases will “result in less change to the current condition of the affected environment than if the . . . projects were implemented consistent with the management direction” in the 2008 ROD/RMP (2008 ROD/RMP, 4). The 2008 ROD/RMP allows the BLM to use work already begun on the planning and analysis of projects if a decision on the project will be signed within two years of the effective date of the 2008 ROD. As a result, this document uses land use allocations and project design features contained in the 1995 RMP that may not be consistent with the management direction found in the 2008 ROD/RMP.

The Doubleday Fire Salvage EA meets the requirements designated in the 2008 ROD/RMP (p. 5-6) for such transition projects:

1. A decision was not signed prior to the effective date of the 2008 ROD.

2. Preparation of National Environmental Policy Act documentation for the Doubleday Fire Salvage project began prior to the effective date of the 2008 ROD when the BLM initiated external project scoping on December 16, 2008.
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3. A decision on the project will be signed within two years of the effective date of the 2008 ROD.
4. Regeneration harvest would not occur in areas allocated under the 2008 RMP as late-successional management areas or timber harvest in deferred timber management areas.¹
5. There would be no destruction or adverse modification of critical habitat designated for species listed as endangered or threatened under the Endangered Species Act.

Chapter 1 of the EA for the proposed Doubleday Fire Salvage project 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 action needs to accomplish, and identifies the criteria we will use for choosing the alternative that will best meet the purpose of and need for this project.

1.2.1 What Action is the BLM Proposing?

The Butte Falls Resource Area, Medford District Bureau of Land Management (BLM) proposes the following activities: salvage a portion of the dead or dying trees burned in the Doubleday Fire, complete road projects (e.g., road renovation, road improvement, road decommissioning, and temporary spur road construction) associated with the salvage activities, realign a steep section of road, and renovate a pump chance. Harvest is proposed in 2009 on up to 220 acres of land designated as matrix in the 1995 ROD/RMP and classified as general forest management area. No salvage is proposed in the 74 acres of riparian reserves or 102 acres of known northern spotted owl activity centers located within the fire perimeter.

Salvaged trees would be yarded using tractor and skyline yarding methods. Two snags per acre 20 inches in diameter at breast height (DBH) or greater would be left across the portions of the 220 acres proposed for salvage. In addition, a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long would be left per the 1995 ROD/RMP management direction (p. 39). On matrix lands designated as general forest management area, management direction is to “Leave a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long . . . . Where this management action/direction cannot be met with existing coarse woody debris, merchantable material will be used to make up the deficit.”

Approximately 1.5 miles of temporary operator spur access roads would be constructed and decommissioned in the same year. Road renovation for the salvage operation would occur on 14.0 miles of road. Road improvements would be made to 0.42 miles of BLM road #35-2E-23.6.

Road realignment would eliminate a steep section of BLM road #35-2E-23.6 by decommissioning 600 feet of road and constructing 900 feet of road in a more favorable location.

A pump chance in Township 35 South, Range 2 East, section 27 would be rebuilt to allow it to retain its original water storage volume.

1.2.2 Where is the Action Proposed to Occur?

The Project Area is 1 mile south of Butte Falls, Oregon in the Lower South Fork Big Butte Creek sixth field watershed (in the Big Butte Creek fifth field watershed) and the Salt Creek-Long Branch sixth

¹After a stand replacing event, deferred areas return to their underlying land use allocation of either Uneven-age Timber Management Area or Timber Management Area (2008 ROD/RMP, 38).
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field watershed (in the Little Butte Creek fifth field watershed) (see Map 1). The Project Area contains the entire 1,236 acres burned by the Doubleday Fire in September 2008. The fire burned across the following ownerships: 451 acres BLM and 785 acres private. BLM-administered land is intermixed with privately owned lands, creating a scattered ownership pattern. The BLM is proposing salvage harvest on 220 acres located within two sixth field watersheds (Figure 1-1). The Project Area contains BLM-administered and private lands located in Township 35 South, Range 2 East, sections 14, 15, 22, 23, 26, 27, and 34; Willamette Meridian; Jackson County, Oregon. Salvage projects are only proposed on BLM-administered lands in sections 23 and 27.

Figure 1-1. Comparison of amount of proposed salvage to acres in sixth field watersheds.

1.3 Why is the BLM proposing this Project?

1.3.1 Need for the Project

The Doubleday Fire burned across 451 acres of BLM-administered land, burning merchantable trees and other vegetation at various severity levels. Salvage of dead or dying trees on up to 220 acres of matrix lands would allow the Butte Falls Resource Area to retrieve some economic value from these trees while retaining sufficient levels of down wood and standing snags.
1.3.2 Purpose (Objectives) of the Project

In order to be considered a reasonable alternative, any action alternative must meet the objectives provided in the 1995 ROD/RMP for projects to be implemented in the Project Area. The 1995 ROD/RMP specifies the following objectives to be accomplished in managing the lands in the Project Area:

- Design an economically feasible salvage timber sale on BLM lands affected by the Doubleday Fire in the Butte Falls Resource Area. The proposed sales would produce revenue for the Federal government and contribute approximately 2.0 million board feet of timber toward the Medford District’s 2009 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 (1995 ROD/RMP, 179-180).

The 1995 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” (1995 ROD/RMP, 186).

The objective for salvage harvest on matrix lands is to recover the economic value of dead and dying trees and reestablish the forest stand for long-term forest production. Salvage harvest on matrix lands is not undertaken to enhance or accelerate the natural recovery of these areas; however, salvage harvest is designed to limit the impacts to the natural recovery processes while meeting the overall purpose of recovering the economic value of the dead trees. Land use allocations within the Doubleday Fire area, such as northern spotted owl activity centers and riparian reserves, that would not be salvaged will provide biological diversity through the natural recovery process.

- Reduce the potential for sediment production on up to 14 miles of road 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 1995 ROD/RMP specifies minimizing sediment delivery to streams from roads by surfacing inadequately surfaced roads (1995 ROD/RMP, 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 1.5 miles of temporary spur roads. The 1995 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 (1995 ROD/RMP, 28 and 157).

- Reduce soil compaction, minimize or reduce sedimentation, and improve site productivity by decommissioning temporary operator spur roads the same season as used. The 1995 ROD/RMP directs the BLM to “Rip temporary spur roads and landings by an approved method to remove ruts, berms, and ditches.”

- Apply rock to create a permanent hardened surface on a portion of BLM road #35-2E-23.6 that is susceptible to scour and erosion. Direction in the 1995 ROD/RMP is “To restore or improve a road to a desired standard in a manner that minimizes sediment production and water quality degradation” by surfacing inadequately surfaced roads (1995 ROD/RMP, 163).
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- Reroute a portion of BLM road #35-2E-23.6 to eliminate a steep (20 percent grade) section located in a through-cut. The road cannot drain properly and rutting and subsequent erosion is occurring on the road surface. The road would be rerouted to a stable location with a milder slope and surfaced. Direction in the 1995 ROD/RMP is “To minimize soil erosion, water quality degradation . . .” by locating roads on stable positions (1995 ROD/RMP, 157).

- Renovate an existing pump chance on a tributary to Salt Creek to provide at least 500 gallons of water for fire suppression. The earthen dam on the pump chance has been breached and the pump chance no longer holds water. Direction in the 1995 ROD/RMP is to improve existing fire suppression facilities by managing sites where water is pumped for fire suppression (1995 ROD/RMP, 90).

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

In choosing the alternative that best meets the purpose and need, we will consider the extent to which each alternative would

1. recover the economic value of dead timber,
2. provide timber resources and revenue to the government from the sale of those resources,
3. provide a sufficient level of down wood and standing snags;
4. reduce the short-term and long-term costs of managing the lands in the Project Area;
5. reduce erosion and subsequent sedimentation from roads;
6. protect the quantity and quality of water in the Ginger Springs Municipal Watershed; and
7. meet the need for adequate water sources in the Project Area for firefighting purposes.

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:

1.5.1 Medford District Record of Decision and Resource Management Plan (2008 ROD/RMP), December 2008

The 2008 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 2008 ROD/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.
1.5.2 Medford District Integrated Weed Management Plan, June 1998

*Medford District Integrated Weed Management Plan* 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 (handpulling, 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.

1.5.3 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.

- **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.

- **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.

- **Archaeological Resources Protection Act (ARPA) 1979** – Protects archaeological 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.

- **Clean Air Act (CAA) 1990** – Provides the principal framework for national, state, and local efforts to protect air quality.

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

1.6.1 Scoping

Scoping marks the beginning of the environmental analysis process. Scoping is a method for identifying the range of issues, management concerns, preliminary alternatives, and other components of a NEPA document. It involves internal and public viewpoints. The BLM initiated public scoping on December 16, 2008 by means of a letter mailed to 40 individuals, businesses, organizations, tribes, and government agencies. The letter requested public participation to identify any relevant issues related to the proposed projects. A notice was also published in the *Upper Rogue Independent* on December 16 and *Medford Mail Tribune* on December 17, 2008. In response, the BLM received four letters containing scoping comments.
The BLM responded to the scoping comments throughout the resource analyses in Chapter 3 and in Appendix A, section A.4, Scoping Comments and Responses - Forest Vegetation Recovery.

### 1.6.2 Relevant Issues

Based on input from the public and the project’s ID Team plus information contained in the 1995 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 formulate alternatives, identify appropriate design features, or analyze environmental effects. The following major issues were identified:

#### 1.6.2.1 Soil Erosion

Soil erosion is infrequent in undisturbed forests because the soil surface is protected by vegetation and organic matter. The loss of this surface cover from the Doubleday Fire may decrease the movement of water into the soil, increase the potential for overland flow of water, and increase the risk of erosion.

#### 1.6.2.2 Soil Productivity

Wildfire affects soil productivity by reducing the amount of organic matter on a site. Soil productivity in a given area may be influenced by the site characteristics (e.g., topography, parent material, revegetation, and climate), logging method, and road or skid trail construction.

#### 1.6.2.3 Sedimentation

The Doubleday Fire burned through riparian vegetation that typically functions to filter and trap sediment before it reaches the stream channel. Stream sedimentation may increase in the Project Area until riparian vegetation recovers.

#### 1.6.2.4 Water Quality in the Ginger Springs Municipal Watershed

The Ginger Springs Municipal Watershed provides water for the community of Butte Falls. A portion of the recharge area was burned during the Doubleday Fire. BLM-administered lands within the municipal watershed are designated as matrix lands which makes them available for timber harvest. BLM management activities within the municipal watershed should not contribute to water quality degradation.

#### 1.6.2.5 Insects

Fire-damaged trees are susceptible to an outbreak of insects, usually bark beetles and wood borers that attack trees in a weakened state after a fire. The Doubleday Fire occurred within a large area of insect buildup that resulted from the blow down of trees during a windstorm in January 2008. Physical damage from insects can kill trees, which can then provide fuel for the next wildfire.

#### 1.6.2.6 Economics

The 2008 Doubleday Fire killed and damaged a number of trees that could be salvaged. The Doubleday Fire 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 fire-killed trees before the decaying process causes the value to decline. The method used to harvest these trees affects the cost of salvage so an evaluation of the economic feasibility of the management actions is considered.

### 1.6.3 Issues Discussed but Considered not Relevant for Purposes of Analysis

During the issue identification process, the following issues were brought forward by the public. These issues were reviewed by the ID Team and were determined to be beyond the scope of this project or would be considered or discussed under one of the six relevant issues 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).

#### 1.6.3.2 Increased Fire Hazard

Scoping comments suggest salvage logging will increase fire hazard. This issue is specifically addressed as a proposed project and in the project design features. Impacts to fire hazard are included in the analysis of Fire and Fuels in section 3.8 of this EA.

#### 1.6.3.3 Cumulative Effects

Section 3.0 Affected Environment/Environmental Consequences addresses cumulative effects by resource. The EA discloses the effects of past, current, and future actions on BLM and private lands.

### 1.7 Decisions to be Made

The following decisions will be made as a result of this Environmental Assessment:

- To determine if a Finding of No Additional Significant Impacts is appropriate, or should a Supplemental Environmental Impact (SEIS) be prepared. If the proposed action results in a finding of significant impacts to the human environment beyond those analyzed in the EIS for the Medford District RMP decision, we will determine if the project proposal could be modified to mitigate the impacts so an SEIS would not be necessary.
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- To salvage dead and dying trees burned in the Doubleday Fire on BLM-administered lands allocated to programmed timber harvest, at what level, where, and how.

2.0 Alternatives

2.1 Definitions

**Burn severity:** The degree of environmental change caused by fire, or the result, is the cumulative effect of fire on ecological communities comprising the landscape; the physical and chemical changes to the soil, conversion of vegetation and fuels to inorganic carbon, and structural transformations that bring new microclimates and species assemblages. An analogy to burn severity would be storm severity, which refers to the damage or outcome left in the wake of the storm (FIREMÓN Landscape Assessment Sampling Methods). Burn severity for the Doubleday Fire was rated as low, moderate, and high.

**Low burn severity** – Litter is charred to partially consumed; upper duff layer may be charred but the duff is not altered over the entire depth; surface appears black; soil is not visibly altered; woody debris is partially burned; logs are scorched or blackened but not charred; foliage and smaller twigs are partially to completely consumed; branches are mostly intact.

**Moderate burn severity** – Litter is mostly to entirely consumed, leaving coarse, light-colored ash (ash soon disappears leaving mineral soil); duff is deeply charred, but not visibly altered; woody debris is mostly consumed; logs are deeply charred and burned out stump holes are evident; foliage twigs and small stems are consumed; some branches are still present.
**High burn severity** – Litter and duff are completely consumed, leaving fine white ash (ash disappears leaving mineral soil); mineral soil is charred and/or visibly altered, often reddish; sound logs are deeply charred and rotten logs are completely consumed; all plant parts are consumed, leaving some or no major stems or trunks, any left are deeply charred.

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

**Road improvement:** Work done to a road to improve the original design. Surfacing a natural road subgrade would increase the road standard by converting to a hard surface road.

**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.

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

**Temporary spur roads:** Roads constructed, used to access salvage units, then decommissioned. These roads are decommissioned by scarifying, seeding with native seeds, mulching, and blocking.

### 2.2 Introduction

Chapter 2 provides a description of the proposed project. The alternative ways for meeting the need for this project and the objectives identified in Chapter 1 are presented. Project Design Features that serve as the basis for resource protection during project implementation are included.

One action alternative was developed to respond to the issues identified in Chapter 1. A No Action Alternative is included to provide a baseline for comparison.

### 2.3 Proposed Projects

#### 2.3.1 Salvage

The BLM is considering salvage harvest on up to 220 acres within the Medford District that were affected by the Doubleday Fire in September 2008. Salvage would focus on matrix lands within the fire perimeter. Only trees considered dead or dying would be salvaged. For purposes of this EA, a dying tree is defined as a Douglas-fir, ponderosa pine, sugar pine, or incense cedar tree with more than 70 percent crown scorch, or a white fir with more than 40 percent crown scorch.
Only lands designated as matrix in the 1995 Medford District ROD/RMP would be considered for fire salvage. Matrix lands are Federal lands outside of reserves and special management areas in which most timber harvest and silvicultural activities will be conducted. Tractor and skyline yarding methods would be considered for removing the salvage trees.

### 2.3.1.1 Road Work Associated with Salvage

**Temporary spur road construction** would allow operators temporary access to salvage units. These 10 temporary roads totaling 1.5 miles would be constructed on or near ridge tops.

**Full decommissioning** would occur on temporary spur roads after harvest is completed and in the same season as used. Roads would be ripped, seeded with native grasses or others as appropriate, mulched, and planted to reestablish vegetation. Cross drain culverts, road fills in stream channels, and potentially unstable fill areas would be removed to restore the natural hydrologic flow. Roads would be closed with a device similar to an earthen barrier or equivalent. Roads would not be maintained in the future.

**Road improvement** would increase the road standard on 0.42 miles of BLM road #35-2E-23.6 by applying rock to convert a natural road subgrade to a hard-surfaced road.

**Road renovation** would occur on about 14 miles of road before roads are used for salvage activities. Road surfaces would be bladed and ditches 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.

**Road realignment** would reroute a portion of BLM road 35-2E-23.6. A 600-foot section of this road with a steep, 20 percent grade would be eliminated by fully decommissioning the 600 feet of road and constructing 900 feet of road with a 12 percent grade. The new construction would be surfaced with rock. The new construction would be routed through an old progeny test site containing dense trees 8 to 10 inches in diameter at breast height (DBH). Trees would be cut where needed and whole tree yarded.

### 2.3.1.2 Fuels Treatment associated with Salvage Harvest

Slash deposited from salvage harvest activities would be reduced by using one or more of the following fuels treatments: hand piling, excavator piling, pile burning, or lopping and scattering. Fuels treatment units would coincide with salvage units and fuels treatments would depend on the amount of slash created. The BLM would evaluate all salvage units following salvage to insure the slash fuels treatments are appropriate for the amount of slash deposited within the salvage unit.

**Lop and scatter** would be used when the post-harvest fuel load of live and dead material 9 inches or less in diameter is less than 15 tons per acre. All stems and branches would be cut from the central stem and scattered until the slash is less than 18 inches deep. Central stems 7 inches and less in diameter would be cut to 3-foot lengths and left on the ground.

**Hand piling and hand pile burning** would occur when residual slash fuel loads of live and dead material 9 inches in diameter is greater than 15 tons per acre. If hand piled, all material between 1 inch
and 7 inches in diameter and greater than 2 feet in length would be hand piled. Minimum hand pile size would be 4 feet high and 6 feet in diameter. The number of piles per acre would range from 45 to 70. Each pile would be covered by a 6-foot by 6-foot piece of polyurethane plastic. Hand piles would cure for at least 6 months before burning. Once cured, piles would be burned from fall through spring after one or more inches of precipitation has fallen. Burning piles would be patrolled and mopped up when needed.

**Excavator piling** would occur only in tractor yarding areas with less than 20 percent slopes and slash levels greater than 15 tons per acre. The excavator would operate from skid trails predesignated for salvage harvest. The excavator would be required to reach out at least 25 feet from the skid trail with a grapple to pick up slash.

### 2.3.1.3 Yarding Systems for Salvage Harvest

**Tractor yarding** uses tractors to drag trees to landing locations. For this project, tractor yarding would only occur on lands with less than 20 percent slope. This yarding method requires narrow skid trails (about 9 to 12 feet wide). Skid trails would be located approximately 150 feet apart but locations could vary depending on site-specific terrain. Existing skid trails would be used to the extent practical. Skid trails would be prelocated and approved by the BLM sale administrator.

**Skyline yarding** uses a stationary machine, or yarder, to pull the logs to the landing or road by means of steel cables. At least one end of the log would be suspended during yarding to minimize the plowing effect of dragging the log.

### 2.3.2 Pump Chance Renovation

An existing pump chance located on a tributary to Salt Creek would be redesigned in order to restore its original water holding capacity of 0.21 acre-feet. The pump chance is located along BLM road #35S-3E-34 in section 27, Township 35 South, Range 2 East. The earthen dam for the pump chance has been breached and the pump chance no longer holds water. Redesign would involve partially rebuilding the earthen dam, buttressing the dam, replacing 18-inch culverts with 24-inch culverts, rechanneling the stream at the pump chance inlet, and stabilizing the disturbed soils at the site.

*A pump chance would be redesigned to restore its water holding capacity.*
2.4 Description of the Alternatives

2.4.1 Alternative 1 – No Action

The No Action Alternative describes the baseline against which the effects of the proposed actions will be evaluated, the existing conditions in the Project Area, and the continuing trends.

2.4.2 Alternative 2 – Proposed Action
(see Map 2)

In Alternative 2, salvage would be considered on up to 220 acres of matrix land burned at moderate to high severity; tractor yarding would occur on 107 acres and skyline yarding on 112 acres. Dead trees and Douglas-fir, ponderosa pine, sugar pine, and incense cedar trees with more than 70 percent crown scorch and white fir with more than 40 percent crown scorch would be considered for salvage harvest. Overstory fire-killed trees would be retained at an average rate of 2 snags per acre 20” DBH or greater within salvage units. A minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long would be retained on-site.

All trees (green and dead) and all coarse woody debris would be left on the remaining 232 acres of BLM-administered land burned in the Doubleday Fire.

Salvage operations would require construction of 10 temporary spur roads, totaling approximately 1.5 miles. The temporary roads would be located near ridge tops on the flat upland area within the fire perimeter. The temporary roads would be fully decommissioned the same season as used.

Before roads are used for salvage activities, road renovation on about 14 miles of road would occur to restore the original road design. Road improvements to 0.42 miles of road would improve the original road design.

Under Alternative 2, a 600-foot segment of steep (20 percent grade) road would be decommissioned and a 900-foot segment of permanent road would be constructed at a 12 percent grade to replace it.

Slash deposited by salvage activities would be lopped and scattered in units with fuel loads less than 15 tons per acre, hand piled and burned in units with fuel loads more than 15 tons per acre, and excavator piled and burned in units with fuel loads more than 15 tons per acre on slopes less than 20 percent that are tractor yarded. The BLM Fire and Fuels Specialist would evaluate all salvage units after harvest to determine the appropriate slash treatment based on the amount of slash deposited.

A breached earthen dam on an existing pump chance would be rebuilt and buttressed to restore the original pump chance storage volume of 0.21 acre-feet. The stream would be rechanneled to allow water to flow into the pump chance again. One or two 18-inch culverts would be replaced with 24-inch culverts. Stabilize the disturbed soils.
2.4.3 Alternatives Considered but Eliminated from Detailed Analysis

During development of this EA, the ID Team considered an alternative using Best Management Practices for tractor yarding from 1995 ROD/RMP. This alternative would have restricted tractor operations to slopes less than 35 percent. Using the 35 percent slope restriction in this alternative would have allowed 188 acres of tractor yarding and 31 acres of skyline yarding. Salvage harvest under this alternative would have required approximately 1.0 miles of temporary spur road construction.

Due to public concerns addressed in previous fire salvage proposals and scoping comments regarding issues relating to impacts of fire and salvage logging on soils, the ID Team eliminated this alternative.

2.5 Project Design Features

The following Project Design Features are included in the design of the projects in Alternative 2. These Project Design Features are a compilation of Best Management Practices identified in the Medford District ROD/RMP and resource protection measures identified by the Interdisciplinary Team. The Project Design Features would serve as a basis for resource protection in the implementation of the projects. They will be considered in the analysis of the impacts of the projects in Chapter 3.

1. Minimize the total number of skid trails by designating skid trails with an average spacing of 150 feet. Avoid creating new skid trails and use existing trails, where feasible, in order to lessen ground disturbance. Design skid trails to minimize disturbance.

2. Locate skid trails to minimize disturbance to coarse woody debris. Where skid roads encounter large coarse woody debris, a section of the coarse woody debris will be bucked out for equipment access. The remainder of the coarse woody debris will be left in place and will not be disturbed.

3. Restrict tractor and mechanical operations to slopes generally less than 20 percent.

4. Rip and water bar all skid trails during the same operating season as constructed in areas where no future access or entry is needed.

5. Apply native seed and weed-free mulch to those portions of skid trails within 50 feet of intersections with system roads and landings.

6. Limit all tractor yarding, soil ripping, and excavator piling operations to the dry season, generally from May 15 to October 15, or when soil moisture is less than 25 percent.

7. Rip areas identified for ripping (skid trails, landings, temporary spur roads) to a depth of 18 inches using a sub-soiler or winged-toothed ripper.

8. Require one-end log suspension for skyline yarding.

9. Limit all road construction, maintenance, and decommissioning work to the dry season, generally from May 15 to October 15, or when soil moisture is less than 25 percent.

10. 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.
11. 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).

12. Decommission temporary roads constructed for harvest operations and apply weed-free mulch and native grass seed within the same operating season as constructed.

13. Refuel equipment outside of riparian reserves and locate fueling areas so accidental spills would be contained and would not drain in the stream system.

14. Restrict the construction of new roads or skid trails to areas outside riparian reserves.

15. Store all hazardous materials and petroleum products in durable containers located outside riparian reserves and located so accidental spills would be contained and would not drain into the stream system.

16. Require a Spill Prevention, Control, and Countermeasure Plan prior to operation. Plan will include but not be limited to the hazardous substances to be used in the Project Area and identification of the Purchaser’s representatives responsible for supervising initial containment action for releases and subsequent cleanup.

17. Follow all applicable State of Oregon Department of Environmental Quality guidelines for spill prevention and containment of petroleum products (Oregon Administrative Rules, Chapter 340, Department of Environmental Quality, Division 142, Oil and Hazardous Materials Emergency Response Requirements).

18. Leave at least 2 snags per acre 20 inches in diameter at breast height or larger to support species of cavity nesting birds.

19. Meet coarse down woody debris requirements in units that currently do not meet the coarse woody debris guidelines of 120 linear feet of down logs per acre greater than or equal to 16 inches in diameter and 16 feet long.

20. Restrict activities from March 1 to June 30 within 0.25 miles of known northern spotted owl nests. If it is determined the owls are not nesting within 0.25 miles of a salvage unit, the restriction could be waived.

21. Restrict activities from March 1 through July 30 within 0.25 miles of northern goshawk nests. If a new goshawk nest is discovered in a salvage harvest unit following the sale date, activities would be halted until mitigation options could be determined.

22. 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 damaged conifers or hardwoods 8 inch DBH or less, lop and scatter, hand pile and burn, or excavator pile and burn.

23. Locate hand piles outside of ditch lines, cut banks above roads, or road corridors.

24. Burn hand piles within 1 year of the completion of hand piling.

25. Provide an approved prescribed fire plan that complies with Prescribed Fire Handbook H-9214-1 prior to the ignition of all prescribed burns.

26. Conduct all prescribed burning in compliance with Oregon Department of Forestry’s Smoke Management Plan.
27. Clean 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. Cleaning is 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.

28. Only logging and construction equipment visually inspected by a qualified BLM specialist to verify 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.

29. Stop work and notify the BLM within 12 hours if an archaeological site is discovered during the project.

30. Apply mitigating measures to areas containing known archaeological sites. Buffers will be determined based on proposed treatment, site-specific environmental conditions, and protection recommendations.

31. Require the use of chemical toilets at all project sites located within the Ginger Springs Municipal Watershed.

32. Use approved absorbent materials under stationary equipment within the Moderate Zone of the Ginger Springs Municipal Watershed.

33. Store fuel or oil products exceeding 200 gallons outside the Ginger Springs Municipal Watershed. Store fuel outside the watershed during nonworking hours.

34. Use a dust abatement that contains no asphalt or solvents in the Ginger Springs Municipal Watershed.

35. In high burn severity areas where fuel loading are expected to be low, lop and scatter logging slash to effectively cover bare soil areas to protect soil surface and aid in nutrient recycling.

36. Protect Special Status vascular plant, lichen, bryophyte, and fungi sites using no entry buffers if plant sites are discovered during the project. Buffers will be determined based on species, proposed treatment, site-specific environmental conditions, and available management recommendations.
<table>
<thead>
<tr>
<th>Element</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>The Project Area is not located within a Class I designated airshed or Smoke Sensitive Receptor Area. Pile burning is not expected to affect visibility within Crater Lake National Park and other smoke sensitive Class I areas (Kalmiopsis and Rogue wildernesses). Impacts to air quality would be localized and of short duration because hand pile burning and landing pile burning would be completed in accordance with the Oregon State Implementation Plan, Oregon Smoke Management Plan, and Visibility Improvement Plan. The Project Area is 20 miles or more from the cities of Grants Pass and Medford/Ashland nonattainment areas and burning activities would have no effect on those areas. Pile burning would occur during unstable atmospheric conditions primarily from October to January to avoid periods of air stagnation.</td>
</tr>
<tr>
<td>Area of Critical Environmental Concern</td>
<td>No effect on an Area of Critical Environmental Concern. The Poverty Flat ACEC, in T34S, R2E, section 31, is located approximately 5 miles from the nearest salvage unit. Logs may be hauled on the Butte Falls Highway which passes the northern boundary of the ACEC. This highway is a well-used, paved road. The salvage project, by design, does not enter any ACEC.</td>
</tr>
<tr>
<td>Cultural Resources</td>
<td>The BLM completed a cultural survey following Oregon BLM/State Historic Preservation Office protocol (Cultural Project Number OR110-09-29). The Medford District Archaeologist assessed the project as “No Effect Determination, no significant resources and/or resources avoided.” The following PDFs were included in the EA to help avoid impacts to cultural resources: Apply mitigating measures to areas containing known archaeological sites. The BLM will determine buffers 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.</td>
</tr>
<tr>
<td>Environmental Justice</td>
<td>The Doubleday Fire Salvage project is not expected to have substantial effects on minority or low income populations. Small or minority-owned businesses would have the opportunity to compete for some of the work. For example, timber companies salvaging blown down trees from BLM-administered land in the project vicinity are subcontracting road work and harvest activities to small businesses in the communities of Butte Falls and Eagle Point.</td>
</tr>
<tr>
<td>Farm Lands (prime or unique)</td>
<td>No farm lands will be affected. Salvage would occur on BLM-administered forest lands.</td>
</tr>
<tr>
<td>Floodplains</td>
<td>Salvage harvest and associated road construction would not take place in 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. The proposed action is consistent with Executive Order 11988, Floodplain Management.</td>
</tr>
</tbody>
</table>

Table 2-1. Effects on Critical Elements of the Human Environment
Table 2-1. Effects on Critical Elements of the Human Environment

<table>
<thead>
<tr>
<th>Element</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive, Nonnative species</td>
<td>Prior to the Doubleday Fire, no noxious weed populations were known within the Project Area. However, fire suppression activities may have introduced noxious weeds. The BLM will monitor and treat weed populations for 3 years after the fire. 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 many factors, including the presence of source seed or plant parts, as well as random acts that may introduce invasive, nonnative plant species into uninfested areas. Activities proposed in this project that could contribute to the introduction or spread of noxious weeds include tractor harvest, road and landing construction and decommissioning, use of existing landings, post-treatment slash pile burning, and movement of vehicles off system roads. To minimize the potential for introducing invasive, nonnative species into the Project Area, the BLM will implement PDFs and additional actions. The use of these preventative and monitoring strategies (recommended weed prevention strategies) will reduce the risk of introducing or spreading noxious weeds in the Project Area.</td>
</tr>
<tr>
<td>Native American Religious Concerns</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Table 2-1. Effects on Critical Elements of the Human Environment

<table>
<thead>
<tr>
<th>Element</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threatened or Endangered Species</td>
<td><strong>T&amp;E Plant Species:</strong> The Project Area does not contain suitable habitat for T&amp;E plants and no T&amp;E plants were discovered during botany surveys. The proposed salvage project would have “No Affect” on T&amp;E plant species.</td>
</tr>
<tr>
<td></td>
<td><strong>T&amp;E Fish Species:</strong> The Project Area does not contain Southern Oregon/Northern California (SO/NC) coho salmon or coho critical habitat. The proposed salvage project would have “No Affect” on SO/NC coho salmon or coho critical habitat because implementation of PDFs would limit soil movement and disturbance and salvage would occur at least 1.5 miles from coho critical habitat.</td>
</tr>
<tr>
<td></td>
<td><strong>T&amp;E Wildlife Species:</strong> The Project Area is outside of the ranges of the vernal pool fairy shrimp or marbled murrelets. Bald eagles and peregrine falcons have not been found within the Project Area and the area does not contain the required components for nesting for these raptors. Northern spotted owl may be associated with the suitable habitat found in the Project Area. The proposed salvage project would have “No Affect” on northern spotted owls because northern spotted owls would continue to use available nesting, roosting, foraging, and dispersal habitat after implementation just as they did before; canopy cover would be maintained at 60 percent or greater in nesting, roosting, and foraging habitat (these stands would not be entered); canopy cover would be maintained at 40 percent or greater in dispersal habitat (no live trees would be removed); decaying woody material would remain after salvage; all multi-canopy, uneven-aged tree structure would remain after salvage; no spotted owl nest trees would be removed; and activities would be seasonally restricted within 0.25 miles of nest trees.</td>
</tr>
<tr>
<td>Wastes, Hazardous or Solid</td>
<td>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. During project implementation, applicable State of Oregon Department of Environmental quality guidelines for spill prevention and containment of petroleum products would be followed (Oregon Administrative Rules, Chapter 340, Department of Environmental Quality, Division 142, Oil and Hazardous Materials Emergency Response Requirements).</td>
</tr>
</tbody>
</table>
### Table 2-1. Effects on Critical Elements of the Human Environment

<table>
<thead>
<tr>
<th>Element</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality</td>
<td>The Oregon Department of Environmental Quality has listed 3 streams as water quality limited in the two sixth field watersheds containing the Project Area. Salt Creek, in the Salt Creek-Long Branch sixth field watershed, is water quality limited for <em>E. coli</em>. Doubleday Creek and Hukill Creek, in the Lower South Fork Big Butte Creek sixth field watershed, are water quality limited for stream temperature. No proposed salvage units are located adjacent to these streams. Riparian reserves would not be salvaged so present shade levels will be maintained. In addition, Salt Creek is located outside of the Project Area. The project would not alter water quality and the State of Oregon water quality standards would not be exceeded. The Project Area contains a portion of the Ginger Springs Municipal Watershed, a water source for the community of Butte Falls. Activities that could affect water quality, such as tractor yarding and road building, would mainly occur in the portion of the watershed considered a low zone of influence so municipal water quality would remain at current conditions. Skyline and tractor yarding would occur on 10 acres within the moderate zone of influence, which mostly follows stream channels. Riparian reserves would protect those stream channels and municipal water quality would remain at current conditions. No salvage activities are proposed within the high zone of influence.</td>
</tr>
<tr>
<td>Wetlands/Riparian Zones</td>
<td>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.</td>
</tr>
<tr>
<td>Wild and Scenic Rivers</td>
<td>The Doubleday Fire Salvage project would have no effect on Wild and Scenic Rivers because the project does not contain any segment of a wild and scenic river.</td>
</tr>
<tr>
<td>Wilderness</td>
<td>No designated wilderness areas are located in or near the Project Area.</td>
</tr>
</tbody>
</table>
Chapter 3 Affected Environment/Environmental Consequences

3.0 Affected Environment/Environmental Consequences

3.1 Definitions

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

**Site-potential Tree:** Trees that have attained the average maximum height possible given site conditions where they occur (USDA and USDI 1994a, Glossary-16).

3.2 Introduction

Chapter 3 describes the current condition of the environment within the Doubleday Fire Salvage area. Past activities have contributed to the conditions currently existing in the Project Area and are reflected in the description of the current conditions. The information in this chapter forms the baseline for determining the effects of the proposed action. This chapter is organized by the resources most relevant to the issues identified in Chapter 1. For each resource, the prefire and postfire environments are described. After each resource’s affected environment description, the impact of each alternative is analyzed under the same resource heading.

3.2.1 Land Use Allocations and Restrictions

As noted in Section 1.2 of this EA, the 2008 ROD/RMP allows the BLM to use work already begun on the planning and analysis of projects if a decision on the project will be signed within two years of the effective date of the 2008 ROD. The action alternative in this EA includes elements consistent with the management direction in the 1995 RMP. Much of the analysis and drafting of this EA was completed or in process at the time the 2008 ROD was signed. Therefore, this document uses 1995 RMP terms such as “matrix” and “riparian reserve” land use allocations rather than the 2008 ROD/RMP terms such as “Timber Management Areas” and “Riparian Management Areas.” This allows the BLM to use reports and analysis previously prepared by BLM resource specialists rather than modifying the proposed action and performing a redundant analysis using 2008 ROD/RMP language, terms, and management direction. These specialist reports remain relevant because, projects consistent with the 1995 RMP in almost all cases will “result in less change to the current condition of the affected environment than if the . . . projects were implemented consistent with the management direction” in the 2008 ROD/RMP (2008 ROD/RMP, 4).

The 1995 Medford District ROD/RMP designates land use allocations that relate to the major land use allocation categories derived from the Northwest Forest Plan (NWFP): Designated Areas and Matrix. Designated areas are riparian reserves, late-successional reserves (including known northern spotted owl activity centers), adaptive management areas, managed late-successional areas, congressionally reserved areas, and administratively withdrawn areas. Forest areas outside designated reserves 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, 38). All of the 220 acres are designated matrix under the 1995 RMP. The proposed pump chance redesign would occur in riparian reserve.

Under the 2008 ROD/RMP, the BLM-administered lands proposed for salvage activities within the Doubleday Fire salvage Project Area are designated as Timber Management Area (TMA) and Deferred Timber Management Area (DTMA). Of the 220 acres proposed for salvage, 168 acres are TMA and 52 acres are DTMA. Under the 2008 ROD/RMP, deferred areas return to their underlying land use allocation of either Uneven-age Timber Management Area or Timber Management Area after a stand-replacing event (2008 ROD/RMP, p. 38). The Doubleday Fire returned the 52 acres of DTMA to TMA. The proposed pump chance redesign would occur in Riparian Management Area (RMA).

3.2.1.1 Matrix
Salvage is proposed on land designated as matrix. Matrix objectives identified in the 1995 Medford District ROD/RMP 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 maintenance of ecologically valuable structural components such as down logs, snags, and large trees; and provide early-successional habitat” (USDI 1995a, 39). In the Project Area, 277 acres (62 percent) of BLM-administered lands are designated as matrix.

3.2.1.2 100-acre Northern Spotted Owl Activity Center
Late-successional reserves were designated in the 1995 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 and USDI 1994a, C-9). The Doubleday Fire Salvage Project Area contains of the five components of the late-successional reserve system—known northern spotted owl activity centers. Known spotted owl activity centers are defined as “one hundred acres of 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 one 100-acre known northern spotted owl activity center (22 percent of the BLM land in the Project Area), but no management activities are proposed in it.

3.2.1.3 Riparian Reserves
Riparian reserves were designated under the 1995 Medford District ROD/RMP and the NWFP 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 and 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 reserves occur across all land use allocations and may overlap other designations.

The riparian reserve width varies based on the fifth field watershed, type of stream, and site-potential tree length for that watershed. Riparian reserve widths in the Big Butte Creek fifth field watershed are
190 feet for non-fish-bearing streams and 380 feet for fish-bearing streams. Riparian reserve widths in the Little Butte Creek fifth field watershed are 165 feet for non-fish-bearing streams and 330 feet for fish-bearing streams. In the Project Area, 74 acres (16 percent) of BLM-administered lands are allocated to riparian reserves. No salvage activities are proposed in riparian reserves.

3.2.1.4 Ginger Springs Municipal Watershed

The Ginger Springs Municipal Watershed is a geologically derived watershed that supplies water for the community of Butte Falls. The 1995 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. Approximately 1,100 acres of BLM and private lands in the 3,500-acre municipal watershed were burned in the Doubleday Fire.

3.2.2 Other Actions in the Watersheds containing the Project Area

The lightning-caused Doubleday Fire began on September 17, 2008 and was contained on September 21 after burning 1,236 acres. The fire burned 900 acres on the first day due to strong afternoon winds; the majority of the high burn severity occurred the first day. The fire burned through conifer forest with a mix of stands in varying age classes. Slopes in the fire area range from less than 10 percent to 60 percent; however, much of the fire area contains less than 40 percent slope. During fire suppression, 600 feet of fire lines were constructed by hand and 10 miles of fire lines were constructed using bulldozers. The BLM identified the following primary rehabilitation needs for the fire suppression activities: erosion control, preventing the establishment of noxious weeds, and restoring road closures. Erosion control included water barring fire lines, seeding and mulching designated areas, clearing road ditch lines, restoring drainage channels in dry streams or areas with seasonal water flow, and spreading berm materials from bulldozer lines back into the fire line.

After the fire suppression was completed, the BLM prepared an Emergency Stabilization Plan “to stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of a fire” (USDI 2008). The Emergency Stabilization Plan identified noxious weeds as a critical concern related to the fire. The strategy for treating the noxious weeds in the fire area includes inventorying staging areas, bulldozer lines, and the fire interior in the summers of the first year after the fire. When noxious weeds are detected, the BLM will treat with herbicides or by hand-pulling.

The BLM also prepared a Burned Area Rehabilitation Plan (2008) to address long-term postfire impacts. Under this plan, the BLM would continue to treat noxious weeds in the fire area by conducting inventories and treating weeds in the summers of the second and third years after the fire. In addition, the BLM would plant trees to reestablish burned habitat, reestablish native tree species, and prevent establishment of invasive plants. Under the Rehabilitation Plan, 340 acres would be considered for planting of native conifer species. These areas burned hot enough to kill most of the trees, leaving a sparse natural seed source. Areas that burned with a low vegetative mortality and contain good natural seed source will not be planted. Replanting in the Doubleday Fire area would occur in fiscal years 2009 and 2010, or after salvage is completed.
The Doubleday Fire Salvage Project Area covers 935 acres within the 158,210-acre Big Butte Creek fifth field watershed and 305 acres within the 238,598-acre Little Butte Creek fifth field watershed. Proposed salvage is focused on portions of the 16,200-acre Lower South Fork Big Butte Creek sixth field subwatershed (in the Big Butte Creek fifth field watershed) and the 14,270-acre Salt Creek-Long Branch sixth field subwatershed (in the Little Butte Creek fifth field watershed).

Land ownership in the Lower South Fork Big Butte Creek and Salt Creek-Long Branch sixth field watersheds is a mix of public and private lands (see Table 3-1). “Private lands are predominately located in the lower elevations, Bureau of Land Management lands occupy a ‘checkerboard’ pattern in the middle elevations, and the Forest Service lands are mostly a contiguous block in the higher elevations” (USDA and USDI 1997, 16).

<table>
<thead>
<tr>
<th>Owner</th>
<th>Acres</th>
<th>Percent of Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower South Fork Big Butte Creek</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bureau of Land Management</td>
<td>4,058</td>
<td>25</td>
</tr>
<tr>
<td>US Forest Service</td>
<td>447</td>
<td>3</td>
</tr>
<tr>
<td>Private</td>
<td>11,688</td>
<td>72</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16,193</td>
<td>100</td>
</tr>
<tr>
<td><strong>Salt Creek-Long Branch</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bureau of Land Management</td>
<td>4,928</td>
<td>35</td>
</tr>
<tr>
<td>Private</td>
<td>9,341</td>
<td>65</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14,269</td>
<td>100</td>
</tr>
</tbody>
</table>

3.2.2.1 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 and USDI 1994a, 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 the NWFP. Under the 1995 ROD/RMP and the NWFP, direction for timber management includes regeneration harvest, commercial thinning, density management, and selection harvest. Since implementation of the 1995 ROD/RMP, timber harvest in these two fifth field watersheds has included approximately 8,200 acres of harvest on BLM-administered lands (Table 3-2). 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 1995 ROD/RMP.

### Table 3-2. Completed Projects within the Two 5th Field Watersheds containing the Project Area

<table>
<thead>
<tr>
<th>Project Name</th>
<th>5th Field Watershed</th>
<th>Year Completed</th>
<th>Yarding System</th>
<th>Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Dudley</td>
<td>Big Butte Creek</td>
<td>1998</td>
<td>15 45 0</td>
<td>60</td>
</tr>
<tr>
<td>Tokyo Ginger</td>
<td>Big Butte Creek</td>
<td>1998</td>
<td>330 14 0</td>
<td>344</td>
</tr>
<tr>
<td>Rancheria</td>
<td>Big Butte Creek</td>
<td>1999</td>
<td>950 0 0</td>
<td>950</td>
</tr>
<tr>
<td>Fred-N-Jack</td>
<td>Big Butte Creek</td>
<td>2000</td>
<td>1,116 273 0</td>
<td>1,389</td>
</tr>
<tr>
<td>Ginger Springs</td>
<td>Big Butte Creek</td>
<td>2003</td>
<td>91 36 86</td>
<td>213</td>
</tr>
<tr>
<td>Lower Big Butte</td>
<td>Big Butte Creek</td>
<td>2003</td>
<td>50 0 0</td>
<td>50</td>
</tr>
<tr>
<td>Titanic</td>
<td>Big Butte Creek</td>
<td>2006</td>
<td>351 10 425</td>
<td>786</td>
</tr>
<tr>
<td>Double Salt</td>
<td>Little Butte Creek</td>
<td>2004</td>
<td>322 42 145</td>
<td>509</td>
</tr>
<tr>
<td>Wasson Fire Salvage</td>
<td>Little Butte Creek</td>
<td>2006</td>
<td>1 41 0</td>
<td>42</td>
</tr>
<tr>
<td>Bieber Wasson</td>
<td>Little Butte Creek</td>
<td>2007</td>
<td>571 155 162</td>
<td>888</td>
</tr>
<tr>
<td>Ground Round</td>
<td>Big Butte Creek</td>
<td>1997</td>
<td>638 60 0</td>
<td>698</td>
</tr>
<tr>
<td>Bowen Over</td>
<td>Big Butte Creek</td>
<td>2008</td>
<td>165 0 0</td>
<td>165</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>4,922</strong></td>
<td><strong>676</strong></td>
<td><strong>818</strong></td>
<td><strong>6,416</strong></td>
</tr>
</tbody>
</table>

Camp Stew is a completed stewardship project within the Big Butte Creek fifth field watershed. This project included spring development, fence removal, stock tank removal, stream channel restoration, pine plantation pruning, thinning, planting root rot resistant tree species within a root rot infected area, chipping unmerchantable thinned material, and road decommissioning. This work was all completed between 2005 and 2008.

### 3.2.2.2 Current Actions

The Forest Service is currently implementing the Big Butte Springs Timber Sale located in the Big Butte Creek and Little Butte Creek fifth field watersheds. This timber sale is located east of the Doubleday Fire Salvage Project Area. The Big Butte Springs Timber Sale includes 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.

In January 2008, a series of winter storms brought strong winds and heavy snow to southern Oregon. These windstorms resulted in uprooted trees throughout the area. Across the Butte Falls and Ashland Resource Areas, stands of trees were blown down and residual standing trees were damaged. The Butte Falls Resource Area completed Categorical Exclusion Reviews for six small salvage projects located in
the two fifth field watersheds containing the Project Area. The *Butte Falls Blowdown Salvage EA* (2008) was completed which assessed the salvaging of trees blown down or damaged by these windstorms. Timber sales resulting from this EA will salvage areas located within Big Butte Creek and Little Butte Creek fifth field watersheds. Five salvage timber sales have been sold within these watersheds as a result of this EA. The area within the Doubleday Fire had been included in the Blowdown Salvage EA, but after the fire it was removed from consideration so the BLM could assess the impacts of the fire. In addition, the Ashland Resource Area completed two Categorical Exclusion Reviews for salvage projects within the Little Butte Creek fifth field watershed (Table 3-3).

The Ashland Resource Area completed an EA that analyzed the Windy Soda Salvage project. The project proposed salvage on 226 acres of matrix land located in the Little Butte Creek fifth field watershed. Salvage harvest systems include tractor (210 acres) and cable (16 acres) yarding. No salvage occurred in late-successional or riparian reserves.

<table>
<thead>
<tr>
<th>Project Name</th>
<th>5th Field Watershed</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Links Blowdown Removal CE #OR115-08-09</td>
<td>Big Butte Creek</td>
<td>Removal of 10 blown down trees that fell onto an adjacent landowner’s fence.</td>
</tr>
<tr>
<td>Blowdown Road Salvage CE #OR115-08-12</td>
<td>Big Butte Creek Little Butte Creek</td>
<td>Removal of trees blocking BLM system roads and hazardous trees that could fall onto BLM roads in the Butte Falls Resource Area. The decisions on this EA resulted in two salvage timber sales: A Minus Road Salvage and Big Butte Road Salvage.</td>
</tr>
<tr>
<td>Butte Falls/Prospect Highway Blowdown Salvage CE #OR115-08-14</td>
<td>Big Butte Creek</td>
<td>Removal of approximately 40 blown down and hazard trees on 1.5 acres of BLM land adjacent to the Butte Falls/Prospect Highway.</td>
</tr>
<tr>
<td>T36S, R2E, Section 2 Blowdown Removal CE #OR115-08-15</td>
<td>Little Butte Creek</td>
<td>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.</td>
</tr>
<tr>
<td>North Line Blowdown Salvage CE #OR115-08-20</td>
<td>Little Butte Creek</td>
<td>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.</td>
</tr>
<tr>
<td>Bowen Over Salvage CE #OR115-08-27</td>
<td>Big Butte Creek</td>
<td>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.</td>
</tr>
</tbody>
</table>
Table 3-3. Additional Salvage Projects within the 5th Field Watersheds containing the Project Area

<table>
<thead>
<tr>
<th>Project Name</th>
<th>5th Field Watershed</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conde Blow Down Roadside Salvage</td>
<td>Little Butte Creek</td>
<td>Salvage along Lower Conde Creek Road within 80 acres of previously harvested areas.</td>
</tr>
<tr>
<td>CE #OR116-08-20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashland Resource Area Road Clearing and Roadside Hazard Removal</td>
<td>Little Butte Creek</td>
<td>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.</td>
</tr>
<tr>
<td>CE #OR116-08-31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Down Wind Salvage</td>
<td>Little Butte Creek</td>
<td>Salvage of wind thrown trees, trees partially uprooted and leaning, and other trees hazardous to workers and the public on up to 170 acres of matrix land.</td>
</tr>
<tr>
<td>CE #OR116-08-41</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windy Soda Blowdown Salvage Environmental Assessment</td>
<td>Little Butte Creek</td>
<td>Salvage of wind thrown trees, damaged trees, and trees hazardous to workers and the public on 413 acres. Salvage harvest systems include 265 acres tractor, 111 acres cable, and 37 acres helicopter.</td>
</tr>
<tr>
<td>EA #OR116-08-04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butte Falls Blowdown Salvage Environmental Assessment</td>
<td>Big Butte Creek</td>
<td>Salvage of wind thrown trees, damaged trees, and trees hazardous to workers and the public. Salvage harvest systems include 4,870 acres tractor, 970 acres skyline, and 170 acres helicopter. The decisions on this EA resulted in four salvage timber sales in these fifth field watersheds: Lower Down Salvage, Windy Salt Salvage, Double Down Salvage, and Lookout B Low Salvage.</td>
</tr>
<tr>
<td></td>
<td>Little Butte Creek</td>
<td></td>
</tr>
</tbody>
</table>

Table 3-4. Salvage Timber Sales Sold in 2008 within Big Butte Creek and Little Butte Creek Fifth Field Watersheds

<table>
<thead>
<tr>
<th>Timber Sale</th>
<th>5th Field Watershed</th>
<th>Yarding System</th>
<th>Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Tractor</td>
<td>Cable</td>
</tr>
<tr>
<td>Bowen Over</td>
<td>Big Butte Creek</td>
<td>144</td>
<td>21</td>
</tr>
<tr>
<td>Down Wind</td>
<td>Little Butte Creek</td>
<td>167</td>
<td>0</td>
</tr>
<tr>
<td>Windy Soda</td>
<td>Little Butte Creek</td>
<td>210</td>
<td>16</td>
</tr>
<tr>
<td>Lower Down</td>
<td>Big Butte Creek</td>
<td>944</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Little Butte Creek</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Windy Salt</td>
<td>Big Butte Creek</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Little Butte Creek</td>
<td>1,272</td>
<td>110</td>
</tr>
<tr>
<td>Double Down</td>
<td>Big Butte Creek</td>
<td>365</td>
<td>30</td>
</tr>
<tr>
<td>Lookout B Low</td>
<td>Big Butte Creek</td>
<td>634</td>
<td>85</td>
</tr>
<tr>
<td>Total</td>
<td>Little Butte Creek</td>
<td>1,688</td>
<td>126</td>
</tr>
<tr>
<td></td>
<td>Big Butte Creek</td>
<td>2,096</td>
<td>161</td>
</tr>
</tbody>
</table>
In addition to the salvage timber sales listed in Table 3-4, blown down timber was salvaged from existing roads in the Big Butte Creek and Little Butte Creek fifth field watersheds.

### 3.2.2.3 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 implement the 2008 ROD/RMP and future harvest may include the following harvest methods: clear-cut, uneven-age harvest, mortality harvest, selection harvest, shelterwood harvest, commercial thinning, and riparian thinning.

- **South Fork Little Butte Timber Sale (2009)** - 4,800 acres in the Little Butte Creek fifth field watershed. Tractor, cable, and helicopter yarding is likely to be used.

- **Twin Ranch Timber Sale (2010)** - 785 acres in the Big Butte Creek fifth field watershed. Since the slope in most of the area is less than 35 percent, tractor yarding is likely to be the primary logging system used.

- **Eighty Acre Creek Timber Sale (2012)** - 700 acres in the Big Butte Creek fifth field watershed. 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 fifth field watershed and 100 acres in the Rogue River/Lost Creek fifth field watershed. 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 fifth field watershed.

Under the Ranch Stew Young Stand Thinning project, the BLM would thin approximately 900 acres of ponderosa pine plantations and stands created after previous harvest entries. The project would be located in the Big Butte Creek fifth field watershed.

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

The BLM revised the Medford District Resource Management Plan and published the *Medford District Record of Decision and Resource Management Plan* in December 2008. The EIS associated with the 2008 ROD/RMP contains a cumulative effects analysis that incorporates these implementation actions in a manner appropriate to the land use planning scale. The EIS states, “... projects scheduled to be sold under the 1995 resource management plans that were proposed prior to December 2008, are assumed for the purpose of this analysis to be completed as proposed” (2008 FEIS). 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 and Insect Populations

Please see Appendix A, section A.1 Doubleday Fire Silviculture Prescriptions for more information about the Forest Condition and Insect Populations analysis area.

3.3.1 Definitions

**Decay Class:** Any of five stages of deterioration of logs in the forest. Stages range from essentially sound (decay class 1) to almost total decomposition (decay class 5).

**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 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.

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

**Site Class:** A classification of an area’s relative productive capacity for tree growth; commonly expressed in terms of the heights of the largest trees in a stand at a common “index” age, usually 50 or 100 years old. Site classes are numbered from 1 (most productive) to 5 (least productive).

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 fire 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 fifth field analytical watersheds for project purposes to describe existing watershed conditions (PRMP 1994, 3-10). The Doubleday Fire occurred in the Big Butte Creek and Little Butte Creek fifth field watersheds. Consistent with the PRMP/EIS, these two watersheds were used as the scale for this analysis.
### Table 3-5. Land Ownership in the 5th Field Watersheds containing the Project Area

<table>
<thead>
<tr>
<th>Land Ownership/Jurisdiction</th>
<th>Big Butte Creek (Acres)</th>
<th>Little Butte Creek (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bureau of Land Management</td>
<td>29,521</td>
<td>54,794</td>
</tr>
<tr>
<td>Forest Service</td>
<td>58,125</td>
<td>59,876</td>
</tr>
<tr>
<td>Industrial Forest Land</td>
<td>55,415</td>
<td>23,582</td>
</tr>
<tr>
<td>Private</td>
<td>13,683</td>
<td>100,337</td>
</tr>
<tr>
<td>City of Medford</td>
<td>1,426</td>
<td>0</td>
</tr>
<tr>
<td>State</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>Bureau of Reclamation</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total Acres</strong></td>
<td><strong>158,210</strong></td>
<td><strong>238,595</strong></td>
</tr>
<tr>
<td><strong>Percent Administered by BLM</strong></td>
<td><strong>19</strong></td>
<td><strong>23</strong></td>
</tr>
<tr>
<td>Doubleday Fire</td>
<td>932</td>
<td>304</td>
</tr>
<tr>
<td>BLM-administered Lands in Doubleday Fire</td>
<td>348</td>
<td>103</td>
</tr>
</tbody>
</table>

### 3.3.3 Assumptions

- Timber management activities, including fire 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 will be designed to ensure that such actions meet the requirements of the 1995 ROD/RMP land use allocations (1995 ROD/RMP, 72 and 186).

- On private forestlands, fire-killed and fire-damaged trees that have commercial value are expected to be salvaged by fall 2009.

- Silvicultural treatments on BLM-administered lands would be designed so that within-stand endemic levels of insects do not increase (1995 ROD/RMP, 194).

### 3.3.4 Affected Environment

#### 3.3.4.1 Prefire

**Forest Condition**

White fir is the dominant plant series with ponderosa pine, sugar pine, incense cedar, and Douglas-fir representing the early seral tree component of this series. Douglas-fir generally dominates the overstory of most stands before being replaced by white fir. The understory is dominated by white fir with Douglas-fir common. Hardwoods include minor amounts of California black oak, madrone, and golden chinquapin. On BLM-administered lands, prefire stand structure was approximately 75 percent late-successional conditions with the remaining 25 percent consisting of 10- to 40-year-old early to mid-seral plantations. Of the 451 acres burned on BLM-administered lands, approximately 210 acres of late-successional forest stands are proposed for salvage. All forest stands proposed for salvage are designated as matrix lands (1995 ROD/RMP, 38).
Chapter 3 Affected Environment/Environmental Consequences

Insect Populations

A January 2008 windstorm damaged overstory tree crowns, caused the loss of canopy cover, and created a large amount of windthrown trees on the forest floor in and adjacent to the fire area. The windthrown Douglas-fir trees created an abundance of favorable breeding habitat for the development of large populations of the Douglas-fir bark beetle and the flatheaded fir borer. Evidence of beetle attacks (orange piles of boring dust on tree boles) is common throughout the wind damaged area.

3.3.4.2 Postfire

Forest Condition

The burn pattern and intensity of the Doubleday Fire caused varying impacts to forest vegetation across the fire area. On approximately 45 percent of the forest stands proposed for salvage, the fire caused complete mortality of all forest vegetation, with nearly total consumption of tree and shrub foliage. The stands affected were late-successional stands that ranged in age from 70 to over 200 years. Given the level of vegetative mortality, the successional pathway of these forest stands has been reset to early seral conditions. With early seral conditions, the live tree crown cover is open; dead structural stand components are present; and shrub, forbs, and grass dominance and competition is expected to be moderate to high for the next 10 to 20 years. In the absence of tree planting and vegetative management, the establishment and growth of conifer species within high burn severity areas would be slow and would occur in a spatially irregular pattern. Total crown kill of needles, buds, and cones of overstory trees has eliminated a postfire seed source. The availability of a natural seed source is limited to adjacent areas of green trees within and outside of the fire perimeter; in some instances, green trees may be up to one-fourth mile away.

In the remaining 55 percent of the proposed salvage area, low to moderate burn severity left a mosaic of stand conditions, with live and dead trees occurring individually and in pockets. Most of these stands are greater than 200 years old and still retain late-successional structural characteristics such as moderate canopy cover, large green trees, snags, and coarse woody debris. The BLM project forester expects additional mortality will occur in fire-injured trees with low amounts of green foliage. Tree survival will depend on tree size, amount of crown scorch, extent of cambium injury, and proximity to active bark beetle populations. In areas with less than 60 percent crown closure, shrub dominance and competition is expected to be moderate to high for the next 10 to 20 years. The remaining green trees with undamaged cones would provide a seed source for the establishment of conifers.

Insect Populations

Within the fire perimeter, the highest concentration of windthrown trees with areas of moderate to severe wind damage occurred in Township 35 South, Range 2 East, section 23. In windthrow areas that experienced high burn severity, most of the windthrown trees infested with bark beetles would have been subjected to temperatures high enough to destroy any beetle eggs or larvae in the inner bark. This mortality would reduce future sources of adult bark beetles that would have emerged from the downed trees in spring 2009. In areas of low to moderate fire intensities, bark beetle broods in windthrown trees were likely unaffected and no decrease is expected in the amount of adult beetles that emerge in spring 2009.

Because of the active beetle populations within and adjacent to the fire area, it is probable the fire-damaged trees that normally would survive the fire damage alone are at a greater risk of mortality due to bark beetle attack. Douglas-fir beetles are strongly associated with attacks on large, fire-injured
trees in dense stands with moderate levels of bole char and light to moderate levels of crown scorch (Hood 2007). Douglas-fir bark beetles are attracted to these types of trees because of the increased physiological stress caused by fire injuries and the reduced defensive abilities of the tree to withstand bark beetle attack.

### 3.3.5 Environmental Consequences

#### 3.3.5.1 Effects of Alternative 1 (No Action) on Forest Condition and Insect Populations

**Direct and Indirect Effects**

Under Alternative 1, no forest stands on BLM-administered lands would be salvaged. Fire killed and injured trees would be left on-site. Dead and injured trees with a high probability of mortality 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 1995 ROD/RMP.

The fire consumed most of the understory layer leaving open space for the establishment and growth of natural and planted seedlings. Germination and resprouting of shrub, grass, and herbaceous vegetation are expected to occur and compete with conifer seedlings for moisture and nutrients.

Some damage and mortality may occur to planted and natural seedlings as fire-killed trees deteriorate and fall. The number of trees that would be affected is unknown. Planted and natural seedlings are not large enough to be affected by the expected increase in insect populations.

The postfire live canopy cover of the stands proposed for salvage ranges from 0 percent to approximately 50 percent, with about 66 acres at 0 percent, 31 acres at 1 to 10 percent, 69 acres at 20 to 30 percent, and the remaining 48 acres at 40 to 50 percent. Forest stands with less than 30 percent canopy cover would most likely function as early seral stands. Early seral stands are defined as the period of forest stand development that occurs following disturbance (fire) and lasts until crown canopies begin to close and conifers dominate the site. This stage of stand development is initially dominated by grasses, forbs, and shrubs. Conifer trees develop slowly at first and gradually become the dominant vegetation (USDI 1994, 112). The small size of the regenerating tree species results in a negligible risk of damage or mortality from bark beetles or borers during this period of plant community development. Forest stands with a live canopy cover of 40 percent or greater would most likely function as late-successional stands and provide spotted owl dispersal habitat with large trees, snags, and coarse woody debris present. Because of the elevated beetle populations from the January 2008 windstorm, live trees, particularly fire-injured trees, would be at greater risk of damage or mortality from bark beetles or borers.

Higher than normal populations of bark beetles in and adjacent to the fire area are expected to increase the mortality rates of fire-injured trees within the next three to four years (Hood and Bentz 2007). Fire-damaged trees that normally would survive fire damage alone would be at a greater risk of mortality due to the increased probability of bark beetle attack from elevated population levels (Hood et al. 2007). Post-fire studies have shown fire damage to the inner bark of trees can exacerbate insect problems (Black 2005). Bark beetles are strongly associated with attacks on large fire-injured trees in dense stands with moderate levels of bole char and light to moderate levels of crown scorch (Hood et al. 2007; Fettig et al. 2007; Parker et al. 2006). Beetles and bark borers are attracted to fire-injured trees because these trees lack the ability or have a reduced ability to produce defensive compounds to resist attack. Many of these fire injured-trees also sustained varying levels of wind damage (e.g., foliage pruning, limb breakage).
prior to the fire, thus compounding the level of damage and increasing the amount of physiological stress and susceptibility to bark beetle infestation.

Douglas-fir and white fir trees dominate the forest stands within and adjacent to the fire area. Because of this, two insects are of particular concern, the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) and the fir engraver beetle (*Scolytus ventralis*). At high population levels, the Douglas-fir bark beetle not only has the ability to attack weakened fire-injured trees but also large, healthy Douglas-fir trees in and adjacent to the fire area. The risk of mortality for live, standing Douglas-fir would be high for three to four years. The fir engraver beetle targets white fir trees and is not as aggressive as the Douglas-fir beetle. Fir engraver beetles generally cannot successfully attack and kill healthy white fir trees; instead, these beetles would infest weakened and fire-injured trees. Other host-specific insects (e.g., pine engraver, flatheaded fir borer, red turpentine beetle, western pine beetle, and mountain pine beetle) will be active with elevated populations.

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 insect populations increase to epidemic levels, 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.

Not salvaging the fire area would leave all fire-killed and -injured trees. Depending on tree diameter and species, the rate of deterioration of fire-killed trees would vary. The condition of Douglas-fir trees would change more slowly than white fir, with trees greater than 24 inches in diameter likely to remain standing for 10 years or more following the fire compared to 3 to 9 years for white fir (USDA 1995). Most twigs and branches would be absent after 5 years, with large limbs beginning to fall after 8 to 10 years. Wood borers and bark beetles would be active within the first year of the fire with wood decay evident within two years. Smaller trees, particularly white fir, would decline more rapidly with breakage occurring within the first 3 to 4 years after the fire. Fire-killed trees would contribute to snags and coarse woody debris amounts and would provide habitat for wildlife, invertebrate, microbial, insect predator, and fungal species. The trees would also provide important ecological functions such as moisture retention, structural complexity, soil stabilization, nutrient recycling, and dead tree shade for the reestablishment of conifer tree species.

**Cumulative Effects**

**Past Actions**

Since the implementation of the Medford District ROD/RMP in 1995, approximately 6,400 acres of BLM-administered lands have been harvested within the Big Butte Creek and Little Butte Creek fifth field watersheds. Density reduction treatments (e.g., commercial thinning, density management, and individual tree selection) occurred on approximately 70 percent of the treatment acres, regeneration harvest on approximately 8 percent, and mortality salvage on the remaining 22 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. 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 windthrown or individual poor vigor trees and used the volume that otherwise would have been lost to decay or to competition related or insect related mortality.

In addition, recent salvage of windthrown trees on BLM-administered lands occurred adjacent to roads throughout the two fifth field watersheds. The BLM removed hazardous trees leaning toward the road and trees lying fully or partially within the road prism on matrix lands. Salvage of these trees allowed the recovery of a small portion of the expected matrix timber volume. In riparian reserves and northern spotted owl activity centers, the BLM removed only the portion of the tree within the road prism. The removal of the roadside salvage trees across all land allocations reduced the breeding areas for bark beetles and wood borers, but had a negligible effect on the potential build-up of insect populations because of the substantial amount and widespread extent of the remaining windthrown trees from the January 2008 windstorm.

Since the implementation of the Northwest Forest Plan in 1994, timber harvesting on Forest Service-administered lands within the Big Butte Creek and Little Butte Creek fifth 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 79,000 acres of private industrial timber lands within the two fifth 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. Fir engraver beetles would not be of concern as they typically only attack weakened trees. Salvage logging of windthrown trees from the January 2008 windstorm has occurred and most of the concentrated and scattered windthrown trees have been removed from industrial forest lands. This has reduced the amount of breeding habitat for the Douglas-fir bark beetle and flatheaded fir borer in the fire 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). Most of the private industrial lands have been salvaged and are considered below this level.

Of the 114,000 acres of privately owned (nonindustrial) lands within the two fifth 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. The level of risk of these forest stands to insect infestation is unknown. It is likely that most commercial sized windthrown and damaged trees form the January 2008 windstorm have been salvaged and would not contribute to the build-up of insect populations.

**Present Actions**

The BLM will plant and maintain moderate and high burn severity areas to accelerate the establishment and growth of conifer seedlings. Because the timing, amount, and distribution of natural regeneration are unpredictable, planting would insure a fully stocked stand occupies the site and the growth and yield objectives for matrix lands are met.
On BLM-administered lands within the Big Butte Creek and Little Butte Creek fifth field watersheds, six blowdown salvage timber sales (Lower Down, Blown A Round, Windy Salt, Look Out B Low, Windy Soda, and Double Down) have been sold. Salvage harvest activities have begun on the Lower Down, Blown A Round, and Windy Salt timber sales. Windthrown and damaged trees above the level needed to meet snag and coarse woody debris requirements would be salvaged across approximately 4,200 acres. Removal of these trees prior to beetle emergence in spring 2009 would help reduce the build-up of bark beetle populations. If windthrown trees containing bark beetles are not removed prior to beetle emergence, fire-injured and wind damaged trees would provide favorable habitat conditions for beetle infestation.

The Forest Service is currently implementing the Big Butte Springs timber sale within the Big Butte Creek fifth 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 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. These limited harvest activities would not be expected to contribute to the build-up of insect populations.

**Future Actions**

In the Big Butte Creek fifth field watershed, six timber sales are proposed by the BLM. The six timber sales are part of the 5-year timber sale plan and include the following: Flounce Around–60 acres, Camp Cur timber sale–800 acres, Twin Ranch–790 acres, Eighty Acre–700 acres, Ranch Stew–800 acres, and Lost Clark–350 acres. Under the 1995 ROD/RMP, 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 2008 ROD/RMP for the Western Oregon Plan Revision would permit commercial thinning in stands generally less than 110 years old (site class 3) or 120 years old (site class 4) and a combination of regeneration harvesting and uneven-aged management in stands 111 years old (site class 3) or 121 years old (site class 4) to an upper age limit of 159 years old on all site classes. The BLM expects post-harvest conifer growth rates to increase with tree vigor at levels less favorable for successful insect attack.

The BLM’s Ranch Stew Young Stand Thinning project would precommercially and commercially thin approximately 900 acres of plantations and stands created after previous harvest entries within the past 50 years. Following treatment, conifer growth rates are expected to increase with tree vigor at levels unfavorable for insect build-up.

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 timber management direction. Acres not meeting the guidelines for timber management would be dropped from the 5-year timber sale planning cycle.

In the Little Butte Creek fifth 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 rates to increase with tree vigor at levels less favorable for successful insect attack.
The Forest Service has no known timber sales planned in the Big Butte Creek or Little Butte Creek fifth 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 DBH, 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 and Insect Populations

#### Direct and Indirect Effects

The acres proposed for salvage in Alternative 2 are consistent with the objectives of the 1995 ROD/RMP for salvage (USDI 1995, 186) and insect and disease management (USDI 1995, 189) criteria for matrix lands. Salvaging the excess trees would meet the planned timber yield assumptions on matrix lands prescribed for in the 1995 ROD/RMP.

On approximately 66 acres of matrix lands that had a high burn severity, dead trees in excess of those needed to meet snag and coarse woody debris requirements would be salvaged. In fire-damaged forest stands with less than 40 percent live canopy cover (approximately 100 acres), trees with green foliage may be removed if there is a high probability of mortality or insect infestation within the next four years (Goheen 2001; Hood et al. 2007; Scott et al. 2002; Ryan and Reinhardt 1988), refer to the marking guidelines in Appendix A, A.2 Marking Guidelines. On the remaining acres with 40 percent or greater live canopy cover(approximately 48 acres), only dead trees with no green foliage remaining would be salvaged. In salvage areas, 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 at least 20 inches in diameter. Only decay class 1 and 2 logs would be counted toward the total of snags and coarse woody debris.

Live canopy closure would vary between 0 to 40 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 (e.g., birds, wasps, and spiders) that naturally regulate insect populations.
Salvage of fire-injured trees on matrix lands would reduce but not eliminate the potential for the build-up of insect populations. With the reduced amount of breeding habitat, 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 Douglas-fir trees in riparian reserves, northern spotted owl activity centers, and unsalvaged lands in the fire area and on lands outside of the fire area.

Following salvage of the fire area, logging slash would be treated (lopped and scattered, or hand piled and burned) to minimize activity fuels. Under the Doubleday Fire rehabilitation plan, conifer seedlings would be planted to establish a fully stocked stand with growth rates at levels expected under the sustained yield objectives of the 1994 PRMP/EIS (USDI 1994a, Volume II, 203-208).

Permanent and temporary roads would be constructed. The permanent roads would convert lands capable of supporting conifer forests to nonforested lands and would no longer contribute to future conifer growth. Approximately 900 feet of permanent road construction would convert less than 0.2 acres of forested land to nonforested lands. This impact would be mitigated by decommissioning 600 feet of old road or about 0.1 acres. The construction and decommissioning of roads would provide a net loss of about 0.1 acres of forest land to nonforest status. Approximately 1.45 miles of temporary spur road would be constructed on approximately 2.5 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. The effect of these road activities on insect populations and insect-related tree mortality is expected to be negligible.

**Cumulative Effects**

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

Salvage of fire-killed and damaged trees with a high probability of mortality would occur on matrix lands and would follow the timber salvage guidelines in the 1995 Medford District ROD/RMP (USDI 1995a, 186). The cumulative effects of salvaging fire-killed and damaged trees were anticipated and 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 toward a lower risk of increased insect populations and insect-related tree mortality. Past, present, and future silvicultural treatments were and are intended to keep insect populations at endemic levels (USDI 1995, 194) by reducing the amount of insect habitat and increasing tree vigor to levels less favorable to insect infestation. Salvaging fire-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 1995 ROD/RMP guidelines for salvage in riparian reserves or late-successional reserves. Not salvaging in riparian reserves and late-successional reserves 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 or fire-damaged trees expected to survive in and adjacent to riparian reserves and northern spotted owl activity centers would not be reduced.
3.4 Soil

3.4.1 Definitions

**Hydrophobic Soil**: Soils that are water repellant, often due to dense fungal mycelia mats or hydrophobic substances vaporized and reprecipitated during a fire.

**Soil Productivity**: The capacity of a soil to support plant growth.

3.4.2 Methodology

- The project soil scientist based the soil descriptions and soil mapping on the Jackson County Soil Survey (NRCS 1987) and field reconnaissance.
- Soil productivity losses from compaction were assessed at the project scale because the 1995 Medford District RMP/ROD (166, 169-170) considers the proposed BMPs as appropriate mitigation for this soil impact at the harvest unit scale.
- Soil erosion for this project was assessed at both the site and project level scales. Landscape erosion issues for the fifth field scale and larger are referenced to and addressed within the Butte Falls Blowdown Salvage EA.
- No soil types identified as fragile (e.g., decomposed granitics or schists) in the 1995 Medford District RMP/ROD are located within the Project Area. However, the BLM acknowledges the fragile nature of soils subjected to high intensity fires and has designed mitigation beyond that identified in the 1995 RMP/ROD such as limiting all tractor yarding operations to 20 percent slope instead of 35 percent slope, scattering logging slash on bare soil areas, requiring one-end suspension for skyline cable operations, and leaving all green trees in salvage harvest units.
- Field reconnaissance of the Project Area found no recent landslides or scoured channels from debris torrents. There are also no at-risk slope configurations (i.e., headwalls on slopes greater than 60 percent and planar slopes over 75 percent) proposed for harvest. All green (live) trees would be left on harvest units, which would help maintain slope stability through rooting strength, provide surface protection and organic matter with needle castings, and provide for future recruitment of coarse woody debris. Therefore, it is not expected that mass wasting or slope stability will be an issue in any proposed salvage harvest unit.

3.4.3 Assumptions

- All proposed PDFs will be appropriately applied in order to meet the objectives intended for the design of the mitigation.
- Short-term is 1 to 5 years and long-term is longer than 5 years. In regards to soil productivity losses, long-term recovery could mean as long as 80 to 100 years in the forests of southern Oregon.
- At this time, it is not known how much or when private timber companies will salvage log their lands in the fire area. The assumption is they will salvage log all of their lands where timber was burned.
3.4.4 Affected Environment

3.4.4.1 Prefire

The two dominant soil types found within the fire area come from the Freezner and Geppert soil series. Both soils are derived from weathered volcanic rocks (andesite) and have a clay loam subsoil.

Freezner soils are deep (40 to 60 inches) and well-drained over weathered bedrock. Typically, Freezner soils are found on sideslopes and benches less than 35 percent. Geppert soils are moderately deep (20 to 40 inches), skeletal (contain more than 35 percent rock fragments in the subsoil), and well-drained over weathered bedrock. Geppert soils are typically found on sideslopes between 25 to 60 percent.

In the fire salvage Project Area, the extent of the Freezner and Geppert soils are about equal. There are no active landslides or steep gradient stream crossings within the Project Area.

Past impacts to the soil resource within the fire area were primarily the result of timber harvest activities, such as road and landing construction, and ground disturbance from mechanical timber harvesting and fuels treatments. All of these activities contribute in varying degrees to soil productivity losses and potential sedimentation increases from compaction, displacement, and erosion.

Tractor yarding conducted prior to 1980 resulted in existing compaction levels that exceed the 1995 Medford District RMP/ROD standard of maintaining less than 12 percent disturbance in a given tractor harvest unit. Prior to the 1980s, conventional tractor yarding methods typically did not use methods such as designated skid roads spaced at least 150 feet apart to reduce soil productivity losses from compaction. Also, past practices typically did not rip compacted skid trails. Based on field reconnaissance estimates by the project soil scientist, all 107 acres of the proposed tractor yarding units in this project currently have existing compaction levels greater than 12 percent.

Due to the recent windstorm in this area, coarse woody debris (logs 16 inches or greater in diameter and at least 16 feet long) is currently in great abundance at the landscape (fifth field watershed) scale. The 1995 Medford District ROD/RMP requires maintaining at least 120 linear feet per acre of coarse woody debris on the forest floor. This is important for retaining soil moisture and providing micro-habitat for species beneficial to soil nutrition and biological diversity.

For a detailed description of prefire soil and watershed condition, please refer to the Butte Falls Blowdown Salvage EA (2008), section 3.6.4, Soil, Affected Environment.

3.4.4.2 Postfire

Soil burn severity is predominantly determined by the presence or absence of the surface litter layer (duff). Severely burned soils have mostly white powdery ash remaining on the surface with no remnants of the litter layer (duff). It typically shows discoloration or recrystallization of the mineral soil in the surface horizon from extreme heat. The potential for hydrophobic soil conditions are greatest in high burn severity areas.

Moderately burned soils typically have remnants of the original litter layer such as blackened needles, twigs, and small branches with little or no change in the mineral soil faction. Low burn or unburned soils still have all or most of the duff layer intact with little or no white ash on the soil surface.
The project fuels specialist determined the vegetative burn severity for the lands burned in the Doubleday Fire through field reconnaissance and by using GIS (Table 3-6). See Appendix E, Fire and Fuels, for the methodology used to make these determinations. The project soil scientist determined during field reconnaissance on the BLM portion of the fire area, that the vegetative burn severity mapped by the fuels specialist and soil burn severity were directly correlated.

<table>
<thead>
<tr>
<th>Burn Severity</th>
<th>Lower South Fork Big Butte</th>
<th>Salt Creek-Long Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acres</td>
<td>Percent</td>
</tr>
<tr>
<td>High</td>
<td>276</td>
<td>32</td>
</tr>
<tr>
<td>Moderate</td>
<td>238</td>
<td>21</td>
</tr>
<tr>
<td>Low</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Unknown¹</td>
<td>405</td>
<td>43</td>
</tr>
<tr>
<td>Totals</td>
<td>932</td>
<td>100</td>
</tr>
</tbody>
</table>

¹Private land.

Burn severity, for all soil types, is an important factor in determining how susceptible a soil is to postfire erosion, runoff with associated sedimentation, and productivity losses. In areas of high burn severity, very little or no litter layers remain on the forest floor. The loss of organic matter upon and within the soil reduces moisture holding capacity, increases surface runoff, decreases soil aggregate stability, and depletes much of the soil nutrients. These losses in soil productivity are long-term (greater than 5 years).

A recent study on the 2002 Biscuit Fire in southwest Oregon reported that much more carbon and nitrogen are volatilized from lower in the soil profile than previously estimated (Bormann et al. 2008). The study also concluded that much of the fine mineral portion of the soil surface layer is transported into the atmosphere from the strong updrafts within the fire’s smoke plumes. This suggests that recovery of soil productivity in severely burn areas after a wildland fire may take much longer than previously documented. It should be noted, however, these effects were documented on a very large-scale fire (several hundred thousand acres) where extreme surface temperatures are expected to be more intense and more common than on smaller scale fires such as the 1,236-acre Doubleday fire. The actual recovery time for any burned area is highly variable and depends primarily on prefire conditions such as existing vegetative and fuel loading components, how much carbon and nitrogen (organic material) were volatilized off the site (fire intensity), and the amount of time before new organic matter becomes available for decomposition.

In the approximately 80 acres of severely burned young BLM plantations (no trees greater than 16" DBH), the recruitment of future coarse woody material (greater than 16" DBH) on the landscape could take decades. In the interim, the amount of organic matter available for decomposition and the availability of coarse woody material on the ground would be limited until the forest returns to the vegetative diversity and maturity of prefire conditions, which is estimated to be about 80 to 100 years in the forests of southern Oregon.

On the approximately 200 acres of BLM-administered land where the forest canopy was burned off, rainfall interception would be greatly reduced. This destabilizes soil surface aggregates by increasing the risk for detachment from raindrop impact and transportation of soil particles off-site, resulting in an increased potential for sedimentation of nearby streams. This lack of canopy along with the amount
of remaining surface vegetation (especially in riparian areas), steepness of slope, rainfall intensity, and proximity to streams has the greatest influence on the amount of potential sediment reaching streams. The majority of the burn area on BLM-administered lands is on slopes less than 35 percent. The topography is typically linear with broad ridge tops and benches and predominantly low gradient (3 to 6 percent) stream channels. These topographical features are expected to moderate potential erosion and subsequent sedimentation from entering local stream channels.

Hydrophobic soil conditions (water repellency) may occur where the soil organic matter (duff and litter layer) was totally consumed. This can reduce infiltration of water into the soil and increase runoff. Typically in the forests of the Pacific Northwest, this occurs in isolated patches across the landscape and breaks down after 1 to 2 seasons of rainfall and as the vegetation recovers (Robichaud et al. 2000; Huffman et al 2001; Letey 2001). The project soil scientist and fuels specialist, after field reconnaissance, did not identify hydrophobic soil conditions on any of the 438 acres of BLM-administered lands with high or moderate soil burn severity.

In moderate burn severity areas, needlecastings (dropping of conifer needles) from partially burned overstory trees can help moderate erosion on these sites by acting as a mulch. The fuels burn severity mapping indicates 259 acres had moderate burns on BLM-administered lands. Private lands were not analyzed for moderate burns or hydrophobicity.

Most of the severe soil burn severity areas occurred in young plantation stands between 20 and 40 years old located primarily on private timber lands and on BLM land in section 27, Township 35 South, Range 2 East. Approximately 58 percent of the acres burned in the Doubleday Fire had severe soil burn severity with very little down coarse wood remaining.

Fire suppression activities such as fire line construction can increase surface runoff, erosion, and sediment delivery to streams, especially on sideslopes over 35 percent. Water barring and covering with straw or slash materials reduces the potential for these impacts and reduces off-site sedimentation. Four miles of tractor fire lines were water barred and covered with slash material where available and drop points (mechanically cleared areas of bare soil used for dropping off supplies) were grass seeded and straw mulched in the postfire suppression rehabilitation.

3.4.5 Environmental Consequences

3.4.5.1 Effects of Alternative 1 (No Action) on Soils

Direct and Indirect Effects

Under the No Action Alternative, fire-killed trees would not be salvaged so no ground disturbance would occur. All remaining trees (live or dead) would be available to provide future down woody debris which would aid in soil protection and improve productivity in the long-term. However, in areas where there is an excessive amount of large down woody debris (i.e., 157 acres of blown down trees), high fuel loadings could contribute to high fire intensity and duration for future wild fires in this area.
The potential for erosion as a result of the fire (see postfire soil effects) would continue for the short-term. Ground disturbance created by the proposed fire salvage activities (e.g., tractor yard, excavator piling, road construction) would not occur and would not be subjected to potential short-term increases in erosion or sedimentation.

**Cumulative Effects**

Under the No Action Alternative, there would be no incremental increases of impacts to the landscape at all spatial scales. Previously discussed impacts from the fire, fire suppression, and past logging operations would continue in the short-term and eventually diminish as the landscape recovers in the long-term.

Soil productivity and erosion would remain at the same levels (see section 3.4.4.2, Affected Environment, Postfire) and would recover, barring any further disturbances, to prefire conditions. Soil compaction would not be reduced on the skid trails within the proposed 107 acres of tractor yard because no ripping would occur on the existing skid roads.

Past, present, and predicted future actions in the two fifth field watersheds are discussed in detail in the *Butte Falls Blowdown Salvage EA*.

### 3.4.5.2 Effects of Alternative 2 on Soils

**Direct and Indirect Effects**

**Soil Productivity**

Under Alternative 2, 107 acres would be tractor yanded and 112 acres would be skyline cable yanded (using one end log suspension). Approximately 1.5 miles of temporary spur road would be constructed and decommissioned after use.

Tractor yarding causes soil compaction and displacement. Soil compaction is an increase in bulk density with a corresponding decrease in soil porosity. Compaction reduces soil productivity through a reduction in root growth, tree height, and timber volume (Greacen and Sands 1980; Froehlich and McNabb 1984) and may be produced by a single pass of logging equipment across a site (Wronski 1984). Productivity losses have been documented for whole sites (Wert and Thomas 1981) and for individual trees (Froehlich 1979; Helms and Hipkin 1986). Decreases in important microbial populations have also been observed in compacted soils (Amaranthus et al. 1996). Soil compaction may also increase surface runoff because of reduced infiltration (Greacen and Sands 1980).

Soil displacement from tractor yarding occurs when the tracked equipment turns on its skids pushing the soil into small piles, or berms, along the skid trails. This displacement of the top soil removes the organic litter layer and exposes mineral soil. Removal of the loose, organic surface materials promotes surface sealing and crusting that decreases infiltration capacity and may increase erosion (Childs et al. 1989). Soil displacement also results in a loss of important soil biota, such as mycorrhizal fungi, which facilitates nutrient uptake by plants (Amanarathus et al. 1989 and 1996).

The 1995 Medford District ROD/RMP discusses the adverse impact on soils from tractor yarding. It acknowledges that some minor losses of soil productivity and increased ground disturbance will occur (p. 44). It concludes that implementing the BMPs (1995 Medford District RMP/ROD, Appendix D)
is sufficient to keep soil productivity losses and erosion to a minimum. The predominant mitigating BMP for this issue is limiting the amount of area impacted by tractors to less than 12 percent of a unit by requiring an average 150-foot spacing of skid roads. Ripping all skid roads and temporary spur roads would reduce compaction on the 107 acres proposed for tractor yarding which currently have approximately 15 percent compacted soil from previous entries. Ripping improves infiltration to the soil, reduces runoff, and facilitates reestablishment of vegetation. These areas are scheduled for replanting with conifer trees which will aid in the long-term biological recovery of the soil in these disturbed areas.

**Soil Erosion and Sedimentation**

The potential for soil erosion increases with surface disturbing activities such as road construction, tractor yarding, and cable skyline yarding. The following PDFs will help mitigate impacts from surface disturbing activities:

- Lopping and scattering logging slash will help protect the soil by adding organic litter to the soil surface.
- Seasonal restrictions will prevent tractor yarding when soil moisture contents exceed 25 percent.
- Restricting tractor yarding to slopes less than 20 percent, water barring, and ripping skid trails and temporary spur roads will effectively reduce or eliminate overland flow and subsequent erosion. The 1995 Medford District RMP/ROD typically uses 35 percent slope restrictions for tractor yarding on the soil types within this Project Area.

In the long-term (5 plus years), the BLM expects these disturbed areas would stabilize as the native vegetation becomes reestablished and the potential for erosion would be reduced. Eventually, if no further disturbances occur, the potential erosion risk would diminish to prefire levels.

Skyline cable yarding (partial suspension of logs during yarding operations) typically disturbs 2.8 percent of a harvest unit (Klock 1975, 81). This equates to about 3 of the 112 total acres proposed for skyline yarding. The primary disturbances are soil compaction and displacement in the cable yarding corridors. The 1995 Medford District ROD/RMP (p. 166) recommends full or partial suspension to minimize these impacts. Although no site-specific data is available to quantify these impacts, it is expected these impacts would be short-term (1 to 5 years) and would not be likely to cause off-site sedimentation because

- sideslopes on the skyline yarding units are moderately steep (between 30 to 60 percent), which substantially reduces the risk of runoff and off-site sedimentation,
- excessive gouging resulting from log yarding where one-end suspension may not occur would be water barred and straw mulched to reduce erosion,
- as vegetation is reestablished, native plant succession will proceed, root strength would be restored, and soil surface protection would increase from reestablishment of surface organic matter,
- maintaining riparian buffers would keep the disturbances away from stream channels, and
- seasonally restricting salvage activities to periods of low flow and low soil moisture content (less than 25 percent) would reduce runoff and sedimentation potential.
Road construction also creates bare soil areas along the cutbanks and fillslopes that are subject to accelerated erosion. The majority of research on soil erosion in most forested watersheds indicates that the greatest contributor of sediments into streams comes from road related erosion. The proposal to construct 900 feet of permanent road, realignment of an existing poorly drained road, and approximately 1.5 miles of temporary roads, which would be decommissioned after use, would contribute to road related erosion in the Project Area in the short-term. Many factors play a role in the potential for a road to erode and produce sediment. Design features such as rock surfacing (surface protection), locating road grades on stable land features (reduced mass wasting potential), seasonal restriction to dry periods (lower erosion and sedimentation potential), and improved drainage structure spacing (reduction in ditch line scouring) all aid in the reduction of sedimentation from roads. Ripping the road prism during temporary roads decommissioning also creates bare soil that can be subject to erosion. The PDFs that effectively reduce the effects of this impact are straw mulching (increase surface protection), native grass seeding (reestablishment of native vegetation), seasonal restrictions (erosion reduction), and water barring (reduction of runoff). The BLM expects that implementing these PDFs would minimize soil erosion and subsequent sedimentation at the site scale. Long-term, it is expected these PDFs would aid in the recovery of the landscape at all scales.

Soil erosion is not only a function of soil properties and condition but also a function of climatic events. Under normal rainfall scenarios (i.e., low intensity short duration rainfall), it is unlikely erosion and off-site soil movement would occur as a result of the implementation of the proposed actions and mitigation under this alternative. However, as the intensity and duration of the rain event increases and the soil becomes saturated, the potential for runoff, erosion, and off-site movement also increases. Disturbed areas created by the proposed salvage logging and untreated severely burn areas would be at risk for erosion and off-site sedimentation, in the short-term, if high intensity or long duration rainstorms were to occur. There is no site-specific data available to quantify this effect.

**Cumulative Effects**

Recently, there has been some controversy among researchers, professionals, and scientists about the effects of salvage logging after a wildland fire. Some researchers (Beschta et al. 2004) suggest that any increase in adverse soil impacts (particularly tractor yarding and road construction) after a wildland fire can impede the ecological recovery of the landscape. The scale of the landscape at which these effects occur and become problematic is where most of the uncertainty and controversy exists. The variables are too numerous in most large-scale landscapes (i.e., fifth field watersheds or greater) to consider when attempting to predict or quantify the effect these impacts may have on ecological recovery. There is agreement among scientists, however, that severely burned soils are very fragile and require special mitigation to the extent necessary to allow for natural recovery of soil function. The BLM expects that with the implementation of the proposed BMPs and PDFs, adverse soil effects created from salvage logging would be minimized at the site scale and would not delay the recovery of the landscape at a larger (fifth field) spatial scale.

**Soil Productivity**

As discussed under the methodologies of this analysis, the cumulative impacts of soil productivity losses from compaction and displacement are analyzed on a unit-by-unit basis as stated in the 1995 Medford District RMP/ROD. Using designated skid roads at 150’ average spacing, ripping all skid roads (including existing), and ripping the 1.5 miles of temporary spur road would result in a net reduction of compaction and an increase in soil productivity on the skid trails within the 107 acres proposed for tractor yarding.
Leaving 120 linear feet per acre of coarse down woody material where it exists would meet 1995 Medford District RMP/ROD (p. 44) management actions/direction. This would aid in recovery of soil organisms helpful for providing soil nutrients and provide for increased carbon and water storage on these sites in the long-term.

**Soil Erosion and Sedimentation**

Under normal rainfall, soil erosion and subsequent sedimentation from the proposed salvage of fire-killed trees are expected to be minimal in the long-term with the implementation of PDFs. In the short-term and under normal rainfall scenarios, soil erosion and sedimentation may increase slightly at the site scale but are expected to be negligible at the fifth field scale for the following reasons:

- A small percentage of the total fifth field watershed acres are proposed for salvage harvest (220 acres salvage in 158,330-acre Big Butte Creek fifth field and 238,598-acre Little Butte Creek fifth field watersheds).
- All proposed road construction is on relatively flat to gently sloping stable landforms. Lower slope gradient means less cut and fill of material during construction which reduces the extent of soil disturbance and the risk of erosion. Decommissioning temporary roads would decompact (loosen) the soil and improve infiltration and reduce runoff to aid in the reestablishing vegetation. All tractor yarding would occur on slopes less than 20 percent and all skid trails would be water barred. This reduces the potential for runoff and sedimentation from skid trails.
- All salvage logging is on stable landforms away from stream channels. Greater distance from the stream channels reduces the risk of sediments entering stream channels. There are no unstable landforms such as steep headwalls or active landslides within proposed harvest units.
- Application of BMPs and PDFs such as designated skid trails, scattering logging and blowdown debris on bare soil areas, and seasonal restrictions for heavy equipment operation would minimize surface disturbance, help protect the disturbed soil surface, and help keep runoff and sedimentation on-site.
- The proposed 900 feet of permanent road construction is a realignment of an existing poorly drained road that will improve drainage and reduce road-related erosion and sedimentation at all scales in the long-term.

### 3.5 Water Resources

#### 3.5.1 Definitions

**Transient snow zone:** A winter precipitation band from about 3,500 feet to 5,000 feet 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.
3.5.2 Methodology

The project hydrologist used the following sources for analysis:

- The Little Butte Creek and Central Big Butte watershed analyses (USDI 1997; USDI 1995b) 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; 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 sixth field watersheds containing the Project Area: Salt Creek-Long Branch and Lower South Fork Butte Creek. This will be referred to as the Water Resources analysis area.

3.5.3 Assumptions

- Vegetative burn severity equals soil burn severity.
- Short-term effects are 10 years or less; long-term effects last more than 10 years (USDI 1994a, 4-4).

3.5.4 Affected Environment

3.5.4.1 Prefire

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.

The 16,193-acre Lower South Fork Big Butte Creek sixth field watershed is part of the larger 158,330-acre Big Butte Creek fifth field watershed. The Lower South Fork Big Butte Creek sixth field watershed has approximately 3,420 acres (21 percent) in the transient snow zone (TSZ). The 14,269-acre Salt Creek-Long Branch sixth field watershed is part of the larger 238,598-acre Little Butte Creek fifth field watershed. The Salt Creek-Long Branch watershed has approximately 4,275 acres (30 percent) within the transient snow zone. Historic extreme high flows have been produced by rain-on-snow events in the transient snow zone where warm rains have melted the snow pack and produced large amounts of runoff.

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 2006a).
Within the Doubleday Fire Salvage Water Resource analysis area, 3 streams are included on DEQ’s 2004/2006 303(d) list for exceeding water quality criteria. In the Lower South Fork Big Butte Creek sixth field watershed, Doubleday Creek (river mile 0 to 3.4) and Hukill Creek (river mile 0 to 3.6) are listed for exceeding the stream temperature criteria. In the Salt Creek-Long Branch sixth field watershed, Salt Creek (river mile 0 to 9) is listed for exceeding the *E. coli* criteria. All three streams have listed portions within the Doubleday Fire Salvage Project Area. Currently, no streams in the Water Resources analysis area are on the DEQ’s 303(d) list as water quality limited for sedimentation.

**Sedimentation**

**Lower South Fork Big Butte Creek Sixth Field Watershed**

The existing road density in this sixth field watershed is 5.6 miles per square mile. Road density can be an indicator of possible sediment sources in the watershed. Not all roads contribute sediment to streams; however, roads located within riparian reserves may be connected to streams through ditch lines causing sediment to reach stream channels. The road density in riparian reserves is 1.4 miles per square mile with approximately 36 miles of road within riparian reserves.

Roads encroaching on stream channels are common in this watershed. These roads result in simplified stream channels and contribute to increased stream temperatures and fine sediment levels. 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 road bed were eight times greater than from roadbeds with 6 to 8 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 roads segments where vegetation was retained. Closure of unsurfaced roads during the wet season can also help reduce erosion (Kattelmann 1996).

**Salt Creek-Long Branch Sixth Field Watershed**

The existing road density in the Salt Creek-Long Branch sixth field watershed is 3.7 miles per square mile. The road density in riparian reserves is 0.9 miles per square mile with approximately 20 miles of road within riparian reserves.

Off-highway vehicle trails throughout the watersheds are also a source of sediment but the extent of these is not known.

An existing pump chance located on a tributary to Salt Creek in the southeast half of the northeast half of section 27, Township 35 South, Range 2 East is no longer holding water because the earthen dam has been breached.

**Ginger Springs Municipal Watershed**

The Ginger Springs Municipal Watershed, or recharge area, lies primarily within the Big Butte Creek fifth field watershed with geologic interfaces extending into the neighboring Little Butte Creek fifth 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 3,457 acres with 2,466 acres in the Big Butte Creek fifth field watershed and 991 acres in the Little Butte Creek fifth field watershed. Activities proposed in this project are only located in the Big Butte Creek fifth field watershed portion of this recharge area; no activities are proposed in the Little Butte Creek fifth 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 1998).

The 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 Falls’ water distribution system and reservoirs have since been upgraded to reduce the amount of water leaking from the original pipes.

Butte Falls’ water source, Ginger Springs, is currently classified as groundwater by the Oregon Department of Human Services’ Drinking Water Program. As a result, turbidity measurements are required by Oregon Administrative Rules (OAR 333-016-0032[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 1998).

Ferrero Geologic identified three zones of influence in their Ginger Springs Geohydrologic Study: high, moderate, and low. 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 municipal watershed; 230 acres on BLM lands). They assessed the remainder of the municipal watershed as low influence (2,945 acres in the municipal watershed; 1,125 acres on BLM lands) (USDI 1998).

BLM road #35S-2E-23.6 is a native surface road located in the Ginger Springs Municipal Watershed within the Lower South Fork Big Butte Creek sixth field watershed. A 600-foot portion of this road is located in a steep (greater than 20 percent grade), entrenched through-cut. Because this road is
Chapter 3 Affected Environment/Environmental Consequences

entrenched, water is not able to drain properly and has resulted in rutting of the road surface and subsequent erosion.

3.5.4.2 Postfire

The Doubleday Fire burned approximately 1,236 acres in two sixth field watersheds located within two fifth field watersheds. Within the Little Butte Creek fifth field watershed, 304 acres burned in the Salt Creek-Long Branch sixth field watershed. Within the Big Butte Creek fifth field watershed, 932 acres burned in the Lower South Fork Big Butte Creek sixth field watershed.

Soils, vegetation, and litter are critical to the functioning of hydrologic process (Robichaud, Beyers, and Neary 2000, 5). When fires burn off the litter layer and kill the vegetation, soils become exposed to the erosive forces of wind, rain, and gravity. Soil structure may also be changed as a result of fires causing more runoff and the potential for erosion. The BLM fire and fuels specialist rated the severity of the fire’s effects on the vegetation in the areas burned by the Doubleday Fire on a scale ranging from low to high (Table 3-6). After field reconnaissance, the project hydrologist and soil scientist determined the vegetative burn severity approximated the soil burn severity and the resulting hydrologic function. Areas of moderate and high soil burn severity contribute to increases in runoff and erosion during storm events for the first one to two seasons following the fire. Areas of low burn severity are less susceptible to increases in runoff and erosion because the majority of vegetation and much of the litter layer are still intact.

The Doubleday Fire increased open areas by removing overstory canopy and consuming litter, duff, and woody debris. Approximately 7 percent of the transient snow zone within the Lower South Fork Big Butte Creek sixth field watershed and approximately 6 percent of the transient snow zone within the Salt Creek-Long Branch sixth field watershed had severe or moderate soil burn severity resulting in mortality of most vegetation within the area. The fire removed the overstory canopy which would result in an increased snow pack on these acres and could increase runoff locally.

Sedimentation

Riparian reserves buffer stream channels and contribute to maintaining water quality. The Doubleday Fire burned with varying intensities through portions of two riparian reserves. The Project Area contains 7,325 acres of riparian reserves; 13 acres of riparian reserve burned at low severity while 61 acres had moderate or high burn severities. These riparian reserves are less effective than if they were fully intact and functional because much of the duff and litter layer was consumed and no longer functions to trap sediment and store moisture. Sediment would increase to local stream channels. The riparian reserves would become more effective as vegetation reestablishes and the duff and litter layer redevelops as vegetation dies and decays. The short-term (1 to 3 years) recovery of vegetation would begin to filter out sediment while the duff layer recovers in the long-term (3 to 10 years).

Streams within the fire perimeter may experience longer flow durations due to the increased runoff caused by the fire. Stream temperature is not expected to be greatly affected within the burn area due to the presence of short duration, low-flow, spring-fed streams.

With good hydrologic condition (greater than 75 percent of the ground covered with vegetation and litter), only about 2 percent or less of rainfall becomes surface runoff and erosion is low (Bailey and Copeland 1961). When site disturbances, such as severe fire, produce poor hydrologic conditions (less than 10 percent of the ground surface covered with plants and litter), surface runoff can increase by over
70 percent and erosion can increase by 3 orders of magnitude (Robichaud, Beyers, and Neary 2000, 5). The majority of the Project Area had high and moderate burn severities which destroyed most of the plants and litter leaving the Project Area in poor hydrologic condition until vegetation is reestablished.

Water repellent soils and cover loss would cause flood peaks to arrive faster, rise to higher levels, and transport considerably greater amounts of bedload and suspended sediments (Robichaud, Beyers, and Neary 2000, 8). Water repellent soils are formed after fires where high temperatures persisted for long periods and created conditions that prevent infiltration and percolation of water into the soil mantle. Because the fire burned relatively small portions of two sixth field watersheds, water repellent soils are not a great concern.

Activities related to fires and fire management, such as construction of fire line, temporary roads, and heli-pads, and postfire rehabilitation can have effects on erosion (Robichaud, Beyers, and Neary 2000, 8). Fire suppression activities increase the amount of erosion and subsequent sedimentation while postfire rehabilitation minimizes erosion. Approximately 3.9 miles of tractor fire line and 0.1 miles of handline were created during the fire suppression efforts. These fire lines were rehabilitated by waterbarring, pulling organic debris back on the surface, and blocking. Sediment production from these sources would be eliminated after recovery in approximately 2 to 3 years.

Ginger Springs Municipal Watershed

About 31 percent (1,065 acres) of the Ginger Springs Municipal Watershed burned at the following burn severities: 499 acres high burn severity, 180 acres moderate burn severity, and 386 acres unknown burn severity on private lands. Surface water quality within the Ginger Springs Municipal Watershed would be affected in the short-term by increased sediment entering stream channels from the exposed soils caused by the fire. However, the fire did not burn the area immediately surrounding Ginger Springs which the Ginger Springs Geohydrologic Study considered a high zone of influence where contamination could occur to the groundwater; therefore, municipal water quality should remain at the current condition.

For more details on the prefire watershed conditions and hydrology within the Project Area and the Ginger Springs Municipal Watershed, please see the descriptions of the Little Butte Creek fifth field watershed and the Big Butte Creek fifth field watershed in section 3.7.4, Affected Environment in the Butte Falls Blowdown Salvage EA (USDI 2008c). The general descriptions of the watersheds are relevant at both the fifth and sixth field levels. The Project Area is entirely outside key and deferred watersheds.

3.5.5 Environmental Consequences

Watershed responses to disturbances are very complex and depend on conditions that include, but are not limited to, the timing and intensity of storm events, basin size, slope, aspect, soils, channel stability, ground cover, and canopy cover. All of these conditions vary greatly over time and space to produce different watershed responses. The magnitude of effects from management activities depends largely on the timing and intensity of storm events during the recovery process.
3.5.5.1 Effects of Alternative 1 (No Action) on Water Resources

Direct and Indirect Effects

**Sedimentation**

Under the No Action Alternative, fire-killed trees would not be salvaged. No temporary roads or landings would be constructed. There would be no additional ground disturbance related to salvage under this alternative. Alternative 1 would not contribute to increased road density within the Lower South Fork Big Butte Creek sixth field watershed or the Salt Creek-Long Branch sixth field watershed. This alternative would not contribute additional sediment to streams. The current watershed condition related to sediment would remain because no ground disturbing activities would occur. As vegetation begins to grow and reestablish itself, sedimentation levels would begin to return to prefire levels.

**Ginger Springs Municipal Watershed**

Salvage operations and temporary road construction would not occur within the Ginger Springs Municipal Watershed so there would be no direct effects from ground-disturbing activities. No activities are proposed which would affect water quality within any of the zones of influence in this watershed. Therefore, municipal water quality in the Ginger Springs Municipal Watershed would remain at the current condition. Short-term impacts of increased sediment to local streams from the fire should improve over time as vegetation recovers. BLM road #35S-2E-23.6 would not be rerouted to reduce erosion and subsequent sedimentation under this alternative. Rutting and subsequent erosion on this section of road would increase.

**Cumulative Effects**

Under the No Action Alternative, fire-killed trees would not be salvaged. No temporary roads or landings would be constructed. There would be no additional ground disturbance related to salvage under this alternative. Alternative 1 would not contribute to additional road density within the two sixth field watersheds. This alternative would not contribute additional sediment to streams.

Alternative 1 would maintain the current cumulative effects from previous logging, road building, the windstorm, and the Doubleday Fire and would not directly add additional effects because no projects would be implemented. However, since no road work would occur under this alternative, eroding roads could become worse over time if left in the current condition.

Past actions, including road building and logging, have contributed to sedimentation in the watersheds. The main roads in the watersheds tend to be within the riparian reserves parallel to perennial streams. Roads lower in the watersheds have rock surfacing and roads further up in the watersheds have rock or natural surfaces. The potential for sediment delivery from roads paralleling streams would be greatest where cross drain spacing is insufficient and road drainage or surfacing is in poor condition. Roads in this situation would deliver chronic fine sediment over many years or decades, contributing to poor aquatic habitat. This situation is common in these two sixth field watersheds.

Future Federal actions include timber sales, young stand thinning, improved road maintenance and drainage, meadow restoration and protection, and large wood projects in area streams. All of these actions will implement PDFs and Best Management Practices to minimize impacts and improve riparian and aquatic function. Therefore, future water quality conditions should have reduced fine sediment levels and reduced stream temperatures.
3.5.5.2 Effects of Alternative 2 on Water Resources

Direct and Indirect Effects

Sedimentation

The 220 acres proposed for salvage harvest are on the flat uplands within the burn area that do not contain any streams. This equates to 49 percent of BLM lands within the fire perimeter and 18 percent of the total fire area across all ownerships. No salvage harvest would occur within riparian reserves; therefore, there would be no affect to stream temperatures as a result of this alternative.

The Doubleday Fire burned across 1,236 acres that affected BLM-administered land in two sections. In section 27, Township 35 South, Range 2 East, the fire was a high severity burn that consumed most of the duff and litter layer. The northern two-thirds of section 27 are within the Salt Creek-Long Branch sixth field watershed with the southern one-third draining into the Lower South Fork Big Butte sixth field watershed. In section 23, Township 35 South, Range 2 East, the fire burned at mixed severity from low to high, with more duff and litter layer left on the soil as well as a greater proportion of canopy intact. This section is entirely within the Lower South Fork Big Butte Creek sixth field watershed.

There are very few streams on BLM-administered lands within the Doubleday Fire area. Full riparian reserves would be used to keep salvage away from streams. In the Salt Creek-Long Branch sixth field watershed, there is one intermittent headwater stream that originates in section 27. This stream would have a full riparian reserve of 165 feet on either side to minimize sedimentation and maintain water quality. In the Lower South Fork Big Butte Creek sixth field watershed, Ginger Creek is a perennial stream that runs through section 23. Ginger Creek has a riparian reserve width of 190 feet on either side to maintain water quality. One salvage unit on the east side of the fire borders a fish-bearing riparian reserve on Doubleday Creek, which has a width of 380 feet. All salvage harvest units and temporary road building would occur outside riparian reserves to minimize water quality impacts.

In areas of moderate burn severity, the majority of the trees did not lose their needles from the fire. Since the fire, the needles have fallen and would provide the soil surface some additional protection from erosion. In areas of high severity burn, the needles were consumed and no additional protection would be provided to the soil through needle fall. Those areas would be at a greater risk for erosion.

The amount of erosion and subsequent sedimentation is so great after a large, intense wildfire, that erosion and sedimentation from logging these areas is very difficult to differentiate. However, similar to harvesting in green tree stands, ground-based skidding generally causes the most erosion and compaction, followed by skyline, and helicopter (McIver and Starr 2001, 166).

Tractor yarding would occur on 107 acres with slopes less than 20 percent. Skyline yarding would occur on approximately 112 acres. Typically, tractor logging occurs on slopes up to 35 percent on BLM-administered lands, but to minimize soil disturbance after the Doubleday Fire, only slopes generally less than 20 percent would be tractor yarded. There is a low probability sediment would reach stream channels as a result of salvage harvest because the units are sufficient distance from stream channels to filter sediment once vegetation recovers and tractor yarding salvage units are located on relatively flat topography.

Under Alternative 2, 10 temporary roads, totaling 1.5 miles, would be constructed. These temporary roads would be located on the flat uplands, on or near ridge-tops, and away from stream channels to
prevent sediment from reaching streams. The roads would be decommissioned after use by ripping the road surface, seeding, and mulching and consequently reducing erosion to a negligible level.

This alternative proposes to rebuild an existing pump chance located on a tributary to Salt Creek in southeast half of the northeast half of section 27, Township 35 South, Range 2 East on BLM road #35S-3E-34. This project is needed because the earthen dam has breached and the pump chance is no longer holding water. The redesign of the pump chance would involve partially rebuilding the pump chance earthen dam to the original storage volume of 0.21 acre-feet, buttressing the dam, replacing two 18-inch culverts with 24-inch culverts, rechanneling the stream at the pump chance inlet, and stabilizing the disturbed soils onsite. This project would be implemented during the dry season to minimize and prevent sediment from being transported downstream.

Of the 220 acres proposed for salvage, 157 acres are within the transient snow zone. The fire burned at moderate and high burn severity and removed the majority of the canopy within these areas. Salvage logging would not affect canopy closure; the canopy has been burned by the fire and no longer is intact. Salvage logging would not increase runoff because the canopy has already been reduced. Evapotranspiration has been reduced where trees have been killed by the fire and would not be further affected by salvage logging; therefore, annual yield or peak flows would not be affected by this alternative.

Of the 220 acres proposed for salvage, 157 acres are within the transient snow zone. The fire burned at moderate and high burn severity and removed the majority of the canopy within these areas. Salvage logging would not affect canopy closure; the canopy has been burned by the fire and no longer is intact. Salvage logging would not increase runoff because the canopy has already been reduced. Evapotranspiration has been reduced where trees have been killed by the fire and would not be further affected by salvage logging; therefore, annual yield or peak flows would not be affected by this alternative.

Water quantity is not expected to change as a result of salvage under this alternative. The canopy and litter layer have been reduced or completely removed by the fire on areas of high and moderate burn severity. This reduction has increased surface runoff and erosion, especially within high and moderate burn severity areas. The removal of fire-killed trees is not expected to further increase the likelihood of runoff because the canopy and litter layer have been removed by the fire and would not be further reduced through salvage.

Ginger Springs Municipal Watershed

Of the 220 acres proposed for salvage harvest, 186 acres are within the Ginger Springs Municipal Watershed. The logging systems on these acres include 79 acres of tractor yarding and 107 acres of skyline yarding. Approximately 0.9 miles of the 1.5 miles total of temporary road would be constructed within the municipal watershed. These temporary roads would be located on stable locations away from stream channels. After use, temporary roads would be ripped, seeded with native grasses, and mulched to increase infiltration, reduce runoff, and prevent sediment from reaching stream channels.

Activities that could affect water quality, such as road building and tractor yarding, would take place within the low zone of influence so municipal water quality would remain at its current condition. Skyline and tractor yarding would occur on a small portion (about 10 acres) of the moderate zone of influence in this watershed. The moderate zone of influence mostly follows stream channels (with some upland exceptions) that would be protected with riparian reserves. There are no activities proposed in the high zone of influence in the Ginger Springs Municipal Watershed so municipal water quality would remain high.

BLM road #35S-2E-23.6 is a native surface road located in the Ginger Springs Municipal Watershed and the Lower South Fork Big Butte Creek sixth field watershed. A 900-foot portion of this road is located in a steep (greater than 20 percent grade), entrenched through-cut and is proposed for relocation. This road was blocked but was opened for access during Doubleday Fire suppression. Water cannot drain properly and has resulted in rutting of the road surface and subsequent erosion. Under Alternative 2, the road...
would be relocated around the steepest portion of the existing road and 12 inches of rock would be added to raise the roadbed and reduce the entrenched portion of road. The existing roadbed would be ripped and recontoured where possible, seeded with native grasses, and mulched to reduce the risk for further erosion. A total of 900 feet of new road would be constructed at a 12 percent grade. In the long-term, this project would reduce erosion from the road surface and subsequent sedimentation within the watershed.

**Cumulative Effects**

Stream sedimentation would not be increased as a result of projects proposed under this alternative. Increases in stream sedimentation are likely as a result of the fire. With the use of PDFs, the road relocation would not contribute to stream sedimentation and is expected to reduce the amount of sediment that occurs from this road in the long-term. All temporary roads would be ripped, seeded with native grasses, and mulched to minimize erosion and sedimentation.

Elevated stream temperature in these watersheds is a result of the cumulative effects of a combination of land management activities, such as removing riparian vegetation for agriculture, logging, settlement, and road building; withdrawing water for irrigation and domestic use; and the simplification of stream channels. These human disturbances, along with natural causes such as climate and geology, have resulted in some stream temperatures above the DEQ's summer standard of a maximum of 64 °F. Management activities proposed under this alternative are not expected to cumulatively increase stream temperatures because riparian vegetation would not be removed along stream channels.

## 3.6 Fisheries

### 3.6.1 Definitions

**Headwater Stream:** The source and uppermost channels of a drainage network.

**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 streams if they meet these two criteria.

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

### 3.6.2 Methodology

- Information used in this analysis includes GIS, Aquatic Habitat Benchmarks (Moore 1997), Smolt Trap Reports (Vogt 1998; Vogt 1999), and BLM Field Observations (2008).
- The Central Big Butte Creek Watershed Analysis and the *Little 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 Fisheries References).
- The Fisheries analysis area for this project is the Big Butte Creek fifth field watershed for fish habitat and population trends. Impacts would focus on all streams within the entire area burned in the Doubleday Fire.
3.6.3 Assumptions

- All private industrial forest lands within the fire perimeter will be harvested.
- The effects of the Blowdown Salvage timber sales within the Big Butte Creek fifth field watershed and Little Butte Creek fifth Field watershed are occurring or are expected to occur as analyzed in the Butte Falls Blowdown Salvage EA (USDI 2008c).
- Fish populations are dynamic, 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).
- The data from studies at the Big Butte Creek fifth field watershed scale reflects population trends within Big Butte Creek.

3.6.4 Affected Environment

3.6.4.1 Introduction

The Doubleday Fire Salvage project is located within the Lower South Fork Big Butte Creek sixth field watershed and the Salt Creek-Long Branch sixth field watershed. Major streams in the Project Area are Horse Creek, Hukill Creek, Ginger Creek, and Doubleday Creek. Horse Creek, located in the Salt Creek-Long Branch sixth field watershed, flows into Salt Creek, which flows into Little Butte Creek. Hukill Creek, Ginger Creek, and Doubleday Creek, located in the Lower South Fork Big Butte Creek sixth field watershed, all flow into South Fork Big Butte Creek.

Major fish species found within the two sixth field watersheds containing the Project Area are 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 only found lower in South Fork Big Butte Creek. Cutthroat trout are the only species that occupy the fire salvage Project Area.

3.6.4.2 Threatened and Endangered Fish

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.

3.6.4.3 Population Trends

BLM and Oregon Department of Fish and Wildlife (ODFW) trap data concluded Big Butte Creek produced more (estimated) coho smolts in 2000 than any other stream in the Rogue River basin. When the number of miles of spawning and rearing habitat in each basin is considered, Big Butte Creek produced the highest number of both coho and steelhead smolts per mile of spawning and rearing habitat.
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. For more information on fish population trends within the Big Butte Creek fifth field watershed, please refer to the Butte Falls Blowdown Salvage EA (USDI 2008c).

### 3.6.4.4 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).

In general, habitat features found to be in an impaired condition within the Big Butte Creek fifth field watershed are pool quality, spawning habitat quality and quantity, large wood volume, and stream temperature. The major identified causes for degradation of aquatic habitat were rural development, logging, roads, and grazing. For more information on aquatic habitat and trends within the Big Butte Creek fifth field watershed, please refer to the Butte Falls Blowdown Salvage EA (USDI 2008c).

Effects of the fire on the stream channels and aquatic habitat have not fully occurred because winter storms are still happening. However, restoration activities to slow water flow in Ginger Creek during peak events will slow sediment transport and release ash and sediment in smaller pulses downstream where fish and other aquatic organisms live. Other streams affected by the burn have adequate structure to trap sediment and release it in smaller pulses. Predicted effects would be influenced by the amount of rain and are anticipated to be minor based on travel distances to fish and other aquatic organisms.

### 3.6.4.5 Streams within the Doubleday Fire Area

**Prefire**

Horse Creek is an intermittent non-fish-bearing stream in the Project Area. Downstream of the burned area, Horse Creek contains large amounts of debris and material that is not easily transported due to limited flows. Cutthroat trout can use Horse Creek approximately 1.5 miles below the Doubleday Fire burned area.

Horse Creek flows into Salt Creek and then into Little Butte Creek. Salt Creek is considered Critical Habitat for coho salmon which are listed as threatened under the Endangered Species Act. Coho salmon are found approximately 3.0 miles below the burned area.

Hukill Creek is a perennial fish-bearing stream on the west side of the burned area (see map). Hukill Creek is a small headwater stream with typical step/pool habitat. Hukill Creek flows into South Fork Big Butte Creek west of the community of Butte Falls. South Fork Big Butte Creek is considered Critical Habitat for coho salmon. Hukill Creek provides habitat for cutthroat trout (up to the northwest corner of section 22). This stream is likely only used during higher flows when cutthroat trout can swim upstream and spawn; trout are forced downstream when flows dry up in late spring.

Ginger Creek is a small, perennial, fish-bearing tributary stream with typical step-pool habitat. Cutthroat trout use Ginger Creek up to the northern part of section 23 where BLM road #35-2E-23.2 crosses. This stream is likely only used during higher flows when cutthroat trout can swim upstream and spawn.
Cutthroat trout are forced downstream when flows become too low. Ginger Creek flows into South Fork Big Butte Creek east of the community of Butte Falls. South Fork Big Butte Creek is considered Critical Habitat for coho salmon.

Doubleday Creek is a perennial fish-bearing stream that flows into South Fork Big Butte Creek west of the community of Butte Falls. South Fork Big Butte Creek is considered Critical Habitat for coho salmon. The closest timber salvage unit is approximately 1.5 miles from coho critical habitat. Doubleday Creek provides habitat for cutthroat trout throughout section 23. The upper extent of fish use in this stream probably only occurs during higher flows when cutthroat trout can swim upstream and spawn. Cutthroat trout are most likely forced downstream when flows become too low for fish. On occasion, some deep pools may allow cutthroat trout to remain over the summer months.

Roads within the Doubleday Fire area are currently in need of maintenance. Road surfaces are in need of rock and blading to prevent rutting and road drainage. Some road stream crossings that lack adequate rock are sources for stream sedimentation.

Postfire

The headwaters of Horse Creek in sections 26 (private), 27 (public land), and 34 (private), Township 35 South, Range 2 East, burned with a high burn severity. The effect of the fire on coho salmon and cutthroat trout downstream is expected to be inconsequential because the headwaters area that burned in Horse Creek is intermittent and the amount of fine material and structure in the channel below the burn would filter sediment and keep the pulses of sediment and ash small and within the natural range of variability. Increases in sediment levels would occur during heavy rain and would be assimilated into background conditions where cutthroat trout and coho salmon inhabit. Additionally, cutthroat trout can use Horse Creek approximately 1.5 miles below the Doubleday Fire burned area.

The Doubleday Fire burned the eastern portion of the headwaters of Hukill Creek, approximately 2.0 miles above coho salmon Critical Habitat. The area burned at high burn severity. The patchy nature of the burn is expected to result in small pulses of sediment and ash that would be inconsequential to coho salmon downstream. Only small, intermittent streams are located within the burned area and only a small reach on the western side of Hukill Creek burned at low to moderate burn severity. As a result, the effect of the fire on cutthroat trout is expected to be inconsequential.

The Doubleday Fire burned with moderate burn severity through a portion of riparian area in the headwaters of Ginger Creek. Ginger Creek is the only perennial stream that had its riparian area burned. Although the fire burned through the riparian area, the increase of direct solar radiation to Ginger Creek is limited because the moderate burn severity left patches of overstory vegetation. As a result, it is unlikely the stream temperature in Ginger Creek would increase from a few small new canopy openings. The burned area is approximately 1.6 miles above coho salmon critical habitat. The effect of the fire on coho salmon downstream is expected to be inconsequential because the patchy nature of the burn.
and the location of the burned area in the headwaters of Ginger Creek would produce small pulses of sediment and ash.

The Doubleday Fire burned at moderate to high burn severity on the eastern side of the headwaters of Doubleday Creek. The effect of the fire downstream on coho salmon is expected to be inconsequential because the patchy nature of the low to moderate burn severity and the location of the fire in the headwaters of Doubleday Creek would only produce small pulses of sediment and ash.

Table 3-7 displays the riparian reserve acres on BLM-administered land burned in the Doubleday Fire and the burn severity for each stream area.

<table>
<thead>
<tr>
<th>Burn Severity</th>
<th>Horse Creek</th>
<th>Hukill Creek</th>
<th>Ginger Creek</th>
<th>Doubleday Creek</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>10.9</td>
<td>1.3</td>
<td>1.3</td>
<td>3.1</td>
<td>16.6</td>
</tr>
<tr>
<td>Moderate</td>
<td>3.2</td>
<td>0</td>
<td>37.9</td>
<td>3.1</td>
<td>44.2</td>
</tr>
<tr>
<td>Low</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>14.1</td>
<td>1.3</td>
<td>39.2</td>
<td>6.2</td>
<td>60.8</td>
</tr>
</tbody>
</table>

Approximately 10 miles of bulldozer line were constructed during fire suppression efforts. The fire lines on both BLM and private lands were rehabilitated by water barring, seeding, pulling debris over the lines, reforming draws that were bladed, and laying mulch at stream crossings. These fire lines could potentially contribute sediment to adjacent stream channels and at stream crossings until revegetation occurs. This would most likely be an extremely small amount that could be produced in the burned areas lacking forest duff.

The fire completely removed the duff layer from the soil surface in some places. A total loss of shrub, grass, and forb vegetation occurred as well. This could result in increased peak flows and subsequent sedimentation and bank erosion.

During the first hard winter rains, increases in sediment and ash are expected to occur in area streams that are adjacent to or within the burned area. The amount of material that gets transported would depend on the amount of rain, how fast the precipitation occurs, soil saturation, amount of forest duff remaining (burn severity), and slope. Most soil movement and sediment transport is expected to occur within the first winter. In the spring, shrub, grass, and forb vegetation would begin to hold soils together and soil would only be transported during very heavy rain on steep, saturated soil. Therefore, it is anticipated that impacts from the fire to fish and other aquatic organisms would be limited to the first winter (2008-2009) during heavy rain and would be locally isolated.

### 3.6.5 Environmental Consequences

#### 3.6.5.1 Effects of Alternative 1 (No Action) on Fisheries

**Direct and Indirect Effects**

Under Alternative 1, salvage activities and the potential for resulting ground disturbance would not occur. Road improvements would not be made and road drainage would not be improved. Forgoing the
road renovation and drainage improvements would continue the production of road-related sediment at road stream crossings, which would continue to keep fish production low around these chronic sites.

If salvage does not occur and the timber remains on the ground and as standing snags, the potential for insect infestation would be high. This could affect forest health outside the burned area which could degrade aquatic conditions for decades. The potential for another wildfire would continue to persist. If another wildfire occurred in this area, the burn severity would be high due to the large amount of heavy fuels remaining (see section 3.8 Fire and Fuels). Large amounts of downed wood in the riparian reserves would remain on-site and continue to function for decades.

**Cumulative Effects**

Although the Doubleday Fire burned 1,236 acres, the impacts of the fire to the Little Butte Creek and Big Butte Creek fifth field watersheds are fairly benign to the overall health of these watersheds. This is due to the small size of the fire over two larger watersheds and the small scale of impacts anticipated from the fire.

In the past decade, numerous Federal timber sales in these two fifth field watersheds have occurred. However, very few timber sales entered riparian reserves. When timber sales did enter riparian reserves, it was for understory thinning or salvage of already downed trees. The riparian reserves, in general, have been recovering from earlier logging and road construction. All timber sale projects had road renovation associated with them. These renovations brought forest roads up to standards that maintain or improve road drainage and, therefore, decrease the amount of sediment that enters area streams.

In 2008, the BLM “brush packed” the area on Ginger Creek below the burned area on BLM-administered lands in the northern part of section 23. Brush packing is placing small conifers into the stream channel to slow stream flows and trap sediment and ash. This will allow smaller pulses of sediment and ash to be transported, rather than a few larger pulses.

The private lands that were burned (785 acres) will most likely be harvested where trees of merchantable size are available and would remove remaining canopy.

Future Federal actions include timber sales, improved road maintenance and drainage, restoration of disturbed areas, cattle fences and exclosures, and large wood projects in area streams. All of these actions will implement PDFs and Best Management Practices to minimize impacts and improve riparian and aquatic function. Therefore, future aquatic conditions should have higher levels of large wood, reduced fine sediment levels, and more complex pools.

If this timber remains on the ground, potential wildland fire and insect infestation would be high (see sections 3.3 Forest Conditions and 3.8 Fire and Fuels). This could affect forest health outside the burned area which could degrade riparian and aquatic conditions for decades.

**3.6.5.2 Effects of Alternative 2 on Fish**

**Direct and Indirect Effects**

Under Alternative 2, 107 acres would be tractor yarded and 112 acres would be skyline yarded. Due to implementation of full riparian buffers, it is unlikely sediment would be transported from salvage units.
Espinosa et al. (1997), in examining BMPs of the early 1970s, stated “Certainly, the advent of the Forest Plan with its quantitative standards for watersheds and fish habitat . . . has prevented the continuation of severe resource damage that was observed in the 1950s through the 1970s.” Northwest Forest Plan riparian reserve buffers are expected to eliminate sediment delivery from logging disturbance. No ground disturbance would occur within the riparian reserves.

Sediment could move to a stream via overland flows; however, overland flow is rare throughout the Pacific Northwest due to low precipitation intensities and high infiltration rates (Salo and Cundy 1987). Although some riparian reserves had a complete removal of the forest duff layer, it is unlikely material would move off-site over the riparian reserve buffer and into an area stream. Intermittent streams in the Big Butte Creek fifth field watershed have 190-foot riparian reserve buffers and perennial streams have 380-foot riparian reserve buffers. Intermittent streams in the Little Butte Creek fifth field watershed have 165-foot buffers.

Although overland flow is rare due to deeper soils and forest duff (in this case forest duff is not available in many areas), many salvage units contain very gentle slopes. Salvage units with slopes greater than 20 percent would be skyline yarded to protect soil conditions. This would prevent further ground disturbance and sediment transport into area streams. Therefore, it is unlikely that material (sediment) would move off-site from salvage units into area streams through full riparian reserves (165 to 380 feet).

No canopy removal would occur within riparian reserves so no shade would be removed and increases in temperature would not occur. Large woody debris recruitment would not be affected by timber harvest activities because riparian reserves would continue to contribute to large woody debris levels. One timber salvage area has slopes greater than 50 percent next to riparian reserves. This area is in the headwaters area of Ginger Creek. It would be unlikely trees would be transported from the upland harvested area through the riparian reserve to Ginger Creek.

**ESA Listed Fish:** Due to the limited acres of salvage (220 acres over two sections), PDFs to limit soil movement and disturbance, and the distance to coho salmon and coho critical habitat (at least 1.5 miles to coho critical habitat), this project would have “no affect” on coho salmon or coho critical habitat.

**Cumulative Effects**

See 3.6.5.1 Effects of Alternative 1 on Fisheries, Cumulative Effects for past, present, and future actions.

This project would have little impact on the fishery resources within the fifth field and sixth field watersheds because implementation of full riparian reserves and PDFs to protect soils would minimize and limit sediment transport to area streams. The burned area and salvage sale units comprise only small portions of the overall watersheds. Lower South Fork Big Butte Creek sixth field watershed is 16,193 acres and 932 acres burned within this watershed. Salt Creek-Long Branch sixth field watershed is 14,269 acres and 304 acres burned in this watershed. Only 164 acres in Lower South Fork Big Butte Creek sixth field watershed are proposed for salvage (84 acres of skyline and 80 acres of tractor yarding) and 55 acres (27 acres of skyline and 28 acres of tractor yarding) in Salt Creek-Long Branch sixth field watershed are proposed for salvage. Very few timber sales or area projects have entered Riparian Reserves since the implementation of the Northwest Forest Plan in 1994. Riparian reserves on BLM land continues to recover and this project would not inhibit riparian and aquatic recovery on BLM lands.
3.7 Economics

3.7.1 Definitions

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

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

3.7.2 Methodology

- Economics focuses on the project objectives of economic recovery of dead and dying trees to produce a sustainable supply of timber and other commodities from matrix lands and to provide jobs and contribute to community stability (USDI 1995a, 38). In addition to commodity supply, evaluation of the economic feasibility of management actions is a consideration in project design (USDI 1995a, 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 for sawlog material. The values used per thousand board feet of harvest are based on October 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.

3.7.3 Assumptions

- For affected employment levels per million board feet processed, the BLM used the same assumption used in the analysis for the Northwest Forest Plan: 9.07 jobs in the solid wood products industry (USDA and USDI 1994a, 3&4-293).

- In choosing between alternatives, the relative economic effects are considered. Recognizing costs and product values may rise and fall over time, the BLM assumed economic values to remain static in order to simplify the comparative analysis between alternatives.

- Harvest levels within the salvage units range from 10 to 20 thousand board feet per acre.

- Salvage volume occurring on matrix lands will contribute to the Medford District’s annual allowable sale quantity (ASQ) of 57 million board feet.

3.7.4 Affected Environment

3.7.4.1 Economic Setting

A regional perspective of the economic setting is provided in the Northwest Forest Plan (USDA and USDI 1994a, 3&4 261-319). 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.
The Doubleday Fire burned 1,236 acres: 451 acres of BLM-administered land and 785 acres of private land. The BLM lands within the Doubleday Fire are fragmented by various land use allocations under the 1995 ROD/RMP, including matrix, riparian reserve, and known northern spotted owl activity center (see Figure 3-1). The forested lands are made up of a mixture of age and size classes of timber stands. The Doubleday Fire area contains 330 acres of merchantable timber stands, generally stands with trees 8” diameter or larger, on matrix lands.

**Figure 3-1.** Acres burned in the Doubleday fire by land allocation.

### 3.7.4.2 Economic Factors

Economic factors which affect supplying forest commodities in an economically feasible manner are the amount and distribution of material available for harvest, harvest method, access to harvest areas, and associated costs to mitigate the effects of harvest, such as post-salvage slash treatment. An additional factor related to salvaging 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.

Common harvest methods (yarding trees from stump to truck) are the 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 increases.

Mitigation of harvest effects includes costs such as ripping compacted soils, decommissioning or closing roads, treating slash, and implementing 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. Delay in salvaging dead trees can lead to both reduced value and reduced volume, depending on the length of the delay and the tree species. In a study completed on the Okanogan and Wenatchee National Forests in March 2006, *Wood Changes in Fire-Killed Tree Species in Eastern Washington*, wood changes in trees killed by 1994 wildfires were estimated. 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.

### 3.7.5 Environmental Consequences

#### 3.7.5.1 Effects of Alternative 1 (No Action) on Economics

**Direct and Indirect Effects**

Under the No Action Alternative, management actions would not occur. Fire-killed trees within the Doubleday Fire would not be salvaged. Within the proposed fire salvage area, the BLM dropped approximately 155 acres of blowdown salvage analyzed in the *Butte Falls Blowdown Salvage EA* (USDI 2008c). Under this alternative, the volume of blowdown salvage from these acres would not be recovered.

There would be no timber volume provided from this Project Area in 2009 timber sale offerings to contribute toward the Medford 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 $400,000 ($200 per thousand board feet times 2,000 thousand board feet) from the fire-killed and burned blowdown trees would not be recovered. Due to the decaying process, recovery of this timber value from fire-killed and burned blowdown trees within the Project Area would be completely lost in an estimated 5 years.
Indirectly, there would be an anticipated increased loss of timber value occurring on adjacent private and public lands under this alternative. It is anticipated stand development and fuel loading would create stand conditions that would increase fire behavior over time and increase the potential impacts if a fire would occur. This would increase the potential for larger fires occurring and killing more green trees, reducing the future economic value from these trees. A higher level of insect infestation is expected if dead and dying trees are not removed. The increased insect infestation is expected to spread to the surrounding live trees further reducing the value of these trees. These conditions would result in a higher level of green tree mortality on both public and adjacent private lands.

Cumulative Effects

Under the No Action Alternative, there would be no contribution from the existing dead and dying trees on these matrix lands to the Medford District’s annual ASQ of 57 million board feet for fiscal year 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 1995 RMP levels. An estimated 2 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.

To meet the Medford District’s ASQ levels, the loss of the opportunity to salvage dead and dying fire-killed trees and burned blowdown would need to be offset by the harvest of green trees in the Medford District’s planned timber sales for fiscal year 2009. Planned fiscal year 2010 timber sale(s) on the district would need to be brought forward for sale in fiscal year 2009.

3.7.5.2 Effects of Alternative 2 on Economics

Direct and Indirect Effects

Under Alternative 2, all salvage available on matrix lands within the Doubleday Fire area, by 1995 ROD/RMP guidelines, would be recovered. Approximately 2 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 18 full-time equivalent jobs. The estimated return to the Federal Treasury for timber harvest would be approximately $200 per thousand board feet for a total value of approximately $400,000.

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 fire-killed and burned blowdown trees on these lands would substitute the harvest of 2 million board feet of planned green (live) timber sales with the salvage of 2 million board feet of dead and dying timber to contribute to the Medford District’s annual allowable sale quantity of 57 million board feet for fiscal year 2009.

Future timber supply from the 220 acres of matrix lands within the fire area 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.
3.8 Fire and Fuels

3.8.1 Definitions

**Burn Severity**: A qualitative assessment of the heat pulse directed toward the ground during a fire. Burn severity relates to soil heating, large fuel and duff consumption, consumption of the litter and organic layer beneath trees and isolated shrubs, and mortality of buried plant parts.

**Canopy Base Height**: The average height from the ground to a forest stand’s canopy bottom. Specifically, it is the lowest height in a stand at which there is a sufficient amount of forest canopy fuel to carry fire vertically into the canopy.

**Canopy Bulk Density**: Determines whether crown fire spread, or the horizontal transfer of fire between crowns, can occur. Measured in kilograms/square meter.

**Fire Behavior**: The manner in which a fire reacts to the influences of fuel, weather, and topography.

**Fire Hazard**: A fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control (NWCG 2008).

**Fire Hazardous Areas**: Those wildland areas where the combination of vegetation, topography, weather, and the threat of fire to life and property create difficult and dangerous problems (NWCG 2008).

**Fire Intensity**: A general term relating to the heat energy released by a fire.

**Fire Risk**: The chance of fire starting, as determined by the presence and activity of causative agents (NWCG 2008).

**Mixed Burn Severity**: An area of relatively uniform 25 to 75 percent top-kill.

Some regional modeling leads and modelers interpreted mixed-severity fire as an area containing patchy combinations of unburned areas and totally burned areas, in effect averaging to a mixed-severity condition (LANDFIRE). This interpretation is consistent with the definition of mosaic fire in version 1.2 of the FRCC Guidebook as “any landscape-scale mixed fire that has scattered patches across the fire perimeter, resulting in a mosaic of burned and unburned patches” (Hann et al. 2004). FRCC Guidebook version 1.3 (http://www.frcc.gov) specifically addresses this issue by clarifying that mixed-severity fire refers only to post-fire effects on vegetation, not to the spatial pattern.

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

**Wildland-Urban Interface**: The area where undeveloped forestland meets and transitions into structures and other human developments.

3.8.2 Methodology

- The scale used for the fuels assessment is the 1,236-acre Doubleday Fire.
- Fuel models (Scott and Burgan 2005) and photo series were used to estimate and predict surface fuels loadings and profiles of all size classes of identified high, moderate, and low burn severity sites within the analysis area. Descriptions of fuel models and photo series used can be found in Appendix E, Fuels Management.
Doubleday Fire Salvage EA

- Fire behavior characteristics were analyzed using the fire behavior models Behave Plus or FMAplus.
- FIREMON (Fire Effects Monitoring and Inventory Protocol) was used to record the effects of the fire on the landscape at multiple scales. FIREMON consists of a standard set of sampling manuals, databases, field forms, analysis programs, and image analysis tools to design and implement a fire effects monitoring project.
- FIREMON protocols for burn severity, composite burn index (CBI), were used to determine burn severity over different areas of the salvage analysis area. In using CBI, burn severity is viewed as a magnitude of change over the landscape. Using this principle, protocols contain design measures that are compatible over multiple scales. This provides a holistic look at burn severity that represents an aggregate of effects over large areas.
- Seven CBI plots were established in the Doubleday Fire area. Plot locations were selected to represent a range of burn severity across the landscape.
- Several FIREMON plots, established in the immediate vicinity of the fire prior to the 2008 windstorms, created a baseline fuel loads for fire hazard. These plots were re-located and re-measured after the blowdown, providing data on post-blowdown fuel loads in the immediate vicinity of the fire.
- New FIREMON plots were established in the burn area to determine fuel loads following the fire. Plots were established in areas of different levels of burn severity.

3.8.3 Assumptions

The following assumptions were made to generate a more accurate surface fuel loading after fire salvage and before fuels treatment:

- Unmerchantable material is less than 8 inches in diameter.
- All material (tops and boles) from cut trees less than 8 inches DBH would be left on the surface where fuel loadings are less than 15 tons per acre.
- Cut trees greater than 8 inches DBH would be removed from the site; however, the unmerchantable tops and boles would remain on-site where fuel loadings are less than 15 tons per acre.
- Stands proposed for fire salvage were analyzed to determine the effect of the salvage activity on the burned area. Modeling results are static and are not intended to be precise predictions of an ever-changing and dynamic environment, but rather a method for comparing alternatives.
- The proposed actions are considered separately from any Burned Area Rehabilitation activities that would take place inside or at the edges of the fire salvage area.

3.8.4 Affected Environment

3.8.4.1 Introduction

The Doubleday Fire burned 451 acres of BLM-administered lands in sections 23 and 27 in Township 35 South, Range 2 East. Of those acres, 179 acres burned at high severity, 259 acres at moderate severity, and 13 acres at low severity.
In Section 23, the fire burned with a greater variety of intensities, resulting in a mosaic pattern of live and dead vegetation. Approximately 79 percent (238 acres) burned at moderate burn severity in a patchy pattern, resulting in varied burn severity throughout the overstory and understory. High severity areas were generally more densely vegetated; however, the presence of heavy blowdown generally resulted in a greater percentage of overstory mortality, even where the overstory was open. In areas of more moderate burn severity, mortality was generally limited to surface and understory vegetation, with areas where group torching resulted in pockets of overstory mortality. Approximately 17 percent of the area (52 acres) burned with high severity resulting in nearly complete mortality in the overstory. This area of high severity was on a ridge top with heavy blowdown present under an open canopy. Approximately 4 percent (13 acres) burned with low severity, burning only the litter layer with minimal to moderate scorch to the brush layer or understory (see Map 3, Doubleday Fire Burn Severity).

In section 27, 86 percent (127 acres) of the BLM acres burned at high burn severity, resulting in nearly 100 percent mortality of all vegetation. A high intensity fire generally consumes the litter, duff, and small woody debris, in addition charring and consuming some of the large woody debris. In the southwest portion of the burned area in section 27, the fire burned 14 percent (21 acres) of the area at moderate burn severity, resulting in the greatest mortality in fine surface fuels such as grasses, forbs, and shrubs with approximately 50 percent of the overstory surviving to date. Visual observations indicate that winds and terrain were the strongest drivers of fire severity in this area, independent of the amount of blowdown present.

### 3.8.4.2 Desired Conditions

The desired condition within the fire salvage area 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).

The desired condition is for predicted fire behavior to decrease following slash disposal activities in the burned areas. This would allow fire suppression resources to effectively suppress future wildland fires during initial attack with hand tools, minimizing the final fire size and cost and the effects on natural resources.

### 3.8.4.3 Fire History and Risk

*Fire risk* is the probability of an ignition, whether the source is human or lightning, within a given area. The fire history and risk for the Doubleday Fire Salvage analysis area was illustrated in the *Butte Falls Blowdown Salvage Environmental Analysis* (2008c). In summary:

“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” (USDI 2008c, 49).
Map 3. Doubleday Fire Burn Severity
Fire risk from blowdown fuels in the fire area was decreased by the Doubleday Fire in the short-term by reducing the amount of readily available fuels on the ground and, in many areas, ladder and canopy fuels as well. Fine fuels are expected to increase immediately following salvage activities with a resultant short-term increase in fire risk. Fire risk would also increase during the early succession (0 to 30 years) of the stand as vegetation becomes reestablished over the fire area (Monsanto and Agee 2008). High risk for reburn and spotting and the potential for high fire intensity would also exist due to the presence of a very high fuel load (up to 100 percent) of horizontal and vertical dead fuels in all size classes.

The BLM project fire and fuels specialist anticipates high dead fuel loads and future snag fall-down from fire-killed trees and trees already weakened by the 2008 windstorms, in addition to an increase in live fuel loads over time, would present high hazards to firefighters and the difficulties encountered during fire suppression would persist (section 3.8.4.5 Fire Behavior).

### 3.8.4.4 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.

The BLM fire and fuels specialist obtained data from FIREMON plots established in moderate and high burn severity areas. Data was also extrapolated using plots established in areas adjacent to the burn area and estimated using measurements from CBI plots in similar, nearby areas. These measurements include coarse woody debris and large boles from the blowdown. Data was averaged over seven plots and used to determine total fuel loads. Table 3-8 shows the total acres of each fuel model and the total fuel loads on the representative plots in the Doubleday Fire area.

<table>
<thead>
<tr>
<th>Burn Severity Rating</th>
<th>Fuel Model</th>
<th>Postfire Fuel Loads (tons/acre)</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>TU1*</td>
<td>No Plots</td>
<td>13</td>
</tr>
<tr>
<td>Moderate</td>
<td>TU1</td>
<td>34.2</td>
<td>259</td>
</tr>
<tr>
<td>High</td>
<td>TU1</td>
<td>28.4</td>
<td>179</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>451</strong></td>
<td></td>
</tr>
</tbody>
</table>

*TU1 is the fuel model suggested for recently burned areas by Scott and Burgan (2005).

### 3.8.4.5 Fire Behavior

Fire behavior describes how a wildfire burns based on environmental characteristics such as surface fuels, vegetation, canopy base height, density or closure, slope, aspect, weather, and elevation. The identification of fuel models helps to describe the fuels available to a fire based on the amount, distribution, and continuity of the vegetation and wood (Table 3-8). Fuels combined with weather and slope can be used to predict potential surface fire behavior characteristics such as rate of spread, flame lengths, and fire line intensity.
Doubleday Fire Salvage EA

The BLM contracts with the Oregon Department of Forestry (ODF) for wildfire suppression. The ODF suppression contract for BLM lands calls for immediate suppression action and containment of all wildfires. The first wildfire in the blowdown area, Taggarts Creek Fire, began early in the 2008 fire season on July 2. ODF firefighters experienced extreme difficulty during initial attack on the fire due to access problems caused by trees blown across roads and high fire line intensity from the heavy fuels on the ground. The Incident Commander reported

- increased response time due to roads blocked by fallen trees,
- heavy equipment (versus hand crews) required for control line construction,
- increased hazard to firefighters from working around heavy equipment in hazardous forest structure,
- increased suppression costs, and
- extreme fire intensity.

The Incident Commander reported, “Although the large diameter trees may not have contributed to the fire’s spread, they inhibited our fire suppression.” He also stated that before the blowdown, fire size would likely have been limited to an acre or two and a hand crew would have been sufficient as a suppression force.

In addition, canopy base height, canopy bulk density, and canopy continuity are key characteristics of forest structure that affect the initiation and propagation of crown fire (Rothermel 1991). Canopy base height is important because it affects crown initiation and propagation of crown fire. As surface fuel loads increase, fire intensity increases, resulting in the potential for ignition of the canopy at higher and higher levels. Canopy closure is an important factor in the ability of a stand to sustain a continuous crown fire; a denser canopy will more likely sustain continuous crown fire.

In the first 10 years following an intense wildland fire, high severity reburn is unlikely due to insufficient duff and downed woody fuels to support prolonged burning (Brown et al. 2003). However, in a study by Ohman (2002), it was found that over a 10-year period, the fall-down rate of dead trees in undisturbed areas was approximately 30 percent; 93 percent of the fall-down occurred in snags less than 100 centimeters in diameter. In drier mixed conifer sites such as the fire area, snag bole fragmentation could take more than 40 years and the increase in coarse woody debris from snags and snag fall-down would also be expected to contribute to fire intensity during that time (Monsanto and Agee 2008).

3.8.5 Environmental Consequences

The amount, distribution, and horizontal and vertical continuity of surface fuels are important elements to consider in reducing undesirable fire behavior. One of the strongest factors influencing fire behavior is fuel moisture, whether live or dead. Fine fuels such as grass, forbs, shrubs, leaves, or needles contribute more to rate of fire spread, while coarse fuels such as logs, stumps, snags, boles, and large branches contribute more to fire intensity.

Predicted fire behavior (e.g., 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 and the resultant fire behavior. Managing fuel quantity and arrangement
across the landscape can moderate fire behavior. Additionally, treated areas could provide locations where fire suppression resources can more safely and effectively initiate fire control measures.

Periods of high fire danger generally occur within the months of July, August, and September, when relative humidity is very low, lightning storms occurring without rain are common, and high winds and drought conditions are present. This proved true for the Doubleday Fire, which was initiated during a late-day dry lightning storm on September 16. To illustrate how weather conditions support extreme fire behavior, during the height of the initial fire run on September 17, the following observations were recorded at NOAA weather station C2551 in east Medford, the closest representative weather station (Table 3-9).

<table>
<thead>
<tr>
<th>Conditions at 2:41 pm</th>
<th>24-hour Maximum</th>
<th>24-hour Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>94.0 °F</td>
<td>96.0 °F at 3:41 pm</td>
</tr>
<tr>
<td>Dew Point</td>
<td>42.5 °F</td>
<td>54.3 °F at 5:31 pm</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>17%</td>
<td>64% at 8:11 am</td>
</tr>
<tr>
<td>Wind Speed</td>
<td>12 mph from WSW</td>
<td>12 mph at 2:41 pm</td>
</tr>
<tr>
<td>Wind Gust</td>
<td>21 mph</td>
<td>21 mph at 6:31 pm</td>
</tr>
<tr>
<td>Pressure</td>
<td>28.19 in</td>
<td>28.33 in at 8:31 am</td>
</tr>
<tr>
<td>Sea Level Pressure</td>
<td>29.64 in</td>
<td>29.88 in at 8:11 am</td>
</tr>
<tr>
<td>Altimeter</td>
<td>29.76 in</td>
<td>29.90 in at 8:31 am</td>
</tr>
</tbody>
</table>

### 3.8.5.1 Effects on Fire and Fuels Common to All Alternatives

#### Direct and Indirect Effects

The majority of the fire area suffered a high rate of mortality in all age classes which burned off the overstory, understory, surface fuels, and much of the fine aerial fuels in areas of the highest burn severity. This increased the effects of sun, winds, and aspect on the remaining fuels. As remaining fuels cure or dry out, they become readily available to burn and contribute to the increase in fire behavior (Leuschen et al. 2000).

Hazard fuels are categorized according to size class (Scott and Burgan 2005).

- 1-hour fuels .......................... 0 to 0.25 inches
- 10-hour fuels ...................... 0.25 to 1.0 inches
- 100-hour fuels ................... 1.0 to 3.0 inches
- 1000-hour fuels .................. more than 3 inches

These size classes are generally accepted and used in most fire behavior analysis programs to determine fire rate of spread and other fire behaviors across fuel models. Fuel models with more fine, “flashy” fuels less than 3 inches in diameter are more likely to have rapid rates of spread. Fuels models with a greater percentage of coarse or heavy fuels greater than 3 inches in diameter will usually have a lower rate of spread, but may burn with greater intensity. These general rules may be affected or altered by changes in the environment such as slope, wind speed, relative humidity, and fuel moistures at the time of a fire. Flame lengths are largely dependent on fuel model and the same environmental factors.
Due to the high intensity with which the Doubleday Fire burned, it is unlikely the load of fine dead fuels would increase significantly over the short-term (10 to 15 years) regardless of activity because the majority of fuels in that size class were directly consumed by the fire. An increase in live fuels is anticipated over time as new vegetation grows in over the fire area.

Over time, dropping branches and snag fall-down would increase heavy dead and down fuel loads, with resulting higher fire intensity and resistance to control (Brown et al. 2003). Problems with firefighter access and egress may increase due to fallen trees across roads. Increased hazard and risk would make it more difficult for the ODF to meet the required suppression objectives during high to extreme weather conditions.

The BLM has a master cooperative fire protection agreement with the ODF that 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. As more people take advantage of recreational opportunities in the wild lands, the occurrence of human-caused fire is 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.

Although it is not necessarily intuitive that fire danger would be possible in the years following a high severity wildfire, even the largest and most intense wildland fire areas will eventually regenerate, at varying rates, depending on how intact and functional the recovery mechanisms are on the site (Miller 2000). In many areas, shrubs and hardwoods resprout vigorously. There is generally dead fuel still present as either aerial or ground fuels. Most aerial (standing) dead fuels will break or fall over time and become ground fuels. As ecosystems recover from fire, they pass through structural stages that have varying levels of fire hazard, risk, and potential intensity.

As vegetation reestablishes through the early seral stage (approximately 0 to 30 years), even lower intensity fire behavior may result in high severity fire effects, regardless of coarse woody debris loads (Monsanto and Agee 2008). Within the first 20 years following the fire, young trees may not be big enough to withstand any reburn, even without the presence of coarse woody debris (natural litter fall or logging slash), as other components of the fuel bed, particularly grasses and shrubs, also contribute to fire spread and fire behavior (Mazza 2007).

**Cumulative Effects**

**Past Actions**

Since the implementation of the Medford District ROD/RMP in 1995, approximately 6,400 acres of BLM-administered lands have been harvested within the Big Butte Creek and Little Butte Creek fifth field watersheds. Density reduction treatments (e.g., commercial thinning, density management, and individual tree selection) occurred on approximately 70 percent of the treatment acres, regeneration harvest on approximately 8 percent, and mortality salvage on the remaining 22 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. Regeneration harvest has replaced stands that have passed the point of optimum wood production with young, fast-growing conifer stands. Mortality salvage has removed windthrown or individual poor vigor trees and used the volume that otherwise would have been lost to decay, competition, or insect mortality.

In addition, on BLM-administered lands, recent salvage of windthrown trees has occurred adjacent to roads throughout the two fifth field watersheds. On matrix lands, the BLM removed hazardous trees leaning toward the road and trees lying fully or partially within the road prism. In riparian reserves and northern spotted owl activity centers, the BLM removed only the portion of the tree within the road prism. The removal of the roadside salvage trees across all land allocations reduced the breeding areas for bark beetles and wood borers, but had a negligible effect on the potential build-up of insect populations because of the substantial amount and widespread extent of the remaining windthrown trees from a January 2008 windstorm.

Hazard fuels treatments in salvage areas ensured that the needles, branches, limbs, and unmerchantable material were either removed to landing sites or lopped and scattered. The roads and adjacent ditch lines were cleared of slash where salvage occurred. Post-harvest fuels treatments such as machine or hand piling and pile burning further reduced surface fuel loading.

If a wildland fire started in these stands, it would likely remain a surface fire throughout most of the fire season. However, after 10 to 20 years, without further treatments to maintain these conditions, surface fuels loads and ladder fuels from shrub and conifer regeneration would continue to increase and the risk of higher intensity surface fires that could produce flame lengths high enough to scorch and damage the overstory trees would increase. This could reduce the number of days during the fire season suppression resources would be able to initially contain a wildfire. Regeneration harvest and mortality salvage treatments, which altered the stand age or structure and which were replanted, would have fire behavior characteristics similar to stands less than 60 years old.

Since the implementation of the Northwest Forest Plan in 1994, timber harvesting on Forest Service-administered lands within the Big Butte Creek and Little Butte Creek fifth 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 79,000 acres of private industrial land within the two fifth 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. Fir engraver beetles would not be of concern as they typically only attack weakened trees. Salvage logging of windthrown trees from the January 2008 windstorm has occurred and most of the concentrated and scattered windthrown trees have been removed. This has reduced the amount of breeding habitat for the Douglas-fir bark beetle and flatheaded fir borer in the fire area. As a general rule, forest lands with less than 4 recently windthrown Douglas-fir trees (greater than 14 inches DBH) per acre would have insufficient numbers of beetles to cause the mortality of healthy trees (ODF 2007). Most of the private industrial lands have been salvaged and are considered below this level.
Of the 114,000 acres of privately owned lands within the two fifth 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. The level of risk of these forest stands to insect infestation is also unknown. It is likely most commercial-sized windthrown and damaged trees from the January 2008 windstorm have been salvaged and would not contribute to the build-up of insect populations.

Hazardous fuel reduction projects on residential properties within the area have helped to expand upon the fuels reduction work completed by the BLM. Most are small projects within the wildland-urban interface and assist in creating a dispersed pattern of fuels reduction on private land. It has been documented that fuels management extending away from urban locations reduces the likelihood that wildfires will spread to urbanized areas and pose ignition threats (Finney and Cohen 2003). At the same time, increased population in the wildland-urban interface increases the risks of new fire starts from human causes.

Present Actions

On BLM-administered lands within the Big Butte Creek and Little Butte Creek fifth field watersheds, six blowdown salvage timber sales (Bowen Over, Blown A Round, Lower Down, Windy Salt, Double Down, and Lookout B Low) have been sold. Windthrown and damaged trees above the level needed to meet snag and coarse woody debris requirements would be salvaged across approximately 4,800 acres. Removal of these trees prior to beetle emergence in spring 2009 would help to reduce the build-up of bark beetle populations. If windthrown trees containing bark beetles are not removed prior to beetle emergence, fire-injured and wind damaged trees would provide favorable habitat conditions for beetle infestation.

The Forest Service is currently implementing the Big Butte Springs timber sale within the Big Butte Creek fifth 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 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.

These limited harvest activities would not be expected to contribute to the build-up of insect populations. Potential fire behavior would be dependent on whether or not slash disposal work was completed, and to what extent.

Future Actions

In the Big Butte Creek fifth field watershed, five timber sales, Flounce Around, Camp Cur, Twin Ranch, Lost Clark, and Eighty Acre, are proposed by the BLM within the 5-year planning cycle. Acreages for the timber sales are as follows: Flounce Around-60 acres, Camp Cur-800 acres, Double Bowen-700 acres, Twin Ranch-450 acres, Eighty Acre-700 acres, and Lost Clark-350 acres. Under the 1995 ROD/RMP, the silvicultural treatments would be a combination of commercial thinning and individual tree selection in stands less than 100 years old and regeneration harvest in stands 100 years or greater. The 2008 RMP revision would permit commercial thinning in stands generally less than 100 years old and
a combination of regeneration harvesting and uneven-aged management in stands 100 to 159 years old. The BLM expects post-harvest conifer growth rates to increase with tree vigor at levels less favorable for successful insect attack.

The Ranch Stew Young Stand Thinning project would precommercially and commercially thin approximately 900 acres of plantations and stands created after previous harvest entries within the past 50 years. Following treatment, conifer growth rates are expected to increase with tree vigor at levels that are unfavorable for insect build-up.

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 timber management direction. Acres not meeting the guidelines for timber management would be dropped from the 5-year timber sale planning cycle.

In the Little Butte Creek fifth 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 rates to increase with tree vigor at levels less favorable for successful insect attack.

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. The BLM will assess fuel loads after harvest and treatment will occur where fuels loads are deemed to be hazardous.

The Forest Service has no known timber sales planned in the Big Butte Creek or Little Butte Creek fifth 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 DBH and greater, 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 DBH, 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. These stands would have potential fire behavior characteristics similar to stands less than 60 years.

### 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 salvage burned timber would not occur. The effects described for this alternative would reflect current conditions and trends shaped by natural events. Vegetation would reestablish itself naturally, with potential for both native and nonnative species to regenerate in the fire area. Conifer species would become established at variable rates of density. Hardwoods would exhibit vigorous brushy sprouting. Rates, species, and density of all vegetation that becomes established would be strongly dependent on the structure that remains in and at the edges of the burned area.
Fuel loading, both live and dead, would continue to increase. Snag fall would continue to increase surface fuel loadings from downed logs and branches. In a study by Ohmann (2002), over 1,000 permanent plots in western Oregon and Washington were visited, in part to quantify rates of snag recruitment and fall. The fall rate of snags in undisturbed stands over a 10-year period over all size classes was 30 percent. The highest fall rate (33 percent) occurred in snags between 50 and 100 centimeters (20 to 39 inches). In snags larger than 100 centimeters, 93 percent were still standing after 10 years, while 30 percent of trees less than 50 centimeters (approximately 20 inches) fell. In the 10-year period following the fire, this would transition coarse woody debris from the crowns to the surface fuel bed.

Ladder fuels would increase due to the influx of more shade-tolerant, fire-intolerant species. An increase in live stem densities or basal area would contribute to higher canopy densities. This in turn would lead to a decrease in healthy, fire-tolerant species and an increase in less healthy, suppressed trees. Fire prediction models indicate that the latter scenario would exhibit greater rates of spread and flame lengths and burn with greater intensities. As the amount of homogeneous, even-aged stands increase in the understory, the potential for high-severity fire impacts would also increase.

As live fuels grow in, fires occurring in the analysis area within the first several years would spread quickly through the fine fuels and build intensity as the larger fuels, such as large limbs, branches, downed snags and small diameter trees, or standing snags, start burning. Active flaming would be sustained for longer periods, especially as these larger fuels 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. Due to snag fall down, fire line construction would likely require the use of bulldozers or heavy equipment in conjunction with hand crews using chainsaws to safely cut and remove large logs impeding the construction of a control line.

In areas of low to moderate burn severity with a live overstory remaining, an increase in individual tree torching and the initiation of crown fire could be expected due to the increased intensities of a fire becoming involved in large amounts of down material. However, the presence of coarse woody debris 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 (Brown et al. 2003). The amount and distance of spotting would be dependent on whether the fire is plume-dominated or wind driven, as well as the type and amount of fuels burning.

In a study by Amman and Ryan (1991) following the 1988 fires in Yellowstone National Park, it was found that within 2 years, 67 percent of the Douglas-fir had been infested by bark beetles. This infestation usually occurred in trees with more than 50 percent basal girdling by fire; however, by 1990, 46 percent of uninjured Douglas-fir were also infested. In a separate, later study (Rasmussen et al. 1996), data on the same plots showed that almost one-third of the Douglas-fir that were green, and considered alive following the 1988 fires, died due to delayed effects of fire or insect infestation.

**Cumulative Effects**

The 2008 Doubleday Fire altered, sometimes drastically, the fuels profile in over 1,200 acres within the analysis area. In areas that burned with relatively high intensity, the result was nearly 100 percent
mortality of all vegetation. Litter, duff, and small woody debris were almost completely consumed, and much of the large woody debris was also charred or consumed. This type of stand-replacement fire sets the stand back to an early-successional stage. In areas of relatively lower or moderate fire severity, the result was a mosaic of burned and unburned soil, shrubs, and mid-to-overstory vegetation. These areas would recover more quickly due to more live forest structure and less damage to soils.

Future fire behavior would be determined by the type and density of species that resprout or germinate. This in turn can be heavily influenced by the degree of soil damage, surviving seed banks, species present at the fire edges or in unburned pockets, seasonal influences, and microsite conditions that may be receptive to the establishment of seeds from species dispersed from off-site (Miller 2000).

In areas of moderate to high fire severity, the BLM anticipates an increase of horizontal continuity of noncompacted, continuous fine fuels from litter fall and new growth. The BLM also expects an increase of vertical continuity or fuel bed depth of fine and large fuels because of an increase in areas of “jack straw” fallen trees from the blowdown and from new snag fall. 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. Over time, 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 areas of low to moderate fire severity, these conditions would also apply, with the added complexity of a larger percentage of live overstory that would help support an influx of shade-tolerant, less fire-resistant trees and shrubs, and open areas supporting the resprouting of hardwoods and shade-intolerant brush species (Hanson and Stuart 2005).

In the early parts of the fire season, the large logs on the ground could provide some shading and increased moistures immediately adjacent to the down logs. However, large areas of 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 more quickly. 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 increase in fire risk can be expected during the majority of the fire season within the burned area, especially until the stand develops a canopy base height sufficient to tolerate understory fire in 20 or more years.

In 5 to 10 years, fire behavior would be modified after the finer fuels have dropped off the larger limbs and become compacted and the larger fuels start to decay. Compaction of the finer 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 occurring at the same time would contribute to the flaming fire front during high to extreme fire 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 passed and would continue to hinder direct fire line construction.

During these stages of recovery, fire behavior would maintain a trend away from historic conditions. Reburn 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. The increase in fire behavior over time could decrease the effectiveness of fire suppression resources to contain wildfires quickly, limit the strategic options, and put firefighters at higher risk.

3.4.5.3 Effects of Alternative 2 on Fire and Fuels

Direct and Indirect Effects

Under the Alternative 2, proposed forest management actions include salvage harvest and slash disposal activities in the areas of low, moderate, and high fire severity within matrix lands. Approximately 1.5 miles of temporary road construction and 900 feet of permanent new road construction are proposed in this alternative.

Salvage would break up the continuity of horizontal and vertical fuel loads contributing to high intensity wildland fire over the long term. Removal of dead and severely damaged trees would also reduce the amount of habitat available for beetles and wood-borers. Appropriate slash disposal treatments following salvage of fire-killed or damaged trees would reduce the amount and alter the distribution of surface fuels in all size classes, subsequently altering the behavior of fire across the landscape. Treating slash created by salvage logging would affect wildland fire intensity within and adjacent to the salvage sites by reducing the finer fuels that create higher fire risk in the short-term (McIver and Ottmar 2007). In areas of lower overstory mortality, the remaining canopy would stand a better chance of surviving future fires or insect infestations. The Project Area is at higher than normal risk for insect infestation, due not only to the presence of fire-killed or weakened trees (Amman and Ryan 1991), but to the location of the fire area in the middle of more than 6,000 acres of windthrown trees.

Salvage and Slash Disposal

In accordance with 1995 ROD/RMP objectives (USDI 1995a, 91), slash would be reduced on all proposed salvage units using an appropriate treatment which may include slashing damaged residual conifers 1 inch to 7 inches DBH, hand-piling slash and burning the piles, chipping the slash, or lopping and scattering slash.

The 1995 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. Any slash disposal treatments would begin within 30 days after the completion of salvage.

In high burn severity areas, all fuels are dead. Most of the fine crown fuels were consumed during the fire, leaving only the larger fuels more than 0.25 inches in diameter. Salvage operations would transition the bulk of the fuel load from the canopy to the ground. The following analysis (Fuel Loading Outputs Report) generated in FMAPlus3 Crown Mass with data collected on-site, illustrates the anticipated ground fuel load following salvage activities (Table 3-10).
Table 3-10. Ground Fuel Load by Fuel Size Class after Salvage Harvest (tons per acre)

<table>
<thead>
<tr>
<th></th>
<th>Foliage</th>
<th>1-hour</th>
<th>10-hour</th>
<th>100-hour</th>
<th>1,000-hour</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crowns</td>
<td>0.00</td>
<td>0.00</td>
<td>0.08</td>
<td>0.19</td>
<td>0.01</td>
<td>0.28</td>
</tr>
<tr>
<td>Crowns deposited to Surface</td>
<td>0.00</td>
<td>0.14</td>
<td>2.62</td>
<td>8.40</td>
<td>0.40</td>
<td>11.56</td>
</tr>
<tr>
<td>Unmerchantable Tops</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Boles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.79</td>
<td>0.79</td>
</tr>
<tr>
<td>Total Loading</td>
<td>0.00</td>
<td>0.15</td>
<td>2.69</td>
<td>8.59</td>
<td>1.19</td>
<td>12.63</td>
</tr>
</tbody>
</table>

Under the Alternative 2, proposed slash disposal activities would reduce fuel loading and continuity within the salvaged treatment areas. A variable amount of merchantable trees greater than 8 inches in diameter would be removed during salvage activities, depending on percent of live crown remaining.

Based on expected fuel loadings and potential fire behavior within the high or moderate to high burn severity areas following salvage activities, the proposed slash disposal treatment is lop and scatter. For low to moderate and moderate severity areas, the BLM would conduct a fuels assessment 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 fire-killed or damaged trees. Those units assessed as a high fire risk due to slash fuel loading would receive priority for slash disposal treatment and the appropriate slash disposal treatment would be conducted. Post-salvage slash treatments would consist of either lop and scatter, hand piling and burning, or excavator piling and burning.

Lopping and scattering the fuels would not change the fuel load following salvage, but would reduce the vertical and horizontal continuity of the fuel bed. Flame lengths and rate of spread would be expected to decrease. However, lop and scatter would increase the 10- and 100-hour surface fuel loads and put the stand into a slash fuel model, resulting in higher expected flame lengths and fire duration and intensity than in an unsalvaged stand. By 10 to 15 years post-salvage, the effect of the slash on fire behavior would be overcome by the effects of new vegetation growth (McIver and Ottmar 2007). 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.

Hand piling and burning would decrease fuel loading of material 1 to 6 inches in diameter by 85 to 95 percent, and would be effective in reducing the rates of spread and flame lengths. Fuels greater than 6 inches in diameter would be left on the surface and would contribute to the coarse woody debris load. This is due to contractual specifications allowing material from 2 to 6 inches in diameter and longer than 2 feet to be hand piled. Following post-salvage assessment, up to 50 percent of low to moderate burn severity areas may receive hand-pile and hand-pile burn slash disposal treatments.

In areas of high fire severity, not enough fine fuels would remain on the slash to make an effective base for hand piles. If, after assessment, it is determined slash levels in a high burn severity area are excessive, excavator piling and pile burning would be the most effective method to use in addressing the total fuel loading and the vertical and horizontal continuity of all fuel size classes. Fuels larger than 6 inches in diameter are able to be piled when using machinery, resulting in a lighter load of fuels between 6 and 8 inches. 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. Flame lengths and rate of spread would be greatly reduced. Approximately 80 to 90 percent of material 2 to
12 inches not removed during salvage operations would be piled and burned. Excavator piling would reduce the overall intensity and duration of a fire burning after the fire front has passed.

**Cumulative Effects**

**Fire Hazard and Risk**

Immediately following salvage activities and prior to slash disposal, fire behavior potential would increase from the current potential fire behavior due to increased surface fuels. A reduction in potential fire behavior would occur within 1 to 5 years following slash disposal treatments, prior to the regeneration of shrubs, grasses, and trees.

Natural regeneration or tree planting in the fire area would result in a temporary (15 years or more) rise in the likelihood of high severity reburn. Thompson et al. (2007) conducted a study on reburn severity in managed versus unmanaged forests. While they found that plantations burned with somewhat higher severity than naturally generated areas, they concluded that “. . . young forests, whether naturally or artificially regenerated, may be vulnerable to positive feedback cycles of high severity fire, creating more early-successional vegetation and delaying or precluding the return of historical mature-forest composition and structure.”

Heavy fuels left untreated on-site would contribute to future fire severity rather than rate of spread. According to Brown et al. (2003), “Large woody fuels have little influence on spread and intensity of the initiating surface fire in current fire behavior models; however, they can contribute to development of large fires and high fire severity.” They address the tendency of larger diameter wood to smolder for extended periods of time, resulting in greater damage to soil and higher resistance to control, but state that this tendency can be mitigated by effective detection and suppression actions.

Stands with moderate or high stand damage, less than 40 percent canopy after salvage, and planted would become more volatile over time and exhibit increased fire behavior intensities. Reestablished stands would become more susceptible to high rates of mortality throughout the summer. After 20 years, all harvested stands would 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 low canopy cover.

Following salvage logging, lop and scatter, and excavator or hand piling followed by pile burning would be the most effective methods to reduce residual fuel loads. Salvage logging followed by lopping and scattering would be effective in reducing large fuels such as the boles from fire-killed or injured trees (Table 3-11). Lopping and scattering would not change the fuel loading of the remaining fuels following salvage, but would further reduce the vertical and horizontal continuity. Flame lengths and fire intensity would be lower than if lop and scatter did not occur. Heavy pockets of fuels would be distributed more evenly, reducing the time it would take for fuels to burn out, with consequently lower severity effects on soil.
Table 3-11. Predicted Fuel Model, Fire Behavior, and Fuel Loadings following Salvage Harvest and Slash Disposal Activities

<table>
<thead>
<tr>
<th>Slash Disposal</th>
<th>Fuel Model</th>
<th>Rate of Spread (chains/hr)</th>
<th>Flame Length (feet)</th>
<th>Intensity (BTU/ft/sec)</th>
<th>1-100 Hour (tons/acre)</th>
<th>100+ Hour (tons/acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lop and Scatter SB1</td>
<td>19.1</td>
<td>5.4</td>
<td>221</td>
<td>2.84</td>
<td>9.59</td>
<td></td>
</tr>
<tr>
<td>Hand Pile Burn TL4</td>
<td>7.3</td>
<td>2.3</td>
<td>35</td>
<td>0.28</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>Machine Pile Burn TL3</td>
<td>4.2</td>
<td>1.6</td>
<td>17</td>
<td>.44</td>
<td>1.44</td>
<td></td>
</tr>
</tbody>
</table>

3.9 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 is included below. See the appendices for the complete discussion.

3.9.1 Effects of Alternatives on Botany

The Doubleday Salvage units are within the range of one federally listed Endangered plant, *Fritillaria gentneri*. However, they do not contain suitable habitat for this species. The proposed actions would be “no effect” to T&E plants because all but 28 acres were surveyed and no populations were discovered.

The proposed actions would not trend to listing Sensitive nonvascular plants because all areas were surveyed and no populations were discovered. No Sensitive vascular plants would trend to listing because all but 28 acres were surveyed and no populations were discovered. The likelihood of a population being present on the 28 acres is very small. Sensitive fungi would not trend to listing because the BLM assumes 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). The BLM surveyed 58 percent of the salvage acres in the past for fungi and no Sensitive species were discovered.

For a complete discussion of existing conditions and analysis of possible impacts from the proposed project, please see Appendix B, Botany.

3.9.2 Effects of Alternatives on Noxious Weeds

Prior to the Doubleday Fire, the BLM conducted surveys for noxious weeds in the area for past harvest projects and for the Blowdown Salvage project. No noxious weed populations were known within the fire area. However, noxious weed seeds may have been introduced during fire suppression activities. Removal of ground cover and overstory vegetation during the fire left soil bare and vulnerable to invasion by weedy species. Although the action alternative creates 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.
3.9.3 Effects of Alternatives on Wildlife

The BLM conducted surveys for Threatened and Endangered (T&E) terrestrial wildlife species known to be present within the range of the proposed Project Area, specifically for the northern spotted owl. One pair of spotted owls has been present within the Project Area since 1988. No other T&E wildlife species are expected to be present within the Project Area based on knowledge of their range and habitat requirements. The action alternative would be “no affect” to T&E terrestrial wildlife species because no habitat for the spotted owl would be removed and noise disturbance would be restricted to occur outside of their critical breeding season. The proposed activities in the action alternative would not trend Special Status wildlife (see Appendix D, Wildlife, Table D-3) toward listing under the ESA and would not remove any of the species’ ability to persist. 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 Special Status wildlife from trending toward listing as a result of the proposed salvage activities in the action alternative.

For a complete discussion of existing conditions and analysis of possible impacts from the proposed project, please see Appendix D, Wildlife.
# 4.0 List of Preparers

## List of Preparers

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Management Guidance</strong></td>
<td></td>
</tr>
<tr>
<td>Heather Bernier</td>
<td>Butte Falls Field Manager/Management Guidance</td>
</tr>
<tr>
<td>Matt Azhocar</td>
<td>Natural Resource Staff Administrator/Management Guidance</td>
</tr>
<tr>
<td><strong>Interdisciplinary Team</strong></td>
<td></td>
</tr>
<tr>
<td>John Bergin</td>
<td>Forest Manager/Team Lead; Economics</td>
</tr>
<tr>
<td>Jean Williams</td>
<td>Environmental Coordinator/NEPA Compliance</td>
</tr>
<tr>
<td>John Osmanski</td>
<td>Forester/Forest Conditions and Insect Populations; Silvicultural Prescriptions</td>
</tr>
<tr>
<td>Shawn Simpson</td>
<td>Hydrologist/Water Resources</td>
</tr>
<tr>
<td>Ken Van Etten</td>
<td>Soil Scientist/Soil</td>
</tr>
<tr>
<td>Marcia Wineteer</td>
<td>Botanist/Botany; Noxious Weeds</td>
</tr>
<tr>
<td>Dave Roelofs</td>
<td>Wildlife Biologist/Wildlife</td>
</tr>
<tr>
<td>Pat Butler</td>
<td>Fuels Specialist/Fire and Fuels</td>
</tr>
<tr>
<td>Randy Bryan</td>
<td>Engineering/Transportation</td>
</tr>
<tr>
<td>Steve Liebhardt</td>
<td>Fishery Biologist/Fisheries</td>
</tr>
<tr>
<td>Terry Garner</td>
<td>Forester/Layout Design</td>
</tr>
<tr>
<td>Phil Ritter</td>
<td>Forester/Planning</td>
</tr>
<tr>
<td>Robyn Wicks</td>
<td>Natural Resource Specialist/Writer-Editor</td>
</tr>
<tr>
<td>Trish Lindaman</td>
<td>Outdoor Recreation Planner/Visual Resources; Recreation</td>
</tr>
<tr>
<td>Ann Ramage</td>
<td>District Archaeologist/Cultural Resources</td>
</tr>
</tbody>
</table>


References

General References


USDA, Forest Service and USDI, 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. Government Printing Office.

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Forest Condition and Insect Populations References


Goheen, DJ. 2001. Guidelines for selecting fire injured trees that are likely to be infested by insects in southwest Oregon forests. Southwest Oregon Forest Insect and Disease Technical Center. Central Point, OR.


USDA, Forest Service, Southwest Oregon Forest Insect and Disease Technical Center. 1995. Relative length of time snags remain standing. Southwest Oregon Forest Insect and Disease Technical Center Workshop on Wildlife Habitat and Insect and Disease Interactions. Butte Falls, OR.
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**Water Resources References**

Bailey, RW and OL Copeland. 1961. Vegetation and engineering structures in flood and erosion control. Technical Bulletin. USDA Intermountain Forest and Range Experiment Station, Ogden, UT.


**Fisheries References**


Doubleday Fire Salvage EA


Economics References


Fire and Fuels References


Appendix A-
Doubleday Fire Silvicultural Prescription, Marking Guidelines, and Responses to Forest Vegetation Scoping Comments

A.1 Doubleday Fire Silvicultural Prescription

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.

**Epicormic**: Shoot arising from an adventitious or dormant bud on a stem or branch of a woody plant.

**Stomate**: An opening in the surface of a leaf through which water vapor, carbon dioxide, and oxygen pass.

A.1.2 Management Direction and Objectives

A.1.2.1 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 1994a, 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 1995 ROD/RMP land allocation (1995 ROD/RMP, 72 and 186).
- Silvicultural treatments would be designed so that within-stand endemic levels of insects do not increase (1995 ROD/RMP, 194).

A.1.2.2 Treatment Objectives

- To recover timber volume from fire damaged trees in excess of CWD and snag requirements. The excess trees on Matrix lands are part of the timber yield analyzed and allowed for in the 1995 ROD/RMP.
- To implement silvicultural treatments that reduces the potential for epidemic levels of bark beetles.
Doubleday Fire Salvage EA

- To accelerate the reestablishment and growth of conifer seedlings in stands that had fire damage with stocking less than the site potential. A mix of conifer species would be planted followed by maintenance treatments to insure the growth potential of the stand is maximized.

A.1.3 Site and Stand Condition

A.1.3.1 General Site Description

The proposed treatment area is located in Jackson County approximately 20 to 25 air miles northeast of the city of Medford. The area is located in portions of section 23 and 27 in Township 35 South, Range 2 East.

A.1.3.2 Drainage/Watershed

The proposed salvage area is located in portions of the Big Butte Creek and Little Butte Creek fifth field watersheds. Approximately 78 percent of the salvage is proposed in the Big Butte Creek fifth field watershed and about 22 percent in the Little Butte Creek fifth field watershed.

A.1.3.3 Abiotic Conditions

Soil Type

The dominant soil types in the Big Butte Creek fifth 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 clay loam subsoil. The Geppert soil is moderately deep and is skeletal (more than 35 percent rock fragments in the subsoil) with an extreme cobbly clay subsoil.

In the Little Butte Creek fifth 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. Soils are older on canyon side slopes as compared to the plateau area. Northerly aspects are deeper and more productive than the warmer rockier southerly aspects.

Site Index

Site index is the average height of the dominant trees at 50 years. Site index is based on the Hann-Scrivani site index equation (Hann and Scrivani 1987). The average site index for Douglas-fir is 76 within the Big Butte Creek fifth field watershed and 81 in the Lower Big Butte Creek fifth field watershed. Height growth is relatively independent of stand density and provides a comparable measure of site productivity between different forest stands.

Topography/Precipitation

The land form within the fire area is variable from moderately steep slopes to gentle slopes to flat. The elevation ranges from 3,040 feet to 4,120 feet above sea level. Annual precipitation averages 45 inches, with approximately 7 inches of dry season precipitation.
A.1.3.4 Biotic Conditions

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 fire 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 prior to the fire was 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 insure successful establishment and growth of conifer regeneration.

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) 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 (see Table A-3) 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.

Snags

1995 ROD/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 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.

Tree and Stand Health, Insects, and Disease

Bark beetle activity has increased within the watersheds, the result of a windstorm in January 2008 that caused windthrown trees across large areas of 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 in and adjacent to the fire area. Widespread presence of windthrown trees has created ideal habitat conditions favorable to the build-up of beetle and borer populations. High populations of these insects may cause the mortality of fire-injured and large healthy green trees over the next 2 to 4 years.
The windstorm in January 2008 also caused tree damage (foliage pruning, branch breakage and root wrenching) in codominant and dominant trees. Damaged trees have increased physiological stress and a greater predisposition to insect infestation.

The wildfire caused varying levels of tree damage, from complete tree mortality to variable levels of crown scorch to a low underburn that left crowns intact and tree boles minimally charred. In areas of recent windthrow, tree damage was greater because burning windthrown trees increased fire duration and intensity.

Douglas-fir mistletoe is present and common in section 23, Township 35 South, Range 2 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 affecting white fir, ponderosa pine, and Douglas-fir. Root rots create tree stress and can predispose trees to bark beetle attack.

Prior to the fire, high stand densities affected 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. Prefire tree vigor influences the ability of fire-injured trees to resist insect attacks and to recover from fire injuries.

Tree senescence, or aging, also plays a role in the condition and vigor of individual trees and their ability to recover from fire damage and resist insect attack. 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 nonphotosynthetic 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.

Other factors contribute to individual tree vigor and the ability of trees to recover from fire damage. Factors, such as the amount of prefire 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 and recover from disturbances.
A.1.4 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.1.4.1 Salvage - Present Conditions

- **Moderate-High**: The fire caused varying levels of tree damage, from complete tree mortality to crown scorch to a low underburn that left crowns intact and tree boles minimally charred. Generally, bark char is moderate to deep and live canopy cover has declined from 80-100 percent to 0-45 percent.

- **Severe**: These stands had complete mortality of the existing forest vegetation. Nearly 100 percent of the above ground vegetation has been fire killed. The bark of tree boles and limbs are uniformly black and tree crowns have no live needles. No live canopy cover is present.

Target Stand

<table>
<thead>
<tr>
<th>Year</th>
<th>Salvage Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Salvage:</td>
</tr>
<tr>
<td></td>
<td>• 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’).</td>
</tr>
<tr>
<td></td>
<td>• In stands with at least 40 percent live canopy cover, only fire-killed trees would be harvested. In stands below 30 percent live canopy cover, fire-killed and high probability of mortality trees in excess of snag and coarse woody debris needs may be salvaged.</td>
</tr>
<tr>
<td></td>
<td>Site preparation:</td>
</tr>
<tr>
<td></td>
<td>• Lop and scatter hand-pile slash concentrations and burn.</td>
</tr>
<tr>
<td></td>
<td>• Limit piling of logging slash to pieces less than 16” DBH.</td>
</tr>
<tr>
<td>0-1</td>
<td>• Plant with a mix of ponderosa pine, Douglas-fir, sugar pine, and incense cedar.</td>
</tr>
<tr>
<td></td>
<td>• Apply appropriate maintenance (e.g., vexar tubing, mulching, shading, scalping, baiting) treatments to insure planting success.</td>
</tr>
<tr>
<td>1</td>
<td>• Conduct 1st year survival survey in planted stands.</td>
</tr>
<tr>
<td></td>
<td>• Assess need for supplemental planting or additional maintenance treatment.</td>
</tr>
<tr>
<td>3</td>
<td>• Conduct 3rd year survey in planted stands.</td>
</tr>
<tr>
<td></td>
<td>• Assess need for replanting and/or additional maintenance needs.</td>
</tr>
<tr>
<td>5</td>
<td>• Conduct fifth year stocking survey in planted stands.</td>
</tr>
<tr>
<td></td>
<td>• Target stand will have a minimum of 280 well-spaced trees per acre. Competing vegetation will have been controlled, with trees growing rapidly.</td>
</tr>
</tbody>
</table>
Table A-1. Salvage Treatment Schedule

<table>
<thead>
<tr>
<th>Year</th>
<th>Salvage Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>In planted stands, a pre-commercial 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.</td>
</tr>
<tr>
<td>35</td>
<td>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.</td>
</tr>
<tr>
<td>45-80</td>
<td>In planted stands, commercial thin, if appropriate. Favor leaving the pines, Douglas-fir, and incense cedar.</td>
</tr>
<tr>
<td>100+</td>
<td>In planted stands, assess stand and watershed conditions for possible regeneration harvest.</td>
</tr>
</tbody>
</table>

A.1.5 Monitoring

Implementation of the standard and guidelines in the NWFP ROD and management direction contained within the 1995 Medford District ROD/RMP require a monitoring system to insure 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 1995 Medford District ROD/RMP (p. 225-248). Monitoring will be specific to the land allocations and resources affected in the Big Butte Creek and Little Butte Creek fifth 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.
A.2 Marking Guidelines

A.2.1 Definitions

**Fire-Killed Tree:** 100 percent of the crown is scorched with brown needles or the crown is black with no needles.

**Fire-Injured Tree:** The tree crown has green needles present.

**Fire-Injured Trees with a High Probability of Mortality:** Douglas-fir, ponderosa pine, sugar pine and incense cedar with more than 70 percent crown scorch and white fir with more than 40 percent crown scorch.

A.2.2 Background

Of the 220 acres proposed for salvage, 150 acres had a moderate to high burn severity. Within these areas, there is a mix of fire-killed and fire-injured trees. The remaining salvage areas (60+ acres) are high burn severity areas that had 100 percent fire-kill with all the trees black and void of green needles. In the majority of the proposed salvage units bark char is rated as moderate to deep. Moderate char is defined as uniformly black bark except occasionally some inner fissures; with bark characteristics still discernable. Deep char has bark that has been burned into, but not necessarily to the wood; outer characteristics are lost (Hood et al. 2007). Bark char provides a visual estimate of cambial damage, with mortality dependent bark thickness and the intensity and duration of the fire near the bole of the tree. Large windthrown trees throughout most of section 23 and portions of section 27 added significant amounts of ground fuels that increased fire intensity and duration and the amount of bole and root damage.

Prior to the fire, many of the codominant and dominant fire-injured trees experienced varying levels of wind damage during January 2008 windstorms. 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 net photosynthesis. The probability of tree survival following the loss of 50 percent or more of the tree’s crown is low as trees generally have insufficient food reserves (carbohydrate/starch) for bud formation and refoliation (Oliver and Larson 1996; Ripley 2008). Because photosynthesis is significantly impaired, the trees suffer serious physiological stress with recovery unlikely. Some of the trees heavily damaged by the wind and with a low probability of survival will be salvaged under the *Butte Falls Blowdown Salvage EA*.

The windstorm also created a large amount of windthrown trees on the forest floor in and adjacent to the fire area. The windthrown trees created an abundance of favorable breeding habitat for the development of large populations of bark beetles and borers. Evidence of beetle attacks (i.e., orange piles of boring dust on tree boles) is common throughout the wind damaged area. Based on past windstorm events that created large amounts of windthrown trees (Schmitz and Gibson 1996), it is highly likely populations of bark beetles and wood borers will increase considerably. 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 in and adjacent to the fire area provide a large and widespread area for beetles and bark borers to reproduce and expand population levels.
Doubleday Fire Salvage EA

The tree stress caused by the compound effects of wind damage (foliage pruning, branch breakage and root wrenching) and fire damage (crown scorch, root heating and cambium mortality) combined with an active beetle population in the area has predisposed fire-injured trees to a greater likelihood of mortality. Fire damaged trees that normally would survive fire damage alone would be at a greater risk of mortality due to the increased probability of bark beetle attack from elevated population levels (Hood et al. 2007). Post-fire studies have shown fire damage to the inner bark of trees can potentially exacerbate insect problems (Black 2005). Bark beetles are strongly associated with attacks on large fire-injured trees in dense stands with moderate levels of bole char and light to moderate levels of crown scorch (Hood et al. 2007; Fettig et al. 2007; Parker et al. 2006).

A.2.3 Determination of Fire-Injured Trees with a High Probability of Mortality

The negative effects of wind damage, fire damage, and an active beetle population combine to substantially increase the risk of mortality of fire-injured trees. Adding to these effects was an increase in the duration and intensity of tree bole and soil heating caused by the burning of large amounts of recent windthrown trees adjacent to the fire-injured trees.

A review of fire mortality research (Fettig et al. 2007; Parker et al. 2006; Hood et al. 2007; Hood and Bentz 2007; Scott et al. 2002; Ryan and Reinhardt 1988) determined that “Guidelines for Selecting Fire Injured Trees that are Likely to be Infested by Insects in Southwest Oregon Forests” (Goheen 2001) was appropriate in selecting fire-injured trees that would be at a high risk of insect infestation/mortality within the next four years. Because of the difficulty of determining the extent of cambium mortality, the guidelines were modified to avoid over estimating tree mortality. The upper crown scorch threshold would be used as the sole criteria for judging trees expected to have a high probability of mortality. This modification will likely underestimate tree mortality within the next four years with any additional mortality increasing the snag and coarse woody debris amounts.

The potential of crown regrowth through epicormic bole branching was a consideration in assessing the ability of white fir to survive fire damage. Had there been minimal bole and root damage, the 40 percent crown scorch threshold would likely overestimate the amount of white fir trees that would die. However, given the level of bole char and the amount of fuels (including recent windthrow) on the ground that increased the intensity and duration of root heating, it is expected that damage occurred to the phloem cells in the roots of white fir. When the phloem cells of the roots are killed, water is still able to go up the tree through the xylem cells but food (carbohydrates) is unable to come down from the crown foliage. When this occurs, the tree essentially starves from lack of food.

The “Guidelines for Selecting Fire Injured Trees that are Likely to be Infested by Insects in Southwest Oregon Forests” provides an estimate of the likelihood of tree mortality based on experience and research. Given the inherent biological and environmental complexities, such as prefire tree vigor, genetics, site quality, and postfire weather conditions, the accuracy of the guidelines is less than 100 percent.
A.2.4 Salvage Criteria for Areas of Severe Fire Damage

Approximately 65 acres

Fire-killed trees in excess of those needed for wildlife and coarse woody debris are available for salvage.

- Retain 2 snags per acre greater than 20 inches in diameter. These fire-killed trees should be well distributed and have desirable wildlife characteristics such as large diameter trees with broken tops, 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-3 for conversion from tree diameter class to the number of qualifying 16-foot logs.

A.2.5 Salvage Criteria for Areas Containing Fire-Injured Trees with Green Foliage

Approximately 100 acres

Fire-killed trees in excess of those needed for wildlife and coarse woody debris are available for salvage.

- Retain 2 snags per acre greater than 20 inches in diameter. These fire-killed trees should be well distributed and have desirable wildlife characteristics such as large diameter trees with broken tops, 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 long. Refer to Table A-3 for conversion from tree diameter class to the number of qualifying 16-foot logs.

In addition to fire-killed trees, any fire-injured tree meeting the following criteria are available for salvage:

- Douglas-fir, ponderosa pine, sugar pine and incense cedar with more than 70 percent crown scorch. The thick bark of these species provides a higher level of fire tolerance by protecting the bole and root cambium from heat damage.
- White fir with more than 40 percent crown scorch. White fir has a lower level of fire tolerance with moderately shallow roots that are susceptible to soil heating.

A.2.6 Salvage Criteria for Areas with Live Canopy Cover greater than 40 Percent and Fire-Injured Trees with Green Foliage:

Approximately 50 acres

Only fire-killed trees in excess of those needed for wildlife and coarse woody debris are available for salvage. Fire-injured trees that have ANY amount (one branch to a full crown) of green needles are to be left.
• Retain 2 snags per acre greater than 20 inches in diameter. These fire-killed trees should be well distributed and have desirable wildlife characteristics such as large diameter trees with broken tops, 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 long. Refer to Table A-3 for conversion from tree diameter class to the number of qualifying 16-foot logs.

A.2.7 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 1995 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).

<table>
<thead>
<tr>
<th>Log Characteristics</th>
<th>Decay Class</th>
<th>Decay Class</th>
<th>Decay Class</th>
<th>Decay Class</th>
<th>Decay Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log Characteristics</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Bark</td>
<td>Intact</td>
<td>Intact</td>
<td>Trace</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Twigs &lt;3 cm.</td>
<td>Present</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Texture</td>
<td>Intact</td>
<td>Intact to partly soft</td>
<td>Hard, large pieces</td>
<td>Small, soft blocky pieces</td>
<td>Soft and powdery</td>
</tr>
<tr>
<td>Shape</td>
<td>Round</td>
<td>Round</td>
<td>Round</td>
<td>Round to oval</td>
<td>Oval</td>
</tr>
<tr>
<td>Color of wood</td>
<td>Original color</td>
<td>Original color</td>
<td>Original color to faded</td>
<td>Light brown to reddish brown</td>
<td>Red brown to dark brown</td>
</tr>
<tr>
<td>Portion of log on ground</td>
<td>Tree elevated on support points</td>
<td>Tree elevated on support points but sagging slightly</td>
<td>Tree is sagging near ground</td>
<td>All of tree on ground</td>
<td>All of tree on ground</td>
</tr>
<tr>
<td>Invading roots</td>
<td>None</td>
<td>None</td>
<td>In sapwood</td>
<td>In heartwood</td>
<td>In heartwood</td>
</tr>
</tbody>
</table>
### Table A-3. Number of 16-foot Logs produced by Tree Diameter Class

<table>
<thead>
<tr>
<th>Tree DBH</th>
<th>Number of logs per tree 16” by 16’</th>
</tr>
</thead>
<tbody>
<tr>
<td>16”</td>
<td>1</td>
</tr>
<tr>
<td>20”</td>
<td>1</td>
</tr>
<tr>
<td>24”</td>
<td>3</td>
</tr>
<tr>
<td>28”</td>
<td>4</td>
</tr>
<tr>
<td>32”</td>
<td>5</td>
</tr>
<tr>
<td>36”</td>
<td>6</td>
</tr>
<tr>
<td>40”</td>
<td>6</td>
</tr>
<tr>
<td>44”</td>
<td>7</td>
</tr>
<tr>
<td>48”</td>
<td>7</td>
</tr>
<tr>
<td>52”</td>
<td>8</td>
</tr>
<tr>
<td>56”</td>
<td>8</td>
</tr>
<tr>
<td>60”</td>
<td>9</td>
</tr>
<tr>
<td>64”</td>
<td>9</td>
</tr>
</tbody>
</table>

### Table A-4. Physical Characteristics of Snags by Deterioration Stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• Limbs and branches all present</td>
</tr>
<tr>
<td></td>
<td>• Pointed tree top</td>
</tr>
<tr>
<td></td>
<td>• Tight bark</td>
</tr>
<tr>
<td></td>
<td>• Recently dead</td>
</tr>
<tr>
<td>2</td>
<td>• Few limbs</td>
</tr>
<tr>
<td></td>
<td>• No fine branches</td>
</tr>
<tr>
<td></td>
<td>• Pointed or broken tree top</td>
</tr>
<tr>
<td></td>
<td>• Variable level of bark remaining</td>
</tr>
<tr>
<td>3</td>
<td>• Limb stubs only</td>
</tr>
<tr>
<td></td>
<td>• Decay in upper bole</td>
</tr>
<tr>
<td></td>
<td>• Some decay at base of bole</td>
</tr>
<tr>
<td></td>
<td>• Variable level of bark remaining</td>
</tr>
<tr>
<td>4</td>
<td>• Few or no stubs</td>
</tr>
<tr>
<td></td>
<td>• No fine branches</td>
</tr>
<tr>
<td></td>
<td>• Broken top</td>
</tr>
<tr>
<td></td>
<td>• Loose or no bark</td>
</tr>
</tbody>
</table>

### A.2.8 Documentation supporting the assumptions and predictions of “Guidelines for Selecting Fire Injured Trees that are Likely to be infested by Insects in Southwest Oregon Forests” (Goheen 2001)

From the guidelines, a 70 percent crown scorch threshold for Douglas-fir, ponderosa pine, sugar pine, and incense cedar and a 40 percent crown scorch threshold for white fir was selected to identify trees with a high probability of mortality. These high probabilities of mortality parameters are consistent with the findings and recommendations in the literature and research cited below.

#### A.2.8.1 Fettig et al. 2007


Page 35: “Douglas-fir beetles are attracted to trees with only moderate amounts of crown scorch. A high percent of large diameter Douglas-fir that are initially classified as surviving a mixed severity wildfire may ultimately die due to beetle attack.” “In general, tree mortality rates were low until crown damage exceeded 70-80% for un-attacked trees, 40-50% for trees with partial (patch or strip) bark beetle attacks, and 30-40% for trees that were mass attacked.”

#### A.2.8.2 Hood and Bentz 2007

Page 1058: “Trees that are only moderately injured by fire and capable of recovery can be subsequently attacked and killed by bark beetles.”

Page 1059: “The Douglas-fir bark beetle has been consistently associated with fire-injured trees, often attacking larger trees with moderate to high levels of basal bole injury and light to moderate levels of crown injury, with attacks declining only in completely defoliated trees.”

Page 1066: “The level of Douglas-fir beetle activity in the vicinity of the fire will also contribute significantly to the probability of beetle-caused post-fire mortality.”

Page 1067: “Our results suggest that the Douglas-fir beetle can have a significant influence on post-fire delayed Douglas-fir mortality, killing trees that otherwise would survive. Models that do not include this effect for Douglas-fir, such as Ryan and Reinhardt’s (1988) model evaluated here, may significantly underestimate post-fire delayed tree mortality when Douglas-fir beetles populations are active nearby.”

A.2.8.3 Hood et al. 2007


In the Doubleday fire area, the average diameter of fire-injured Douglas-fir is 25 inches.

Page 26: Figure A-5. Predicted probability of mortality curves by Cambium Kill Rating (CKR) and attack status for 25-inch DBH trees. Douglas-fir with an average diameter of 25 inches, crown volume scorch of 70 percent with a cambial kill rating of 2 (scale of 0 to 4) would have a 70 percent probability of mortality. If these trees are attacked by bark beetles there is a greater than 95 percent probability of mortality.

A cambium kill rating of 2 is a light to moderate level of damage that is considered to be a conservative estimate of the actual conditions in the Doubleday Fire.

A.2.8.4 Parker et al. 2006


Page 175. “Fire weakening of Douglas-fir typically increases the probability of attack by Douglas-fir beetles. Despite their inner bark, mature Douglas-fir often suffer severe mortality after fire because Douglas-fir beetles are attracted to trees with only moderate amounts of crown scorch. A high percentage of large diameter Douglas-fir that are initially classified as surviving a fire may ultimately die due to beetle attack.”

A.2.8.5 Ryan and Reinhardt 1988

**Page 1293:** “Table 3. Single bark thickness (BT) as a function of diameter outside bark (DOB) for seven western North America conifer species.” The equation for Douglas-fir is $BT(\text{cm}) = 0.065 \times DOB$. The average DOB of fire-injured Douglas-fir in the proposed salvage units is 25 inches resulting in an average bark thickness of 1.625 centimeters. No bark thickness equation for white fir was available but generally mature white fir/grand fir has a bark thickness of about 2 inches (Howard and Aleksoff 2000) or 0.79 centimeters. The average DOB of fire-injured white fir in the proposed salvage units is 18 inches.

**Page 1294:** “Figure 2, Probability of mortality of seven western conifers, predicted by model 1, as a function of observed crown volume killed and bark thickness calculated from diameter at breast height (1.4).” Using this figure, Douglas-fir with an average bark thickness of 1.625 centimeters and 70 percent crown volume killed would have a probability of mortality of about 80 percent. White fir with an average bark thickness of 0.79 centimeters and 40 percent crown volume killed would have a probability of mortality of about 70 percent.

These probabilities of mortality do not include the potential effects of an active beetle population in the area. Including beetles as a mortality factor would likely increase the probability of mortality percentages.

“Our results suggest that the Douglas-fir beetle can have a significant influence on post-fire delayed Douglas-fir mortality, killing trees that otherwise would survive. Models that do not include this effect for Douglas-fir, such as Ryan and Reinhardt’s (1988) model evaluated here, may significantly underestimate post-fire delayed tree mortality when Douglas-fir beetles populations are active nearby” (Hood and Bentz 2007).

**A.2.8.6 Scott et al. 2002**

This rating system uses a ten factor value system to determine the probability of survival of conifers. The ten factors are listed below; each factor is assigned a point value and the totals for Part A and Part B are added together for a composite score.

**Page 5:**
Part A. Factors common to all species and size classes (except as noted):
- Season of Fire  Pre-fire Vigor, Growth Rate and Site Quality
- Arrangement or Distribution of Down Woody Material
- Dwarf Mistletoe Occurrence
- Root Disease Occurrence for True Firs and Douglas-fir Only
- Bark Beetle Pressure – Infestation Last Year or Known Current Year”

Part B. Factors for Determining Tree Survival up to 1 year after the Fire, Page 13 for Douglas-fir >20 inches DBH and Page 21 for white fir (all size classes):
- Crown Volume Scorch
Doubleday Fire Salvage EA

- Boles Char
- Total Scorch Height
- Duff Consumption

**Page 14:** Douglas-fir - the following rating ranges are used to assess the probability of tree survival:
  - High Probability of Tree Surviving = Composite Rating Score Ranging from 3-10
  - Moderate Probability of Tree Surviving = Composite Rating Score Ranging from 11-17
  - Low Probability of Tree Surviving = Composite Rating Score Ranging from 19-31

Using 70 percent as the crown scorch threshold, Douglas-fir in the Doubleday Fire had a composite score of 20, indicating the tree would have a low probability of survival.

**Page 22:** White fir - the following rating ranges are used to assess the probability of tree survival:
  - High Probability of Tree Surviving = Composite Rating Score Ranging from 3-4
  - Moderate Probability of Tree Surviving = Composite Rating Score Ranging from 5-10
  - Low Probability of Tree Surviving = Composite Rating Score Ranging from 11-30

Using 40 percent as the crown scorch threshold, white-fir in the Doubleday fire had a composite score of 21, indicating the tree would have a low probability of survival.

A.2.9 Doubleday Fire Stand Information

**T35S, R2E, Section 23**

- Stand data for forest stands with fire-injured trees
- Moderate to high fire intensity

<table>
<thead>
<tr>
<th>Table A-5. Stand Information for T35S, R2E, Section 23</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OI Unit</strong></td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>002</td>
</tr>
<tr>
<td>004</td>
</tr>
<tr>
<td>005</td>
</tr>
<tr>
<td>012</td>
</tr>
<tr>
<td>014</td>
</tr>
</tbody>
</table>

1.OI=Operational Inventory
2. All OIs had varying amounts of windthrown trees on the ground. Many of the crowns of the remaining codominant and dominant green trees have wind damage in addition to crown scorch.

DF=Douglas-fir; WF=White fir; IC/PP/SP=Incense cedar/Ponderosa pine/Sugar pine
The stand data provided is not absolute, rather it is an estimate based upon sampling. It is intended to provide a general approximation of existing stand conditions and the effect of implementing the salvage guidelines.

**T35S, R2E, Section 27**

- Operational inventory units – No stand data
- Low and high fire intensity

<table>
<thead>
<tr>
<th>OI Unit</th>
<th>Acres</th>
<th>Stand Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
<td>7</td>
<td>100% tree mortality</td>
</tr>
<tr>
<td>002</td>
<td>32</td>
<td>100% tree mortality</td>
</tr>
<tr>
<td>003</td>
<td>7</td>
<td>100% tree mortality</td>
</tr>
<tr>
<td>004</td>
<td>10</td>
<td>100% tree mortality</td>
</tr>
<tr>
<td>006</td>
<td>23</td>
<td>100% tree mortality</td>
</tr>
<tr>
<td>009</td>
<td>3</td>
<td>low burn severity; small amount of salvage</td>
</tr>
<tr>
<td>010</td>
<td>2</td>
<td>low burn severity; small amount of salvage</td>
</tr>
<tr>
<td>012</td>
<td>6</td>
<td>low burn severity; small amount of salvage</td>
</tr>
<tr>
<td>017</td>
<td>7</td>
<td>100% tree mortality</td>
</tr>
<tr>
<td>018</td>
<td>2</td>
<td>low burn severity; small amount of salvage</td>
</tr>
<tr>
<td>019</td>
<td>4</td>
<td>100% tree mortality</td>
</tr>
</tbody>
</table>
A.3 Silviculture References


Goheen, DJ. 2001. Guidelines for selecting fire injured trees that are likely to be infested by insects in southwest Oregon forests. Southwest Oregon Forest Insect and Disease Technical Center, Central Point, OR.


A.4 Scoping Comments and Responses - Forest Vegetation Recovery

A.4.1 Summary

This salvage proposal provides consideration of both societal needs for timber and also the needs for ecological recovery. It is understood that salvage logging may have negative impacts on the natural recovery process as discussed in papers by Graham et al. (1994), Beschta et al. (1995), Sexton (1998), Donato et al. (2000), Lindenmayer and Franklin (2002), Lindenmayer and Noss (2005), DellaSala et al. (2006), Noss et al. (2006), and DellaSala (2006). However, this proposal seeks to limit those effects to short-term impacts by retaining large biological legacies, minimizing soil compaction, limiting soil disturbance, insuring the establishment of conifer species, providing large riparian reserves, and leaving a large late-successional reserve intact. Given the amount of salvage to nonsalvage acres proposed under this environmental assessment, a diverse mosaic of landscape conditions would be left on BLM-administered lands following salvage activities.

To the extent possible, ecological concerns are incorporated into the design of this proposal. Specifically, salvage is limited to matrix lands. Matrix lands are general forest management areas with timber production as a primary management goal. Matrix lands as analyzed under the 1995 RMP provide for salvage operations to recover the economic value of fire-killed trees and to reestablish fully stocked conifer stands necessary to meet the growth and yield objectives of the matrix land allocation. Two other land allocations within the Doubleday Fire, riparian reserves and late-successional reserves, are not proposed for salvaging. Retention of all trees (fire-killed, fire-injured trees or green) within riparian reserves and late-successional reserves would provide for spatial complexity and diversity of structural conditions within the fire perimeter. Variability in the amount, size, and type of biological legacies (e.g., fire-killed trees, fire-injured trees, snags, green trees, coarse woody debris) would provide varying stand structure and unique habitats across the fire area. The retention of coarse woody debris and snags will provide valuable ecological benefits such as habitat for wildlife, invertebrate, microbial, and fungal species and moisture retention, soil stabilization, shade, and nutrient recycling.

Salvage logging would occur on about 50 percent (220 acres) of the 451 acres of BLM-administered lands in the Doubleday Fire. The amount of trees removed would vary and would correspond to the level of fire severity and amount of tree mortality. The result would be a mix of low, moderate, and high density stand and canopy conditions. On all acres that are salvaged, biological legacies (e.g., green trees expected to survive, 2 snags per acre at least 20 inches in diameter, and 120 linear feet per acre of coarse woody debris at least 16 inches in diameter and 16 feet long) would be left. The number of snags and amount of coarse woody debris identified above applies to snags and coarse woody debris in decay classes 1 and 2 only. Additionally, all snags and coarse woody debris in older decay classes (3, 4, and 5) will be left on-site and protected to the greatest extent possible from disturbance. On the remaining 232 acres, no salvage logging would occur; all trees, regardless of condition, would be left. Of the 232 no-salvage acres, approximately 143 acres have postfire stand characteristics considered to be late-successional. The remaining 89 acres are predominately fire-killed younger stands (less than 40 years old) that function as early successional stands.
**A.4.2 Klamath Siskiyou Wildlands Center et al. Scoping Comments**

**Comment:**

**Attachment 1:** A peer-reviewed study by Donato et al. entitled “Post-Wildfire Logging Hinders Regeneration and Increases Fire Risk” published in Scienceexpress, January 5, 2006.

The paper concludes,

“Our data shows that postfire logging, by removing naturally seeded conifers and increasing surface fuel loads, can be counterproductive to goals of forest regeneration and fuel reduction. In addition, forest regeneration is not necessarily in crises across all burned forest landscapes. The results presented here suggest that postfire logging may conflict with ecosystem recovery goals.”

**Response:**

Natural conifer regeneration is likely to occur within the Doubleday Fire area adjacent to areas that have mature trees with green foliage remaining. Generally, seed cones of the dominant tree species (Douglas-fir, white fir and ponderosa pine) reach maturity and viability during late August to October. Seed production varies with abundant seed crops every two to six years. The fire occurred in mid- to late September and it is expected that any seed cones present at the time of the fire had reached maturity and, if not consumed by the fire, would provide variable amounts of seeds that would germinate in the spring of 2009. The germination of conifer seeds does not guarantee the survival and growth to a mature tree. The recovery process may begin with thousands of seedlings per acre, but over time environmental factors cause many seedlings to die. As late-successional conditions are reached, the same acre may have less than 100 large (greater than 8 inches in diameter) trees per acre.

In the Doubleday Fire, the salvage logging is designed to meet the 1995 RMP management goals and objectives for matrix lands. In meeting those goals, it is expected some natural regeneration would be reduced from the impacts of logging. To insure full site occupancy and the development of late-successional forest conditions, the remaining natural regeneration would be augmented by the planting of a species mix of conifer seedlings suited to the environmental conditions of the site.

**Comment:**


The abstract for this paper states,

“We summarize the documented and potential impacts of salvage logging—a form of logging that removes trees and other biological material from sites after natural disturbance. Such operations may reduce or eliminate biological legacies, modify rare post disturbance habitats, influence populations, alter community composition, impair natural vegetation recovery, facilitate the colonization of invasive species, alter soil properties and nutrient levels, increase erosion, modify hydrological regimes and aquatic ecosystems, and alter patterns of landscape heterogeneity. These impacts can be assigned to three broad and interrelated effects: (1) altered stand structural complexity; (2) altered ecosystem processes and functions; and (3) altered populations of species and community composition. Some impacts may be different from or additional to the effects of traditional logging that is not preceded by a large natural disturbance because the conditions before, during, and after salvage logging may differ from those
that characterize traditional timber harvesting. The potential impacts of salvage logging often have been overlooked, partly because the processes of ecosystem recovery after natural disturbance are still poorly understood and partly because potential cumulative effects of natural and human disturbance have not been well documented. Ecologically informed policies regarding salvage logging are needed prior to major natural disturbances so that when they occur ad hoc and crisis-mode decision making can be avoided. These policies should lead to salvage-exemption zones and limits on the amounts of disturbance-derived biological legacies (e.g., burned trees, logs) that are removed where salvage logging takes place. Finally, we believe new terminology is needed. The word salvage implies that something is being saved or recovered, whereas from an ecological perspective this is rarely the case.

Components of an ecologically defensible salvage policy include the following measures.

(1) Exclude salvage logging entirely from some areas (Hutto 1995, 2006), such as nature reserves and water catchments (e.g., Land Conservation Council 1994), extensive areas of old-growth forest, and places with few or no roads (Trombulak & Frissell 2000). Sensitive sites such as steep slopes and fragile or highly erodible soils also should be exempt from salvage harvesting (Minshall 2003; Karr et al. 2004).”

Response:

The proposed salvage would only occur on matrix lands. All riparian reserves and late-successional reserve lands within the Doubleday Fire would not be salvaged (EA, section 1.2.1). The fire area is well rooded and is not in an area of few or no roads. The topography is generally flat to moderate. Where salvage is proposed on slopes greater than 20 percent, skyline cable yarding would be used to minimize soil compaction and disturbance (EA, section 2.3.1.3).

Comment:

“(2) Ensure that unburned or partially burned patches within the perimeter of a disturbed area (e.g., see De Long & Kessler 2000) are either exempt from salvage or subject to low-intensity harvesting with high levels of legacy retention.”

Response:

Within the fire perimeter, unburned and partially burned patches would receive low-intensity harvesting with high levels of legacy retention. In stands with at least 40 percent canopy cover, only dead trees above the level needed for snags and coarse woody debris would be available for salvage. In these areas, all trees with any amount of green foliage would be left (EA, section 2.4.2).

Comment:

“(3) Ensure that certain biological legacies are retained in salvage-logged areas such as fire-damaged trees (Hutto 1995; Nappi et al. 2004) and large (damaged or undamaged) commercially valuable trees (Morissette et al. 2002). These often have either high habitat value (e.g., for foraging by woodpeckers; Nappi et al. 2003) or a high probability of remaining standing for a prolonged period (Gibbons & Lindenmayer 2002).”
Response:

No riparian reserves or late-successional reserves are proposed for salvage (EA, section 1.2.1). Retention of all trees (fire-killed, fire-injured, or green) within riparian reserves and late-successional reserves would provide for spatial complexity and diversity of structural conditions within the fire perimeter. Variability in the amount, size, and type of biological legacies (e.g., fire-killed trees, fire-injured trees, snags, green trees, coarse woody debris) would provide varying stand structure and unique habitats across the fire area.

On matrix lands that are salvaged, at least 120 linear feet per acre of coarse woody debris (decay class 1 and 2) greater than or equal to 16 inches in diameter and 16 feet long would be left. Snags (decay class 1 and 2) 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 addition to decay classes 1 and 2, all snags and coarse woody debris in older decay classes (3, 4, and 5) will be left on-site and protected to the greatest extent possible from disturbance (EA, section 3.3.5.2). The retained snags and coarse woody debris would be well distributed within the salvage units.

The retention of coarse woody debris and snags will provide for valuable ecological benefits, such as habitat for wildlife, invertebrate, microbial, and fungal species, and for moisture retention, soil stabilization, shade and nutrient recycling. Additionally, all fire-damaged trees expected to survive would be left (EA, section 3.3.5.2).

Comment:

“(4) Modify salvage policies to limit the amounts of biological legacies that are removed from particular sorts of areas (Hobson & Schieck 1999)—such as from burned old-growth stands within wood-production zones as currently occurs in some parts of northwestern North America (e.g., Forest Ecosystem Management Team 1993).”

Response:

No late-successional reserves are proposed for salvaging (EA, section 3.2.1.2). Retention of all trees (fire-killed, fire-injured, or green) within late-successional reserves would provide for spatial complexity and diversity of structural conditions within the fire perimeter. Variability in the amount, size, and type of biological legacies (e.g., fire-killed trees, fire-injured trees, snags, green trees, coarse woody debris) would provide varying stand structure and unique habitats.

Scoping Comment:

“(5) Schedule salvage logging so that effects on natural recovery of vegetation are limited (e.g., Roy 1956 in McIver & Starr 2000; van Nieuwstadt et al. 2001). This suggestion is related to a need to appraise the ability of disturbed stands to recover naturally (Cooper-Ellis et al. 1999) and, hence, the ecological desirability of programs to replant fire-damaged areas (Noss et al. 2006).”

Response:

This salvage proposal provides consideration of both societal needs for timber and also the needs for ecological recovery. It is understood that salvage logging may have negative impacts on the natural recovery process. The proposed salvage would occur on matrix lands only. Matrix lands are general
Appendices

forest management areas with timber production as a primary management goal. Matrix lands as
analyzed under the 1995 RMP provides for salvage operations to recover the economic value of fire-
killed trees and to reestablish fully stocked conifer stands necessary to meet the growth and yield
objectives of the matrix land allocation. To insure full site occupancy and the development of late-
successional forest conditions, a species mix of conifer seedlings suited to the environmental conditions
of the site would be planted (EA, section 3.3.5.2).

Comment:
“(6) Related to the points above, ensure the future maintenance or creation of particular habitat elements
for species of conservation concern within burned areas potentially subject to salvage logging, such as
some woodpeckers (Hutto 1995; Smucker et al. 2005), rare forest carnivores (Bull et al. 2001), cavity-using
mammals (Lindenmayer & Ough 2006), invertebrates (Hoyt & Hannon 2002), and plants (Scott 1985).”

Response:
Retained overstory trees, snags, and down logs would provide for structural and biological legacies
necessary to maintain ecosystem processes throughout the management cycle. These structural
components would also provide habitat for woodpeckers, forest carnivores, cavity-using mammals,
invertebrates, and plants. The salvage proposal would leave varying amounts, sizes, and types of
biological legacies (e.g., fire-killed trees, fire-injured trees, snags, green trees, coarse woody debris)
across the fire area.

Comment:
“(7) Ensure adequate riparian buffers are in place to protect aquatic ecosystems within areas where
salvage harvesting operations occur (Minshall 2003), and retain structures such as logs and logging slash
on the ground to limit soil erosion (Shakesby et al. 1993).”

Response:
No riparian reserves are proposed for salvaging. Riparian reserve buffer widths range from 190 feet
adjacent to intermittent streams and 380 feet adjacent to fish-bearing streams. Within these areas, no
salvage activities would occur and all trees (e.g., fire-killed, fire-injured, or green) and coarse woody
debris would be left (EA, section 1.2.1).

Comment:
“(8) The effects of ground-based logging on soil and water in post disturbance environments can be
great; thus, this type of harvesting should be limited and, whenever possible, replaced with cable or
helicopter systems for removing fire-burned trees.”

Response:
1995 RMP guidelines provide for ground-based yarding on slopes 35 percent or less, (1995 ROD/RMP,
166). This salvage proposal reduces that guideline to 20 percent or less to mitigate impacts to soil. On
slopes greater than 20 percent, skyline yarding systems would be used (EA, section 3.4.2).
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Comment:


Key Findings of this paper include the following:

• Research by both ecologists and foresters provides evidence that areas affected by large-scale natural disturbances often recover naturally.

• Post-fire logging does not contribute to ecological recovery; rather it negatively impacts recovery processes, with the intensity of such impacts depending upon the nature of the logging activity.

• Post-fire logging destroys much of whatever natural tree regeneration is occurring on a burned site.

• Evidence from empirical studies is that post-fire logging typically generates significant short- to mid-term increases in fine and medium fuels.

• There is no scientific or operational linkage between reforestation and post-fire logging; potential ecological impacts of reforestation are varied and may be either positive or negative depending upon the specifics of activity, site conditions, and management objectives. On the other hand, ecological impacts of post-fire logging appear to be consistently negative.

Response:

This salvage proposal provides consideration of both societal needs for timber and also the needs for ecological recovery. It is understood that salvage logging may have negative impacts on the natural recovery process. However, this proposal seeks to limit those effects to short-term impacts by retaining large biological legacies, minimizing soil compaction, limiting soil disturbance, insuring the establishment of conifer species, providing large riparian reserves, and leaving a large late-successional reserve intact.

To the extent possible, ecological concerns are incorporated into the design of this proposal. Specifically, salvage is limited to matrix lands. Matrix lands are general forest management areas with timber production as a primary management goal. Matrix lands as analyzed under the 1995 RMP provides for salvage operations to recover the economic value of fire-killed trees and to reestablish fully stocked conifer stands necessary to meet the growth and yield objectives of the matrix land allocation.

Riparian reserves and late-successional reserves are not proposed for salvage. Retention of all trees (fire-killed, fire-injured, or green) within riparian reserves and late-successional reserves would provide for spatial complexity and diversity of structural conditions within the fire perimeter (EA, section 1.2.1).

Variability in the amount, size, and type of biological legacies (e.g., fire-killed trees, fire-injured trees, snags, green trees, coarse woody debris) would provide varying stand structure and unique habitats across the fire area. The retention of coarse woody debris and snags will provide valuable ecological benefits such as habitat for wildlife, invertebrate, microbial, and fungal species, and moisture retention, soil stabilization, shade, and nutrient recycling (EA, sections 3.3.5.1 and 3.3.5.2).
It is expected the amount of natural regeneration would be reduced from the impacts of logging. To insure full site occupancy and the development of late-successional forest conditions, the remaining natural regeneration would be augmented by the planting of a species mix of conifer seedlings suited to the environmental conditions of the site (EA, section 3.3.5.2).

**Comment:**

**Attachment 12:** An October 6, 2006 letter that appeared in *Science* volume 314 from a number of scientists concluding that:

“The effects of post-disturbance logging require careful consideration of whether to log at all, and if so, how to conduct such logging to minimize negative consequences. If we must conduct post-disturbance logging for timber production, stringent ecological safeguards must be in place to minimize impacts to terrestrial and aquatic ecosystems. When viewed through an ecological lens, a recently disturbed landscape is not just a collection of dead trees, but a unique and biologically rich environment that also contains many of the building blocks for the rich forest that will follow the disturbance.”

**Response:**

See Response for Attachment 8.

**Comment:**

**Attachment 13:** A September 2006 post-disturbance literature review by Dr. Dominick A. DellaSala, Ph.D. for the National Center for Conservation Science and Policy.

The executive summary for the review states,

“Post-disturbance recovery, much like fire itself, has been the subject of intense debate and widespread misunderstanding regarding how and whether to treat regenerating landscapes following large disturbance events. As HR4200 – the Forest Emergency Recovery and Research Act – heads to the Senate for debate, it is important that lawmakers and land managers consider the latest science in making informed decisions about the management of public lands following natural disturbances. Numerous scientific studies have demonstrated that natural disturbances, even very large ones such as volcanic eruptions, wildfires, and severe wind storms, are critical to the health of terrestrial and aquatic ecosystems as they are characterized by unique biological communities and generate important structural elements that forests depend on for decades to centuries. The standing dead, dying, and downed trees (especially large ones) and surviving green and scorched ones transfer their critical functions from the predisturbed forest to the regenerating one. When post-disturbance ‘salvage logging’ removes these important forest elements, it sets back recovery triggering ecosystem damages that may exceed the impact of the initial disturbance itself. Based on a review of approximately 38 scientific studies on post-fire logging and additional government reports published to date, not a single study indicated that logging benefits ecosystems regenerating after natural disturbance. In fact, post-fire logging impedes regeneration when it compacts soils, removes ‘biological legacies’ (e.g., large dead standing and downed trees), introduces or spreads invasive species, causes soil erosion when logs are dragged across steep slopes, and delivers sediment to streams from logging roads. With post-disturbance logging these impacts occur when forest recovery is most vulnerable to the effects of additional, especially anthropogenic disturbances, creating cumulative effects that exceed logging of undisturbed forests. Such effects can extend for a century or more, because of the removal of long-persisting and functioning wood legacies. These findings are especially relevant to public lands policy and management.
Doubleday Fire Salvage EA

as post disturbance logging currently generates ~40 percent of the timber volume on Forest Service lands nation-wide (USFS Washington Office, timber volume spread sheets - Timber Management Staff, 2005 statistics). Therefore, the following conclusions were provided to assist decision makers regarding post-disturbance management decisions: (1) post-disturbance landscapes should be allowed to regenerate naturally as evidence from several locations (Biscuit fire (sw Oregon), Storrie and Starr fires (California Sierra’s), Yellowstone 1988 fires, Mt. St. Helens eruption, New England hurricanes and insect infestations) indicates recovery can be surprisingly swift and many species that colonize disturbed areas are adapted to them, contributing to recovery in unique ways; (2) road building (even temporary roads) damages regenerative processes in terrestrial and aquatic ecosystems and should be avoided; (3) natural disturbances are characterized by unique biological legacies (large dead and dying trees) essential to regenerative processes – recovery is not possible in their absence; and (4) if salvage logging is to take place for economic reasons, large trees should be retained to protect their biological legacy functions and ‘no harvest zones’ established on steep slopes with fragile soils, including areas of conservation and public health concern such as late-successional and old-growth forests, riparian areas, aquatic watersheds essential to drinking water municipalities, and roadless areas.”

Response:
See Response for Attachment 8. The fire has roads throughout the area and is not considered a roadless area. The topography is generally flat to moderate and where salvage is proposed on slopes greater than 20 percent, skyline cable yarding would be used to minimize soil compaction and disturbance (EA, section 3.4.2).

Comment:
CALUCULATING [sic] THE NUMBER OF LEAVE SNAGS PER ACRE

The forthcoming NEPA document must fully analyze and disclose the ability of the timber sale units to provide the required habitat for snag-dependent species. This analysis must be conducted on an acre-by-acre basis rather than “masked” by relying on snags outside of harvest units to alter the post-harvest per-acre snag numbers.

Response:
In areas that are salvaged, 2 snags per acre at least 20 inches in diameter would be left. The number of snags applies to decay class 1 and 2 snags only. In addition to decay classes 1 and 2, all snags in older decay classes (3, 4, and 5) will be left on site and protected to the greatest extent possible from disturbance. The retained snags would be left well distributed within the salvage units (EA, section 3.3.5.2).

Comment:
DISCLOSE THE ECOLOGICAL ROLE OF LARGE DOWN WOOD

The forthcoming NEPA documents should provide an analysis of the role of large-coarse woody debris in ecosystem recovery processes, including maintenance of soil, mycorrhizal mats, “nurse logs,” woody debris for fish, microclimate for seedling establishment, and habitat for insect eating species (considerable research on this has been conducted throughout the Pacific Northwest, most by agency scientists).
Response:

Coarse woody debris would provide habitat for wildlife, invertebrate, microbial, insect predators, and fungal species. The trees would also provide important ecological functions such as moisture retention, structural complexity, soil stabilization, nutrient recycling and dead shade for the re-establishment of conifer tree species. On matrix lands that are salvaged, at least 120 linear feet per acre of coarse woody debris (decay class 1 and 2) greater than or equal to 16 inches in diameter and 16 feet long would be left. In addition to decay classes 1 and 2, all coarse woody debris in older decay classes (3, 4, and 5) will be left on-site and protected to the greatest extent possible from disturbance (EA, section 3.3.5.2). In addition to this coarse woody debris, nonmerchantable fire-killed conifers (less than 8 inches in diameter), all size of hardwoods, standing snags, green trees, and defective trees on the ground or not cut will contribute and increase the total amount of coarse woody debris present.

A.4.3 Oregon Wild Scoping Comments

Comment:


“Indeed, naturally developed early-successional forest habitats, with their rich array of snags and logs and nonarborescent vegetation, are probably the scarcest habitat in the current regional [Pacific Northwest] landscape.”

Response:

Although salvaging would affect the natural recovery process on a portion of the fire area, biological legacies (e.g., snags, coarse woody debris, and green trees expected to survive) would be maintained to provide an array of structural components that would persist during the development of a new stand. Post-fire conditions would include the establishment and dominance of early seral herbaceous and shrub vegetation. Salvage logging would occur on about 50 percent of the 451 acres of BLM-administered lands in the Doubleday fire. The amount of trees removed would vary and would correspond to the level of fire severity and amount of tree mortality. The result would be a mix of low, moderate, and high density stand and canopy conditions. On all acres that are salvaged, biological legacies (e.g., green trees expected to survive, 2 snags per acre at least 20 inches in diameter, and 120 linear feet per acre of coarse woody debris at least 16 inches in diameter and 16 feet long) would be left. The number of snags and amount coarse woody debris identified above applies to snags and coarse woody debris in decay classes 1 and 2 only. In addition to decay classes 1 and 2, all snags and coarse woody debris in older decay classes (3, 4, and 5) will be left on-site and protected to the greatest extent possible from disturbance. On the remaining 232 acres, no salvage logging would occur; all trees, regardless of condition, would be left (EA, section 3.3.5.2).

Comment:

Also, consider an alternative modeled on the recommendations of the Beschta report. Specifically:

- prohibit post-fire logging and road building on all sensitive sites, including: severely burned areas (areas with litter destruction), on erosive soils, on fragile soils, in roadless areas, in riparian areas, on steep slopes, and any site where accelerated erosion is possible.

Response:

This salvage proposal provides consideration of both societal needs for timber and also the needs for ecological recovery. It is understood that salvage logging may have negative impacts on the natural recovery process. However, this proposal seeks to limit those effects to short-term impacts.

The proposed salvage would occur on matrix lands only. Matrix lands are general forest management areas with timber production as a primary management goal. Matrix lands, as analyzed under the 1995 RMP, provide for salvage operations to recover the economic value of fire-killed trees and to reestablish fully stocked conifer stands necessary to meet the growth and yield objectives of the matrix land allocation.

The salvage would not occur in a roadless area.

About 1.5 miles of temporary roads would be built on flat terrain on matrix lands. No roads would be built in riparian areas or areas of fragile soils. Road use would be limited to summer and early fall. Following use, the roads would be removed by ripping, mulching, and planting native grasses and conifer seedlings (EA, section 2.3.1.1). New road construction would occur outside of the fire perimeter and would be limited to 900 feet. The construction would reroute a portion of BLM road #35S-2E-23.6 to eliminate a steep eroded portion of the road.

To minimize soil compaction and disturbance the RMP guidelines of using ground-based logging systems on slopes 35 percent or less would be modified to 20 percent or less for the Doubleday Fire. On slopes greater than 20 percent skyline cable yarding systems would be used (EA, section 3.4.2).

Riparian reserves and late-successional reserves are not proposed for salvaging. Retention of all trees (e.g., fire-killed, fire-injured, or green) within riparian reserves and late-successional reserves would provide for spatial complexity and diversity of structural conditions within the fire perimeter (EA, section 1.2.1).

Comment:

- protect all live trees;

Response:

All live trees expected to survive would be left on the 220 acres salvaged. On the remaining 232 acres, all trees regardless of condition would be left (EA, section 2.4.2).

Scoping Comment:

- protect all large and old snags over 20 inches DBH;
Response:
On the 220 acres salvaged, 2 snags (decay class 1 and 2) per acre at least 20 inches in diameter would be left. In addition to decay class 1 and 2, all snags in older decay classes (3, 4, and 5) will be left on-site and protected to the greatest extent possible from disturbance. No salvage logging would occur on 232 acres, all snags, regardless of decay class or size would be left (EA, section 2.4.2).

Comment:
- protect at least 50% of each size class of dead trees less than 20 inches DBH.

Response:
The cited recommendation is not in the Beschta et al. report. The Beschta et al. report recommendation is “Leave at least 50% of standing dead trees in each diameter class.” “Leave all trees greater than 20 inches DBH or older than 150 years.”

Leaving 50 percent of the standing dead trees in each diameter class and all trees greater than 20 inches DBH or older than 150 would not meet the 1995 RMP management direction for salvage on matrix lands. Matrix lands are general forest management areas with timber production as a primary management goal. Matrix lands as analyzed under the 1995 RMP provide for salvage operations to recover the economic value of fire-killed trees and to reestablish fully stocked conifer stands necessary to meet the growth and yield objectives of the matrix land allocation.

The proposed salvage would occur on about 50 percent of the BLM-administered lands in the Doubleday Fire. On the remaining 50 percent of the acres, 100 percent of the standing dead trees in each diameter class and all trees greater than 20 inches DBH or older than 150 would be left.

Comment:

“. . . research has shown a direct relationship between the level of on-site coarse woody debris and the amount active ectomycorrhizal root tips.”

Response:
The research provides recommended levels of coarse woody debris to retain to insure healthy functional forest soils. It does not preclude the removal of coarse woody debris; rather, it recommends that a portion should be maintained. For the Rocky Mountain Region, the recommended amount is dependent on the vegetative habitat type present. A range from 3 tons per acre to 32 tons per acre is provided, with a generic average of 10 to 15 tons per acre recommended. Only coarse woody debris greater than 3 inches in diameter is included in meeting the target amounts. For the Doubleday Fire, it is expected that the minimum amount of coarse woody debris on the ground following salvage would be 10 to 15 tons (EA, section 3.4.5.3 and Table 3-10).
Appendix B - Botany

B.1 Introduction

Special Status plant categories include Federal Threatened and Endangered (T&E) and Bureau Sensitive vascular plants, lichens, bryophytes, and fungi. The BLM’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.2 Methodology

B.2.1 Predisturbance Surveys

The Medford District’s 1995 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 2008) 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 Field Office – *Limnanthes floccosa* ssp. *grandiflora*, *Lomatium cookii*, and *Fritillaria gentneri* – only *Fritillaria gentneri*’s range is within the Project Area. The areas proposed for fire salvage do not contain suitable habitat for this species. The prefire stands were in the moister Douglas-fir/white fir plant series. *Fritillaria gentneri* typically grows in grassland and chaparral habitats within, or on the edge of, dry, open woodlands, often with a component of Oregon white oak in the overstory (USDI FWS 2003, 10-11).

The BLM completed surveys for Special Status nonvascular plants in 2006 and 2008 on all 220 acres identified for timber salvage and no Special Status species were detected.

Surveys for Special Status vascular plants were completed in 1999, 2006, and 2008 on 191 of the 220 acres identified for salvage and no sites were discovered. Vascular plant surveys will not be conducted on the remaining 28 acres because the likelihood of a rare plant population being present is small. The BLM surveyed approximately 800 acres in sections 23 and 27 for vascular plants between 1991 and 2008 and no Special Status species on the 2008 list were documented. Before the Doubleday Fire, stands in the Project Area were habitat for *Cypripedium fasciculatum*, an orchid that blooms in May and June. The closest populations are one to two miles away. If *Cypripedium fasciculatum* plants were present on those 28 acres prior to the Doubleday Fire in 2008, their underground rhizomes may have been damaged or destroyed during the fire. The fire was stand-replacing, all ground vegetation was consumed, and the soil was scorched. *Cypripedium fasciculatum* recovery after fire is variable. It does not appear to tolerate high-intensity fire which eliminates the duff layer. Past monitoring after fires has shown that plants take several years to recover and produce leaves even where the duff layer is not eliminated (USDA and USDI 2005, 15). A survey one year after the fire would not likely discover this species, even if underground rhizomes survived the fire, because it takes several years to recover and produce leaves.

The BLM does not require predisturbance surveys for Special Status fungi (USDI 2004, Attachment 5,
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1-2). However, the BLM surveyed some portions of the Project Area in the past for fungi prior to timber harvest. In fall 1999 and spring 2000, the BLM surveyed for fungi on 128 acres within the burned area in section 23 and 73 acres outside the burned area in section 27. Surveys documented no Sensitive fungi on the 2008 Special Status Species list in the areas surveyed.

B.2.2 Analysis Area

The analysis area for Special Status plants in this EA encompasses 451 acres of BLM-managed lands in Township 35 South, Range 2 East, Sections 23 and 27. Because no Special Status plant or fungi species are known to occur in the Project Area, analyzing the effects of the proposed actions on a larger area serves no purpose for the protection of rare plants or fungi.

B.3 Assumptions

- There are no legal directives for protecting T&E or Special Status plants on private lands. Although suitable habitat for rare plants may exist 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 Project Area would not change from the existing conditions as a result of the salvage harvest because the proposed salvage would only remove fire-killed trees.

B.4 Affected Environment

No Special Status vascular or nonvascular plant or fungi species have been documented in the proposed fire salvage units.

B.4.1 Prefire

Prior to the Doubleday Fire, the Project Area contained mixed age conifer stands in the Douglas-fir and white fir plant series. Elevation ranges from approximately 3,000 to 4,120 feet. Horse Creek, Ginger Creek, the edge of Doubleday Creek, and smaller tributaries bisect the topography. Aspects are mostly north, east, and south with gentle to steep slopes. Riparian vegetation composition is similar to but denser than upland vegetation and environmental conditions are more mesic.

B.4.2 Postfire

The Doubleday Fire burned in September 2008 across 1,236 acres of mostly conifer stands in the Lower South Fork Big Butte Creek and Salt Creek-Long Branch sixth field watersheds. Of the 451 acres burned on BLM-administered lands, approximately 40 percent (179 acres) burned at high severity, 57 percent (259 acres) burned at moderate severity, and 3 percent (13 acres) burned at low severity. The BLM identified 220 acres for potential salvage of fire-killed conifers: 138 acres previously identified as salvage units in the Butte Falls Blowdown Salvage EA and 81 acres added in small parcels around the blowdown units.
The Butte Falls Field Office botanist visited the proposed salvage units in October 2008. The majority of units burned at high severity. In the high severity burn areas, all understory herbaceous vegetation, shrubs, and small conifers were entirely consumed by the fire and trees were scorched 10 or more feet up their boles (Figure B-1). In areas burned slightly less severely, there were occasional small patches of vegetation (1 to 15 feet in diameter) (Figure B-2) and trees with intact lichens and bryophytes on one side that did not burn (Figure B-3). The stands that burned at high severity do not currently provide suitable habitat for Sensitive vascular or nonvascular plants or fungi that are most likely to occur in the area—*Cypripedium fasciculatum* (vascular plant), *Chaenotheca subroscida* (lichen), and Sensitive fungi—because they grow in late-successional conifer forests.

**Figure B-1.** In high burn severity areas, understory vegetation was killed and trees were scorched.

**Figure B-2.** Occasional small patches of vegetation survived.

**Figure B-3.** Some lichens and bryophytes did not burn.
B.5 Environmental Consequences

B.5.1 Effects of Alternative 1 (No Action) on Special Status Plants and Fungi

B.5.1.1 Direct and Indirect Effects

Threatened and Endangered Plants

The Project Area does not contain suitable habitat for T&E plants and no T&E plants were discovered during surveys. Therefore, the No Action Alternative would be “no effect” to T&E plants.

Sensitive Plants and Fungi

No Sensitive vascular or nonvascular plants have been documented in the Project Area and no Sensitive fungi are known to occur there, although not all areas have been surveyed for fungi. No disturbance would occur under the No Action Alternative; therefore, there would be no direct impacts to Sensitive plants or fungi. Not removing the fire-killed trees would not indirectly affect Sensitive plant or fungi species.

B.5.1.2 Cumulative Effects

Threatened and Endangered and Sensitive Plants and Fungi

The BLM surveyed much of the Project Area for Special Status plants and fungi and no species on the 2008 Special Status Species list are known to occur there. However, if Special Status species are present in unsurveyed areas or were present there in the past, they may have been impacted on private or public lands by past activities that altered conditions on the land. Road building, timber harvest, wildfire, and fire suppression activities have caused soil disturbance or removed or altered forest habitat.

Recent events that may have impacted rare plants include a severe windstorm in January 2008 that blew down trees on both private and BLM-administered lands in sections 23 and 27. Although the number of trees that blew down in those two sections was not as great as in other areas, up to 50 percent of the canopy cover was removed in some areas. The reduced canopy cover increases light and air temperatures and reduces relative humidity. These changes in environmental conditions can negatively affect plants and fungi that grow in cooler, moister, shadier conditions.

In September 2008, the Doubleday Fire burned through the area, severely burning stands in the two sections, including the areas with blown down trees. Not only was canopy cover removed and all vegetation burned, the soil was also scorched. Both terrestrial plants or fungi and arboreal species may have been damaged or destroyed, due to the intensity of the fire. Fire suppression activities during the Doubleday Fire, including building dozer and hand lines and using and expanding staging areas, could also have impacted Special Status plant or fungi species if present.

Under the No Action Alternative, the BLM would not salvage fire-killed trees in the Doubleday Fire; therefore, no cumulative effects would be added to past, present, or foreseeable future actions that would negatively affect Special Status plants or fungi. Other planned activities would be implemented, including the salvage of blown down trees on 21 acres in section 23 in the Double Down Salvage Timber...
Sale and 114 acres in section 27 in the Windy Salt Salvage Timber Sale. Foreseeable future actions include continued timber harvest and forest management on private industrial lands, planting conifer seedlings in burned areas or in severe blowdown areas with less than 50 percent canopy cover, recreation, precommercial thinning or brushing in unburned stands, and vehicle traffic on roads throughout the Project Area. Because the BLM surveys for Special Status plants prior to habitat altering management actions, rare plants would continue to be protected on BLM-managed lands when detected. Special Status plants and fungi would not trend toward listing under the No Action Alternative because no disturbance would occur and no additional cumulative effects would be added that could impact them.

**B.5.2 Effects of Alternative 2 on Special Status Plants and Fungi**

**B.5.2.1 Direct and Indirect Effects**

**Threatened and Endangered Plants**

No direct or indirect effects would occur to T&E plants under Alternative 2 because no sites are present and therefore no plants or potential habitat would be impacted. Implementing this alternative would be “No Effect” to T&E plants.

**Sensitive Plants and Fungi**

Under Alternative 2, the BLM would salvage fire-killed conifers on up to 220 acres. Roughly half the acres would be tractor yarded and the other half skyline cable yarded. The BLM would construct 900 feet of permanent road and 1.45 miles of temporary spur roads and fully decommission 600 feet of road. Logging slash would be lopped and scattered or excavator piled and burned on up to 50 percent of the acres. One pump chance would be renovated. Because no Sensitive vascular or nonvascular plant sites are known to occur in the salvage areas, the actions proposed in Alternative 2 would not result in direct or indirect effects to Special Status plants. Although 28 acres were not surveyed for vascular plants and it is unknown if Sensitive vascular plant species occur there, it is highly unlikely populations are present. No other Sensitive vascular plant sites have been discovered in either section 23 or section 27. The Doubleday Fire reduced the likelihood that rare vascular plants are present in the unsurveyed areas. The fire burned at high severity and if present before the fire, both above and below ground plant parts were likely severely damaged or destroyed by the intensity of the flames and scorching of the soil.

Logging and road construction present some risk of damaging or destroying fungi if present in the salvage harvest units. Ground-based equipment could directly impact fungal mycelia during logging, road construction, or ripping during road decommissioning through soil disturbance or compaction. Burning slash piles creates localized high intensity soil scorching that kills existing seed sources and likely also damages fungal mycelia. However, the likelihood of impacting Sensitive fungi during implementation of the proposed actions in this alternative is very low. Approximately 58 percent (128 of 220 acres) of the proposed salvage harvest area has been surveyed in the past for fungi; no Sensitive fungi from the 2008 Special Status Species list were found. No direct or indirect effects would occur to Sensitive fungi during implementation of the proposed management actions in those areas. It is unknown if Sensitive fungi are present in the unsurveyed areas, although it is unlikely because of their rarity across the landscape. If present before the fire, their fungal mycelia was likely damaged or destroyed because the fire burned at high severity through those areas. The fire was a stand-replacing event and the area does not currently provide suitable habitat for Sensitive fungi that grow in late successional forest habitat. Removing fire-killed overstory or downed trees will not change the habitat in the burned area.
Because of these conditions, the likelihood of impacting Sensitive fungi in the unsurveyed areas is very small.

### B.5.2.2 Cumulative Effects

#### Threatened and Endangered and Sensitive Plants and Fungi

Except for the salvage harvest activities proposed in Alternative 2, the past, present, and foreseeable future actions in the Project Area are the same under Alternative 2 as described in Alternative 1. The proposed activities would not add to cumulative effects on rare plants because surveys for Sensitive nonvascular species were completed on all acres and surveys for Sensitive vascular plants were completed on all but 28 acres and no populations were discovered; they would not trend toward listing. Removing fire-killed trees would not reduce the amount of late-successional habitat in the Project Area that Special Status plants may occupy in the future.

Implementing the salvage harvest activities proposed in Alternative 2 would not add cumulative effects to Sensitive fungi that would result in the need to list them because:

- it is unlikely populations are present (see Direct and Indirect Effects of Alternative 2),
- the units do not currently provide suitable habitat for Sensitive fungi because of damage caused during the Doubleday Fire,
- removing fire-killed trees would not reduce the amount of late-successional habitat in the Project Area that Special Status fungi could occupy in the future. The severely burned stands would not provide suitable habitat for rare fungi for decades, and
- the BLM assumes 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 Botany References

Appendices

Appendix C – Noxious Weeds

C.1 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 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 OR110-98-14 (1998). In the 1995 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).

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. Fire management, road construction, logging, farming, over-grazing, recreation, and residential development are activities that exacerbate or contribute to the establishment and spread of noxious weeds (Table C-1) (USDI 1985, 59).

<table>
<thead>
<tr>
<th>Table C-1. Factors Affecting Noxious Weed Spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Private Lands</td>
</tr>
<tr>
<td>Farming and Grazing</td>
</tr>
<tr>
<td>Logging</td>
</tr>
</tbody>
</table>
Table C-1. Factors Affecting Noxious Weed Spread

<table>
<thead>
<tr>
<th>Activity</th>
<th>Role in Dispersing Noxious Weed Seed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Vehicle Traffic (including Log Trucks)</td>
<td>Roads on public land are for public use, which results in an excess of seed-dispersal activities occurring on a daily basis. Private landowners use public roads to haul logs, undertake recreational pursuits, or access their properties. This transportation often occurs along BLM-administered roads that 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 or seed source, presenting a high likelihood of detachment on public lands.</td>
</tr>
<tr>
<td>Recreational Use</td>
<td>The public often recreates on BLM-administered 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; and fur of domestic animals.</td>
</tr>
<tr>
<td>Utility Corridors</td>
<td>Power and telephone lines and other utility corridors present avenues for noxious weed dispersal. They stretch for miles across the landscape and often cross multiple counties where different noxious weed species occur. Authorized maintenance vehicles and unauthorized OHVs and vehicles drive on the corridors carrying or spreading weed parts between sections. Competing vegetation is generally removed along the corridors, leaving them open to occupation by noxious weeds that are adapted to establishing quickly after disturbance.</td>
</tr>
<tr>
<td>Rural and Urban Development</td>
<td>Because of BLM’s checkerboard land ownership, BLM parcels are generally interspersed with private lands, many of which are used for home sites, 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.</td>
</tr>
<tr>
<td>Natural Processes</td>
<td>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.</td>
</tr>
</tbody>
</table>

C.2 Affected Environment

Prior to the Doubleday Fire in September 2008, no noxious weed populations were known within the fire area. Fire removes ground cover vegetation, leaving soil bare and vulnerable to invasion by early successional species. Most noxious weeds are early successional opportunistic species that produce many seeds and establish quickly, thereby outcompeting native species for space, sunlight, water, and nutrients.

Noxious weed seeds may have been introduced during fire suppression activities. A weed washing station was staged in the community of Butte Falls during part of the fire suppression efforts, but it was not present from the beginning to the end of the fire. In addition, all vehicular traffic traveling into the fire area did not use the station. Fire suppression personnel on the southern divisions of the fire were staged at a rock quarry along the Salt Creek Road and traveled directly into the fire perimeter from
there. The BLM treated populations of yellow star-thistle, Klamath weed, and bull thistle at the quarry in summer 2008. Five other invasive, nonnative species were also documented at this quarry in 2008. During fire suppression activities, bulldozers and other vehicles drove off main roadways and may have transported weed seeds or plant parts into the fire area.

Under the Doubleday Fire Emergency Stabilization and Burned Area Rehabilitation Plans, the BLM will inventory bulldozer lines and the fire interior in 2009 for noxious weed populations. When populations are found, they will be treated. The BLM will monitor the fire area and treat weed populations for 3 years after the fire (2009 to 2011).

### C.3 Environmental Consequences

#### C.3.1 Effects of Alternative 1 (No Action) on Noxious Weeds

**C.3.1.1 Direct and Indirect Effects**

Under the No Action Alternative, salvage of fire-killed and fire-damaged trees on BLM-administered lands in the Doubleday Fire Salvage Project Area would not occur. However, noxious weeds would continue to spread into the Project Area at an unknown rate due to on-going activities in the area that contribute to weed spread (Table C-1). The rate at which noxious weeds spread in a particular area is impossible to quantify, as it depends on many factors including, but not limited to, logging on private lands, motor vehicle traffic, recreational use, rural and urban development, natural processes, and the proximity of noxious weed populations to the Project Area. 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. The Doubleday Fire area will be inventoried for noxious weeds and populations treated in 2009, 2010, and 2011 under the Doubleday Fire Emergency Stabilization and Burned Area Rehabilitation Plans.

**C.3.1.2 Cumulative Effects**

Added to past, present, and foreseeable future actions, Alternative 1 would not contribute additional cumulative effects to noxious weeds in the Doubleday Fire 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 as a result of activities and processes beyond the control of the BLM.

#### C.3.2 Effects of Alternative 2 on Noxious Weeds

**C.3.2.1 Direct and Indirect Effects**

In the short-term (approximately 1 to 5 years), BLM’s proposed salvage harvest activities within the Project Area could potentially introduce or spread 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 107 acres, constructing or decommissioning 1.55 miles of
roads, constructing new landings and using existing landings, using rock from commercial quarries and stockpiles for road improvements, and post-treatment slash pile burning on up to 50 percent of the harvested acres. Movement of vehicles and equipment off system roads and throughout the Project Area 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-1.

In order to reduce the risk of introducing or spreading noxious weeds in the Project Area, PDFs and additional BLM actions (see Table C-2) 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>
<thead>
<tr>
<th>Table C-2. BLM Actions and Project Design Features for Noxious Weeds and Expected Implementation Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PDFs and BLM Actions</strong></td>
</tr>
<tr>
<td>Treat noxious weed populations in proposed harvest units, areas proposed for landing and road construction, and existing roads proposed for decommissioning when detected prior to timber harvest activities.</td>
</tr>
<tr>
<td>Prior to entry onto BLM-managed lands, pressure wash vehicles and equipment, including undercarriages.</td>
</tr>
<tr>
<td>Treat noxious weed populations in rock quarries where gravel would be removed for use in road work.</td>
</tr>
<tr>
<td>Seed or plant areas disturbed during project implementation with native plant materials.</td>
</tr>
<tr>
<td>Mulch disturbed areas after treatment with weed-free straw or hay.</td>
</tr>
<tr>
<td>Monitor landings and decommissioned roads 1 to 3 years after harvest is complete and treat noxious weeds as detected.</td>
</tr>
</tbody>
</table>

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In addition to the preventative measures listed above, the following specific project design features would be implemented in the Doubleday Fire salvage area to minimize the risk of introducing or spreading noxious weeds:

- Apply native seed and weed-free mulch to portions of skid trails within 50 feet of intersection with system roads and landings. Quickly establishing native vegetation in highly vulnerable areas would help preclude establishment of noxious weeds.

- Decommission temporary roads constructed for harvest operations and apply weed-free mulch and native grass seed within the same operating season as constructed. Decommissioning temporary roads after use during logging closes natural surface roads to future vehicle use that may carry in noxious weed seed on their tires.

- Clean 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. Cleaning is 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.

- Apply native seed to burn piles after burning. This would speed up establishment of native vegetation in areas where seeds and perennial root systems have been damaged by intense heat.

**C.3.2.2 Cumulative Effects**

As of summer 2008, past activities in the Project Area have not resulted in noxious weed infestations. Fire suppression activities for the Doubleday Fire in fall 2008 may have contributed to the introduction of noxious weed seed into and around the burned area. The BLM will monitor and treat noxious weed populations in summer 2009 under the Emergency Stabilization Plan. Monitoring and treatment of noxious weed populations is planned for fiscal years 2010 and 2011 under the Burned Area Rehabilitation Plan.

Current planned activities in and around the Doubleday Fire area that could introduce weeds into the Project Area include harvest on private land and salvage of blown down trees on unburned BLM-administered lands in Township 35 South, Range 2 East, Sections 23 and 27.

Foreseeable future activities that could contribute to the introduction and spread of noxious weeds in the Project Area include timber harvest on private and BLM-administered lands, construction of temporary or permanent roads, vehicle traffic on existing roads, and natural processes. Added to these past, present, and foreseeable future actions, the proposed salvage harvest activities in Alternative 2 could potentially introduce noxious weeds into the Project Area. 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. 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 minimize the risk that the proposed activities would introduce or spread noxious weeds. Because monitoring and treatment of noxious weeds in the fire area will occur under the Doubleday Fire Emergency Stabilization and Burned Area Rehabilitation plans, whether salvage harvest occurs or not, there is a high likelihood of detecting and treating weeds if present. Therefore, Alternative 2 would not contribute additional cumulative effects to noxious weeds.
C.4 Noxious Weeds References


Appendix D - Wildlife

D.1 Definitions

**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.

D.2 Methodology

The wildlife analysis area encompasses the Big Butte Creek and Little Butte Creek fifth field watersheds. The project wildlife biologist specifically considers the effects of the proposed actions on the wildlife occurring within the Project Area, which constitutes the entire area burned by the September 2008 Doubleday Fire.

D.3 Assumptions

- Late-successional forest is forested habitat 80 years or older. Late-successional forest usually, but not always, provides suitable habitat for northern 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) or dispersal habitat. Disturbance-only actions would be seasonally restricted from March 1 through June 30, following the mandatory distances established by USFWS.

- 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. Trees in nesting, roosting, and foraging habitat would not be salvaged, while spotted owl dispersal habitat would maintain at least 40 percent canopy after the salvage. Salvage would be seasonally restricted within 0.25 miles of known or suspected northern spotted owl sites from March 1 through June 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. Tables D-2 and D-3 contain lists of the current T&E and special status species that were analyzed for the proposed action.

D.4 Affected Environment

D.4.1 Threatened and Endangered Species

D.4.1.1 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 Doubleday Fire Salvage Project Area.

Northern spotted owls prefer coniferous forests 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 nesting, roosting, and foraging. 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 two components: nesting, roosting, foraging, and dispersal (Thomas et al. 1990) (Table D-1).

<table>
<thead>
<tr>
<th>Table D-1. Northern Spotted Owl Habitat Types</th>
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<tbody>
<tr>
<td><strong>Habitat Type</strong></td>
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<tr>
<td>------------------</td>
</tr>
<tr>
<td>Suitable Nesting, Roosting, Foraging (NRF)</td>
</tr>
<tr>
<td>Dispersal</td>
</tr>
<tr>
<td>Capable</td>
</tr>
<tr>
<td>Non-capable</td>
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</table>

The 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. Northern spotted owl recovery may depend, in part, on restoration of habitat lost to catastrophic disturbances, including forest fires (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 and USDI 1994b). One known nest tree is present within the protected activity center that survived the fire and blowdown events. The nest patch is defined herein as the 300-meter radius area around a known or likely nest site (USDI 2008).

Proposed salvage units are within 1.2 miles² of 2, 100-acre northern spotted owl activity centers. One activity center was not impacted by the wildfire and is outside the Project Area, while the other was impacted by wildfire at varying intensities, ranging from light underburns to patches of high burn severity that killed overstory trees. The burned activity center continues to provide nesting, roosting, and foraging habitat, though greatly reduced, as well as dispersal habitat for spotted owls. Despite habitat loss from the September 2008 Doubleday Fire and the January 2008 windstorm, approximately 30 percent nesting, roosting, and foraging; 60 percent dispersal; and 10 percent capable habitat remains inside the northern spotted owl activity center. On BLM-administered land within the boundaries of the Project Area, approximately 10 percent is nesting, roosting, and foraging; 30 percent is dispersal; and 60 percent is capable habitat (postfire).

There are no designated Critical Habitat Units for the spotted owl within the Project Area or the two fifth field watersheds containing the Project Area, as described in the Federal Register (73 FR 157:47326-47374).

D.4.1.2 Other Threatened and Endangered Species

Table D-2 contains a list of Threatened and Endangered Species that are suspected or documented on Medford District BLM-administered land. There is no habitat within the Project Area for vernal pool fairy shrimp or marbled murrelets and the project is outside of their ranges. The area does not contain the required components to harbor these species. These species will not be discussed further.

D.4.2 Special Status Species

Special status species are those species designated by the BLM as Bureau Sensitive. The list of special status species known to be present in the Medford District BLM was updated in January 2008 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). The project wildlife biologist conducted biological evaluations using a review of existing records, field reconnaissance, field surveys, and aerial photographs, and an analysis of potential impacts.

The project wildlife biologist completed a review of the special status species identified in the Butte Falls Resource Area (Table D-3). 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

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²1.2 miles is the northern spotted owl provincial radius for the Cascades West physiographic province.
surveys, species not present in the watershed, or historic sites which are vacant or would not be impacted by the action.

**D.4.2.1 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 documented fishers in the Rogue River/Lost Creek, Big Butte Creek, and South Fork Rogue River fifth field watersheds on BLM lands near Rogue River National Forest lands. A Medford District BLM fisher biological survey team conducted protocol surveys for fishers in the Big Butte Creek fifth field watershed in 2008. A fisher was detected outside 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 Rogue River National Forest lands is unknown, although 22 fishers were captured during the PNW study in 1995 and 2001 (Aubry and Raley 2002).

Habitat management guidelines relative to stand characteristics and the amount of each stand type to be maintained have not been established for fisher. Patches of older seral habitat are present in the Project Area within riparian reserves and one northern spotted owl activity center. 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 (e.g., 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.

**D.4.2.2 Mollusks**

Mollusk surveys were completed on 7,055 acres in the Big Butte Creek fifth field watershed from 1998 through 2007. Special Status Species located were the Chace sideband, Oregon shoulderband, and Siskiyou hesperian. Mollusk surveys on 2,244 acres within the Little Butte Creek fifth field watershed between 1998 and 2000 located three Siskiyou hesperian sites and one Oregon shoulderband. The closest site is 4 miles west of the Project Area.

BLM biologists and biological contractors completed mollusk surveys for special status species on 130 acres in 1998 and on 52 acres in 2007 within and adjacent to the Project Area. No special status mollusk species were detected in or adjacent to the Project Area.

**D.4.2.3 Bats**

Pallid bats roost during the day in rocky outcroppings, buildings, caves, mines, rock piles, and tree cavities, especially near water. There currently are no bodies of standing water within the Project Area and no salvage will take place in riparian areas. They forage on most types of insects on the ground and on vegetation. Tree cavities in dead and dying trees were present before and after the fire, but no other potential roosting structures were found.

Townsend’s big-eared bats hibernate and give birth to their young in caves or mines and feed mainly on moths. The fringed myotis bat also roosts in caves, mines, and buildings, and their diet includes moths and beetles. There are no caves, mines, or buildings within the Project Area and none of these bat colonies have been detected here.
D.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. BLM biologists reviewed bird species determined to be of concern for the lands in the region where Medford District BLM is located (Bird Conservation Region 5, USFWS Region 1) and compiled a list of Migratory Birds of Concern and Game Birds below Desired Condition.

BLM biologists also conferred with local bird groups and knowledgeable individuals to identify which birds on the list are present within Medford District BLM lands. See Table D-4 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 fifth field watershed were reviewed to see if birds on the Medford District BLM Migratory Birds of Concern and Game Birds below Desired Condition list were found in the watershed.

The following birds on the USFWS Migratory Birds of Concern and Game Birds below Desired Condition list may occur in the Project Area and could be impacted by proposed salvage operations:

- Band-tailed Pigeon
- Flammulated Owl
- Mourning Dove
- Olive-sided Flycatcher
- Rufous Hummingbird
- White-headed Woodpecker
- Williamson’s Sapsucker

**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 pigeons 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 have not been detected, they are suspected to be present in the watershed, at least during spring and fall migration.

**Flammulated owls** (USFWS Migratory Birds of Concern) may be present in the forested areas of the Project Area. No nest sites have been documented in the Butte Falls Resource Area. They prefer
ponderosa pine and mixed coniferous forests with high levels of canopy closure. They tend to nest in snags in cavities excavated by woodpeckers. Prey items they pursue include crickets, moths, and beetles.

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 likely present in the open grasslands and woodlands within the Project Area.

Olive-sided flycatchers (USFWS Migratory Birds of Concern) 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 species such as the olive-sided flycatcher that are 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 may be present in the Project Area.

Rufous hummingbirds (USFWS Migratory Birds of Concern), 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 possibly present in the Project Area where salvage is proposed.

White-headed woodpeckers (USFWS Migratory Birds of Concern) may use the Project Area for nesting. It prefers mature forest with large-diameter ponderosa pines.

Williamson’s sapsuckers (USFWS Migratory Birds of Concern) may be present in the two fifth field watersheds in small numbers, but they are not known to nest west of the crest of the Cascade Mountains. Williamson’s sapsuckers feed on tree sap, phloem fibers, and cambium, but will also forage on insects. They primarily use Douglas-fir and ponderosa pine for their sap wells.

D.4.4 Other Wildlife Species

D.4.4.1 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, published in the Federal Register on June 29, 1998 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, 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 United States (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. BLM biologists conducted goshawk surveys to protocol in the Project Area and no nesting pairs were located.

D.4.4.2 Big Game Winter Range and Elk Management Area

In the southern part of the Project Area, a “Big Game Winter Range and Elk Management Area” (designated in the Medford District ROD/RMP) includes section 27. Deer and elk also migrate through the Project Area during the spring and fall. Many historic game trails are present and used annually within the winter range and elk management areas. 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. The BLM is required to keep existing roads open that provide access to adjacent private lands.

D.5 Environmental Consequences

D.5.1 Effects of Alternative 1 (No Action) on Wildlife

D.5.1.1 Direct and Indirect Effects

Under Alternative 1, no fire salvage would occur and no dead or dying trees would be harvested. Populations of special status species would remain at current levels, although certain species’ populations would fluctuate within a decade as understory layers begin to emerge and some of the standing, burned trees fall. Raptors would continue to forage in the burned areas, but the likelihood of them nesting within the burned units would be low. Habitat to support cavity-nesting birds would be at 100 percent, but would decline as the dead trees began to fall to the ground. Spotted owls might use the light to moderately burned units for foraging or dispersal, but they would not find the required structure for nesting for the next 40 to 60 years.

D.5.1.2 Cumulative Effects

Under Alternative 1, there would be no cumulative effects to Bureau special status species populations within the Big Butte Creek and Little Butte Creek fifth field watersheds because the BLM expects the persistence of these species would not be affected by No Action. No new roads would be constructed in big game winter range and elk management areas; therefore, there would be no change from current conditions.

Past Actions

No suitable, nesting, roosting, and foraging habitat for spotted owls on BLM was downgraded or removed due to fire suppression activities, such as burnouts or tractor fire lines, within the Project Area.
Aerial suppression activities prevented the loss of additional nesting, roosting, and foraging habitat and had no affect on suitable habitat.

**Present Actions**

Within the proposed Project Area, the combination of the Doubleday Fire and the 2008 windstorm reduced the amount of available nesting, roosting, and foraging habitat for spotted owls. On BLM-administered land, approximately 125 acres of nesting, roosting, and foraging and 280 acres of dispersal habitat existed before the disturbances. Approximately 80 acres of nesting, roosting, and foraging habitat were reduced to dispersal or nonhabitat; 70 acres were downgraded to dispersal habitat and 10 acres of NRF were removed.

**Future Actions**

Post-fire emergency stabilization and rehabilitation (ESRP), such as planting trees, grass seeding, and treatment of noxious weeds, would not impact special status wildlife. Salvage of burned trees would likely occur on privately-owned land within the Project Area. The BLM plans to salvage blown down timber outside of the fire salvage Project Area on approximately 6,000 acres within the Big Butte Creek and Little Butte Creek fifth field watersheds. Additionally, the BLM will be considering timber sales on 3,500 acres of matrix lands within the two fifth field watersheds in the next 5 years, within the framework of the Medford District’s RMP.

**D.5.2 Effects of Alternative 2 on Wildlife**

**D.5.2.1 Direct and Indirect Effects**

**Threatened and Endangered Species**

*Northern Spotted Owl – Federally Threatened*

Under Alternative 2, up to 220 acres of burned trees would be salvaged. Salvage activities would not occur in nesting, roosting, and foraging habitat for the spotted owl, and salvage in dispersal habitat would retain at least 40 percent canopy. Large trees, snags, large down wood, and structural diversity important to northern spotted owls would be maintained. Temporary spur roads would not be constructed in NRF habitat. Although temporary roads would be constructed in dispersal habitat, construction would not alter dispersal habitat. The BLM has determined the effects to spotted owls as a result of the implementation of salvage treatments within dispersal habitat will be “No Affect” to northern 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 because these stands would not be entered.

3. Canopy cover would be maintained at 40 percent or greater in dispersal habitat because no live trees would be removed in these stands.

4. Decadent woody material, such as large snags and down wood, would remain after treatment, as required by Medford BLM’s management guidelines.

5. All multi-canopy, uneven-aged tree structure that was present pretreatment would remain post-treatment.
6. No spotted owl nest trees would be removed and a seasonal restriction for activities within 0.25 miles of nest trees would be implemented.

Burned stands proposed for salvage harvest do not currently provide nesting, roosting, and foraging habitat. Although 39 acres proposed for salvage provide dispersal habitat, only dead trees would be salvaged; canopy cover would remain the same. The remaining 181 acres do not have enough canopy closure and sufficient component of live trees to provide cover for spotted owls.

The proposed units fall within the 1.2-mile provincial home ranges of 2 known spotted owl territories. The 220 acres to be salvaged would be a small percentage of the provincial home ranges of these owls (2,890 acres each) and it is not expected foraging opportunities would be depressed from the current postfire condition. No harvest would occur in the designated 100-acre known northern spotted owl activity center or within any 300-meter nest patch for spotted owls. The Project Area includes only one 100-acre known northern spotted owl activity center. Salvage of units within 0.25 miles of nesting spotted owls would be restricted to occur outside of their critical nesting and fledgling period, March 1 through June 30. If protocol surveys determine that the resident spotted owls are not nesting, the seasonal restriction could be waved.

The windstorm and wildfire events of 2008 removed and downgraded suitable habitat for spotted owls within the Project Area and only 45 acres of nesting, roosting, and foraging habitat remains. While there will be no entry into these 45 acres for the salvage, a study conducted by an Oregon State University (OSU) graduate student following the Timbered Rock Fire portrays the negative impact a catastrophic forest fire can have on the productivity of owl sites. Within the 27,000-acre perimeter of the 2002 Timbered Rock Fire, there were 19 known spotted owl activity centers. Surveys conducted by OSU, BLM, and Boise Cascade portrayed a decline in the productivity of these owl sites in the years after the fire, indicating that moderately to highly burned areas that were previously habitat no longer provided the required structure for nesting (Figure D-1).

**Figure D-1.** Number of adult and fledgling spotted owls detected within the Timbered Rock Fire perimeter.

```
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<tr>
<td>2008</td>
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```

“Occupancy was similar at the Timbered Rock and South Cascades from 1992-2002 but occupancy declined rapidly following the Timbered Rock Fire when compared to unburned landscapes at the South
Doubleday Fire Salvage EA

From 2003 through 2008 (postfire), only three young have been found to have fledged within the fire perimeter, based on data collected by OSU and BLM surveyors from each of the historic sites. Only one adult was detected in 2007 and four adults in 2008, suggesting that the burned owl sites no longer provided enough nesting, roosting, and foraging habitat to sustain the previous population levels that existed before the 2002 fire. “Occupancy at Timbered Rock declined slightly from 1992-2002, but declined in an almost linear fashion following wildfire. Only 20% of territories were occupied by a pair of owls in 2006” (Clark 2007, 32). No timber harvest has occurred on federally-managed lands in the Timbered Rock Fire or in the 19 owl sites since the wildfire of 2002. The highest number of adults or fledglings detected in the area was in 1993, with a total of 31. Before the wildfire in 2002, 24 adults or fledglings were found in this area.

As the study by Clark demonstrated, work done by Bond et. al. (2002) also showed spotted owls can survive a wildfire and can be located in their burned territories the following year. What the study by Bond et al. does not show, however, is the long-term effect moderate to high severity fires have on spotted owl territories. It is unknown whether the sites in their study continued to provide suitable habitat two or more years following the fires. As a precaution for the spotted owls historically found within the Doubleday Fire Salvage Project Area, no salvage will occur within their historic nest patch or within the 100-acre activity center set aside for them in 1994, in case the owls do remain in the area. Surveys conducted in 2008 found no owls in the Project Area and the windstorm event earlier that year may have already extirpated them. Surveys will be conducted to locate the owls before salvage begins and appropriate measures will be taken to protect their nest site if they are found nesting.

Special Status Species

Table D-3 lists additional special status species considered. It is not expected the one-time fire salvage of 220 acres would have an impact on the persistence of the species in Table D-3, or the species not expected to occur in coniferous forest types.

Fisher

No known fisher dens are located in the proposed salvage area. The proposed action would not change fisher habitat to nonsuitable because canopy closure would not be changed in green stands. As evidenced in the Federal Register (69 FR 69:18770-18792), the Pacific fisher uses coniferous forests with dense canopy cover, a feature currently lacking within these proposed salvage units. The wildfire and windstorms of 2008 produced a fragmented landscape and reduced the quality of habitat within the proposed salvage units. In the 39 acres proposed for salvage where green trees are providing 40 to 60 percent canopy closure, only completely dead, burned trees would be removed. An additional 45 acres with canopy cover greater than 60 percent would be left untouched, providing potential den and resting sites for fishers. One fisher detected during BLM surveys in 2008 was located one mile from where salvage is proposed. No den was found and it is unknown if the fisher detected in 2008 was male or female. The proposed salvage would leave root wads and coarse wood on the forest floor, maintaining at least 120 linear feet of logs per acre with diameters of 16 inches or greater and lengths of 16 feet or longer. The proposed action would not be expected to reduce the persistence of the fisher population in the two fifth field watersheds, although they would be expected to remain at naturally low numbers.
Neotropical Migratory Bird Species of Conservation Concern and Game Birds below Desired Condition

**Band-tailed pigeons** may be present in the Project Area. They primarily nest in Douglas-fir trees within closed-canopy mixed conifer stands, a condition present here. Removing dead and dying trees in stands with less than 40 percent canopy closure, as proposed in this project, would not affect the persistence of the species.

**Flammulated owls** may be present in the forested areas. No nest sites have been documented in the Butte Falls Resource Area, but they prefer ponderosa pine and mixed coniferous forests with high levels of canopy closure. They tend to nest in snags in cavities excavated by woodpeckers. Prey items they pursue include crickets, moths, and beetles. No nesting habitat with high levels of canopy closure would be removed during the salvage activities.

**Lewis’ woodpeckers** are associated with open woodlands near streams and rivers. They breed sparingly along Bear Creek and areas of the Upper Rogue Valley in Jackson County. Habitat preference is hardwood oak stands with scattered ponderosa pine near grassland shrub communities. Threats include the decline of lowland oak habitat, competition with European starlings, prospects for nest and food storage trees, competition for nest holes, and effects of pesticides. While the Project Area does not provide suitable habitat for them, a study in the *Conservation Biology* journal (Smucker et al. 2005) states, “The only bird species that may benefit from partial salvage logging (American Kestrel [*Falco sparverius*], Lewis’s Woodpecker [*Melanerpes lewis*] and Western Bluebird [*Sialia mexicana*]) are not nearly as restricted in their distributions to burned forest conditions; they commonly occur in naturally open, unburned, low-elevation conifer forests as well.” Smucker et al. did not demonstrate that burned landscapes provided suitable habitat for any other federally listed or Bureau Sensitive species that may be found in the Project Area.

**Mourning doves** forage on the seeds of plants like grasses, herbaceous plants, and trees. They prefer nesting on the ground, but will also nest in trees. Mourning doves are well-distributed throughout the Butte Falls Resource Area and have adapted to a wide variety of habitats, from forests to clear-cuts, as well as agricultural to suburban areas. Salvage of burned trees would not disrupt their ability to survive.

**Olive-sided flycatchers** are often encountered on the Butte Falls Resource Area and occur in coniferous forests where they use tall trees and snags for nesting and foraging. Although there is evidence olive-sided flycatchers respond positively to burned landscapes following wildfires (Smucker et al. 2005; Hutto 2006), salvage of 220 acres is not expected to impact the persistence of the species as it is relatively abundant and breeds throughout North America, and 51 percent of the Project Area on Federal land would be left undisturbed.

**Rufous hummingbirds** may use the areas of light burn severity for foraging and nesting, preferring the wooded areas with a well-developed understory and high canopy cover for nesting. While it feeds on nectar from flowering plants, it will also forage on insects and take advantage of hummingbird feeders near houses. Because the rufous hummingbird prefers to nest under a closed canopy, it is not expected the proposed project would have a negative impact on the persistence of the species.

**White-headed woodpeckers** may use this area for nesting. They prefer mature forest with large-diameter ponderosa pines. The Doubleday Fire burned 451 acres of BLM-administered lands. With 220 acres proposed for salvage, 51 percent of the Federal land in Project Area would be left to provide
snags for cavity-dependent species. As directed by the 1995 Medford ROD/RMP (USDI 1995, 40), snags sufficient to support species of cavity nesting birds will be maintained at 40 percent of potential population levels on areas that average no larger than 40 acres. Considering the woodpecker species suspected in the area, such as white-headed woodpeckers, the number of snags required for the 40 percent level is an average of 1.2 per acre (Neitro et al. 1985, 145). To meet the 1995 ROD/RMP requirements to provide for at least a minimum of 40 percent of the cavity user level, 2 dead trees per acre would be reserved within each 40-acre block. No scorched green trees would be cut on 39 acres of spotted owl dispersal habitat. Clumps of scorched green trees would provide recruitment for additional snags within the next few years. On 231 acres of BLM-administered lands within the fire perimeter, no trees would be cut, providing additional habitat for cavity nesters. As these burned trees fall, they will supplement the current downed wood component. Maintaining at least 2 snags per acre would satisfy the RMP requirement to maintain white-headed woodpeckers at their 100 percent level.

Williamson’s sapsuckers may be occasional visitors in the two fifth field watersheds, but there are no records of them nesting. They most commonly occur and breed east of the crest of the Cascades. The persistence of this species will not be impacted by salvage of dead or dying trees because they primarily use live Douglas-fir and ponderosa pine for their sap wells.

Other Wildlife Species

NOTE: Species not found on the Bureau Special Status Species list were not analyzed and it is not expected the fire salvage would have an effect on the persistence of those species.

Northern Goshawk

Any raptor nests located before or during the fire salvage, however, would be protected and measures would be taken to allow them to complete their reproductive cycle.

Big Game Winter Range and Elk Management Area

Approximately 0.7 miles of temporary road construction is proposed on lands designated in the 1995 ROD/RMP as Big Game Winter Range and Elk Management Area in T35S, R2E, section 27. These temporary road spurs would be closed and decommissioned at the conclusion of the salvage project. Closing roads would meet 1995 ROD/RMP management direction and impacts to big game would be negligible. Existing roads in this section would be left open because they also provide access to private lands and there would be no change from current conditions. The rebuilding of a pump chance will likely be completed under Alternative 2. An earthen dam will be rebuilt to hold in water in section 27 and will provide drinking water for deer and elk.

D.5.2.2 Cumulative Effects

Salvage operations are proposed in two fifth field watersheds: Big Butte Creek 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 high burn severity areas would not affect spotted owls because the fire killed the majority of the overstory trees and the areas no longer provide habitat for spotted owls. Salvage of dead
trees in partially green stands that provide spotted owl 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 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 the alternative would not lead to the need to list sensitive wildlife species as threatened or endangered. The proposed action has environmental impacts on certain individual organisms, but impacts 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.

**Past Actions**

After the windstorm of January 2008, the BLM inventoried over 28,000 acres and found blown-down trees scattered across more than 6,800 acres of BLM-administered land; approximately 6,100 acres are proposed for salvage in 2008 and 2009. On matrix lands, the BLM removed hazardous trees leaning toward the road and trees lying fully or partially within the road prism. In riparian reserves and northern spotted owl activity centers, the BLM removed only the portion of the tree within the road prism. Salvage harvest of wind thrown trees occurred on private timberlands within the Big Butte Creek and Little Butte Creek fifth field watersheds in 2008. Most of the private land was not considered suitable nesting, roosting, and foraging habitat before the windstorms in January 2008. It is expected most of the concentrated and scattered wind-thrown trees on private industrial lands would be salvaged by the end of 2009.

Within the two fifth field watersheds, timber harvest occurred on approximately 6,400 acres of BLM-administered lands: 53 acres of clearcut, 1,153 acres of commercial thinning, 2,904 acres of density management, 24 acres of overstory removal, 1,408 acres of mortality salvage, 434 acres of select cut, and 436 acres of regeneration harvest.

No suitable, nesting, roosting, and foraging habitat on BLM was downgraded or removed due to fire suppression activities, such as burnouts or tractor fire lines. Aerial suppression activities prevented the loss of additional nesting, roosting, and foraging habitat and had no adverse affect on suitable habitat.

**Present Actions**

Within the proposed Project Area, the combination of the Doubleday Fire and the windstorm of 2008 reduced the amount of available nesting, roosting, and foraging habitat for spotted owls (Figure D-2). On BLM-administered land, approximately 125 acres of nesting, roosting, and foraging and 280 acres of dispersal habitat existed before the disturbances. Approximately 80 acres of nesting, roosting, and foraging habitat were reduced to dispersal or nonhabitat; 70 acres were downgraded to dispersal habitat and 10 acres were removed.
Future Actions

The BLM plans to salvage blown down timber outside of the fire-salvage Project Area on approximately 6,000 acres within the Big Butte Creek and Little Butte Creek fifth field watersheds. Additionally, the BLM will be considering timber sales on 7,300 acres of matrix lands within the two fifth field watersheds in the next 5 years, within the framework of the Medford District’s RMP.

The cumulative effect of the proposed salvage on BLM would be negligible and difficult to distinguish beyond the impacts of the Doubleday Fire, 2008 windstorms, and previous timber harvest.

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<th>Scientific Name</th>
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<td>Designated 2003</td>
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Federal Status:  
FE = Federally Endangered  
FT = Federally Threatened  
FTO = Federally Threatened in Oregon
### Table D-3. Sensitive Wildlife Species List for Medford District BLM

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<td>Evening fieldslug</td>
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<td>Sensitive (OR)</td>
<td>D</td>
</tr>
<tr>
<td><em>Myotis thysanodes</em></td>
<td>Fringed myotis</td>
<td>Sensitive (OR)</td>
<td>D</td>
</tr>
<tr>
<td><em>Melanerpes lewis</em></td>
<td>Lewis’ woodpecker</td>
<td>Sensitive (OR)</td>
<td>D</td>
</tr>
<tr>
<td><em>Actinemys marmorata marmorata</em></td>
<td>Northwestern pond turtle</td>
<td>Sensitive (OR/WA)</td>
<td>D</td>
</tr>
<tr>
<td><em>Rana pretiosa</em></td>
<td>Oregon spotted frog</td>
<td>Sensitive (OR/WA)</td>
<td>D</td>
</tr>
<tr>
<td><em>Antrozous pallidus</em></td>
<td>Pallid bat</td>
<td>Sensitive (OR/WA)</td>
<td>D</td>
</tr>
<tr>
<td><em>Progne subis</em></td>
<td>Purple martin</td>
<td>Sensitive (OR)</td>
<td>S</td>
</tr>
<tr>
<td><em>Corynorhinus townsendii</em></td>
<td>Townsend’s big-eared bat</td>
<td>Sensitive (OR/WA)</td>
<td>D</td>
</tr>
<tr>
<td><em>Agelaius tricolor</em></td>
<td>Tricolored blackbird</td>
<td>Sensitive (OR)</td>
<td>D</td>
</tr>
<tr>
<td><em>Picoides albolarvatus</em></td>
<td>White-headed woodpecker</td>
<td>Sensitive (OR/WA)</td>
<td>D</td>
</tr>
</tbody>
</table>

**ISSSSP** = Interagency Special Status/Sensitive Species Program

**D** = **Documented occurrence**: A species located on land administered by the BLM based on historic or current known sites of a species reported by a credible source for which BLM has knowledge of written, mapped, or specimen documentation of the occurrence.

**S** = **Suspected occurrence**: Species is not documented on land administered by the BLM, but may occur on the unit because (1) the BLM District is considered to be within the species’ range and (2) appropriate habitat is present or (3) known occurrence of the species (historic or current) in vicinity such that the species could occur on BLM land.
D.6 Wildlife References


Appendices


USDA 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.


Appendix E - Fire and Fuels

E.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, fuelbed depth and moisture of extinction.

The following definitions are from Scott and Burgan (2005) and represent fuel models (representing more than 1 percent of the area) found in the analysis area based on the 40 fuel models guide.

E.1.1 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.

TL1 (181): A low load of compact conifer litter. This fuel model may be used to represent a recently burned forest. Low spread rate and very low flame length.

E.1.2 Slash-Blowdown (SB) Fuel Models

The primary carrier of fire is activity fuel or blowdown.

SB1 (201): Low load activity fuel. Moderate rate of spread and low flame length.


E.2 Fire Behavior

E.2.1 BehavePlus

Predicted or estimated fire behavior characteristics were determined using the fire behavior model BehavePlus. The BehavePlus3 fire modeling system is based on a collection of models that describe fire behavior, fire effects, and the fire environment. For more information see BehavePlus3 FIRE MODELING SYSTEM, VERSION 2: OVERVIEW by Patricia L. Andrews and Collin D. Bevins (2003).

E.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 Fire Family Plus, which calculates the 90th Percentile fuels moistures used in FMAplus and represent the probability that these conditions could occur 10 percent of the time during a 100-day period for the Evans Remote Area Weather Station (RAWS). With wind speed as a variable, temperature and fuels moistures were held constant to calculate the fire during high and extreme fire season conditions.

Temperature and fuels moistures used for analysis in FMAplus:

Temperature: 85 degrees
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 Fire Family Plus. The 90th percentile daily average 20-foot wind speed was 5 mph. However, this is based on a daily average using calculated 10 minute averages and appeared to be underestimated. Further review of the daily winds indicated that wind speeds exceeded 5 mph approximately 30 percent of the time. Recorded 10 minute averages were as high as 13 mph. 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 mph 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 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 mph. 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.

The 20-foot wind speed is the wind speed 20 feet above the canopy. To determine the wind speed at ground level where the fire is burning, an adjustment must be made to accommodate for friction loss and shelter from the overstory. FMAplus provides the wind adjustment table developed by Albini and Baughman in 1979.

Fuel loading and tree data were collected on-site and were modeled using FMAplus3.

### E.3 Definitions

**Aerial Fuels** (also referred to as canopy fuels): Fuels suspended above the ground in trees or vegetation. These fuels consist mostly of live and fine material less than .025 inches (Graham et al. 2004).

**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.
Doubleday Fire Salvage EA

**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 hand and should be controlled with mechanical equipment. Measured in feet.

**Fire line 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. Fire line intensity is a function of rate of spread and heat per unit area, and is directly related to flame length. Fire line 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** - A fire spreading through surface fuels (Scott and Reinhardt 2001).

- **Passive Crown Fire** - A crown fire in which individual or small groups of trees torch out, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior from the occasional torching of an isolated tree to a nearly active crown fire. Also called torching and candling (Scott and Reinhardt 2001).

- **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’Hara 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 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:** 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 (NWCG 1994).
E.4 Fuels References


Appendix F - Aquatic Conservation Strategy

F.1 Components of the Aquatic Conservation Strategy

The following are four main components to the ACS: Riparian Reserves, Key Watersheds, Watershed Analysis (WA), and Watershed Restoration.

F.1.1 Riparian Reserves:

The 1995 RMP/ROD (p. 27) 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.”

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 streams would maintain at least one site-potential tree as a no harvest buffer. There would be no salvage in any riparian reserves throughout the entire Doubleday Fire Salvage Project Area. The riparian reserve width for the Doubleday Fire Salvage Project is 190 feet within the Big Butte Creek Watershed and 165 feet within the Little Butte Creek Watershed.

These buffers consist of the area on each side of the stream extending from the edges of the active stream channel from a minimum of 190 feet to a maximum of 380 feet slope distance within Big Butte Creek fifth field watershed and a minimum of 165 feet to a maximum of 330 feet slope distance within the Little Butte Creek fifth field watershed.

The proposed activities considered in the riparian reserves for this project include pump chance renovation, road renovation, and log hauling.

F.1.2 Key Watersheds:

Key watersheds are “crucial for maintaining and recovering habitat for at-risk stocks of anadromous salmonids and resident fish species” (1995 ROD/RMP, 22). These watersheds have a high potential for being restored as part of a watershed restoration program. The Doubleday Fire Salvage project is located in the Lower South Fork Big Butte Creek sixth field watershed within the larger Big Butte Creek fifth field watershed and the Salt Creek-Long Branch sixth field watershed within the larger Little Butte Creek fifth field watershed. The Doubleday Fire Salvage project is located outside of key watersheds.

F.1.3 Watershed Analysis:

Watershed Analysis is intended to enable the planning of landscape scale projects which can achieve Aquatic Conservation Strategy objectives. Watershed Analysis will serve as the basis for BMP design during project specific planning (1995 ROD/RMP, 152).
The relevant watershed analyses for this project are the Central Big Butte WA (USDI 1995) and the Little Butte Creek WA (USDA and USDI 1997).

**F.1.4 Watershed Restoration:**

Watershed Restoration is “an integral part of a program to aid recovery of fish habitat, riparian habitat, and water quality. The most important components of a watershed restoration program are control and prevention of road-related runoff and sediment production, restoration of the condition of riparian vegetation, and restoration of in-stream habitat complexity” (1995 ROD/RMP, p. 23).

**F.2 Project Summary**

The Butte Falls Resource Area is proposing to salvage trees that were burned in the 2008 Doubleday Fire. Salvage would occur on up to 220 acres located in the Big Butte Creek and Little Butte Creek fifth field watersheds.

This project is proposed within matrix land use allocation and would not enter riparian reserve land use allocations. Trees proposed for salvage would include damaged trees not likely to survive, and trees determined hazardous to workers or the public. Timber would be salvaged using tractor, shovel, or cable yarding systems. No salvage would occur in riparian reserves.

The proposed project includes pump chance renovation, road renovation, landing construction, road realignment (construction and decommissioning), temporary spur road construction, and site preparation or slash disposal activities such as lop and scatter.

**F.2.1 Project Design Features that would maintain or restore Aquatic Conservation Strategy Objectives**

1. Minimize the total number of skid trails by designating skid trails with an average spacing of 150 feet. Avoid creating new skid trails and use existing trails, where feasible, in order to lessen ground disturbance. Design skid trails to minimize disturbance.

2. Locate skid trails to minimize disturbance to coarse woody debris. Where skid roads encounter large coarse woody debris, a section of the coarse woody debris will be bucked out for equipment access. The remainder of the coarse woody debris will be left in place and will not be disturbed.

3. Restrict tractor and mechanical operations to slopes generally less than 20 percent.

4. Rip and water bar all skid trails during the same operating season as constructed in areas where no future access or entry is needed.

5. Limit all tractor yarding, soil ripping, and excavator piling operations to the dry season, generally from May 15 to October 15, or when soil moisture is less than 25 percent.

6. Rip areas identified for ripping (skid trails, landings, temporary spur roads) to a depth of 18 inches using a sub-soiler or winged-toothed ripper.
8. Require one-end log suspension for skyline yarding.

9. Limit all road construction, maintenance, and decommissioning work to the dry season, generally from May 15 to October 15, or when soil moisture is less than 25 percent.

10. 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.

11. 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).

12. Decommission temporary roads constructed for harvest operations and apply weed-free mulch and native grass seed within the same operating season as constructed.

13. Refuel equipment outside of riparian reserves and locate fueling areas so accidental spills would be contained and would not drain in the stream system.

14. Restrict the construction of new roads or skid trails to areas outside riparian reserves.

15. Store all hazardous materials and petroleum products in durable containers located outside riparian reserves and located so accidental spills would be contained and would not drain into the stream system.

16. Require a Spill Prevention, Control, and Countermeasure Plan prior to operation. Plan will include but not be limited to the hazardous substances to be used in the Project Area and identification of the Purchaser’s representatives responsible for supervising initial containment action for releases and subsequent cleanup.

17. Follow all applicable State of Oregon Department of Environmental Quality guidelines for spill prevention and containment of petroleum products (Oregon Administrative Rules, Chapter 340, Department of Environmental Quality, Division 142, Oil and Hazardous Materials Emergency Response Requirements).

18. Leave at least 2 snags per acre 20 inches in diameter at breast height or larger to support species of cavity nesting birds.

19. Meet coarse down woody debris requirements in units that currently do not meet the coarse woody debris guidelines of 120 linear feet of down logs per acre greater than or equal to 16” in diameter and 16’ long.

20. Restrict activities from March 1 to June 30 within 0.25 miles of known northern spotted owl nests. If it is determined the owls are not nesting within 0.25 miles of a salvage unit, the restriction could be waived.

21. Restrict activities from March 1 through July 30 within 0.25 miles of northern goshawk nests. If a new goshawk nest is discovered in a salvage harvest unit following the sale date, activities would be halted until mitigation options could be determined.

22. 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 damaged conifers or hardwoods 8 inch DBH or less, lop and scatter, hand pile and burn, or excavator pile and burn.
23. Locate hand piles outside of ditch lines, cut banks above roads, or road corridors.

24. Burn hand piles within 1 year of the completion of hand piling.

25. Provide an approved prescribed fire plan that complies with Prescribed Fire Handbook H-9214-1 prior to the ignition of all prescribed burns.

26. Conduct all prescribed burning in compliance with Oregon Department of Forestry’s Smoke Management Plan.

27. Clean 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. Cleaning is 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.

28. Only logging and construction equipment visually inspected by a qualified BLM specialist to verify 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.

29. Stop work and notify the BLM within 12 hours if an archaeological site is discovered during the project.

30. Apply mitigating measures to areas containing known archaeological sites. Buffers will be determined based on proposed treatment, site-specific environmental conditions, and protection recommendations.

31. Require the use of chemical toilets at all project sites located within the Ginger Springs Municipal Watershed.

32. Use approved absorbent materials under stationary equipment within the Moderate Zone of the Ginger Springs Municipal Watershed.

33. Store fuel or oil products exceeding 200 gallons outside the Ginger Springs Municipal Watershed. Store fuel outside the watershed during nonworking hours.

34. Use a dust abatement that contains no asphalt or solvents in the Ginger Springs Municipal Watershed.

35. In high burn areas where fuel loading are expected to be low, lop and scatter logging slash to effectively cover bare soil areas to protect soil surface and aid in nutrient recycling.

**F.3 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 Doubleday Fire Salvage project would maintain the distribution, diversity, and complexity of the watershed and landscape-scale features for all essential habitat elements (off channel
Doubleday Fire Salvage EA

habitat and refugia, channel conditions/dynamics/floodplain connectivity). No Riparian Reserves would be salvaged and would therefore retain all essential habitat elements listed above. In addition, the PDFs listed above would limit any affects to the aquatic environment. By staying outside riparian reserves, retaining large amounts of coarse woody debris, and implementing the PDFs listed above, riparian areas would continue to recover from the burn and function would improve as vegetation regrows while maintaining the distribution, diversity, and complexity of watershed and landscape-scale features.

**Long-Term:** No long-term impacts from salvage, yarding, or road and landing construction are expected. None of these activities would occur inside riparian reserves. Riparian reserves would continue to recover and function would improve and maintain the distribution, diversity, and complexity of watershed and landscape-scale features. No project activities would have long-term negative impacts to aquatic ecosystems. Road renovation would improve road drainage and ensure the protection of the aquatic ecosystem.

Fuels reductions outside 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 salvage would occur. It is likely that only a few areas would have to be hand piled for slash disposal, because the fire consumed the fine material in most salvage units. The riparian reserves would not be salvaged in order to retain the diversity and complexity. Furthermore, coarse woody debris (CWD) would be retained on-site within upland salvage units (120 linear feet per acre) to ensure short- and long-term CWD supply.

**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 salvage activities would not occur within the riparian reserves. The large amount of CWD retained on-site in salvage areas will ensure short- and long-term CWD storage. Thus, at the watershed scale, this project would maintain the distribution, diversity, and complexity of both fifth field watersheds.

**Long-Term:** There will be no long-term impacts from salvage, yarding, or road and landing construction (ground disturbing activities). Fuels reductions would not negatively influence the distribution, diversity, and complexity of watershed and landscape-scale features because no salvage or fuels projects would be conducted within the riparian reserves. At the watershed scale, keeping projects out of all riparian reserves will retain watershed features that protect the aquatic systems to which species, populations, and communities are uniquely adapted.

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 recover. Function would improve, and spatial and temporal connectivity would be maintained because no projects will occur within riparian reserves. Staying outside the riparian reserves and retaining large amounts of
woody debris provides forest complexity, enhances habitat characteristics, and establishes a buffer to riparian chemical and physical processes. Culvert replacements in the pump chance project would increase the culvert size and would improve connectivity for aquatic species.

Road renovations would immediately improve the hydrologic drainage of roads within the Project Area.

**Long-Term:** Riparian reserves throughout the entire Project Area would continue to recover as vegetation establishes. Function would improve and spatial and temporal connectivity would be maintained as a result of this project. Culvert replacements for the pump chance project would increase culvert size and would improve connectivity for aquatic species.

**Watershed Scale**

**Short-Term/Long-Term:** Riparian reserves throughout the entire Project Area would continue to recover. Function would improve to maintain spatial and temporal connectivity. Culvert replacements for the pump chance would increase culvert size and improve connectivity for aquatic species.

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 entire Project Area would continue to recover and function would improve to protect the aquatic ecosystem including shorelines, banks, and bottom configurations. Implementing PDFs and restricting salvage in riparian reserves will maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configuration by eliminating ground disturbance near streams. All banks and stream configurations would remain unchanged and would not affect the overall physical integrity of the aquatic system within the Project Area.

**Long-Term:** Riparian reserves throughout the entire Project Area would continue to recover and function would improve to protect the aquatic system. No long-term impacts are expected in regard to the physical integrity of the aquatic system.

**Watershed Scale**

**Short-Term/Long-Term:** Riparian reserves throughout the Project Area would continue to recover and function would improve to protect the aquatic system in the short-term and the long-term. At the watershed scale, all banks and stream bottoms would continue to be protected by 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**: Riparian reserves throughout the Project Area would continue to maintain water quality. Stream temperatures would not be affected by the proposed project because the salvage of burned trees would not occur within the riparian reserve. Some short-term inputs of sediment and turbidity may occur due to timber hauling and road renovations, but would be minor at the project site and would be within the natural range of variability. Road renovation activities would maintain or improve water quality.

Fuels reductions 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.

No salvage and yarding would occur in riparian reserves; therefore, riparian reserves throughout the Project Area would continue to recover from the burn. There is a low probability sediment would reach stream channels as a result of salvage logging because the units are a sufficient distance from stream channels to filter sediment once vegetation recovers. In addition, the tractor yarding would occur on relative flat topography. Long-term benefits would result from road renovations and road decommissioning. The subsequent improved road drainage and related decreases in sediment caused by degraded forest roads would result.

Watershed Scale

**Short-Term/Long-Term**: Some short-term, minute inputs of sediment are likely to occur from timber hauling, road decommissioning, 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, project road activities would improve road drainage (short-term and long-term) while decreasing the 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 not occur in Riparian Reserves. Riparian reserves would continue to recover and maintain the sediment regime. Although some areas of riparian reserves have been burned and a complete removal of forest duff has occurred, all salvage operations would be
outside these areas. There is a low probability sediment would reach stream channels as a result of salvage logging because the units are a sufficient distance from stream channels to filter sediment once vegetation recovers. Some forest duff and vegetation will reestablish before salvage activities take place. In addition, the tractor salvage units are located on relatively flat topography. It is unlikely that material from an upland salvage unit would travel through the riparian reserve with the use of PDFs designed to minimize soil compaction and soil erosion, such as tractor yarding on slopes less than 20 percent. Short-term delivery of sediment may occur due to hauling and road renovations, but would be minor at the site scale. Road renovations would improve water drainage and would reduce sediment delivery from roads before hauling occurs. Moreover, seasonal restrictions for hauling on rocked and natural surface roads would be in place to limit the amount of potential sedimentation from roads. PDFs (listed above) include seasonal restrictions for mechanical disturbance during implementation of road renovations and haul in order to minimize the risk for sediment delivery to streams.

**Long-Term:** No long-term impacts from salvage and yarding are expected due to PDFs described above. Riparian reserves would continue to recover. Function would improve as vegetation recovers to protect the aquatic system by providing a buffer to runoff and sediment delivery mechanisms. No ground disturbance would occur within the riparian reserves. Sediment could only move to a stream via overland flows; however, overland flow is rare throughout the Pacific Northwest due to low precipitation intensities and high infiltration rates (Salo and Cundy 1987). Although some riparian reserves sustained a complete removal of the forest duff layer, it is unlikely material would move off-site over 165 feet (smallest riparian reserve buffer for a non-fish-bearing stream) to a stream. Long-term benefits would result from road renovations and subsequent upgrades to road drainage as sediment decreases 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:** Some minute inputs of sediment may occur due to road renovations, road improvements, and log hauling. However, these small deliveries of sediment would not influence the sediment regime at the watershed scale.

This small, short-term input of sediment would likely be of no consequence at the site level, thus, would not alter the sediment regime. It is 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 occur outside 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 road realignment 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. Fuel reductions would reduce the risk of catastrophic fire in these salvaged riparian areas, which can affect adjacent riparian reserves throughout the 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 outside of riparian reserves in this project. Riparian reserves throughout the Project Area would continue to recover and regain function. Patterns of sediment, nutrient, and wood routing would be retained despite duff removal in some riparian areas. The project would not diminish large wood 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 and road renovation, but would not alter the sediment regime at the project scale. Vegetation canopy removal, soil compaction, roads, and stream crossings (four risk assessment factors) would not increase or approach risk thresholds of peak or base flows. Therefore, this project would have no causal mechanism to alter flows.

Replacement of the pump chance 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 sediment storage and routing within the stream network where the culvert is being placed. Also, to minimize short-term turbidity and sediment delivery, culvert replacement would be completed during the dry season, generally from May 15 to October 15. Road renovations would improve road drainage off forest roads to allow a more natural hydrologic function (e.g., timing, magnitude, duration, and spatial distribution of peak, high, and low flows).

**Long-Term:** Salvage (ground disturbing activities) would not occur in the riparian reserves in this project. Riparian reserves would continue to recover to protect the aquatic system. Long-term benefits would result from road renovations and improvements. The subsequent return to functioning road drainage would decrease sedimentation from forest roads at the site scale and improve sediment routing.

Watershed Scale

**Short-Term/Long-Term:** Some minor inputs of sediment may occur due to road renovations 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 recover to maintain patterns of sediment, nutrient, and wood routing and the distribution of peak, high, and low flows. Long-term benefits would result from road renovations 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 Doubleday Fire 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 (four risk assessment factors) would not increase or exceed risk thresholds for altering hydrology. Therefore, the timing, variability, and duration of floodplain inundation and water table elevation would be maintained at the site scale.

Long-Term: The Doubleday Fire Salvage project would restore the timing, variability, and duration of floodplain inundation and the water table elevation in meadows and wetlands because older compacted skid trails would be ripped to allow water infiltration and 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 Doubleday Fire Salvage project would maintain the timing, variability, and duration of floodplain inundation and the water table elevation in meadows and wetlands because none of the project activities would increase the risk of peak flows or water accumulations. Furthermore, project activities would not occur within riparian reserves. Therefore, the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands would be maintained at the watershed scale.

Long-Term: The Doubleday Fire Salvage project would restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands because older compacted skid trails would be ripped to allow water infiltration and allow 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 Doubleday Fire Salvage project would maintain species composition and structural diversity of plant communities in riparian areas and wetlands because “no-disturbance” buffers on all riparian reserves would 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. Although some riparian areas have been burned, vegetation would reestablish within a year (before salvage operations would occur). The salvage would maintain species composition and structural diversity of plant communities in riparian areas and wetlands because these areas would not be entered.
**Doubleday Fire Salvage EA**

**Long-Term:** The Doubleday Fire 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 only occur in upland areas outside of riparian reserves. Salvage in upland areas 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 Doubleday Fire Salvage project would maintain species composition and structural diversity of plant communities in riparian areas and wetlands since there will be no disturbance within these areas. The small amount of upland acres across the two fifth 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 both watersheds would be maintained.

**Long-Term:** The Doubleday Fire 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 only occur in upland areas and would reduce the risk of catastrophic fires and insect infestations that could further damage riparian areas adjacent to salvage units and across 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 Doubleday Fire Salvage project would maintain populations of native plant, invertebrate and vertebrate riparian-dependent species because no riparian reserves would be salvaged. All riparian areas would be free of any ground disturbing activities, except for road renovations that have stream crossings and pump chance enhancements that would improve road drainage.

**Long-Term:** The Doubleday Fire 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 units would reduce the risk of fire and high insect infestation by reducing fine fuels and breeding habitat for insects. If fuels and insect breeding habitat are not reduced, 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 and take decades to recover.

**Watershed Scale**

**Short-Term:** The Doubleday Fire Salvage project would maintain populations of native plant, invertebrate, and vertebrate riparian-dependent species throughout the watersheds. All riparian areas would be free of any ground disturbing activity. PDFs such as staying above the slope break, restricting tractor and mechanical operations to slopes generally below 20 percent, 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 scale.
**Long-Term:** The Doubleday Fire Salvage project would maintain long-term populations of native plant, invertebrate, and vertebrate riparian-dependent species in riparian reserves throughout Project Area fifth field watersheds. Furthermore, all riparian areas would be free of any ground disturbing activity. Additionally, PDFs such as slope restrictions on ground based yarding and 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.

**F.4 Conclusion**

The Doubleday Fire Salvage project would maintain all Aquatic Conservation Strategy objectives in the short- and long-term at both the site and watershed scales because there would be no salvage within riparian reserves across both fifth field watersheds and PDFs would be implemented. This project would have very limited affects on the aquatic environment and would allow riparian reserves to continue to recover, function, and protect Project Area streams.