

United States
Department of
Agriculture

Forest
Service



September
2014

North Fork Mill Creek Revised

Environmental Assessment

Hood River & Barlow Ranger Districts Mt. Hood National Forest

Hood River and Wasco Counties, Oregon

Legal Description: T1S, R11E, Sections 4-9; Willamette Meridian



Government Flats Complex 6-months Post Fire

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Lead Agency:	U.S. Forest Service
Responsible Official:	Lisa Northrop, Forest Supervisor Mt. Hood National Forest
Information Contact:	Janeen Tervo, District Ranger Hood River Ranger District 6780 Highway 35 Mount Hood/Parkdale, OR 97041 (541) 352-2001 jtervo@fs.fed.us Jennie O'Connor Card, IDT Leader (406) 522-2537 jennieoconnorcard@fs.fed.us
Website:	http://www.fs.usda.gov/goto/mthood/projects

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SUMMARY

The Government Flats Complex Fire started from lightning strikes on August 16, 2013 on Oregon Department of Forestry lands. On August 21, the fire burned onto National Forest System (NFS) lands. Approximately 2,200 acres burned on the NFS lands and the total fire covered 11,354 acres on a variety of land ownerships. The fire occurred in an area with a complex mix of land allocations from the Mt. Hood Land and Resource Management Plan, Northwest Forest Plan, Tier 1 Watershed and Northern spotted owl Critical Habitat. The fire burned two stewardship contracts that were sold (Roan and Eques) as well as several unsold and planned units. All of the stewardship units were analyzed as part of the North Fork Mill Creek Restoration Opportunities Environmental Assessment (2008).

The Decision Notice and Finding of No Significant Impact (DN/FONSI) for North Fork Mill Creek Restoration Opportunities (signed December 19, 2008) authorized fuels reduction activities on 2,720 acres. Fuels reduction activities include 1,896 acres of commercial thinning to open dense stands and reduce fuel ladders, 153 acres of non-commercial treatments, 61 acres of aspen cottonwood enhancement, and 610 acres of underburning. The overarching objective of the treatments in the North Fork Mill Creek planning area was to reduce fuels and restore stands to their historical species composition while also providing for wildlife habitat needs. The prescriptions were designed to move treated areas toward the appropriate condition class based on the fire regime classification and to address fuels reduction needs in the treated areas.

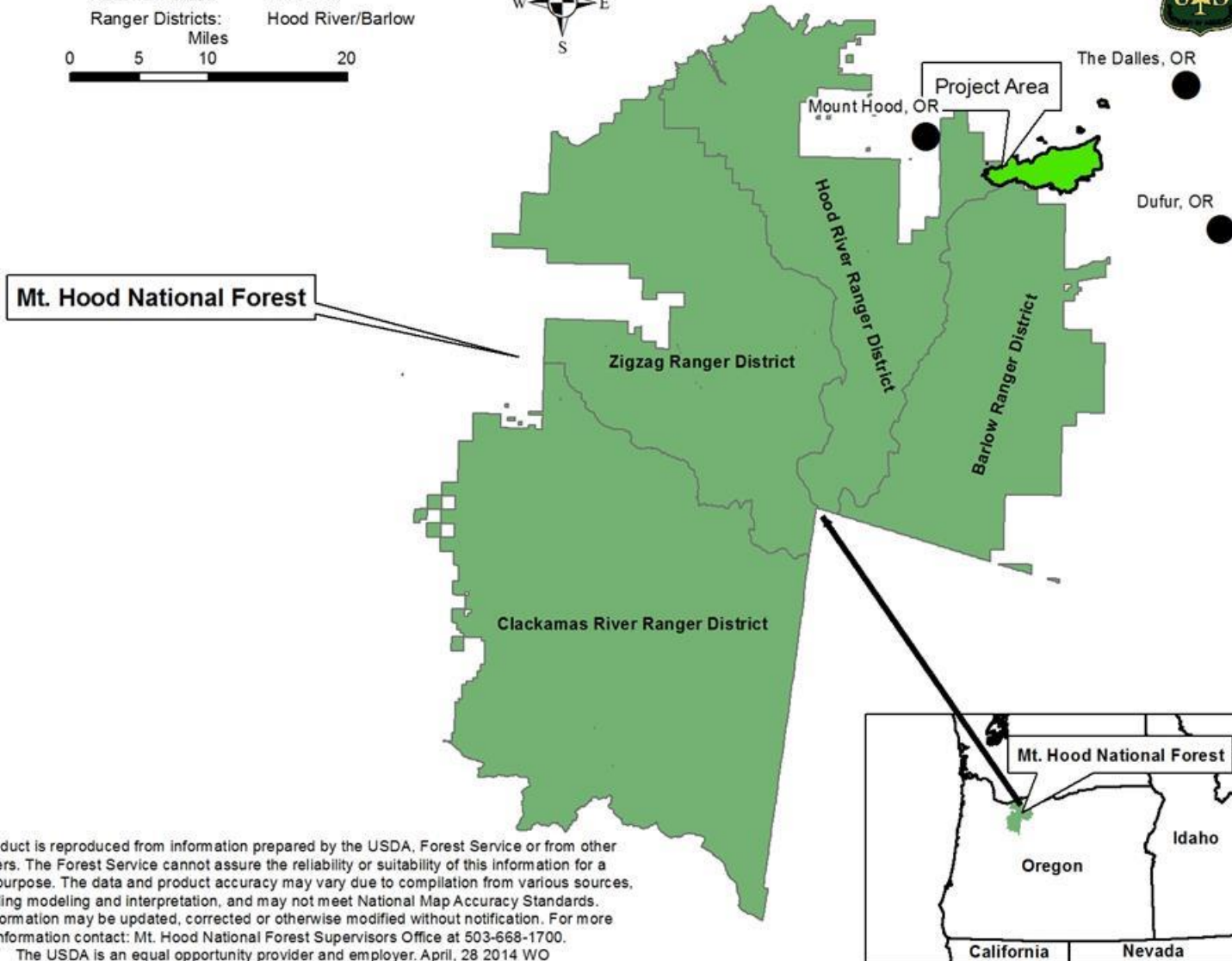
To implement this decision, the project area was broken into six stewardship sales (Appy, Buckskin, Clyde, Roan, Eques, and Lokai Stewardship Sales). Of the six stewardship sales, three sales have been fully implemented (Appy, Buckskin and Clyde Stewardship Sales) and two other sales are partially completed (Roan and Eques Stewardship Sales). The last sale (Lokai Stewardship Sale) is scheduled to be awarded in fiscal year 2014. The Government Flats Complex Fire burned 89 percent of Roan and 54 percent of Eques. As time progresses, fire-killed trees lose economic value due to staining, insects, and checking (cracks in the wood that occur as the burned wood dries). By early summer to late fall of 2014 up to 60 percent of the economic value of these trees could be lost. Both of these stewardship sales were determined to have catastrophic damage as defined by the stewardship contract.

All treatment and activities analyzed under the original Proposed Action that were affected by the fire were considered in the changed condition analysis. The changed condition analysis is based on the Adaptive Management Model from Forest Service Handbook 1909.12, Chapter 20 to address the question on what changed condition analysis is required and what changes are needed to the original Proposed Action. These treatments include: restoration thinning, sapling thinning, cottonwood aspen enhancements, underburning, and road maintenance. In addition to changes in the treatments, any changes in law, regulation or policy within the analysis area (fire perimeter) will be applied and incorporated into a revised Proposed Action, as necessary. Some of these changes include: compliance with the 2001 Survey and Manage Record of Decision; updated critical habitat for northern spotted owls; updated critical habitat for steelhead; updated sensitive species list; and updated analysis on management indicator species. The overall objective of this project is to meet the existing contractual obligations within the existing stewardship sales and to improve safety on the National Forest System roads.

North Fork Mill Creek Changed Conditions

National Forest: Mt. Hood
 Ranger Districts: Hood River/Barlow

Miles
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Figure 1-1: Vicinity Map of North Fork Mill Creek Planning Area

CHAPTER 1 – INTRODUCTION

The Government Flats Complex Fire started from lightning strikes on August 16, 2013 on Oregon Department of Forestry protected lands. On August 21, the fire burned onto National Forest System (NFS) lands. Approximately 2,200 acres burned on the NFS lands and the total fire covered 11,354 acres on a variety of land ownerships. Within the fire perimeter on NFS lands, approximately 27 percent of the lands were classified as low severity burn, 29 percent as moderate severity, and 30 percent as high severity burns. On the moderate to high severity areas, combustion of the litter and humus layers on the soil surface was complete; several inches of grayish-white ash covered the ground; fine roots were consumed within the top half to one inch below the soil surface; and soil color and structure was not altered to depth except in some places a thin layer at the surface, or where large fuels were in contact with the ground burned for a prolonged period of time. The moderate severity areas represent a broad range of burn characteristics with much of the moderate severity burn on the high end of the moderate severity class. The overstory tree and shrub mortality was often greater than 50 percent, but needle-cast has been covering the ground since burning has ceased. It is possible that many of the stands that experienced moderate to high severity burns do not have an adequate natural seed source to regenerate the forest to the desired future conditions. Also, the fire burned along approximately six miles of roads. Many of the trees along these roads pose a safety hazard along these routes.

The primary purpose of this environmental analysis is to assess the changed conditions to the landscape resulting from the Government Flats Complex Fire and to assess how these changes impact existing contractual obligations in the fire perimeter (see Figure 1-1, Vicinity Map).

1.1 Document Structure

This Environmental Assessment discloses the direct, indirect, and cumulative environmental effects that would result from the No Action (baseline), Proposed Action and action alternatives. The document is organized into four parts:

- *Introduction:* The section includes information on the history of the project proposal, the purpose and need for action, and the agency's proposal for achieving that purpose and need. This section also details the collaboration process among state, local and tribal governments, non-governmental organizations, and interested parties for this project, as well as how the Forest Service informed the public of the proposal and how the public responded.
- *Alternatives, including the Proposed Action:* This section provides a more detailed description of the No Action, Proposed Action and action alternatives. This discussion also includes project design criteria and mitigation measures that were added as a result of environmental analysis.
- *Environmental Consequences:* This section describes the environmental effects of no action as well as the trade-offs and effects of implementing the action alternatives. This analysis is organized by resource area. Within each section, the existing environment is described first, followed by the estimated effects of no action that provides a baseline for

evaluation, and finally the estimated effects of the action alternatives.

Consultation and Coordination: This section provides agencies consulted during the development of the Environmental Assessment and a list of preparers.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning records for both North Fork Mill Creek Restoration Opportunities (2008) as well as this current planning effort, located at the Hood River Ranger District Office in Mount Hood/Parkdale, Oregon.

1.2 Background

This project is located within the North Fork of Mill Creek watershed on Mt. Hood National Forest in Hood River and Wasco Counties. The planning area includes a complicated mix of land allocations from the Mt. Hood Land and Resource Management Plan, Northwest Forest Plan, Tier 1 Watershed and Northern spotted owl Critical Habitat. Vegetation includes mixed conifer forests, meadows, and open grassy slopes. Dry grand fir, lodgepole pine and white pine are predominant in the west half of the drainage. The eastern half of the drainage on NFS lands features open, grass covered slopes and forests of hot, dry ponderosa pine, with Oregon white oak dominating the lower elevations and drier sites. Average annual precipitation ranges from 50 inches on the westside to 30 inches on the eastside, occurring mostly during the winter months. Elevation ranges from 2,200 to 4,200 feet. The area supports a wide variety of human uses, including recreation, wood products, and grazing. The area is important for fisheries, wildlife, plant, and other natural values.

The Government Flats Complex Fire burned in this area, which includes two stewardship contracts that were sold (Roan and Eques) as well as several unsold and planned units. In addition, several planned underburn units were severely burned in the fire. All of the stewardship, unsold and underburn units were analyzed as part of the North Fork Mill Creek Restoration Opportunities Environmental Assessment (2008).

The Decision Notice and Finding of No Significant Impact (DN/FONSI) for North Fork Mill Creek Restoration Opportunities (signed December 19, 2008) authorized fuels reduction activities on 2,720 acres. Fuel reduction activities include 1,896 acres of commercial thinning to open dense stands and reduce fuel ladders, 153 acres of non-commercial treatments, 61 acres of aspen cottonwood enhancement, and 610 acres of underburning. The overarching objective of the treatments in the North Fork Mill Creek planning area was to reduce fuels and restore stands to their historical species composition while also providing for wildlife habitat needs. The prescriptions were designed to move treated areas toward the appropriate condition class based on the fire regime classification and to address fuels reduction needs in the treated areas. Stand treatments were designed to reduce the vulnerability of the area to uncharacteristic fires.

To implement this decision, the project area was broken into six stewardship sales (Appy, Buckskin, Clyde, Roan, Eques, and Lokai Stewardship Sales). Of the six stewardship sales, three sales have been fully implemented (Clyde, Appy and Buckskin Stewardship Sales) and two other sales are partially completed (Roan and Eques Stewardship Sales). The Government Flats Complex Fire burned 89 percent of Roan and 54 percent of Eques Stewardship Sales (see Table 1). The last sale

(Lokai Stewardship Sale) is scheduled to be awarded in fiscal year 2014. This sale will be located entirely outside the fire perimeter; and therefore, this sale is outside the geographic scope for this project.

Table 1-1: Stewardship Sales Impacted by Government Flats Complex Fire

Stewardship Sale	Total Sale Area	Acres Burned	Acres Harvested	Percent of Sale Impacted
Roan Stewardship	273	243	92	89%
Eques Stewardship	304	165	0	54%

The fire area includes the stewardship units under Integrated Resource Timber Contracts (Roan and Eques Stewardship). As time progresses, fire-killed trees lose economic value due to staining, insects, and checking (cracks in the wood that occur as the burned wood dries). By early summer to late fall of 2014 up to 60 percent of the economic value of these trees could be lost. Both of these stewardship sales were determined to have catastrophic damage as defined by the stewardship contract. The contract defines catastrophic damage as: “major change or damage has affected the value of trees or products within the Contract Area and is estimated to total either: More than half of the estimated timber volume or more than 2,000 CCF or equivalent (1,000 MBF).” Therefore, there is a contractual obligation to analyze the changed conditions resulting from the Government Flats Complex Fire. These changed conditions would be utilized to provide the necessary context for contract modifications.

1.3 Purpose and Need for Action

The overall purposes of this project are to meet the existing contractual and economic obligations within the existing Roan and Eques stewardship sales, to conduct a changed condition analysis to determine if changes to the original decision are required, and to improve safety on National Forest System roads within the burned area of the Government Flats Complex Fire. In order to meet these two primary purposes, the underlying needs of the North Fork Mill Creek Revised project are to:

- Modify the existing stewardship contracts, including salvaging dead and dying trees¹;
- Improve the health and vigor of forested stands, including within Riparian Reserves;
- Reforest the desired tree species (where natural, on-site, seed sources are lacking) to aid in the accelerated development of forest conditions consistent with Forest Plan management objectives; and,
- Improve public, administrative and operational safety along Forest Service roads.

The contractual obligations require the Forest Service to assess the changed conditions, including the value and condition of the timber that has been affected and whether damaged undesignated timber in the contract area can and should be salvaged together with the designated timber. The resulting contract modification includes: any changes to the prescriptions; any undesignated timber that can be salvaged and should be cut concurrently; eliminated areas that should not be cut or have lost their value; and, rate re-determination for all of the volume. The changes to the Proposed Action and resulting prescriptions are based on the Forest Service requirements to meet law,

¹ A dying tree is any tree that would die as a result of Government Flats Complex Fire. The Scott’s Species Specific Guidelines (Scott, Schmitt and Spiegel 2002) would be used to assess individually dying trees. These guidelines are available in the project record located at the Hood River Ranger District. See Section 2.2.1 for more information.

regulation and policy. Overall, the Forest Service has the obligation (if possible) to make the timber purchaser whole in the existing contracts based on the economic value of the timber.

The geographic scope of this project is the North Fork Mill Creek Restoration Opportunity (2008) planning area that overlaps with the Government Flat Complex fire perimeter.

1.3.1 Management Direction

The North Fork Mill Creek Revised project is proposed to respond to goals and objectives of the Mt. Hood Land and Resource Management Plan, as amended (US Forest Service, 1990a). This Environmental Assessment has been completed in accordance with direction contained in the National Forest Management Act (NFMA), the National Environmental Policy Act (NEPA), the Council on Environmental Quality regulations, Clean Water Act, the Endangered Species Act and other applicable laws, policies and regulations.

This Environmental Assessment is tiered to the Mt. Hood National Forest Land and Resource Management Plan Final Environmental Impact Statement (US Forest Service, 1990b) and Record of Decision (US Forest Service, 1990c), and incorporates by reference the accompanying Forest Plan. The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management. Goals, objectives and desired future conditions of the management areas within the project area are discussed below in the description of land allocations. In addition, management direction for the area is provided in three major Forest Plan amendments:

- The Northwest Forest Plan (NWFP) - *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* (1994);
- Survey and Manage – *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001); and,
- Invasive Plants – *Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision* (2005) and *Site-Specific Invasive Plant Treatments for the Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon, including Forest Plan Amendment #16* (2008).

The Mill Creek Watershed Analysis (2000) also provides guidance for this project. The watershed is bordered to the west by the East Fork of Hood River watershed, to the south and east by Mile Creeks watershed, and to the north by an assemblage of small tributaries of the Columbia River. About 38 percent of the watershed, or 15,298 acres, is National Forest System lands. Most of this land is also within the City of The Dalles Municipal Watershed boundaries. The Forest Service areas encompass the headwaters of both the North and South Forks of Mill Creek, and include Crow Creek and its tributaries. The NWFP Record of Decision requires a watershed analysis for all Key Watersheds prior to resource management (page C-3). Watershed analysis is a systematic procedure

to characterize the aquatic, riparian, and terrestrial features within a watershed. The information is used to refine riparian reserves boundaries, prescribe land management activities, including watershed restoration and develop monitoring programs (NWFP ROD page 10). The Mill Creek watershed is a Tier 1 Key Watershed. The watershed analysis reviews disturbance regimes and processes, vegetation conditions, wildlife species presence and viability, and human influences. The watershed analysis makes recommendations generated from the analysis and potential restoration projects. The watershed analysis has not been updated to incorporate the effects of this fire.

1.3.2 Land Allocations

Several land allocations as designated by the Forest Plan and Northwest Forest Plan are found within the project area. The primary Forest Plan land allocations in the planning area are Research Natural Area (A3), Semi-Primitive Roded Recreation (A6), Special Old Growth (A7), Deer and Elk Winter Range (B10) and Timber Emphasis (C1). Additionally, there is one secondary land use allocation in the planning area – Pileated Woodpecker/Pine Marten Habitat Area (B5). Where a secondary land use allocation has more stringent standards and guidelines than the primary land use allocations, the secondary land use allocation standards and guidelines would be followed. See Figure 1-2, Forest Plan Land Use Allocation Map.

Approximately 85 percent of the proposed projects are located within Deer and Elk Winter Range (B10). The goal for deer and elk winter range is to provide high quality deer and elk habitat for use during most winters; and to provide for stable populations of mule deer and Rocky Mountain elk on the eastside. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices (Forest Plan, Four-272). The major characteristics of this land use allocation that are applicable to this project include the following:

- At least 50 percent of area is maintained in thermal and optimal cover;
- High production of berries, acorns, nuts and seeds are typical;
- Evidence of fire occurrence is prevalent;
- Visual diversity of vegetation is evident;
- Evidence of timber harvest activity is evident; and,
- Areas of dense heavy vegetation occur for cover.

Approximately 11 percent of the proposed treatments are located within Timber Emphasis (C1). The goal for timber emphasis lands is to provide lumber, wood fiber, and other forest products on a fully regulated basis, based on the capability and suitability of the land. A secondary goal is to enhance other resource uses and values that are compatible with timber production (Forest Plan, Four-289). The remaining 4 percent of the proposed treatments are located within Research Natural Area (A3), Semi-Primitive Roded Recreation (A6), Special Old Growth (A7) and Special Emphasis Watershed (B6). The following are the goals and proposed treatments for these land use allocations.

- The goal for research natural area is to preserve examples of natural ecosystems in an unmodified condition for research and education and to provide areas to serve as a baseline against which human impacts on natural systems can be measured (Forest Plan, Four-145). Only hazard tree treatments are proposed on A3 lands.

- The goal for semi-primitive roaded recreation is to provide a variety of year-road dispersed motorized opportunities and opportunities for semi-primitive recreation experiences (Forest Plan, Four-168). Only hazard tree treatments and reforestation are proposed on A6 lands.
- The goal of special old growth is to provide the many significant values of old growth forests for present and future generations; and, to maintain old growth to provide for wildlife and plant habitat, ecosystem diversity, presentation of aesthetic qualities, and to provide opportunities for high degree of interaction between people and forests the old growth character (Forest Plan, Four-168). Only hazard tree treatments are proposed on A7 lands.
- The goal of special emphasis watershed is to maintain and improve watershed, riparian, and aquatic habitat conditions and water quality for municipal use and/or long term fish production. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices. Only hazard tree treatments are proposed on B6 lands.

The major Northwest Forest Plan allocation within the planning area is Matrix (86%) with smaller amounts in Riparian Reserves (10%) and Administratively Withdrawn Areas (4%). Riparian reserves include areas along rivers, streams, wetlands, ponds, lakes, and unstable or potentially unstable areas where the conservation of aquatic and riparian-dependent terrestrial resources receives primary emphasis. Riparian Reserves are designed to protect the health of the aquatic system and its dependent species. Administratively Withdrawn Areas (AW) are areas not scheduled for timber harvest. Matrix areas consist of Forest Service lands outside of designated areas (i.e., Congressionally Reserved Areas, LSRs, Adaptive Management Areas, Administratively Withdrawn Areas, and Riparian Reserves). Most timber harvest and other silvicultural activities are conducted in portions of Matrix with suitable forest lands. The AW lands overlap with the special old growth land use allocation (A7). See Figure 1-3, Northwest Forest Plan Land Use Allocation Map.

The planning area also includes the Mill Creek Tier 1 Key Watershed. Tier 1 Key Watersheds were designated as sources for high water quality; they contain at-risk anadromous fish. Mill Creek contains Middle Columbia River Evolutionary Significant Unit steelhead trout (*Oncorhynchus mykiss*), listed as a threatened species.

1.3.3 Desired Future Condition

The desired future condition as stated in North Fork Mill Creek Restoration Opportunities (2008) is to develop an uneven-aged stand with canopy closure that would allow fire behavior to change from crown fire to surface fire, and to have stand species composition reflecting Condition Class 1 (ponderosa pine, western larch, white oak, and dry-climate Douglas-fir). Achieving this desired future condition would enable meeting the overall goals of the primary land use allocations within the project area (see Figure 1-4).

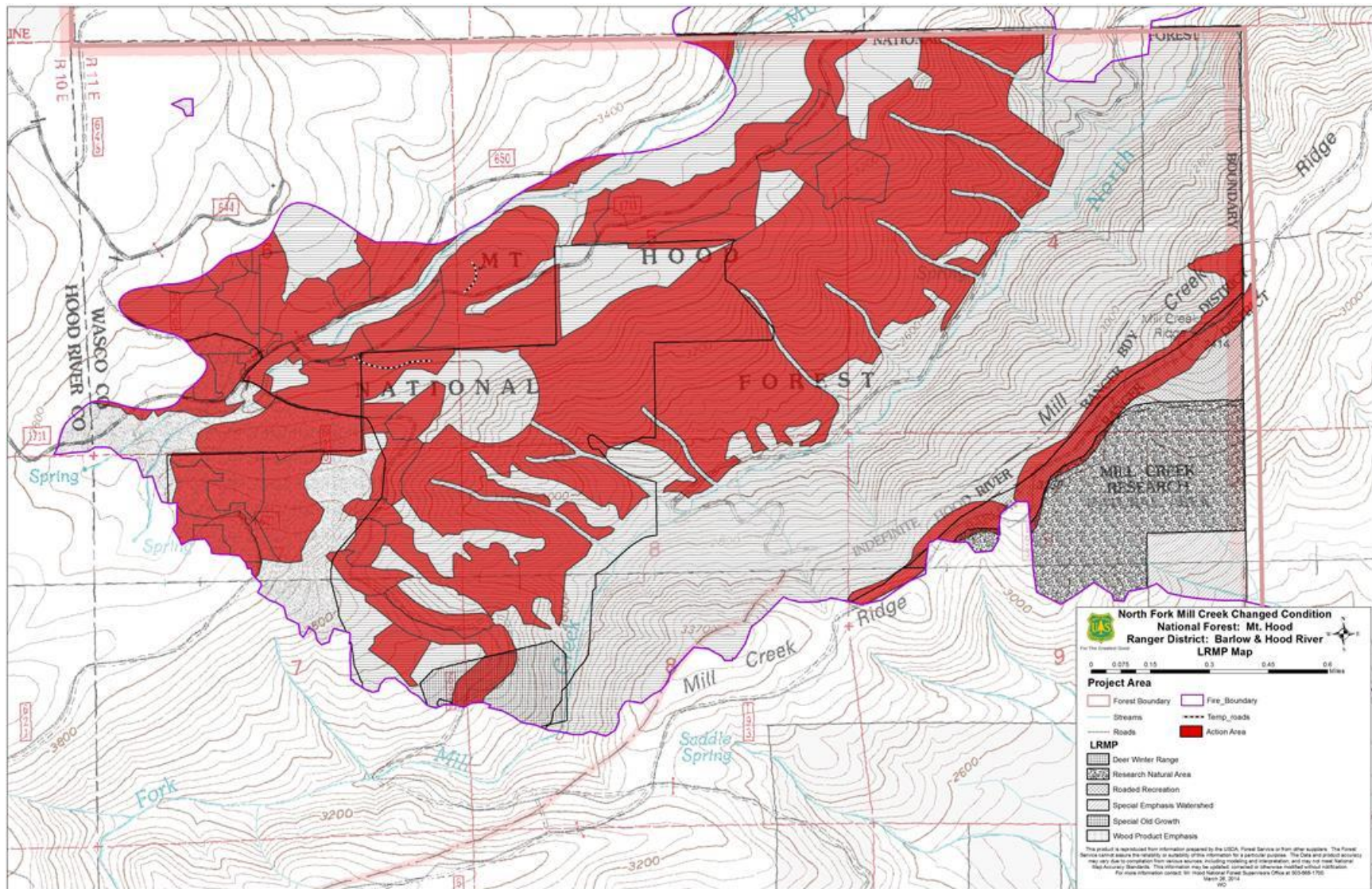


Figure 1-2: Forest Plan Land Use Allocations for Planning Area

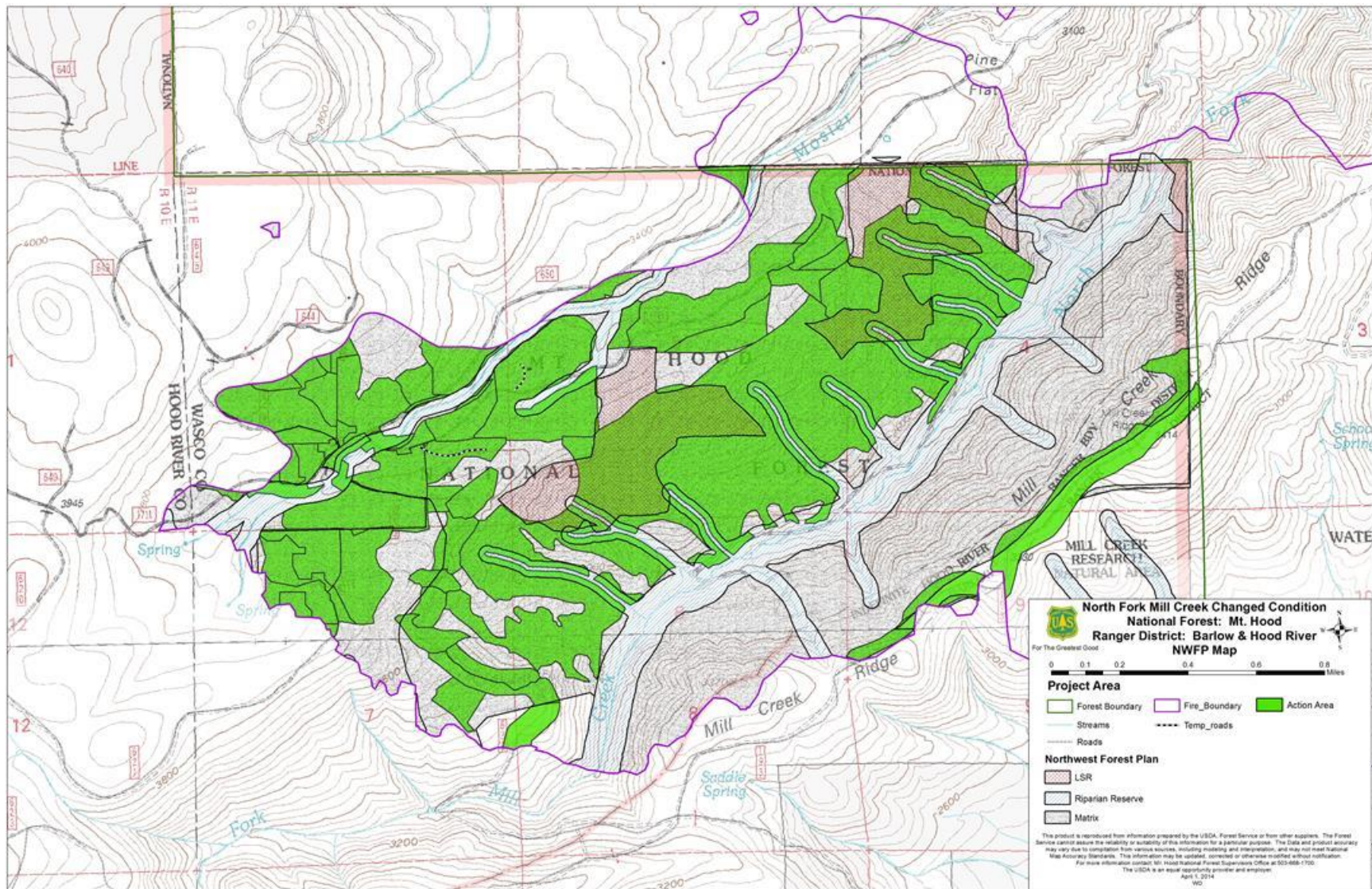


Figure 1-3: Northwest Forest Plan Land Use Allocations for Planning Area

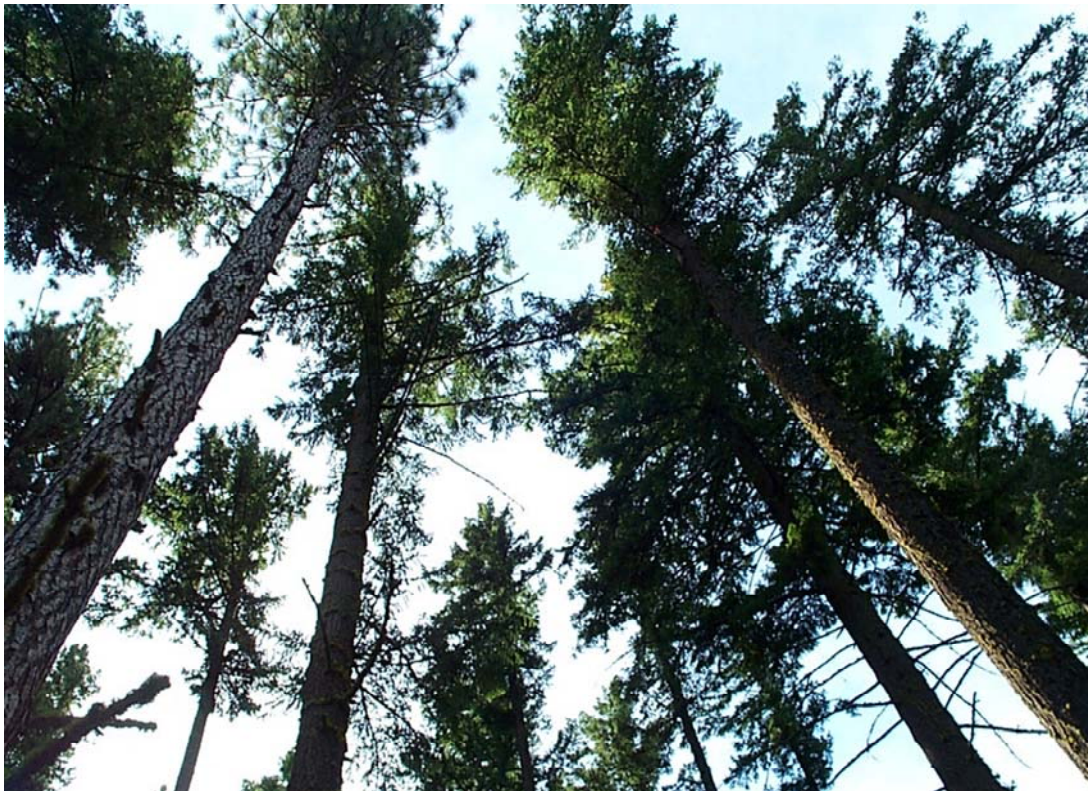


Figure 1-4: Desired future condition in the North Fork Mill Creek planning area. Photo A is the target canopy cover. Photo B is a stand that has been commercially thinned and underburned in the mid-1990s.

1.4 Changed Condition Analysis

In order to assess the changed conditions to the landscape resulting from the Government Flats Complex Fire, the Interdisciplinary Team used a flow chart (Figure 1-5) based on the Adaptive Management Model from Forest Service Handbook (FSH) 1909.12, Chapter 20. This flow chart helps to address the question as to what should be considered in a changed condition analysis and what specific changes are needed to the original proposed action. The flow chart considers the desired future condition described in Section 1.3.3. The flow chart also considers the status of work completed under the original NEPA and consistency with Forest Plan standards and guidelines.

All activities outside the fire perimeter as well as completed activities regardless of location do not have a changed condition and may proceed under the original DN/FONSI. The completed activities include: seasonal road closures, year-round road closures, and trail improvements/construction. Although the culvert replacements and road decommissioning have not been fully implemented, these do not have a changed condition since the overall road infrastructure was not impacted by the fire. As such, these activities will be implemented under the original DN/FONSI. A letter stating that these activities may proceed was signed on February 13, 2014 by Forest Supervisor, Lisa Northrop and is available in the project record, located at the Hood River Ranger District in Mount Hood/Parkdale, Oregon.

The Roan and Eques Stewardship Sales encompass approximately 577 acres. Based on the changed condition flow chart, approximately 169 acres from these sales do not have a changed condition because they are located outside of the fire perimeter. Approximately 91 acres from the sales would be reforested only because they were thinned prior to the fire. In order to meet several Forest Plan standards (see table below), approximately 42 acres were dropped from further consideration and other treatments can be considered on 22 acres where thinning cannot be completed while meeting Forest Plan standards. As a result of the flow chart, 275 acres (253 acres for thinning and 22 acres for other treatments) from Roan and Eques Stewardship were carried forward into a changed condition analysis and used as a starting point to develop the revised Proposed Action (see Table 1-2).

Table 1-2: Results from the Changed Condition Flow Chart for Roan and Eques Stewardship Sales

Action	Acres	Rationale
No Changed Condition	169	Continue with original proposed treatment
Thinning Completed	91	Reforestation only
Late Successional Reserve Acres Dropped	25	Dropped to meet requirements in Northwest Forest Plan (Units 49A & 49B)
Riparian Reserves Acres Dropped	7	Dropped to meet requirements for Riparian Reserves in Northwest Forest Plan (various units)
Pileated Woodpecker/Pine Marten Habitat Dropped	10	Dropped to meet Forest Plan Standard B5-021 (Unit 41C)
Consider Other Treatments in Changed Condition Analysis	22	Thinning does not meet Forest Plan Standard FW-129 in Units 56C & 70 and does not meet Riparian Reserve requirements in Units 48A,

Action	Acres	Rationale
		106A, 107A, and 108A)
Changed Condition Analysis	253	Proposed Action Restoration Thin Units
Total Acres Under Contract	577	Includes Roan and Eques Stewardship

The original treatments on these 253 acres from the North Fork Mill Creek Restoration Opportunities were reviewed using the flowchart (Figure 1-5). The anticipated treatment changes are summarized in Table 1-3. This changed condition analysis was used to develop the revised Proposed Action (Alternative 2). Alternative 1 represents the No Action Alternative. Alternative 3 was developed to better address the issues regarding snag retention while meeting the purpose and need for action described above. Alternatives 1 and 3 do not fully incorporate the anticipated treatments developed using the flowchart.

Table 1-3: Changed Condition for the Original Proposed Action

Original Treatment	Burn Severity	Anticipated Action
Restoration Thin		
Completed	High, Moderate, Low & No Burn	Reforestation
Incomplete (unsold)	High, Moderate, Low & No Burn	Reforestation
Incomplete (sold)	High to Moderate	Meet contractual obligation with thinning and/or salvage
	Low to No Burn	Minor changes in prescription (e.g., gaps)
Other Veg Treatments		
Sapling Thin	High to Moderate	Reforestation
Cottonwood Aspen Enhancement	High, Moderate, Low & No Burn	Implement original Proposed Action (Unit 82).
Underburning	High to Moderate	Reforestation
Road maintenance	High, Moderate, Low & No Burn	Hazard tree felling. Forest Plan will determine if the trees can be removed or left in place. Required road maintenance for the haul route will continue.

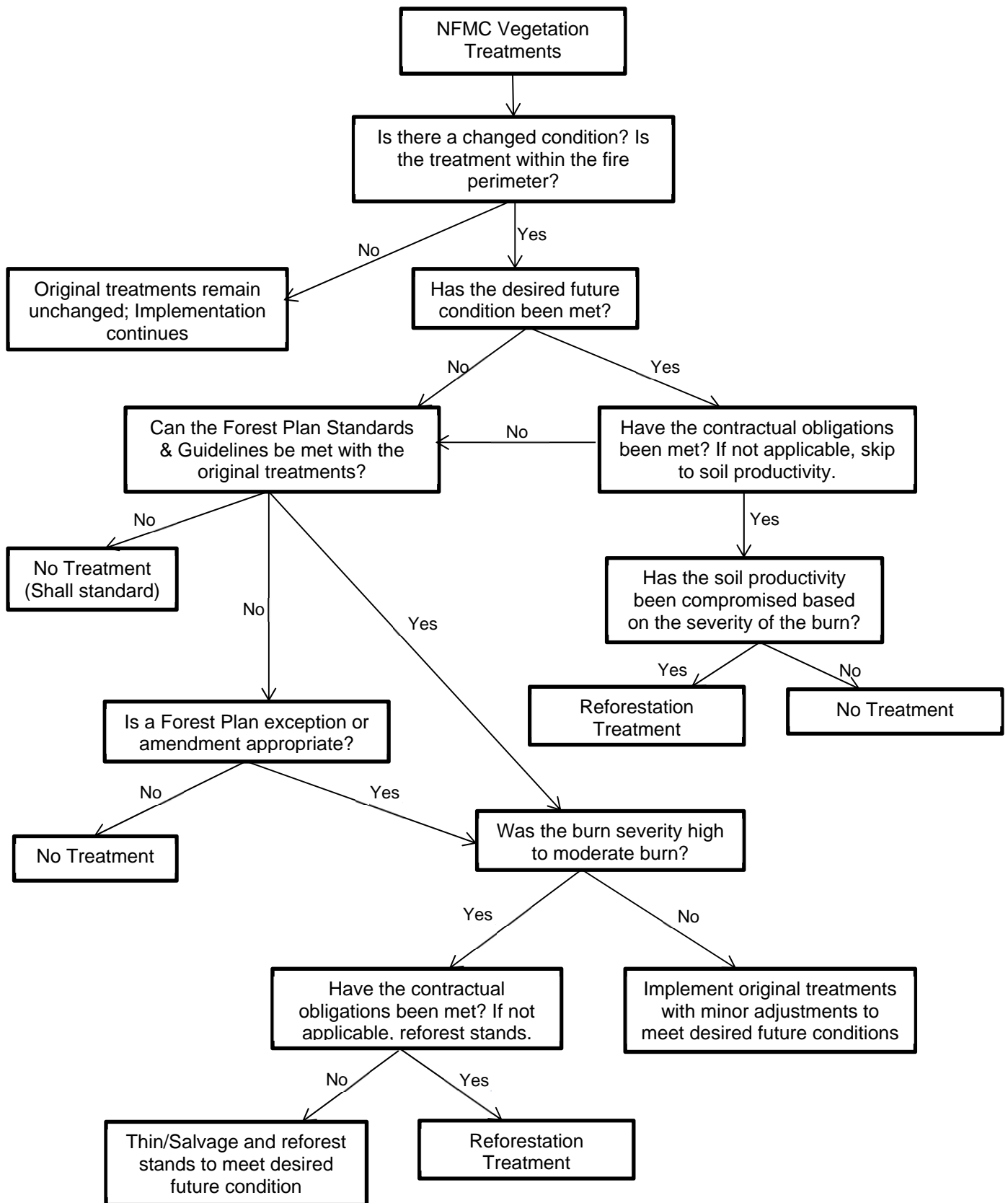


Figure 1-5: Changed Condition Flow Chart

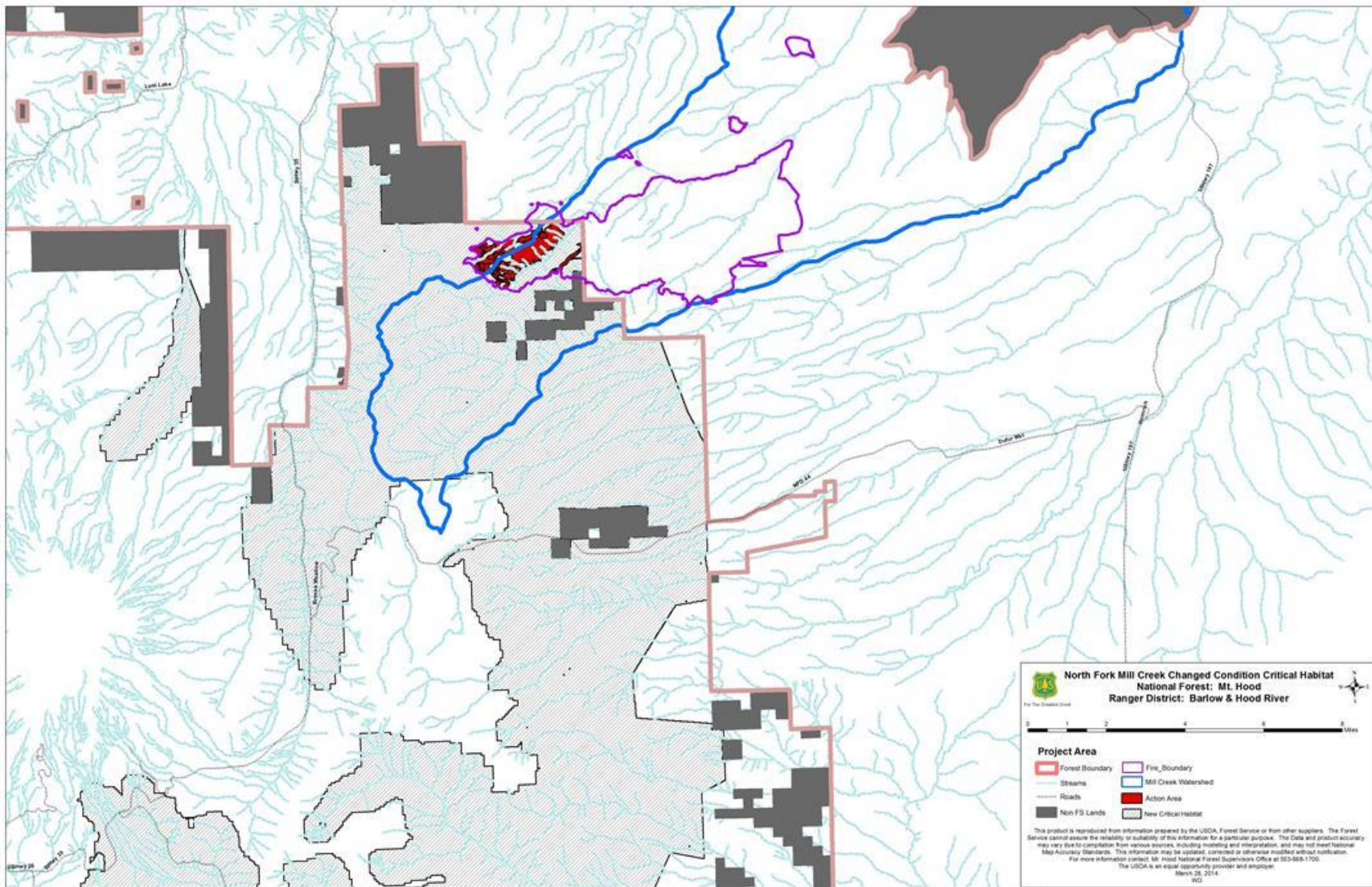


Figure 1-6: Changed Condition for Northern Spotted Owl Critical Habitat

In addition to changes in the treatments, any changes in law, regulation or policy within the changed condition analysis area (fire perimeter) will be applied and incorporated into all action alternatives, as necessary. Some of these changes include:

- Completion of Burned Area Emergency Response (BAER) work;
- Compliance with Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001);
- Updated U.S. Forest Service Region 6 sensitive species list (December 2011);
- Updated Mt. Hood National Forest analysis for management indicator species;
- Updated critical habitat for northern spotted owls (Federal Register Vol. 77, No. 233, December 4, 2012);
- Changed status for wolervine to threatened species (Final Rule expected in Spring 2014);
- Completion of the Off Highway Vehicle Management Plan, including Forest Plan Amendment #17 (2010);
- Updated list of 303(d) listed streams; and,
- New National Best Management Practices (BMPs) Guidelines (2012).

Figure 1-6 shows the proposed project area and fire perimeter overlaid with the new critical habitat for northern spotted owls along with the home range, core area and nest patch.

1.5 Alternative 2 – Revised Proposed Action

The Revised Proposed Action (Alternative 2) includes treating 1,009 acres within the Mill Creek watershed. This represents approximately 50 percent of the NFS lands burned by the Government Flats Complex Fire in August and September 2013. The Proposed Action includes restoration thinning, hazard tree removal, and reforestation treatments (see Figure 1-7).

Restoration thinning treatments would harvest timber from 253 acres within the Government Flats Complex Fire perimeter. These units are all under existing stewardship contacts (Roan and Eques), and the Forest Service has a contractual obligation to analyze continued operations on these lands in order to provide the necessary context for contract modifications. Fire-killed and dying trees would be harvested and removed from areas of high to moderate severity burn (146 acres). Restoration thinning would also occur on the unburned to low severity burns with minor changes to the prescriptions (107 acres). These changes would focus on the gaps; in large part, the gaps would no longer be needed due to the fire activity within the units. See Figure 1-8 for a map of burn severity and treatment types.

Most mortality from fire typically occurs over several years as a result of first order fire effects (e.g., crown consumption, cambium kill, and/or root kill) (Wagener 1961, Hood et al. 2010). The dying trees are trees that experienced damage as a result of the fire activity. A dying tree is any tree that would die as a result of Government Flats Complex Fire. Significant levels of mortality can occur as long as four years after the fire, as a result of second order fire effects such as insect infestations (Rasmussen et al. 1996), root death, or cambium death on the bole (Schmitt and Phillip 2005). Due to these time lags, the Scott's Species Specific Guidelines (Scott, Schmitt and Spiegel 2002) would be used to assess individually dying trees. These guidelines are available in the project

record located at the Hood River Ranger District. If additional trees are needed for soil stability or soil productivity, these trees would be retained and limbed as needed. A minimum of 10 snags per acre would be retained. Additional snags may be retained to meet habitat requirements for Northern spotted owls and snag and down log associated species, as much as possible.

Restoration thin units in all burn severities may be made available for firewood and/or restoration log removal, if the harvest operations are not able to be conducted while the product is viable. Vegetation treatment over most of the area would involve the use of available roads and skid trails existing from past activities. Less than one mile of temporary roads would be constructed for removal of vegetation in some stands, but these roads would be rehabilitated at the end of the project.

Hazard tree treatment would treat 134 acres. These treatments would remove any tree that is classified as a hazard tree and that is predicted to strike or damage the road up to 200-feet from either side of the center line of the road. All hazard (danger) tree evaluation and identification must follow the “Field Guide for Danger Tree Identification and Response” (Toupin et al. 2008). Any slash exceeding Forest Plan standards and guidelines would be machine and/or hand-piled to reduce the resulting fuel loading. If additional trees are needed for soil stability or soil productivity, these also would be felled and left on site. Approximately 125 hazard trees have already been felled along Forest Service Road 1711-630 as part of the Burned Area Emergency Response (BAER) work. These trees would be removed, if they exceed Forest Plan standards and guidelines. On lands within Riparian Reserves (Units 87A, 106A, 107A, and 108A), the hazard trees would be felled and left on-the-ground in order to comply with the Northwest Forest Plan.

Approximately 622 acres would be planted to reforest moderate to high severity burn areas in naturally forested areas and not in grass or meadow plant communities. Hazard trees within the stand would be hand-felled in order to facilitate safe tree planting operations. These trees would be left on-the-ground and used as contour trees whenever possible. These trees would be used to provide micro-siting for planted tree seedlings as well. All other restoration thinning and hazard tree units in the high to moderate burn severity areas (approximately 280 acres) would be reforested as needed in order to establish slow growing, shade intolerant, rot resistant species, such as ponderosa pine, western white pine and western larch. Any slash along the roads within these units that exceeds Forest Plan standards and guidelines and that are not needed for soil stability or soil productivity would be piled to reduce the resulting fuel loading. These units were all originally analyzed under the North Fork Mill Creek Restoration Opportunities EA, but they have not met the desired future condition given the severity of the burn and anticipated natural regeneration.

For more details on associated fuels reduction activities and riparian prescription included in this alternative, see Section 2.2.

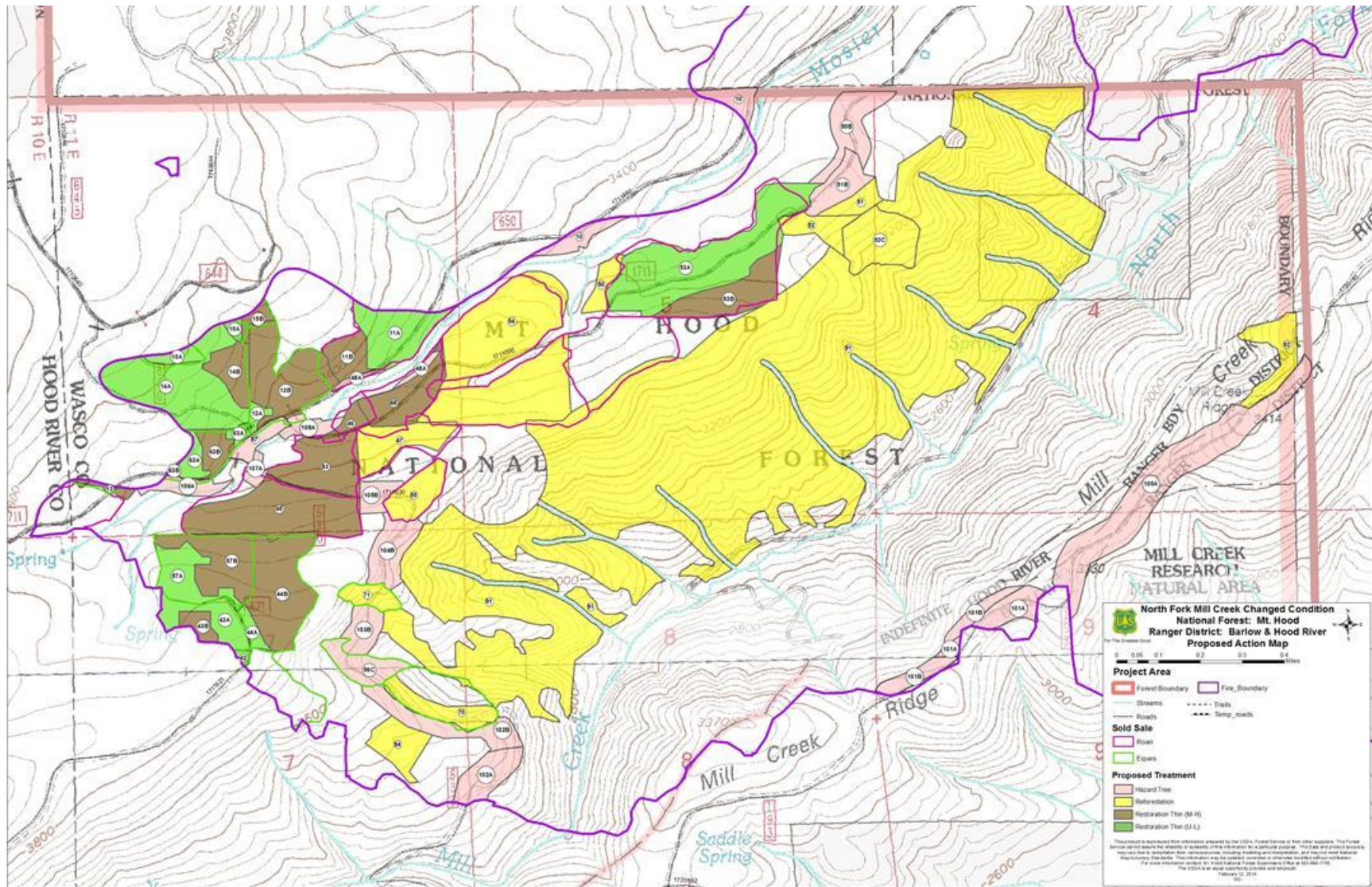


Figure 1-7: Alternative 2 – Revised Proposed Action Map

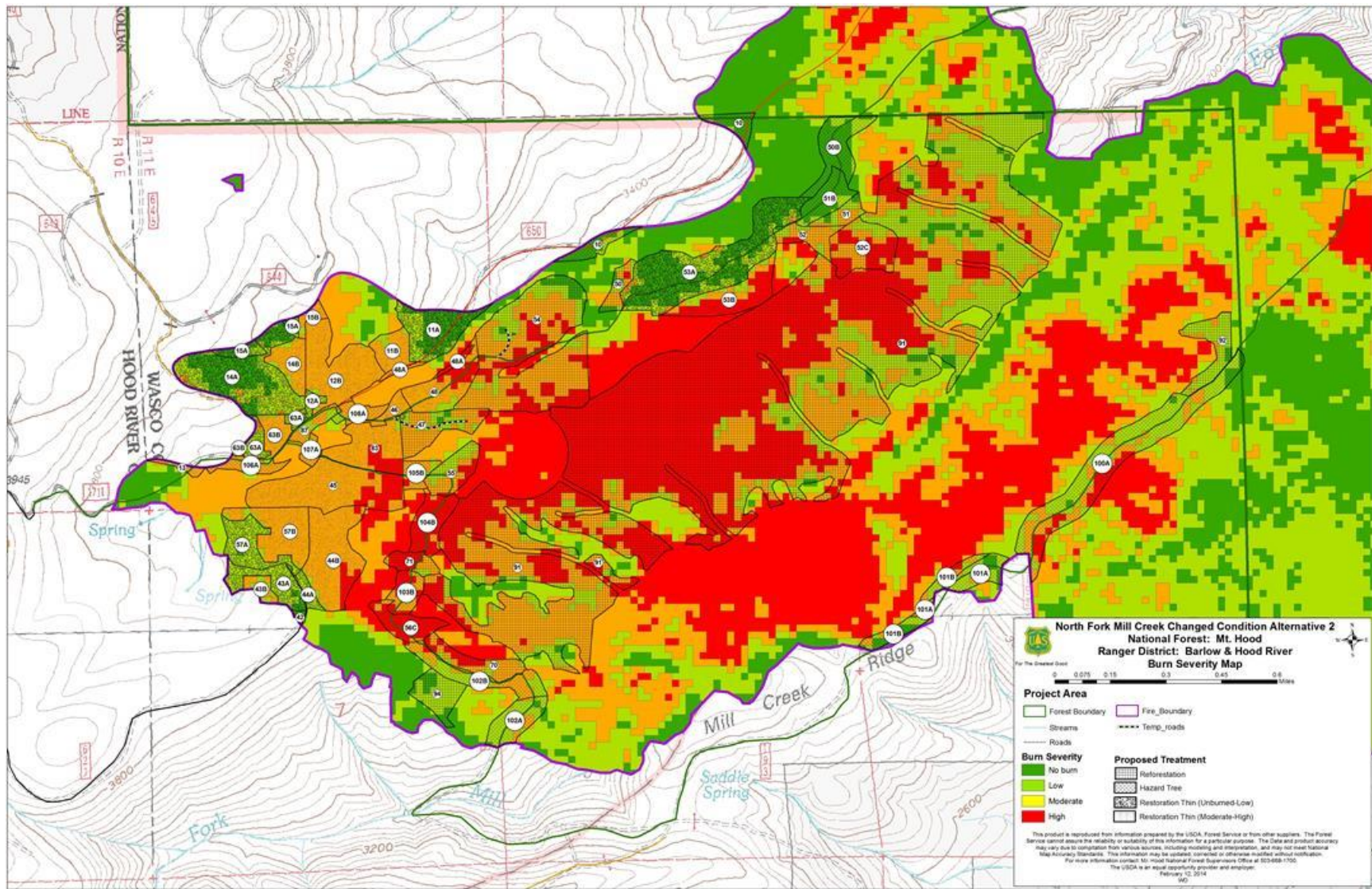


Figure 1-8: Burn Severity Map for Alternative 2

1.6 Decision Framework

The Forest Supervisor for the Mt. Hood National Forest will make the following decisions based on this interdisciplinary analysis:

- Whether or not to meet the existing contractual and economic obligations within the existing stewardship sales (Roan and Eques Stewardship) in whole or in part by implementing the Proposed Action or Alternative 3;
- Whether or not to improve safety on the National Forest System roads by abating (felling) hazard trees;
- Whether or not to reforest desired tree species (where natural, on-site, seed sources are lacking) to aid in the accelerated development of forest conditions consistent with management plan objectives;
- Whether or not to amend the Forest Plan; and,
- What, if any, project design criteria/mitigation measures are needed.

1.7 Public Involvement

The public involvement efforts conducted as part of the North Fork Mill Creek Restoration Opportunities (2008) planning process were used during the development of the revised Proposed Action analyzed as part of this process. The previous public involvement included collaboration with the Mill Creek Collaborative Group as well as the scoping and objection periods in 2008. These efforts are summarized below; additional details are available in the original environmental assessment and the public record available at the Hood River Ranger District.

1.7.1 Collaboration

The Mill Creek Collaborative Group was actively involved throughout the original planning process for North Fork Mill Creek Restoration Opportunities. This collaborative group was active from 2004 through 2010 on hazardous fuels reduction projects in the North and South Fork Mill Creek planning areas. These collaborative efforts have resulted in three projects which have been or are currently being implemented: 1) The Dalles Watershed Fuelbreak on the Barlow and Hood River Ranger Districts; 2) North Fork Mill Creek Restoration Opportunities on the Hood River Ranger District; and, 3) The Dalles Watershed Phase 2 Fuels Reduction on the Barlow Ranger District. Although collaboration was not specifically undertaken for this revised project, the collaborative group recommendations and efforts from the original project were used in the planning process.

The collaborative group met on several occasions to explicitly discuss the North Fork Mill Creek project in 2007 and 2008, including a field trip in to review a representative sample of the marking in the North Fork Mill Creek planning area. Additionally, in October 2008, the District Ranger went on a follow-up field trip with Oregon Wild to discuss the issues raised during the objection period. Based on this field trip and some follow-up conversations, the Responsible Official incorporated some of the suggestions as noted in the Decision Notice for this project.

After signing this decision, a follow-up field trip was conducted in October 2009 to review work that had been completed on-the-ground in The Dalles Watershed Fuelbreak (Willow Stewardship Sale) and North Fork Mill Creek (Appy Stewardship Sale). The collaborative group members that

attended the field trip were supportive of the work that had been completed. The group also met annually beginning in 2009 to discuss the use of retained receipts resulting from the stewardship sales implementing the North Fork Mill Creek Restoration Opportunities project which included the Roan and Eques Stewardship Sales.

In addition, this project lies within an identified wildland urban interface (WUI), as outlined in the Hood River County Community Wildfire Protection Plan (CWPP) and Wasco County CWPP. Additionally, Wasco County CWPP identified the Mill Creek Watershed, which is adjacent to the project area, as an at-risk community. Both CWPPs were prepared in a collaborative effort by individuals and agencies within each respective county. Both the original and revised project meet the objectives set forth in the CWPPs (available in the project record).

1.7.2 Public Involvement

North Fork Mill Creek Revised was listed in the Mt. Hood National Forest quarterly planning newsletter (Schedule of Proposed Action [SOPA]) beginning in February 2014. The project was listed on the Mt. Hood National Forest website beginning in January 2014 at: <http://www.fs.usda.gov/projects/mthood/landmanagement/projects>. No comments were received through this effort.

The original hazardous fuels reduction proposal for North Fork Mill Creek Restoration Opportunities (2008) was listed in the Mt. Hood National Forest quarterly planning newsletter (Schedule of Proposed Actions [SOPA]). No comments were received through that effort. In March 2008, a letter providing information and seeking public comment was mailed to 135 individuals and groups. This included federal and state agencies, the Confederated Tribes of Warm Springs, municipal offices, businesses, interest groups, landowners near the watershed and individuals. Also, a public meeting was held on March 26, 2008 at the Hood River Ranger Station at Mt. Hood/Parkdale, Oregon. Comments were received from representatives of Oregon Wild, SDS Lumber, and three individuals. A summary of the public comments received during the scoping period are included in Appendix 2 of the 2008 Environmental Assessment.

A new scoping period is not required for a revised environmental analysis resulting from a changed condition. Forest Service Handbook (FSH) 1909.12, Chapter 20 describes the requirements for the Adaptive Planning Process. A second scoping period was not conducted, but an information letter was mailed to approximately 150 individuals and groups. The mailing list included all those interested in the original project as well as all members of the collaborative group. This included federal and state agencies, the Confederated Tribes of Warm Springs, municipal offices, businesses, interest groups, landowners near the watershed and individuals. One comment from an individual has been received to date from these efforts.

A legal notice announcing the availability of the North Fork Mill Creek Revised Preliminary Analysis for review and comment was published in *The Oregonian* (newspaper of record) on June 18, 2014. The 30-day comment period ended on July 18, 2014. Comments were received from 436 individuals and organizations within the comment period. An additional 29 comments were received from individuals after the comment period ended. The comments were received from individuals, Oregon Wild, Confederated Tribes of Warm Springs, Bark and Mt. Hood Study Group.

Of the comments received, 458 comments were form emails received from individuals. Copies of these letters are in the North Fork Mill Creek Revised project file. During the comment period, a public open house was held on July 9, 2014 to present and answer questions about the Preliminary Assessment. Two individuals and a member of Bark attended the meeting. Substantive comments received during the comment period are summarized along with Forest Service responses in Appendix 2.

1.7.3 Healthy Forest Restoration Act Objection

In August 2008, Oregon Wild objected (Objection #: 08-06-06-03-218) the North Fork Mill Creek Restoration Opportunities project under the 218 regulations for the Healthy Forest Restoration Act (HFRA). The objection included several issues related to silviculture, fire, soils, and wildlife. The issues and responses from the Objection Reviewing Official are available in the project record, located at the Hood River Ranger District.

On September 26, 2008, the Objection Reviewing Officer issued a letter to Oregon Wild stating that he had reviewed the objection and did not identify any substantial flaws in the project proposal. The letter also instructed Gary Larsen, Mt. Hood National Forest Supervisor, to proceed with issuance of a decision notice for this project without any substantive changes to the EA. A decision for this project was signed on December 19, 2008.

1.8 Issues

Issues serve to highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the Responsible Official and public to understand. Issues are best identified during scoping early in the process to help set the scope of the actions, alternatives, and effects to consider; but, due to the iterative nature of the NEPA process, additional issues may come to light at any time. Issues are statements of cause and effect, linking environmental effects to actions, including the Proposed Action (Forest Service Handbook 1909.15, 12.4). Issues are used to generate additional action alternatives to the Proposed Action.

During the 2008 planning process, the interdisciplinary team used comments from the collaborative effort, the general public and other agencies to identify a list of issues and concerns to address. The issues and concerns identified during that process were canopy fuels reduction, large tree retention, forest health, snags and downed logs, road density and temporary roads. More information on these issues and concerns is available in the original environmental analysis (2008). These issues and concerns were considered along with the preliminary effects analysis conducted during the changed condition analysis. One issue was identified for this project and used to develop Alternative 3 as described in Chapter 2 of this Environmental Assessment.

Commenters raised a concern based on the original analysis that there is a shortage of large down wood and snags across the landscape due to extensive logging over the past century. The commenters believe that all large snags and down wood should be left in place and/or created to at least meet Forest Plan standards. The original Proposed Action did not impact any of the existing snags on the landscape. The only snags removed were associated with landings or temporary roads,

or those that posed a safety hazard.

Under the revised Proposed Action, snags would be removed in the restoration thinning units with moderate to high severity burn as well as the hazard tree treatment units. The removal of these snags is in addition to the snags posing a safety hazard for all treatment types as well as those associated with landings. The Proposed Action does not fully follow the DecAID analysis, which recommends that all snags should be retained whenever possible to benefit cavity nesting species. Alternative 3 – Snag Retention was designed to address this issue more fully. The measures to compare these alternatives are: 1) snags removed by treatment type; and, 2) snags removed by diameter class. Discussion of this issue can be found in Section 3.2, Wildlife Resources.

CHAPTER 2 – ALTERNATIVES

Chapter 2 describes and compares the alternatives considered for meeting the existing contractual and economic obligations within the existing stewardship sales and improving safety on the National Forest System roads in the Government Flats Complex Fire perimeter. A description and map are provided for each alternative considered in detail. Also, this section presents the alternatives in comparison form, highlighting the differences between each alternative and providing a basis for choice among options for the Responsible Official and the public. This chapter also includes project design criteria/mitigation measures, monitoring requirements, and regulatory framework. The Responsible Official for this project is the Forest Supervisor of the Mt. Hood National Forest.

2.1 No Action Alternative

Under the No Action Alternative, the only action that would take place is the felling of hazard trees¹ (also known as danger trees) that pose an imminent threat to human safety or infrastructure. The goal for felling these hazard trees would be to re-open the road for administrative and public use. Based on tree evaluation surveys conducted on September 9, 2013 and May 22, 2014 by a qualified danger tree specialist, it is estimated that 12,500 snags would be removed under this alternative. These trees would be felled and would not be sold. The trees may be removed for firewood or for use in restoration projects as permitted by existing NEPA decisions². As time passes, this number is anticipated to increase to the numbers described in the action alternatives as likely hazard trees become imminent hazard trees. Many of the hazard trees would not be removed, which may lead to an increased fuel loading along National Forest System Roads. Under the No Action Alternative, no thinning activities, associated fuel treatments, or reforestation activities would take place, and no temporary roads would be built. As such, the Forest Service would not meet its existing contractual obligations associated with the Roan and Eques Stewardship Sales.

In the unburned to low severity burn areas, stands would remain in dense overstocked conditions and maintain high fuel loadings and ladder fuels that put the stands at high risk for stand replacing events. Overtime the dry mix conifer sites, currently occupied by densely stocked Douglas-fir and grand fir stands would experience the continuing spread of root disease and resultant mortality over the long-term. Also, a continued infestation and mortality from dwarf mistletoe would continue adding to the already abundant fuel loadings and ladder fuels. By maintaining high tree competition, stems would continue to grow in height, but diameter growth would continually slow. When trees develop in this manner they are more likely to blow down in large groups or if drought conditions persist, also adding to the existing fuel loading. In the long term, the stand structure and composition would be dominated by Douglas-fir and grand fir in both the overstory and the understory and would not be moved towards a more historic

¹ A danger (hazard) tree is any tree or its parts that will fail because of a defect, and cause injury or death to people (Toupin et al 2008). The danger trees range from 6 inches to 40+ inches in DBH and from 30 to 120 feet tall.

Trees are located in light to severely burned areas on slopes up to 80%.

² NEPA Authorization for Eastside Special Forest Products 2014 Program, signed March 2014; and, Programmatic Downed Tree Removal for Restoration Projects Decision Memo, signed September 2009.

disturbance regime with fire resistant species. With no thinning treatments the ponderosa pine/Douglas-fir stands would continue to have grand fir dominate the understory, thereby suppressing regeneration of shade intolerant fire resistant species like ponderosa pine or western larch. Young stands would continue to grow in densely stocked conditions with very little regeneration of desired fire resistance species. Densely stocked stands would continue to have large amounts of small patches with increasing crown closure with very little species and structural diversity. More information is available under the Existing Conditions in Section 3.1, Vegetation Management.

In the moderate to high severity burn areas, tree mortality would continue for several years and the area would not be reforested. The snags would remain on site and would continue to provide habitat for snag-dependent wildlife species. It is estimated that there are currently an average of 60 to 100 snags per acre greater than or equal to 20 inches in diameter and 100 to 150 snags per acre between 8 and 19.9 inches in diameter. Given the above averages, the total number of snags in the project area is estimated at 77,880 to 130,000 snags greater than or equal to 20 inches in diameter and 130,000 to 194,700 snags between 8 and 19.9 inches. Without timely reforestation or ample natural regeneration, the moderate to high severity burn areas of the project may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity burn areas, depending on the success of natural regeneration. More information is available under the Existing Conditions section in Section 3.1, Vegetation Management and under the Snag and Down Log Associated Species section in Section 3.2, Wildlife.

2.2 Alternative 2 – Revised Proposed Action

Overall, the revised Proposed Action includes treating 1,009 acres within the Mill Creek watershed. This represents approximately 50 percent of the National Forest System (NFS) lands burned by the Government Flats Complex Fire in August and September 2013. The Proposed Action includes restoration thinning, hazard tree removal, and reforestation treatments (described below). In addition to these treatments, the Proposed Action includes less than one mile of temporary road construction as a connected action. The Proposed Action is summarized in Table 2-1 and Figure 1-7, Proposed Action Map.

Table 2-1: Proposed Action Treatment Acres

Proposed Treatment	Acres
Restoration Thin (Unburned to Low Severity)	107
Restoration Thin (Moderate to High Severity)	146
Hazard Tree	134
Reforestation	622
Total Acres	1009

The Proposed Action treatment types are summarized by Forest Plan land use allocation in Table 2-2 and Northwest Forest Plan land use allocation in Table 2-3. Approximately 85 percent of the proposed projects are located within Deer and Elk Winter Range (B10) and then approximately 11 percent are located within Timber Emphasis (C1). Then approximately 86 percent of the proposed projects are located within Matrix lands and then approximately 10 percent are located

within Riparian Reserves. All of the proposed projects overlap with the critical habitat for Northern spotted owls (see Section 3.2, Wildlife for more details).

Table 2-2: Proposed Action Treatment Acres by Forest Plan Land Use Allocation (A3 = Research Natural Area; A6 = Semi-Primitive Routed Recreation; A7 = Special Old Growth; B10 = Deer and Elk Winter Range; and C1 = Timber Emphasis)

Treatment	A3	A6	A7	B6	B10	C1	Total
Restoration Thin (Unburned to Low Severity)	0	0	0	0	79	28	107
Restoration Thin (Moderate to High Severity)	0	0	0	0	75	71	146
Hazard Tree	3	30	8	3	81	9	134
Reforestation	0	1	0	0	619	2	622
Total Acres	3	31	8	3	854	110	1009

Table 2-3: Proposed Action Treatment Acres by Northwest Forest Plan Land Use Allocation (AW = Administratively Withdrawn Areas)

Treatment	Matrix	Riparian Reserves	AW	Total Acres
Restoration Thin (Unburned to Low Severity)	106	1	0	107
Restoration Thin (Moderate to High Severity)	146	0	0	146
Hazard Tree	80	11	43	134
Reforestation	536	85	1	622
Total Acres	868	97	44	1009

Table 2-4 contains a detailed unit-by-unit description of the Proposed Action following the descriptions of the treatment types. Figure 1-8 shows the Proposed Action treatment units overlaid with burn severity.

2.2.1 Restoration Thinning

Restoration thinning treatments would harvest timber from 253 acres within the Government Flats Complex Fire perimeter. These units are all under existing stewardship contacts (Roan and Eques), and the Forest Service has a contractual obligation to analyze continued operations on these lands in order to provide the necessary context for contract modifications. The acres of treatment were reduced from the existing contractual acres based on the changed condition analysis in Section 1.4. Approximately 64 acres were dropped in order to meet the standards and guidelines in the Forest Plan and Northwest Forest Plan.

The goal of the restoration thinning (as described in the original EA) was to reduce hazardous fuels by thinning from below. Smaller diameter trees growing in lower crown positions would be removed, leaving more space around remaining larger trees. To further reduce fuel loadings, trees would be selected for removal if their spacing facilitates the spread of a crown fire (canopy closure), or a tree form contributes to the initiation of a crown fire (crown base height) such as low growing tree branches over brush, which if ignited, could lead to crown fire initiation. Trees heavily infected with dwarf mistletoe would also be removed, since these trees contribute to ladder fuels (low hanging “brooms”), to low crown base height (distance from surface fuels to

bottom of tree crowns), and to torching. Tall brush, which may contribute to the initiation of a crown fire, would also be reduced through mechanical and hand treatments as well as burning. Activity fuels (residual from mechanical treatments such as masticated material, thinning, etc.) as well as residual fuels from natural accumulation would be treated by piling and burning.

Restoration Thinning (Moderate to High Severity)

Fire-killed and dying trees would be harvested and removed from areas of high to moderate severity burn (146 acres). Most mortality from fire typically occurs over several years, as a result of first order fire effects (e.g., crown consumption, cambium kill, and/or root kill) (Wagener 1961, Ryan 2005, and Hood et al. 2010). A dying tree is any tree that would die as a result of Government Flats Complex Fire. Significant levels of mortality can occur as long as four years after the fire, as a result of second order fire effects such as insect infestations (Rasmussen et al. 1996), root death, or cambium death on the bole (Schmitt and Phillip 2005). Due to these time lags, the Scott's Species Specific Guidelines (Scott, Schmitt and Spiegel 2002) would be used to assess individually dying trees. These guidelines are available in the project record located at the Hood River Ranger District. Snags would be retained to meet habitat requirements for the Northern spotted owl and snag and down log associated species, as much as possible. If additional trees are needed for soil stability or soil productivity, these trees would be retained and limbed as needed. A minimum of 10 snags per acre would be retained.

Restoration Thinning (Low to No Severity)

Restoration thinning would also occur on the unburned to low severity burns with minor changes to the prescriptions (107 acres). These changes would focus on the gaps; in large part, the gaps would no longer be needed due to the fire activity within the units. All thinning activities on the unburned and low severity burn areas would apply variable density thinning (VDT), which allows flexible local density levels to achieve overall treatment objectives.

VDT was part of the original Proposed Action and would be carried forward in the unburned and low severity burn units. This allows emphasis to be placed on leaving vigorous trees of all sizes without concern for spacing. Leave tree spacing associated with variable density thinning would vary within and between units. Tree density would be measured by basal area, canopy closure, trees per acre or relative density depending on the circumstances for each unit. Where the objective is to delay the time at which the stand reaches the stem exclusion stage, a heavy variable density thinning would be prescribed (wide leave tree spacing). In other areas, the objective would be to have stands reach the stem exclusion stage sooner and they would have moderate or light variable density thinning. Leave trees would include minor species and would include trees with the elements of wood decay.

Included in variable density thinning are skips and gaps within the stands to mimic more natural stands. Skips are areas where no trees would be removed; gaps are areas where few trees would be retained. No additional gaps would be added to these units. The gaps created by the Government Flats Complex Fire would be used in determining the best applications of VDT. Some of the characteristics of skips include the following.

- Skips would be created in a variety of sizes. The sizes and total quantity would vary within and between units.

- Skips may be placed where there are special features such as clumps of minor species, clumps of down logs, key snags or potential snag concentrations, wet areas, or locations of rare or uncommon species.
- All non-hazardous snags would be retained. Future snags and down logs would be recruited through the use of skips.
- Existing down logs would be retained as practical and key concentrations of woody debris in the older decay classes would be protected as long as doing so would meet the intent of the project.

The riparian prescriptions in the unburned to low severity restoration thinning units are described below. No riparian treatments would occur on the moderate to high severity burn units based on the Northwest Forest Plan standards and guidelines that prohibit salvage logging in Riparian Reserves (page C-32).

All Restoration Thinning

In the moderate to high severity restoration thinning units within 200-feet of roads and in the unburned and low severity restoration thinning units, target fuel loading is between 7 and 15 tons per acre. In the moderate to high severity restoration thinning units that are 200 feet beyond roads, target fuel loading is between 10 to 20 tons per acre. The units of highest concern would be prioritized during implementation based on current on-the-ground and weather conditions. Restoration thinning units in all burn severities may be made available for firewood and/or restoration log removal, if the harvest operations are not able to be conducted while the product is viable. Vegetation treatment would utilize already disturbed areas as much as possible, including the use of available roads, skid trails existing from past activities and dozer line from the fire suppression activities.

Less than one mile of temporary roads would be constructed for removal of vegetation and completion of proposed activities in some stands. Two temporary roads are already located on-the-ground; approximately 0.2 miles of temporary road to access Unit 47 and then 0.1 miles of temporary road to access Unit 54. These roads were constructed to complete thinning operations and were not rehabilitated before the timber purchaser was evacuated for fire activity. All temporary roads, including those already constructed on-the-ground, would be rehabilitated as part of this project.

2.2.2 Hazard Tree Removal

Hazard tree treatment would treat 134 acres. These treatments would remove any tree that is classified as a hazard tree and that is predicted to strike or damage the road up to 200-feet from either side of the center line of the road. All hazard (danger) tree evaluation and identification must follow the “Field Guide for Danger Tree Identification and Response” (Toupin et al. 2008). Based on field reviews, it is estimated that approximately 40 percent of the trees would need to be treated to address safety concerns; this is approximately 82 trees per acre.

Any slash exceeding Forest Plan standards and guidelines (FW-032 & FW-033) would be machine and/or hand-piled to reduce the resulting fuel loading. If additional trees are needed for soil stability or soil productivity, these also would be felled and left on site. Approximately 125

hazard trees have already been felled along Forest Service Road 1711-630 as part of the Burned Area Emergency Response (BAER) work. These trees would be removed, if they exceed Forest Plan standards and guidelines. On lands within Riparian Reserves (Units 87, 106A, 107A, and 108A), the hazard trees would be felled and left on-the-ground in order to comply with the Northwest Forest Plan. Implementation of these treatment units may occur outside the normal operating season from April 2nd to November 30th in order to facilitate safe travel on the road system as quickly as possible.

2.2.3 Reforestation

Approximately 622 acres would be planted to reforest moderate to high severity burn areas in naturally forested areas and not in grass or meadow plant communities. Hazard trees within the stand would be hand-felled in order to facilitate safe tree planting operations, according to all State of Oregon and Federal (OSHA) safety standards. These trees would be left on-the-ground and used as contour trees whenever possible. Also, these trees would be used to provide micro-siting for planted tree seedlings as well. These areas would be reforested as needed in order to establish slow growing, shade intolerant, rot resistant species, such as ponderosa pine, western white pine and western larch. Similarly, all other restoration thinning and hazard tree units (approximately 280 acres) in the high to moderate burn severity areas would be reforested as needed. Any slash along the roads within these units that exceeds Forest Plan standards and guidelines and that are not needed for soil stability or soil productivity would be piled to reduce the resulting fuel loading prior to reforestation. These units were all originally analyzed under the North Fork Mill Creek Restoration Opportunities EA, but they have not met the desired future condition given the severity of the burn and anticipated natural regeneration.

Table 2-4: Unit-by-Unit Description of Proposed Action (Alternative 2)

Tree Species Abbreviations: DF = Douglas-fir; GF = Grand fir; WWP = Western white pine; PP = Ponderosa Pine; WL = Western Larch); Treatment Abbreviations: U-L = Unburned to Low Severity Burn; M-H = Moderate to High Severity Burn

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
10	8	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Hand Piling
11A	13	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
11B	6	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
12A	1	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
12B	19	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
13	1	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	C1	III	III	Mechanical and Hand Piling
14A	27	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10, C1	III	III	Mechanical and Hand Piling
14B	7	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	B10, C1	III	III	Mechanical and Hand Piling
15A	3	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
15B	2	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
42	1	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
43A	8	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
43B	3	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
44A	2	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
44B	21	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
45	27	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	C1	III	III	Mechanical and Hand Piling

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
46	3	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
47	11	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes*	B10/B5	III	III	Hand Piling
48	11	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
48A	2	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Hand Piling
50	4	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10	III	III	Hand Piling
50B	10	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Mechanical and Hand Piling
51	4	DF, GF, WWP, PP, WL	Reforestation	Ground	No	B10	III	III	Mechanical and Hand Piling
51B	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	No	B10	III	III	Mechanical and Hand Piling
52	6	DF, GF, WWP, PP, WL	Reforestation	Ground	No	B10	III	III	Mechanical and Hand Piling
52C	14	DF, GF, WWP, PP, WL	Reforestation	Ground	No	B10	III	III	Mechanical and Hand Piling
53A	37	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	Yes	B10	III	III	Mechanical and Hand Piling
53B	13	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	Yes	B10	III	III	Mechanical and Hand Piling
54	57	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes*	B10	III	III	Mechanical and Hand Piling
55	8	DF, GF, WWP, PP, WL	Reforestation	Skyline	N/A	B10/B5	III	III	Mechanical and Hand Piling
56C	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Skyline/ Ground	N/A	B10/B5	III	III	Hand Piling
57A	9	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
57B	14	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
63A	4	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1	III	III	Mechanical and Hand Piling
63B	4	DF, GF, WWP, PP, WL	Restoration Thin (M-H)	Ground	N/A	C1	III	III	Mechanical and Hand Piling
70	8	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10/B5	III	III	Mechanical and Hand Piling
71	4	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10/B5, C1/B5	III	III	Mechanical and Hand Piling
83	14	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	Yes	B10	III	III	Mechanical and Hand Piling
87	4	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Hand Piling
91	490	DF, GF, WWP, PP, WL	Reforestation	Hand Work	N/A	B10/B5	III	III	Hand Piling
92	9	DF, GF, WWP, PP, WL	Reforestation	Hand Work	N/A	A6/B10	III	III	Hand Piling
94	8	DF, GF, WWP, PP, WL	Reforestation	Hand Work	N/A	B10/B5, C1/B5	III	III	Hand Piling
100A	36	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	A6/B10, A3	III	III	Mechanical and Hand Piling
101A	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	A6/B10, A3	III	III	Mechanical and Hand Piling
101B	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	A6/B10, A3	III	III	Mechanical and Hand Piling
102A	8	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, A7	III	III	Hand Piling
102B	10	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, A7	III	III	Hand Piling
103B	6	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5	III	III	Hand Piling
104B	9	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, C1/B5	III	III	Hand Piling
105B	4	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, C1/B5	III	III	Hand Piling

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
106A	3	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	C1	III	III	Hand Piling
107A	1	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	C1, B10	III	III	Hand Piling
108A	2	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10	III	III	Hand Piling

* Temporary road from completed thinning operations remains open in the unit. The temporary road would be closed when operations resume.

2.2.4 Associated Fuels Reduction Activities

Natural fuels (organic litter, brush, and trees) would be treated in the Proposed Action; treatment methods would include handpiling, pile burning and mastication. The treatments would be used over a large area to reduce the fuel loadings and modify the fuel profiles of the unit. These treatments are a subset of the original fuels activities that would be applicable to the restoration thinning units under the changed condition.

Hand Piling

Handpiling is the piling of understory brush, small trees, and down dead woody material by hand crews into piles of woody debris that may be later burned or utilized. Chainsaws and hand tools would be used to cut the material to aid in the piling operation. Ladder fuels are reduced as a result of the piling of brush and small trees. The fuel loading is reduced by the piling and subsequent burning of the down dead woody material. The piles would be burned in the fall season.

Machine Piling

Machine piling is the use of mechanical devices to pile activity and residual fuels. Typical mechanical use on the Mt. Hood National Forest is grapple piling to reduce soil disturbance. Bulldozers are generally more efficient in collecting and piling vegetative debris and creating compact piles. Bulldozer piling may be used at the landings.

Pile Burning

Pile burning is the consumption of landing, hand and/or mechanical piles. The hand piles would contain woody material from brush, small trees, and other dead woody material found on the surface. Mechanical piles would contain woody material from within a treatment unit consisting of residual and activity fuels. The landing piles would contain the woody material (limbs, needles, bark and portions of the trunk) removed from the tree during the harvesting procedure. Pile burning would occur in the fall season. A burn plan would be written which outlines the parameters under which the burning would occur.

When possible, utilization of piles would be encouraged rather than burning. Utilization of the woody material is dependent on existing market conditions. After thinning operations, there is a small amount of clean up remaining, which consists of burning the residual piles. Burning the pile eliminates the high concentrations (fuel loading) of woody material.

Mastication

The treatment consists of mowing the understory of brush, small trees, and other vegetation. A mowing attachment is towed behind a dozer or tractor, or attached to the head of an excavator. The vegetation is chopped into small pieces and left on the surface. Ladder fuels are reduced by mowing thus reducing potential for crown fire initiation.

Leave Tops Attached Yard

This method is used to harvest trees. A mechanized feller buncher or similar machinery, restricted to designated skid trails, or cable systems on steeper slopes would be used to remove any vegetative material to meet silvicultural and fuels needs. The tops and limbs are left attached to the last log of each tree as it is yarded to the landing. The tops and limbs are machine piled

and burned at the landing or utilized as chips or fuel wood. Vegetation removal may be done over frozen ground or when soil conditions allow.

2.2.5 Riparian Prescriptions

The original riparian prescriptions (described below) would be maintained wherever possible within the unburned to low severity burn areas. The original prescription for treatments within Riparian Reserves is based on initial analysis of aquatic and riparian areas and dialogue between interdisciplinary team members based on field information. Any thinning prescription within the Riparian Reserve shall meet Northwest Forest Plan standard and guideline TM-1C: “Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives” (NWFP ROD page C-32). In other words, prescriptions within the Riparian Reserves are designed to protect and enhance riparian and aquatic values.

For perennial streams, seeps and springs, the prescription is derived from a Memorandum of Agreement (MOA) that the Forest Service has with the State of Oregon Department of Environmental Quality (DEQ) on how to thin stands within the Riparian Reserves and still maintain water temperatures for perennial streams. In addition, this prescription provides protection from additional sediment input, one of the parameters for which streams within the planning area are on the Oregon Department of Environmental Quality water quality lists.

- 0-feet to 60-feet: This prescription would have an undisturbed vegetative buffer that would be maintained in the primary shade zone as defined in the March 3, 2004 “Sufficiency Analysis for Stream Temperature.” Some areas of prescribed fire may creep into the outside portions of this zone which is acceptable as long as these are infrequent and no vegetation currently providing shade to surface water would be removed or destroyed. Danger trees that pose a risk to human safety such as along roads or in developed recreation sites areas could to be felled and left within this area. The width of the primary shade zone depends on the height of the trees proposed to be cut in the general treatment prescription and the hill slope. Based on the physical setting (some streamside slopes >60 percent) and that trees identified for thinning in the general prescriptions may be up to 80-feet tall, the primary shade zone should be 60 feet wide on either side of a perennial stream in order to maintain current water temperatures.
- 60-feet to 150-feet: This area is still within the Riparian Reserve and constitutes the secondary shade zone as defined in the March 3, 2004 “Sufficiency Analysis for Stream Temperature.” Where suitable, treatments shall not reduce final canopy closure below 60 percent in spotted owl habitat. As stated in the Sufficiency Analysis, vegetation treatment would not result in more than a 50 percent reduction in the current canopy closure in order to maintain current water temperatures. The prescription shall emphasize creating species diversity of riparian vegetation and thin dense understories to maintain survival of late-seral trees by creating a stand that is moving toward a natural, pre-fire exclusion structure and composition with high large woody debris recruitment potential. Controlled burning may take place in this area in order to restore plant species composition and structure that would occur under natural fire regimes.

- 150-feet to 300-feet along Fish-bearing Streams: Where suitable, treatments shall not reduce final canopy closure below 60 percent in order to maintain spotted owl habitat requirements. The prescription shall emphasize creating species diversity of riparian vegetation and thin dense understories to maintain survival of late-seral trees by creating a stand that is moving toward a natural, pre-fire exclusion structure and composition with high large woody debris recruitment potential. Controlled burning may take place in this area in order to restore plant species composition and structure that would occur under natural fire regimes.

For intermittent streams and wetlands, the original riparian prescriptions would be maintained wherever possible within the salvage units. In some units, the canopy cover requirements may not be possible given the severity of the burn within those units.

- 0-feet to 30-feet: This area would have a 30-foot undisturbed vegetative buffer for sediment control. Danger trees that pose a risk to human safety such as along roads or in developed recreation sites areas could be felled and left within this area.
- 30-feet to 100-feet: Where suitable, treatments shall not reduce final canopy closure below 60 percent in order to maintain spotted owl habitat requirements. The prescription shall emphasize creating species diversity of riparian vegetation and thin dense understories to maintain survival of late-seral trees by creating a stand that is moving toward a natural, pre-fire exclusion structure and composition with high large woody debris recruitment potential.
- 100-feet to 150-feet Along Wetlands Less than 1 acre: Where suitable, treatment from 100-feet to 150-feet shall not reduce final canopy closure below 60 percent in order to maintain suitable spotted owl habitat requirements. The prescription shall emphasize creating species diversity of riparian vegetation and thin dense understories to maintain survival of late-seral trees by creating a stand that is moving toward a natural, pre-fire exclusion structure and composition with high large woody debris recruitment potential.

No tree cutting except the falling hazard trees would occur within Riparian Reserves in moderate to high severity burn areas. Any hazard trees cut in the Riparian Reserves would be left on-site.

2.3 Alternative 3 – Snag Retention

Similar to the Proposed Action, Alternative 3-Snag Retention includes treating 1,006 acres within the Mill Creek watershed. This alternative was designed to minimize the number of snags removed from the landscape in order to follow the recommendations resulting from the DecAID analysis as much as possible while addressing the safety hazards along the roads (see Section 3.2, Wildlife for more information). Snags would only be removed to meet health and safety objectives, including the Occupational Safety and Health Administration (OSHA) standards. As such, no thinning would take place on the moderate to high severity burn areas. These units are changed to hazard tree and reforestation treatments when compared to the Proposed Action.

This action alternative includes restoration thinning, hazard tree removal, and reforestation

treatments. Alternative 3 is summarized in Table 2-5 and Figure 2-1, Alternative 3 Map.

Table 2-5: Alternative 3-Snag Retention Treatment Acres

Proposed Treatment	Acres
Restoration Thin (Unburned to Low Severity)	107
Hazard Tree	167
Reforestation	732
Total Acres	1006

The Alternative 3 treatment types are summarized by Forest Plan land use allocation in Table 2-6 and Northwest Forest Plan land use allocation in Table 2-7. Approximately 85 percent of the proposed projects are located within Deer and Elk Winter Range (B10) and then approximately 11 percent are located within Timber Emphasis (C1). Then approximately 86 percent of the proposed projects are located within Matrix lands and then approximately 10 percent are located within Riparian Reserves. All of the proposed projects overlap with the critical habitat for Northern spotted owls (see Section 3.2, Wildlife for more details).

Table 2-6: Proposed Action Treatment Acres by Forest Plan Land Use Allocation (A3 = Research Natural Area; A6 = Semi-Primitive Roaded Recreation; A7 = Special Old Growth; B10 = Deer and Elk Winter Range; and C1 = Timber Emphasis)

Treatment	A3	A6	A7	B6	B10	C1	Total
Restoration Thin (Unburned to Low Severity)	0	0	0	0	79	28	107
Hazard Tree	3	30	8	3	106	17	167
Reforestation	0	1	0	0	667	64	732
Total Acres	3	31	8	3	851	109	1006

Table 2-7: Proposed Action Treatment Acres by Northwest Forest Plan Land Use Allocation (AW = Administratively Withdrawn Areas)

Treatment	Matrix	Riparian Reserves	AW	Total Acres
Restoration Thin (Unburned to Low Severity)	106	1	0	107
Hazard Tree	114	11	42	167
Reforestation	646	85	1	732
Total Acres	866	97	43	1006

Table 2-8 contains a detailed unit-by-unit description of Alternative 3. Figure 2-2 shows the Alternative 3 treatment units overlaid with burn severity.

2.3.1 Restoration Thinning

Restoration thinning treatments would harvest timber from 107 acres on the unburned to low severity burned area within the Government Flats Complex Fire perimeter. These units are all under existing stewardship contacts (Roan and Eques), and the Forest Service has a contractual obligation to analyze continued operations on these lands, which is necessary for contract modifications. The treatment of these units would be implemented as described under the Proposed Action.

In these units, target fuel loading is between 7 and 15 tons per acre in order to meet the goal of thinning from the original EA. The goal was to reduce hazardous fuels by thinning from below. Smaller diameter trees growing in lower crown positions would be removed, leaving more space around remaining larger trees. To further reduce fuel loadings, trees would be selected for removal if their spacing facilitates the spread of a crown fire (canopy closure), or a tree form contributes to the initiation of a crown fire (crown base height) such as low growing tree branches over brush, which if ignited, could lead to crown fire initiation. Trees heavily infected with dwarf mistletoe would also be removed, since these trees contribute to ladder fuels (low hanging “brooms”), to low crown base height (distance from surface fuels to bottom of tree crowns), and to torching. Tall brush, which may contribute to the initiation of a crown fire, would also be reduced. Activity fuels (residual from mechanical treatments) as well as residual fuels from natural accumulation would be treated by piling and burning.

All thinning activities would apply variable density thinning (VDT), which allows flexible local density levels to achieve overall treatment objectives (see Proposed Action for description of VDT). No additional gaps would be added to these units. The gaps created by the Government Flats Complex Fire would be used in determining the best applications of VDT. The units of highest concern would be prioritized during implementation based on current on-the-ground and weather conditions. Vegetation treatment utilize already disturbed areas as much as possible, including the use of available roads, skid trails existing from past activities and dozer line from the fire suppression activities. No new temporary roads are needed to implement this alternative.

2.3.2. Other Treatments and Activities

Hazard tree treatment would treat 167 acres. These treatments would be implemented as described under the Proposed Action. Approximately 125 hazard trees have already been felled along Forest Service Road 1711-630 as part of the Burn Area Emergency Response work. These trees would be removed, if they exceed Forest Plan standards and guidelines. On lands within Riparian Reserves (Units 87, 106A, 107A, and 108A), the hazard trees would be felled and left on-the-ground in order to comply with the Northwest Forest Plan.

Approximately 732 acres would be planted to reforest moderate to high severity burn areas in naturally forested areas and not in grass or meadow plant communities. Hazard trees within the stand would be hand-felled in order to facilitate safe tree planting operations. These trees would be left on-the-ground and used as contour trees whenever possible. Also, these trees would be used to provide micro-siting for planted tree seedlings as well. All hazard tree units (approximately 167 acres) in the high to moderate burn severity areas would be reforested as needed. These treatments would be implemented as described under the Proposed Action.

Lastly, the associated fuels reduction activities and riparian prescriptions would be implemented as described under the Proposed Action.

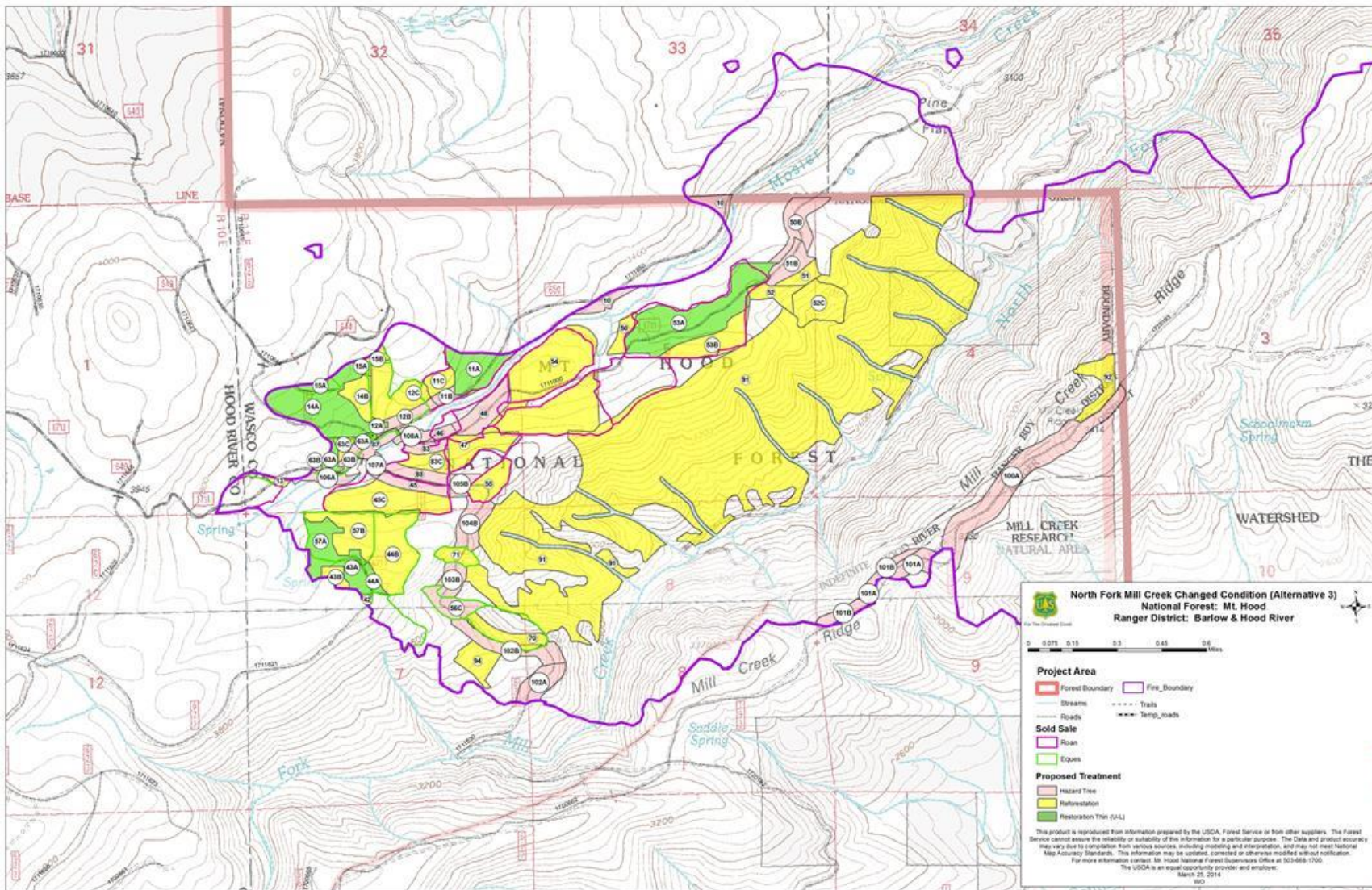


Figure 2-1: Alternative 3 – Snag Retention

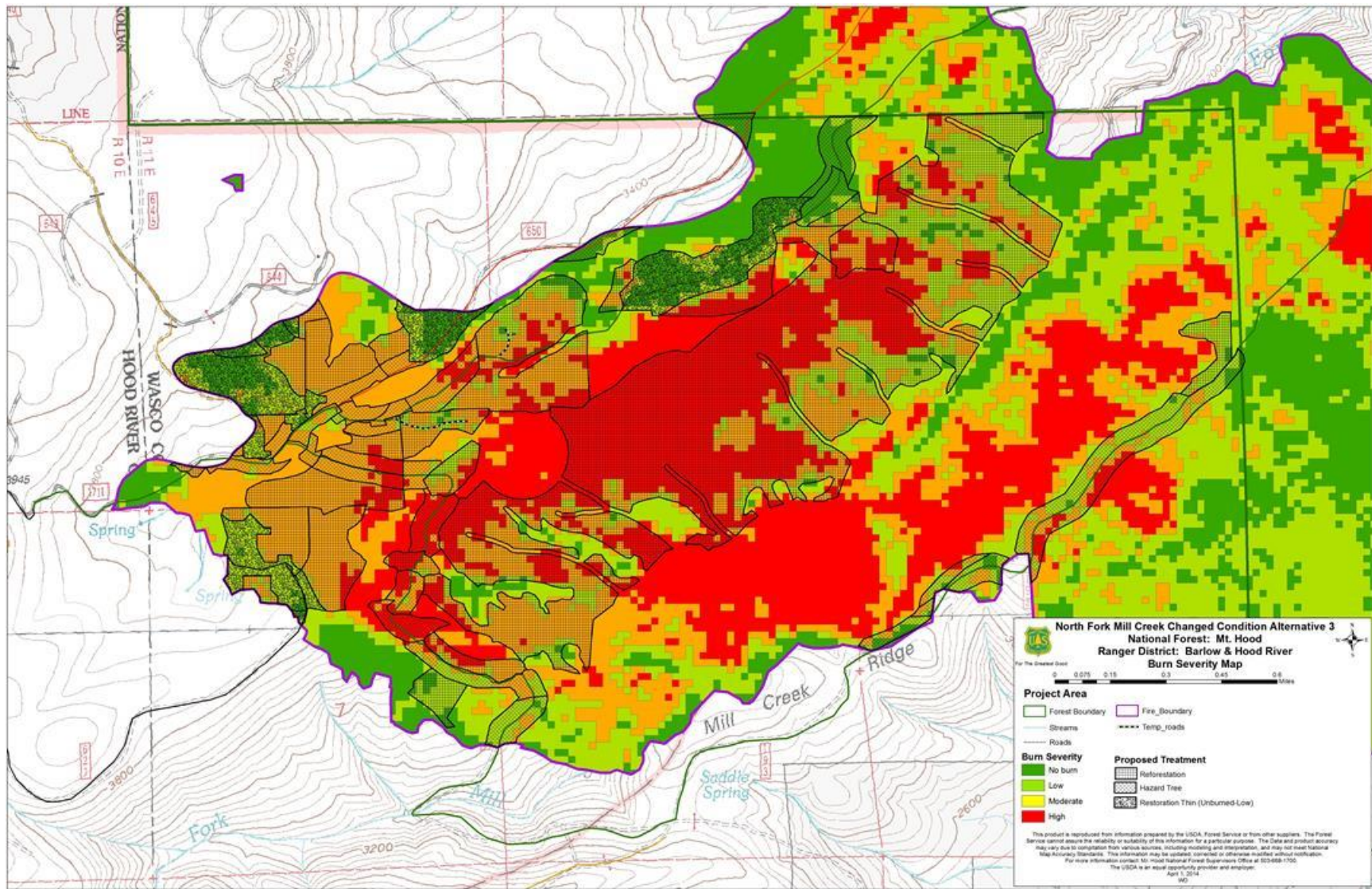


Figure 2-2: Burn Severity Map for Alternative 3

Table 2-4: Unit-by-Unit Description of Snag Retention Alternative (Alternative 3)

Tree Species Abbreviations: DF = Douglas-fir; GF = Grand fir; WWP = Western white pine; PP = Ponderosa Pine; WL = Western Larch); Treatment Abbreviations: U-L = Unburned to Low Severity Burn; M-H = Moderate to High Severity Burn

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
10	8	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Hand Piling
11A	13	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
11B	2	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Mechanical and Hand Piling
11C	4	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10	III	III	Mechanical and Hand Piling
12A	1	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
12B	5	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Mechanical and Hand Piling
12C	15	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10	III	III	Mechanical and Hand Piling
13	1	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	C1	III	III	Mechanical and Hand Piling
14A	27	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10, C1	III	III	Mechanical and Hand Piling
14B	7	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10, C1	III	III	Mechanical and Hand Piling
15A	3	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	B10	III	III	Mechanical and Hand Piling
15B	2	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10	III	III	Mechanical and Hand Piling
42	1	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
43A	8	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
43B	3	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
44A	2	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
44B	21	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
45	6	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	C1	III	III	Mechanical and Hand Piling
45C	21	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	C1	III	III	Mechanical and Hand Piling
46	2	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Mechanical and Hand Piling
47	11	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes	B10/B5	III	III	Hand Piling
48	10	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Hand Piling
50	4	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10	III	III	Hand Piling
50B	10	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Mechanical and Hand Piling
51	4	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes	B10	III	III	Mechanical and Hand Piling
51B	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	Yes	B10	III	III	Mechanical and Hand Piling
52	6	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes	B10	III	III	Mechanical and Hand Piling
52C	14	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes	B10	III	III	Mechanical and Hand Piling
53A	37	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	Yes	B10	III	III	Mechanical and Hand Piling
53B	13	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes	B10	III	III	Mechanical and Hand Piling

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
54	58	DF, GF, WWP, PP, WL	Reforestation	Ground	Yes	B10	III	III	Mechanical and Hand Piling
55	8	DF, GF, WWP, PP, WL	Reforestation	Skyline	N/A	B10/B5	III	III	Mechanical and Hand Piling
56C	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Skyline/ Ground	N/A	B10/B5	III	III	Hand Piling
57A	9	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
57B	14	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	C1/B5	III	III	Mechanical and Hand Piling
63A	4	DF, GF, WWP, PP, WL	Restoration Thin (U-L)	Ground	N/A	C1	III	III	Mechanical and Hand Piling
63B	2	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	C1	III	III	Mechanical and Hand Piling
63C	2	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	C1	III	III	Mechanical and Hand Piling
70	8	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10/B5	III	III	Mechanical and Hand Piling
71	4	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10/B5, C1/B5	III	III	Mechanical and Hand Piling
83	8	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Mechanical and Hand Piling
83C	6	DF, GF, WWP, PP, WL	Reforestation	Ground	N/A	B10	III	III	Mechanical and Hand Piling
87	4	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground	N/A	B10	III	III	Hand Piling
91	490	DF, GF, WWP, PP, WL	Reforestation	Hand Work	N/A	B10/B5	III	III	Hand Piling
92	9	DF, GF, WWP, PP, WL	Reforestation	Hand Work	N/A	A6/B10	III	III	Hand Piling
94	8	DF, GF, WWP, PP, WL	Reforestation	Hand Work	N/A	B10/B5, C1/B5	III	III	Hand Piling

Unit	Acres	Tree Species	Treatment	Logging System	Temp Road	Land Use Allocation	Fire Regimes	Condition Class	Fuels Treatment
100A	36	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	A6/B10, A3	III	III	Mechanical and Hand Piling
101A	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	A6/B10, A3	III	III	Mechanical and Hand Piling
101B	7	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	A6/B10,A3	III	III	Mechanical and Hand Piling
102A	8	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, A7	III	III	Hand Piling
102B	10	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, A7	III	III	Hand Piling
103B	6	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5	III	III	Hand Piling
104B	9	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, C1/B5	III	III	Hand Piling
105B	4	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10/B5, C1/B5	III	III	Hand Piling
106A	4	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	C1	III	III	Hand Piling
107A	2	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	C1, B10	III	III	Hand Piling
108A	4	DF, GF, WWP, PP, WL	Hazard Tree & Reforest	Ground/ Hand Work	N/A	B10	III	III	Hand Piling

* Temporary road from completed thinning operations remains open in the unit. The temporary road would be closed when operations resume.

2.4 Project Design Criteria/Mitigation Measures

The National Environmental Policy Act defines “mitigation” as avoiding, minimizing, rectifying, reducing, eliminating or compensating project impacts. The following project design criteria and mitigation measures are an integral part of this project and would be carried out if the project is implemented under either action alternatives. In most cases, the effects analysis in Chapter 3 is based on these project design criteria and mitigation measures being implemented.

Fuels:

- F-1. Any mechanical slash piling within units would be done with equipment capable of picking up (grasping) slash material and piling (as opposed to pushing/dozing) thereby meeting the objectives of minimizing detrimental soil impacts. Piles would be covered with water resistant material meeting clean air standards to facilitate consumption of piled fuels. Piles need to be 4-feet wide, 4-feet long, and 6-feet high as a minimum².
- F-2. Hand piles would be constructed with enough fine fuels to allow for ignition during fall and winter months, and covered with water resistant material meeting clean air standards to facilitate consumption of piled fuels. Piles need to be 4-feet wide, 4-feet long, and 6-feet high as a minimum³.
- F-3. Piles should be as compact and free of dirt as possible.

Roads:

- T-1. If a proposal to implement winter logging is presented, the following would be considered by the District Ranger and Responsible Official if the ground is not frozen hard enough and/or insufficient snow depth to support the weight and movement of machinery in moist to wet soil conditions (these are based upon observations and monitoring of winter logging in Sportsman’s Park):
- The proposal would be considered on a unit-by-unit basis using soil types in the area since some soils may be more prone to detrimental damage than others.
 - Since the margin of difference between not detrimental and detrimental soil damage could be so slim under moist to wet soil conditions, monitoring of the logging activity may need to occur daily, or more, as agreed to by sale administrator and soil scientist.
 - Equipment normally expected to traverse the forest, such as feller bunchers, track mounted shears, etc., would be restricted to skid trails once soil moistures are such that even one or two trips are causing detrimental soil damage out in the unit (i.e., not on landings or skid trails).
 - When soils become fully saturated (approach their liquid limit), equipment with a pounds per square inch of 9 or higher would not be used. Typically rubber-tired equipment (e.g., skidders) would not be permitted under these conditions.

³ The Forest Service would meet an *average* width of 8-feet and height of 6-feet for mechanical and hand piles. From past experience with implementation, it is virtually impossible to maintain an exact dimension of fuel piles, so allowance for a small deviation would be made as long as this deviation doesn’t jeopardize meeting the above stated goals.

- T-2. Locate new temporary roads and landings outside of Riparian Reserves⁴. Use of existing facilities within riparian reserves may be allowed if erosion potential and sedimentation concerns could be sufficiently mitigated. Existing landings within one site potential tree height from streams, seeps, springs or wetlands would not be used unless the slope between the landing and surface water is thirty percent or less and there is an intact vegetated buffer between the landing and surface water. All temporary roads and landings would be decommissioned immediately after harvest operations are completed.
- T-3. Rock haul and equipment transportation may be allowed outside the Normal Operating Season (generally June 1 to October 31) on aggregate and native surface roads, if the following criteria are met:
- a. Haul routes must be inspected weekly, or more frequently if weather conditions warrant. Inspections by the timber sale administrator (or qualified specialist) would focus on road surface condition, drainage maintenance, and sources of erosion and sediment delivery to streams.
 - b. Sediment traps would be installed where there are potential sediment inputs to streams. Sediment traps would be inspected weekly by the timber sale administrator (or qualified specialist) during the wet season and entrained soil would be removed when the traps have filled to 3/4 capacity. Dispose of these materials in a stable site not hydrologically connected to any stream.
- T-4. Log haul and heavy vehicle transport on paved roads shall be prohibited when the temperature of the road surface, as measured at the lowest elevation along the haul route on National Forest System lands, is above 28 degrees Fahrenheit and when the temperature as measured at the highest elevation on the active haul route is between 28 and 38 degrees Fahrenheit or at any time when the designated Timber Sale Administrator determines that freeze-thaw conditions along the haul route exists or that the subgrade on the paved roads is saturated.
- T-5. Log and rock haul on system and temporary roads shall be prohibited at any time there is 1.5- inches of precipitation within any given 24-hour period as measured at the lowest elevation along the haul route. To measure precipitation, the purchaser may install a temporary rain gauge on National Forest System land near or adjacent to the lowest elevation along the haul route as agreed upon; otherwise, precipitation would be measured according to the Pollywog RAWS station (PYF03). Data for the Pollywog RAWS station can be found at: http://raws.wrh.noaa.gov/cgi-bin/roman/meso_base.cgi?stn=PYFO3.
- T-6. Mechanized equipment would not be allowed off the road surface on any A3-Natural Resource Area lands. All logging removal equipment would remain on the road prism.

Soil Resource:

- S-1. All skid trails would be rehabilitated immediately after harvest activities. Landings and

⁴ Riparian Reserve refers to the Northwest Forest Plan Riparian Reserve designation.

temporary roads normally would have erosion control measures installed following fuels or reforestation treatments. If those treatments are anticipated to be delayed beyond the current field season, then temporary effective closure of roads would occur to prevent unauthorized use.

- S-2. In commercial units, ground-based harvest systems should not be used on slopes greater than 30 percent to avoid detrimental soil and/or watershed impacts.
- S-3. Within hazard tree units, the lowest layer logs should be left in place (the logs that are providing maximum ground contact). Leaving these logs in place would help protect the burned soils from gouging and displacement during log removal.
- S-4. Mechanized equipment would not be allowed off the road surface on Forest Service Road (FSR) 1711-630 from Mile Post (MP) 0.3-2.3 (western boundary of Unit 105B to the junction of the FSR 1711-630 and 1700-662). One end suspension and high stumping is required on this road segment.
- S-5. All hazard trees dropped in Unit 56C would remain on site, and all piling needs to be done by hand

Riparian Areas:

- A-1. No vegetation removal or manipulation, (except felling of hazard trees within restoration units) would occur within 60-feet⁵ of any perennial and 30-feet² of any intermittent streams, seeps, springs or wetlands. This would ensure current stream shading would remain unchanged and protect stream temperatures as well as reduce the likelihood of eroded material entering streams or other wet areas.
- A-2. No ground-based mechanized equipment, including but not limited to tractors or skidders would be allowed within 100-feet² of streams, seeps, springs or wetlands. This would reduce the chance of sediment delivery to surface water.
- A-3. Refuel mechanized equipment at least 150-feet from water bodies or as far as possible from the water body where local site conditions do not allow a 150-foot setback to prevent direct delivery of contaminants into water. Parking of mechanized equipment overnight or for longer periods of time shall be at least 150 feet from water bodies or as far as possible from the water body where local site conditions do not allow a 150-foot setback. Absorbent pads would be required under all stationary equipment and fuel storage containers. A Spill Prevention Control and Countermeasures Plan shall be prepared by the contractor as required under EPA requirements (40 CFR 112).
- A-4. All trucks used for refueling should carry a hazardous material recovery kit, including absorbent pads to be used during refueling if that occurs in the project area. Any

⁵ The Forest Service would meet an *average* distance of 30-feet, 60-feet, or 100-feet from streams, seeps, springs or wetlands. From past experience with implementation, it is virtually impossible to maintain an exact distance from a wet area due to stream sinuosity and dense riparian vegetation so allowance for a small deviation would be made as long as this deviation doesn't jeopardize meeting the above stated goals.

- contaminated soil, vegetation or debris must be removed from National Forest System Lands and disposed of in accordance with Oregon State laws.
- A-5. Use erosion control measures where de-vegetation may result in delivery of sediment to adjacent surface water. Soil scientists or hydrologists would assist in evaluation of sites to determine if treatment is necessary and the type of treatment needed to stabilize soils.
 - A-6. In Restoration Thin (Unburned to Low Severity) units, fall trees away from the 60-foot unmanaged area of perennial streams or the 30-foot unmanaged area of intermittent streams, seeps, springs or wetlands when possible. Fall trees away from the Riparian Reserve in Restoration Thin (Moderate and High Severity) units when possible.
 - A-7. No mechanical fuel piling within Riparian Reserves. Hand piles of slash would be at least 100-feet away from streams, seeps, springs or wetlands.
 - A-8. No timber salvage (removal of dead or dying trees) should occur within Riparian Reserves in Moderate and High Severity burn areas.
 - A-9. Heavy equipment, such as skidders, dozers, and feller-bunchers, operation would not be allowed outside the Normal Operating Season (generally June 1 – October 31) within Riparian Reserves.
 - A-10. Within the hazard tree units, no logs within Riparian Reserves should be removed and all cutting and piling should be done by hand.
 - A-11. In Unit 91, hazard trees would be directionally felled towards the creek when possible. Hazard trees that may hit the North Fork Mill Creek stream channel would only be felled from July 15 – September 30.
 - A-12. Log haul on Forest Service Road (FSR) 1711630 would occur from July 1 – September 30 from Mile Post (MP) 1.5 (at approximately the southern boundary of Unit 102A) to MP 2.66 (the junction of FSRs 1711630 and 1700662) to prevent road sediment from entering North Fork Mill Creek.

Wildlife:

- W-1. Known Northern spotted owl activity centers would be protected through the implementation of seasonal operating restrictions (March 1- July 15) for Units 41C, 42, 47, 54, and 55. In the event that new activity center(s) is/are located during the period of the contract(s) seasonal operating restrictions would be implemented in the area affected.
- W-2. A seasonal operating restriction (restricting harvest and fuels treatment activities) for winter range would be implemented with this project from December 1 through April 1 for Units 10, 11A, 11B, 12A, 12B, 14A, 14B, 15A, 15B, 46 through 56, 70, and 71.
- W-3. To enhance diversity, variable-density thinning would include the retention of snags and wildlife trees where possible.

W-4. In Unit 50B, no logs should be removed within the Late-Successional Reserve.

Botany:

B-1. Machinery should avoid historical populations of *Arabis sparsiflora* var. *atrорubens* (sickle-pod rockcress), an R6 Sensitive species, in Units 101, 100, and 92. Locations to avoid would be mapped, flagged and buffered by approximately 50 meters (164 feet).

Invasive Species:

- IS-1. It is recommended that “pre-treatment” occur before any harvest activities are implemented along roads 1700 (treatment sites #66-044 and #66-074) and 1700-662 (treatment sites #66-081 and #66-033). If possible schedule implementation of work from infestation-free areas into infested areas rather than vice-versa.
- IS-2. In order to prevent the spread of invasive plants, all equipment would be cleaned of dirt and weeds before entering National Forest System lands. This practice would not apply to service vehicles traveling frequently in and out of the project area that would remain on the roadway.
- IS-3. The process for locating all new skid trails and landing locations would be coordinated with a noxious weed specialist so as to insure these locations are not within any currently established noxious weed populations. If necessary, pre-treat existing landings and skid trails that may be used for project implementation where existing infestations present an unacceptable risk of spreading established invasive plant populations.
- IS-4. If the need for restoration/revegetation of skid trails and landings is identified, the use of native plant materials are the first choice for meeting this objective where timely natural regeneration of the native plant community is not likely to occur. Non-native, non-invasive plant species may be used in any of the following situations: 1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, 3) if native plant materials are not available, or 4) in permanently altered plant communities.
- IS-5. If using straw, hay or mulch for restoration/revegetation in any areas, use only certified, weed-free materials.
- IS-6. Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists.

Recreation (Trails and Campgrounds):

R-1. Sale Administrator would coordinate trail and road closures and associated signage with eastside recreation staff to lessen impacts to recreationists and Special Use Permit holders.

Heritage Resource Sites:

- HR-1. All designated cultural resource sites (excepting those described in heritage resource design criteria #3 below) requiring protection would have a 100-foot buffer zone where heavy machinery would be excluded. Treatment of vegetation by hand could still occur as necessary.
- HR-2. All culturally-modified trees or trees with insulator mountings would be avoided during harvest activities, unless otherwise specified by the archaeologist.
- HR-3. No new features would be added to the historic Forest Service Road 1711-630, including new ditches or culverts. The road would not be widened and no turnouts would be added. Existing landings would be reused with no new landings adjacent to National Forest Service Road 1711-630. Timber skid trails would be allowed within areas scheduled for reforestation treatments.
- HR-4. No ground based mechanized equipment would be allowed off the road surface into Units 10 and 87 to protect a known heritage resource. All logging removal equipment would remain on the road prism.

2.5 Monitoring Requirements

After the presale work for the timber/stewardship contract is completed, the project moves into the appraisal and contract preparation phase. One of the first steps in the process is to complete the contract project design and implementation crosswalk form. The purpose of the crosswalk is to ensure that all components of the NEPA Decision Notice, including the PDC, Best Management Practices (BMP) and terms and conditions from consultation, are incorporated into the timber/stewardship contract. For each required component of the NEPA decision, the crosswalk identifies how and what stage in the process the component will be addressed (e.g., presale, contract, sale administration, post contract monitoring). The information generated from the cross-walk process is used to guide the contract preparation process and to identify any issues that need to be addressed by resource specialists. The crosswalk is usually prepared by the primary person responsible for developing the appraisal and contract, and signed by the District Ranger. A crosswalk was prepared for both the Eques and Roan Stewardship Sales prior to award. These crosswalks would be updated if an action alternative is selected to ensure that the contracts are modified as needed, based on the decision.

Beginning in May 2012, the District Rangers are required to conduct a “Plan in Hand” review on a minimum of one timber/stewardship sale within each zone every other year. The review is conducted after all presale work is completed, including all timber marking, and prior to the timber/stewardship sale entering the appraisal and contract preparation stage. The goal of the review is to monitor and evaluate forest resource management prescriptions to measure compliance with goals and objectives, review effects, and adjust subsequent management actions when needed as required by Forest Service Manual direction. The overarching management direction is used as the basis for the review and includes the final NEPA decision as well as Forest Service Handbook, Forest Service Manual and Stewardship Guide (where applicable) regulations and direction.

During implementation, the Sale Administrator in conjunction with the Forest Service Representative and Contracting Officer are responsible to ensure that the contract is administered properly throughout all stages of implementation. The sale administration team monitors compliance with the contract which contains the provision for resource protection, including but not limited to: seasonal restrictions, snags and coarse woody debris retention, stream protection, erosion prevention, soil protection, road closure and protection of historical sites. The Sale Administrator records observations demonstrating compliance as well as any concerns/issues on inspection reports that are signed by both the Forest Service and Purchaser Representative. The inspection reports would also document any resolutions that have been identified. As needed during the implementation process, the sale administration team may request a resource specialist or Line Officer to come for a field visit to discuss a resource issue that has been identified. Also, a resource specialist may visit a sale without a formal request to conduct monitoring and to make sure that the project is being implemented as directed by the NEPA decision.

Also, resource specialists may visit the site to conduct a post-harvest review before completing any secondary activities, such as slash clean up, KV or retained receipt projects, or firewood removal. Based on these reviews, post-harvest activities would be adjusted where needed to achieve project and resource objectives.

Lastly, monitoring is also conducted at the Forest level as part of the Forest Plan implementation, including monitoring of noxious weeds and BMP. The monitoring of noxious weeds and invasive plants would be conducted where appropriate to track changes in populations over time and corrective action would be prescribed where needed.

BMP monitoring may be conducted on projects after treatment is complete. According to The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012), monitoring is one of four steps outlined in the BMP process. Monitoring is used to inform and improve management activities and share with other appropriate Federal, State and local agencies. The Technical Guide states “The Forest Service Nonpoint Source Strategy uses “programmatic monitoring” to evaluate BMP implementation and effectiveness; that is, aside from project administration described above, BMPs are not monitored on every project or activity that occurs on National Forest System lands. Projects to monitor or specific monitoring sites are selected in a manner that results in objective and representative data on BMP implementation and effectiveness. Often, a random or systematic random selection procedure is used to choose monitoring locations across a forest or grassland where specific activities or BMPs are targeted.” This project would go into a pool of similar projects to be selected for project level BMPs implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. If selected an Interdisciplinary Team (IDT) would evaluate whether the site-specific BMPs were implemented and the effectiveness of the BMPs. Monitoring for each BMP is outlined in Appendix 1: Best Management Practices for Water Quality Protection.

2.6 Scientific Controversy for Salvage Logging

The topic of post-disturbance logging is surrounded by public concern and controversy. The

controversy focuses mainly on the ecological consequences. The premise of the arguments being that there are no ecological benefits to salvage logging (Hutto 2006, Noss et al. 2006). The importance of the loss of biological legacies, in particular large snags and large live trees; effects to wildlife species specifically associated with recently burned forests, effects to burned and exposed soils, and effects to riparian areas. There are also valid socio-economic reasons for conducting post-disturbance logging, such as economic recovery of potential lost value, providing economic activity for rural communities, and mitigating public safety hazards posed by dead and damaged trees along transportation corridors and in high use areas.

NFS lands are managed for multiple uses, and all of these values (social, ecological, and economic) must be considered. The challenge for post-disturbance management is to determine, based on established management objectives, where and when post-disturbance logging is appropriate, and how to avoid, minimize, or mitigate the potential for undesirable ecological effects associated with proposed post-disturbance logging activities.

Lindenmayer et al. (2008) present a wide-ranging summary of the documented ecological consequences associated with salvage logging after natural disturbances, and highlight the central components of the debate. They provide management recommendations for excluding areas from salvage, identifying situations where salvage may be appropriate, and planning salvage logging operations. The bulk of the published literature about the ecological effects of salvage logging considers large scale salvage that removes most, if not all, living and dead vegetation across large areas. There is limited research and monitoring data concerning smaller scale salvage projects that are designed to minimize undesirable ecological effects while realizing other social or economic benefits. The following discussion provides a framework for considering the proposed post-disturbance logging activities within the Government Flats Complex Fire. This discussion reviews the management context of the analysis area, and considers extent of the proposed activities.

The Government Flats Complex Fire started from lightning strikes on August 16, 2013 on Oregon Department of Forestry lands. On August 21, the fire burned onto NFS lands. Approximately 2,200 acres burned on the NFS and the total fire covered 11,354 acres on a variety of land ownerships. The fire occurred in an area with a complicated mix of land allocations from the Mt. Hood Land and Resource Management Plan, Northwest Forest Plan, Tier 1 Watershed and Northern spotted owl Critical Habitat. The majority of the proposed activities would occur within Forest Plan land use allocations B10-Deer and Elk Winter Range and C1-Timber Emphasis. The Forest Plan direction for these land use allocations provides a blend of economic, social, and ecological objectives. The majority of the area in which the Government Flats Complex Fire and proposed treatment activities occur fall within matrix lands designated by the Northwest Forest Plan and meet the definition of matrix offered by Lindenmayer et al. (2008, p.133): “a semi-natural landscape utilized for various commercial activities, including forestry”. The majority of the areas proposed for treatment fit their definition of an area where salvage logging may be an appropriate response to natural disturbance (*ibid*). On a more site specific scale or stand-level, several areas are managed for specific ecological considerations. These include Research Natural Area (A3), Roaded Recreation (A6), Special Old Growth (A7), and Special Emphasis Watershed (B6). The Government Flats Complex Fire burned across the analysis area with varying intensities, creating a mosaic of unburned, low,

moderate, and high mortality forest patches.

Of critical importance to this discussion is the overall scale of the proposed activities within the burned area. Of the 2,261 acres within the fire perimeter on NFS lands, the proposed post-disturbance logging would occur on roughly 146 acres of restoration thinning units burned at a moderate to high severity and 134 acres of hazard tree abatement. Due to topography, locations of stream buffers, varying levels of tree mortality, and a range of operational constraints, it is estimated that at most about 12 percent, roughly 280 acres, would actually have post-disturbance logging occur. Note, also, that because public safety is the overriding priority in the roadside corridors, treatment prescriptions differ somewhat between roadsides and the areas outside them, and roadside hazard tree removal is proposed along open roads in areas that are otherwise excluded from salvage harvest. Only 6 percent (146 acres) would have post-disturbance logging outside the roadside corridor.

In summary, the activities proposed for the North Fork Mill Creek Revised project and analyzed in this Environmental Assessment were designed to balance both the ecological and economic concerns presented by the post-fire conditions in the planning area. Information gained from post-salvage monitoring has the potential to contribute to future proposals for and decisions about post-disturbance management in similar areas guided by multiple-use land management objectives.

2.7 Comparison of Alternatives

This section provides a summary of the alternatives by purpose and need component, proposed activities, and issues/concerns. Information in Table 2-5 focuses on activities and effects where different levels of effects could be distinguished quantitatively or qualitatively.

Table 2-5: Comparison of Alternatives by Purpose and Need Components, Proposed Activities and Issues

Action	Alternative 1 No Action	Alternative 2 Revised Proposed Action	Alternative 3 Snag Retention
Purpose and Need Components			
Meet contractual obligations for the existing Integrated Resource Timber Contracts (IRTCs) for the Eques and Roan Stewardship projects	No additional contractual work would be completed under the Roan and Eques Stewardship Sales.	Approximately 80% of the acres within the stewardship sales under existing stewardship contacts (Roan and Eques) within the fire perimeter would move forward.	Approximately 34% of acres within the stewardship sales under existing stewardship contacts (Roan and Eques) within the fire perimeter would move forward.
Modify the existing stewardship contracts, including salvaging dead and dying trees	Restoration thinning treatments on high to moderate burn severity lands would salvage 0 acres	Restoration thinning treatments on high to moderate burn severity lands would salvage 146 acres	Restoration thinning treatments on high to moderate burn severity lands would salvage 0 acres
Improve the health and vigor of forested stands, including within Riparian Reserves	Restoration thinning treatments would harvest timber from 0 acres.	Restoration thinning treatments would harvest timber from 107 acres.	Restoration thinning treatments would harvest timber from 107 acres.
Reforest desired tree species to aid in the accelerated development of forest conditions consistent with management plan objectives	No reforestation would occur in the moderate to high severity burn areas. These areas may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity burn areas, depending on the success of natural regeneration.	Approximately 622 acres would be planted to reforest moderate to high severity burn areas in naturally forested areas and not in grass or meadow plant communities. All other treatment areas in high to moderate severity burn areas (approximately 280 acres) would be reforested as needed.	Approximately 732 acres would be planted to reforest moderate to high severity burn areas in naturally forested areas and not in grass or meadow plant communities. The hazard tree treatment areas in high to moderate severity burn areas (approximately 167 acres) would be reforested as needed.
Improve public administrative and operational safety by abating (felling) hazard trees along roads	Hazard trees that pose an imminent threat to human safety or infrastructure would be felled in order to re-open the road for administrative and public use. None of the hazard	Hazard tree treatment would treat 134 acres . These treatments would remove any tree that is classified as a hazard tree and that is predicted to strike or damage	Hazard tree treatment would treat 167 acres . These treatments would remove any tree that is classified as a hazard tree and that is predicted to strike or damage

Action	Alternative 1 No Action	Alternative 2 Revised Proposed Action	Alternative 3 Snag Retention
	trees would be removed, which may lead to an increased fuel loading along the road system.	the road up to 200-feet from either side of the center line of the road. All hazard trees outside of Riparian Reserves would be removed to decrease fuel loading along the road system.	the road up to 200-feet from either side of the center line of the road. All hazard trees outside of Riparian Reserves would be removed to decrease fuel loading along the road system.
Proposed Activities			
Overall acres of treatment	152 acres	1,009 acres	1,006 acres
Restoration thin on high to moderate severity burn areas (salvage logging)	0 acres	146 acres	0 acres
Restoration thin on unburned to low severity burn areas	0 acres	107 acres	107 acres
Hazard tree treatments along roads	152 acres	134 acres	167 acres
Reforestation treatments	0 acres	622 acres	732 acres
Issue – Snags and Down Wood⁶			
Snags removed in restoration thin treatments	0 snags	26,600 snags	0 snags
Snags removed in hazard tree treatments ⁷	12,500 snags	11,000 snags	13,700 snags
Snags ≥ 20-inches removed	4,900 snags	15,000 snags	5,300 snags
Snags 8-inches to 19.9-inches removed	7,600 snags	22,600 snags	8,400 snags
Total Snags Removed	12,500 snags	37,600 snags	13,700 snags

⁶ All hazard (danger) trees evaluation and identification must follow the “Field Guide for Danger Tree Identification and Response” (Toupin et. al. 2008). These numbers represent the highest number of possible snags affected.

⁷ The number of snags removed is an estimate based on field reviews and the average number of trees per acre to be removed (82 TPA). These numbers were developed for analysis purposes. The number of snags to be removed may be less than estimated.

Action	Alternative 1 No Action	Alternative 2 Revised Proposed Action	Alternative 3 Snag Retention
Other Concerns			
Canopy Fuels Reduction	No canopy fuels would be removed. Fire hazard from canopy fuels would not be reduced and there would be no reduction in the fire rate of spread.	Opening crown spacing reduces the probability of a wildland fire transition from a surface fire to a crown fire. Approximately 107 acres would be commercially thinned (canopy fuel reduction) on unburned to low severity burn areas under this alternative.	Same as Alternative 2.
Large Tree Retention	No large diameter old-growth trees would be removed. No change in existing conditions, as described in the Vegetation Resource section of Chapter 3 of the original Environmental Assessment (2008).	Field visits and GIS data layers do not indicate a shortage of large diameter old-growth trees within the watershed on unburned to low severity burn areas. Within the planning area, large trees would be retained where appropriate as indicated in the stand objective table. Leaving all large trees would not meet the purpose and need for this project due to the infestations of dwarf mistletoe.	Same as Alternative 2.
Temporary Roads	0 miles constructed	< 1 mile of roads constructed	Same as Alternative 2.

2.8 Alternatives Considered, but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received as well as the preliminary effects analysis conducted by the interdisciplinary team suggested alternative methods for achieving the purpose and need. Some of these alternatives may be outside the scope this analysis, may not meet the purpose and need for action, may not be reasonably feasible or viable, may be duplicative of the alternatives considered in detail, or may be determined to cause unnecessary environmental harm.

Cancel Roan and Eques Stewardship Sales

An alternative was considered to cancel the Roan and Eques stewardship sales due to the catastrophe damage resulting from the Government Flats Complex Fire. This alternative would not salvage any dead or dying trees nor would this alternative thin unburned or low severity burned areas within the stewardship sales. This alternative would exercise the contractual provisions in the Integrated Resource Timber Contract (IRTC) to pay the timber purchasers for the timber currently under contract.

The original sales include 577 acres of treatments (see Table 2-6), including 92 acres that were treated prior to the fire. On the remaining acres that were not treated prior to the fire, salvage logging or thinning treatments could not be completed while meeting all law, regulation and policy on approximately 64 acres (see Table 1-2 for more information). After removing these acres, there are approximately 421 acres available to be treated (see Table 2-7), including approximately 170 acres outside the fire perimeter and 105 acres on low severity burn areas.

Table 2-6: Sale Area under Contract and Available for Treatment

Stewardship Sale	Acres Thinning Completed	Acres Not Meeting Law & Regulations	Acres Available for Salvage or Thinning	Total Sale Area Under Contract
Roan Stewardship	92 (34%)	26 (9%)	155 (57%)	273
Eques Stewardship	0 (0%)	38 (13%)	266 (87%)	304
Total	92 (16%)	64 (11%)	421 (73%)	577

Table 2-7: Acres Available for Salvage and Thinning Treatments within Roan and Eques Stewardship Sales

Stewardship Sale	Acres Outside Fire Perimeter	Acres on Low Severity Burn Areas	Salvage Logging	Total Acres Available
Roan Stewardship	30 (19%)	50 (32%)	75 (48%)	155
Eques Stewardship	140 (53%)	55 (21%)	71 (27%)	266
Total	170 (40%)	105 (25%)	146 (35%)	421

This alternative could meet the overall purpose to meet the existing contractual and economic obligations within the existing Roan and Eques stewardship sales, but it would not meet the underlying needs to improve the health and vigor of forested standing, including within the

Riparian Reserves (see Section 1.3, Purpose and Need for Action). If the stewardship sales were cancelled, the purpose and need for action would not be met on 275 acres which represents 65% of the sale areas where treatment can be implemented while meeting all law, regulation and policy. These acres are located outside the fire perimeter and are on low severity or unburned areas. Further, this alternative is similar to the No Action Alternative (see Section 2.1, No Action Alternative). Under the No Action Alternative, the only action that would take place is the felling of hazard trees that pose an imminent threat to human safety or infrastructure. The No Action Alternative does not include any salvage or thinning treatments. As such, this alternative was not analyzed in detail since it does not fully meet the purpose and need for action and is duplicative of the No Action Alternative.

2.9 Mt. Hood Land and Resource Management Plan Consistency

2.9.1 Forest Plan Exception

There are several Forest Plan standards that would not be met in order to meet the Purpose and Need for Action as described above. Exceptions to the Forest Plan standards are allowed under the Forest Plan, if they are identified during the interdisciplinary process. The exceptions were identified during the interdisciplinary planning analysis and the IDT process concluded that these exceptions were within the Purpose and Need for Action. Forest Plan page 4-45 states that for “should” standards “action is required; however, case-by-case exceptions are acceptable if identified during interdisciplinary project planning, environmental analyses. Exceptions are to be documented in environmental analysis (National Environmental Policy Act 1969) public documents.” Also, the exceptions were shared with the public during the scoping and notice and comment periods. All other standards and guidelines are expected to be met with this project.

The following exceptions to the Forest Plan have been identified during an interdisciplinary preliminary planning analysis and are fully analyzed in the environmental analysis.

- **Detrimental Soils Conditions (FW-022 & FW-023):** The combined cumulated detrimental impacts, occurring from both past and planned activities of detrimental soil compaction, puddling, displacement, erosion or severely burned soils should not exceed 15 percent of the activity area. Landings, non-transportation system roads, and dispersed recreation sites should be included within the 15 percent.

Effective Ground Cover (FW-025): In the first year following surface disturbing activities, the percent effective ground cover by soil erosion hazard class should achieve at least the following levels:

Soil Erosion Hazard Class	Effective Ground Cover
Low to Moderate	60%
Severe	75%
Very Severe	85%

Effective groundcover and organic matter standards are not being met across all acres under the current post-fire condition. As such, a Forest Plan exception would be needed

for Forest Plan standards FW-022, FW-023 and FW-025. However, the trend over the next few years is to meet these standards as dead material comes down and the ground recovers its vegetative cover. See EA, Section 3.3 for more details.

- **Organic Matter (FW-033):** At least 15 tons per acre of dead or down woody material in east side vegetation communities should be maintained and evenly distributed across managed sites.

FW-033 is not being met across all acres under the current post-fire condition. On the FW-033 is currently not being met across all acres under the current post-fire condition, especially in the moderate to high severity burned areas. The trend, however, over the next few years is to meet this standard as dead material comes down and the ground recovers its vegetative cover. Most acres would likely meet this standard in less than four years.

The original analysis included a Forest Plan exception for this standard as well. The exception would still apply to the restoration thinning treatments in unburned to low severity burned areas. Since the overarching goal of the hazardous fuel reduction project is to reduce organic matter available to burn, it is a trade-off to meet the purpose and need. Fine organic matter levels should trend upward as the forest floor in higher fire frequency areas increase in shrubs, forbs, and grasses. Also, it is likely localized acreage would be lower than Forest Plan standards for organic matter, which is an intention of the Proposed Action for a hazardous fuel reduction project. When this occurs, it is not expected to be a substantial impact to nutrient cycling because these are not clearcuts followed by intense burning and extreme loss of current and future organic matter. Many of the soils impacted would retain substantial organic matter reserves in the mineral topsoil due to the way in which they have developed. See EA, Section 3.3 and Chapter 3 – Soil Productivity in the original North Fork Mill Creek Restoration Opportunities EA for more details.

See Section 3.3, Soil Productivity in this EA and Chapter 3 – Soil Productivity in the original North Fork Mill Creek Restoration Opportunities EA for more details.

- **Silvicultural Systems (FW-333):** Uneven-age management should not be applied on slopes where cable logging systems would be necessary (30+% slopes).

Silvicultural Systems (FW-337). Uneven-aged management should not be applied where stands are moderately to heavily infected with dwarf mistletoe.

The original analysis included a Forest Plan exception for this standard as well. The The original analysis included a Forest Plan exception for these standards (FW-333 and FW-337) as well. The exception will still apply to the restoration thinning treatments in unburned to low severity burned areas. Silvicultural systems refer to whether even-aged or uneven-aged management should be applied. Even-aged systems are regeneration harvests, including clearcutting, seed tree, and shelterwood cuts. The Forest Plan recommends an even-aged system on slopes over 30 percent because the residual trees in an uneven aged harvest system are often damaged with cable logging systems. Even-aged

management is also the preferred approach when treating stands with dwarf mistletoe because of the spread of the parasitic plants to healthy trees under the canopy of infected trees. These Standards (FW-333 and FW-337) are not being met because the silvicultural prescriptions use uneven-aged management to fulfill resource objectives other than timber production (Forest Plan, Four-88).

See Section 3.1, Vegetation Resources in this EA and Chapter 3 – Vegetation Resources in the original North Fork Mill Creek Restoration Opportunities EA for more details.

- Research Natural Area (A3-023, A3-024): Hazard trees may be cut or knocked down, but should not be removed from the site.

A Forest Plan exception is proposed for A3-024 in order to remove the hazard trees from the RNA and not increase the fuel loading. The only treatments proposed on the RNA are hazard tree abatement along the roadside. The trees would be removed, if the slash exceeds Forest Plan standards and guidelines for fuel loading. The fuels would be machine and/or hand-piled to reduce the resulting fuel loading in order to meet the purpose and need for this project. See Section 3.10, Fuels Management for more details.

- Deer and Elk Winter Range (B10-014): Forest canopy closure should reach at least 70 percent canopy closure within 10 years of the last commercial thinning activity.

Deer and Elk Winter Range (B10-21 & B10-22): Optimal cover and thermal cover habitat components for deer and elk (measured at the area analysis level, i.e., approximately 5000 acres, or at the Management Area level) should encompass at least 50 percent of the area. Optimal cover should be at least 25 percent.

Forest Plan standards B10-014, B10-21 and B10-22 are not being met across all acres under the current post-fire condition. There are approximately 1,885 acres of B10 lands in project area. A total of 53.5 percent of these lands experienced a moderate to high severity burn in the Government Flats Complex Fire. This habitat within this burned area is no longer providing optimal and thermal cover. The action alternatives would further reduce the optimal and thermal cover within the project areas. The habitat would become forage habitat for the deer and elk. Most of the lost thermal cover characteristics in the stands should be regained in the next 40 to 50 years. See Section 3.2, Wildlife for more details.

2.9.2 National Forest Management Act Findings for Vegetation Manipulation

As required by regulations (FSH 1909.12 5.31a), “all proposals that involve vegetative manipulation of tree cover for any purpose must comply with the seven requirements found at 36 CFR 219.27(b).” All of these requirements are met by the project (refer to project record).

Suitability for Timber Production: The primary objective of this project is salvage, fuels reduction, and hazard tree removal rather than timber production. However, as a pre-cursor to the silvicultural diagnosis process, stand examinations are conducted to determine existing stand conditions, and a determination of suitability (in regard to management of the stand for timber

production) is made for each stand. Stands proposed for above mentioned treatments were examined for suitability in accordance with 36 CFR 219.13, Timber resource land suitability. Stands were found to be suitable for timber management based upon the following:

- Meet the definition of forestland as described in 36 CFR 219.3.
- Technological feasibility exists to ensure soil productivity and watershed protection. All sites considered for treatment would use established harvesting and site preparation methods. In combination with resource protection standards in the Forest Plan and applicable Best Management Practices, these methods would be sufficient to protect soil and water resource values.

Suitability for Reforestation: Forest Plan guidelines advise “timber harvesting shall be completed in a fashion that reasonably assures each harvest area can be adequately restocked within 5 years after final harvest” (FW-358). Replanting would occur to a minimum of 125 trees per acre (FW-361 thru FW-363) in root rot openings large enough to support resistant tree species establishment. Inter-planting would be used to maintain genetic quality and desired species composition (FW-332).

2.9.3 Best Management Practices

Best Management Practices (BMPs) are defined as “methods, measures or practices selected by an agency to meet its nonpoint source control needs. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters” (EPA Water Quality Standards, Regulation, 40 CFR 130.2). Appendix H of the Forest Plan provides management direction on the BMP implementation process. Appendix H states: “The general BMP’s described herein are action initiating mechanisms which are for the development of detailed, site-specific BMP prescriptions to protect beneficial uses and meet water quality objectives. They are developed as part of the NEPA process, with interdisciplinary involvement by a team of individuals that represent several areas of professional knowledge, learning and/or skill appropriate for the issues and concerns identified. BMP’s also include such requirements as Forest Service Manual direction, contract provisions, environmental documents, and Forest Plan Standards and Guidelines. Inherent in prescribing project-level management requirements is recognition of specific water quality objectives which BMP’s are designed to achieve.” Appendix H of the Forest Plan continues on to describe the implementation process and format for project specific BMP requirements.

According to the Northwest Forest Plan, BMPs would be incorporated into the implementation of the project. BMPs are drawn from General Water Quality Best Management Practices, Pacific Northwest Region (November 1988); Draft Environmental Protection Agency Region 10 Source Water Protection Best Management Practices for USFS, BLM (April 2005); Mt. Hood National Forest Standards and Guidelines, Northwest Forest Plan Standards and Guidelines and The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012) and professional judgment. The BMPs have been adjusted and refined to fit local conditions and then incorporated

in the project design criteria/mitigation measures as described in Section 2.4 as well as the standard contract language for implementing these projects. According to the USFS National Core BMP Technical Guide (April 2012) “Site-specific BMP prescriptions are developed based on the proposed activity, water quality objectives, soils, topography, geology, vegetation, climate, and other site-specific factors and are designed to avoid, minimize, or mitigate potential adverse impacts to soil, water quality, and riparian resources. State BMPs, regional Forest Service guidance, land management plan standards and guidelines, monitoring results, and professional judgment are all used to develop site-specific BMP prescriptions.”

Appendix 1 of this Environmental Assessment details the site-specific Best Management Practices for Water Quality for this project. The appendix includes all the required components of the site-specific BMPs as specified in Appendix H of the Forest Plan, including BMP title, objective, explanation, ability to implement, effectiveness, and monitoring. In addition, the site-specific BMP table provides a cross-walk with the PDC and planning process. The refined BMP selected for this project have been found to be implementable and effective based on prior field observations and professional judgment, other pertinent research described in Chapter 3 of this document, and monitoring on the Mt. Hood National Forest. These BMPs are fully analyzed in Chapter 3 of this document (see Section 3.4, Water Quality and Section 3.5, Fisheries & Aquatic Fauna).

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

This chapter presents information on the physical, biological, social, and economic environments of the affected project area, and the potential direct, indirect and cumulative effects to those environments due to the implementation of the alternatives. Each resource area discloses the direct, indirect and cumulative effects for that resource area.

The National Environmental Policy Act defines these as:

- **Direct:** Effects which are caused by the action and occur at the same time and place
- **Indirect:** Effects which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable
- **Cumulative:** Impacts that result from the incremental impact of an action, when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions

The Environmental Assessment hereby incorporates by reference the project record (40 CFR 1502.21). The project record contains specialist reports, biological evaluations, and other technical documentation used to support the analysis and conclusions in this Environmental Assessment. Specialist reports were completed for vegetation resources, wildlife, soils, water quality, fisheries, botany, invasive plants, transportation resources, fuels, recreation, visual quality, fuels, and heritage resources. Separate biological evaluations were completed for botanical species, aquatic species, and terrestrial wildlife species. Full versions of these reports are available in the project record, located at the Hood River Ranger District office in Mount Hood/Parkdale, Oregon.

Each of the specialist reports and biological evaluations conduct an analysis of cumulative effects resulting from this project. Table 3-1 lists the projects that the interdisciplinary team (IDT) considered in their analysis.

Table 3-1: List of Projects Considered in Cumulative Effects Analysis

Past Activities
Culvert replacements on Mill Creek road (1711-630 Road) and on North Fork Mill Creek (located approximately 0.5 miles downstream of Forest boundary)
Firewood cutting activities
Government Flats Complex Fire Suppression Repair activities
Illegal trail construction in Gibson Prairie area
Multi-use trail construction
North Fork Mill Creek Stewardship Projects (Appy, Buckskin, and Clyde Stewardship)
Past road building in planning area
Past timber harvests
Pre-commercial/sapling thinning
Private land harvesting activities on Sections 31 and 36
Road closures (seasonal and year-round)
The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship)

Ongoing Activities
Aspen Cottonwood Enhancement
Bonneville Power Administration maintenance, including herbicide treatments
Government Flats Complex Fire Burned Area Emergency Response (BAER) activities
Hazard tree removal along roads
Invasive Plant Treatments
Long Prairie Grazing Allotment (fence building and range improvements)
Maintenance and Use of Gibson Prairie Horsecamp
Neal Creek (Forest Service Road 1710) Culvert Replacement
North Fork Mill Creek Stewardship Projects (Roan and Eques Stewardship outside fire boundary)
Ongoing road maintenance
Ongoing trail maintenance
Pre-commercial/sapling thinning
Road Decommissioning in North Fork Mill Creek Project Area
Special Forest Products (e.g., firewood cutting, mushroom picking)
The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship)
Underburning within North Fork Mill Creek planning area (outside fire boundary)
Future Activities
Alder Creek (Forest Service Road 1721) Culvert Replacement
Hazard tree removal along roads
Long Prairie Grazing Allotment (grazing)
North Fork Mill Creek Stewardship Projects (Lokai Stewardship outside fire boundary)
Road Decommissioning in North Fork Mill Creek Project Area
West Fork Neal Creek (Forest Service Roads 1700, 1710, 1700-710, and 1700-630) Culvert Replacements
Tributary to West Fork Neal Creek (Forest Service Roads 1700 and 1700-730) Culvert Replacements

3.1 Vegetation Resources

More information is available in the project record including the full silviculture analysis file as part of the Silvicultural Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.1.1 Methodology

The intent of this report is to analysis how the vegetation related resources would be affected by the management actions proposed by the US Forest Service. Professional judgment and stand level data was incorporated in determining the project's potential effects. Effects analyses were based on several components described below.

Landscape Scale

Information on the vegetative conditions of the larger landscape within which North Fork Mill Creek project lies is provided largely by the Mill Creek Watershed Assessment. The watershed

assessment characterizes resource conditions at their respective scales, identifies issues, discusses trends and changes in conditions over time, defines desired conditions, and identifies possible management opportunities to be pursued at the project planning level. Only the elements from these analyses most pertinent to the proposal are discussed in this section. For the complete analysis of vegetation conditions and ecological processes at the landscape scale, refer to the Mill Creek Watershed Assessment (available in the project record, located at the Hood River Ranger District in Mt. Hood-Parkdale, OR). The North Fork Mill Creek Silviculture Report provides an additional summary of this landscape information as related to the project.

Site-Specific Scale

The analysis area is the fire perimeter within the Mt. Hood National Forest 2,261 acres. The analysis area boundary for disclosing effects at a more site-specific level is the North Fork Mill Creek-South Fork Mill Creek subwatershed, as well as parts of Neal and Mosier Creek headwaters, where stands were evaluated for possible treatment actions. Information sources included stand records and field surveys conducted in the 1980s and 1990s, as well as field reviews conducted in the year 2007 and 2013 (on file at the Hood River Ranger District in Mt. Hood-Parkdale, Oregon).

Forest Service Vegetation Module

FSVeg module contains data that has been collected in the “field.” FSVeg contains plot vegetation data from field surveys such as FIA data, stand exams, inventories, and regeneration surveys. It includes data on trees, surface cover, understory vegetation, and down woody material.

Forest Vegetation Simulator

The Forest Vegetation Simulator (FVS) was used to interpret data collected in the Common stand exams (CSE). FVS is a growth and yield model used for predicting forest stand dynamics that is used extensively in the United States. FVS is the standard model used by various government agencies including the USDA Forest Service. Forest managers have used FVS extensively to summarize current stand conditions, predict future stand conditions under various management alternatives, and update inventory statistics (USDA, 2008).

Plant Associations

Forested Plant Associations of the Oregon East Cascades were used to analyze the effects of proposed treatments. Plant association classification describes repeating patterns of plant communities that indicate different biophysical environments. The combinations of factors such as moisture and temperature regimes, light, and soil nutrients provide habitat for a group of plant species. There are few distinct boundaries along the environmental continua. However, categorizing discrete plant associations provides a means to track and predict vegetation composition, structure, and response to disturbance. Plant association classification of forested lands has been a forest management tool for many years. Ecosystem management and concerns with biodiversity also require understanding the plant and animal habitats that occur across our landscapes.

Burn Area Reflectance Classification (BARC)/Burned Area Emergency Rehabilitation (BAER)

Satellite imagery and other remotely sensed images are used to assist in rapid assessment and mapping of burned areas. Items typically provided by remote sensing images are classes depicted on maps and are based on a preliminary classification of the reflectance properties of the target area as recorded by a satellite sensor. The Burned Area Reflectance Classification (BARC) map is intended to support immediate post-fire assessment by Burned Area Emergency Response (BAER) teams. The purpose of the soil burn severity map (BARC) in a BAER assessment is to identify areas of fire-caused changes in soil characteristics that affect the soil hydrologic function.

Soil burn severity is a term that describes classes of fire-caused changes to soil hydrologic function, as evidenced by soil characteristics and surface fuel and duff consumption. The amount and duration of subsurface heating determine the degree of soil burn severity, and can be inferred from fire effects on ground fuels (plants other organic matter) and soils. Soil burn severity classes are unburned, low, moderate, and high as defined by Burned Area Emergency Rehabilitation (BAER) Soil Burn Severity Definitions and Mapping Guidelines (Parsons, 2003) and listed below.

- a) Unburned soil burn severity: Fire has not entered the area, or has very lightly charred only the litter and fine fuels on the ground; soil organic matter, structure, and infiltration unchanged.
- b) Low soil burn severity: Low soil heating or light ground char occurs; mineral soil is not changed; leaf litter may be charred or partially consumed, and the surface of the duff may be lightly charred; original forms of surface materials, such as needle litter or lichens may be visible; very little to no change in runoff response. Indicators include very small diameter (<1/4 inch) foliage and twigs are consumed, some small twigs may remain; generally, foliage may be yellow; the surface is mostly black in a grassland or shrubland ecosystem, but some gray ash may be present; above-ground portions of vegetation may be consumed, but root masses are intact. Change in runoff response is usually slight.
- c) Moderate soil burn severity: Moderate soil heating with moderate ground char; soil structure is usually not altered; decreased infiltration due to fire-induced water repellency⁴ may be observed; litter and duff are deeply charred or consumed; shallow light colored ash layer and burned roots and rhizomes are usually present. Indicators include understory foliage, twigs (1/4 to 3/4 inch) are consumed; rotten wood and larger diameter woody debris are deeply charred or partially consumed; on shrubland sites, gray or white ash is present and char can be visible in the upper 1 cm of mineral soil, but the soil is not altered; in forested ecosystems, brown needles or leaves may remain (but not always) on overstory trees—these are important as mulch, and should play a role when identifying treatment candidate sites; increase in runoff response may be moderate to high, depending on degree of fire-caused changes to the pre-fire vegetation community, density of pre-fire vegetation, and presence or absence of mulch potential, sprouting vegetation, etc.

- d) High soil burn severity: High soil heating, or deep ground char occurs; duff is completely consumed; soil structure is often destroyed due to consumption of organic matter; decreased infiltration due to fire induced water repellency is often observed over a significant portion of the area; top layer of mineral soil may be changed in color (but not always) and consistence and the layer below may be blackened from charring of organic matter in the soil; deep, fine ash layer is present, often gray or white; all or most organic matter is removed; essentially all plant parts in the duff layer are consumed; increase in runoff response is usually high. Other indicators include large fuels > ¾ inch including major stems and trunks are consumed or heavily charred. On a shrub site, shrub stems and root crowns are often consumed. In forested ecosystems, generally no leaves or needles remain on standing trees; high soil burn severity areas are primary treatment candidate sites if there are downstream values at risk;

3.1.2 Changed Condition

The Government Flats Complex Fire (GFCF) burn roughly 10,706 acres which is 26% of the Mill Creek-Columbia River watershed, 708 acres which is <1% of the Mosier Creek-Columbia River watershed, and 14 acres which is <1% of the Eightmile Creek watershed. The GFCF was a mix severity burn with approximately 945 acres at high severity, 2,453 acres at a moderate severity, 6,301 acres of low severity, and 1,809 acres unburned. Soil burn severity levels were based on BARC maps from the GFCF (available in the project record). All changes in conditions refer to areas that were impacted by the fire. All conditions within the unburned areas within the fire perimeter have not changed; refer to North Fork Mill Creek Restoration Vegetation Resources Report (Smolt, 2008) for these conditions.

Landscape Scale

In the high to moderate burn severity areas, the fire regimes have been moved from a 3 to a 1 (refer to Fuels and Air Quality Specialist Report). In these areas the over-story tree mortality is 100% but can be as low as 75%, especially on the edges of the moderately burned areas. Some of these areas also experienced complete consumption of needles and duff. Prior to the fire, the landscape was comprised of several plant communities ranging from mixed conifer (dry and wet) to pine/oak with fire return interval that ranged from 15-200 years (Refer to fire and fuels report). Within the Mill Creek-Columbia River, Mosier Creek-Columbia River, and Eightmile Creek watersheds the high to moderate burn severity areas have been converted to an early seral forest habitat. Early seral forest habitat is defined as “those ecosystems that occupy potentially forested sites in time and space between a stand-replacement disturbance and re-establishment of a closed forest canopy” (Swanson et al. 2010). These habitats can persist from decades to centuries depending on the successful establishment of a new cohort of trees. It is well recognized that these early seral ecosystems provide a multitude of beneficial functions and processes, such as complex food webs, nutrient cycling, and high structural complexity (Noss et al. 2006, Swanson et al. 2010).

Generally, in areas without sufficient seed source, with shrub competition, and without artificial reforestation, establishment of a closed canopy stand may take more than 100 years (Sessions et al. 2004, Swanson et al. 2010). With planting, this successional pathway would occur on a

shorter time scale. Where planting occurs, early seral forests would still persist on the landscape until the establishment of the new cohort of trees.

Site-Specific Scale

All proposed treatments in the project occur within the upper end of the North Fork Mill Creek-South Fork Mill Creek subwatershed (27,938) (Mill Creeks) and the headwaters of Mosier and Neal Creek subwatershed (10,767 acres) (Mosier). Douglas-fir dominated forests growing on warm, dry grand fir habitats cover the majority of the upper slopes of the drainages. For site specific conditions in the unburned and low severity burn refer to the North Fork Mill Creek Restoration Vegetation Resources Report (Smolt, 2008). There is an estimated total of 20,780 acres of Dry Douglas-fir, grand fir, ponderosa pine, and Oregon white oak forest type and an estimated 14% of these plant communities had a high to moderate burn severity within Mill Creek. There is an estimated total of 7,158 acres of moist Douglas-fir and grand fir forest type and an estimated 1% of these plant communities had a high to moderate burn severity within Mill Creek. There is an estimated total of 9,806 acres of Dry Douglas-fir, grand fir, ponderosa pine, and Oregon white oak forest type and an estimated 2% of these plant communities had a high to moderate burn severity within Mosier. There is an estimated total of 961 acres of moist Douglas-fir and grand fir forest type and an estimated 11% of these plant communities had a high to moderate burn severity within Mosier.

Table 3-2: Existing Site and Vegetative Condition of Proposed Action Area

Plant Association	Restoration Thin (U-L) Acres	Restoration Thin (M-H) Acres	Hazard Tree Acres	Reforestation Acres
Grand fir/dwarf Oregon grape-shiny leaf	18	56	32	81
Grand fir /oceanspray-eastside	23	11	24	116
Grand fir/big huckleberry-dwarf huckleberry	0	4	3	16
Grand fir/ vine maple/vanilla leaf	63	82	3	31
Douglas-fir/common snowberry-ninebark	1	1	51	348
Douglas-fir/pinegrass-elk sedge	2	0	15	30
TOTALS	107	154	128	622

*Acreages are rounded and do not agree with overall acreage due to approximations from GIS.

The majority of the high to moderate burn severity areas changed stand stages from Stem Exclusion and Understory Reinitiation stages to the stand initiation stage as a result of the fire (see Figures 3-1 and 3-2 below). Mortality effects from fire typically occur over several years, with most mortality occurring within the first 2 years of fire, as a result of first order fire effects (e.g. crown consumption, cambium kill, and/or root kill) (Wagener 1961 and Hood et al. 2010). However, significant levels of mortality can also occur as long as four years after, due second order fire effects such as insect infestations (Rasmussen et al. 1996). For trees suffering only root

death or cambium death on the bole, it may take several years for the canopy to exhaust its resources and turn from green to red (Schmitt and Filip 2005). Due to delayed mortality, assessment of the level of fire damage and prediction of imminent mortality in trees can be challenging. Numerous case studies and publications are available to assist in the evaluation of fire damage and the likelihood of tree survival. Scott and others (2002) developed guidelines relevant for the region. Each tree species has different guidelines based on their physiological differences in withstanding fire. These guidelines will be used to assist the selection of dying trees to be removed in the moderate and high burn severity areas.

Within the low severity burns, the fire created openings ranging from ¼ to 2 acres in size in conjunction with already existing opening from root rot pockets and insect activity. These openings were not large enough to change the stands stage from previous analyzed stand stages from North Fork Mill Creek Restoration Project. Snag densities increased on the landscape and site-specific scales, refer to the Wildlife Specialist Report for current snag densities.

Table 3-3: Stand Size Class and Descriptions (Oliver 1996)

Stand Size Class	Description
Stand Initiation	Young, single cohort stands whose canopy has not yet closed; seedlings and small saplings; remnant of previous stand may be present.
Stem Exclusion	Relatively young, single cohort stand whose canopy has closed and thinning has begun; saplings and poles; remnants of previous stand may be present
Understory Reinitiation	Middle-aged, medium sized trees with variable canopy closure; second cohort of young trees present in the understory; scattered mortality in all size classes; remnant of previous stand may still be visible
Old Growth	Much later in the life of a stand, overstory trees die in a spatially patchy pattern while some of the younger trees in the understory begin to grow into the overstory (Oliver and Larson 1996). In most forest types old growth may be roughly distinguished from understory reinitiation by the loss of the pioneer cohort of trees.

Table 3-4: Acres and Percent of the Stand Stage for the Burn Area

Stand size class	Acres	Percentage of area
Stand Initiation	1,321	58%
Stem Exclusion	458	20%
Understory Reinitiation	350	16%
Old Growth	123	6%

*Acreages are rounded and not agree with overall acreage due to approximations from GIS.

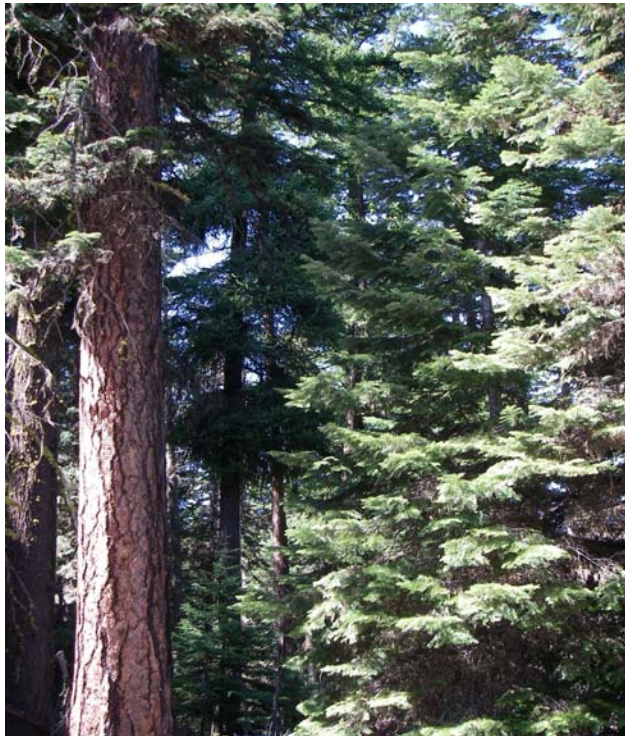


Figure 3-1: Pre-Fire Stand conditions



Figure 3-2: Post Fire Stand Conditions
(High to Moderate burn severity)

3.1.3 Effects Analysis/Environmental Consequences

The baseline condition against which changes to the vegetation would be measured is the changed condition. Criteria used to determine effects on vegetation include: (1) total acres treated and acres treated within each affected forest type; (2) changes in forest structure and composition; (3) effects on residual trees; and (4) effects on insect and disease processes and forest vulnerability to these elements. This section only analyzes the impacts of the restoration thin within the moderate to high severity burn areas, reforestation, and hazard tree removal treatment. As previously described, the restoration thin within the unburned to low severity burn do not have any changed conditions, and as such, will not be discussed further.

No Action – Direct and Indirect Effects

The no action alternative is where the forest vegetation would remain as described in the Changed Condition section above, reforestation would not occur and thinning would not occur. Only hazard trees posing an imminent threat to human safety or infrastructures would be dropped and left. Mechanical ground disturbance would not occur.

The National Forest Management Act (NFMA) and the Regional Office direction recommend reforestation as quickly as possible after stand replacing fire, if no harvest occurs, reforestation is not required within 5 years. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs that have had a longer period to

occupy the site and become established. Without timely reforestation or ample natural regeneration, the moderate to high severity burn areas of the project may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity burn areas, depending on the success of natural regeneration.

With no thinning activities occurring, there are no direct effects to the vegetation. Existing conditions as described above, and in the North Fork Mill Creek Restoration Vegetation Resources Report (Smolt, 2008), would be maintained. In the short-term, there would be no measurable direct or indirect change in the current condition of the area relative to insect and disease levels and vulnerability of the stands to infestations, stand structure and composition, forest type, stand density, fuel loading, or impacts to residual trees. Ultimately, with no vegetation treatments the stand would remain in dense overstocked conditions and maintain high fuel loadings and ladder fuels that put the stands at high risk for stand replacing events. Overtime the dry mix conifer sites, currently occupied by densely stocked Douglas-fir and grand fir stands, and would experience the continuing spread of root disease and resultant mortality over the long-term. Also, a continued infestation and mortality from dwarf mistletoe would continue adding to the already abundant fuel loadings and ladder fuels. By maintaining high tree competition, stems would continue to grow in height, but diameter growth would continually slow. These trees would become more dependent on neighboring trees for support. When trees develop in this manner, they are more likely to blow down in large groups or if drought conditions persist, which would also add to the existing fuel loading.

In the long term, the stand structure and composition would be dominated by Douglas-fir and grand fir in both the overstory and the understory, and would not be moved towards a more historic disturbance regime with fire resistant species. With no thinning treatments, the ponderosa pine/Douglas-fir stands would continue to have grand fir dominate the understory suppressing regeneration of shade intolerant fire resistant species like ponderosa pine or western larch. Young stands would continue to grow in densely stocked conditions with very little regeneration of desired fire resistance species. Densely stocked stands would continue to have large amounts of small patches with increasing crown closure with very little species and structural.

There would be no measurable direct or indirect impacts to the current vegetation resources with the felling of hazardous trees. Hazardous trees dropped and left in stands would provide for a micro-climate for natural regeneration.

Proposed Action (Alternative 2) – Direct and Indirect Effects

In areas of moderate to high burn severity, reforestation, and hazard tree treatments the salvaging of dead and dying timber would have no major effects on the vegetation resource. Salvage and hazard tree removal activities would take place on an estimated 1% of each the dry and moist plant communities within the Mill Creek and Mosier subwatersheds. The salvage and hazard tree removal activities would occur in an estimated 7% of the fire that burned in the moderate to high severity within the Mill Creek and Mosier subwatersheds.

Forest types, Forest Structure and Composition within the Project Area

Within the moderate to high burn severity areas, the salvaging of dead and dying timber, and subsequent reforestation and hazard tree removal, would have no impacts on existing forest vegetation and development of early seral habitat given the current on-the-ground conditions. Currently 93% the subwatersheds that had a high to moderate burn severity would be maintained in their current condition of early seral habitat. There is concern that early seral habitat would be diminished or reduced beyond acceptable levels due to artificial reforestation (planting). At present, there would be no extensive loss of early seral habitat of across the landscape due to reforestation. Though artificial reforestation may speed up the successional process, these areas would not be considered a loss to early seral habitat. It may take several decades to a century, for these stands to develop into closed canopy forest depending on the success of seedling establishment. The most critical factor in establishment of natural seedlings in the stand initiation areas is the available seed source. In the moderate to high severity burn areas, regeneration could be established from seed from adjacent stands, seed from the surviving large trees, existing cone/seed crop at the time of the fire, or dissemination by other means such as wind. While some seed sources still exist on the edges of moderate and high burn severity areas, natural regeneration potential is likely to be hindered by the aggressive establishment of brush and other non-tree vegetation. In areas where the seed source was lost, little to no natural regeneration is expected. Natural tree regeneration is expected to consist mostly of grand fir, which could persist under the shrub layer for decades, with some Douglas-fir, western larch, and ponderosa pine. Artificial regeneration of ponderosa pine, western white pine, and western larch from local seed sources would move the forest towards a mixed conifer forest. However, several years of delay in planting may cause higher tree mortality rates due to competition with shrubs.

Due to the early establishment of competing brush, even if seed is disseminated across the moderate and high burn severity areas in years following the fire, tree seedlings would be at a competitive disadvantage. Without active reforestation, desirable conifers have a small window for establishment amid rapidly growing shrubs (Shatford et al. 2007, Sessions et al. 2004). Due to the ground impacts of salvage logging, there may be a reduction in the number of natural seedlings where activities occur (Donato et al. 2006). The use of ground-based machinery would disturb established vegetation mostly on implemented skid trails and landings. However, soil disturbance would be limited within the proposed treatment units due to the Project Design Criteria (Refer to Soils Productivity Specialist Report). Salvage is planned to occur in as quickly as possible following the fire, so any existing natural regeneration would not be well established and planting would occur approximately up to four years following salvage activities. Seedlings would be around the same age or older than the natural regeneration, giving the seedlings a good chance of growing above the competition of non-tree vegetation.

To ensure that seedlings are adapted to the area, local seed is used for all species in reforestation following guidelines for seed transfer rules (FSH 2409.26b,60) within seed zones. A seed zone is a designated area, usually with definite topographic, climate, and growing conditions, containing trees with relatively uniform genetics composition (Helms 1998). All artificial reforestation activities would be with tree species that are commonly found in the present forest types and are fire resilient. Also, under the planned reforestation design, there would be no impacts of reforestation on the establishment of stand complexity due to the planting of a variety of tree

species and attainment of variable stocking densities due to differences in terrain, natural seed source, and natural mortality.

Residual Trees in Thinned Areas

Within the moderate to high burn severity areas the salvaging of dead and dying timber, and subsequent reforestation and hazard tree removal, would have minimal impacts on the existing live and dead residual trees. Mechanized equipment would be used to fell and remove the trees in the moderate to high burn severity units. There is some risk of damage to residual trees from these activities. However, residual tree spacing would be wider, allowing machinery to have adequate room to maneuver; and therefore, should be able to avoid any appreciable damage to residual trees. All Mt. Hood Land and Resource Management Plan (Forest Plan) standards would be met for snag and down wood retention. Any live trees within these treatment areas would not be harvested.

Insect and Disease Processes and Forest Vulnerability

Dwarf mistletoe

A direct reduction in dwarf mistletoe populations has occurred within the moderate and high burn severity areas after the fire. All activities proposed within these areas would have no impact on the dwarf mistletoe populations. Artificial reforestation would favor non susceptible species near the edges of the moderate to high burn severity areas where mistletoe population were not removed by the fire.

Root disease

A direct reduction in root disease has occurred within the moderate and high burn severity areas after the fire. All activities proposed within these areas would have no impact on the root disease pockets that previously existed in the moderate to high severity burn areas. Clearings of sufficient size have been created by the fire were both artificial and natural regeneration of resistant species (where present) would be encouraged within the low severity burn areas. Artificial reforestation would favor non susceptible species near the edges of the moderate to high burn severity areas and where root pocket population were not removed by the fire.

Snag Retention (Alternative 3) – Direct and Indirect Effects

In areas of reforestation and hazard tree treatments, the planting, felling, and removing of hazard trees would have no major effects on the vegetation resource. Reforestation and hazard tree removal activities would take place on an estimated 1% of each the dry and moist plant communities within the Mill Creek and Mosier subwatersheds. The hazard tree felling and removal activities would occur on an estimated 7% of the fire that burned in the moderate to high severity within the Mill Creek and Mosier subwatersheds. Although this alternative does not include any salvage logging, the overall impact at the subwatershed level remains unchanged due to the size of the watershed in relation to the number of treatment acres.

Forest types, Forest Structure and Composition within the Project Area

Within the moderate to high burn severity areas, the reforestation and hazard tree felling, would have no impacts on existing forest vegetation and development of early seral habitat given the current on-the-ground conditions. Currently 93% the subwatersheds that had a high to moderate

burn severity would be maintained in their current condition of early seral habitat. There is concern that early seral habitat would be diminished or reduced beyond acceptable levels due to artificial reforestation (planting). The impacts at the subwatershed level remain unchanged from Alternative 2, given the size of the subwatershed compared to the number of treatment acres. See the discussion under Alternative 2 for more details. Overall, there would be no considerable change in the forest structure for the plant association within the analysis area.

Residual Trees in Thinned Areas

Within the moderate to high burn severity areas, the reforestation and hazard tree felling, would have minimal impacts on the existing live and dead residual trees. Mechanized equipment would be used to fell and remove the trees when possible in the hazard tree units. There is some risk of damage to residual trees from these activities. However, residual tree spacing would be wider, allowing machinery to have adequate room to maneuver; and therefore, should be able to avoid any appreciable damage to residual trees. All Mt. Hood Land and Resource Management Plan (Forest Plan) standards would be met for snag and down wood retention. Any live trees within these treatment areas would not be harvested.

Insect and Disease Processes and Forest Vulnerability

Dwarf mistletoe & root disease

A direct reduction in dwarf mistletoe populations has occurred within the moderate and high burn severity areas after the fire. All activities proposed within these areas would have no impact on the dwarf mistletoe populations and the root disease pockets that previously existed. Artificial reforestation would favor non susceptible species near the edges of the moderate to high burn severity areas where mistletoe and root pocket population were not removed by the fire.

Cumulative Effects

Discussions of the cumulative effects are limited to those past, present and reasonably foreseeable activities that have been determined to have a cumulative effect on the vegetative resource. Refer to the cumulative effects project list in Chapter 3 of the EA for a list of all possible activities that were originally considered in this cumulative effects analysis for vegetative conditions.

The spatial and temporal bounds of this cumulative effects analysis are the Mill Creek watershed over the next century. The temporal period of 100 years for analysis is based on the literature suggesting that early seral habitat may persist for upwards of 100 years without artificial regeneration (Sessions et al. 2004, Swanson et al. 2010). The total acreage treated by restoration, thinning, and hazard tree in the Proposed Action is an estimated 1,009 acres. This represents an estimated 3% of the Mill Creek watershed. The Government Flats Complex Fire reset stand conditions in the areas of moderate to high burn severity proposed for salvage and reforestation to the stand initiation stage, effectively eliminating the effects of past timber management activities. As such, there would be no cumulative effects for Alternative 2 of the proposed salvage in moderate and high burn severity areas (154 acres), hazard tree (128 acres), and reforestation (622 acres) with past, current, and future timber-related activities, including the completed North Fork Mill Creek stewardship sales. Furthermore, there would be no cumulative effects for Alternative 3 with the proposed hazard tree (167 acres) and reforestation (732 acres)

with past, current, and future timber-related activities, including the completed North Fork Mill Creek stewardship sales. Timber-related activities occurring for both Alternatives 2 and 3 are impacting less than 10% of the Mill Creek-Columbia River, Mosier Creek-Columbia River, and Eightmile Creek watersheds.

3.1.4 Consistency Determination

NFMA Findings for Vegetation Manipulation

As required by regulations (FSH 1909.12 5.31a), “all proposals that involve vegetative manipulation of tree cover for any purpose must comply with the seven requirements found at 36 CFR 219.27(b).” All of these requirements are met by the project (refer to project record).

Suitability for Timber Production: The primary objective of the proposal is salvage, fuels reduction, and hazard tree removal rather than timber production. However, as a pre-cursor to the silvicultural diagnosis process, stand examinations are conducted to determine existing stand conditions, and a determination of suitability (in regard to management of the stand for timber production) is made for each stand. Stands proposed for above mentioned treatments were examined for suitability in accordance with 36 CFR 219.13, Timber resource land suitability. Stands were found to be suitable for timber management based upon the following:

- Meet the definition of forestland as described in 36 CFR 219.3.
- Technological feasibility exists to ensure soil productivity and watershed protection. All sites considered for treatment would use established harvesting and site preparation methods. In combination with resource protection standards in the Forest Plan and applicable Best Management Practices, these methods would be sufficient to protect soil and water resource values.

Mt. Hood Land and Resource Management Plan

This project is consistent with the applicable standards and guidelines listed below from the Forest Plan.

- FW-308 & 309: Timber cutting on unsuitable lands may occur e.g. salvage, windthrown timber, protect other multiple use values or activities.
- A3-023: Hazard trees may be cut or knocked down.
- A6-021: Timber salvage activities (e.g., harvest windthrown timber, fire damaged trees, insect and disease attacked trees, hazard trees, or other similar natural tree mortality) for protection of the surrounding forest or visitor safety may be permitted.
- A7-015: Timber salvage activities shall not be allowed, except for removal and/or sale of hazard trees.
- B6-027: Timber salvage activities may occur
- B10-012 & B10-013: Regulated timber harvest should occur. Timber salvage activities may occur

Suitability for reforestation

Forest plan guidelines advise timber harvesting shall be completed in a fashion that reasonably assures each harvest area can be adequately restocked within 5 years after final harvest” (FW-358) Replanting would occur to a minimum of 125 trees per acre (FW361-363) in root rot openings large enough to support resistant tree species establishment. Interplanting would be used to maintain genetic quality and desired species composition (FW-332)

3.1.5 Summary of Effects by Alternative

For all three alternatives there would be no short-term effect on forest structure, residual tree survival, or change in insect and disease process. Long-term effects of the No Action alternative would be stands would be maintained in an early successional stage longer with limited species composition. The long-term effects for both Alternative 2 and 3 would move species diversity toward historic conditions through artificial regeneration and stand structure would move out of an early successional stage more quickly. Overall, the impacts associated with Alternatives 2 and 3 are very similar at the subwatershed level given the size of the watershed in relation to the number of treatment acres.

3.2 Wildlife

More information is available in the project record including the full wildlife analysis file, and biological evaluation as part of the Wildlife Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.2.1 Overall Methodology

Four species of wildlife and critical habitat that are classified as threatened, endangered or proposed may be found on or adjacent to the Hood River Ranger District. There are seventeen U.S. Forest Service Region 6 Sensitive species (2011), seven Survey and Manage species (2001), and seven Management Indicator species that may also be found on the District. The status of species in the project area is listed in Table 3-5. Species that are not present or do not have habitat within the project area will not be discussed further in this biological evaluation.

Table 3-5: The status of Threatened, Endangered, and Proposed Species; Forest Service Region 6 Sensitive Species; Survey and Manage Species; and Management Indicator Species in the Project Area

Species	Habitat	Presence
Federally Threatened, Endangered or Proposed		
Northern spotted owl (<i>Strix occidentalis caurina</i>)	yes	yes
Northern spotted owl critical habitat	yes	yes
North American wolverine (<i>Gulo gulo luscus</i>)	yes	unknown
Canada lynx (<i>Lynx canadensis</i>)	no	-
R6 Sensitive Species		
Bald eagle (<i>Haliaetus leucocephalus</i>)	no	-

Species	Habitat	Presence
Peregrine falcon (<i>Falco peregrinus anatum</i>)	no	-
Bufflehead (<i>Bucephala albeola</i>)	no	-
Harlequin duck (<i>Histrionicus histrionicus</i>)	no	-
White-headed woodpecker (<i>Picoides albolarvatus</i>)	yes	yes
Lewis' woodpecker (<i>Melanerpes lewis</i>)	yes	yes
Cope's giant salamander (<i>Dicompodon copei</i>)	no	no
Cascade torrent salamander (<i>Rhyocotriton cascadae</i>)	no	-
Oregon spotted frog (<i>Rana pretiosa</i>)	no	-
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	no	-
Fringed myotis (<i>Myotis thysanodes</i>)	no	-
Pacific fisher (<i>Martes pennanti</i>)	no	-
Western bumblebee (<i>Bombus occidentalis</i>)	yes	unknown
Beller's ground beetle (<i>Agonum belleri</i>)	no	-
California Shield-backed bug (<i>Vanduzeenia borealis californica</i>)	no	-
Johnson's hairstreak (<i>Callophrys johnsoni</i>)	no	-
Mardon skipper (<i>Polites mardon</i>)	no	-
Survey and Manage		
Great gray owl (<i>Strix nebulosa</i>)	no	-
Larch Mountain salamander (<i>Plethodon larselii</i>)	no	-
Dalles sideband (<i>Monadenia fidelis minor</i>)	yes	yes
Crater Lake tightcoil (<i>Pristiloma arcticum crateris</i>)	yes	unknown
Evening fieldslug (<i>Deroceras hesperium</i>)	yes	unknown
Puget Oregonian (<i>Cryptomastix devia</i>)	yes	unknown
Columbia Oregonian (<i>Cryptomastix hendersoni</i>)	yes	unknown
Management Indicator Species		
Mule Deer (<i>Odocoileus hemionus</i>) and Elk (<i>Cervus elaphus nelsoni</i>)	yes	yes
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	yes	yes
American Marten (<i>Martes americana</i>)	yes	yes
Wild Turkey (<i>Meleagris gallopavo</i>)	yes	yes
Western Gray Squirrel (<i>Sciurus griseus griseus</i>)	yes	yes
Other Speices of Interest		
Snag and Down Log Associated Species	yes	yes
Neotropical Migratory Birds	yes	yes

The following analysis includes a discussion for wildlife species for the components of the North Fork Mill Creek project that have a changed condition resulting from the Government Flats Complex Fire; that have a changed condition resulting of regulation, policy, or law; or that were not present when the original analysis was completed, but are present now. If there was no change in condition, that component of the North Fork Mill Creek Revised analysis will not be discussed further in this assessment. The effects to the species with no changed condition are analyzed and fully disclosed within the original North Fork Mill Creek Restoration Opportunities Wildlife Biological Evaluation (Walcott, 2008). This analysis is available in the project record, located at the Hood River Ranger District in Mount Hood-Parkdale, Oregon.

3.2.2 Threatened, Endangered and Proposed Species

3.2.2.1 Northern Spotted Owl

Methodology

Disturbance

The U.S. Fish and Wildlife Service (USFWS) has concluded that noise, smoke, and human presence can result in a disruption of breeding, feeding or sheltering behavior of the northern spotted owl (spotted owl) such that it creates the potential for injury to individuals (i.e., incidental take in the form of harassment). For a significant disruption of spotted owl behavior to occur as a result of disturbance caused by the Proposed Action, the disturbance and spotted owl(s) must be in close proximity to one another. Human presence on-the-ground is not expected to cause a significant disruption of behavior because spotted owls do not seem to be startled in those situations.

A spotted owl that may be disturbed at a roost site is presumably capable of moving away from the disturbance without a substantial disruption of its behavior. Since spotted owls forage primarily at night, projects that occur during the day are not likely to disrupt its foraging behavior. The potential for effects is mainly associated with breeding behavior at active nest sites.

In the late breeding period, potential effects from disturbance decline because juvenile spotted owls are increasingly more capable of moving as the nesting season progresses. To ensure that more than 86 percent of juvenile spotted owls in the Oregon Eastern Cascades Physiographic Province are able to move away from disturbance without increasing their risk of predation or harm, the critical breeding period is considered to be March 1 through July 15. After July 15, it is estimated that most fledgling spotted owls are capable of sustained flight and can move away from most harmful disturbances.

The USFWS has based disruption distances on interpretation of the best available science. The Proposed Action for this project that generate noise above ambient levels would be the use of heavy equipment and chainsaw use. Disruption distances of 35 yards for heavy equipment use and 65 yards for chainsaws have been set by the USFWS.

Home Range and Core Area

Since there are few recent surveys for spotted owls that show the locations of active nest sites on the Forest, historical spotted owl information is used. Historical nest sites are used because studies show that nests are used for many years and when a site has been found to be unoccupied during surveys, it can be subsequently utilized by a different pair of owls years later. In addition to historic sites, predicted nest sites are used to analyze the effects of the proposed project on spotted owls. The predicted sites are used for areas with incomplete or no spotted owl survey information. The purpose of using predicted sites is to estimate spotted owl numbers and distribution within unsurveyed habitat for purposes of assessing the effects of a proposed project on spotted owls. These predicted sites are based on factors known to influence the carrying capacity of a given area for spotted owls.

While it is usually the alteration or removal of suitable habitat that potentially results in adverse impacts to a territorial pair of spotted owls, the loss or degradation of dispersal habitat may also result in short-term impacts. For the Willamette Province, the home range is a 1.2 mile radius circle (2,955 acres) centered on a nest site. Incidental take would be presumed to occur when suitable habitat is removed from a home range and if suitable habitat is less than 40 percent of the home range. A core area has been defined as the area within a home range that receives disproportionately high use (503 acres or 0.5 mile radius circle from the historic nest). Incidental take would be presumed to occur when suitable habitat is removed from a core area and if suitable habitat is less than 50 percent of the core area.

Changed Condition

Habitat

There are four home ranges that overlap with the proposed treatment units. Because of the amount of habitat that burned in the Government Flats Complex Fire, all home ranges are currently below the threshold of 40 percent suitable habitat in the home range and 50 percent suitable habitat within the core area. The amount of suitable habitat within the fire perimeter reduced by 248 acres and the amount of dispersal habitat was reduced by 257 acres (Table 3-6). There are currently 689 acres of suitable nesting habitat and 269 acres of dispersal habitat within the proposed project area.

Table 3-6. Suitable and Dispersal Habitat Pre and Post Fire

Acres	Northern Spotted Owl Habitat	
	Dispersal	Suitable
Pre Fire	526	937
Post Fire	269	689
Total Acres Lost	257	248

Snags

Because of the fire, the number of snags in the project area has increased since the original North Fork Mill Creek Restoration Opportunities analysis in 2008. It is estimated that there are currently an average of 60 to 100 snags per acre ≥ 20 inches in diameter and 100 to 150 snags per acre between 8 and 19.9 inches in diameter. The snags created by the fire were in the moderate to high severity portions of the burn on a total of 1,298 acres on the Forest. Given the above averages, the total number of snags in the project area is estimated at 77,880 to 130,000 snags ≥ 20 inches in diameter and 130,000 to 194,700 snags between 8 and 19.9 inches.

Management and Population Trends

The Revised Recovery Plan for the Northern Spotted Owl (U.S. Fish and Wildlife Service 2011) has developed a habitat modeling tool to aid in the development of future land management plans by Federal land managers, and the consideration of management options by State, Tribal or private land owners. The Recovery Plan has been updated since the original Wildlife Biological Evaluation (2008) was completed.

Given the continued decline of the species, the apparent increase in severity of the threat from barred owls, and information indicating a recent loss of genetic diversity for the species, the Revised Recovery Plan recommends retaining more occupied spotted owl sites and unoccupied, high value spotted owl habitat on all lands. Vegetation management actions that may have short-term impacts, but are potentially beneficial to occupied spotted owl sites in the long-term meet the goals of ecosystem conservation. Such actions may include silvicultural treatments that promote ecological restoration and are expected to reduce future losses of spotted owl habitat and improve overall forest ecosystem resilience to climate change, which should result in more habitat retained on the landscape for longer periods of time.

In the more disturbance-prone provinces on the east side of the Cascade Mountains, agencies are working to develop strategies that incorporate the dynamic natural disturbance regime in a manner that provides for long-term ecological sustainability through the restoration of ecological processes while conserving spotted owl habitat over the long-term.

The Revised Recovery Plan also identifies competition from the barred owl as an important threat to the spotted owl. Since barred owls are more aggressive and also use the same habitats and prey as spotted owls they are believed to be out competing spotted owls for habitat and food (USFWS 2011, Wiens 2012). Within the Oregon demographic study areas, there has been a steady increase in the number of barred owls as measured by the proportion of spotted owl sites with barred owls detected, with as many as 60 percent of the spotted owl sites having barred owls detected, see Figure 3-3 (Forsman et al. 2011).

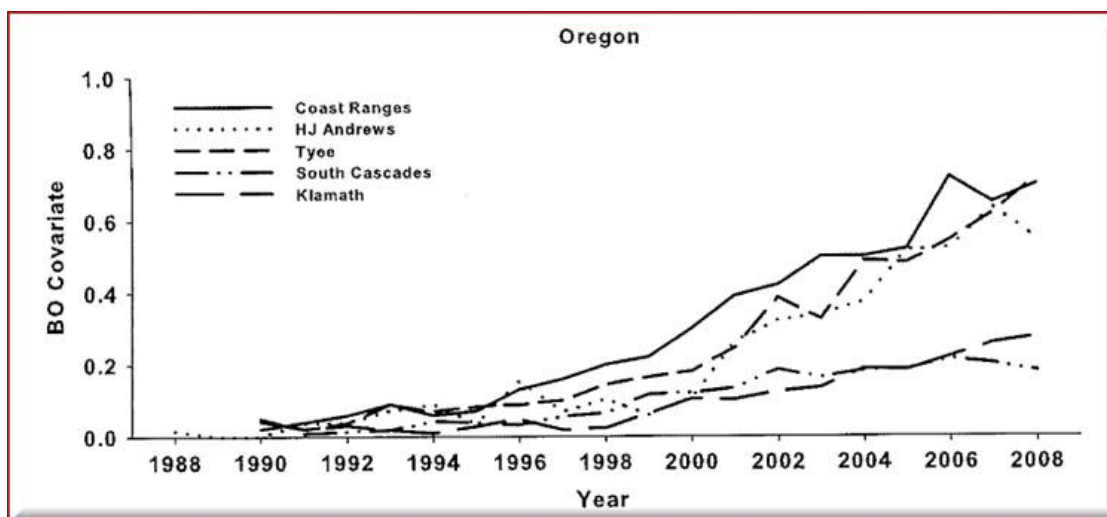


Figure 3-3: Annual Proportion of Spotted Owl Territories with Barred Owl Detections

Dugger et al. (2011) modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study area where barred owls were detected on some home ranges. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was 2 to 3 times greater when barred owls were detected. They found that colonization rates for spotted owls decreased as the distance between patches of old-growth forest increased (i.e. increased habitat loss and fragmentation) and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs. They concluded that

conserving large blocks of contiguous old-forest habitat was important for reducing interference competition between the two owl species. They mapped old-forest habitat as generally >100 years of age with trees diameter at breast height (dbh) >35 cm (K. Dugger, personal communication, 2012). Wiens (2012) also found that the relative probability of a location being selected by spotted owls was reduced if the location was in close proximity to the core-use area of a barred owl.

Effects Analysis

Analysis Area

The analysis area for spotted owl includes the Government Flats Complex Fire perimeter and the four spotted owl territories that overlap and extend beyond the fire perimeter (Figure 3-4).

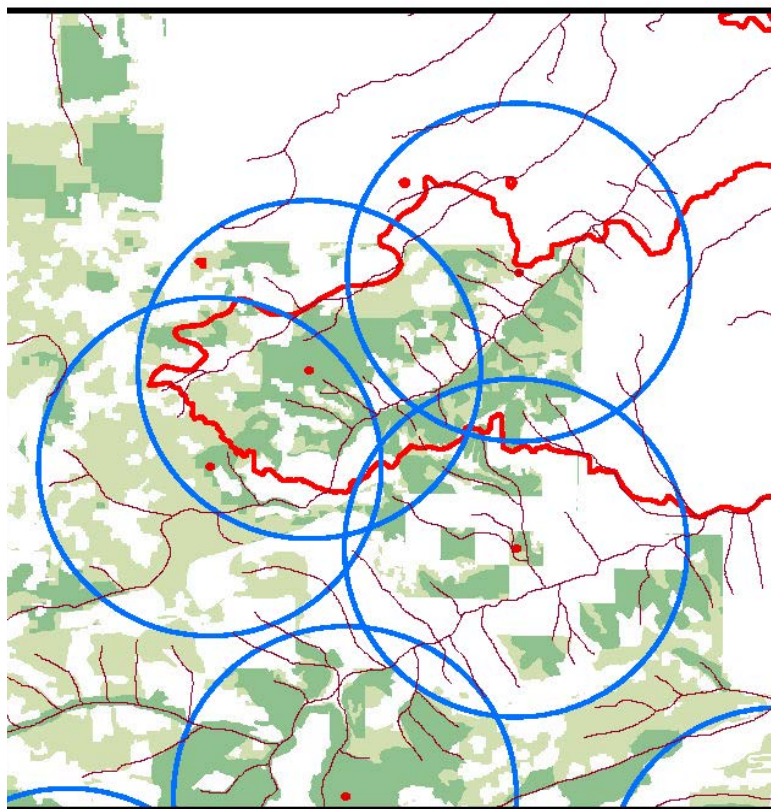


Figure 3-4: Spotted owl analysis area

No Action – Direct and Indirect Effects

Under the No Action Alternative there would be no reforestation in the burned area to accelerate the development of desired forest conditions. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas of the project may experience stands that are dominated by dense shrubs for several decades. Early

seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration since burned stands would be dependent on nearby natural seeds for reforestation.

Restoration thinning in high severity burned areas would not occur and these areas would continue to serve as foraging habitat for spotted owls. Hazard trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure, which would also provide for foraging habitat over a longer period of time.

Alternative 2—Direct and Indirect Effects

Habitat Impacts

The proposed treatments under Alternative 2 would impact 70 acres of dispersal habitat and 15 acres of suitable habitat. This habitat would be impacted by reducing the canopy cover from approximately 70 percent to less than 40 percent and the loss of some down wood, shrubs and snags, which provide habitat for prey species. These units would no longer function as suitable and dispersal habitat after treatments. It is estimated that these units would again provide dispersal habitat approximately 20 years after harvest, but it would be many decades before it would again provide suitable nesting habitat.

There are four home ranges that overlap with the proposed treatment units. Because of the amount of habitat that burned in the Government Flats Complex Fire, all home ranges are currently below the threshold of 40 percent suitable habitat in the home range and below the threshold of 50 percent suitable habitat within the core area. The proposed treatments would further reduce the amount of suitable habitat within either the core area or home range in two of the territories.

The impacts to dispersal habitat from the proposed treatments under Alternative 2 would affect the ability of owls to move through these treated stands since they would no longer be providing dispersal habitat. In the high severity burned areas of the project area dispersal habitat was reduced by 257 acres (see Table 3-6) and this Alternative would further reduce the amount of dispersal habitat by 70 acres. Because the impacts to dispersal habitat are considered at the landscape scale, the removal of this habitat would not prevent owls from dispersing between territories. Although there is no suitable habitat north and east of the fire and the project area, the removal of the dispersal habitat would not prevent owls from dispersing to the west and the south.

Snag Removal

Alternative 2 would remove snags on 146 acres in the Restoration Thin treatment units in the moderate to high severity burned areas and on 134 acres in the Hazard Tree treatment units. In addition to these acres, snags would be felled in the Reforestation units and Restoration Thin treatment units in the low severity burned and unburned areas in order to meet OSHA standards for worker safety.

The total number of snags to be removed in the Restoration Thin units is estimated to be 11,000 snags ≥ 20 inches in diameter and 15,600 snags 8 to 19.9 inches in diameter. Based on field

reviews, it is estimated that approximately 40 percent of the trees in the hazard tree units would need to be removed for an average of 4,000 snags ≥ 20 inches in diameter and 7,000 snags 8 to 19.9 inches in diameter for Hazard Tree treatments. A total of approximately 37,600 snags (14.1 percent of snags in project area) would be removed under this Alternative (Table 3-7).

Table 3-7: Number of Snags Removed by Alternative 2.

Treatment	$\geq 20''$	8'' to 19.9''	Total
Restoration Thin (Moderate to High)	11,000	15,600	26,600
Hazard Tree Treatments	4,000	7,000	11,000
Total	15,000	22,600	37,600

Results from three radio-telemetry studies of spotted owls in post-fire landscapes indicate that spotted owls use forest stands that have been burned, but generally do not use stands that have been burned and logged. California spotted owls tracked 4 years post-fire in burned, unlogged stands had 30 percent of their nonbreeding-season roost locations within the fire's perimeter (Bond *et al.* 2010); selected low-severity burned forests for roosting during the breeding season (Bond *et al.* 2009); and selected low-, medium-, and high-severity burned forests for foraging within 1.5 km of the nest or roost site, with the strongest selection for high-severity burned forest (Bond *et al.* 2009). However, for spotted owls in stands that had been harvested post-fire, infrequent foraging in stands burned with low-, medium-, and high-severity fires was restricted to areas with live trees such as those in riparian areas (Clark 2007), and use shifted away from burned stands during 3 years post-fire (King *et al.* 1997).

Based on these studies and because there is sufficient suitable habitat adjacent to the burned area to support a nesting pair of owls, the removal of post fire habitat would reduce available foraging on 280 acres from Restoration Thin treatments and Hazard Tree treatments. And reforestation activities on 622 acres would be expected to increase the rate at which seedlings become established which could increase the rate of establishing large tree structure and canopy cover needed for suitable spotted owl habitat (See Silviculture Specialist Report, No Action Alternative, available in the project record).

Barred Owls

There is concern that timber harvest and other silvicultural activities may directly or indirectly affect the interaction between barred owls and spotted owls and increase the competitive advantage for barred owls. The main areas of concern that may be related to the Proposed Action are: logging may expand the range of barred owls; and silvicultural treatments that thin forests and create early seral habitat, or create edge habitat, may favor barred owls over spotted owls.

Across their range barred owls are known to use a wide variety of forest types and it has been suggested they are habitat generalists that may benefit from timber harvest activities such as clearcutting and thinning (Hamer *et al.* 1989, Iverson 1993). However, a detailed review for the spotted owl recovery plan found much evidence that barred owls prefer old-growth and older forest habitat in the Pacific Northwest (USFWS 2011). While a suggestion has been made that timber harvest activities may favor barred owls, an alternative hypothesis is that barred owls

have a wider range of habitat use in the northern part of the spotted owl's range, and the spotted owl has a narrower one. But in the more southerly part of the spotted owl's range, the spotted owl seems to have a broader range of habitat use than does the barred owl (Courtney et al 2004). Therefore, timber harvest may have the effect of leading to a competitive advantage for barred owls in some areas, but not in others (Courtney et al 2004, Dugger et al. 2011).

In some portions of the spotted owl's range, barred owl populations are increasing while spotted owls are declining, to some degree independently of forest management history in the area (Courtney et al 2004). For example, barred owls are increasing while spotted owls are declining throughout the Olympic peninsula in both industrial and national forest, but also in the National Park in areas that have never been harvested. On the Gifford Pinchot National Forest (Washington), the density and impact of barred owls appears higher in areas without timber harvest (Pearson and Livezey 2003).

Wiens (2012) conducted a detailed study of the interaction between barred and spotted owls in the moist temperate forests of western Oregon by radio tracking 29 spotted owls and 28 barred owls in 36 neighboring territories over a 2-year period. He found that both owl species had similar use of young, mid-seral, and mature forests and that both species avoided areas within 135 meters of forest/non-forest edges. Both species avoided open areas and young forests less than 60 years of age and used mature conifer forests (60-120 years of age) proportional to their availability within the landscape (second order selection).

Because barred owls can prey on a wider range of species than spotted owls, there has been speculation that thinning may increase prey favored by barred owls. The Young Stand Study on the Willamette National Forest found that commercial thinning of mid-seral stands would significantly increase the abundance of deer mice and Townsends chipmunks (McComb et al 2013). Wiens (2012) found that these two species comprised about 5 percent of the prey biomass for spotted owls compared to 3 percent for barred owls in an area of western Oregon. Therefore, the small mammal species that have been found to increase most after thinning are not ones that are selectively favored by barred owls more than spotted owls. Based on these studies, the proposed treatments in the project area would not create habitat favored by barred owls over spotted owls and would not expand the range of barred owls.

Sound Disturbance

The sound from project activities would not adversely affect the breeding behavior of spotted owls during their critical breeding period because no heavy equipment, chainsaw use, or helicopter use would occur within the 35 to 120 yard disruption distances. Some activities would take place during the critical nesting season between March 1 and July 15, but these activities would be beyond the disruption distance of an actively nesting spotted owl pair or beyond the disruption distance from the nest patch of a predicted site.

Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests,

private land timber harvest activities, hazard tree removal, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

The cumulative effects to spotted owls and dispersal habitat from Alternative 2 and the above listed projects would not prevent spotted owls from continuing to forage or disperse throughout the watershed because dispersal and foraging habitat is not the limiting factor for owls in the analysis area. The amount of suitable habitat proposed for removal in the Revised EA as analyzed at the watershed scale is approximately 0.03 percent of the available habitat and cannot be meaningfully measured in terms of impacts to owls. Therefore, there are no measurable cumulative effects to spotted owl suitable habitat from Alternative 2.

Snags would not be cut in the other projects considered under cumulative effects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects under this Alternative. None of these projects propose to salvage burned trees associated with east-side mixed conifer or ponderosa pine/Douglas fir habitat types within the Mill Creek Watershed; therefore, there are no cumulative effects from the Restoration Thin treatments in the moderate to high severity burned areas.

Endangered Species Act (ESA) Effects Determination

Because suitable habitat would be removed in territories that are currently below the threshold levels, and because foraging would be reduced on 280 acres, the proposed project **may affect, and is likely to adversely affect** spotted owls. Although the rationale for the effects determination has changed, the original analysis also included an effects determination of may affect and is likely to adversely affect spotted owls.

Alternative 3– Direct and Indirect Effects

Habitat Impacts

The habitat impacts under this Alternative are the same as those discussed in Alternative 2.

Snag Removal

Alternative 3 would remove snags on 167 acres of Hazard Tree treatment units and would not remove any snags in the Restoration Thin treatments units. In addition to these acres, snags would be felled in all the Reforestation units and Restoration Thin treatment units in the low severity burned and unburned areas in order to meet OSHA standards for worker safety.

The number of snags to be removed for Hazard Tree treatments would be greater under Alternative 3 than Alternative 2 since the acres of treatment increased. Based on field reviews, it is estimated that approximately 40 percent of the trees in the hazard tree units would need to be removed. Alternative 3 would remove an estimated 5,300 snags ≥ 20 inches in diameter and approximately 8,400 snags 8 to 19.9 inches in diameter for Hazard Tree treatments. A total of approximately 13,700 snags (5.1 percent of snags in project area) would be removed under this Alternative (Table 3-8). That is less than the total amount of snags removed under Alternative 2 which was 14 percent.

Table 3-8: Number of Snags Removed by Alternative 3.

Hazard Tree Treatments	≥ 20"	8" to 19.9"	Total
Alternative 2	4,000	7,000	11,000
Alternative 3	5,300	8,400	13,700

Based on the telemetry studies discussed above under Alternative 2, and because there is sufficient suitable habitat adjacent to the burned area to support a nesting pair of owls, the removal of post fire habitat under Alternative 3 would reduce available foraging on 167 acres. This is less than the amount of foraging habitat impacted from Alternative 2 which was 280 acres. And reforestation activities on 732 acres would be expected to increase the rate at which seedlings become established which could increase the rate of establishing large tree structure and canopy cover needed for suitable spotted owl habitat (See Silviculture Specialist Report, No Action Alternative, available in the project record).

Sound Disturbance

The sound from project activities would not adversely affect the breeding behavior of spotted owls during their critical breeding period because hazard tree removal activities would not occur within the 65 yard disruption distance. Some activities would take place during the critical nesting season between March 1 and July 15, but these activities would be beyond the disruption distance of an actively nesting spotted owl pair or beyond the disruption distance from the nest patch of a predicted site.

Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

The cumulative effects to spotted owls and dispersal habitat from the Alternative 3 and the above listed projects would not prevent spotted owls from continuing to forage or disperse throughout the watershed because dispersal and foraging habitat is not the limiting factor for owls in the analysis area. The amount of suitable habitat proposed for removal in the Revised EA as analyzed at the landscape scale is approximately 0.03 percent of the available habitat and cannot be meaningfully measured in terms of impacts to owls. Therefore, there are no measurable cumulative effects to spotted owl suitable habitat from Alternative 3.

Snags would not be cut in the other projects concerned for cumulative effects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this alternative.

ESA Effects Determination

Because suitable habitat would be removed in territories that are currently below the threshold levels, and because foraging would be reduced on 167 acres, the proposed project **may affect, and is likely to adversely affect** spotted owls.

Consistency Determination

See the Consistency Determination under Spotted Owl Critical Habitat below.

3.2.2.2 Northern Spotted Owl Critical Habitat

Methodology

Critical habitat (CH) includes those specific areas within the geographical area occupied by the species at the time it was listed and on which are found those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection. For the spotted owl, these features are defined as primary constituent elements (PCEs) which include particular forest types that are used or likely to be used by spotted owls for nesting, roosting, foraging, or dispersing habitat. The effects to CH are analyzed based on the impacts to the individual PCEs. The PCEs for the spotted owl were defined in the Final Rule, Federal Register Vol. 77, No. 233 December 4, 2012. They are listed as:

1. Forest types that support the spotted owl across its geographic range. This PCE is essential to the conservation of the species because it provides the biotic communities that are known to be necessary for the spotted owl.
 - a. Includes - Sitka spruce, western hemlock, mixed conifer, mixed evergreen, grand fir, Pacific silver fir, Douglas-fir, white fir, Shasta red fir, redwood/Douglas-fir, and the moist end of ponderosa pine.
 - b. Coniferous zones at elevations up to 6000'.
 - c. This PCE must be in concert with at least one other PCE to be critical habitat.
2. Habitat for nesting and roosting. Nesting habitat is essential to provide structural features for nesting, protection from adverse weather conditions, and cover to reduce predation risks. Roosting habitat is essential to provide for thermoregulation, shelter, and cover to reduce predation risk while resting or foraging.
 - a. These habitats must provide:
 - i. Sufficient foraging habitat to meet home range needs of territorial pairs throughout the year.
 - ii. Nesting and roosting habitat (see definition above)
3. Foraging habitat is essential to provide a food supply for survival and reproduction.
 - a. Varies widely across the range in accordance with ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions
 - b. East Cascades foraging habitat
 - i. Stands of nesting or roosting habitat
 - ii. Stands of Douglas-fir or white fir/Douglas-fir mix
 - iii. Mean tree size >16.5" dbh

- iv. Increased density of large trees (>26" dbh) and increased basal area
 - v. Large accumulations of fallen trees and other woody debris
 - vi. Sufficient space below canopy to fly
4. Habitat to support the transience and colonization phases of dispersal.
- a. Would optimally be composed of nesting, roosting or foraging habitat but may also be composed of other forest types that occur between larger blocks of nesting, roosting, and foraging habitat
 - i. Where nesting, roosting, and foraging habitat is insufficient to support dispersal, dispersal habitat may be provided by:
 - 1. Habitat supporting the transience phase of dispersal
 - a. Stands with adequate tree size and canopy cover to provide protection from avian predators and minimal foraging opportunities
 - b. May include but is not limited to trees at least 11" dbh and a minimum of 40% canopy cover AND
 - c. Younger and less diverse forest stands than foraging habitat like even-aged, pole-sized stands if they contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the transience phase
 - 2. Habitat supporting the colonization phase of dispersal
 - a. Equivalent to nesting, roosting, and foraging habitat but may be smaller in area than that needed to support nesting pairs

The Final CH Rule has a section entitled "Determining Whether an Action is Likely to Adversely Affect CH" (77 FR 71939). For this analysis the stand scale was utilized to assess effects for all four PCEs. This scale of analysis is consistent with the current method recommended by the Willamette Province Level 1 Team for addressing effects to CH for consultation.

PCE 1 is the forest types that support spotted owls. This criterion was used to identify CH affected by the Proposed Action. PCEs 2, 3, and 4 (nesting/roosting, foraging, and dispersal habitat) were specifically considered with respect to the Proposed Action to determine if they were removed, reduced, maintained or enhanced at a stand level. The analysis of impacts has both a temporal scale (would the actions delay or accelerate the development of the PCEs in the stand following treatment) and a qualitative scale (would the life history needs of the spotted owl be better or worse with respect to the PCEs as a result of the treatment).

In addition to the above scales, the effects to the PCEs are evaluated at the scales of the CH subunit, CH unit, and the range of the spotted owl. However, if the Proposed Action does not have significant effects at a smaller scale they would not have significant effects at increasingly larger scales and would therefore not be analyzed at the larger scale. For example, if the Proposed Action maintains the PCEs in a manner that meets the life history needs of the spotted owl at the stand scale, then it would not have significant adverse impacts at the subunit scale.

Changed Condition

In 2008, the analysis area did not include any critical habitat for northern spotted owls. The critical habitat was designed by USFWS in 2012 (Final Rule 50 CFR 17).

A total of 9,577,969 acres in 11 units and 60 subunits have been designated as CH for the spotted owl. The 11 units identified as CH are: (1) North Coast Olympics, (2) Oregon Coast Ranges, (3) Redwood Coast, (4) West Cascades North, (5) West Cascades Central, (6) West Cascades South, (7) East Cascades North, (8) East Cascades South, (9) Klamath West, (10) Klamath East, and (11) Interior California Coast Ranges. The proposed project falls within unit 7: East Cascades North (ECN) and includes a total of 1,345,523 acres in 9 subunits. The proposed project falls within subunit 7.

The ECN-7 subunit consists of approximately 139,983 ac in Hood River and Wasco Counties, Oregon, and is comprised of only Federal lands managed by the U.S. Forest Service under the Northwest Forest Plan (USDA and USDI 1994). Special management considerations or protection are required in this subunit to address threats from current and past timber harvest, removal or modification of habitat by forest fires and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between subunits and other CH units.

An evaluation of sites known to be occupied at the time of listing indicates that nearly 100 percent of the area of ECN-7 was covered by verified northern spotted owl home ranges. When combined with likely occupancy of suitable habitat and occupancy by nonterritorial owls and dispersing subadults, we consider this subunit to have been largely occupied at the time of listing. In addition, there may be some smaller areas of younger forest within the habitat mosaic of this subunit that were unoccupied at the time of listing.

The CH Rule determined that all of the unoccupied and likely occupied areas in this subunit are essential for the conservation of the species to meet the recovery criterion that calls for the continued maintenance and recruitment of northern spotted owl habitat (USFWS 2011). The increase and enhancement of northern spotted owl habitat is necessary to provide for viable populations of northern spotted owls over the long term by providing for population growth, successful dispersal, and buffering from competition with the barred owl.

Effects Analysis

Analysis Area

The analysis area for spotted owl CH is the ENC-7 subunit. The analysis for the effects to spotted owl CH relates the impacts of activities within the fire perimeter to the subunit (ENC-7) as described above. The impacts to the subunit are then related to impacts at the unit and range-wide scale.

No Action – Direct and Indirect Effects

Under the No Action Alternative there would be no reforestation in the burned area to accelerate the development of PCEs. Longer time periods between fire and seedling establishment may

decrease the ability of tree seedlings to compete with shrubs. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas of the project may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration since burned stands would be dependent on nearby natural seeds for reforestation. There would be no restoration thinning in the moderate to high severity burn and these areas would continue to provide PCEs 3 and 4. Hazard trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure and therefore PCEs 3 and 4 would be provided over a longer time period.

Alternative 2– Direct and Indirect Effects

The Alternative 2 would impact the PCEs at the stand scale. Fifteen acres of nesting habitat (PCE 2) would be removed and 70 acres of dispersal habitat (PCE 4) would be removed in treatment units. In addition to the removal of this habitat, potential foraging habitat (PCE 3) would be reduced on 280 acres in the adjacent burned stands. These treatments would delay the development of PCEs in the stand following treatment, and the life history needs of the spotted owl would no longer be met in these treatment units. Reforestation would increase the rate of the development of all PCEs on 622 acres. See Silviculture Specialist Report for a discussion on the rate of seedling establishment with and without reforestation activities.

In addition to the effects at the stand scale, the effects to the PCEs were evaluated at the scales of the CH subunit, CH unit, and the range of the spotted owl. Removal of the PCEs within the analysis area would impact approximately 0.1 percent of Subunit ENC-7. Therefore, the life history needs of the spotted owl would continue to be met at the subunit, unit, and range-wide scale and these CH units would continue to function as demographic support to the overall population, as well as providing connectivity between other CH units and subunits.

Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

The cumulative effects to spotted owl critical habitat under Alternative 2 from the above listed projects would not prevent spotted owls from continuing to disperse or forage (PCEs 3 and 4) throughout the subunit because dispersal and foraging habitat is not the limiting factor for owls in the analysis area. The amount of suitable habitat (PCE 4) proposed for removal under Alternative 2 and analyzed at the subunit scale is approximately 0.04 percent of the available habitat and cannot be meaningfully measured in terms of impacts to CH. Therefore, there are no measurable cumulative effects to spotted owl CH from Alternative 2.

Snags would not be cut in the other projects considered in cumulative effects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is

extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this alternative. None of these projects propose to harvest burned trees associated with east-side mixed conifer or ponderosa pine/Douglas fir habitat types within Subunit ENC-7; therefore, there are no cumulative effects from the Restoration Thin treatments in the moderate to high severity burned areas.

ESA Effects Determination

Because PCEs 1 through 4 would be removed on 15 acres, and PCEs 3 and 4 would be removed on an additional 280 acres and these treatment units would no longer provide the necessary PCEs, Alternative 2 **may affect, and is likely to adversely affect** spotted owl critical habitat.

Alternative 3– Direct and Indirect Effects

Alternative 3 would impact the PCEs at the stand scale. Fifteen acres of nesting habitat (PCE 2) would be removed and 70 acres of dispersal habitat (PCE 4) would be removed in treatment units. In addition to the removal of this habitat, potential foraging habitat (PCE 3) would be reduced on 167 acres in the adjacent burned stands. These treatments would delay the development of PCEs in the stand following treatment, and the life history needs of the spotted owl would no longer be met in these treatment units. Reforestation would increase the rate of the development of all PCEs on 732 acres. See Silviculture Specialist Report for a discussion on the rate of seedling establishment with and without reforestation activities.

In addition to the effects at the stand scale, the effects to the PCEs were evaluated at the scales of the CH subunit, CH unit, and the range of the spotted owl. Removal of the PCEs 1 through 4 within the analysis area would impact approximately 0.1 percent of Subunit ENC-7. Therefore, the life history needs of the spotted owl would continue to be met at the subunit and unit scale and these CH units would continue to function as demographic support to the overall population, as well as providing connectivity between other CH units and subunits.

Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

The cumulative effects to spotted owl critical habitat under Alternative 3 from the above listed projects would not prevent spotted owls from continuing to disperse or forage (PCEs 3 and 4) throughout the subunit because dispersal and foraging habitat is not the limiting factor for owls in the analysis area. The amount of suitable habitat (PCE 2) proposed for removal in the Revised EA as analyzed at the subunit scale is approximately 0.04 percent of the available habitat and cannot be meaningfully measured in terms of impacts to CH. Therefore, there are no measurable cumulative effects to spotted owl CH from Alternative 3.

Snags would not be cut in the other projects considered in cumulative effects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this Alternative. None of these projects propose to harvest burned trees associated with east-side mixed conifer or ponderosa pine/Douglas fir habitat types within Subunit ENC-7; therefore, there are no cumulative effects from the restoration thin treatments in the moderate to high severity burned areas.

ESA Effects Determination

Because PCEs 1 through 4 would be removed on 15 acres, and PCEs 3 and 4 would be removed on an additional 167 acres, the proposed project **may affect, and is likely to adversely affect** spotted owl critical habitat.

Consistency Determination for Spotted Owl and Critical Habitat for Alternatives 2 and 3

The effects to spotted owls and CH for this project will be included in a letter for reinitiation of consultation that will be submitted to the U.S. Fish and Wildlife Service in June 2014.

This project is consistent with the Northwest Forest Plan and with the Revised Northern Spotted Owl Recovery Plan (U.S. Fish and Wildlife Service 2011). The Final Rule for Critical Habitat Designation refers to the Recovery Plan for habitat management guidance:

- Known spotted owl activity centers within the project area would be protected (ROD Standards and Guidelines pp C-10). One hundred acres of the best spotted owl habitat would be retained as close to the nest site or owl activity center as possible for all known spotted owl activity centers (as of January 1, 1994) located on federal lands.
- Salvage should only occur in stands where disturbance has reduced canopy closure to less than 40 percent. (Standards and Guidelines pp C-14).
- Management following a stand-replacing event should be designed to accelerate or not impede the development of late-successional conditions (Standards and Guidelines pp C-14).

The Following Mt. Hood National Forest Land and Resource Management Plan Standards and Guidelines that apply to the Proposed Action alternatives and would be met:

- FW-174: Habitat for threatened, endangered, and sensitive species has been identified and managed in accordance with the ESA (1973), the Oregon ESA (1987), and FSM 2670.
- FW 177 & 178: Consultation with the USFWS shall occur on each program activity or project that the Forest Service determines may affect threatened or endangered species. Consultation shall be completed before any decision is made on the proposed project.

3.2.2.3 North American Wolverine

Changed Condition

Since the original analysis for the North Fork Mill Creek was completed, The U.S. Fish and Wildlife Service proposed to list the distinct population segment of the North American wolverine under the endangered Species Act (U.S. Fish and Wildlife 2013). The extended

comment period for this proposal closed on December 2, 2013 and a Final Rule is expected in 2014.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed

No Action – Direct and Indirect Effects

Under the No Action Alternative there would be no reforestation in the burned area to accelerate the development of forested conditions. Early seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration. Burned stands would be dependent on nearby natural seeds for reforestation. Hazard trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure. The Mill Creek Watershed does not include denning habitat and therefore there would be no impacts to denning habitat under this alternative. There would be no disturbance to dispersing wolverine under the No Action Alternative.

Alternative 2 and 3–Direct and Indirect Effects

Activities from thinning of burned and unburned stands and hazard tree removal would not impact individuals through disturbance because there is a very low probability that a wolverine would be in the area. There would be no effect to wolverine from the proposed alternatives. Any wolverine in the watershed would be a dispersing individual and activities would not prevent them from moving across the landscape. The Mill Creek Watershed does not include denning habitat and therefore there would be no impacts to denning habitat under these alternatives. Restoration thinning and hazard tree treatments would not impact wolverine prey species.

Cumulative Effects

Because there are not direct or indirect effects to the wolverine under the proposed alternatives, there would be no cumulative effects.

Consistency Determination

The following Mt. Hood National Forest Land and Resource Management Plan Standards and Guidelines that apply to the Proposed Action alternatives and would be met:

- FW-174: Habitat for threatened, endangered, and sensitive species has been identified and managed in accordance with the ESA (1973), the Oregon ESA (1987), and FSM 2670.

3.2.3 Snag and Down Log Associated Species

Methodology

The Mill Creek Watershed as a whole was analyzed for historic and current snag levels because stand level analyses do not provide a meaningful measure to snag and down wood dependent species. Habitats created by fire represent a small percentage of landscapes, and therefore, the analysis for fire created dead wood habitats need to be conducted on a scale larger than just the burned area. Impacts to snags and down wood in proposed treatment units would be compared to

unharvested stands which represent historic conditions. To best provide for the largest number of snag dependent species, management objectives should mimic natural conditions and the distribution of unharvested portions of the areas across the landscape.

DecAID Advisor

Wildlife species models and advisory tools related to managing snags and down wood on federal lands in the Pacific Northwest were first developed in the 1970's and 1980's (Thomas and others 1979, Neitro and others 1985, and Raphael 1983). Although these tools were based on sound empirical information and expert knowledge available at the time, the data and model structures have become outdated. A considerable amount of new information about the ecology, dynamics, and management of decayed wood has become available since the 1980's. More recent field studies, particularly in eastern Oregon (e.g., Bull et al. 1997), suggest that the amounts and sizes of snags selected by wildlife are far greater than those depicted by previous models.

DecAID is a planning tool intended to help advise managers as they conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen et al. 2006). It also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. This tool is not a wildlife population simulator nor is it an analysis of wildlife population viability.

Modeling biological potential of wildlife species (particularly primary cavity excavator birds) has been used in the past and DecAID was developed to avoid some pitfalls associated with that approach. There is not a direct relationship between the statistical summaries presented in DecAID and past calculations or models of biological potential. Field studies have suggested that predictions of biological potential (relative or absolute population sizes of snag associated wildlife species) do not match research findings.

To assess the effects of the proposed alternatives to snag and down wood dependent species, information contained within the wildlife data found in DecAID for recent post-fire and large tree environments was used. The wildlife data in DecAID is provided in the form of tolerance levels of 30 percent, 50 percent, or 80 percent. DecAID tolerance levels "may be interpreted as three levels of "assurance": low (30% tolerance level), moderate (50% tolerance level), and high (80% tolerance level)" (Mellen et al. 2006). The higher the tolerance level, the higher the "assurance" that snag and down wood habitat is being provided.

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

Changed Condition

Snags

The Government Flats Complex Fire burned approximately 2,200 acres on the Forest. Of these acres, 660 burned as high severity, 638 burned as moderate, and 549 acres were unburned or low severity. The moderate and high severity burned areas represent the greatest potential for an increase in snag habitat. All of these acres burned within the DecAID wildlife habitat type (WHT) of Eastside Mixed Conifer Cascades/Blue Mountains and vegetation condition of “large trees.” An additional 1000 acres of this habitat type burned in moderate to high severity on adjacent State of Oregon and City of The Dalles lands. These State and City lands have already been salvaged or are proposed for future harvest. For the purpose of this analysis, it is assumed that these lands would not significantly contribute to the amount of snags in the watershed. Large snags (≥ 20 inches) comprise 39 percent and small snags (≥ 10 inches) account for 61 percent of the burned area on the Forest. Table 3-9 shows the estimated total number of snags within the fire perimeter on Forest Service land.

Table 3-9: Number of Snags Created by the Government Flats Complex Fire

DBH	Number of Snags
≥ 10 in.	162,350
≥ 20 in.	103,940
Total	266,290

Due to the fire, the moderate and high severity burned areas (1,298 acres) are now within the WHT identified in DecAID as the Eastside Mixed Conifer Forest Cascades/Blue Mountains and vegetation condition of “post fire.” For this habitat type, the DecAID advisor identifies the 30, 50, and 80 percent tolerance level for snags. Data on snag density used by wildlife at the 80 percent tolerance level range from 63 to 119 snags per acre for snags ≥10 inches dbh and 16 to 40 snags per acre for snags ≥ 20 inches dbh. Snag densities used by wildlife at the 50 percent tolerance level range from 40 to 82 snags per acre for snags ≥10 inches dbh and 6 to 17 snags per acres for snags ≥ 20 inches dbh. Snag densities used by wildlife at the 30 percent tolerance level range from 18 to 57 snags per acre for snags ≥10 inches dbh and 0.2 to 2 snags per acres for snags ≥ 20 inches dbh (Table 3-10). The project area currently has 100 to 150 snags per acre ≥10 inches dbh and 60 to 100 snags per acre ≥ 20 inches dbh which is above the 80 percent tolerance level for this WHT.

Table 3-10: Various tolerance levels used by wildlife in post fire habitat.

Snags	30% Tolerance Level	50% Tolerance Level	80% Tolerance Level
≥ 10 dbh	18 – 57	40 – 82	63 – 199
≥ 20 dbh	0.2 – 2	6 – 17	16 – 40

Figures 3-5 through 3-8 show the condition of snags on the Forest and in the Mill Creek watershed compared to the reference conditions for the WHT. When calculating the snags at the watershed scale for large trees post fire, 50 percent of the acres burned were from the 0 snags per acre category, 25 percent were from the 0 to 2 snags per acre category, and 25 percent were from

the 2 to 6 snags per acre category. These percentages were then added to the highest density category of 10+ snags per acre. The same percentages were also used for the small snag analysis and taken from the 0, 0 to 6, and 6 to 18 snag per acre categories and added to the 30+ snags per acre. The pre and post fire snags for the Forest were not broken into separate categories. The snags created by the fire only represent 0.1 percent of the WHT at the Forest scale and did not show a marked change between pre and post fire conditions. The current condition for the Forest includes the snags from the Government Flats Complex Fire.

While the Government Flats Complex Fire created snags, when these snags are added to the current condition, the number of snags per acre at the watershed and Forest scale is still below historic levels. The largest increase (2.4%) was small snags in high density patches (30+), but with the addition of these snags, the post fire condition is still 3 times lower than what occurred on the landscape historically. In all cases, at the watershed and Forest scale, the fire did not increase the current levels enough to meet the reference conditions.

Figure 3-5 shows that a greater percentage of the watershed (60.6 percent) has zero large snags (≥ 20 inches) per acre, compared to the reference condition of 34.6 percent of the watershed. Historically, 29 percent of the watershed had 2 to 6 snags per acre. Currently, just over 10 percent falls within this same category. Figure 3-5 also shows that the watershed is lacking in high density patches of large snags. The reference condition shows 8.1 percent of the watershed with 10+ large snags per acre and the current condition post fire is 4.6 percent of the watershed in the same category.

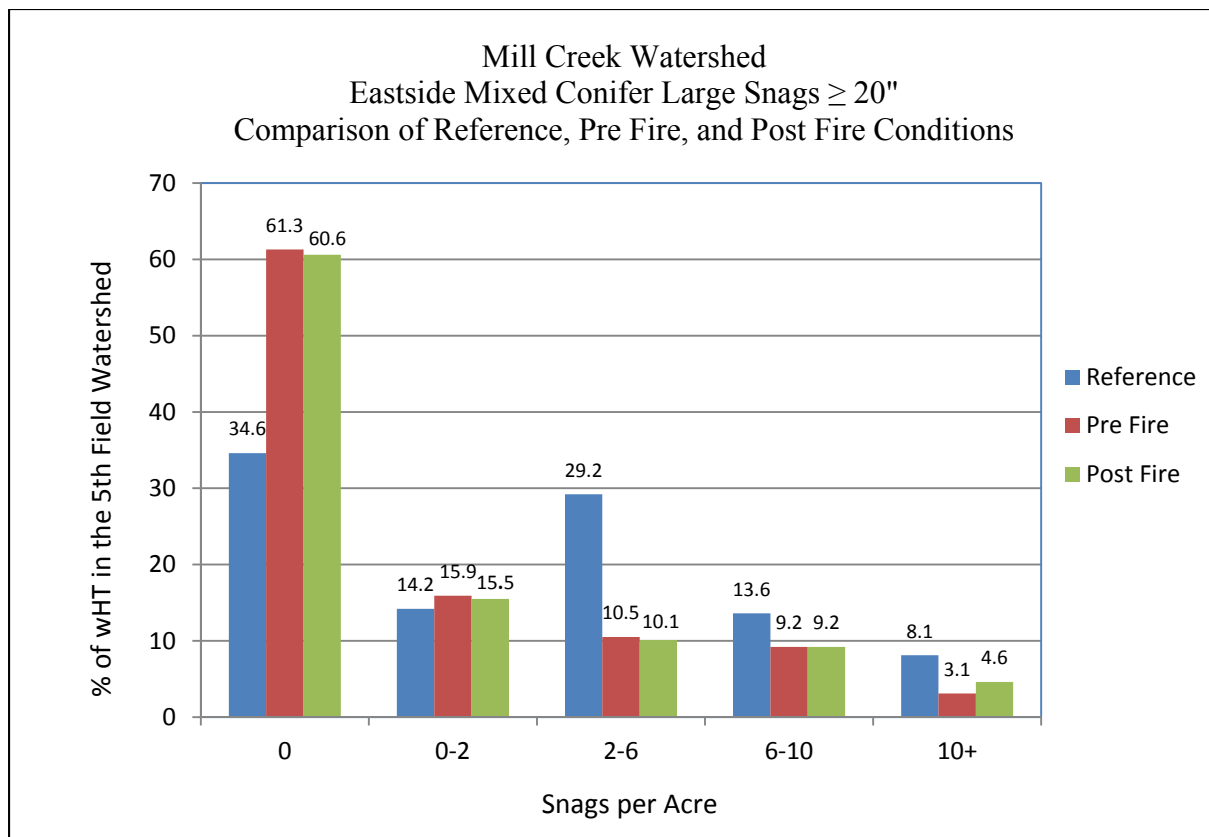


Figure 3-5: Comparison of reference, pre fire, and post fire conditions for large snags in the Mill Creek Watershed.

Figure 3-6 compares the reference and current conditions of large snags for this WHT at the Forest scale. The difference in these conditions is similar to the differences for the watershed, although there is a greater departure from historic levels of snags in the 6 to 10 and 10+ snags per acre categories for the Forest. The reference condition indicates that 13.6 percent of the Forest should have 6 to 10 snags per acre compared to the current condition of 5.8 percent. Also, 1.7 percent of the Forest is in the category of 10+ snags per acre compared to 8.1 percent at historic levels.

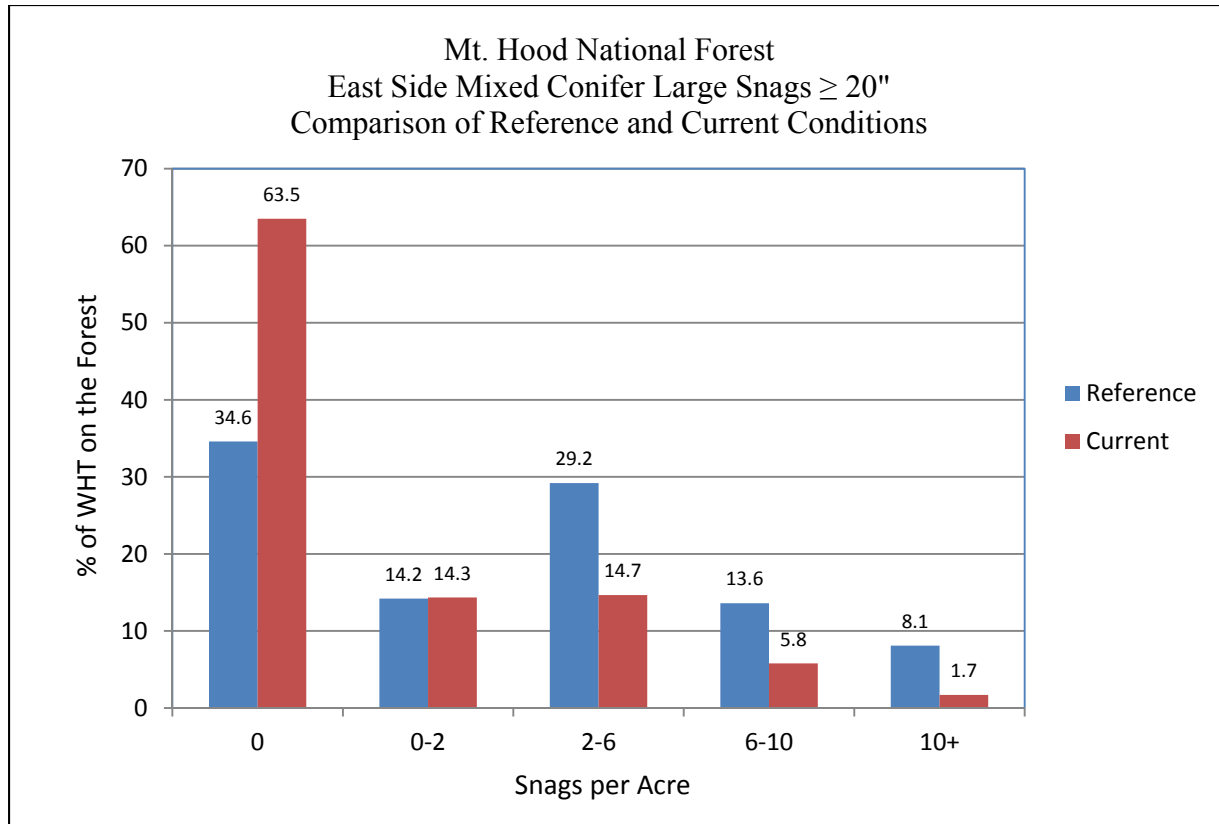


Figure 3-6: Comparison of reference and current condition for large snags on the Forest.

Figure 3-7 compares the reference condition with the pre and post fire condition for small snags in the watershed. Historically, 20 percent of the watershed contained zero snags per acre. Currently, 3 times as much of the watershed has zero snags per acre. The watershed is below the reference condition in all the remaining categories, especially in the 0 to 6, 6 to 18, and high density patches of 30+ snags per acre.

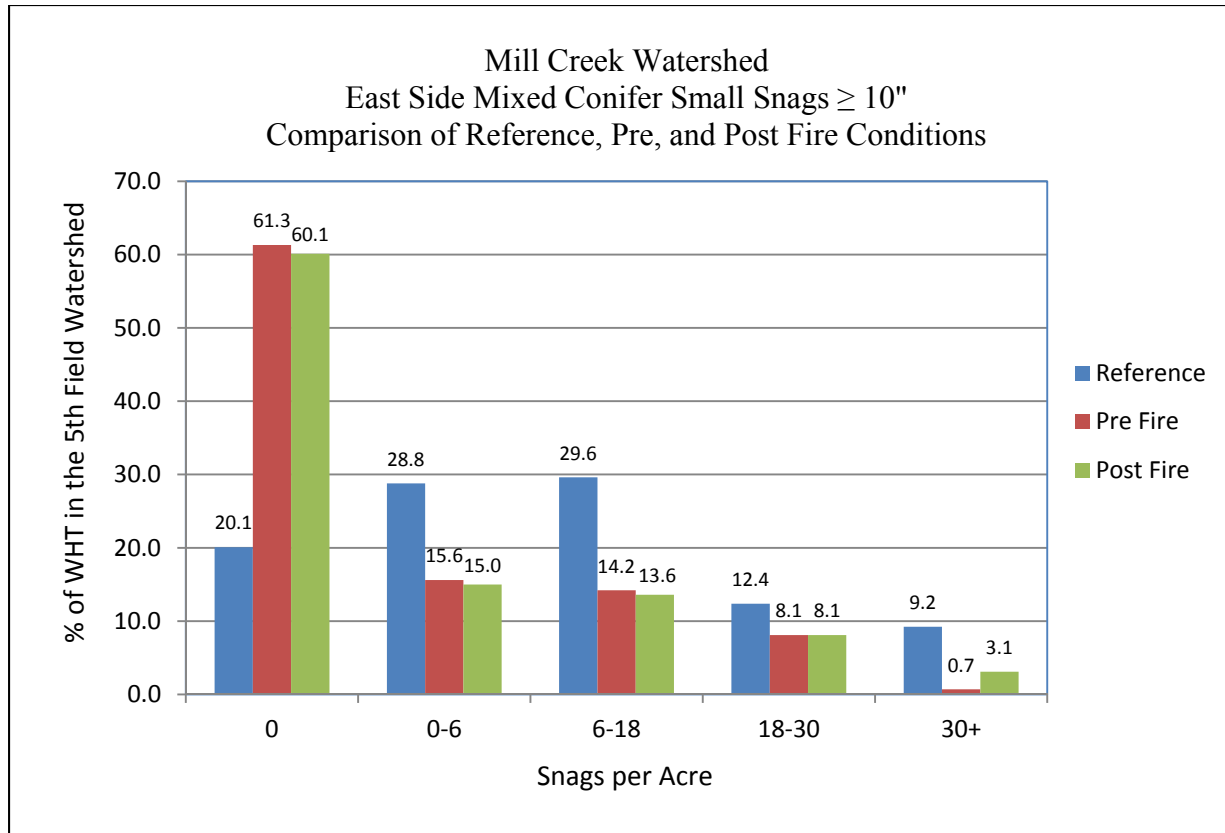


Figure 3-7: Comparison of reference, pre fire, and post fire conditions for small snags in the Mill Creek Watershed.

Figure 3-8 compares the reference and current conditions of small snags for this WHT at the Forest scale. The difference in these conditions is similar to the differences for the watershed, although there is a greater departure from historic levels of snags in the 18 to 30 categories for the Forest. The reference condition indicates that 12.4 percent of the Forest should have 18 to 30 snags per acre compared to the current condition of 5.0 percent.

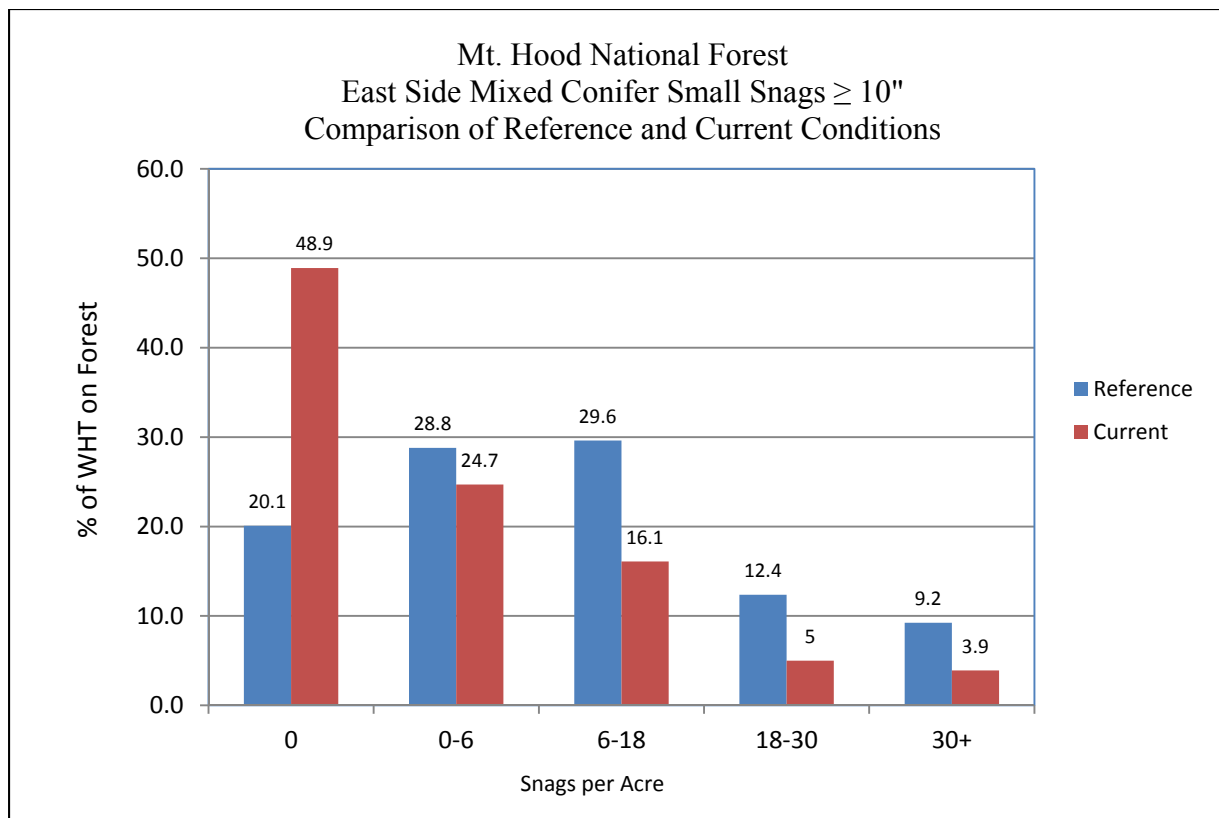


Figure 3-8: Comparison of reference and current condition for large snags on the Forest.

Down Wood

Logs are an important component on the landscape. They provide organic and inorganic nutrients in soil development, provide microhabitats for invertebrates, plants, amphibians, and other small vertebrates, and provide structure for riparian associated species in streams and ponds. It has been shown that size, distribution, and orientation may be more important than tonnage or volume. Small logs provide escape cover or shelter for small species. Tallmon and Mills (1994) have shown that red-backed voles, a primary prey species for the spotted owl, are highly associated with large down material in more advanced decay stages. Truffles, a dietary staple of the northern flying squirrel, have also been loosely associated with down material.

Too much down material may impede travel by big game and present a fire hazard. However, increased levels may protect seedlings from browse and scorching. Orientation has also been shown to be important. Logs that lie along a contour are used more than those lying across contours. Larger sized logs are also used more and by more species than smaller logs. (Bull et al. 1997).

A variety of species are associated with down wood. Use by species differs in relation to size, decay class, and purpose of use, as well as many other factors. Therefore, by providing for varying densities, sizes, species, and decay classes on the landscape, it would provide for an array of wildlife species. Most available information of wildlife use of down wood is representative of green stands. No information is available for down wood in DecAid for post-

fire environments and little literature exists for wildlife use of down wood in post-fire environments.

Down wood within the fire perimeter is limited because the fire consumed a large portion of the down wood. It is estimated that approximately 75 percent of all snags are likely to fall within 20 years (Keen 1929, Dahms 1949, Parks et al. 1999, and Everett et al. 1999). This influx of snags to down wood will increase the amount of down wood in the next 20 years. In the mixed severity areas, trees that survived the fire will provide a more consistent supply of dead wood material.

Within stand replacement areas, much of the pre-existing down wood was consumed. However, within the fire perimeter a percentage of the existing down woody material are trees that have fallen since the fire and most are in Decay Classes 1 and 2 (Thomas 1979, Brown 1985). Some downed material was consumed within the low severity areas where fire intensity was greater. This primarily consisted of smaller material (<12 inches dbh) and advanced decayed logs.

Down wood abundance within the watershed and on the Forest is highly variable due to many factors. The Forest lies on the eastside of the Cascades where there is a limited availability of water and nutrients as compared to the west side of the Cascades. This, combined with overcrowded stand conditions due to fire suppression, has led to tree mortality above historic levels especially within smaller size classes. Plant association groups that tend to be drier (i.e. ponderosa pine and mixed conifer dry) may recruit higher levels of down wood today than historically. This is the case with the Surveyors Ridge Late Successional Reserve (LSR) in the western portion of the watershed. In addition to fire suppression, past harvest activities in the watershed have created large areas of small diameter trees with little down wood present in the stand.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed. The condition of snags across the Forest was also reviewed because the current levels within the watershed are, in some cases, far below historic levels. The intent of examining snags at the Forest level was to determine if conditions were being met at a larger scale.

No Action – Direct and Indirect Effects

There would be a short-term increase in snag numbers as additional trees die from fire damage. Over the long-term, the number of snags would decrease creating a gap in time when little snag habitat would exist (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. Dahms (1949) found that 50 percent of fire killed ponderosa pine snags remained standing after 10 years, but this declined to 22 percent standing after 20 years. It is estimated that approximately 75 percent of all snags may fall within 20 years (Parks et al. 1999, and Everett et al. 1999). Under the No Action alternative, the 80 percent tolerance level would be met for this WHT.

Reforestation of desired tree species (Ponderosa pine, western white pine and western larch) would not occur to accelerate the development of desired forest conditions. Stands that

underwent stand-replacement and mixed severity fires would be dependent on nearby natural seeds for reforestation. Under the No Action Alternative, the time period of dominance by shrubs could last up to a century. Delayed reforestation would increase the likelihood of this period of shrub dominance.

Alternative 2 – Direct and Indirect Effects

Alternative 2 would treat 107 acres of green tree habitat. When considered at the watershed scale, this does not result in any new effects to snags and down wood from treatments in these units. As such, the analysis in the original Biological Evaluation (2008) for Restoration Thin treatments in low severity burn to unburned areas would still apply.

Snags

Restoration thinning in the high to moderate burn severity areas on 146 acres would leave 10 snags per acre which would be reduced to less than 2 snags per acre within 20 years based on the rates of snags falling over time. Hazard Tree treatments on 134 acres would potentially remove all snags. Hazard Tree treatments and Restoration Thin in the moderate to high severity burned areas would reduce the number of snags within the eastside mixed conifer habitat type by 37,600 snags which is approximately 14.1 percent of the snags within the burned area on the Forest. These treatments would remove snag habitat to below the 30 percent tolerance level in those units. The density of large and small snags is currently below historic levels and the removal of snags in the Restoration Thin and Hazard Tree treatments would further reduce the amount of high density snags within the watershed.

Reforestation activities on 622 acres would not have an impact on current snag levels and would be expected to increase the rate at which seedlings become established which would increase the rate of establishing trees needed for future snags and down wood.

Down Wood

Most available information for wildlife use of down wood is representative of green stands. Wildlife use data are not available for percent cover in DecAid for post-fire environments and little literature exists for wildlife use of down wood in post-fire environments.

Restoration thinning in the high to moderate burn severity areas on 146 acres would decrease the amount of down woody material for future recruitment (primarily material ≥ 10 inches dbh). This would result in a decrease in habitat for some species requiring large logs. Reducing down woody material levels would provide for species that utilize areas without heavy accumulations of down wood, such as deer and elk. The largest snags would be retained and would include ponderosa pine, whenever possible. Ponderosa pine generally last longer on the landscape. Hazard tree treatments on 134 acres would remove all snags which would also eliminate future recruitment of down wood. These trees would be removed, if they exceed Forest Plan standards and guidelines. On lands within Riparian Reserves, the hazard trees would be felled and left on-the-ground in order to comply with the Northwest Forest Plan.

Reforestation activities on 622 acres would be expected to increase the rate at which seedlings become established which would also increase the rate of establishing trees needed for future snags and down wood.

Alternative 3– Direct and Indirect Effects

Snags

Based on field reviews, it is estimated that approximately 40 percent of the trees in the hazard tree units would need to be treated to address safety concerns. Hazard Tree treatments on 167 acres would reduce the number of snags within the eastside mixed conifer habitat type by approximately 13,700 snags. This is 5.1 percent of the snags within the burned area on the Forest. These treatments would remove snag habitat to below the 30 percent tolerance level in those units. The density of large and small snags is currently below historic levels and the removal of snags for Hazard Tree treatments would further reduce the amount of high density snags within the watershed.

Reforestation activities on 732 acres would not have an impact on current snag levels and would be expected to increase the rate at which seedlings become established which would increase the rate of establishing trees needed for future snags and down wood.

Down Wood

Most available information for wildlife use of down wood is representative of green stands. Wildlife use data are not available for percent cover in DecAid for post-fire environments and little literature exists for wildlife use of down wood in post-fire environments.

Hazard tree treatments on 167 acres would remove all snags which would also eliminate future recruitment of down wood. These trees would be removed, if they exceed Forest Plan standards and guidelines. On lands within Riparian Reserves, the hazard trees would be felled and left on-the-ground in order to comply with the Northwest Forest Plan. This would result in a decrease in habitat for some species requiring large logs. Reducing down woody material levels would provide for species that utilize areas without heavy accumulations of down wood such as deer and elk. The largest snags would be retained and would include ponderosa pine, whenever possible. Ponderosa pine generally last longer on the landscape.

Reforestation activities on 732 acres would be expected to increase the rate at which seedlings become established which would also increase the rate of establishing trees needed for future snags and down wood.

Cumulative Effects for Alternatives 2 and 3

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, hazard tree removal, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

Most of these projects focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires. The exception to this is The Dalles Watershed Fuelbreak which was designed to prevent fires from entering the

municipal watershed. These projects would thin green stands and would not remove snags aside from hazard tree removal. Overall, treatments proposed would reduce the risk of losing existing snags and down wood from future large-scale disturbances. As such, these projects do not have any cumulative effects with this project.

Hazard trees would not be cut in the other projects considered in cumulative effects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this alternative. None of these projects propose to harvest burned trees associated with east-side mixed conifer or ponderosa pine/Douglas fir habitat types; therefore there are no cumulative effects from the restoration thin treatments in the moderate to high severity burned areas.

Consistency Determination

Both alternatives are consistent with all standards and guidelines. The Landbird Conservation Strategy objectives include retention of all ponderosa pine trees and snags >20 inches dbh. This objective would not be met.

3.2.4 Region 6 Sensitive Species

All Region 6 sensitive species within the project area must be analyzed in a Biological Evaluation, as required by the Forest Plan. The sensitive species within the project area are the white-headed woodpecker, the Lewis's woodpecker, and the western bumblebee. Information on these species from the Interagency Special Status / Sensitive Species Program as well as other research was reviewed and summarized below to determine how these species use the project area and the impacts that this project would have on these species.

3.2.4.1 White-headed Woodpecker

Changed Condition

The white-headed woodpecker is now on the Regional Forester's Sensitive Species List (2011) for both Oregon and Washington.

Life History/Habitat

White-headed woodpeckers are cavity nesting birds strongly associated with coniferous forests dominated by pines. They are residents from south-central British Columbia, north-central Washington and northern and western Idaho south through eastern and southwest Oregon to southern California and west-central Nevada (, Garrett et al. 1996). White-headed woodpeckers range from very rare in British Columbia to common further south in their range in California.

In Oregon and Washington, white-headed woodpeckers occur primarily in open ponderosa pine (*Pinus ponderosa*) or dry mixed-conifer forests dominated by ponderosa pine (Bull et al. 1986, Dixon 1995a, Frenzel 2004, Buchanan et al. 2003). They have also been found in moderate densities in dry mixed conifer forests which were dominated by firs but contained both ponderosa pine and sugar pine.

Nesting usually occurs in open ponderosa pine forests with higher number of large trees and snags than the surrounding forest (Buchanan et al. 2003, Frenzel 2004, Hollenbeck et al. 2011) and typically excavate nest cavities in large, moderately decayed, ponderosa pine snags (Buchanan et al. 2003, Dixon 1995a, Frenzel 2004). White-headed woodpeckers forage in ponderosa pine trees in stands with higher canopy closure than nest stands (Dixon 1995a, Fredrick and Moore 1991).

White-headed woodpeckers have also been found to use recently burned forest of ponderosa pine (Forristall et al. 2004, 2007, Kozma 2011, 2012, Kozma and Kroll 2012, Saab and Dudley 1998, Wightman et al. 2011). In south central Oregon, nest success was higher in burned habitats than unburned habitats (Forristal et al. 2004, Frenzel 2004).

Landscapes with a mosaic of open habitat for nesting in close proximity to closed-canopy forests which provide foraging habitat seem to be important for White-headed woodpeckers (Hollenbeck et al. 2011, Wightman et al. 2010, Latif et al. 2012). Closed-canopied forests with cone-producing pine trees and insects may be important for year-round foraging, particularly outside the breeding season (Garrett et al. 1996).

White-headed woodpeckers may rely more on decay condition of snags than density (Wightman et al. 2010). Saab and Dudley (1998) found this species selected for the largest and most heavily decayed snags compared to other woodpeckers. However, snags created by fire have lower retention rates than trees killed more slowly by insects or disease and fire-killed snags may not reach levels of decay favored by white-headed until 2 to 3 years post-fire (Wightman et al. 2010). Therefore, snags existing before fire, if retained, or those with more advanced decay seem to be critical components in post-fire landscapes, especially in the first few years after fire (Wightman et al. 2010).

Nest trees of White-headed woodpeckers are typically large, moderately decayed, ponderosa pine snags. In Oregon and Washington, 6 separate studies indicate average nest tree dbh of 15 to 40 inches dbh. Wightman et al. (2010) found nest survival rates were higher in burned areas than nest success reported for unburned forests in central Oregon. Wightman et al. (2010) also found white-headed woodpeckers selected for nest snags >20 inches dbh from unburned or low severity burned areas that contained live trees. Table 3-11 displays summarized data in the 30, 50, and /80 percent tolerance levels for the white-headed woodpecker in post fire habitats. No data was available for white-headed woodpeckers in post fire habitats for large snags (greater than 20 inches). The snags greater than 20 inches are represented in the >10 inches category.

Table 3-11: Snags per acre at various tolerance levels in post fire habitats within DecAID for white-headed woodpecker*.

	30% Tolerance Snags per acre	50% Tolerance Snags per acre	80% Tolerance Snags per acre
Snags > 10"	0.0	40.0	118.4

*From DecAID Table EMC_PF.sp-22

Forests with live trees have more abundant and complex assemblages of predators than high severity burned areas (Wightman et al. 2010). The golden-mantled ground squirrel and yellow pine chipmunk are known nest predators. Golden-mantled ground squirrels are positively associated with down wood volume and yellow pine chipmunks are positively associated with shrub cover (Wightman et al. 2010). Down wood and shrub cover are less in post-fire environments, thus nest placement in high severity burned areas may be a viable strategy to reduce nest predation as long as unburned or low severity burned areas are available within the landscape for foraging (Wightman et al. 2010). Nests in unburned forests may be more vulnerable than those in burned forests as these may also experience lower ambient temperatures which affect incubation behavior and reproductive effort (Hollenbeck et al. 2011).

Hollenbeck et al. (2011) developed a habitat suitability index model for unburned forests of central and southeastern Oregon. Based on this model, there are 2,887 acres of highly suitable habitat, 5,357 acres of marginally suitable habitat, and 1,010,461 acres of non-habitat for white-headed woodpecker on the Forest. Approximately 75 acres of the burned area on the Forest are within the marginal habitat and the remainder is within the non-habitat. Based on the average home range size of 793 acres in fragmented habitat, the project area may provide enough habitat for 1 to 2 pairs of white-headed woodpeckers.

Threats

Habitat loss is the primary threat to White-headed woodpeckers (NatureServe 2008). Logging practices that target large ponderosa pine, snag removal, and fragment forests contribute to declines in habitat, especially in the northern half of the species range (Garrett et al. 1996). Fire suppression has led to changes in forest tree species composition and structure primarily due to the development of true fir (*Abies spp.*) in the understory. These changes have altered fire regimes, and as a result ponderosa pine forests are no longer maintained by frequent natural fire, which leaves the forests susceptible to stand-replacing fires (Nature Serve 2008).

Wightman et al. (2010) and Frenzel (2004) found that predation by small mammals was the most common cause of nest failure of White-headed woodpeckers. Increasing shrub cover may lead to increasing populations of small mammals (Smith and Maguire 2004). Nest success of White-headed woodpeckers is higher at nest sites with lower shrub cover (Frenzel 2004, Kozma and Kroll 2012).

Landbird Conservation Strategy

Oregon-Washington Partners in Flight have developed conservation strategies for the east-slope of the Cascades and the northern Rocky Mountains of Oregon and Washington (Altman 2000a, 2000b). The White-headed woodpecker is a focal species for ponderosa pine or dry habitats in both ecoregions. Strategy objectives include no net loss of this habitat type, retention of all ponderosa pine trees and snags >20 inches dbh, use of natural disturbance regimes such as fire, and restoration of at least 30 percent of the potential late-successional forest by 2025.

Management considerations should focus on white-headed woodpecker habitats on public lands which are primarily, low-elevation, dry forests with a component of large ponderosa pine. In Oregon and Washington, the vast majority of habitat for this species is on National Forest System lands. Private, State, and City lands are not managed for woodpecker habitat, therefore, it

is assumed that any habitat currently present in those areas, would not be maintained for the long term. Management considerations should include spatial heterogeneity at the landscape scale that mimics historical conditions.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed.

No Action – Direct and Indirect Effects

There would be a short-term increase in snag numbers as additional trees die from fire damage. Over the long-term, the number of snags would decrease creating a gap in time when little snag habitat would exist (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. Dahms (1949) found that 50 percent of fire killed ponderosa pine snags remained standing after 10 years, but this declined to 22 percent standing after 20 years. It is estimated that approximately 75 percent of all snags may fall within 20 years (Parks et al. 1999, and Everett et al. 1999). Snags created by fire have lower retention rates than trees killed more slowly by insects or disease and fire-killed snags may not reach levels of decay favored by white-headed woodpeckers until 2 to 3 years post-fire (Wightman et al. 2010). The effects associated with reforestation are the same as those described under the snags and down wood section above.

Alternative 2– Direct and Indirect Effects

Caution should be exercised when using the white-headed woodpecker data from DecAID, which are from a population where adult mortality is outpacing recruitment (Frenzel 2004). The density of snags may or may not be part of the issue with this species since white-headed-headed woodpeckers do not rely on snags for foraging and thus may be able to use areas with lower snag densities than other woodpecker species that do forage extensively on snags.

Reforestation activities on 622 acres would be expected to increase the rate at which seedlings become established which would also increase the rate of establishing large trees needed for white-headed woodpecker habitat.

Restoration thinning on 107 acres of unburned to low severity burned areas would impact habitat for white-headed woodpecker because ponderosa pine trees, including trees greater than 20 inches would be cut in these units. In the long term, the health of these stands would improve which would increase the potential for maintaining larger green trees on the landscape,. Moving stands toward historic conditions of more open fire resistant stands would improve habitat in the future for white-headed woodpecker. See the DecAID analysis for a discussion on the effects to snag and down wood from green tree harvest in these units.

Restoration thinning on 146 acres of moderate to high severity burned areas would leave 10 snags per acre which would be reduced to less than 2 snags per acre within 20 years based on the rates of snags falling over time. Based on field reviews, it is estimated that approximately 40 percent of the trees in the hazard tree units would need to be removed for an average of 4,000 snags ≥ 20 inches in diameter and 7,000 snags 8 to 19.9 inches in diameter for Hazard Tree

treatments. A total of approximately 37,600 snags (14.1 percent of snags in project area) would be removed under this Alternative (Table 3-7). Of these snags, 15,000 are >20 inches dbh. Approximately half of the trees in this portion of the watershed are ponderosa pine.

The removal of large pine trees and snags would reduce the amount of suitable nesting habitat available for white-headed woodpeckers. Nest success would also be reduced since potential nest trees would be removed from the moderate to high severity burned areas and success was shown to be highest in burned areas. The Landbird Conservation Strategy for white-headed woodpeckers calls for no net loss of this habitat type and retention of all ponderosa pine trees and snags >20 inches dbh. The large snags that would be removed could not be replaced until the forest regenerates and is able to supply large trees again which could become snags. This could take hundreds of years in the east side dry forests.

As mentioned above, habitat loss is the primary threat to white-headed woodpecker. The removal of large ponderosa pine trees and snags contributes to declines in habitat. Hazard Tree and Restoration Thin treatments in the moderate to high severity burned areas would remove large ponderosa pine trees and snags. Under Alternative 2, Hazard Tree and Restoration Thin treatments in the moderate to high burn severity units **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** While snags within this habitat type are below historic levels at the watershed and at the Forest scale (see DecAID analysis), white-headed woodpeckers do not appear to rely on these high density patches and may rely more on the presence of large ponderosa pine. Based on the average home range size within the fragmented habitat, and the amount of suitable habitat within the analysis area, the proposed project would not impact more than one territory.

Alternative 2 – Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, hazard tree removal, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

Most of the other projects considered in the cumulative effects analysis focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires. The exception to this is The Dalles Watershed Fuelbreak which was designed to prevent fires from entering the municipal watershed. These projects would thin green stands and would not remove snags aside from hazard tree removal. Overall, treatments proposed would reduce the risk of losing existing habitat from future large-scale disturbances. Private lands are not managed for woodpecker habitat and therefore, it is assumed that any habitat provide there is incidental and may not be long term.

Snags would not be cut in these others projects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not

contribute to cumulative effects from Hazard Tree treatments under this alternative. None of these projects propose to harvest burned trees associated with east-side mixed conifer or ponderosa pine/Douglas fir habitat types; therefore, there are no cumulative effects from the Restoration Thin Treatments in the moderate to high severity burned areas.

Alternative 3– Direct and Indirect Effects

Reforestation activities on 732 acres would be expected to increase the rate at which seedlings become established which would also increase the rate of establishing large trees needed for white-headed woodpecker habitat.

Restoration Thin on 107 acres of unburned to low severity burned areas would impact habitat for white-headed woodpecker. Ponderosa pine trees, including trees greater than 20 inches would be cut in these units. Snags would not be removed in these units unless they pose a safety risk. In the long term, the health of these stands would improve and the potential for larger green trees and thus the recruitment of larger snags would increase. Moving stands toward historic conditions of more open fire resistant stands would improve habitat in the future for white-headed woodpecker. See the DecAID analysis for a discussion on the effects to snag and down wood from green tree harvest.

The number of snags to be removed for Hazard Tree treatments would be greater under Alternative 3 than Alternative 2 since the acres of treatment increased. Based on field reviews, it is estimated that approximately 40 percent of the trees in the hazard tree units would need to be removed. Alternative 3 would remove an estimated 5,300 snags ≥ 20 inches in diameter and approximately 8,400 snags 8 to 19.9 inches in diameter for Hazard Tree treatments. A total of approximately 13,700 snags (5.1 percent of snags in project area) would be removed under this Alternative (Table 3-8). This is less than the total amount of snags removed under Alternative 2 which was 14 percent.

The removal of large pine trees and snags would reduce the amount of suitable nesting habitat available for white-headed woodpeckers. Nest success would also be reduced since potential nest trees would be removed from the moderate to high severity burned areas and success was shown to be highest in burned areas. The Landbird Conservation Strategy for white-headed woodpeckers calls for no net loss of this habitat type and retention of all ponderosa pine trees and snags >20 inches dbh. The large snags that would be removed could not be replaced until the forest regenerates and is able to supply large trees again which could then become snags. This could take hundreds of years in the east side dry forests.

As mentioned above, habitat loss is the primary threat to white-headed woodpecker. The removal of large ponderosa pine trees and snags contributes to declines in habitat. Hazard Tree and Restoration Thin treatments would remove large ponderosa pine trees and snags. Under Alternative 3, Hazard Tree and Restoration Thin treatments **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** White-headed woodpeckers do not appear to rely on these high density patches and may rely more on the presence of large ponderosa pine. Based on the average home range size within the fragmented habitat, and the amount of suitable habitat within the analysis area, the proposed project would not impact more than one territory.

Alternative 3– Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, hazard tree removal, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

Most of the other projects considered in the cumulative effects analysis focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires. The exception to this is The Dalles Watershed Fuelbreak which was designed to prevent fires from entering the municipal watershed. These projects would thin green stands and would not remove snags aside from hazard tree removal. Overall, treatments proposed would reduce the risk of losing existing habitat from future large-scale disturbances. Private lands are not managed for woodpecker habitat, therefore, it is assumed that any habitat provided by this land is incidental and may not be long term.

Snags would not be cut in these other projects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this alternative.

Consistency Determination

Both alternatives are consistent with all Forest Plan standards and guidelines. The Landbird Conservation Strategy objectives include no net loss of this habitat type and retention of all ponderosa pine trees and snags >20 inches dbh. This objective would not be met.

3.2.4.2 Lewis’s Woodpecker

Changed Condition

This species was not analyzed in the original Wildlife Biological Evaluation (2008) because nesting and foraging habitat is strongly tied to burned forests and this habitat was not present in the Mill Creek Watershed at that time. The Government Flats Complex Fire burned 11,354 acres, 2,200 of which are on the Forest. There is now suitable habitat in the analysis area for Lewis’s woodpeckers in the moderate to high severity portions of the burn on the Forest (1,298 acres) and it is expected that they would utilize these areas for nesting and foraging.

Life History/Habitat

Formerly widespread, this species is common year-round only in the white oak ponderosa pine belt east of Mt. Hood. Habitat for the Lewis’ woodpecker includes old-forest, single-storied ponderosa pine, and Oregon white oak. Burned ponderosa pine forests created by stand-replacing fires provide highly productive habitats compared to unburned pine (Wisdom et al. 2000). Lewis’s woodpeckers feed on flying insects and are not strong cavity excavators. They require large snags in an advanced state of decay that are easy to excavate, or they use old cavities

created by other woodpeckers. Nest trees generally range from 17 to 44 inches in diameter (Saab and Dudley 1998, Wisdom et al. 2000).

In evaluating landscape predictor variables for the Lewis's woodpecker, Saab et al. (2002) found a negative correlation to burned ponderosa pine/Douglas-fir stands with a high density of small snags and high crown closure (>70%). They also found that partially logged landscapes were favored by Lewis's woodpeckers. Although it selects for more open stands, this species selects nest sites with higher densities of large snags (>20" dbh) (Saab and Dudley 1998). Table 3-12 displays summarized data in the 30, 50, and 80 percent tolerance levels for the Lewis' woodpecker in post fire habitats.

Table 3-12: Snags per acre at various tolerance levels in post fire habitat within DecAID for Lewis' Woodpecker*.

	30% Tolerance Snags per acre	50% Tolerance Snags per acre	80% Tolerance Snags per acre
Snags > 10"	24.8	43.0	71.0
Snags > 20"	0.0	6.2	16.1

*From DecAID Table EMC_PF.sp-22

From the snags per acre in Table 3-12, it appears that the more snags that are found per acre, the higher the quality of habitat. This may not necessarily be the case as Lewis' woodpeckers are most commonly found in open woodlands and the most important breeding habitat is open canopies with large diameter dead or dying trees. Open foraging habitats are selected as shown by the utilization of logged areas more often by Lewis' woodpeckers than unlogged areas that Sabb et al. (2002).

The data in Table 3-12 is based upon 0.10 acre plots taken around the nest sites then extrapolated to reflect the per acre number of snags (Saab et al 1998 from DecAID). Data indicates that Lewis' woodpeckers depend upon densely stocked pockets of snags for nesting habitat. For quality nesting, there is a need for these dense pockets of snags to be situated near openings to allow for effective foraging. Providing these snag densities near openings would create habitats that are similar to the sites found in the Saab et al. studies from 1994 to 1998.

Threats

The Lewis's woodpecker is declining throughout its range. Threats to this species include the loss of suitable habitat, competition for nest trees, and effects of pesticides on insects. Abele et al. (2004) completed a Technical Conservation Assessment for the Rocky Mountain Region of the Forest Service and threats to the conservation of the Lewis's woodpecker are listed below. The threats that are relevant to this project include #1 and 2.

1. The loss of breeding and wintering habitats in burned pine forests, park-like pine forests, riparian cottonwood stands, and woodlands.
2. Reduction of natural disturbances and management activities associated with these disturbances. For example a wildfire followed by salvage logging.

3. Fire Suppression within pine forests that have increased canopy cover and reduced shrub and grass understories, which reduces insect populations that Lewis's woodpeckers forage on.
4. Water regulation, which has altered riparian woodlands.
5. Cattle grazing by altering the historic fire regimes with a reduction of understory vegetation.
6. Firewood cutting by reducing potential nest sites.
7. Competition with European starling and other cavity nesting species for nest sites.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed.

No Action – Direct and Indirect Effects

There would be a short-term increase in snag numbers as additional trees die from fire damage. Over the long-term, the number of snags would decrease creating a gap in time when little snag habitat would exist (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment. Dahms (1949) found that 50 percent of fire killed ponderosa pine snags remained standing after 10 years, but this declined to 22 percent standing after 20 years. It is estimated that approximately 75 percent of all snags may fall within 20 years (Parks et al. 1999, and Everett et al. 1999). Lewis' woodpecker would continue to utilize the burned area for several years after the fire as snag densities decline due to small snags falling. The effects associated with reforestation are the same as those described under the snags and down wood section above.

Alternative 2– Direct and Indirect Effects

Restoration thinning on 107 acres of unburned to low severity burned units would not immediately impact habitat for Lewis' woodpecker. The watershed is currently below historic levels for snags and down wood. Potential nesting snags would not be removed in these units unless they pose a safety risk. In the long term, the health of these units would improve and the potential for larger green trees and thus the recruitment of larger snags would increase in these units. See the DecAID analysis for a discussion on the effects to snag and down wood from green tree harvest.

Restoration thinning on 146 acres would leave 10 snags per acre (80% tolerance level) which would be reduced to less than 2 snags per acre (below 30% tolerance level) within 20 years based on the above rates of snags falling over time. Lewis' woodpecker often prefer more open post-fire habitat and these stands would initially provide some suitable nesting habitat, but would lose most of their snags and provide very little or no habitat nesting habitat within the next 20 to 30 years. Based on field reviews, it is estimated that approximately 40 percent of the trees in the hazard tree units would need to be removed. This is approximately 82 trees per acre, leaving approximately 123 trees per acre, which is above the 80 percent tolerance level for post fire habitat for Lewis' woodpecker (Table 3-12).

As noted above, some of the threats to Lewis' woodpecker include the loss of breeding habitat and salvage logging. The removal of snags would reduce the number of potential nest sites for Lewis' woodpecker. The watershed and the Forest are lacking in high density patches of snags compared to historic conditions. The high density patches of snags that were created by the fire are rare on the landscape and are the only place in the watershed where these conditions can be found. See the DecAID analysis for a more detailed discussion on snag and down wood levels at the watershed and Forest scale.

There are no known immediate impacts to the Lewis' woodpecker from activities associated with the 622 acres of reforestation. In the long-term, planting would accelerate forest development, and as green trees develop and stand densities increase, open areas for foraging would decrease. Reforestation could limit foraging opportunities in the long-term within these areas at a more expedited rate than other unplanted areas of the fire.

The Hazard Tree and Restoration Thin treatments in the moderate to high burn severity units **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** Lewis' woodpeckers do not appear to rely on these high density patches since this species is most commonly found in open woodlands and the most important breeding habitat is open canopies with large diameter dead or dying trees. Nesting habitat would be provided since high density patches of snags would remain in the hazard tree units and untreated burned areas which are adjacent to more open stands that will provide the necessary foraging habitat.

Alternative 2– Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, hazard tree removal, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

Most of the other projects considered in the cumulative effects analysis focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires. The exception to this is The Dalles Watershed Fuelbreak which was designed to prevent fires from entering the municipal watershed. These projects would thin green stands and would not remove snags aside from hazard tree removal. Overall, treatments proposed would reduce the risk of losing existing habitat from future large-scale disturbances. Private lands are not managed for woodpecker habitat, therefore, it is assumed that any habitat provided by this land is incidental and may not be long term.

Hazard trees would not be cut in these other projects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this alternative. None of these projects propose to harvest burned trees associated with east-side mixed conifer or

ponderosa pine/Douglas fir habitat types; therefore, there are no cumulative effects from the Restoration Thin treatments in the moderate to high severity burned areas.

Alternative 3– Direct and Indirect Effects

Restoration thinning on 107 acres of unburned to low severity burned areas would not immediately impact habitat for Lewis' woodpecker and are the same as discussed under Alternative 2. See the DecAID analysis for a discussion on the effects to snag and down wood from green tree harvest.

The number of snags to be removed for Hazard Tree treatments would be greater under Alternative 3 than Alternative 2 since the acres of treatment increased. Based on field reviews, it is estimated that approximately 40 percent of the trees in the hazard tree units would need to be removed. This is approximately 82 trees per acre, leaving approximately 123 trees per acre, which is above the 80 percent tolerance level for post fire habitat for Lewis' woodpecker (Table 3-12). Private, State, and City lands are not managed for woodpecker habitat, therefore, it is assumed that any habitat currently present in those areas, would not be maintained for the long term.

The removal of snags under this alternative would reduce the number of potential nest sites for Lewis' woodpecker. The watershed and the Forest are lacking in high density patches of snags compared to historic conditions. The high density patches of snags that were created by the fire are rare on the landscape and are the only place in the watershed where these conditions can be found. See the DecAID analysis for a more detailed discussion on snag and down wood levels at the watershed and Forest scale.

There are no known immediate impacts to the Lewis' woodpecker from activities associated with the 732 acres of reforestation. In the long-term, planting under this alternative would accelerate forest development, and as green trees develop and stand densities increase, open areas for foraging would decrease. Reforestation could limit foraging opportunities in the long-term within these areas at a more expedited rate than other unplanted areas of the fire.

The Hazard Tree treatments may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Lewis' woodpeckers do not appear to rely on these high density patches since this species is most commonly found in open woodlands and the most important breeding habitat is open canopies with large diameter dead or dying trees. Nesting habitat would be provided since high density patches of snags would remain in the hazard tree units and untreated burned areas which are adjacent to more open stands that will provide the necessary foraging habitat.

Alternative 3 – Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, hazard tree removal, The Dalles Watershed Fuelbreak

Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

Most of the other projects considered in the cumulative effects analysis focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires. The exception to this is The Dalles Watershed Fuelbreak which was designed to prevent fires from entering the municipal watershed. These projects would thin green stands and would not remove snags aside from hazard tree removal. Overall, treatments proposed would reduce the risk of losing existing habitat from future large-scale disturbances. Private lands are not managed for woodpecker habitat, therefore, it is assumed that any habitat provided by this land is incidental and may not be long term.

Hazard trees would not be cut in these other projects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this alternative.

Consistency Determination for Alternatives 2 and 3

Both alternatives are consistent with all Forest Plan standards and guidelines. The Landbird Conservation Strategy objectives include no net loss of this habitat type and retention of all ponderosa pine trees and snags >20 inches dbh. This objective would not be met.

3.2.4.3 Western Bumblebee

The analysis area for the Western bumble bee includes the area within the project area of the Proposed Action.

Changed Condition

The western bumblebee was widespread and common throughout the western United States and western Canada before 1998 (Xerces Society 2009). The former range of U.S. states included: northern California, Oregon, Washington, Alaska, Idaho, Montana, western Nebraska, western North Dakota, western South Dakota, Wyoming, Utah, Colorado, northern Arizona, and New Mexico. Since 1998, populations of this bumblebee have declined drastically throughout parts of its former range. In Alaska, east of the Cascades and in the Canadian and U.S. Rocky Mountains, viable populations still exist. Populations of the western bumblebee in central California, Oregon, Washington and southern British Columbia have mostly disappeared. It is difficult to accurately assess the magnitude of these declines since most of this bee's historic range has not been sampled systematically.

Life History

According to Goulsen (2003a), bumblebee colonies are annual. In the late winter or early spring, the queen emerges from hibernation and then selects a nest site, which is often a pre-existing hole, such as an abandoned rodent hole. She then supplies the nest with pollen as well as nectar, which she stores in a wax pot formed by wax secreted by specialized glands. The queen then starts her new colony by laying between 8 and 16 eggs in her first batch, which she then incubates until hatching. The young feed upon the food mass provided by the queen and subsequent feedings are provided by the queen regurgitating food from her crop. After feeding

has been completed, the young pupate in cocoons spun from silk. The queen ceases to forage within a few days of the workers' emergence and then focuses upon increasing the colony's population. Male bumblebees develop from unfertilized eggs and females develop from fertilized eggs. According to Thorp et al. (1983), around the time that the number of workers equal or outnumber the brood to be fed, some unfertilized eggs have been laid, which would develop into males, while fertilized eggs become new queens. Young queens may assist with some household activities before leaving the hive to mate with the male drones. After mating, the queen then digs a hole in which she would hibernate through the winter. The rest of the colony including the old queen, workers and males die out.

Bumblebees would visit a range of different plant species and are important generalist pollinators of a wide variety of flowering plants and crops (Goulsen 2003a;). Although bumblebees do not depend on a single type of flower, some plants rely solely on bumblebees for pollination. In addition, native bees, such as bumblebees are adapted to local conditions (Goulsen 2003b).

Threats

There are several threats which face bumblebees and are leading to their decline. The following threats and conservation considerations are from a status review, co-authored by Robbin Thorp, Elaine Evans, and Scott Hoffman (Thorp et al. 2008).

Agriculture and urban development alter landscapes and habitat required by bumblebees while grazing livestock poses a threat since the animals remove flowering food sources, disturb nest sites and alter the vegetation community. Foraging bumble bees are directly threatened by insecticide applications when used in agricultural settings. Massive bumble bee kills have occurred as a result of insecticide application on Forest Service managed public lands intended for the control of spruce budworm. Bumble bees can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides. When exotic plants invade and dominate native grasslands, they may threaten bumble bees by competing with the native nectar and pollen plants relied upon by bumble bees.

Habitat

Surveys for Western bumble bees were conducted by the Xerces Society on the Mt. Hood National Forest in 2013. A total of 34 locations were surveyed and Western bumble bees were located at 8 of these locations. All bumble bee detections were east of the Pacific Crest and above 3,800 feet in elevation.

Effects Analysis

Analysis Area

The effects to this species were considered at the Mill Creek Watershed scale, since genetic diversity and connectivity between colonies is a concern for the Western bumble bee.

No Action – Direct and Indirect Effects

Under the No Action alternative, bumble bee nesting, foraging, and over-wintering habitat would not be impacted. The moderate to high severity burned areas within the project area would eventually provide foraging habitat as flowering plants recolonize the stands.

Alternative 2 – Direct and Indirect Effects

Alternative 2 may temporarily impact flowering plants during restoration thinning and associated fuels activities. Reducing this food source would reduce the ability of foraging bees to find nectar at these sites which is a required food source for young bees. It is expected that these shrubs would regenerate within a few years and that the bumblebees would have other nectar plants available within the project area.

There are no known immediate impacts to bumblebees from activities associated with the 622 acres of reforestation. In the long-term, planting would accelerate forest development, and as green trees develop and stand densities increase, open areas for foraging plants would decrease. Reforestation could reduce foraging opportunities in the long-term within these areas at a more expedited rate than other unplanted areas of the fire.

The proposed project may temporarily impact nest sites if these nests are located within abandoned bird nests or other structures above ground. Restoration thinning and associated fuels activities could temporarily reduce the number of nests available and, therefore, reduce the number of bumblebees that this area could support. Nest sites would increase within a few years after treatment.

The temporary reduction in flowering shrubs and nesting sites **may impact individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species**. The total number of acres impacted would not exceed 107 acres since most of the activities are within heavily timbered units or within the moderate to high severity burned areas and do not currently provide foraging habitat or nest sites. This impact represents less than one percent of the Forest Service owned lands within the Mill Creek Watershed. While the number of bees in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs and nest sites increase within a few years after treatments. Nest sites and flowering plants would also increase in the untreated portions of the burn as shrubs recolonize the area over the next decade.

Because bumble bees can forage for nectar on a variety of flowering plants, the untreated portions of the Mill Creek Watershed would continue to provide a food source. These untreated portions of the watershed would also continue to provide for nesting and hibernating habitat. The adjacent untreated areas would allow for bumble bees to recolonize the impacted acres within the treatment area as foraging and nesting habitat returns.

Alternative 2 – Cumulative Effects

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: Government Flats Complex Fire suppression repair activities, Stewardship Projects, road building, past timber harvest, pre-commercial/sapling thinning, road and trail maintenance, Bonneville Power Administration maintenance, The Dalles Watershed Fuel Break Stewardship Projects, livestock grazing in the Long Prairie Grazing Allotment, road closures, and invasive plant treatments. Cumulative effects for this species were considered at the watershed scale, since genetic diversity and connectivity between colonies is a concern for the bumble bee.

Projects that may increase or improve foraging habitat in the long-term include road closures, sapling thinning, and noxious weed treatments. Depending on the prescription and the condition of the stand before treatments, timber/stewardship sales may increase or decrease the amount of foraging habitat available. Road, trail, and Bonneville Power Administration maintenance have the potential to reduce the amount foraging habitat. Livestock grazing also reduces the amount of foraging and nesting habitat.

Habitat alterations including those that could destroy, fragment, alter, degrade or reduce the food supply produced by flowers as well as destruction of nest sites and hibernation sites for overwintering queens, such as abandoned rodent burrows and bird nests, adversely affect these bees. Large scale ground disturbing activities alter landscapes and habitat required by bumble bees by removing flowering food sources, disturbing nest sites and altering the vegetation community. The size of bumble bee populations diminish and inbreeding becomes more common as habitats become fragmented. This in turn, decreases the genetic diversity and increases the risk of population decline.

While the projects analyzed under cumulative effects may have impacts to individual bumble bees, the main threats to this species are agriculture and urban development, livestock grazing, and broad scale insecticide application (Thorp et al. 2008). These kinds of activities are not included in the Alternative 2. Because some of the proposed activities increase or improve habitat while others may decrease it, the impacts would likely be beneficial and detrimental at the same time, and populations of this species would still persist at the watershed scale.

Alternative 3 – Direct, Indirect and Cumulative Effects

There would be a slight increase in the number of acres for Reforestation treatments from 622 to 732 acres. In the long-term, planting would accelerate forest development, and as green trees develop and stand densities increase, open areas for foraging plants would decrease.

Reforestation could reduce foraging opportunities in the long-term within these areas at a more expedited rate than other unplanted areas of the fire. The effects of restoration thinning on low severity burn to unburned areas remain unchanged from Alternative 2.

Because the differences between Alternatives 2 and 3 are related to treatments in the high to moderate severity burned areas which do not provide habitat for the bumblebee, the cumulative effects under this Alternative are the same as those discussed under Alternative 2.

Consistency Determination

The Proposed Action alternative is consistent with the following Standards and Guidelines for sensitive species: (1) FW-174: Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670; and, (2) FW-175: habitat for threatened, endangered and sensitive plants and animals shall be protected or improved.

3.2.5 Survey and Manage Species

3.2.5.1 Dalles Sideband, Crater Lake Tightcoil, Evening Fieldslug, Puget Oregonian, Columbia Gorge Oregonian

Changed Condition

The amount of suitable habitat for these species has been reduced in the project area because of the Government Flats Complex Fire. Because these species are closely associated with old-growth forests, the amount of habitat impacted by the fire is represented by the changed condition to suitable spotted owl habitat. See the discussion under Northern Spotted Owl “Changed Condition” for the suitable habitat impacted by the fire. More information is available on the methodology and existing conditions for these species in the Wildlife Biological Evaluation (2008) from the original analysis, available in the project record.

Effects Analysis

Analysis Area

The analysis area includes the units within the proposed project boundary.

No Action– Direct and Indirect Effects

Under the No Action Alternative, there would be no reforestation in the burned area to accelerate the development of desired forest conditions. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs that have had a longer period to become established. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas of the project may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration. Burned stands would be dependent on nearby natural seeds for reforestation. Hazard trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure.

Alternative 2– Direct and Indirect Effects

Overall, Alternative 2 would impact 15 acres of habitat for these species. When considered at the unit scale, this does not result in any new effects. As such, the analysis in the original Biological Evaluation (2008) would still apply. Reforestation activities on 622 acres would be expected to increase the rate at which seedlings become established which could benefit these species by increasing the rate that habitat would be established.

Alternative 3– Direct and Indirect Effects

Because the differences between Alternative 2 and Alternative 3 are related to treatments in the high to moderate severity burned areas which do not provide habitat for these species, the impacts under this Alternative are the same as under Alternative 2.

There would be a slight increase in the number of acres for Reforestation Treatments from 622 to 732 acres. Reforestation activities would be expected to increase the rate at which seedlings

become established which could benefit these species by increasing the rate that habitat would be established.

Cumulative Effects for Alternatives 2 and 3

Because the analysis area is within the project unit boundaries, there are no projects that overlap in time or space, and therefore, there are no cumulative effects.

Consistency Determination

All required survey protocols for these species have been followed. As such, both action alternatives are consistent with the survey requirements and management provisions found in the Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines 2001.

3.2.6 Management Indicator Species

Methodology for All Species

The National Forest Management Act requires the Forest Service to manage wildlife habitat to “maintain viable populations of existing native and desired non-native vertebrate species in the planning area.” The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. The primary assumption of this process is that indicator species represent the habitat needs of other species because they have similar habitat requirements. Spotted owls, for example, indicate the needs of a variety of animals that use old growth forest. This analysis focuses on certain key species and does not specifically address common species except to the extent that they are represented by these management indicator species.

Management Indicator Species for this portion of the Forest within the project area include northern spotted owl (see analysis above), deer and elk, pileated woodpecker, American marten, wild turkey, and western gray squirrel (Table 3-13).

Table 3-13: Management Indicator Species for the Project Area.

Management Indicator Species	Habitat Description	Habitat Present in Analysis Area	Species Present in Analysis Area
Northern Spotted Owl	Old Growth	Yes	Documented
Deer and Elk	Early Forest Succession Mature/Old Growth	Yes	Documented
Pileated Woodpecker	Mature/Over Mature	Yes	Documented
American Marten	Mature/Over Mature	Yes	Suspected
Wild Turkey	Pine / Oak	Yes	Documented
Western Gray Squirrel	Pine / Oak	Yes	Documented

3.2.6.1 Mule Deer and Elk

Changed Condition

There are approximately 1,885 acres of B10-Deer and Elk Winter Range (Forest Plan Land Use Allocation) in the project area and 540 acres of B10 in the Mill Creek Watershed outside of the project area. A total of 53.5 percent of these B10 lands experienced a moderate to high severity burn in the Government Flats Complex Fire. The habitat within this burned area is no longer providing optimal and thermal cover.

Black-tailed deer are common and relatively abundant in the spring, summer, and fall within the project area. Elk are less common. Population numbers for deer and elk are probably most limited by the unavailability of quality winter range. Elk herds within the project area likely exhibit a close association with riparian habitat in areas of gentle terrain and low road density. Research on elk in this kind of habitat generally shows that elk spend most of their time in close proximity to a stream or wetland. Forage is widely available, but is generally of low quality. The low quality of the forage and the lack of wetlands and permanent low-gradient streams are considered one of the limiting factors for elk and possibly deer in the project area.

Thermal cover for deer and elk is defined as a stand of coniferous trees at least 40-feet tall with an average crown closure of 70 percent or more. Optimal cover is found mainly in multi-storied mature and old-growth stands.

The Mt. Hood Land and Resource Management Plan (Forest Plan) Standards and Guidelines have minimum requirements for optimal and thermal cover habitat components, but no specific level for forage. During the 1980s and 1990s, wildlife managers considered thermal cover to be important to deer and elk survival and production. Over time, wildlife managers have questioned if elk required thermal cover. Telemetry data presented at the Elk Modeling Workshop (April 2010) indicated that elk were negatively associated with cover and that openings are far more valuable for elk than cover. With the reduction in regeneration timber harvest, the Forest now has abundant optimal and thermal cover, but openings for forage are becoming scarce. There are approximately 69,226 acres of early-seral habitat on the Forest. This level is declining over time at mid and lower elevations since plantations have grown dense with trees that shade out forage. The Gnarl Ridge and Dollar Lake fires have increased forage at the higher elevations and The Government Flats Complex Fire increased forage in the Mill Creek Watershed.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed.

No Action – Direct and Indirect Effects

Under the No Action Alternative there would be no reforestation in the burned area to accelerate the development of desired forest conditions. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas of the watershed may experience stands that are dominated by dense shrubs for several decades. Early

seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration. Burned stands would be dependent on nearby natural seeds for reforestation.

Hazard trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure. Due to the fire's intensity in these stands, thermal cover is largely reduced, but the high density of standing dead trees in some areas does provide some thermal habitat. The removal of hazard trees would further reduce the ability of the stands to provide cover.

Although shrubs would provide forage, as the shrubs increase in age, the palatability of these plants decreases. This typically occurs within the first 10 years after the fire. Overstory canopy cover from regenerating trees typically shade out shrubs providing opportunities for other plants to get started, providing a mosaic of cover and forage over time. Without reforestation, the length of time before forested stands develop may increase, limiting the quality of forage to cover ratios.

Alternative 2 – Direct and Indirect Effects

Treatment on 107 acres of forested habitat (Restoration Thin treatments on low severity burned to unburned areas) would further reduce the amount of available cover in B10 winter range which is now below the Forest Plan Standard of 50 percent of the area maintained in optimal and thermal cover habitat. The loss of thermal cover in the proposed units would alter the distribution and use of habitat by deer and elk in the project area. During the summer, fewer animals would be expected to use the area since it would be relatively open. Forage would increase, but would not occur close enough to cover for it to be fully utilized by deer and elk. Most of the lost thermal cover characteristics in the stands should be regained in the next 40 to 50 years.

The Hazard Tree and Restoration Thin treatments in the moderate to high severity burned areas (approximately 280 acres) would have some impacts to deer and elk. Large accumulations of down wood have the potential to impede deer and elk movement. Due to the fire's intensity in these stands, thermal cover is largely reduced, but the high density of standing dead trees does provide some thermal habitat. This habitat does not currently meet the Forest Plan Standards and Guidelines as thermal cover. After treatment, these units would have 10 snags per acre or less and thermal cover would be further reduced until the establishment of a closed canopy stand which may take more than 100 years. The removal of dead material that may fall and impede movement may benefit big game as they move throughout the project area.

Reforestation on approximately 622 acres would benefit deer and elk winter habitat. Replanting would help establish trees sooner than what would occur with natural regeneration thereby developing the thermal cover needed in winter range more rapidly.

Alternative 3– Direct and Indirect Effects

The impacts of Restoration Thinning in the unburned and low severity burned areas are the same as Alternative 2 since that portion of the project remains the same. The Hazard Tree treatments on 167 acres in the moderate to high severity burned areas would still have some impacts to deer and elk, although the amount of habitat impacted would be less than Alternative 2. While the

total number of snags removed is less under Alternative 3, the number of acres with zero snags and less cover would increase from 134 acres in Alternative 2 to 167 acres in Alternative 3. Due to the fire's intensity in these stands, thermal cover is largely reduced, but the high density of standing dead trees does provide some thermal habitat. This habitat does not currently meet the Forest Plan Standards and Guidelines as thermal cover. After treatment, these units would have 10 snags per acre or less and thermal cover would be further reduced until the establishment of a closed canopy stand which may take more than 100 years (Sessions et al. 2004, Swanson et al. 2010). Large accumulations of down wood have the potential to impede deer and elk movement. The removal of dead material that may fall and impede movement may benefit big game as they move throughout the project area.

Reforestation on approximately 732 acres would benefit deer and elk winter habitat. Replanting would help establish trees sooner than what would occur with natural regeneration thereby developing the thermal cover needed in winter range more rapidly.

Cumulative Effects for Alternatives 2 and 3

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in this cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, hazard tree removal, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

The cumulative effects to deer and elk from Alternative 2 and the above listed projects would decrease thermal, optimal, and hiding cover and would increase forage. These projects are not within deer and elk B10 winter range and are in habitat that would benefit deer and elk by providing both forage and cover. Most of these projects focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires, which would temporarily increase forage and decrease cover. These projects would thin green stands and would not remove snags aside from hazard tree removal. The exception to this is The Dalles Watershed Fuelbreak which was designed to prevent fires from entering the municipal watershed and in this case, no cover remained. Overall, these projects would reduce the risk of losing cover and optimal habitat from future large-scale disturbances.

Snags would not be cut in these projects unless they pose an imminent threat to human safety or infrastructure. The exact number is unknown, but is extremely small and would not contribute to cumulative effects from Hazard Tree treatments under this Alternative. None of these projects propose to salvage burned trees; therefore there are no cumulative effects from the restoration thin treatments in the moderate to high severity burned areas.

Consistency Determination

The following Mt. Hood National Forest Land and Resource Management Plan Standards and Guidelines that apply to the Proposed Action alternatives and would be met:

- B10-012, 013: Regulated timber harvest should occur. Timber salvage activities may occur.

The following Mt. Hood National Forest Land and Resource Management Plan Standards and Guidelines that apply to the Proposed Action alternatives and would not be met. A Forest Plan exception is proposed for these standards in order to allow the project to be implemented as described (see Chapter 2 for more details).

- B10-14: Forest canopy closure should reach at least 70 percent canopy closure within 10 years of the last commercial thinning activity.
- B10-021, 022: Optimal cover and thermal cover habitat components for deer and elk should encompass at least 50 percent of the area. Optimal cover should be at least 25 percent.

3.2.6.2 Pileated Woodpecker

Changed Condition

The amount of suitable habitat for this specie has been reduced in the project area because of the Government Flats Complex Fire. Because pileated woodpeckers are closely associated with old-growth forests, the amount of habitat impacted by the fire is represented by the changed condition to suitable spotted owl habitat. See the discussion under Northern Spotted Owl “Changed Condition”, for the suitable pileated woodpecker habitat impacted by the fire. More information is available on the existing conditions for this species in the Wildlife Biological Evaluation (2008) from the original analysis, available in the project record.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed.

No Action– Direct and Indirect Effects

Under the No Action Alternative there would be no reforestation in the burned area which could delay the development of suitable habitat for pileated woodpecker. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs that have had a longer period to become established. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration. Burned stands would be dependent on nearby natural seeds for reforestation. Hazard trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure.

Alternative 2 and 3– Direct and Indirect Effects

Restoration thinning in the low severity and unburned units under both alternatives would impact 15 acres of suitable pileated woodpecker habitat. When considered at the project boundary scale, this does not result in any new effects. As such, the analysis in the original Biological Evaluation (2008) would still apply.

Reforestation activities on 622 (Alternative 2) or 732 acres (Alternative 3) would be expected to increase the rate at which seedlings become established which could benefit this species by increasing the rate that habitat would be established. Hazard Tree and Restoration Thin treatments in the moderate to high severity burned areas are not expected to impact pileated woodpecker since they are not known to utilize areas within stand replacing fires.

Cumulative Effects for Alternatives 2 and 3

The amount of suitable habitat proposed for removal in the Revised EA as analyzed at the watershed scale is approximately 0.03 percent of the available habitat and cannot be meaningfully measured in terms of impacts to pileated woodpeckers. Therefore, there are no measurable cumulative effects to pileated woodpecker suitable habitat from Alternatives 2 and 3 since there are no direct or indirect effects.

3.2.6.3 American Marten

Changed Condition

The amount of suitable habitat for this species has been reduced in the project area because of the Government Flats Complex Fire. Because American marten are closely associated with old-growth forests, the amount of habitat impacted by the fire is represented by the changed condition to suitable spotted owl habitat. See the discussion under Northern Spotted Owl “Changed Condition / Current Condition”, for the suitable habitat impacted by the fire. More information is available on the existing conditions for this species in the Wildlife Biological Evaluation (2008) from the original analysis, available in the project record.

Martens are closely associated with forested habitats that have complex physical structure near the ground (Slauson et al. 2007). Open areas, such as regeneration logging units, recent severely burned areas, and natural openings are avoided, especially during the winter. All areas that received stand replacement fire are no longer considered habitat.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed.

No Action– Direct and Indirect Effects

Under the No Action Alternative, there would be no reforestation in the burned area which could delay the development of suitable habitat for American marten. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas of the project may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration. Burned stands would be dependent on nearby natural seeds for reforestation. Restoration thinning would not occur in the moderate to high severity burned areas which are no longer providing suitable habitat. Hazard

trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure.

Alternatives 2 and 3 – Direct and Indirect Effects

Alternatives 2 and 3 would impact 15 acres of habitat. When considered at the watershed scale, this does not result in any new effects. As such, the analysis in the original Biological Evaluation (2008) would still apply.

Reforestation activities on 622 acres (Alternative 2) or 732 acres (Alternative 3) would be expected to increase the rate at which seedlings become established which could benefit these species by increasing the rate that habitat would be established. Hazard Tree and Restoration Thin treatments in the moderate to high severity burned areas are not expected to impact American marten since these units are not providing suitable habitat for this species.

Cumulative Effects Alternatives 2 and 3

The amount of suitable habitat proposed for removal in the Revised EA as analyzed at the watershed scale is approximately 0.03 percent of the available habitat and cannot be meaningfully measured in terms of impacts to marten. Therefore, there are no measurable cumulative effects to marten suitable habitat from Alternatives 2 and 3 since there are no direct or indirect effects.

3.2.6.4 Wild Turkey and Western Gray Squirrel

Changed Condition

Wild turkeys and Western gray squirrels rely mostly on the dry Douglas-fir, ponderosa pine, and Oregon white oak habitat within the project area. The amount of this habitat was reduced by 505 acres because of the Government Flats Complex Fire. Both species are generally associated with the mixed conifer and pine/oak vegetation classifications. Nest sites are closely associated with mixed conifer stands. Wild turkey roost trees are large diameter (> 20 inch dbh) ponderosa pine and douglas fir. All areas that received stand replacement fire are no longer considered habitat.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed.

No Action – Direct and Indirect Effects

Under the No Action Alternative, there would be no reforestation in the burned area which could delay the development of suitable habitat for turkeys and gray squirrels. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas of the project may experience stands that are dominated by dense shrubs for several decades. Early seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration. Burned stands would be dependent on nearby natural seeds for reforestation. Restoration thinning would not occur in the moderate to high severity burned areas which are no longer providing suitable

habitat. Hazard trees would be felled and left along roads over a longer time period as they pose and imminent threat to human safety or infrastructure.

Alternatives 2 and 3 – Direct and Indirect Effects

Alternatives 2 and 3 would have the same effect to turkey and gray squirrel. Both would impact 107 acres of habitat (Restoration Thin treatments in low severity burned to unburned areas). When considered at the watershed scale, this does not result in any new effects. As such, the analysis in the original Biological Evaluation (2008) would still apply.

Reforestation activities on 622 acres (Alternative 2) or 732 acres (Alternative 3) would be expected to increase the rate at which seedlings become established which could benefit these species by increasing the rate that habitat for wild turkey and gray squirrel would be established. Hazard Tree and Restoration Thin treatments in the moderate to high severity burned areas are not expected to impact turkey and gray squirrel since these units are not providing suitable habitat for these species.

Cumulative Effects Alternatives 2 and 3

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in this cumulative effects analysis: Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

Most of the other projects considered in the cumulative effects analysis focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires, which would benefit turkey and gray squirrel. These projects would thin green stands and would not remove snags aside from hazard tree removal. The exception to this is The Dalles Watershed Fuelbreak which was designed to prevent fires from entering the municipal watershed and in this case, little suitable habitat remained. Overall, these projects in conjunction with the treatments in the unburned units of the proposed action, would reduce the risk of losing suitable habitat from future large-scale disturbances by reduce the hazard fuel loadings.

Consistency Determination for All Management Indicator Species

This analysis is consistent with The National Forest Management Act which requires the Forest Service to manage wildlife habitat to “maintain viable populations of existing native and desired non-native vertebrate species in the planning area.” The National Forest Management Act requires the Forest Service to identify Management Indicator Species through the planning process, and to establish objectives to maintain and improve the habitat of indicator species. A Forest wide analysis was completed and is incorporated by reference. Viable populations of all the Management Indicator Species addressed in this biological evaluation would be maintained at the Forest scale.

3.2.7 Neotropical Migratory Birds

Methodology

The Forest Service has implemented management guidelines that direct migratory birds to be addressed in the NEPA process when actions have the potential to impact migratory bird species of concern. The methodology for this analysis follows “Incorporating Migratory& Resident Bird Concerns into the National Environmental Policy Act Process Region Six Forest Service & OR/WA Bureau of Land Management” (Bresson 2013).

Conservation strategies for land birds of the east slope of the Cascade Mountains in Oregon and Washington and a conservation strategy for land birds in coniferous forests in western Oregon and Washington were prepared in June 2000 and March 1999 respectively by Bob Altman of American Bird Conservancy for the Oregon-Washington Partners in Flight. The strategies are designed to achieve functioning ecosystems for land birds by addressing the habitat requirements of “focal species.” By managing for a group of species representative of important components of a functioning ecosystem, it is assumed that many other species and elements of biodiversity would be maintained. The Mill Creek Watershed contains elements of both these physiographic regions.

Changed Condition

The habitat for migratory bird species has changed since the original North Fork Mill Creek Restoration Opportunities analysis in 2008. Prior to the fire the landscape was comprised of several plant communities ranging from mixed conifer to pine/oak with fire return interval that ranged from 15-200 years (Refer to fire and fuels report). Within the Mill Creek Watershed the high to moderate burn severity areas have been converted to an early seral forest habitat. Early seral forest habitat is defined as “those ecosystems that occupy potentially forested sites in time and space between a stand-replacement disturbance and re-establishment of a closed forest canopy” (Swanson et al. 2010). These habitats can persist from decades to centuries depending on the successful establishment of new trees.

Table 3-14 displays the focal species potentially positively or negatively affected by changes in habitat in the eastern slope of the Cascade Mountains region, and the forest conditions and habitat attributes they represent.

Table 3-14: Focal Migratory Bird Species

Forest Conditions	Habitat Attribute	Focal Species
Ponderosa Pine	Old forest, large patches	White-headed woodpecker
	Large trees	Pygmy nuthatch
	Open understory, regeneration	Chipping sparrow
	Burned old-forest	Lewis’s woodpecker
Mixed Conifer	Large trees	Brown Creeper*
	Open understory, regeneration	Williamson’s sapsucker
	Grassy openings, dense thickets	Flammulated owl

Forest Conditions	Habitat Attribute	Focal Species
Mixed Conifer	Multi-layered, structural diverse	Hermit thrush
	Fire edges and openings	Olive-sided flycatcher*
Oak-Pine Woodland	Early-seral, dense understory	Nashville warbler
	Large oaks with cavities	Ash-throated flycatcher
	Large pine trees/snags	Lewis' woodpecker
Lodgepole Pine	Mature/old-growth	Black-backed woodpecker
Whitebark Pine	Mature/old-growth	Clark's nutcracker
Montane Meadows	Wet and dry	Sandhill crane
Aspen	Large trees/snags, regeneration	Red-naped sapsucker
Subalpine fir	Patchy presence	Blue grouse*

*Significantly declining population trends in the Cascade Mountains Physiographic Region.

In developing the list of species to be considered in the planning process, the current (updated every 5 years) USFWS Birds of Conservation Concern was consulted as was the State lists, and comprehensive planning efforts for migratory birds. This analysis was completed in part to evaluate the effects of the agency actions on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors.

Approximately 30 species of migratory birds occur within the District, some of which are present within the project area during the breeding season. Some species favor habitat with late-successional characteristics, such as the hermit thrush and brown creeper, while others favor early-successional habitat such as the Nashville warbler. Lewis's woodpeckers, white-headed woodpeckers, and olive-sided flycatchers would be found in or near the burned portions of the project area.

Effects Analysis

Analysis Area

The analysis area includes the Mill Creek Watershed.

No Action – Direct and Indirect Effects

Under the No Action Alternative, there would be no reforestation in the burned area which could delay the development of suitable habitat for late seral species such as the brown creeper. Longer time periods between fire and seedling establishment may decrease the ability of tree seedlings to compete with shrubs. Without reforestation or sufficient natural regeneration, the moderate to high severity burned areas of the project may experience stands that are dominated by dense shrubs for several decades which would benefit. Early seral habitat could persist for a century or more in some places of moderate to high burn severity, depending on the success of natural regeneration, which would benefit Nashville warbler and other early seral habitat species. Burned stands would be dependent on nearby natural seeds for reforestation. Restoration thinning would not occur in the moderate to high severity burned areas. Hazard trees would be felled and left along roads over a longer time period as they pose an imminent threat to human safety or infrastructure.

Alternative 2 – Direct and Indirect Effects

Alternative 2 would treat 107 acres of green tree habitat (Restoration Thin treatments on the low severity burn to unburned areas). When considered at the watershed scale, this does not result in any new effects to migratory bird species from treatments in these units. As such, the analysis in the original Biological Evaluation (2008) for green tree treatments would still apply.

Reforestation activities on 622 acres under Alternative 2 would be expected to increase the rate at which seedlings become established, increasing the rate of establishing trees which would benefit brown creeper and other species dependent on large trees.

Restoration Thin on 146 acres in moderate to high severity burn areas would leave 10 snags per acre which would be reduced to less than 2 snags per acre within 20 years based on the rates of snags falling over time. Hazard Tree treatments on 134 acres would remove all potential nest trees. Hazard Tree and Restoration Thin treatments in the moderate to high severity burned areas would reduce the number of snags within the eastside mixed conifer habitat type (Table 3-7). These treatments would reduce the number of snags within the eastside mixed conifer habitat type by 54,095 snags which is approximately 20 percent of the snags within the burned area on the Forest (Table 3-7). Of these snags, 20,950 are >20 inches dbh. Approximately half of the trees in this portion of the watershed are ponderosa pine. These treatments would benefit species associated with early seral habitat and would remove habitat for species associated with large snags or high density patches of snags. See the above analysis for impacts to white-headed and Lewis's woodpeckers.

Alternative 3 – Direct and Indirect Effects

Similar to Alternative 2, this alternative would treat 107 acres of green tree habitat (Restoration Thin treatments on the low severity burn to unburned areas). When considered at the watershed scale, this does not result in any new effects to migratory bird species from treatments in these units. As such, the analysis in the original Biological Evaluation (2008) for green tree treatments would still apply.

Reforestation activities on 732 acres under Alternative 3 would be expected to increase the rate at which seedlings become established, increasing the rate of establishing large trees, which would benefit brown creeper and other species dependent on large trees.

Hazard Tree treatments on 167 acres would remove all snags. This would reduce the number of snags by 34,235 snags which is approximately 12.8 percent of the snags in this habitat type within the burned area on the Forest. While the total number of snags removed is less under Alternative 3, the number of acres with zero snags would increase from 134 acres in Alternative 2 to 167 acres in Alternative 3. Of these snags, 13,360 are larger than 20 inches in diameter (Table 3-8). These treatments would benefit species associated with early seral habitat and would remove habitat for species associated with large snags or high density patches of snags. See the above analysis for impacts to white-headed and Lewis's woodpeckers.

Cumulative Effects for Alternatives 2 and 3

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in this cumulative effects analysis:

Stewardship Projects (Lokai Stewardship [unsold]; Roan and Eques Stewardship outside fire boundary; and, Appy, Buckskin, and Clyde Stewardship [completed]), past timber harvests, private land timber harvest activities, The Dalles Watershed Fuelbreak Stewardship Projects (Hodi, Alder and Willow Stewardship), and The Dalles Watershed Phase II Stewardship Projects (Mint, Fern, and Voodoo Stewardship).

Most of the other projects considered in the cumulative effects analysis focus on thinning young stands or thinning from below to restore and enhance mixed conifer stands while reducing the risk of stand replacing fires, which would benefit late seral dependent species and reduce habitat for early seral species in the long-term. These projects would thin green stands and would not remove snags aside from hazard tree removal which would maintain the existing habitat for snag dependent species.

Consistency Determination

The Proposed Action is consistent with Executive Order 13186 (66 Fed. Reg. 3853, January 17, 2001) “Responsibilities of Federal Agencies to Protect Migratory Birds.” This Executive Order directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. This Executive Order also requires federal agencies to develop Memorandum of Understandings (MOU) with the USFWS to conserve birds including taking steps to restore and enhance habitat, prevent or abate pollution affecting birds, and incorporating migratory bird conservation into agency planning processes whenever possible. The Bureau of Land Management and U.S. Forest Service have both completed, and are currently implementing, their respective MOU’s with the USFWS.

3.2.8 Effects Determination

Table 3-15 shows the effects determination for the wildlife species analyzed.

Table 3-15: Summary of Effects to Wildlife Species by Alternatives

Species	Impact of Alternative 2	Impact of Alternative 3	Impact of No Action
Federally Threatened, Endangered or Proposed			
Northern spotted owl (<i>Strix occidentalis caurina</i>)	LAA	LAA	NE
Northern spotted owl critical habitat	LAA	LAA	NE
North American wolverine	NE	NE	NE
R6 Sensitive Species			
White-headed woodpecker	MII-NL	MII-NL	NI
Lewis’s woodpecker	MII-NL	MII-NL	NI
Western bumblebee (<i>Bombus occidentalis</i>)	MII-NL	MII-NL	NI

NE: No Effect

LAA: Likely to Adversely Affect

MII-NL: May Impact Individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.

NI: No impact

3.3 Soil Productivity

More information is available in the project record including the full soils analysis file as part of the Soil Productivity Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.3.1 Analysis Assumptions and Methodology

Analysis Assumptions

The logging systems have been designed to ensure less than 15% of the area is impacted (ground disturbance – detrimental soil condition) within each proposed treatment that uses ground-based equipment. This includes that damage on skid trails would not exceed 12 feet in width. It is assumed that these logging systems would be followed during implementation.

Even though needlecast was observed during field visits in quantities to be considered effective groundcover in the moderate burn locations, it is assumed that effective groundcover was lost or substantially reduced in the high burn severity areas.

It is assumed proposed treatment would take place during the normal operating season, when soil damage risk is lower than for the same activities occurring in winter.

Methodology

The bulk of this analysis will focus on changed conditions where the treatments units overlap areas that burned with moderate to high severity (Restoration Thin); and all of the treatment units where the fire suppression impacts and subsequent repairs impacted the soils. The remaining treatment units, whether unburned or lightly burned, are still expected to meet or not meet certain standards as originally analyzed in the Soil Productivity Specialist Report (Dodd, 2008). This includes all Restoration Thin treatments on unburned to low severity in Alternatives 2 and 3 as well as all Reforestation treatments. As such, there is no changed condition in these units and they will not be discussed further in this analysis. The changed conditions and analysis in the moderate to high severity burn units will focus on the removal of effective groundcover and loss of organic matter assessed by tonnage.

The analysis area for soil resources in this report are the Restoration Thinning units that burned moderate to high severely as well as the Hazard Tree Treatment units. A comparison of alternatives will be conducted using applicable Mt. Hood Land and Resource Management Plan (Forest Plan) standards and guidelines in Table 3-16 below as the method of assessment. For this analysis, the following three measures will be used to evaluate impacts based on the standards listed in Table 3-16.

Table 3-16: Summary of Forest Plan Soil Standards guiding the soils analysis. Full texts of these standards are on pages 4-49 and 4-50.

<p>FW – 025 (Page 4-49)</p>	<p>In the first year following surface disturbing activities, the percent effective groundcover by soil erosion hazard class should achieve at least the following levels:</p> <table border="1" data-bbox="464 380 1265 541"> <thead> <tr> <th data-bbox="464 380 883 443">Soil Erosion Hazard Class (risk)</th> <th data-bbox="883 380 1265 443">Effective Groundcover</th> </tr> </thead> <tbody> <tr> <td data-bbox="464 443 883 478">Slight to Moderate</td> <td data-bbox="883 443 1265 478">60%</td> </tr> <tr> <td data-bbox="464 478 883 514">High</td> <td data-bbox="883 478 1265 514">75%</td> </tr> <tr> <td data-bbox="464 514 883 541">Very High</td> <td data-bbox="883 514 1265 541">85%</td> </tr> </tbody> </table>	Soil Erosion Hazard Class (risk)	Effective Groundcover	Slight to Moderate	60%	High	75%	Very High	85%
Soil Erosion Hazard Class (risk)	Effective Groundcover								
Slight to Moderate	60%								
High	75%								
Very High	85%								
<p>FW – 022, 023 (Page 4-49)</p>	<p>The combined cumulative detrimental soil impacts occurring from both past and planned activities should not exceed 15% of an activity area (paraphrased).</p>								
<p>FW – 032, 033, 034 (Page 4-50)</p>	<p>Favorable habitat conditions for soil organisms should be maintained for short and long-term soil productivity. At least 15 tons per acre should be maintained and evenly distributed across managed sites (paraphrased).</p>								

1. The risk of erosion and subsequent sedimentation to adjacent water bodies.

Erosion Hazard: The possible impact of concern stemming directly from soil erosion is runoff from bare areas carrying sediment that affect watercourses. This hazard rating is based upon a particular soils’ inherent physical properties, such as soil texture, slope, rock content, and soil structure, under three differing circumstances: 1) undisturbed; 2) bare soil; and 3) bare and compacted soil.

2. The risk of detrimental soil conditions such as heavy compaction and intense burning that alter water movement through the soil and reduce site productivity.

Detrimental Soil Condition: The Forest Plan standard of no more than 15% detrimental soil condition in an activity area following project completion would protect site productivity, maintain water movement through the soil, reduce erosion risks and associated sedimentation, and protect organic matter. Soils within the identified treatment areas have a moderate compaction hazard due to inherent soil properties.

3. The risk of altering the soil biological ecosystem because of insufficient amounts of down woody debris to feed the forest carbon and nutrient cycles.

Soil Biology (organic matter levels): Poorly functioning soil biological systems may lead to difficulties in revegetation efforts, or decline in existing desirable vegetation. In and of itself, soil biology is extremely difficult to evaluate because of infinitely complex interactions occurring between organisms and their soil habitats, including physical and chemical characteristics. It is assumed that soil biological systems would properly function given certain habitat components are present, such as non-compacted soils, appropriate levels of organic matter, and types of native vegetation under which the soil developed.

Management actions that displace, burn or compact soil or that remove ground cover are considered to result in a greater risk to soil productivity. These actions would include: landing use (some existing landings would be reused and some new landings would be created); skidding with ground based equipment (some would use existing skid trails and some areas would have new skid trails); use of low impact (low ground pressure) harvester felling equipment; use of existing temporary roads; temporary road and landing obliteration; erosion control activities; and landing slash burning. The analysis will also consider restorative actions and the Project Design Criteria (PDC) and best management practices (BMPs) to minimize impacts. Other aspects of the Proposed Action would not have a meaningful or measurable effect on soil productivity.

The methodology used to gather data needed for this effects analysis included field visits as well as previous field experience in this and adjacent watersheds. The previous field experience includes Fivemile planning area to the south (1996), three planning efforts in North and South Fork Mill watersheds (2006 to present), Mill Creek Watershed Analysis (1997), Forest Service Road 17 fuel break on the west (2002), and the Government Flats Complex Fire in 2013. Professional observation and knowledge of how soils respond to the proposed types of management actions was used to predict impacts. Spatial and temporal predictions for recovery are based upon what has been observed in the fire area through April 30, 2014, in addition to observing other fire recoveries on the District.

3.3.2 Changed Conditions

Soil Types Affected

Burn severities are defined in a paper by Parsons (2003), which is available in the project record, located at the Hood River Ranger District in Mt. Hood-Parkdale, Oregon. Burn severities are also summarized in the Silviculture Specialist Report. Two main soil types occur in the units that burned with moderate to severe intensity, they are 1C (Alkiridge soils) and 5C (Crackler Variant soils) as described in the Soil Survey of The Dalles Watershed (High, 1989), both of which are on gentle slopes that range from 0-15% (see Figure 3-9). The differences in soil development characteristics are summarized in Table 3-17, and explained in detail below.

Observed organic matter tonnages are taken from Graham (1994), and indicate that there is an ecological range of tonnage and logs per acre; ranging from a low of 10 tons and one log per acre average in the driest ecotypes, to a high of 29 tons and 6 logs per acre in the high elevation riparian areas. Soil types 1 and 5 occur on the higher end of the spectrum, and given their burn severity, could benefit from leaving between 15 and 20 tons and 3 to 5 logs per acre, since they would not be accumulating logs and tonnage once the leave trees fall down.

Table 3-17: Soil types on the Mt Hood National Forest within the planning area and useful ecological characteristics.

	<i>North and West – Neal, Mosier, Upper NF Mill</i>	<i>South and East – Lower NF Mill</i>
Soil types	13/14 → 1 → 5 → 6 → 10 → 4 → 7 → 8 → 3	
Soil characteristics	Glacial, Deeper, Lower rock content, Gentle slopes	→ Steep, High rock content, Shallow
Vegetation	Cedar/W. Hemlock → Moist Grand fir → Dry Grand fir/Doug fir	→ Pond. Pine → Grassland
Climate	Cooler, wetter	→ Warmer, dryer
Organic matter	Average appx. 29 tons and six logs per acre*	→ Average 10 tons and one log per acre*
Fire frequency/type	Less frequent/stand replacing	→ More frequent/underburn
Landslides	Very rare, usually small	→ More frequent, larger

* From Managing Coarse Woody Debris in Forests of the Rocky Mountains (Graham, et.al., 1994)

Soils within this area are developing on gentle, glaciated terrain where slopes rarely exceed 30%. Soil types occurring where activities are proposed include 1, 4, 5, 13 and 14. Soils 1, 4, and 5 are deep, loamy, well-drained, productive soils that contain slightly higher gravel and rock content than described in the soil survey. The deep, loamy nature of the soils allows them to store adequate moisture for the growing season. Factors limiting growth here include cool temperatures and nutrient availability. Nutrients on these sites are stored in the duff layer, woody debris, and very thin light brown topsoil that is found just above the thin (an inch or less), nutrient poor bleached horizon. Soils 13 and 14 are moist to wet, and support stands of aspen/cottonwood and western red cedar. Soils here are silty with a dense clay pan that perches and stores water year round. These soils are nearly black with accumulated organic matter, but productivity is somewhat limited by anaerobic conditions from the high water table, which confines the available rooting zone to the soil surface.

A summary of soil mapping units and their associated management interpretations as adjusted by field observations is located in Table 3-18 below. In the table, soils shaded in gray are the Restoration Thin (Moderate to High Severity) treatment units. Soil types in **bold** (13 and 14) are the riparian areas, and have been included in the table due to the proximity to the remaining units under contract.

Table 3-18: Modified summary of soil types in the analysis area and associated management interpretations adapted from The Dalles Watershed Soil Survey.

Soil Map Units	Compaction Hazard	Erosion Risk		
		Undisturbed	Bare Soil	Bare and Compacted Soil
5C	Moderate	Slight	Moderate	High
1C	Moderate	Slight	Moderate	High
13C/14C	Moderate	Slight	Moderate	Moderate

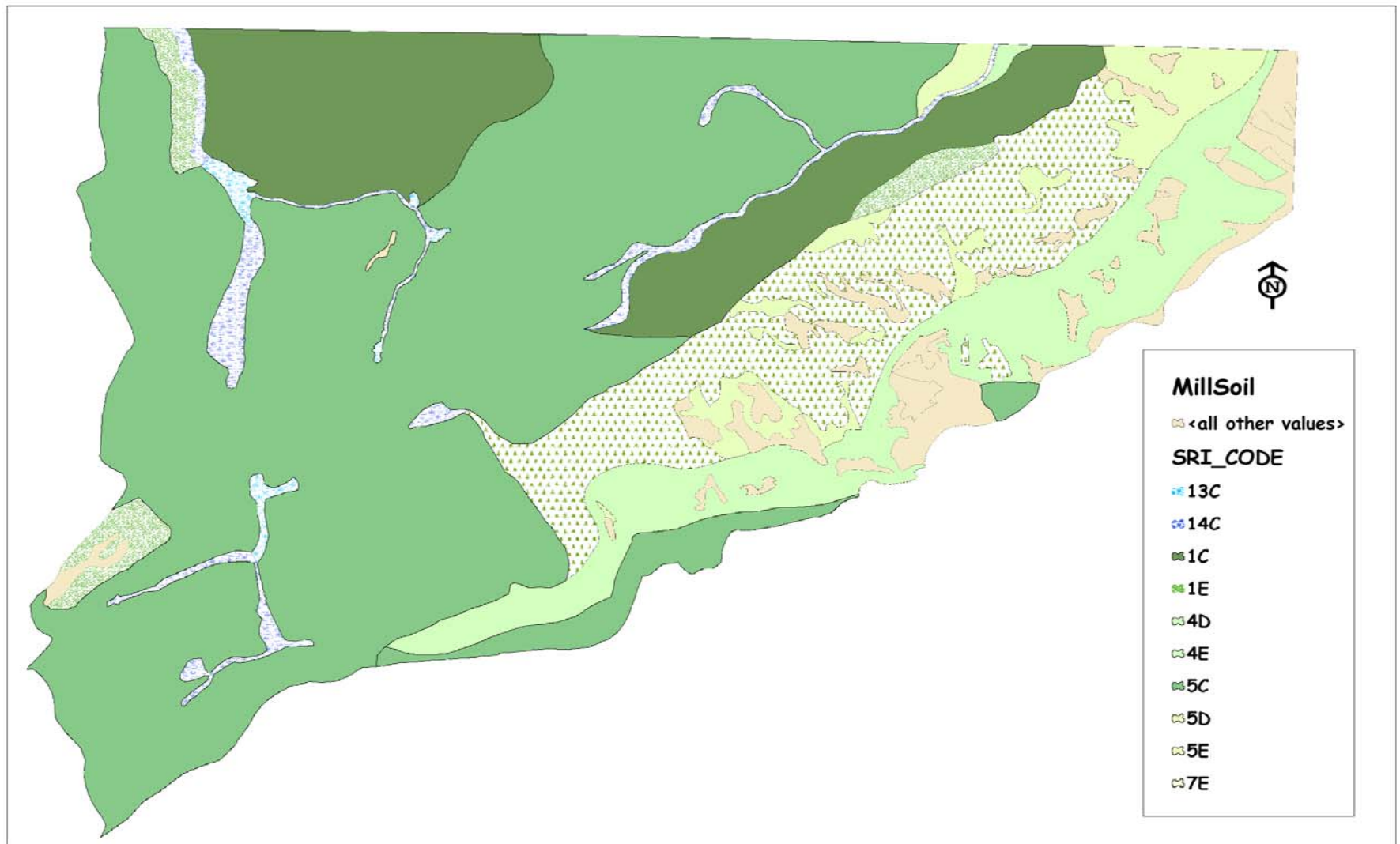


Figure 3-9: Soil map units in the NF Mill Planning Area are fairly simple in the solid greens, more complex and variable in the tans and stippled patterns. 'All other values' consists of smaller mapped units lumped together in lower NF Mill Creek Canyon.

Note: SRI_CODE in the legend refers to the Mt Hood National Forest Soil Resource Inventory (Howes, 1979), from which High provided much finer detail in his mapping effort of The Dalles Watershed. SRI_CODE equates with Soil Type.

Soil Erosion Risk

No active erosion from previous vegetation management or inside the current sale units where severe burning occurred was observed during the field surveys for this project. Yet, there is a heightened risk of erosion due to the loss of effective groundcover in blocks covering several acres at a time. Localized erosion was observed where total groundcover was lost on steep road cutslopes, likely the result of an unusually heavy rainstorm at the end of September, 2013. The Dalles airport reporting station recorded 0.88 inches of rain in a 72 hour period from September 27-29, as the remnants of a tropical storm impacted the region (Weather Underground archive). Precipitation totals on the fire were likely much higher, and there was an expectation that more erosion would be seen, but it was not the case. Needlecast has occurred where moderate fire severities were experienced, and occurs in discontinuous patterns across the 146 acres of sale units under contract where moderate and severe burn severities are intermixed. By occurring in a mosaic pattern, and on such flat ground, erosional forces cannot gather momentum to mobilize material and move it very far, if at all.

3.3.3 Effects Analysis/Environmental Consequences

Soil Erosion Risk

No Action

The risk of erosion within the proposed treatment units would remain low in unburned and low severity areas, but elevate from low to moderate in areas where the most severe burning occurred. This heightened risk would last for approximately the next 1 to 3 years because groundcover protecting the soil surface from erosional influences is absent. As was observed in fires such as Gnarl and Dollar Lake to the west, shrubs and forbs would resprout and grow robustly, and standing dead trees would begin to shed branches and/or fall over completely. After a few years, the severely burned areas would likely stabilize completely, and the erosion risk would decline back to a rating of low over all the acres. Figure 3-10 shows the needlecast in the moderate burn areas that has occurred within just weeks after the fire. This natural mulching is a very effective groundcover, with the erosion risk very low.



Figure 3-10: Needlecast in moderate burn areas showing effective groundcover.

Under the No Action Alternative, there are still 152 acres of hazard tree treatments due to health and safety along road systems. As currently described and flagged in the field, the actual acreage impacted should be lower due to the clumpy nature of the trees, proximity to the road system, design of this particular activity, and topography. Therefore, it is not expected that risk of soil erosion along the roads would be elevated beyond moderate, and should there be any soil movement, the distance would be very short.

Alternative 2 – Proposed Action

For Restoration Thin (Moderate to High Severity) treatment units, the soil erosion risk would increase with implementation because bare soil would be disturbed and compacted. The erosion risk is high in compacted/bare areas, such as skid trails and landings, and some soil movement is likely to occur in the first year or two following project implementation as a result. As amount of bare, bare/compacted soil increases, so does the risk of soil movement. Actual erosion occurrence depends on weather events that would provide the energy to move soil material from one location to another.

In order to diminish this risk while soils are exposed, certain erosion control techniques are practiced to reduce erosive energies. The effectiveness of these ‘BMPs, is discussed by Rashin et.al. (2006). Comparing the Proposed Action to their application of studied BMPs would indicate the proposed buffers and logging system criteria would substantially reduce the risk of resource damage should a storm event occur while the ground is exposed. For example, the study showed an assessment of surface erosion and sediment routing during the first two years following harvest indicated a 10 meter (approximately 30 feet) setback from ground disturbance can be expected to prevent sediment delivery to streams from about 95% of harvest related erosion features. The Proposed Action buffers approximately 5 times that distance, in addition to directional felling that would further reduce erosion features and disturbance. Furthermore, the logging itself would create a more immediate input of branches, twigs, and other small wood, that would contribute to effective groundcover in the most severely burned areas and help offset the impacts of the skid trails and landings. Therefore, by maintaining and producing as much protective groundcover as possible, along with BMPs, the risk of soil actually exiting the units and subsequent sediment delivery caused by the thinning treatments is extremely small. There would be areas that do not immediately meet the effective groundcover standard of 60%. All areas should meet in less than 3 years.

In addition to the proposed thinning treatments, there are 134 acres of hazard tree treatments for health and safety along road systems. As currently described and flagged in the field, the actual acreage impacted should be lower due to the clumpy nature of the trees, proximity to the road system, design of this particular activity, and topography. Therefore, it is not expected that the risk of soil erosion along the roads would be elevated beyond moderate, and should there be any soil movement, the distance would be very short.

Alternative 3 – Snag Retention

The effects to the soil erosion risk would be similar to those described in the No Action Alternative for Hazard Tree treatments. The effects to soil erosion risk would be similar, with a slightly higher amount of acreage (167 acres).

Detrimental Soil Conditions

No Action

Damaged soils would continue to recover and change at an unknown rate as roots, animals, and other influences slowly break up existing compaction. The effect of soil recovery is a gradual increase in available soil (therefore nutrients and water) for all normally expected soil biological, chemical, and physical functions to occur. Soils damaged by the most severe burning were very small and localized. To actually get the soil color and structural changes to meet the severe definition, it takes a great deal of heat and duration, which only occurred under large logs or fuel concentrations scattered across the landscape.

Effects on detrimental soil conditions caused by the hazard tree removal on 152 acres would be measurable, but would likely not exceed the Forest Plan standard of 15 percent.

Alternative 2 – Proposed Action

The logging systems for the treatment units have been designed to ensure less than 15% of the area is impacted (ground disturbance) within each individual unit. Since ground disturbance does not equate with detrimental soil condition, and design already has impact area below 15%, it is not expected that any of the treatment areas would exceed the Forest Plan standard. Soils underlying skid trails nearest landings are most likely to incur detrimental damage because they receive the most trips with equipment. Further away from landings, soils are impacted less and less as fewer trips occur over them. The past several years of Forest Plan monitoring results indicate a clear trend in the reduction of detrimental impacts due to the use of lower ground impact machinery. Observations during monitoring indicate obvious detrimental impacts on main skid trails and landings that receive numerous trips with higher impact machinery (such as skidders), with much less impact on lateral trails and within the unit where harvester equipment typically works.

There would be an increase in the amount of detrimental soil damage within the Restoration Thin and Hazard Tree treatment units caused by heavy equipment. This increase is not expected to exceed Forest Plan standards, and therefore, there would be no accompanying decrease in site productivity. A study of post fire logging conducted in northeastern Oregon on similar sites showed an increase of detrimental condition of less than 5% above existing levels in spite of higher levels of actual soil disturbance (McIver and others, 2006.).

Alternative 3 – Snag Retention

The effects to the soil erosion risk would be similar to those described in the No Action Alternative. The effects causing detrimental soil conditions would be similar, with a slightly higher amount of acreage (167 acres).

Organic Matter Levels

No Action

Soil organic matter and corresponding soil functions would continue to occur as they are in a general sense. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms

or wildfire. In addition, organic matter decomposition is influenced substantially by temperature, moisture, and fire, thus the rate of decay and cycling would continue accordingly. As dead and dying trees shed branches, bark, and tops, and then fall over there would be a large influx of organic matter in the next 10 to 20 years. In the Hazard Tree Treatment units, sufficient material would be left on site to meet tonnage requirements on the majority of acres immediately following project completion.

Alternative 2 - Proposed Action

The project is designed to leave more organic matter than was originally proposed due to the burn severity. Therefore, organic matter levels are expected to be met on the majority of acreage. Some localized acreage in thinning and hazard tree units directly adjacent to roads, where the risks of fire ignitions are higher, may be below 15 tons per acre. However, due to the nature of the thin, linear nature of how these acres lie, it is not expected to result in a measured reduction of soil function or productivity. In addition, as trees and limbs from just outside the 200-foot hazard tree area fall into acres below the tonnage goal they would increase and likely meet the tonnage over the long-term (in less than 10 to 20 years).

In most thinning areas there would be substantial future organic matter left standing in addition to material on the ground, although it is likely localized acreage would be lower than Forest Plan standards for organic matter in the higher burn severity areas. By designing the project to leave additional tonnage and logs per acre than originally proposed, the renewed forest should have sufficient organic matter capital over the short and long term.

Alternative 3 – Snag Retention

In the Hazard Tree Treatment units, sufficient material would be left on site to meet tonnage requirements on the majority of acres immediately following project completion as described under Alternative 2.

Overall Impacts

No Action

The overall impacts from the No Action Alternative are a result of the fire itself, which is now considered the baseline condition. Needlecast from the moderately burned areas would remain intact and in place, providing very efficient groundcover protection. High severity burn areas would rely on more resprouting of vegetation and input from above from dead branches falling to the surface, the rate at which would be determined by rate of decay, snow loads, and wind primarily; all of which are unpredictable. It is estimated that it should provide a large flux of organic matter in less than 4 years based on observances of other past fires in the area. Considering baseline factors in Table 3-19 below, which include Burn Severity through Surface Roughness and the current road conditions, the risk of hillslope sediment transport is low.

Alternative 2 – Proposed Action

Table 3-19 below, summarizes the overall risk of the Proposed Action plus baseline factors, and is a modification of one used in the McIver report (2006), previously mentioned. The Overall Risk is Low to Moderate due to the additional disturbance from heavy equipment, although equipment impacts are offset somewhat by the immediate input of down woody material. Table

3-21 compares the three alternatives in terms of how well they meet the three main forest standards and guidelines assessed throughout this report.

Table 3-19: Factors contributing to hillslope sediment transport and relative risk of predicted impacts.

Factor	Mosier Creek Headwaters	Relative Risk
Burn Severity	Moderate to High	Moderate to High
Water Repellency	Very Minor	Low
Recovery of Groundcover	Rapid in < 4 years	Low
Soil Types	Alkiridge and Crackler Variant	Low for 0-15% slope Moderate for compaction Moderate for infiltration rate
Surface Roughness	Increased	Low
Logging Systems		
Felling	Machine	Moderate
Retrieval	Skidder or forwarder	Moderate
Soil Conditions	Dry, Late summer-fall season	Low
Roads		
New Roads	None	Low
Existing Road Condition	Good	Low
Overall RISK		Relatively Low to Moderate

Alternative 3 – Snag Retention

Overall effects from this alternative are very small and localized along the edges of roads that would have hazard trees cut and removed. No adverse short or long term impacts are expected from this alternative.

Cumulative Effects

EA, Chapter 3 includes a comprehensive list of past, present and future actions which were reviewed for potential soil impacts overlap in time and space. Most projects dropped off the list due to a lack of overlap. Only projects that overlap in either time or space with actions in the North Fork Mill Revised EA or have a potential cumulative effect are included in Table 3-20 below, which provides a qualitative assessment of the remaining potential cumulative soil resource effects. It shows existing and potential projects, effects from those projects that may result in cumulative effects with actions in the North Fork Mill Revised EA, and an assessment if a measureable cumulative effect is expected.

Table 3-20: Cumulative Effects Summary.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect	Extent, Detectable?
		Time	Space		
<p>Government Flats Complex Fire (including BAER* and Fire Suppression Rehabilitation projects)</p> <p>*Burned Area Emergency Response</p>	Hillslope Erosion from High Burn Severity areas	Yes	Yes	No	<p>There may be an overlap in timing of effects from the Government Flats Complex Fire and associated activities and activities in North Fork Mill Revised EA. As described in the Changed Condition section and the No Action Alternative in the Water Quality Specialist Report, increased coarse and fine sediment is expected from the fire. Some fine sediment input resulted from initial construction of dozer fireline in the headwaters of Mosier Creek. The fireline has been rehabilitated and would have mulch applied in the spring of 2014 to further stabilize it. The amount of sediment would decrease through time as physical soil and vegetation conditions recover. In addition, the flat terrain and undisturbed ground lying between waterways and proposed ground disturbance provides ample opportunity for settling out of any minor soil movement that could move downslope.</p> <p>BAER treatments focused on the North Fork Mill Creek sub-watershed and would result in reduced hillslope and road erosion and sedimentation in the FSR 1711630 road area and North Fork Mill Creek. There may be an overlap in timing of these events with activities in North Fork Mill Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on activities in North Fork Mill Revised EA.</p>

3.3.4 Consistency Determination

Effective groundcover and organic matter standards are not being met across all acres under the current post-fire condition. As such, a Forest Plan exception would be needed for Forest Plan standards FW-022, FW-023, FW-025 and FW-033. However, the trend over the next few years is to meet this standard as dead material comes down, and the ground recovers its vegetative cover.

3.3.5 Summary of Effects by Alternative

The following table is a summary of effects by alternatives for this project.

Table 3-21: Summary of Forest Plan Standards by Alternative.

Alternative	Effective Groundcover	Detrimental soil condition > 15%	Organic Matter Levels to Forest Plan Standard
No Action	Does not meet 60% on every acre currently. Would likely meet in less than 4 years.	Would remain well under 15%.	On the ground tonnage does not currently meet on all acres, especially moderate to high severity burned areas. Would likely meet on most acres in less than 4 years once material comes down.
Alternative 2 - Proposed Action	Does not meet 60% on every acre currently. Would likely meet sooner than no action across more acreage.	Not likely to exceed 15%.	On the ground tonnage does not currently meet on all acres, especially moderate to high severity burned area. Would likely meet sooner, and on more acres than with other alternatives because material would be brought down intentionally.
Alternative 3 – Snag Retention	Does not meet 60% on every acre currently. Would likely meet in less than 4 years.	Not likely to exceed 15%.	On the ground tonnage does not currently meet on all acres, especially moderate to high severity burned areas. Would likely meet on most acres in less than 4 years once material comes down.

3.4 Water Quality

More information is available in the project record including the full water quality analysis file as part of the Water Quality Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.4.1 Analysis Assumptions and Methodology

The following effects analysis utilizes research, relevant monitoring, field data and modeling to provide a context, amount and duration of effects for each of the alternatives.

GIS analysis and additional modeling were completed for a variety of site conditions and parameters in the project area. Applicable portions of the Burned Area Report dated September 30, 2013 prepared by the Forest Service will be used to characterize the changed conditions, No Action alternative and portions of this effects analysis (USDA Forest Service, 2013). This report was prepared by a variety of resource specialists experienced in wildfire effects and utilized several models to characterize changes in peak flow and erosion rates that may result from the fire and treatments prescribed as part of the Burned Area Emergency Response (BEAR) effort. The models used in the Burned Area Report are widely accepted in the fire community as reflecting the most current knowledge and science of peak flow and erosion/sedimentation effects resulting from wildfires. The job of the BAER team is to identify imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on National Forest System lands and take immediate actions, as appropriate, to manage unacceptable risks.

Some considerations about strengths and weaknesses associated with the analysis approach discussed above include the following.

Table 3-22: Strengths and Weaknesses of the Water Quality Analysis Approach

Analysis Method	Strength	Weakness
GIS Generated Site Data	Provided more site-specific data for effects analysis. This led to a more accurate effects analysis.	Since layers in GIS are updated as new, more accurate data becomes available, there may be some inaccuracies in current mapping. Accuracy depends on the level of field verification and ownership.
Effectiveness of Aquatic Mitigation Measures and Design Criteria	Effectiveness of various erosion control measures in reducing erosion is well documented. General effectiveness of buffers in reducing sediment and other impacts is well documented.	Effectiveness of various buffer widths on reduction of effects to surface water is not extensively documented in a wide variety of physical settings.
BAER Analysis	Some of the model input parameters can be adjusted to reflect site conditions. This resulted in more accurate representations of potential erosion and sediment	Not able to adjust all of the variables that reflect all of the actual physical conditions in the project area. Results are for a broad geographic area and may

Analysis Method	Strength	Weakness
	delivery	not totally reflect detailed, site specific conditions.
	Model results give an actual value for changes in peak flow, erosion and sediment delivery.	The model results have some error associated with predicted results versus actual results.
Stream Inventories	Provided more site-specific data for effects analysis. This data has been collected in a Nationally standardized protocol by trained resource professionals.	Some of the inventories are older and some conditions may have changed between the time the data was collected and the present time.
Field Reconnaissance	Able to view and collect site specific information on the analysis area.	Not able to visit all sites
Analysis Method	Strength	Weakness
	Some of the model input parameters can be adjusted to reflect site conditions. This resulted in more accurate representations of potential erosion and sediment delivery	Not able to adjust all of the variables that reflect all of the actual physical conditions in the project area.
WEPP Model	Model results give an actual value for erosion and sediment delivery.	Model results have been documented to underestimate actual amounts of erosion and sediment delivery (Welsh, 2008). The model documentation states that results can be up to + or – 50% of actual amounts.

The following assumptions are utilized in the Water Quality Analysis:

- All Best Management Practices (BMP) and Project Design Criteria (PDC) listed in the Revised Environmental Assessment (EA), Chapter 2 would be implemented and effective as described in the BMP Table in Appendix 1 of this Environmental Assessment.
- The areas of impact outlined in the Revised EA are actual areas of disturbance during implementation.
- Monitoring effectiveness of PDC and compliance would be a component of project implementation.
- All surface water areas have been identified through field work prior to project implementation.
- The number of hazard trees cut in the Riparian Reserve is the same between the No Action Alternative, Alternative 2 and Alternative 3.

3.4.2 Changed Conditions

As outlined in the Project Description section, this area experienced a wildfire during the summer/fall 2013. This analysis will only include portions of the planning area or actions that have experienced some kind of changed condition from the original North Fork Mill Restoration Opportunities EA (2008). Areas and/or activities that are not considered to have a changed

condition include all activities located outside of the fire perimeter, all completed work, road decommissioning, and culvert replacements. Activities that were proposed in the original North Fork Mill Creek EA and located in low severity to unburned areas within the fire perimeter are not considered to have a changed condition for water quality or quantity. The following table identifies changed conditions relating to water quality and quantity for this proposal. Each of these changed conditions will be discussed in detail in the following sections. Effects for activities proposed that do not include one or more of these conditions are covered in the original North Fork Mill Restoration Opportunities Water Quality Specialist Report (Kreiter 2008) and corresponding EA.

Table 3-23: Changed Conditions Relating to Water Quality and Quantity

Condition	Kind of Change	Result in Different Effects from Original EA?	Comments
Moderate to High Severity Burn Areas	Physical Conditions on the Ground	Yes	The 2013 Government Flats wildfire has changed baseline conditions relating to water temperature, erosion, sedimentation, runoff amounts and riparian area condition.
Fire Suppression Activities	Physical Conditions on the Ground	Potentially	Fire Suppression Activities, primarily firelines constructed by heavy equipment, has changed baseline conditions relating to erosion and sedimentation.
BAER Treatments	Physical Conditions on the Ground	Yes	BAER Treatments including road and slope treatments will reduce some detrimental soil and water effects from the Government Flats Complex Fire.
New State Water Quality Listings and Delistings	Change in Law, Regulation or Policy	No	Mosier Creek and North Fork Mill Creek were added to the 2010 Oregon DEQ Integrated Assessment as Category 2-Attaining Water Quality Standards for Biocriteria. Additionally, these two streams were removed as Category 5-Water Quality Limited for Water Temperature since a Total Maximum Daily Load (TMDL) was completed.
New Forest Service Best Management Practice (BMP) Process	Change in Law, Regulation or Policy	No	A new National BMP process has been adopted by National Forests throughout the nation. This process includes standardized BMP, a series of BMP monitoring protocol and a database.
New MOU Between the Forest Service and the Oregon State Department of Environmental Quality (DEQ)	Change in Law, Regulation or Policy	No	The Forest Service and Oregon DEQ just completed a new MOU (signed in 2014) that identifies roles and responsibilities of each agency in implementing the Clean Water Act on National Forest lands in the State of Oregon

A majority of the activities proposed in the North Fork Mill Creek Revised EA occur in the Mosier Creek (21K) and North Fork Mill Creek (14A) 7th field sub-watershed. Approximately 24 acres (0.2 percent of the total sub-watershed area) of hazard tree removal is proposed in the South Fork Mill Creek (14B) sub-watershed. Since this activity is along a ridge top road, not in any Riparian Reserve, and very few trees are expected to be cut due to the low severity burn, no detrimental effects to water quality and quantity are expected from this activity. As such, the South Fork Mill Creek sub-watershed will not be discussed further.

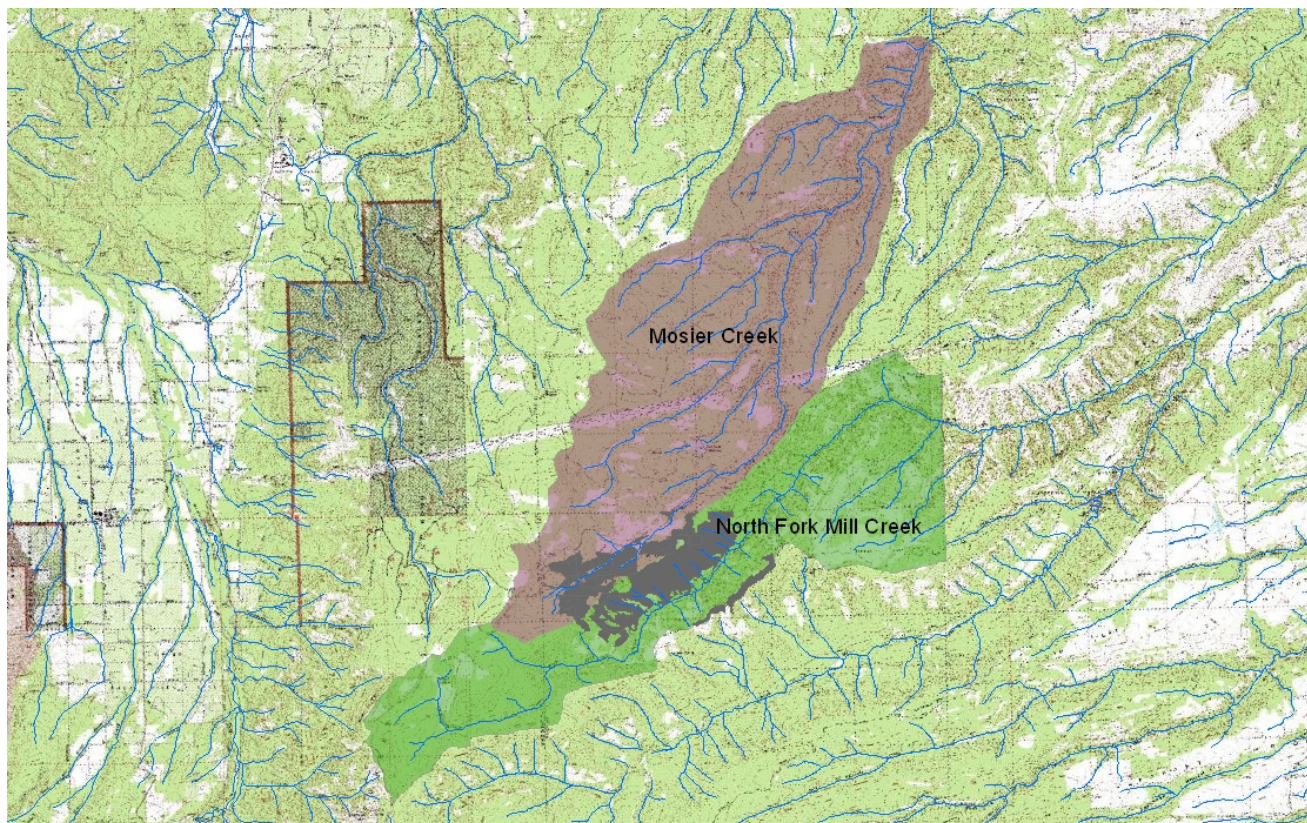


Figure 3-11: Map of the Water Quality Analysis Area showing 7th field sub-watersheds. The North Fork Mill Creek Revised EA Analysis Area is shown in gray.

Moderate to High Burn Severity Areas

As a result of the Government Flats wildfire, approximately 5 percent of the total Mosier Creek sub-watershed burned low to high severity while approximately 41 percent of the North Fork Mill Creek sub-watershed burned low to high severity. The table below displays the percent of each sub-watershed burned by severity class.

Table 3-24: Percent of Sub-watershed Burned by Severity Class

	Low Severity	Moderate Severity	High Severity
Mosier Creek	1.6%	2.5%	0.7%
North Fork Mill Creek	15.2%	15.4%	10.5%

Approximately 47 percent of the Riparian Reserves in the Forest Service portion of the analysis area did not burn or burned at a low severity. Fifty three percent of the Riparian Reserve burned moderate to high severity. A majority of the moderate to high severity burn in Riparian Reserves occurred in the North Fork Mill Creek sub-watershed.

The table below shows acres of Riparian Reserve burned by severity class.

Table 3-25: Acres of Riparian Reserve Burned by Severity Class

Severity Class	Mosier Creek Sub-watershed	North Fk. Mill Creek Sub-watershed
Low	15	103
Moderate	37	85
High	3	102

In the moderate to high severity burn areas, the Government Flats Burned Area Report stated that “Combustion of the litter and humus layers on the soil surface was complete. Several inches of grayish-white ash cover the ground. Fine roots were consumed within the top ½ to 1 inch below the soil surface, but below that they were wholly intact. Soil color and structure was not altered to depth except in some places a thin layer at the surface, or as mentioned where large fuels in contact with the ground burned for a prolonged period of time.” Needle cast is expected to provide “natural” mulch which would reduce some erosion and sedimentation in moderate severity burn areas.



Figure 3-12: Photo showing needle cast in a moderate severity burn area near Mosier Creek in treatment area 83.



Figure 3-13: Willow resprouting in a moderate to high severity burned portion of treatment unit 83. This picture was taken on October 30, 2013.

The report goes on to state “The largest threat to water quality” from the wildfire “is increased turbidity and sedimentation resulting from primary hillslope erosion and secondary sediment introduction by channel bed and bank erosion. It is estimated from the high severity soil burn severity area on National Forest System Lands that there is the potential for 0.6 tons per acre sediment delivery associated with a 10 year event...” Most of the source areas for post-fire slope failures are the steep, moderate to high severity burn areas in the North Fork Mill Creek sub-watershed.

Increased peak flows are anticipated due to decreased infiltration of precipitation into soil, loss of surface roughness and increased “bulking” of runoff with ash from the fire. It is estimated that there would be a “~25% increase in the 10 year peak streamflow event at approximately the National Forest Boundary...” The table below from the BAER Report shows increased peak flows modeled after the Government Flats Complex Fire for a 10 year streamflow event. Specialists that prepared the report used the model FireHydro (Cerrelli, 2005) to calculate post fire runoff for these areas.

Table 3-26: Pre and Post Fire Peak Flow Estimates by Sub-watershed

Sub-watershed	Area (acres)	Pre-Fire Peakflow (cubic feet per second - CFS)	Post-Fire Peakflow (CFS)	Post-Fire Peakflow with Bulking from Ash (CFS)	Percent Increase from Pre-Fire Flows
North Fork Mill Creek	4142	419	549	582	39%
Mosier Creek	1391	140	171	178	25%

Fire Suppression Activities and BAER Treatments

Fire suppression activities including construction of firelines utilizing heavy equipment may increase surface erosion and sedimentation depending on the location and post fire rehabilitation. Approximately 3100 feet of equipment constructed fireline or dozer fireline was constructed in Riparian Reserves. Almost 1200 feet of the total is located in the headwaters of Mosier Creek. This fireline is on flat ground (average less than 10 percent) and was rehabilitated by pulling fill material out of the drainage and waterbarring to reduce the risk of erosion. The fireline would be mulched with straw this spring to further reduce erosion. The rest of the dozer fireline in Riparian Reserves is located outside the analysis area.

BAER treatments that were proposed in the Burned Area Report include measures to stabilize steep, potentially unstable drainages in the North Fork Mill Creek sub-watershed and road segments primarily along Forest Service Road (FSR) 1711630. According to the report “Structural stability of Forest Road 1711-630 (Slobber Drive) from MP 0.3-1.9 is at Very High risk of likely substantial erosion damage.” “High burn severity on select sites where headwater convergence zones and steep draws are located were determined to be at a very high risk for accelerated erosion”. The higher risk convergence zones were identified for aerial or hand mulching to reduce the potential for erosion and sedimentation into North Fork Mill Creek. Aerial mulching plans were later abandoned after erosional responses were observed after a fall rainfall event. “...there was a storm that dropped about 3.5 inches of precipitation over a 4 day period, during and afterwards of which it was observed that turbidity had not been notably elevated. Hence, the team felt that the aerial treatments that were initially prescribed could be abandoned, because their efficacy relative to the amount of observed post-storm erosion seemed debatable, particularly cost vs benefit”. Other treatments are planned for implementation in the spring of 2014.



Figure 3-14: Photo showing steep high severity burn area identified for hand mulching as a BAER treatment. This draw is located in the North Fork Mill Creek sub-watershed.

New State Water Quality Listings/Delistings

Oregon Department of Environmental Quality (DEQ) updated its Integrated Report on Oregon's Surface Water in 2010. As a result of that process, Mosier Creek and North Fork Mill Creek were added as Category 2-Attaining Water Quality Standards for Biocriteria. Additionally, a TMDL plan for water temperature for streams in the project area (Miles Creek Sub-basin) was completed and accepted by the EPA in 2009. Mosier Creek and North Fork Mill Creek were removed as Category 5-Water Quality Limited for Water Temperature in the 2010 report since a TMDL was completed. All other listings in the original North Fork Mill Restoration Opportunities EA remain unchanged. For a description of TMDLs within the planning area, see the Water Quality Specialist Report prepared for North Fork Mill Creek Restoration Opportunities EA in 2008.

New Forest Service Best Management Practice (BMP) Process

A National Core BMP Technical Guide (USDA Forest Service 2012) was issued that identifies standardized BMP for a variety of activities that may occur on National Forest System (NFS) lands. Draft monitoring protocols that are part of the National Process were tested during the summer of 2012 and 2013 on the Mt. Hood National Forest.

New MOU Between the Forest Service and Oregon DEQ

The Forest Service's responsibilities under the Clean Water Act (CWA) are defined in a 2014 Memorandum of Understanding (MOU) with Oregon DEQ. The MOU designates the Forest Service as the responsible agency for meeting the CWA on NFS lands and recognizes BMPs as the primary mechanism for control of non-point source pollutants on NFS lands. It recognizes that BMPs are developed by the Forest Service as part of the planning process and includes a commitment by the Forest Service to meet or exceed standards (USDA Forest Service, 2014). BMPs that apply to the project are identified in Appendix 1 of this Environmental Assessment and are discussed throughout this report.

3.4.3 Effects Analysis/Environmental Consequences

No Action – Direct and Indirect Effects

Areas that burned moderate to high severity have the potential to have increased sediment input to adjacent surface water through increased landsliding and surface erosion, increased stream channel and bank erosion from increased runoff and sediment bulking from ash deposits. Sediment yields for the Wilson River watershed in Oregon were 252 tons per square mile per year or 5.7 times higher than for a comparable unburned watershed, after the 1933 Tillamook Fire. The number of days that the river experienced very high turbidity (sediment concentrations greater than 27 mg. per liter) increased from 18 to 102 days per year (Anderson 1976). It is not known to what extent salvage operations in the burned area contributed to this sediment increase. Increased sediment yields were found after a wildfire burned three relatively steep watersheds (average slopes of 50percent) in the central Washington Cascades (Helvey 1980, Helvey et. al. 1985). An increased susceptibility to debris torrents was noted following the fire and was an important factor in causing increased sediment yields.

While much of the sediment increase can occur within the first year after the fire (Agee 1993, DeBano et. al. 1998), it may take many years for sediment levels to reach pre-fire levels depending on fire severity. DeBano et al. (1996) demonstrated that following a wildfire in ponderosa pine, sediment yields from a low severity fire recovered to normal levels after three years, but moderate and severely burned watersheds took 7 and 14 years, respectively. Robichaud and Brown (1999) reported first year erosion rates after a wildfire from 9 to 22 tons per acre decreasing by one to two orders of magnitude by the second year and to no sediment by the fourth in an unmanaged forest stand in eastern Oregon. Erosion rate reduction was due to recovery of natural vegetation. First year growing season shrubs, forbs and grasses accounted for 28 percent of the total ground cover whereas after the second growing season, total ground cover was 82 percent. Rhoades and others (2011) found that basins that burned at high severity on greater than 45 percent of their area had four times the turbidity as basins burned to a lower extent and these values remained elevated through 5 years post-fire. The researchers concluded that due to the slow pace of tree colonization and forest regrowth, recovery of the watersheds burned by the Hayman Fire will continue for decades. Under this alternative, hillslope erosion would likely increase from a reduction in live canopy and consumption of organic material on the forest floor from the Government Flats Complex Fire, especially in stands that burned at high severity. This could lead to increased sedimentation due to delivery of hillslope erosion material and channel bed and bank erosion.

There would be no reforestation activities associated with harvest units under the No Action Alternative; however, soil stabilization would occur once shrubs, grasses, and tree seedlings reestablish. Hillslope erosion may continue longer because tree regrowth and evapotranspiration, precipitation, and interception would occur at natural rates which are estimated to be slightly lower than in areas where conifers are planted. Re-growth and needle-fall established since the fire would not be disturbed by mechanical treatments. In the short term, establishment of fine woody material may be lower than within treatment areas because harvesting activities would break branches of harvested dead trees. Down wood from falling dead trees would increase over the next 5-10 years and provide surface roughness to trap and store sediment.

Hazard trees would be cut down through time as they become safety risks along road systems and work areas. There is a potential of hazard tree cutting within 7.2 acres of Riparian Reserve. Some of these trees would be in the primary shade zone although their influence on shade would be low since they lack limbs and a canopy.

Stream temperatures in Mosier Creek and North Fork Mill Creek would initially increase due to loss of stream shading in the moderate to high severity burn areas due to burning of the shrub component and loss of tree canopy closure by burning up the tree limbs. These temperatures should recover as vegetation recovers and provides shading. Rhoades and others (2011) found that stream temperatures in burned areas increased by an average of 29 degrees F compared to unburned areas in the Hayman Fire Complex in Colorado. Research on the effects of wildfire on stream temperature is limited, but there is quite a bit of research on burning after clearcut logging. In the central Oregon Cascades, clearcut harvesting along a stream increased summertime maximum stream temperatures by 4 degrees F. This same area was burned the following year and stream temperatures increased 14degrees F when compared to an undisturbed forest watershed (Levno and Rothacher 1969). In the central Oregon Coast Range, clearcut harvesting along a stream increased maximum stream temperatures by 17degrees F; after a hot slash burn, an additional increase of 10degrees F was measured the following summer (Brown 1972). The above mentioned studies indicate that riparian vegetation that experiences a high severity burn has the potential to increase water temperature due to loss of stream shading.

Alternative 2 – Direct and Indirect Effects

Stream Temperature

Vegetation removal near water bodies has the potential of increasing solar radiation to surface water which in turn may increase water temperature. This analysis utilized tools contained within the *Northwest Forest Plan Temperature TMDL Implementation Strategy* (USDA and BLM 2012) document to identify necessary shade so that stream temperatures within treatment areas would not increase as a result of vegetation treatments. The document was the result of work between the U.S. Forest Service and the Bureau of Land Management (BLM) and identifies how to maintain sufficient stream shading to meet the Clean Water Act while providing the opportunity to treat Riparian Reserve vegetation to improve riparian conditions.

The concept of the Implementation Strategy is to maintain a primary shade zone of vegetation next to the stream and identify a secondary shade zone and other areas within the Riparian Reserves further away from the stream that can be treated to reach Riparian Reserve objectives while maintaining stream temperatures. In order to maintain sufficient shade next to the stream, the primary shade zone is untreated. The size of this zone is dependent on the height of the trees that would be removed and the hill slope (Table 3-27). The buffers were developed by calculating the width of the riparian area adjacent to perennial stream channels that provides stream shade for the period of greatest solar loading (between 1000 and 1400 hours), known as the primary shade zone, and the width of the riparian area that provides shade in the morning and afternoon (0600-1000 hours; 1400-1800 hours), considered the secondary shade zone. In dense riparian stands, optimum shade can be provided by the primary shade zone alone, and the secondary shade zone may contribute little to no shade since trees in the primary shade zone are already blocking the sun's solar radiation.

Table 3-27: Width of Primary Shade Zone

Height of Tree	Hill slope <30%	Hill slope 30% – 60%	Hill slope >60%
Trees < 20 feet	12 feet	14 feet	15 feet
Trees 20 to 60 feet	28 feet	33 feet	55 feet
Trees > 60 feet to 100 feet	50 feet	55 feet	60 feet
Trees > 100 feet to 140 feet	70 feet	75 feet	85 feet

As an example, if the heights of trees in the riparian area are predominately less than 20 feet tall, the primary shade zone would be 14 feet wide for an area that had 30 percent to 60 percent hill slopes next to the stream.

The only units where removal of vegetation is proposed in Riparian Reserves are 11A, 87, 106A, 107A, 108A. Trees in the Riparian Reserve in units 106A, 107A and 11A were either unburned or low severity so water quality and quantity effects are analyzed in the original North Fork Mill Restoration Opportunities EA (2008) as there is no changed condition. In the moderate to high severity burn areas in 87 and 108A, most of the shading capability of the adjacent riparian vegetation has been lost due to burning of the shrub component and loss of tree canopy closure by burning up the tree limbs. Additionally, there is a potential of hazard tree cutting within 7.2 acres of Riparian Reserve. Only dead and dying trees that pose a hazard to area roads would be cut and left onsite in the Reserve. Very few trees are expected to be cut in the primary shade zone of Mosier Creek. All Restoration Thin units within the moderate to high severity burn area would maintain a 150 foot Riparian Reserve with no activity proposed in the Reserve.

Due to the limited amount of activity within the Riparian Reserve, treatments associated with the North Fork Mill Creek Revised EA are expected to have an immeasurable effect to stream temperatures described in the No Action Alternative of this report.



Figure 3-15: Photo showing hazard tree removal area along Mosier Creek in unit 108A

Sediment

Soil-disturbing activities were evaluated for the potential to increase hillslope erosion and potential sedimentation in streams. Ground disturbing activities within this alternative that could potentially increase short-term hillslope erosion and stream sedimentation include: reopening and use of temporary roads, construction and use of landings and skid trails, hazard tree removal and log haul in Riparian Reserves. A detailed discussion of soil erosion and hillslope sediment transport related to the salvage of dead and dying trees is contained in the Soil Productivity Specialist Report, available in the project record located at the Hood River Ranger District. According to the soils analysis, the risk of erosion and hillslope sediment transport are expected to be low to moderate due to physical conditions and implementation of BMPs or PDC as they are referred to in Chapter 2 of the Revised EA. The soils analysis is based on pertinent research including McIver (2006), which looked at soil disturbance and hillslope sediment transport after logging a severely burned site. The risk of delivery of any hillslope eroded sediment to adjacent streams is low due to the flat topography of the project area and maintaining a 150 foot unharvested Riparian Reserve. This area would maintain existing trees that are expected to drop branches, needles and tree boles through time that would provide more surface roughness to store eroded soils prior to reaching Mosier Creek. Research suggests downed wood in burned riparian zones can trap fine sediment before it erodes to channels and intrudes into stream substrates (Wondzell & King 2003). “Riparian plants exhibit a suite of adaptations that allow

relatively rapid recovery after fire. Adaptations include epicormic and basal sprouting, windborne and waterdispersed seeds, refractory seeds buried in the soils, and on-plant seed storage” (Reeves and others, 2006). This relative rapid recovery of effective ground cover would provide additional stability components that would hold soil and store potential eroded material.

The Alternative 2 would re-open approximately 0.3 miles of existing temporary road. The two reopened roads re-trace the alignment of temporary roads that were recently used for the Roan Stewardship Project. These temporary roads have not been rehabilitated since the stewardship sale was only partially completed and all the timber had not been removed. As such, these roads can be reopened with minimal earth movement, without side casting material and would be rehabilitated after project completion. Re-opening these roads would pose an overall low risk of introducing sediment to streams because these roads are on flat ground (less than 25 percent slope) and outside Riparian Reserves. In addition, erosion control measures described in the PDC would be employed to reduce and/or eliminate erosion and potential sedimentation. The re-opened temporary roads would be rehabilitated and revegetated immediately following completion of harvest operations to help reduce compaction, increase infiltration rates, minimize surface erosion, and re-establish natural drainage patterns.

Road maintenance prior to log haul is not considered a changed condition so it is covered in the original North Fork Mill Creek Restoration Opportunities EA. In general, the road system is well rocked and stream crossings across Mosier Creek are armored and not expected to create sediment during haul. Putting gravel or rock on road surfaces can reduce the amount of fine sediment from road surfaces entering streams following log haul, especially during and following rainfall events. The following WEPP model runs show the difference in erosion and sediment delivery (shown as sediment leaving buffer in table below) between a 200 foot section of native surface road (road is made from native soil) and a 200 foot section of gravel surface road. All of the model inputs stayed the same except surface material, which was changed from native to gravel surface.

Table 3-28: WEPP model run showing the difference in erosion and sedimentation between a gravel surface road and a native surface road.

Road Surface	Road Prism Erosion	Sediment Leaving Buffer
Native Surface Road	136 lbs.	39lbs
Gravel Surface Road	86 lbs.	32 lbs.

Results from the WEPP model runs show that in this situation, the native surface road produced 136 pounds of eroded soil while the gravel surface road produced 86 pounds of eroded soil which is a 37 percent reduction in eroded soil. It should be noted that under some circumstances, gravel surfaced roads may produce more runoff and erosion than native surface roads (WEPP manual).

PDC that include limiting the time of haul to the normal operating season on all roads except a section of 1711630 and to the dry season for the section of the 1711630 going into North Fork

Mill Creek, prohibiting haul during higher intensity precipitation events on all roads and monitoring conditions of roads during haul should minimize road erosion from timber haul.



Figure 3-16: Photo showing the 1711 road crossing of Mosier Creek. The crossing is flat and well rocked.



Figure 3-17: Photo showing the 1711 road crossing of an intermittent stream that is tributary to Mosier Creek. This crossing and the crossing shown in Figure 3-15 are the only Riparian Reserve stream crossings in moderate to high severity burn areas. This crossing is also flat and well rocked.

Alternative 3 – Direct and Indirect Effects

Stream Temperature

Effects to stream temperature from implementing Alternative 3 would be similar to those described for Alternative 2. Alternative 3 proposes the same treatment areas in the Riparian Reserves as Alternative 2 (11A, 87, 106A, 107A and 108A) which are primarily hazard tree treatments along roads. See Alternative 2 – Direct and Indirect Effects for more information.

Sediment

The effects associated with the temporary roads, road maintenance, and hauling are the same as Alternative 2. Alternative 3 proposes considerably less ground disturbance in moderate to high severity burn areas than Alternative 2, since the only Restoration Thin treatments are on the unburned to low severity burn areas. These Restoration Thin treatments do not have any changed conditions, as described above. The only activities taking place on the moderate to high severity

burn areas are Hazard Tree treatments. As such, this alternative has a lower relative risk for soil erosion and hillslope sediment transport. There will be less equipment traffic associated with tree harvest and hauling in Alternative 3 so overall risk of sediment introduction for Alternative 3 will be less than Alternative 2.

Best Management Practices and Project Design Criteria for Alternatives 2 and 3

A complete list of BMPs and PDC are included in Chapter 2 of the Revised EA. BMPs and PDC were developed for the North Fork Mill Creek Revised EA using the National Core BMP Technical Guide (USDA Forest Service 2012), monitoring, field verification, professional judgment, and the best available science. BMPs and PDC are discussed throughout the effects analysis of this report and are the primary mechanism to mitigate potential effects to water quality and quantity from the project.

BMP implementation and effectiveness has been systematically monitored across National Forest Lands in California since 1992. From 2008-2010, randomized monitoring showed 91% of BMPs were implemented, and 80% of implemented BMPs were rated effective. BMPs for timber harvests, fuels treatments, and vegetation management were consistently highly effective, while BMPs for other activities, including roads, range management, recreation, and mining, were less effective (USDA Forest Service 2013). At sites where BMPs were not implemented or effective the monitoring program includes a strong feedback loop to take corrective action on non-compliance scenarios.

At the national scale, a consistent program to monitor BMP implementation and effectiveness has been in development for several years. Monitoring of BMP implementation and effectiveness using the national BMP protocols has taken place on the Mt. Hood National Forest (MHNF) since 2012. A Forest wide monitoring report was produced in 2014, summarizing BMP monitoring results from 2013 (U.S. Forest Service 2014). “Of the 36 Core BMPs monitored for implementation on all projects, 89 percent were implemented fully as prescribed.” Twenty one Core BMPs specifically pertaining to ground based vegetation management were monitored and found to have 95 percent of the measures fully implemented. “Of the 38 Core BMPs monitored for effectiveness, 87 percent were fully effective at preventing or minimizing the effects of activities to aquatic and water resources as prescribed.” Twenty one Core BMPs specifically pertaining to ground based vegetation management were monitored and found to have 95 percent of the measures fully effective. The one measure that was not implemented (temporary road rehabilitation) “resulted in some observable surface erosion, but transport of sediment off-site to a water body had not occurred and because of its location there was no potential for it to do so.” Additional project-level BMP monitoring by hydrologists and soil scientists has occurred as part of project implementation on the MHNF and is incorporated in professional judgment. Select BMPs, PDC, and project design elements are shown in Table 3-29.

Table 3-29: Select project design considerations, BMPs, and PDC for the North Fork Mill Creek Revised EA.

Practice	Initial Project Design	BMP/PDC
No Timber Salvage in Riparian Reserves	X	X
No Timber Salvage in units proposed for BAER Treatments	X	X
No temporary road construction within Riparian Reserves	X	X
Leave additional down woody material (10 to 20 tons per acre) in Moderate to High Severity units to provide Short-term effective ground cover	X	
Timber haul only during the Normal Operating Season		X
Timber haul only during the dry season (July 1 through September 30) on the 1711630 road		X
Installation of waterbars on skid trails		X
No ground-based salvage on slopes over 30%	X	
Hazard trees within Riparian Reserves would be cut by hand and left on-site	X	

Initial project design elements were included in the development of the Alternative 2, BMPs were developed using recommendations in the National Core BMP Technical Guide (USDA Forest Service 2012), and site-specific analysis of the project area.

The ability of PDC and BMP to reduce erosion and sediment delivery is documented in a study referenced in the Soil Productivity Specialist Report (Rashin et. al. 2006). In this study, the authors looked at 21 harvest sites that had a variety of treatments ranging from no buffers to buffers up to 66 meters (216.5 feet) wide. They found that “Of 157 individual erosion features determined to deliver sediment to streams during either the first or second year following timber harvest, 94 percent were located within 10 meters (33 feet) of the stream. Conversely, 74 percent of the 248 erosion features with no evidence of sediment delivery were greater than 10 m from streams. The sediment routing survey results indicate that when erosion is initiated by ground disturbing activities within 10 meters (slope distance) of a stream, delivery of sediment was more likely than not.” Other studies also support the effectiveness of mitigating sediment delivery by maintaining a buffered area adjacent to surface water. Lakel and others (2010) looked at the effectiveness of a variety of treated and untreated buffers in trapping sediment adjacent to timber harvest units. They concluded that streamside management zones (buffers) between 25 feet and 100 feet were effective in trapping sediment before it could enter streams. These streamside management zones consisted of both treated and untreated areas.

Other studies also support the effectiveness of mitigating sediment delivery by maintaining a buffered area adjacent to surface water. Burroughs and King (1989) found that 80 percent of sediment reaching streams from roads in the first year after construction came from the fill slope of the road. They also found that transport distances and obstructions between the fill slopes and streams influenced the amount and likelihood of eroded material reaching these streams. Burroughs and King found that windrowed fill slopes, which would act very similar to unharvested Riparian Reserves in that there would be obstructions to flow, had an average travel distance of 3.8 feet for eroded material, and a maximum travel distance of 33 feet. Similar results

were documented by Packer (1967). He found that “the most important factors that affect the distance that sediment moves are the spacing between down slope obstructions and an interaction between this spacing and the kind of obstruction”. He found that logs, rocks, and trees or stumps were the second, third, and fourth most effective materials in reducing sediment movement distances below roads. Travel distances were similar to those reported by Burroughs and King.

PDC that include protection buffers of at least 60 feet along perennial streams and at least 30 feet along intermittent streams, keeping large mechanized equipment away from surface water, use of erosion control (e.g., ditchline sediment traps, straw wattles, waterbars) where necessary, and lower impact road maintenance techniques (leaving vegetated buffer strips in ditchlines near streams) would substantially reduce the amount of sediment reaching the streams from this work. Burroughs and King (1989) reported that measures, such as erosion control blankets, could reduce sediment production by 80 to 90 percent. This in conjunction with other measures, such as minimizing the amount of ground disturbance would further decrease the chance of short-term direct and indirect sediment production. Hazard trees on roads within Riparian Reserves would be hand felled and left in place so effects related to stream channel sediment from this activity would be minimal.

With the above-mentioned design elements and PDC reopening and use of temporary roads, construction and use of landings and skid trails, hazard tree removal and log haul in Riparian Reserves are expected to have an immeasurable effect on sedimentation compared to the changed condition resulting from the Government Flats Complex Fire.

Cumulative Effects for Alternatives 2 and 3

The table below provides a qualitative summary of potential cumulative watershed effects. It shows existing and potential projects, effects from those projects that may result in cumulative effects with actions in the North Fork Mill Creek Revised EA, whether these projects overlap in time and space and an assessment if a measureable cumulative effect is expected. Only projects that overlap in either time or space with actions in the North Fork Mill Creek Revised EA or have a potential cumulative effect are included in the table. Findings in this summary are supported by the analysis above which utilizes pertinent research, PDC and applicable management standards and guidelines. Water quantity is included in this section, as potential increased peak flow from vegetation removal is primarily a cumulative effect at the sub-watershed and larger scale.

Table 3-30: Cumulative Effects for Water Quality and Water Quantity

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Multi-use Trail Construction – North Fork Mill Restoration Opportunities EA	Coarse and Fine Sediment	No	Yes	No	There is not an overlap in timing of this project with activities in North Fork Mill Creek Revised EA. The only trail that overlaps in space was the construction of one stream crossing of Mosier Creek approximately 0.5 miles downstream from harvest activity. Any minor suspended sediment would not be measurable due to timing between these projects and implementation of PDC, conformance with existing standards and guidelines on both the trail construction and the activities in North Fork Mill Creek Revised EA.
	Stream Temperature	No	Yes	No	Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.
	Water Quantity	No	Yes	No	There would be no cumulative effects to peak flows because no live trees would be harvested, and detrimental soil conditions from ground-based harvesting methods would be minimized through BMPs and PDC.
Forest Service Vegetation Treatment Activities Planned or Underway (Roan, Eques and Lokai)	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of these projects with activities in North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on both the existing projects and activities in North Fork Mill Creek Revised EA.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Forest Service Vegetation Treatment Activities Planned or Underway (Roan, Eques and Lokai)	Stream Temperature	Yes	Yes	No	Some projects are completed so there are no remaining stream temperature effects due to natural recovery. The more recent vegetation treatment projects conform to the Northwest Forest Plan Stream Temperature Sufficiency document. Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.
	Water Quantity	Yes	Yes	No	No cumulative water quantity effects because no live trees would be harvested and mitigation measures and design criteria implementation, conformance with existing standards and guidelines and natural recovery on both the existing projects and activities in North Fork Mill Creek Revised EA.
Aspen Cottonwood Enhancement	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of this project with activities in North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA and the original North Fork Mill Creek Restoration Opportunities EA.
	Stream Temperature	Yes	Yes	No	Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.
	Water Quantity	Yes	Yes	No	No cumulative water quantity effects because no live trees would be harvested and mitigation measures and design criteria implementation and conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Government Flats Complex Fire (including BAER and Fire Suppression Rehabilitation projects)	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of effects from the Government Flats Complex Fire and associated activities and activities in North Fork Mill Creek Revised EA. As described in the Change Condition section and the No Action Alternative, increased coarse and fine sediment is expected from the fire. Some fine sediment input resulted from initial construction of dozer fireline in the headwaters of Mosier Creek. The fireline has been rehabilitated and would have mulch applied in the spring of 2014 to further stabilize it. The amount of sediment would decrease through time as physical soil and vegetation conditions recover. BAER treatments focused on the North Fork Mill Creek sub-watershed and would result in reduced hillslope and road erosion and sedimentation in the 1711630 road area and North Fork Mill Creek. There may be an overlap in timing of these events with activities in North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA.
	Stream Temperature	Yes	Yes	No	There may be an overlap in timing of effects from the Government Flats Complex Fire and associated activities and activities in North Fork Mill Creek Revised EA. As described in the Change Condition section and the No Action Alternative, increased stream temperature is expected as a result of the fire. Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Government Flats Complex Fire (including BAER and Fire Suppression Rehabilitation projects)	Water Quantity	Yes	Yes	No	There may be an overlap in timing of effects from the Government Flats Complex Fire and associated activities and activities in North Fork Mill Creek Revised EA. As described in the Change Condition section and the No Action Alternative, increased peak flows are expected as a result of the fire. Tree planting associated with the North Fork Mill Creek Revised EA would speed up recovery of watershed conditions compared to the No Action Alternative. There would be no cumulative effects to peak flows because no live trees would be harvested, and detrimental soil conditions from ground-based harvesting methods would be minimized through BMPs and PDC.
Road Decommissioning Associated with Original North Fork Mill Restoration Opportunities EA	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of this project with activities in North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA and the original North Fork Mill Restoration Opportunities EA.
	Stream Temperature	Yes	Yes	No	Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.
	Water Quantity	Yes	Yes	No	No cumulative water quantity effects because no live trees would be harvested and mitigation measures and design criteria implementation and conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Hazard Tree Removal Along Roads	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of this project with the North Fork Mill Creek Revised EA project; any minor suspended sediment would not be measurable due to implementation of mitigation measures and design criteria and conformance with existing standards and guidelines in both projects.
	Stream Temperature	Yes	Yes	No	Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.

Summary of Cumulative Effects

Stream Temperature

No detrimental cumulative effects are expected as a result of increased water temperature due to PDC and BMP that maintain existing primary shade vegetation adjacent to perennial streams. As described in the direct and indirect effects section, this project is expected to have an immeasurable effect to post-fire water temperatures.

Sediment

No detrimental cumulative effects are expected as a result of increased coarse and fine sediment due to PDC and BMP that maintain an undisturbed Riparian Reserve next to Restoration Thin units in moderate to high severity burn areas in Alternative 2, provide additional cover by leaving higher volumes of branches and limbs on the ground and timber haul only during the normal operating season. As described in the direct and indirect effects section, this project is expected to have an immeasurable effect to post-fire coarse and fine sediment.

Water Quantity

Activities in North Fork Mill Creek Revised EA would not change conditions associated with increased peak flow. Thinning low severity to unburned areas is covered in the original North Fork Mill Restoration Opportunities EA. There would be no cumulative effects to peak flows because no live trees would be harvested, and detrimental soil conditions from ground-based harvesting methods would be minimized through BMPs and PDC.

Overall Effects

The potential for cumulative effects resulting from implementation of Alternative 3 would be less than those described for Alternative 2 due to less overall ground disturbance in Alternative 3. As noted in Alternative 2 there are no detrimental cumulative effects to stream temperature, sediment and water quantity expected from implementation of Alternative 3.

3.4.4 Consistency Determination

Forest Plan and Northwest Forest Plan

Numerous existing plans provide guidance for projects in the form of Standards and Guidelines (S&G) and recommended BMP. These documents include the Mt. Hood National Forest Land and Resource Plan (Forest Plan), the Northwest Forest Plan (NWFP) and associated supporting documents and the Middle Columbia-Hood (Miles Creeks Subbasin) TMDL. A summary of applicable water quality S&G and BMP's from these documents are displayed below.

Forest Plan Standards and Guidelines (pages Four-53 through 63)

- Standards and Guidelines dealing with BMPs – FW-54,55,56,57,58,59,60
- Standards and Guidelines dealing with analysis considerations – FW-61,62,63,64,65,66,67
- Standards and Guidelines dealing with maintaining good water quality (temperature and sediment) - FW-109,110,111,112,113,114,127,128,129,132,133,134,135,136

Northwest Forest Plan (NWFP) Standards and Guidelines:

- Standards and Guidelines dealing with Key Watersheds (NWFP ROD pg. C-7).
- Standards and Guidelines dealing with Riparian Reserves (NWFP ROD, pg. C-31 through C-38). The primary Standards and Guidelines that pertain to this project are Recreation Management – TM-1.
- Aquatic Conservation Strategy

The Clean Water Act of 1948 (as amended in 1972 and 1987) establishes as federal policy the control of point and non-point pollution and assigns the States the primary responsibility for control of water pollution. Compliance with the Clean Water Act by National Forests in Oregon is achieved under State Law. The Forest Service just signed an MOU with ODEQ that defines roles and responsibilities for implementation of the Clean Water Act on National Forest lands in the State of Oregon.

Miles Creeks Subbasin TMDL: Continue to follow Forest Plan and Northwest Forest Plan Standards and Guidelines as well as the *Northwest Forest Plan (NWFP) Temperature TMDL Implementation Strategies: Evaluation of the Northwest Forest Plan Aquatic Conservation Strategy (ACS) and Associated Tools* (2012).

In addition to the plans discussed above other documents such as the “Forest Service National Core Best Management Practices” (USDAFS, 2012) provide guidance about potential BMP’s for this project. Those BMP’s would be incorporated where appropriate.

Key Watershed: The NWFP states that “The amount of existing system and non-system roads within Key Watersheds should be reduced through decommissioning of roads” (NWFP B-19). There are no new roads proposed within the Mill Creek Tier 1 Key Watershed in the North Fork Mill Creek Revised EA.

Summary

As outlined in the effects section this project is consistent with applicable law and direction. Major highlights include:

- The inclusion of Best Management Practices (BMP) to meet water quality standards and the Clean Water Act. These BMPs reduce or eliminate potential degradation from increased water temperature and sedimentation.
- Establishment of Riparian Reserves and meeting standards within the Tier 1 Key Watershed.
- Designing activities within Riparian Reserves to contribute to attainment of Aquatic Conservation Strategy Objectives (see the Aquatic Conservation Strategy section for more information).

Executive Order 11990 – Protection of wetlands

As documented above, none of the proposed activities are located in wetlands. As outlined in the Water Quality section, PDC and BMP aimed at reducing or eliminating potential detrimental effects to water quality are included with this project.

Executive Order 11988 – Protection of Floodplains

Due to the steepness of the topography, small stream size and confined nature of streams in this area, floodplain width is fairly limited. The 100-year floodplain on all first order tributaries is estimated to be less than 15 feet wide in general. On North Fork Mill Creek, the 100-year floodplain is estimated to be generally less than 50 feet wide, while smaller streams such as Mosier Creek are about 20 to 30 feet wide. There only activity proposed within the floodplain is hazard tree falling. There should be a limited number of these and any hazard tree that would be dropped within the Riparian Reserve would be left on-site and would continue to provide floodplain function. Activities in North Fork Mill Creek Revised EA would meet the ACS Objectives.

3.4.5 Summary of Effects by Alternative

Water temperatures are likely to change as a result of the Government Flats Complex Fire as described in the Changed Condition Section and the No Action Alternative. There would be a low risk of increased water temperature in Alternative 2 and Alternative 3 due to dropping hazard trees adjacent to Mosier Creek. The risk of increased stream temperatures is low due to the limited number of trees expected to be cut. The same areas within the Riparian Reserve would receive hazard tree treatments in the No Action Alternative, Alternative 2 and Alternative 3. The short-term sedimentation risk would be high for the No Action alternative because sediment delivery to streams in the project area is expected to increase as a result of the Government Flats Complex Fire. The risk would be low under Alternative 2 and Alternative 3 due to existing road conditions, BMP and PDC. The long-term sedimentation risk would be moderate to high under the No Action alternative with the highest risk associated with post fire slope failures into North Fork Mill Creek. Under Alternative 2 and Alternative 3, the long-term sedimentation risk would be low due to BMP and PDC and recovery of effective ground cover. The risk of change to peak flow from Alternative 2 and Alternative 3 is expected to be low due primarily to removing dead trees that are not providing evapotranspiration and snow storage capabilities.

3.5 Fisheries and Aquatic Fauna

More information is available in the project record including the full fisheries analysis file and biological evaluation as part of the Fisheries and Aquatic Fauna Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.5.1 Analysis Assumptions and Methodology

The analysis method utilized to determine potential impact to fish, aquatic invertebrates, and their associated habitat are listed below.

- Determine known and suspected locations of federally listed or proposed aquatic species, designated critical habitat, essential fish habitat, Region 6 Regional Forester's sensitive

species, and Mt. Hood National Forest management indicator species in relation to proposed project activities.

- Assess proposed project activities and determine the aquatic habitat elements potentially impacted and the geographic area where effects could occur (i.e. the action area).
- Overlap the species/habitat locations with the action area and determine which species/habitat could be affected by project activities.
- When species/habitat overlaps with the action area, predict impacts from proposed project activities to individuals and their associated habitat. This analysis relies upon the Soil Productivity and Water Quality Specialist Reports to determine the potential effects to physical resources (i.e. habitat). These specialist reports are available in the project record located at the Hood River Ranger District in Mount Hood/Parkdale, Oregon.
- Potential effects to aquatic fauna and habitat were determined from the following:
 - Direct effects from project activities;
 - Potential reductions in stream shade and subsequent increases in water temperature compared to existing levels;
 - Potential increases in erosion and fine sediment input to streams and other wet areas compared to existing levels;
 - Potential increases in the amount of large wood that could be recruited to the stream in Riparian Reserves; and,
 - Cumulative effects associated with ongoing or proposed projects in the action area.
- Where changes to habitat parameters discussed above result from proposed project activities, the potential impacts to aquatic species/habitat were analyzed and then the effects to the biological resource were determined based on professional experience, applicable surveys/studies, and available literature/research.

In addition, applicable portions of the Burned-Area Report for the Government Flats Complex Fire dated September 30, 2013 and prepared by the Forest Service was used to characterize the changed condition, the No Action alternative, and portions of this effects analysis (USDA Forest Service, 2013). This report was prepared by a variety of resource specialists experienced in wildfire effects and utilized several models to characterize changes in peak flow and erosion rates that may result from the fire and treatments prescribed as part of the Burned Area Emergency Response (BEAR) effort (see the Soil Productivity and Water Quality Specialist Reports). The Fisheries section of the report does not address Mosier Creek or other aquatic habitat or fauna within the fire perimeter specifically but it does describe how increases in erosion and sedimentation as a result of the fire could impact habitat and fish species in North Fork Mill Creek.

Assumptions associated with the methodology are listed below.

- Aquatic faunal and habitat survey data utilized is the latest available. It is assumed that this information is representative of current conditions unless otherwise noted below.
- All Best Management Practices (BMP) and Project Design Criteria (PDC) listed in the Revised Environment Assessment (EA), Chapter 2 would be fully implemented and effective (see BMP Table in Environmental Assessment, Appendix 1).
- The project areas outlined in Revised EA, Chapter 2 are the actual areas of disturbance.

- Monitoring effectiveness of PDC and compliance would be a component of project implementation.
- A large chemical spill (gas, oil or other material) would not be considered in this analysis because it is not a planned activity.
- All surface water areas have been identified through field work.

3.5.2 Changed Condition

Affected Environment / Action Area

The affected environment, also known as the action area, is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. For the purposes of this analysis, the action area is defined as all areas where ground disturbance would take place for the proposed projects, as well as aquatic habitat areas downstream where potential effects could occur. In this case, the action area for the aquatic fauna and habitat analysis is located in the Mosier Creek and North Fork Mill Creek 7th-field sub-watersheds. The action area for this analysis is a subset of the affected environment or action area described in the North Fork Mill Creek Restoration Opportunities EA (2008). It includes the area within the fire perimeter (see description below and Burn Severity Map in EA, Chapter 1) and the stream habitat in both Mosier Creek and North Fork Mill Creek. For Mosier Creek, the action area extends from the headwater springs downstream to the Mt. Hood National Forest (Forest) boundary. For North Fork Mill Creek, the action area extends from the NFSR 1711-630 road crossing to the Forest boundary. For both streams, the Forest boundary is the farthest point downstream where effects of the Proposed Action would extend. The hazard tree units and the one reforestation unit along NFSR 1720-193 would have no effect on any aquatic habitat or species and thus will not be discussed further.

As described in the Proposed Action of this Revised EA, the Government Flats Complex Fire burned parts of the action area in August and September, 2013. This analysis will only include portions of the planning area or actions that underwent some kind of changed condition from the original North Fork Mill Creek Restoration Opportunities EA (2008). Areas and/or activities that are not considered to have a changed condition include all activities located outside of the fire perimeter. Note also that there is no changed condition in the Unburned to Low Burn Severity Units (shown in green in Burn Severity Map in EA, Chapter 1) and the only change to the Proposed Action in these areas from the 2008 EA is to no longer create gaps (these were achieved by the fire). Thus, the effects of the Proposed Action to these areas are the same as those described in the Fisheries and Aquatic Input for the North Fork Mill Creek Planning Area (Asbridge, 2008), which is available in the project record; and as such, they will not be discussed further. The following table identifies changed conditions relating to fish and aquatic fauna for the Proposed Action.

Table 3-31: Changed Conditions for Fisheries and Aquatic Fauna

Condition	Kind of Change	Results in Change in Baseline Conditions from Original EA?
Moderate to High Burn Severity Areas	Physical conditions on the ground	The 2013 Government Flats Complex Fire changed baseline conditions in aquatic habitat areas (streams, seeps, and springs) including

Condition	Kind of Change	Results in Change in Baseline Conditions from Original EA?
		streambed substrate, turbidity, pool quality, water temperature, recruitment potential of large wood from surrounding Riparian Reserves, and peak flows (see Water Quality Input).
Fire Suppression Activities	Physical conditions on the ground	Fire Suppression Activities, primarily firelines constructed by heavy equipment, have changed baseline conditions relating to sedimentation, turbidity, and pool quality.
Burned Area Emergency Response (BAER) Treatments	Physical conditions on the ground	BAER activities including road and slope treatments reduced and will further reduce (as the work continues) some detrimental changes in aquatic habitat caused by the Government Flats Complex Fire.
New Region 6 Special Status Species listings or changes in listing status for specific species. Now the 2011 Region 6 Special Status Species list and the 2001 Record of Decision for Survey and Manage Species are used.	Change in Law, Regulation, or Policy and Change in understanding of species distribution based on survey data and description of appropriate habitat	The Dalles Juga, a caddisfly (<i>Namamyia plutonis</i>), the Columbia duskysnail, and the Basalt Juga are known or assumed to be present in the action area. The Purple-lipped Juga and Scott's Apatanian Caddisfly are no longer considered to be present.
Updated requirement for analysis of effects on habitat for Management Indicator Species (MIS)	Change in Law, Regulation, or Policy	Presence and Distribution of MIS species (salmonids) in the action area has not changed.

Environmental Baseline

Fish Species Presence/Absence and Distribution

There is no change in the distribution of fish species from that described in the North Fork Mill Creek Restoration Opportunities EA (2008). However, there is a change in the status of one fish species: Interior Redband Trout (*Oncorhynchus mykiss spp.*), suspected to be present in North Fork Mill Creek within the action area, are no longer considered a sensitive species on the Region 6 Regional Forester's Sensitive Species list (last updated in 2011), but they are included in this analysis as a Management Indicator Species (MIS). Please note that Mosier Creek has a barrier falls at its mouth at the Columbia River and is not fish bearing. For fish and relevant critical habitat relative to Alternative 2 please see Figure 3-18: Steelhead/Rainbow Trout Distribution and Steelhead Designated Critical Habitat for Alternative 2 – Proposed Action and Figure 3-19: Cutthroat Trout Distribution for Alternative 2 – Proposed Action. For fish and relevant critical habitat relative to Alternative 3 please see Figure 3-20: Steelhead/Rainbow Trout

Distribution and Steelhead Designated Critical Habitat for Alternative 3 and Figure 3-21: Cutthroat Trout Distribution for Alternative 3.

Designated Critical Habitat and Essential Fish Habitat

There are no changes in the extent of designated critical habitat or Essential Fish Habitat (EFH) from that described in the 2008 analysis.

Aquatic Macroinvertebrate Presence/Absence and Distribution

There are now three aquatic mollusks and two caddisflies known or suspected to occur on the Forest included on the Region 6 Regional Forester's 2011 Sensitive Species list (Table 3-32). In addition, there are four additional mollusks and three caddisflies considered strategic species by the Regional Forester. Two of the strategic mollusks, Basalt Juga (*Juga (Oreobasis) n. sp. 2*) and Columbia duskysnail (*Colligyrus n. sp. 1*) were also listed as Survey and Manage Category A species requiring management of known sites and minimizing inadvertent loss of undiscovered sites (USFS and BLM 2001).

Only sensitive species are required to be addressed in a biological evaluation (Forest Service Manual 2670). Distribution, life history, etc. for many strategic species are poorly understood; thus when they are found while conducting surveys for other species, the Forest Service requires recording location(s) in corporate databases established by the agency. For the purposes of this report, the only two strategic species discussed further are the Columbia duskysnail and Basalt Juga since they are Survey and Manage species as described above.

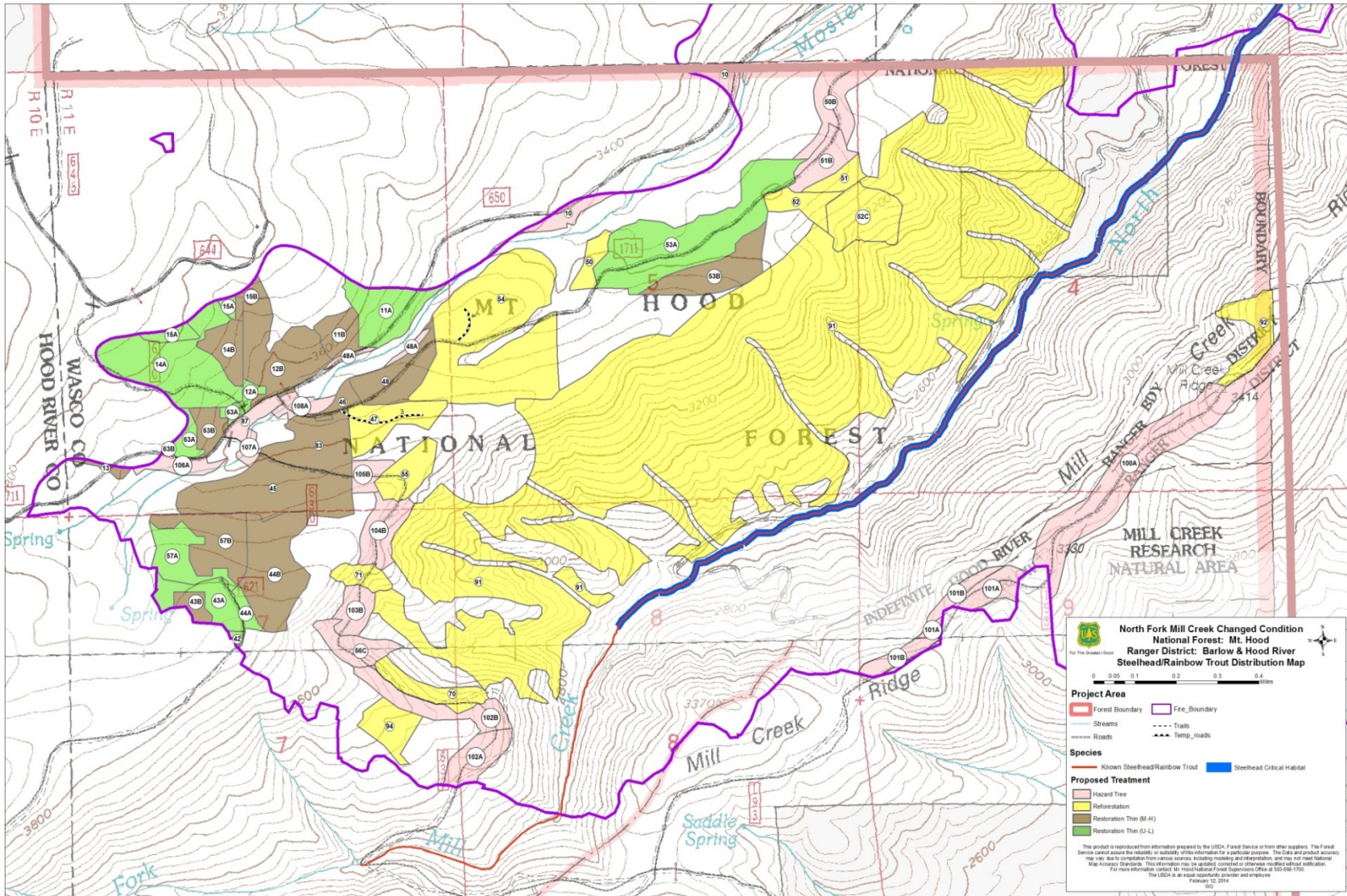


Figure 3-18: Steelhead and Rainbow Trout Known Distribution and Extent of Steelhead Designated Critical Habitat Relative to the Government Flats Complex Fire Perimeter and the Units Proposed for Treatment under Alternative 2 – Proposed Action in the North Fork Mill Creek Revised EA.

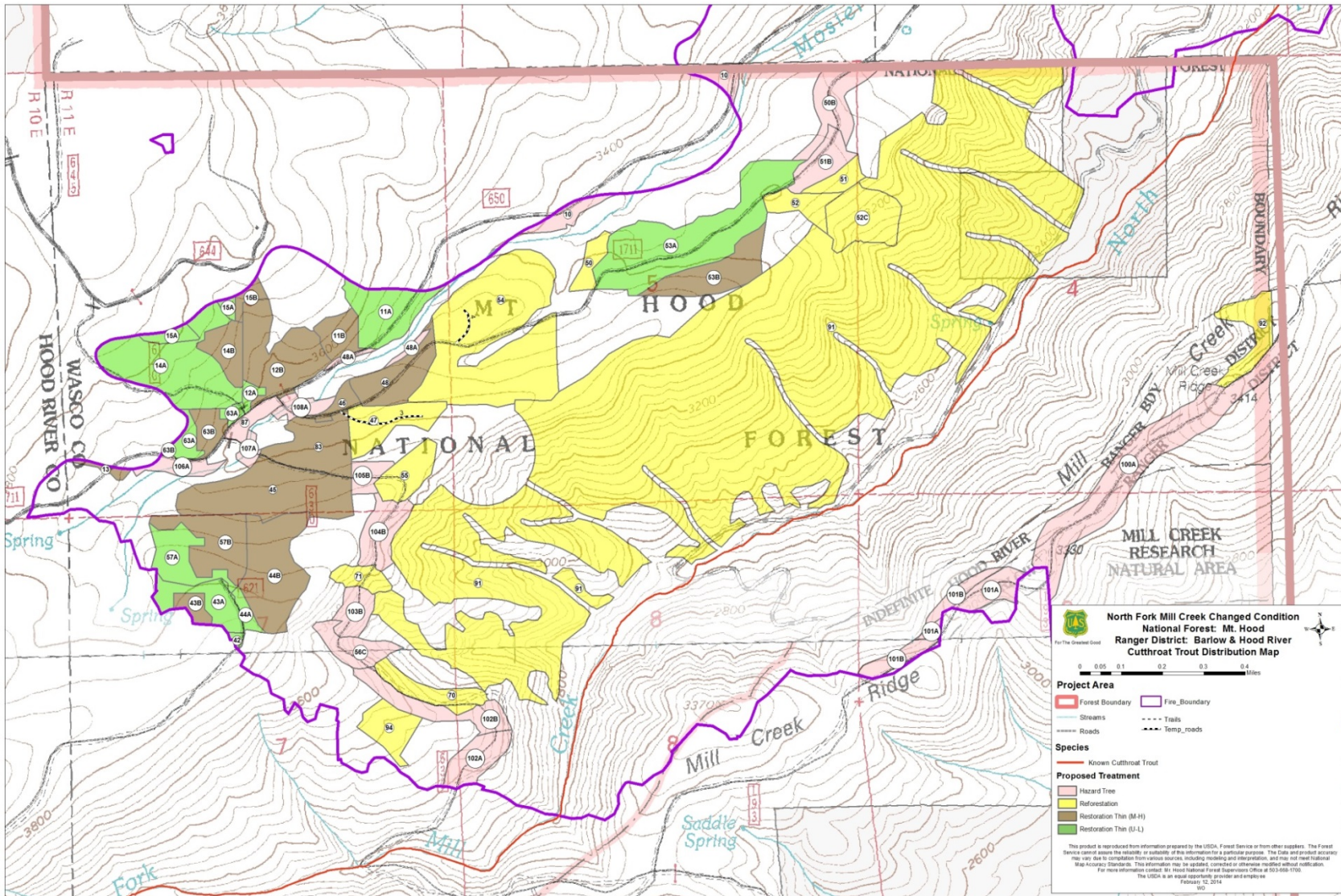


Figure 3-19: Cutthroat Trout Distribution Relative to the Government Flats Complex Fire Perimeter and the Units Proposed for Treatment under Alternative 2 – Proposed Action in the North Fork Mill Creek Revised EA.

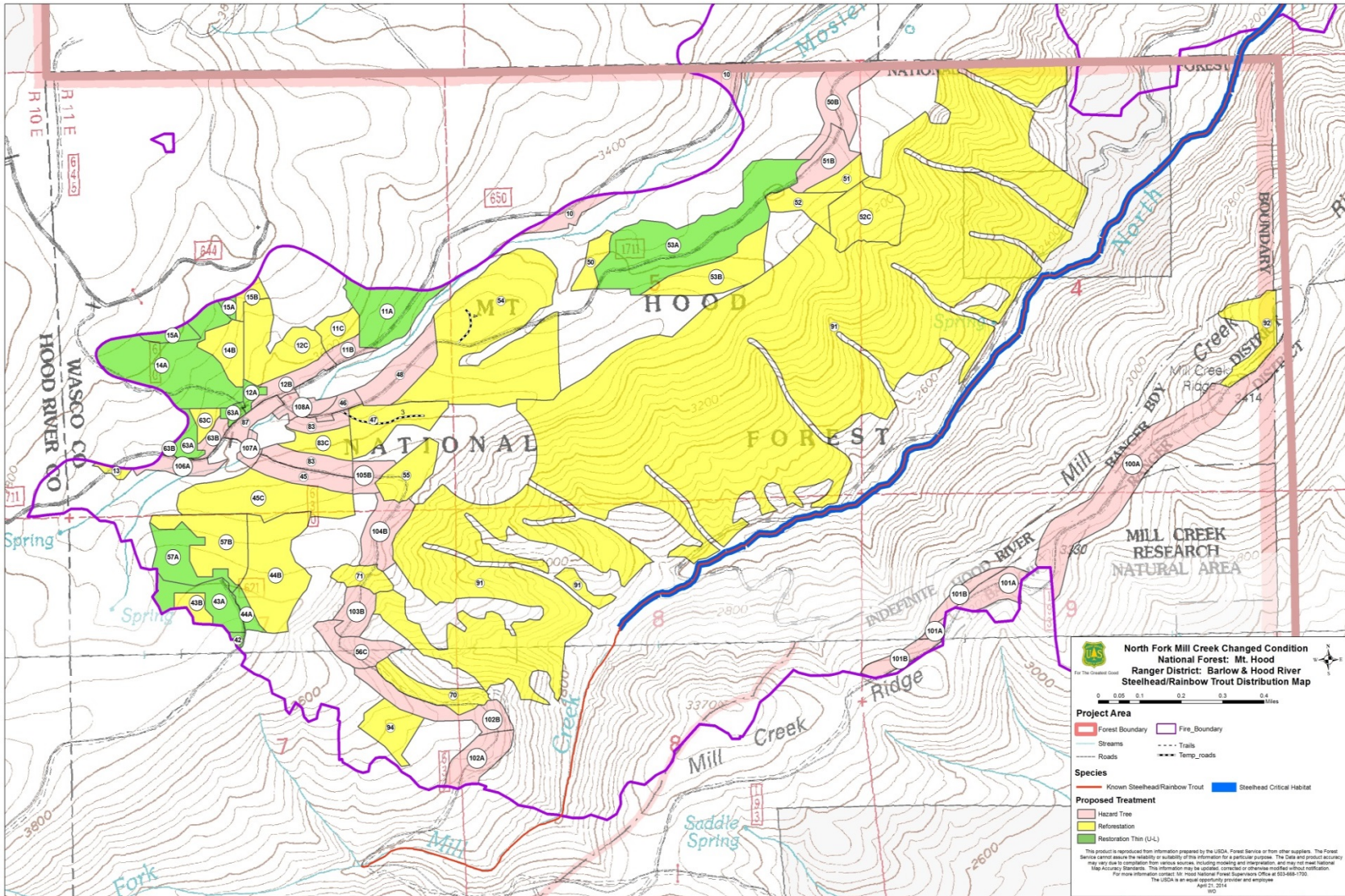


Figure 3-20: Steelhead and Rainbow Trout Known Distribution and Extent of Steelhead Designated Critical Habitat Relative to the Government Flats Complex Fire Perimeter and the Units Proposed for Treatment under Alternative 3 in the North Fork Mill Creek Revised EA.

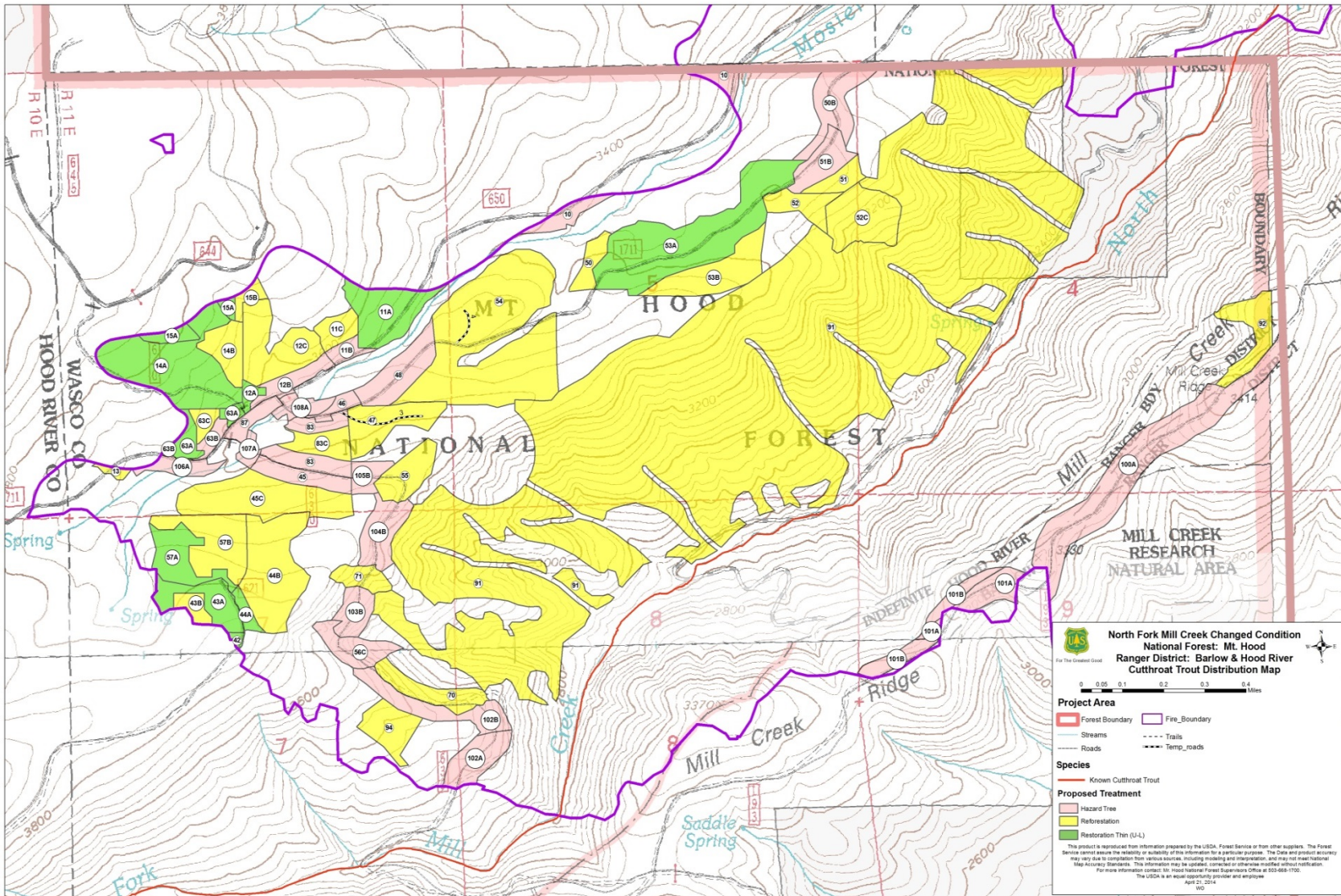


Figure 3-21: Cutthroat Trout Distribution Relative to the Government Flats Complex Fire Perimeter and the Units Proposed for Treatment under Alternative 3 in the North Fork Mill Creek Revised EA.

Table 3-32: Region 6 (R6) special status species either documented (D) or suspected (S) to occur within the Mt. Hood National Forest and within the action area (Yes, No, Unknown). The two species in **bold** are also Survey and Manage species as outlined in Forest Service et al. 2001.

Scientific Name	Common Name	Forest Presence	Action Area Presence
Sensitive Species			
<i>Juga hemphilli dallesensis</i>	Dalles Juga	S	Yes*
<i>Juga hemphilli hemphilli</i>	Barren Juga	D	Yes*
<i>Juga hemphilli maupinensis</i>	Purple-Lipped Juga	S	No
<i>Allomyia scotti</i>	Scott's Apatanian Caddisfly	D	No
<i>Namamyia plutonis</i>	Caddisfly (no common name)	S	Yes*
Strategic Species			
<i>Fluminicola sp. nov. (Pinhead)</i>	Pinhead Pebblesnail	S	Unknown
<i>Juga (Oreobasis) n. sp. 2</i>	Basalt Juga	D	Yes
<i>Juga sp. nov. (Brown)</i>	Brown Juga	S	Unknown
<i>Colligyryus n. sp. 1</i>	Columbia Dusksnail	D	Yes*
<i>Lepania cascada</i>	Caddisfly (no common name)	S	Unknown
<i>Moselyana comosa</i>	Caddisfly (no common name)	S	Unknown
<i>Rhyacophila unipunctata</i>	One-Spot Rhyacophilan Caddisfly	D	Unknown

*Not found during any survey, presumed present based on available habitat.

There are several changes in the status of macroinvertebrates that were included in the 2008 analysis, and there are additional species that are now included on the Region 6 special status species list as of 2011:

- The Dalles Juga (*Juga hemphilli dallesensis*) and a caddisfly (*Namamyia plutonis*) are now considered sensitive species by the Region 6 Regional Forester and are documented or suspected to occur within the Mt. Hood National Forest.
- The Basalt Juga (*Juga (Oreobasis) n. sp. 2*) and the Columbia dusksnail (*Colligyryus n. sp. 1*) are considered strategic species by the Region 6 Regional Forester. They are both also Survey and Manage species as outlined in Forest Service et al. 2001, and thus require management of known sites and minimizing inadvertent loss of undiscovered sites (USFS and BLM 2001).

Also, new survey data has become available since the 2008 analysis was completed and has changed the known or suspected distribution of specific species. This survey data is available in the project record.

For the following descriptions of species presence, it is important to note that Mosier Creek is a perennial stream from the springs at its headwater forks downstream to just below the 1711 road

crossing. It is an intermittent stream from that point downstream past the Forest boundary (Asbridge and Kreiter, USFS unpublished data, 2013).

Dalles Juga

The Dalles Juga has been found in Mill Creek and the central and eastern Columbia River Gorge from Hood River to The Dalles, in Hood River and Wasco Counties, Oregon and Skamania County, Washington (Frest and Johannes 1995). The Dalles Juga is found at low elevation large springs and small-medium streams with a stable gravel substrate and fast-flowing, unpolluted, highly-oxygenated cold water. Relatively few macrophytes or epiphytic algal taxa are present, with *Rorippa* being the most frequently encountered. The species cannot survive long out of water (Frest and Johannes 1995). Given the fact that it has been found in Mill Creek (North Fork Mill Creek is one of the headwater forks of this stream) presence of the Dalles Juga is assumed in the action area. It would be expected to be found in North Fork Mill Creek, in the headwaters of Mosier Creek, and in any other perennial surface water.

Barren Juga

Consistent with the original analysis for this species, it is assumed to be present in the action area. Similar to the Dalles Juga, it would be expected to be found in North Fork Mill Creek, in the headwaters of Mosier Creek, and in any perennial surface water.

Purple-lipped Juga

The Purple-lipped Juga snail is endemic to Oregon. It is found in large streams at low elevations. These snails prefer riffle habitat with stable gravel substrates, in cold well oxygenated water. It is more tolerant of silt and slack water than other Juga subspecies. The known range of the species is the Lower Deschutes River drainage, below Pelton Dam, and the Warm Springs River in Wasco and Sherman counties, Oregon. Sites where the species are known to occur are located on the Warm Springs Reservation and Prineville Bureau of Land Management (BLM) in the Deschutes Wild and Scenic River Area. There are few locations on the Forest that match the above preferred habitat description. These locations are in larger rivers likely near the Forest boundary. The Purple-lipped Juga is not believed to occupy streams in the action areas because it prefers larger streams.

Scott's Apatanian Caddisfly

Species of *Allomyia* occur in forested mountain areas below the sub-alpine zone in North America. The larvae inhabit small, cold streams and according to Wiggins (1973) *Allomyia scotti* may be associated with moss in their habitats. Scott's Apatanian caddisfly is known to reside in four streams on Mt. Hood: an alpine stream 3.3 miles below Timberline Lodge, 4,200 feet (SW ¼ Sec13 T3S R8E; Wiggins 1973); the South Fork of Iron Creek (Sec15-16 T3S R9E; Anderson 1976); from a stream (likely the creek known as "Green Apple Creek" that is a tributary to White River) at the junction of Highway 35 and FSR 48 (SE ¼ Sec16 T3S R9E; ONHP 2005), and in a tributary to the Salmon River (ONHP 2005). The species may occur in other localities on or near Mt. Hood; however, extensive surveys have not been conducted. Given that all known locations found to date on the forest were in high-elevation streams, they are not believed to reside in the action area.

Namamyia plutonis

Little is known about the specific life history characteristics of *Namamyia plutonis* but it is likely that their life history is similar to other caddisflies in general (including *Allomyia scotti*) as described by Spellman (2008). They have been found in small streams in densely forested old growth or mature forest watersheds, and larvae have been found in core samples collected from areas composed of coarse gravel mixed with silt and organic sediments (Anderson 1976). They are known to reside in the Coastal and Cascade Ranges of Oregon and California, including documented occurrences in the Rogue River-Siskiyou, Siuslaw, and Willamette National Forests (Anderson 1976), and a recent occurrence in the Rogue River-Siskiyou National Forest (Borgias and Wisseman 1999). *Namamyia plutonis* has never been documented in the Forest, but suitable habitat (small streams) is present within the action area. As such they are believed to be present in North Fork Mill Creek and in the headwaters of Mosier Creek where the stream is perennial.

Survey and Manage Aquatic Mollusks

The Basalt Juga was documented in North Fork Mill Creek within the action area on April 25, 2008. They have not been found in any other stream or water body surveyed since Forest personnel began surveying in 1998. They are not believed to reside in watersheds other than those that drain into the Columbia River near The Dalles, Oregon. The Basalt Juga is present in the action area in North Fork Mill Creek and is assumed to be present in the headwaters of Mosier Creek where the stream is perennial.

The Columbia duskysnail is an aquatic mollusk that has been found across the Forest during surveys conducted over the past several years (Mt. Hood National Forest, unpublished data). Habitat requirements for this species are fairly specific: cold well-oxygenated springs, seeps, and small streams, often in areas with aquatic macrophytes. Individuals have not been found in larger streams and river or glacial streams. Individuals were found in 2010 in Crow Creek and in an unnamed tributary to Crow Creek. Crow Creek is a headwaters tributary to South Fork Mill Creek immediately to the south of North Fork Mill Creek (North and South Forks Mill Creek are the headwater forks of Mill Creek) (Rossel, USFS unpublished field data, 2010). Although the Columbia duskysnail has not been documented in North Fork Mill Creek, Mosier Creek, or in other perennial surface water within the action area, they are assumed to be present due to the presence of appropriate habitat.

Pre-disturbance surveys for the Basalt Juga and the Columbia duskysnail are not needed. The few individuals that may be impacted by hazard tree falling (drop and leave) in the Riparian Reserves or in other perennial surface water would not “cause a significant negative effect on the species’ habitat or the persistence of the species at the site.” Also, hazard tree falling that is required for human safety or infrastructure does not require pre-project surveys. As such this project is consistent with all survey requirements from the *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (USFS et al. 2001, *Standards and Guidelines p. 22*).

Management Indicator Species

Because of their relative sensitivity to change, salmonids were selected as “an indicator species group” for aquatic habitats on the forest. This group of species is especially important for their

commercial and game values and because they occupy the spectrum of aquatic habitats on the forest. These requirements are restricted enough that it is reasonable to assume that if the life history needs of salmonids are met, the rest of other fish species found on the Forest will be met (see FEIS, III-58). Management Indicator Species (MIS) for the Forest include ESA listed fish species (Chinook salmon, coho salmon, steelhead trout, and bull trout), coastal cutthroat trout, and resident rainbow trout. The only MIS fish species in the action area are Middle Columbia River steelhead trout, and resident rainbow trout and cutthroat trout.

A forest-level analysis of the status of these species and their habitat was conducted in March 2011 (project file). The state of Oregon, in concert with the regulatory agencies, manages fish populations while the Forest manages the habitat. For a population to be viable, attributes such as species abundance, productivity, spatial structure, and genetic diversity are needed for the species to maintain its capacity to adapt to various environmental conditions and allow it to sustain itself in the natural environment. All of these attributes are affected by habitat and other environmental conditions that influence species behavior and survival.

The forest-wide analysis also assessed the quantity and quality of habitat available on the forest, and how much habitat was occupied, for each of the salmonid species. The analysis was performed by calculating the linear distance of stream miles of the intersect between widely available National Hydrography Dataset (NHD) and StreamNet fish distribution layers of the geo database on file at the Forest headquarters office. Fish distribution was determined by utilizing the Oregon Department of Fish & Wildlife (ODFW) 1:24000 data for anadromous fish (which matched StreamNet data), U.S. Fish and Wildlife Service data for bull trout, and Forest legacy fish distribution data for resident trout distribution. Results of this analysis are summarized below (Table 3-33).

Table 3-33: A comparison of salmonid management indicator species occupied habitat within the Mt. Hood National Forest (total) and the action area. Private land wholly within the Mt. Hood National Forest boundary is included in the “Total Occupied Habitat” column. Steelhead trout is the summer run only.

MIS	Total Occupied Habitat in the Mt. Hood National Forest (mi)	Occupied Habitat in the Action Area (mi)	Percentage of Total Occupied Habitat in the Action Area
Steelhead trout	95	3.35	3.5%
Resident trout ¹	1370	6.6	0.5%

Existing Aquatic Habitat Conditions within the Action area

Mosier Creek is a perennial stream from its headwater forks to just below the NFSR 1711 road crossing (approximately just under 1.0 RM downstream). It is then an intermittent stream downstream at least to the Forest boundary (Asbridge and Kreiter, USFS, unpublished data, 2013). The springs from which the headwater forks of Mosier Creek originate were documented

¹ Because resident rainbow and cutthroat trout are found in many watersheds across the Mt. Hood National Forest and their distribution often overlaps the MIS analysis lumped their distribution into one category: resident trout. Resident rainbow trout are the most widely distributed salmonid on the forest, occurring in virtually all major watersheds, thus they likely occupy over 90% of the total occupied resident trout habitat displayed in Table 3-33.

during the Government Flats Complex Fire in 2013; they were not documented or surveyed for the initial 2008 analysis.

Consistent with the 2008 analysis, the primary aquatic habitat elements that could be affected by some or all proposed activities include: streambed substrate (especially fine sediment), turbidity, pool quality (as measured by depth or volume), water temperature (as it relates to stream shade), recruitment potential of large woody debris (LWD) from surrounding Riparian Reserves, and in-stream wood amounts. Fish passage would not be affected by either of the action alternatives as there is no changed condition that would modify the planned culvert replacements; these culvert replacements can be implemented under the original North Fork Mill Creek Restoration Opportunities Decision Notice (2008).

North Fork Mill Creek, Mosier Creek and other Aquatic Habitat (seeps and springs)

Aquatic habitat conditions have changed since the 2008 analysis in areas where the fire burned at moderate to high severity in close proximity to each creek. The Water Quality Specialist Report for this analysis references the Burned Area Report and states that the fire resulted in increases in water temperatures, peak flows, erosion, sedimentation and turbidity in streams within the action area. The Burned Area Report Fisheries section stated that in North Fork Mill Creek “Stream surveys indicate that the presence of fine sediment exceeds Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) Standards and Guidelines (S&Gs), and that the presence of high quality pools is considered to be relatively low.”

The Water Quality Specialist Report for this analysis also describes how fire suppression activities, specifically fireline constructed by large equipment in the headwaters of Mosier Creek, could increase surface erosion and sedimentation. However, the fire rehabilitation efforts associated with these activities would reduce erosion. Fireline that was built by hand across and in close proximity to the headwater forks of Mosier Creek and also downstream near the Forest boundary was rehabilitated in fall of 2013, immediately following the fire. The Water Quality Specialist Report also describes how BAER treatments that were proposed in the Burned Area Report include measures to stabilize steep, potentially unstable drainages in the North Fork Mill Creek Basin and road segments primarily along NFSR 1711-630.

Water temperatures in North Fork Mill Creek were well below Oregon Department of Environmental Quality (DEQ) standards at the time of the 2008 analysis (see the Water Quality Input for the North Fork Mill Creek Restoration Opportunities Project (Kreiter, 2008), availability in the project record). Water temperatures in Mosier Creek ranged from 8-10°C during the 1993 survey which took place from August 2-5, and at the time of the 2008 analysis DEQ temperature standards were being met in Mosier Creek. However, the Water Quality Specialist Report for the Revised EA states that areas which experienced high severity burns have “the potential to increase water temperature due to loss of stream shading,” at least in the short term.

In a stream survey conducted by the Forest in 2000, North Fork Mill Creek met the Desired Future Conditions outlined in the Columbia River Basin Project Implementation Guide (PIG) and National Marine Fisheries Service (NMFS) woody debris standards (20 pieces per mile) in Reach 1 but did not meet Forest Plan standards (106 pieces per mile) (Table 3-34). Mosier Creek

did not meet PIG or NMFS woody debris standards in the 1993 stream survey. Higher peak flows and associated bank erosion predicted as a result of the fire would increase large wood recruitment to the stream channels in the action area. Furthermore, in the moderate to high severity burn areas, the current number of standing dead trees (snags) is estimated to be 60-100 trees >20" diameter at breast height (DBH) per acre, and 100-150 trees 8-19.9 inches DBH per acre (see Wildlife Specialist Report, available in the project record). As these trees fall in the next several years, there would be an increase in the amount of large wood recruited to both the riparian area and to the stream channels.

Table 3-34: Summary of habitat parameters (not including large wood recruitment potential) in North Fork Mill Creek and Mosier Creek that could be affected by proposed activities outlined in the action alternatives. This data is from surveys conducted by the U.S. Forest Service (USFS) in 2000 (North Fork Mill Creek) and in 1993 (Mosier Creek), before the Government Flats Complex Fire. Each of the habitat parameters has the potential to change in the future as a result of the fire as described above. The action area in North Fork Mill Creek extends from RM 6.4 – 9.75 and in Mosier Creek from RM 13.0 – 14.7 (the reach surveyed in 1993).

Stream/Reach	Surveyor	Year Surveyed	Shade (%)	Substrate <2 mm (%)	Bank Erosion (%)	Pools/ Pools > 3 ft deep	Large Wood Density per Mile (pieces)
North Fork Mill Creek							
RM 6.4-10.7	USFS	2000	71	18	8.5	257/4	32.59
RM 10.7-12.4	USFS	2000	57	44	0.1	39/0	5.72
Mosier Creek							
RM 13.0 – 14.7	USFS	1993	16.5	ND*	ND*	42.3/ND	1.7

ND = No Data taken

*Pebble counts were not conducted. The dominant substrate was listed as "gravel."

3.5.3 Effects Analysis/Environmental Consequences

No Action

Direct Effects

The only direct effect of the No Action alternative on aquatic fauna or habitat is hazard tree falling near streams or other perennial surface water as this is the only activity that could directly impact aquatic habitat and thus could directly harm or harass aquatic fauna. No hazard trees could fall in a perennial fish-bearing stream (North Fork Mill Creek), so the No Action alternative would have no effect on fish or their habitat. Regional Forester's Special Status mollusks, Survey and Manage mollusks, and the one caddisfly may be present in the perennial reach at the headwaters of Mosier Creek, given known habitat preferences. Hazard tree falling could impact a total of approximately 1.0 RM of perennial aquatic habitat for mollusks and caddisflies in the following locations:

- Mosier Creek along National Forest Service Road (NFSR) 1711 (~0.8 River Mile RM of perennial stream);

- Mosier Creek along NFSR 1711-630 (~0.2 RM of perennial stream); and,
- Aquatic habitat, including seeps and springs along area roads (NFSRs 1711, 1711-630, and 1711-650).

If a hazard tree were to fall into the habitat listed above, there is a slight chance that it could either kill or harm an aquatic macroinvertebrate or disrupt its normal behavior for a short time. The risk for this is very low, but not zero.

Indirect Effects

Aquatic habitat conditions have changed within the action area since the 2008 analysis due to the Government Flats Complex Fire. Specifically, stream temperatures have increased, both sedimentation and turbidity have increased, and the quality of pools has decreased (become less deep or have less volume as they are filled with fine sediment). Due to the fact that 53% of the Riparian Reserve in the action area burned at moderate to high severity, both recruitment of large wood from the surrounding Riparian Reserves and amounts of in-stream wood would increase in the short-term (as trees killed by the fire fall) and decrease in the long-term (as trees take time to grow to maturity, die, and eventually fall). In addition, peak flows have increased due to more runoff, particularly in the Moderate and High Burn Severity areas.

Oliver et al. 2012 found that “Large and severe wildfires can dramatically alter terrestrial and aquatic ecosystems” and in the stream that they studied in the Lake Tahoe basin, California post-fire they found that “canopy cover and bank stability declined dramatically following the wildfire (canopy cover: 88% pre-fire, 22% post-fire; stable bank: 93% pre-fire, 11% post-fire). Substrate also changed substantially, with fine sediment 8x more abundant post-fire and cobble 7x less abundant post-fire.” In their paper “The Effects of Postfire Salvage Logging on Aquatic Ecosystems in the American West,” Karr et al. 2004 also reference a study by Waters (1995) that found that fire-affected ecosystems are sensitive to further disturbances and “Increased runoff and erosion alter river hydrology by increasing the frequency and magnitude of erosive high flows and raising sediment loads. These changes alter the character of river channels and harm aquatic species ranging from invertebrates to fishes.” However, Reeves et al. 1995 and Benda et al. 2003 state that “Fire and subsequent erosion contribute wood and coarse sediment that create and maintain productive aquatic habitats” (Reeves et al. 2006). Karr et al. also reference a study by Gresswell (1999) that “High severity burns place the most stress on watersheds and aquatic systems. By themselves, the effects of fire create few problems for aquatic populations that have access to high-quality stream environments; fire even provides benefits, such as pulsed additions of spawning gravel and wood.”

Because no reforestation activities would take place, increases in stream temperatures and erosion and sedimentation resulting from the fire would continue. Each of these potential effects is discussed below.

Stream Temperature

The Water Quality Specialist Report states that under the No Action alternative “stream temperatures in Mosier Creek and North Fork Mill Creek would increase due to loss of stream shading in the moderate to high severity burn areas.” Stream temperature plays a critical role in determining metabolic rates, physiological function, and life-history of aquatic organisms as well

as ecological processes, such as nutrient cycling and productivity (Allen and Castillo, 2007). Aquatic species are restricted to temperature ranges that limit their distribution and available habitat. For salmonid species, there is a well-established connection between temperature and growth rate. Warmer temperatures increase feeding activity and rates of digestion, but also increase respiratory rates and energetic costs (Allen and Castillo, 2007). Aquatic species present within the action area could experience a decrease in growth rates and other physiological function due to possible increases in stream temperature.

Stream Sediment

The Water Quality Specialist Report states that under the No Action alternative, there would be an increase in sedimentation from hillslope, channel bed, and bank erosion. Hillslope erosion may also continue longer than it would if the burned areas were reforested.

The Government Flats Burned Area Report Fisheries section states that “Increases in sedimentation and embeddedness to spawning gravels could affect the local population by reducing spawning success and fry survival, and further diminish the abundance of quality pools for returning adults to rest for spawning. The risk of potential negative effects to the local population is thought to be high because the magnitude would be considerable and long-term.”

Fine sediment that enters aquatic habitat in the action area could be deposited on the stream bottom and can impact aquatic creatures directly or indirectly depending on the location of the sediment source in relation to aquatic life, amount of sedimentation, and timing of sedimentation. Indirect effects are possible if fine sediment fills pools and reduces living space, decreases food availability, and covers fish spawning areas thereby reducing spawning success. All of these elements will be discussed below.

Turbidity

Increases in turbidity could affect fish by reducing feeding, stimulating movement out of the area, respiratory impairment, increasing stress, and reducing tolerance to disease (Waters 1995). Sigler et al. (1984) found steelhead trout and coho salmon growth rates decreased in turbid water with as little as 25 NTU (nephelometric turbidity units) measured turbidity over test periods ranging from 14 to 31 days. Visual impairment is likely the most common reason for reduced feeding rates and thus reduced growth rates. They also noted there was more fish emigration from tanks with turbid water compared to tanks with clear water. They speculated that salmonids emerging from the gravel would likely emigrate quickly if turbid conditions were encountered. In fact, Waters (1995) states that behavioral avoidance of turbid water may be one of the most important sub-lethal effects of turbidity. Direct mortality as a result of increased turbidity levels is possible, but unlikely.

The effect of increased turbidity on aquatic macroinvertebrates is likely similar to those described for fish, at least for aquatic insects, but most of the literature focused on fine sediment deposition rather than suspended sediment. Waters (1995) postulates that prolonged episodes of turbidity may result in insect drift stimulation (i.e., emigration) that can reduce food supplies. The level of turbidity would have to be very high for long periods of time however. Waters admits that in streams with such a high turbidity load there could be as much or more affect on macroinvertebrates from deposited sediment. Effects on mollusks are not well documented, but

given that preferred habitat characteristics include clean water, it is assumed that long periods of high turbidity could be detrimental.

Both streams (North Fork Mill Creek and Mosier Creek) in the action area are spring fed and generally quite clear. Turbid conditions resulting from increased runoff and associated erosion in the moderate to high burn severity areas would only occur during high water periods and are likely to be limited in time.

Sedimentation

It is very likely that aquatic species within the action area have been and would continue to be negatively impacted by increased fine sedimentation. The deposition of fine sediment on the streambed could negatively impact habitat conditions and subsequent survival and/or production for both fish and aquatic macroinvertebrates (Waters 1995). The effect of fine sediment deposition on macroinvertebrate production, survival, and species composition is relatively well documented. Bjornn et al. (1974 and 1977) found riffles with the most sediment contained the lowest abundance of insects in Idaho streams, but small amounts of sediment added to riffles in streams did not greatly affect abundance or drift. In laboratory studies, they concluded that embeddedness levels more than one third around cobbles decreased insect abundance by over 50 percent, especially riffle inhabiting taxa (e.g., stoneflies, mayflies, and caddisflies), which are most important as salmonid food. The reduction in abundance associated with fine sediment appears to be related to respiration (Rutherford and Mackay 1986) and possibly the loss or reduction of organic detritus, which is a source of food for macroinvertebrates (Culp et al. 1983). Most studies have focused on aquatic insects as these are more important as fish food, but it is likely that impacts to aquatic mollusks are similar.

Indirect effects of fine sediment deposition on fish and fish habitat, particularly salmonids, relates primarily to the following: reduction in the quantity and/or quality of spawning habitat for fish, reduction in food supply, reduction in fry survival in riffles, and reductions in living space. The relationship between spawning success and fine sediment levels has been addressed in detail over the last 40+ years. Suffice it to say that the more fine sediment in spawning areas the lower the spawning success.

Reduction in food supply for salmonids, particularly riffle-dwelling insects, can be significantly impacted by surface and embedded sediment as described above. Reduction in food would lead to increases in competition, increased stress, decreased growth rates, and emigration from the area. The degree to which the above would occur depends on a variety of factors including the amount of sediment, overall productivity of a stream or reach and other water quality factors, such as temperature or pollution, fish species present, and fish abundance prior to the sediment disturbance.

Salmonid fry spend some time throughout the year, much of it during the winter, living in the interstitial spaces between rocks, primarily cobble. Their survival can be reduced if the spaces between cobbles are filled with fine sediment because the actual living space is reduced and they are unable to utilize this protective habitat. Bustard and Narver (1975) found that sedimented substrates reduced winter survival of juvenile cutthroat trout.

In summary, in moderate to high burn severity areas within the fire perimeter there is reduced site productivity, increased erosion, and more riparian vegetation burned. This would result in degraded stream habitat and water quality conditions in turn leading to negative impacts to fish, snails, or caddisflies such as impaired feeding, impaired respiration or suffocation, and increased stress, which could reduce survival rates. Still, increased erosion and sedimentation could also have or would increase the amount of spawning-sized gravel and large wood in the streams within the action area as well, thus having a potential beneficial effect on salmonids present.

Large Wood

As described in the Changed Condition section above, in the next several years there could be an increase in the amount of large wood recruited to both the riparian areas and to the stream channels in the moderate to high burn severity areas as trees killed by the fire gradually fall. Hazard trees that are felled and left in the Riparian Reserves would slightly increase large wood recruitment and potentially amounts of in-stream wood, at least in the short term. This wood could benefit aquatic species by improving aquatic habitat. Specifically, large wood could create additional pools, provide nutrients, provide deeper water habitat where fish can find cover, increase floodplain connection, and could slow flows during high water events, thus decreasing the scouring of stream substrate including spawning gravel.

Alternatives 2 and 3

Much of the analysis in regards to water temperature, erosion potential, sedimentation potential, is covered in detail in the Soil Productivity and/or Water Quality Specialists Reports. As such, this effects analysis on aquatic fauna and habitat relies extensively on the Soil Productivity and Water Quality effects analyses because the primary effects to aquatic fauna are related to water temperature and fine sediment. For example, if hydrology and soils experts expect little to no sedimentation from a specific activity then that activity would have little to no effect on fish or aquatic macroinvertebrates from a sediment perspective. Other indicators incorporated in the effects analysis from a sediment perspective included reopening and use of temporary roads, construction and use of landings and skid trails, hazard tree removal and log haul in Riparian Reserves, including haul route road crossings over streams. The miles of roads adjacent to stream and the potential effects of road maintenance were covered in the 2008 analysis. The falling of hazard trees directly into the stream channel was also included as a potential source of short-term turbidity and sedimentation.

Direct Effects

As with the No Action alternative, the only activity described in the Alternatives 2 and 3 that could have a direct effect on aquatic fauna or habitat is hazard tree falling near streams or other perennial surface water as this is the only activity that could directly impact aquatic habitat. All other proposed activities would occur too far from streams or other water bodies to directly harm or harass aquatic fauna or habitat. Within Riparian Reserves and within 30 feet of any seep, spring, or wetland, there would be no tree falling except for hazard trees (dropped and left). If a tree were to fall in a perennial fish bearing stream or in other aquatic habitat there is a slight chance that it could either kill or harm a fish and/or aquatic macroinvertebrate or disrupt its normal behavior for a short time. The risk for this is very low, but not zero.

The only units where a felled tree could land in or near a stream is in North Fork Mill Creek (steelhead, rainbow, and cutthroat trout present) along some unnamed tributaries to North Fork Mill Creek (non-fish bearing), and along Mosier Creek (non-fish bearing). Regional Forester's sensitive mollusks, Survey and Manage mollusks, and the one caddisfly may be present in North Fork Mill Creek and in the perennial reach at the headwaters of Mosier Creek, given known habitat preferences. Hazard tree falling could impact a total of approximately 1.8 RM of perennial aquatic habitat for fish, mollusks and caddisflies in the following locations:

- Mosier Creek along Forest Service Road (NFSR) 1711 (~0.8 River Mile RM of perennial stream);
- Mosier Creek along NFSR 1711-630 (~0.2 RM of perennial stream);
- Mosier Creek along NFSR 1711-650 (~0.8 RM of intermittent stream);
- A tributary to Mosier Creek along NFSR 1711 (~0.4 RM of intermittent stream);
- Aquatic habitat, including seeps and springs along any haul route (NFSRs 1711, 1711-630, and 1711-650);
- North Fork Mill Creek where hazard tree falling associated with reforestation activities in Unit 91 is in close proximity to the stream channel (~0.8 RM of perennial stream); and,
- Unnamed tributaries (non fish-bearing) to North Fork Mill Creek where hazard tree falling associated with reforestation activities in Unit 91 are in close proximity to stream channels (~3.0 RM of intermittent stream).

Some hazard trees may be felled in the Riparian Reserve of North Fork Mill Creek to ensure that tree planting can be done safely. These trees would be directionally felled towards the creek and into the creek, if possible to increase large wood. All tree falling into the creek would be in compliance with project design criteria included in the Aquatic Restoration Biological Opinion (ARBO) from the NMFS (see Consistency Determination below).

Indirect Effects

A review of the literature (see No Action section above) indicates that the Government Flats Complex Fire changed aquatic habitat conditions within the analysis area, but some changes may not have a deleterious effect on aquatic species. More sediment entering streams could increase spawning gravel and an increase in wood recruitment could occur in the Riparian Reserves and in the stream channels, for example. Alternatives 2 and 3 take this into account and is corroborated by studies like that by Karr et al. 2004 who state that "The effects of postfire salvage logging are especially significant on steep slopes, in erosion-prone soils, on severely burned sites.and in riparian and roadless areas." The paper also found that "Logging, landings, and roads in riparian zones degrade aquatic environments by lessening the amount of large wood in streams, elevating water temperature, altering near-stream hydrology, and increasing sedimentation."

Alternatives 2 and 3 include elements and Project Design Criteria (PDC) which would prevent the exacerbation of indirect effects of the fire, including increased peak flows, increased erosion, sedimentation, and turbidity, and increased water temperatures. These include the following.

- There would be no vegetation treatment except tree planting and the falling and leaving of hazard trees in the Riparian Reserves in stands that were burned at moderate to high severity.

- No vegetation removal or manipulation would occur within 60 feet of any perennial stream and within 30 feet of any intermittent stream, seep, spring, or wetland (see PDC A-1).
- There would be no removal of felled hazard trees, new temporary roads or landings, or mechanical piling of slash within Riparian Reserves (see PDC A7)
- There would be no piling of slash within at least 100 feet of streams, seeps, springs, or wetlands (see PDC A7)
- Salvage logging would not take place on the steep hillslope above North Fork Mill Creek (see PDC A8).

Indirect negative effects of Alternatives 2 and 3 to fish, aquatic macroinvertebrates, and their habitat center on increases in water temperature and potential erosion and subsequent sedimentation. Each of these potential effects is discussed below.

Water Temperature

As described in the Water Quality Specialist Report, increases in water temperature could potentially result from vegetation treatments. However, an immeasurable increase in water temperature is anticipated as a result of proposed activities and thus there would be no effect on aquatic fauna or habitat.

Sediment

Potential erosion and subsequent sedimentation into streams or other water bodies could come from proposed activities including vegetation treatment and associated temporary roads, landings, skid trails, and log hauling. These activities and their anticipated effects were covered in the Soil Productivity and Water Quality Specialists Reports and the details will not be repeated here. Hazard tree falling, including that associated with reforestation activities, could cause brief pulses of sediment if a tree falls directly into a stream channel.

The risk of significant erosion and subsequent sedimentation into area streams from project activities was deemed quite low resulting from limited vegetation treatments within Riparian Reserves (only hazard tree and reforestation treatments). There are only 0.3 miles of temporary road associated with Alternatives 2 and 3. These roads are located in Units 47, 54, and 83, are outside of the Riparian Reserve and are a minimum of 180 feet from any wet area, and thus would not have an effect on aquatic habitat or species.

Log hauling has the potential to increase road related sediment into streams, primarily near stream crossings. The following table summarizes road crossings over perennial and intermittent stream channels.

Table 3-35: Haul route road crossings over stream channels included in the North Fork Mill Creek Revised EA. The effects of road maintenance for these roads was included in the 2008 analysis.

Road Number	Stream Crossed	Perennial or Intermittent	Fish Bearing?	PETS** Fish Species Present?
1700-660	North Fork Mill Creek	Perennial	Yes	No
1700-663	North Fork Mill Creek	Perennial	Yes	No

Road Number	Stream Crossed	Perennial or Intermittent	Fish Bearing?	PETS** Fish Species Present?
1711-000	Mosier Creek	Perennial	No	No
1711-630	Mosier Creek	Perennial	No	No
1711-630	North Fork Mill Creek	Perennial	Yes	Yes***
1711-650	Mosier Creek	Intermittent	No	No

**PETS Fish Species are Proposed, Endangered, Threatened, or Sensitive species

***Steelhead (ESA listed as threatened)

Log hauling itself could exacerbate erosion, especially in wet conditions, and produce dust. Hauling is proposed in the normal operating season (May 15-October 31) which is normally the dry part of the year in this area. When hauling on dry roads the sediment produced is dust (depending on the speed of the truck) which has a negligible effect on water quality. There are PDC in place to address hauling during wet conditions. The 1711 road is heavily rocked at its crossing of Mosier Creek and at its crossing of a tributary to Mosier Creek (in Units 108A and 54) (see Water Quality Specialist Report). BAER treatments include stormproofing the segment of NFSR 1711-630 from mile post (MP) 0.1 to 1.5. The stormproofing includes installing 24 armored drivable drain dips and cleaning out culvert inlets to mitigate potential erosion and instability on surrounding steep and potentially unstable slopes. The BAER treatments on this section of road would be completed before log haul. Log haul on the section of the 1711-630 road which has potential hydrologic connection to North Fork Mill Creek, including the stream crossing itself, would be restricted to July 1 to September 30 to prevent sediment associated with wet road conditions from entering the stream. PDC are in place to prevent potential erosion on NFSR 1711-630, including not allowing mechanized equipment off the road surface from MP 0.3 to 2.3, and dropping and leaving hazard trees in steep areas that were burned severely. Table 3-36 summarizes the above discussion regarding proposed activities that could generate sediment in streams within the action area. The information is displayed in terms of relative risk of sedimentation, both at individual sites and downstream, because it is difficult to predict exact amounts of sediment generated. The risk assessment includes the beneficial effects of PDC meant to reduce impacts

Table 3-36: The relative sedimentation risk of various activities included in Alternatives 2 and 3, as well the potential effects risk to fish and aquatic macroinvertebrates.

Proposed Activity	Relative Sedimentation Risk		Potential Effects Risk		
	Site Specific	Downstream	Macro-invertebrates	Cutthroat Trout	Rainbow Trout and ESA Listed Fish
Vegetation Treatment	Low	Very Low	Low	Low	Low
Log Hauling	Low	Very Low	Low	Low	Low

Potential effects from sediment on aquatic fauna and habitat: The effects of turbidity and fine sediment on aquatic fauna and habitat are described in detail above in the Indirect Effects analysis for the No Action alternative. Because there would be immeasurable amounts of fine sediment and turbidity introduced to aquatic habitat in the action area as a result of Alternatives 2 and 3, there would be little effect on habitat conditions or aquatic fauna.

Increases in turbidity would be immeasurable against background levels with no biological significance. Increased turbidity would have little to no effect on habitat conditions and the impact on aquatic species would likely be minimal.

The amount of sediment generated from the proposed activities would not be enough to measurably reduce pool habitat. Given the anticipated amounts of sediment generated from all proposed projects the impact to spawning and food producing habitat would be minimal. To summarize, Alternative 2 would harvest and remove timber from 387 acres, including the hazard tree treatments. Alternative 3 would only harvest and remove timber from 274 acres. Thus, Alternative 3 would require less log haul, fewer landings and fewer skid trails. As stated in the Water Quality Specialist Report, the overall risk of sediment introduction for Alternative 3 would be less than for Alternative 2. Thus, the effects of both sediment and turbidity on aquatic habitat and fauna would be less for Alternative 3 than for Alternative 2.

Beneficial Effects

Large Wood: The only trees that would be cut in Riparian Reserves in Alternatives 2 and 3 are hazard trees, which would be dropped and left. Because no hazard trees would be removed from the Riparian Reserves, Alternatives 2 and 3 would increase the amount of large wood in the Riparian Reserves that could be recruited to streams in the short term, and would thus be a beneficial effect to aquatic species. Within the reforestation units long-term stand health should improve resulting in increased growth rates of remaining trees so that bigger trees would fall into area streams in the future.

Reforestation: Reforestation of the 490-acre unit (91) directly upslope from North Fork Mill Creek that was burned severely during the Government Flats Complex Fire would have a beneficial long-term effect for aquatic habitat and species by causing vegetation to become established more quickly, thus reducing erosion and associated sedimentation. Also, hazard trees felled in this unit would be positioned along the slope contour when possible, adding additional mitigation for potential erosion.

Cumulative Effects

Cumulative effects include the effects of past, present and reasonably foreseeable future State, tribal, local or private actions that overlap in time and space within the action area (i.e., affected environment) of the Federal action subject to consultations (50 CFR 402.02). The “reasonably foreseeable” clause is a key factor in assessing and applying cumulative effects and could include actions that are permitted, imminent, have an obligation of venture, or have initiated contracts (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). Past and present impacts are incorporated as part of the environmental baseline and discussed here in the effects discussion.

Only those proposed projects in the North Fork Mill Creek Revised EA that have direct or indirect effects are included in the cumulative effects analysis (if the action has no direct/indirect effects there is nothing to cumulate). The spatial context for the following cumulative effects analysis is the action area as described previously. Project/activities occurring outside this area may have an effect on aquatic species/habitat, but would not add to those effects from projects proposed in this EA. The temporal context depends on the existing or future project/activity. If there is an overlap in time from an effects perspective then it is included.

Cumulative effects from an aquatic species and habitat perspective overlap considerably with water quality cumulative effects because most of the attributes analyzed by the hydrologist are directly related to aquatic habitat conditions. As such, this analysis builds upon the Water Quality cumulative effects analysis.

The analysis summary outlined in Table 3-37 below follows the same format as Table 3-30. The one addition is a column that describes potential effects to aquatic species and/or habitat. Those activities that were identified in the Water Quality Specialist Report as having a possible cumulative effect have been copied into the table below and a description of potential species/habitat effects has been added.

Table 3-37: A summary of cumulative effects on aquatic species and habitat resulting from proposed projects in the North Fork Mill Creek Revised EA and known/expected projects elsewhere in or near the action area.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Multi-use Trail Use and Maintenance – North Fork Mill Creek Restoration Opportunities EA	Coarse and Fine Sediment	Possible	Yes	No	There may be an overlap in timing of this project with activities in North Fork Mill Creek Revised EA. The only trail that overlaps in space has one stream crossing of Mosier Creek approximately 0.5 miles downstream from harvest activity. Any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on both the trail maintenance and the activities in North Fork Mill Creek Revised EA.	None. Mosier Creek is intermittent at the location where the trail crosses the stream. No appropriate habitat is present.
	Stream Temperature	Possible	Yes	No	Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.	

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Multi-use Trail Use and Maintenance – North Fork Mill Creek Restoration Opportunities EA	Water Quantity	Possible	Yes	No	There would be no cumulative effects to peak flows because no live trees would be harvested, and detrimental soil conditions from ground-based harvesting methods would be minimized through BMPs and PDC.	
Forest Service Vegetation Treatment Activities Planned or Underway (Roan, Eques, Lokai)	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of these projects with activities in North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on both the existing projects and activities in North Fork Mill Creek Revised EA.	None.
	Stream Temperature	Yes	Yes	No	Some projects are completed so there are no remaining stream temperature effects due to natural recovery. The more recent vegetation treatment projects conform to the Northwest Forest Plan Stream Temperature Sufficiency document. Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.	None.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Forest Service Vegetation Treatment Activities Planned or Underway (Roan, Eques, Lokai)	Water Quantity	Yes	Yes	No	No cumulative water quantity effects due to mitigation measures and design criteria implementation, conformance with existing standards and guidelines and natural recovery on both the existing projects and activities in North Fork Mill Creek Revised EA.	None.
	Pool Quantity and Quality	Yes	Possible	No	The amounts of sediment generated from the vegetation management activities would be insignificant and thus would not impact pool depth.	None.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Forest Service Vegetation Treatment Activities Planned or Underway (Roan, Eques, Lokai) Continued	Large Wood Recruitment Potential and In-stream Large Wood	Yes	Yes	Slight	Hazard trees that are dropped in the Riparian Reserves along Mosier Creek would be too few to influence large wood recruitment. Thinning in the outer zones of the Riparian Reserves (outside the 60-foot no treatment zone) would reduce the number of trees available to fall into the Riparian Reserve and/or the stream. In the long-term stand health would improve, tree growth rates would increase, and bigger trees would be available to fall into area streams.	Minimal cumulative effect throughout action area because the reduction in large wood recruitment potential resulting from proposed projects would be quite small. Beneficial effect in the long term as more large wood is available for recruitment.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Government Flats Complex Fire (including BAER and Fire Suppression Rehabilitation projects)	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of effects from the Government Flats Complex Fire and associated activities and activities in North Fork Mill Creek Revised EA. As described in the Change Condition section and the No Action Alternative, increased coarse and fine sediment is expected from the fire. Some fine sediment input resulted from initial construction of dozer and hand fireline in the headwaters of Mosier Creek. The fireline has been rehabilitated and would have mulch applied in the spring of 2014 to further stabilize it. The amount of sediment would decrease through time as physical soil and vegetation conditions recover. BAER treatments focused on the North Fork Mill Creek sub-watershed and would result in reduced hillslope and road erosion and sedimentation in the 1711-630 road area and North Fork Mill Creek. There may be an overlap in timing of these events with activities in North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA.	Insignificant cumulative effect throughout action area.
			<i>Hood River and Barlow Ranger Districts Mt. Hood National Forest</i>	3-136		

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Government Flats Complex Fire (including BAER and Fire Suppression Rehabilitation projects)	Stream Temperature	Yes	Yes	No	There may be an overlap in timing of effects from the Government Flats Complex Fire and associated activities and activities in North Fork Mill Creek Revised EA. As described in the Change Condition section and the No Action Alternative, increased stream temperature is expected from the fire. Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.	Insignificant cumulative effect throughout action area.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Government Flats Complex Fire (including BAER and Fire Suppression Rehabilitation projects)	Water Quantity	Yes	Yes	No	There may be an overlap in timing of effects from the Government Flats Complex Fire and associated activities and activities in North Fork Mill Creek Revised EA. As described in the Change Condition section and the No Action Alternative, increased peak flows are expected as a result of the fire. Tree planting associated with the North Fork Mill Creek Revised EA would speed up recovery of watershed conditions compared to the No Action Alternative. There would be no cumulative effects to peak flows because no live trees would be harvested, and detrimental soil conditions from ground-based harvesting methods would be minimized through BMPs and PDC.	Insignificant cumulative effect throughout action area.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Government Flats Complex Fire (including BAER and Fire Suppression Rehabilitation projects)	Large Wood Recruitment Potential and In-stream Large Wood	Yes	Yes	Yes	In the Medium to High severity burn areas, the current number of standing dead trees (snags) is estimated to be 60-100 trees >20 inches diameter at breast height (DBH) per acre, and 100-150 trees 8-19 inches DBH per acre. There would be an increase, at least in the short-term, in large wood recruitment to riparian areas and streams within the action area as these snags fall. Hazard tree drop and leave activities and reforestation in the Riparian Reserves proposed in the North Fork Mill Creek Revised EA would further increase large wood recruitment in the short- and long-term.	Beneficial cumulative effect throughout the action area in the short- and long-term.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Road decommissioning (NFSR 1711-650) and Road closures (NFSR 1711 and 1711-630 seasonal, NFSR 1711-640 year-round) associated with North Fork Mill Creek Restoration Opportunities EA	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of this project with activities in North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of PDC, conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA and the original North Fork Mill Restoration Opportunities EA.	Insignificant cumulative effect throughout action area.
	Stream Temperature	Yes	Yes	No	Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.	Insignificant beneficial cumulative effect throughout action area.
	Water Quantity	Yes	Yes	No	No cumulative water quantity effects because no live trees would be harvested and mitigation measures and design criteria implementation and conformance with existing standards and guidelines on activities in North Fork Mill Creek Revised EA.	None.

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?	Aquatic Species or Habitat Effect
		Time	Space			
Hazard Tree Removal Along Roads	Coarse and Fine Sediment	Yes	Yes	No	There may be an overlap in timing of this project with the North Fork Mill Creek Revised EA; any minor suspended sediment would not be measurable due to implementation of mitigation measures and design criteria and conformance with existing standards and guidelines in both projects.	Insignificant cumulative effect throughout action area.
	Stream Temperature	Yes	Yes	No	Except for dropping some hazard trees in Riparian Reserves along Mosier Creek, activities in North Fork Mill Creek Revised EA would maintain the primary shade zone so there is a low risk of increase in stream temperature from this project.	Insignificant cumulative effect throughout action area.
	Large Wood Recruitment Potential and In-stream Large Wood	Yes	Yes	No	Hazard trees could be felled in the Riparian Reserves, thus increasing large wood.	Insignificant beneficial cumulative effect throughout action area.

Cumulative Effects Summary

Stream Temperature: No detrimental cumulative effects are expected as a result of increased water temperature due to PDC that maintain existing primary shade vegetation adjacent to streams. As described in the Water Quality Specialist Report, this project would maintain existing water temperatures. As such, there are no temperature related cumulative effects on aquatic species or habitat.

Sediment: Insignificant detrimental cumulative effects may occur throughout the action area as a result of sediment introduction. Regardless, the cumulative effect is expected to be very small and localized due to the small amount of sediment expected.

Pool Quantity and Quality: There could be some reduction in pool volume resulting from increased fine sediment levels. Given the low amount of sediment expected, it is unlikely pool volume reductions would be measurable. Potential impacts to aquatic species would be negligible.

Large Wood Recruitment Potential and Amount of In-stream Large Wood: Large wood recruitment potential and amounts of in-stream large wood would likely increase throughout the action area, particularly in areas that were burned at moderate to high severity in the fire. Actions proposed in the North Fork Mill Creek Revised EA would slightly increase large wood recruitment potential by falling and leaving hazard trees in Riparian Reserves. Over time, increased tree growth of remaining trees, coupled with the eventual growth to maturity of trees planted during reforestation activities, would increase large wood recruitment potential.

3.5.4 Consistency Determination

Numerous existing plans provide guidance for projects in the form of Standards and Guidelines and recommended Best Management Practices (BMP). These documents include the Forest Plan and the Northwest Forest Plan. A summary of applicable water quality standards and guidelines and BMP from these documents were included in the original analysis and still apply. Additional Northwest Forest Plan standards that apply to the changed condition are listed below.

- Guidelines for Salvage (NWFP ROD pp. C-13 to C-16):
 - While priority should be given to salvage in areas where it will have a positive effect on late-successional forest habitat, salvage operations should not diminish habitat suitability now or in the future.
- Timber Management in Riparian Reserves (NWFP ROD pp.C-31, C-32):
TM-1:
 - a. Where catastrophic events such as fire, flooding , volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting if required to attain Aquatic Conservation Strategy objectives.
 - b. Salvage trees only when watershed analysis determines that present and future coarse woody debris needs are met and Aquatic Conservation Strategy objectives are not adversely affected.
 - c. Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics

needed to attain Aquatic Conservation Strategy objectives.

In addition to the above, the Forest Service is required to assess and disclose the effects of any federal action on ESA listed species, candidate species, and Regional Forester's Special Status species, as outlined in the Endangered Species Act of 1973 and National Forest Management Act of 1976. Lastly, the Magnuson-Stevens Fishery Conservation and Management Act of 1976 requires the Forest Service to assess and disclose the effects to essential fish habitat.

All proposed activities regardless of alternative comply with applicable aquatic direction, recommendations, and/or standards and guidelines outlined in the following plans:

- Mt. Hood National Forest Land and Resource Management Plan (1990)
- Northwest Forest Plan (1994)
- Survey and Manage ROD (2001)
- Aquatic Conservation Strategy (2001)
- Mill Creek Watershed Analysis (2000)

Hazard tree falling into North Fork Mill Creek for worker safety during reforestation activities and the proposed riparian tree planting itself is in complete accordance with the large wood placement and streambank restoration activity categories in the Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in the States of Oregon and Washington (ARBOs II) (NMFS Consultation Number: NWR-2013-9664) from the National Marine Fisheries Service (CY2013 – indefinite end point).

3.5.5 Determination of Effect

The only federal action that would occur under the No Action alternative would be the falling of hazard trees, and there is a chance, albeit slight, that PETS species could be killed or harmed if a tree were felled into a stream channel or other aquatic habitat. More important, because of the short- and long-term effects of the Government Flats Complex Fire, some aquatic habitat conditions could degrade under the No Action alternative. Increased water temperatures, peak flows, erosion, sedimentation and turbidity could negatively impact habitat within the action area and thus could consequently affect fish and other aquatic fauna by causing impaired feeding, impaired respiration or suffocation, and increased stress. However, the fire could have beneficial effects on aquatic habitat and species by increasing spawning-sized gravel and large wood amounts.

Activities proposed in Alternatives 2 and 3 could impact PETS species that reside in the action area, as well as habitat conditions (Table 3-38). Depending on the species and/or habitat direct, indirect, and cumulative effects are possible. PDCs would greatly minimize potential effects, but not eliminate them altogether. As with the No Action alternative, hazard trees felled into stream channels could kill or harm fish or macroinvertebrate species present. Insignificant amounts of fine sediment and turbidity would be introduced to aquatic habitat in the action area as a result of Alternatives 2 and 3, and thus there would be minimal negative effects to aquatic species present.

Over the long-term, Alternatives 2 and 3 could have a beneficial effect to aquatic species and habitat by increasing large wood recruitment in both the short-term (by dropping and leaving hazard trees in the Riparian Reserves), and in the long-term (by reforesting areas that were burned severely during the Government Flats Complex Fire, in particular the steep hillslope above North Fork Mill Creek).

Alternatives 2 and 3 could result in direct effects to fish individuals and could also result in small increases in fine sediment, particularly from log hauling in Riparian Reserves. Due to the potential for direct effects to fish and disturbance and slight sediment increases, Alternatives 2 and 3 *May Affect, and are Likely to Adversely Affect (LAA)* Middle Columbia River steelhead, but would have a long-term *Beneficial Effect (BE)* due to reforestation activities that would mitigate potential negative effects of the Government Flats Complex Fire and would improve habitat in North Fork Mill Creek over time. Designated or proposed critical habitat in North Fork Mill Creek would *Not be Adversely Modified*. This project *May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species (MIIH)* for the Barren Juga, the Dalles Juga, and the Caddisfly *Namamyia plutonis*, all Region 6 sensitive invertebrates, and for the Columbia Dusksnail and Basalt Juga, both Region 6 strategic species as well as Survey and Manage Species. The projects would have *No Impact (NI)* on the Purple-lipped Juga or the Scott’s Apatanian caddisfly, Region 6 sensitive invertebrates.

The falling of hazard trees into North Fork Mill Creek is consistent with the large wood placement category of the Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in the States of Oregon and Washington (ARBOs II) (NMFS Consultation Number: NWR-2013-9664) from both the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (CY2013 – indefinite end point).

Table 3-38: The North Fork Mill Creek Revised EA determination summary for ESA listed species, designated critical habitat, and Region 6 Regional Forester’s Sensitive Species. For ESA listed species, short-term effects (during implementation) are underlined, long-term effects in **BOLD** (post-implementation).

	Listing & Critical Habitat Date	Suitable Habitat Present	Species Present	Effects of Actions	
Endangered Species Act Listing by ESU/DPS – Fish Species are Threatened, Macroinvertebrate Species are Sensitive				No Action	Alternatives 2 and 3
Lower Columbia River steelhead & CH (<i>Oncorhynchus mykiss</i>)	1/06 9/05	N	N	NE	NE, NAM
Lower Columbia River chinook & CH (<i>Oncorhynchus tshawytscha</i>)	6/05 9/05	N	N	NE	NE NAM
Columbia River Bull Trout & CH (<i>Salvelinus confluentus</i>)	6/98 11/10	N	N	NE	NE NAM
Middle Columbia River steelhead & CH	1/06	Y	Y	NE	LAA, BE ,

	Listing & Critical Habitat Date	Suitable Habitat Present	Species Present	Effects of Actions	
(<i>Oncorhynchus mykiss</i>)	9/05				NAM
Upper Willamette River chinook & CH (<i>Oncorhynchus tshawytscha</i>)	6/05 9/05	N	N	NE	NE
Lower Columbia River coho & CH (<i>Oncorhynchus kisutch</i>)	6/05 1/13	N	N	NE	NE NAM
Barren Juga (<i>Juga hemphilli hemphilli</i>)	1/08	Y	Y	MIIH	MIIH
Purple-lipped Juga (<i>Juga hemphilli maupinensis</i>)	1/08	N	N	NI	NI
Dalles Juga (<i>Juga hemphilli dallesensis</i>)	12/11	Y	Y	MIIH	MIIH
Scott's Apatanian Caddisfly (<i>Allomyia scotti</i>)	1/08	N	N	NI	NI
Caddisfly (<i>Namamyia plutonis</i>)	12/11	Y	Y	MIIH	MIIH

Acronyms:

BE – Beneficial Effect	CH – Critical Habitat	LAA – May Affect, Likely to Adversely Affect
MIIH - May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species		
NAM – Not Adversely Modified	NE - No Effect	NI – No Impact

3.5.6 Summary of Effects by Alternative

In the No Action alternative, only hazard tree treatment would occur and there is a slight chance that aquatic species could be harmed or killed if a hazard tree were to fall directly on aquatic habitat. Also in the No Action alternative, habitat degradation that may have resulted from the Government Flats Complex Fire and associated negative impacts to aquatic species would continue. There would be an increased risk of higher peak flows, erosion and sedimentation and thus increased fine sediment input to area streams would be greater. Not completing reforestation on the steep hillslope that was severely burned above North Fork Mill Creek could exacerbate erosion. The resulting potential increase in fine sediments in both Mosier and North Fork Mill Creeks could degrade habitat for fish and/or macroinvertebrates by filling pools, reducing living space, decreasing food availability, and by embedding stream substrate. Aquatic species could experience impaired feeding, impaired respiration or suffocation, increased stress, and reduced spawning success. The reduction in shade in riparian areas that burned at Moderate to High Severity could cause an increase in water temperature. Potential beneficial effects of the fire on aquatic habitat would continue, including pulses of spawning gravel and wood.

Similar to the No Action alternative, hazard tree treatment included in Alternatives 2 and 3 would have a slight chance of harming or killing aquatic species if a hazard tree were to fall

directly on aquatic habitat. The chances of this are slight, and impacts to listed steelhead and their designated critical habitat in North Fork Mill Creek would be minimized by the adherence to PDCs included in ARBO. Alternatives 2 and 3 would also result in short-term disturbance that could result in localized increases in fine sediment (log hauling and removal of hazard trees in Riparian Reserves). These effects would be minimal and not result in an irreversible or irretrievable loss of aquatic habitat or species. In fact, Riparian Reserve forest conditions along both Mosier and North Fork Mill Creek would improve leading to increased growth rates and larger down wood over time compared to the No Action scenario. Due to the project design, including PDCs, cumulative effects would be minimal.

Alternatives 2 and 3 *May Affect, and are Likely to Adversely Affect (LAA)* Middle Columbia River steelhead, but would have a long-term *Beneficial Effect (BE)*. Designated or proposed critical habitat in North Fork Mill Creek would *Not be Adversely Modified* under this alternative. Alternatives 2 and 3 *May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species (MIIH)* for the Barren Juga, the Dalles Juga, and the Caddisfly *Namamyia plutonis*, all Region 6 sensitive invertebrates, and for the Columbia Dusksnail and Basalt Juga, both Region 6 strategic species as well as Survey and Manage Species. The projects would have *No Impact (NI)* on the Purple-lipped Juga or the Scott's Apatanian caddisfly, Region 6 sensitive invertebrates.

3.6 Aquatic Conservation Strategy

In order for a project to proceed, "a decision maker must find that the proposed management activity is consistent with the Aquatic Conservation Strategy objectives" (ROD B-10) from the Northwest Forest Plan Record of Decision. The nine objectives are listed on page B-11 of the ROD. Portions of the effects analysis in this document focus on key parameters or indicators that make up elements of the nine Aquatic Conservation Strategy objectives, to determine if the project would restore, maintain, or degrade these indicators. Once this determination is made, the indicators are examined together with the Range of Natural Variability to ascertain whether the project is consistent with the objectives. A description of the range of natural variability of the "important physical and biological components" (ROD B-10) is necessary for determining whether a project "meets" or "does not prevent attainment" of the Aquatic Conservation Strategy objectives (ROD B-10).

The Wasco County Soil and Water Conservation District Watershed Assessment describes the range of natural variability for Mosier Creek: "Mosier Creek Watershed includes areas of The Dalles Formation and Bretz flood sediments. The Dalles Formation is a unit of mixed sedimentary material and volcanic ash deposited on top of the underlying basalt in the Mosier Syncline (low). Mosier Creek collects a lot of sand and fine sediments from The Dalles Formation. On the other hand, Rock Creek includes very little fine material, because its geology is dominated entirely by basalt formations" (pg. 4). Natural sources of sediment include "landslides and burns" (pg. 30). "Sedimentation can also be related to land use through road runoff (urban and rural) or road failure, and surface erosion on crop or rangeland" (pg. 30). (Wasco SWCD 2002).

The Mill Creek Watershed Analysis (WA) describes the range of natural variability for North Fork Mill Creek: “the key factors that contribute to landslides in Mill Creek are steep slopes, abundant precipitation, and weak geologic features...” However, “only a small percentage of the watershed consists of steep slopes, and many of these are comprised of rock that is relatively resistant to slope failure.” Still, “the steep terrain of the North Fork Mill Creek canyon upstream from the National Forest boundary” is in “a high category of erosion hazard.” (pp. Ch-II-3 and 4). The Hydrology section states that “The Mill Creek basin is one of the more stable on the Mt. Hood National Forest” and that “Riparian areas are generally fair to good in the upper watershed and show a recovery trend.”(p. Ch-II-23) (USFS 2000). Due to the Government Flats Complex Fire in 2013 peak flows, hillslope erosion and resulting sediment loads, water temperatures, and specific habitat components (large wood, streamback condition, and riparian reserves) have changed.

The following table displays specific indicators that comprise the Aquatic Conservation Strategy (ACS) objectives and the effects section that covers this indicator in the Revised Environmental Assessment. Also, refer to the Fisheries and Aquatic Fauna, Soil Productivity and Water Quality Specialists Reports for additional effects descriptions. These specialist reports are available in the project record, located at the Hood River Ranger District in Mount Hood-Parkdale, Oregon.

Table 3-39: ACS Objective Indicators in the Revised EA

Indicators	Analysis Found in the Effects Section of the EA
Water Temperature	Water Quality, Fisheries
Sediment	Soil Productivity, Water Quality, Fisheries
Chem. Contaminants	Water Quality, Fisheries
Physical Barriers	Water Quality, Fisheries
Substrate	Fisheries
Large Woody Debris	Fisheries
Pool Frequency	Fisheries
Pool Quality	Fisheries
Off-Channel Habitat	Fisheries
Refugia	Fisheries
Width/Depth Ratio	Fisheries
Streambank Condition	Water Quality, Fisheries
Floodplain Connectivity	Water Quality, Fisheries
Peak/base Flows	Water Quality
Drainage Network Increase	Water Quality
Riparian Reserves	Water Quality, Fisheries

The following table displays the individual indicators and the effect the alternatives have on those indicators at the 5th, 6th and 7th field watershed scale. Fifth field watersheds are generally large in size (40,000 acres to 250,000 acres), while 6th and 7th field watersheds are smaller (5,000 acres to 40,000 acres and 2,000 acres to 5,000 acres respectively).

Table 3-40: ACS Objective Indicators for each Alternative. The abbreviations in the table are defined as: “Restore” which means the action(s) would result in acceleration of the recovery rate of that indicator; “Maintain” which means that the function of an indicator does not change by implementing the action(s) or recovery would continue at its current rate; and, “Degrade” which means changing the function of an indicator for the worse.

Indicators		Effects of the Actions by Alternative	
		No Action	Proposed Action Alternatives 2 and 3
Water Quality	Temperature	Slight Degrade over Short-term, Maintain over Long-term	Maintain
	Sediment	Slight Degrade over Short-term, Maintain over Long-term	Slight Restore over the Long-term
	Chemical Contamination	Maintain	Maintain
Habitat Access	Physical Barriers	Maintain	Maintain
Habitat Elements	Substrate	Slight Degrade over Short-term, Maintain over Long-term	Maintain
	Large Woody Debris	Slight Restore over the Short- and Long- term	Slight Restore over the Short- and Long-term
	Pool Frequency	Maintain	Maintain
	Pool Quality	Slight Degrade over Short-term, Maintain over Long-term	Maintain
	Off-channel Habitat	Maintain	Maintain
	Refugia	Maintain	Maintain
Channel Conditions and Dynamics	Width/Depth Ratio	Maintain	Maintain
	Streambank Condition	Slight Degrade over Short-term, Maintain over Long-term	Slight Restore over the Short- and Long-term
	Floodplain Connectivity	Maintain	Maintain
Flow/Hydrology	Peak/Base Flows	Slight Degrade over Short-term, Maintain over Long-term	Maintain
	Drainage Network Increase	Maintain	Maintain
Watershed Conditions	Riparian Reserves	Maintain	Slight Restore over the Short- and Long-term

The following summarizes the Individual Indicator Table and associated ACS Objectives:

- The proposed project would result in a slight increase in both in-channel large wood and in large wood recruitment potential when hazard trees are felled and left in the Riparian Reserves. Some trees would be dropped into streams that are currently lacking in-channel woody material to improve aquatic habitat quality and stream channel function. Reforestation activities would also contribute to a long-term recovery of riparian and upslope forest stands that were burned at moderate to high severity. Benefits from implementation of the Proposed Action Alternatives 2 and 3 would be noticeable at the site scale and possibly the 7th field sub-watershed scale and include reduction in sedimentation, and restoration of large woody debris and some adjacent stream channel bank stability. This would most likely result in some recovery in all of the ACS Objectives.
- Indicators other than those described in the bullet above would be maintained as outlined in the effects analysis above.

3.7 Botany

More information is available in the project record including the full botanical analysis file, and biological evaluation as part of the Botany Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.7.1 Analysis Assumptions and Methodology

Under the North Fork Mill Creek Restoration Opportunities Biological Evaluation for Region 6 Sensitive Plants and Northwest Forest Plan Rare & Uncommon Botanical Species (Nugent, 2008), the treatment units were evaluated for the presence of threatened, endangered, and sensitive plant species using a 5-step biological evaluation process required by Forest Service policy to “assure that management activities do not jeopardize the continued existence of sensitive species or result in an adverse modification of their essential habitat” (FSM 2670.3).

Sources of information used during the review included the Mt. Hood National Forest (MHNF) sensitive species plant database, the Interagency Species Management System (ISMS), Oregon Natural Heritage Database of rare species, survey protocols and management recommendations for Rare & Uncommon botanical species, scientific literature, aerial photos, topographic maps, District botany records of previous surveys in the area, and knowledge provided by individuals familiar with the area. Survey methodology and results are included in the final Biological Evaluation for Region 6 Sensitive Plants and Northwest Forest Plan Rare & Uncommon Botanical Species (Nugent, 2008) which is available in the project record located at the Hood River Ranger District in Mount Hood-Parkdale, Oregon.

The original analysis identified 75 U.S. Forest Service Pacific Northwest Region (R6) Sensitive and/or Survey and Manage species (special status species) within the Mt. Hood National Forest, using the 2008 Regional Forester’s Sensitive Species list and the 2004 Modification of the Northwest Forest Plan Record of Decision. The presence of two sensitive species was identified within the planning area: *Arabis sparsiflora* var. *atorubens* (sickle-pod rockcress) and

Botrichium minganense (Mingan moonwort). This analysis was updated to incorporate changes associated with the updated 2011 Regional Forester's Sensitive Species list.

Suitable habitat is present for 38 of these sensitive plant species (see Table 3 of original Botany report), including 16 fungi species; although, individuals were not found. Formal surveys for many Survey and Manage fungi are not practical or are not required (2001 Survey and Manage Record of Decision, Standard & Guideline-9) unless activities are planned in areas of old growth forest (forest stands over 180 years old) or near known sites. Fungal surveys were not conducted in the planning area. Informal surveys (incidental, or surveys for other projects) have been conducted for various fungi throughout the Mill Creek watershed, but no species were found.

Following fire and rehabilitation activity, the Natural Resource Information System Threatened, Endangered and Sensitive Plants-Invasive Species (NRIS TESP-IS) database was used to evaluate the disturbance impacts to individuals and habitats for additional sensitive species newly listed on the Regional Forester's sensitive species list (December 2011), and for Survey and Manage species, in order to meet requirements for the 2001 Survey and Manage ROD.

3.7.2 Changed Condition

The species listed in Appendix 1 of the Botany Biological Evaluation have potential suitable habitat within the project area and were considered during this analysis. The species discussed below are present within the project area. As such, only these species will be considered in the effects analysis for this project.

Mingan moonwort

This moonwort is found in riparian floodplains, seeps, and springs on the east and west sides of the the Mt. Hood National Forest. The Government Flats complex fire did not impact the known sites for Mingan moonwort. As such, there is no changed condition that impacted this species and it will not be discussed further. The effects to this species are fully disclosed in Biological Evaluation for Region 6 Sensitive Plants and & Northwest Forest Plan Rare & Uncommon Botanical Species (Nugent, 2008).

Sickle-pod rockcress

Sickle-pod rockcress occupies grassland/shrub habitat at the northern edge of Mill Creek Ridge, in hazard tree treatment Units 101B, 101A, and 100A. There are historic sites in 100A and in reforestation Unit 92. On the Mt. Hood National Forest, this species is widely scattered along Surveyors Ridge Trail from Shellrock to the top of Bald Butte, and along Mill Creek Ridge. Periodic informal monitoring between 1992 and 2007 indicated that populations in the Mill Creek watershed were not declining in numbers or size. Recent surveys suggest that populations at these sites are in decline following the rapid invasion of non-native annual grasses, particularly South African wiregrass (*Ventenata dubia*), within the past several years. On the Mt. Hood National Forest, sickle-pod rockcress appears to be a pioneer species (i.e., early seral) associated with pine/oak/grassland habitats in fire prone areas that remain in an early seral stage. (Refer to the Silviculture Species Report, available in the project record, for a definition of early seral forests.) The fire burned with moderate to high severity into areas of known habitat and known sites for the sickle-pod rockcress in the Mill Creek Ridge area.

R6 Sensitive and Survey & Manage Fungi

Fungi occupy diverse types of habitats within the Mt. Hood National Forest. Suitable habitat is often in areas of mature forests, but species will occur in younger growth. Fungal species considered in this report are associated with the roots (mycorrhizal species) of Douglas-fir (*Psuedotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), and true fir, such as grand fir (*Abies grandis*), or occur on litter or wood (saprobes). Species may be terrestrial, or sequestrate (truffles or gastroid mushrooms). In the vicinity of the planning area, the suitable habitat is present around North Fork Mill Creek and in the Surveyors Ridge Late- Successional Reserve at the west edge of the planning area.

Areas of high intensity fire may have resulted in significant consumption of the substrate on which fungi rely, such as litter, downed wood, or living host/mycorrhizal associate. Areas of moderate to low intensity burns likely had a patchy pattern of litter consumption which should continue to support fungal species. The fire impacted potentially suitable habitat for R6 Sensitive and Survey & Manage fungi, especially in areas of high severity burns. It is unknown if individual populations were impacted, as none have been documented within the project area.

3.7.3 Effects Analysis/Environmental Consequences

Alternative 1 - No Action (Direct and Indirect Effects)

The No Action alternative would have few effects. Under this alternative, hazard trees would be felled along roads within the project area. None of the Restoration Thin treatments, associated (fuels treatments) or connected actions (temporary roads) would take place. No reforestation activities would take place.

Under this alternative, hazard trees would be removed along the road accessing habitat for sickle-pod rockcress. Mechanical activity within these areas may adversely impact individuals or habitat, but would not likely contribute toward a trend.

Mechanical operations along the road may promote the spread of competitive invasive plant species which could indirectly influence sensitive species and suitable habitat.

Alternative 2 - Revised Proposed Action (Direct and Indirect Effects)

Sickle-pod rockcress

There would be limited effects to this species as a result of the Proposed Action. The species is a biennial that typically flowers and dies in its second year. It occupies areas of rocky, open grassland and forest edges in ponderosa pine forests and appears to be a fire-adapted species. It responds favorably to disturbances, such as road decommissioning and low severity burns (L. Holmberg, personal comm.). There is anecdotal evidence that some disturbance, such as a light fire, increases seed germination. The grasslands were only lightly burned by the fire, and this should enhance the habitat for this species. There is an increased threat from invasive annual grasses (*Bromus tectorum*, *Bromus mollis*, and *Ventenata dubia*), which are now the dominant grass species in this historic bunchgrass-dominated habitat. These species respond favorably to fire and to soil disturbance, such as dozer and handlines. Seeds of invasive species may have been transported during fire suppression activities.

Under the Proposed Action, hazard trees would be removed along the road accessing this habitat. Immediate direct effects could be loss of some individual plants from mechanical trampling and adverse impacts to habitat. Long term direct effects could actually be a temporary population increase in some localities due to moderate disturbance. Project Design Criteria for the Proposed Action would include buffering known sites of sickle-pod rockcress to avoid damage. Mechanical activity within these areas may also increase the risk of invasive species spread, causing both direct and indirect effects to individuals and suitable habitat over time.

The effects determination for this species is **May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.**

R6 Sensitive and Survey & Manage Fungi

Since sufficient local survey has been completed to determine the low potential for species presence and habitat, there is a low risk to species viability, and a low likelihood of 'trend towards listing' caused by the project. There would be limited effects to these species as a result of the Proposed Action. Under the Proposed Action, salvage operations would remove trees within areas of moderate and high severity burns in the Restoration Thin (High to Moderate Severity). Machinery operating within these areas may destabilize soil and destroy substrate. Following Project Design Criteria for soil stability, such as leaving debris and downed logs for erosion control, would assist in maintaining fungal populations until substrate recovers (see the Soils Productivity Specialist Report).

The effects determination for this species is **May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.**

Alternative 3 – Snag Retention (Direct and Indirect Effects)

Sickle-pod rockcress

Under this alternative, hazard trees would be removed along the road accessing habitat for sickle-pod rockcress. Mechanical activity within these areas may adversely impact individuals or habitat, but would not likely contribute toward a trend. Reforestation activities would not impact sickle-pod rockcress populations. Mechanical operations along the road may promote the spread of competitive invasive plant species which could indirectly influence sensitive species and suitable habitat.

The effects determination for this species is **May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.**

R6 Sensitive and Survey & Manage Fungi

Since sufficient local surveys have been completed to determine the low potential for species presence and habitat, there is a low risk to species viability, and a low likelihood of 'trend towards listing' caused by the project. There would be limited effects to these species as a result

of this alternative. There would be no salvage thinning activities within areas of high to moderate severity burns. Reforestation activities would cause minimal soil disturbance and would not impact the substrate or habitat.

The effects determination for these species is **No Impact**.

Cumulative Effects for Alternatives 2 and 3

Recent and planned projects considered in cumulative effects are the Government Flats Complex Fire, fire suppression activities, completed North Fork Mill Creek Restoration Opportunities sale activities, harvesting activities within The Dalles Watershed, The Dalles Watershed Fuelbreak projects, and ongoing road maintenance. These activities occur within the Upper Mosier Creek and North Fork Mill Creek 5th field Watersheds. These areas contain similar habitat and species which provide seed/propagule source and genetic diversity for the species considered during this report, or for invasive species. The timeframe considered is from 2008 when the North Fork Mill Creek Sale was proposed, and for 5 years into the future, which is a reasonable amount of time to see the result of these cumulated effects within the project area.

There are direct and indirect effects from this project relating to soil disturbance and potential invasive species spread. The cumulative effects associated with invasive species are discussed in the Invasive Species Specialist Report, available in the project record.

Measures may be taken to reduce these cumulative effects. The Burned Area Emergency Response (BAER) report for the Government Flats Complex Fire includes monitoring for invasive species and non-native plants within 56 acres of native bunchgrass meadows bisected by or adjacent to roads and that were burned over. Treatment would include manual and herbicide treatments followed by seeding with native plant species appropriate for this area. Under the 2008 Site-Specific Invasive Plant Treatment EIS, roadside populations would be treated regularly depending on the need and level of infestation. Project Design Criteria associated with the Proposed Action would provide mitigation for the introduction and spread of invasive species through the cleaning of equipment, use of weed-free materials, and restoration with native seed. Known infestations would be treated prior to implementation. These combined actions would lower the risk of invasive species spread within the project area.

3.7.4 Consistency Determination

Forest Service Policy

Alternative 1 (No Action), Alternative 2 (Revised Proposed Action) and Alternative 3 (Snag Retention) are consistent with the following Forest Service Standards:

- FSM 2672.1 - Sensitive Species Management. “Sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. There must be no impacts to sensitive species without an analysis of the significance of adverse effects on the populations, its habitat, and on the viability of the species as a whole. It is essential to establish population viability objectives when making decisions that would significantly reduce sensitive species numbers.”

- FSM 2670.22(2) - “Maintain viable populations of all native and desired non-native wildlife, fish and plant species in habitats distributed throughout their geographic range on National Forest System lands.”

Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) Direction

Alternative 1 (No Action), Alternative 2 (Revised Proposed Action) and Alternative 3 (Snag Retention) are consistent with the following Forestwide Standards:

- FW-148, 149 and 150 – “Management activities shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species. The diversity of plants and animals shall be at least as that which would be expected in a natural forest; the diversity of tree species shall be similar to that existing naturally in the allotment area (36 CFR 219.27).”
- FW-162 – “Habitat management should provide for the maintenance of viable populations of existing native and desired non-native wildlife, fish (36 CFR 219.19) and plant species (USDA Regulation 9500-4) well distributed throughout their current geographic range within the National Forest System.”
- FW-174, pg. Four-69. “Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670.”
- FW-175 – “Habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved.”

2001 Survey and Manage Record of Decision

Alternative 1 (No Action), Alternative 2 (Revised Proposed Action) and Alternative 3 (Snag Retention) are consistent with the survey protocols 2001 Survey and Manage Record of Decision. All botany surveys included consideration of botanical species in table C-3 of the 2001 Survey and Manage Record of Decision.

NFMA Implementing Regulations

Alternative 1 (No Action), Alternative 2 (Revised Proposed Action) and Alternative 3 (Snag Retention) are consistent with the following regulations:

- 36 CFR 219.19 - “Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations would be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals could interact with others in the planning area.”

- The 1983 USDA Departmental Regulation 9500-4 provides further direction to the Forest Service, expanding the viability requirements to include plant species:

“Habitats for all existing native and desired non-native plants, fish, and wildlife species would be managed to maintain at least viable populations of such species. In achieving this objective, habitat must be provided for the number and distribution of reproductive individuals to ensure the continued existence of a species throughout its geographic range . . . Monitoring activities would be conducted to determine results in meeting population and habitat goals.”

3.7.5 Summary of Effects by Alternative

Alternative 1 (No Action) would have **no impact** on R6 sensitive or Survey and Manage fungi. This alternative **may impact** sickle-pod rockcress individuals and habitat through mechanical disturbance of the soil and invasive species spread, but is not likely to cause a trend. This alternative would have **no impact** on other sensitive species.

Alternative 2 (Proposed Action) **may impact** sickle-pod rockcress and sensitive fungi individuals and habitat through mechanical disturbance of the soil, loss of substrate, and the spread of invasive species. This alternative would have **no impact** on other sensitive species.

Alternative 3 (Snag Retention) **may impact** sickle-pod rockcress individuals and habitat through mechanical disturbance of the soil and invasive spread, but is not likely to cause a trend. This alternative would have **no impact** on other sensitive species.

Vascular Plants, Lichens, Bryophytes, and Fungi:

	No Impact
X	May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.
	Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

3.8 Invasive Plant Species

More information is available in the project record including the full noxious weed analysis file, as part of the Noxious Weed Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.8.1 Analysis Assumptions and Methodology

The North Fork Mill Creek Restoration Opportunities Noxious Weed Risk Assessment and Invasive Plants Specialist Report (Nugent, 2008) identified non-native and invasive species known from the project area and surrounding areas of concern. Invasive species were prioritized based on the Oregon Department of Agriculture’s (ODA) Noxious Weed Control Rating System.

Other species of concern, such as non-native annual grass, were also discussed in this report. This report is available in the project record located at the Hood River Ranger District in Mount Hood-Parkdale, Oregon. This analysis will use the current ODA Noxious Weed List (2013), which includes two additional species now known from within one mile of the project area.

Table 3-41: Oregon Department of Agriculture's (ODA) Noxious Weed Category

Category	Common Name	Scientific Names
B	diffuse knapweed	<i>Centaurea diffusa</i>
B, T	spotted knapweed	<i>Centaurea stoebe (C. maculosa)</i>
B, T	rush skeletonweed	<i>Chondrilla juncea</i>
B	Canada thistle	<i>Cirsium arvense</i>
B	bull thistle	<i>Cirsium vulgare</i>
B	St. Johnswort (Klamath weed)	<i>Hypericum perforatum</i>
B	yellow toadflax	<i>Linaria vulgaris</i>

Noxious Weed Control Rating System

Noxious weeds, for the purpose of this system, shall be designated “A”, “B”, and/or “T”, according to the ODA Noxious Weed Rating System.

1. **“A” Designated weed** – a weed of known economic importance which occurs in the state in small enough infestations to make eradication /containment possible; or is not known to occur, but its’ presence in neighboring states make future occurrence in Oregon seem imminent. Recommended action: Infestations are subject to intensive control when and where found.
2. **“B” designated weed** - a weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. Where implementation of a fully integrated statewide management plan is infeasible, biological control shall be the main control approach.
3. **“T” designated weed** – a priority noxious weed designated by the State Weed Board as a target weed species on which the Department will implement a statewide management plan.

Bull thistle can be found along most of the major roads in the planning area, such as the 17, 1711 and 17-660 roads. This species also occurs on disturbed areas such as past timber harvested units (landings/slash piles), skid trails, roadside prisms, OHV trails, trailheads, and dispersed campsites. Forested areas with little disturbance and understory competition are generally weed free from this species.

Rush skeleton weed is known from one site within The Dalles Municipal Watershed off the 1720-190 road and from one site on the 193/Mill Creek Ridge Road. It is an aggressive perennial weed in rangeland and cropland and has been found outside of the forest boundary along the 1720/Threemile road.

The Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants FEIS, was completed in 2005, and the “Site-Specific Invasive Plant Treatments for the Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon, including Forest Plan Amendment #16” FEIS, was completed in 2008. The invasive plant risk assessment for this project is tiered to the 2005 and 2008 FEIS. The 2005 FEIS provides invasive plant management direction to all National Forest Land and Resource Management Plans in U.S. Forest Service Pacific Northwest Region (Region 6). The management direction includes invasive plant prevention and treatment/restoration standards intended to help achieve stated desired future conditions, goals, and objectives, and is expected to result in decreased rates of spread of invasive plants while protecting human health and the environment from the adverse effects of invasive plant treatment. The 2008 FEIS, in turn, is tiered to the 2005 FEIS. It identifies 208 invasive plant treatment areas on the Mt. Hood National Forest and Columbia River Gorge National Scenic Area, where integrated invasive plant management methods (e.g., manual, mechanical, chemical, biological, and/or cultural treatments) would occur; authorizes the use of 10 herbicides; and provides for an early detection/rapid response (ED/RR) program. The goal of ED/RR is to identify and treat invasive plant populations early when they are still small since treatment and control become more difficult as populations get larger. Both of these EIS are incorporated by reference for this analysis, and are available in the project record.

The sites of known infestations are recorded in the Natural Resource Manager Threatened, Endangered and Sensitive Species – Invasive Species Database. This database is used to record sites and treatment information. It was used after the Government Flats Complex Fire to evaluate the risk of invasive species spread.

3.8.2 Changed Condition

The invasive species within this project area have not changed significantly since the original specialist report was completed. Under the Mt. Hood National Forest Site-Specific Invasive Plant Treatment EIS the following sites along roads 1700 (treatment sites #66-044 and #66-074), and 1700-013 (treatment site #66-055), have been completed between 2012 and 2013. This has significantly reduced the invasive species presence within the project area. The site along 1700-662 (treatment sites #66-081 and #66-033) has not been treated and requires evaluation.

Fire suppression activity may have introduced new seed sources or created disturbance along roads, landings, dozerline and handline. This increases the risk of spread by invasive species. Machinery, such as dozers and excavators, were washed prior to entry onto National Forest Land, and upon leaving to mitigate for invasive species introduction. Populations already present may have been spread to new locations. In moderate to high burn severity areas, the understory was impacted significantly, and provides ideal habitat for invasive species, many of which are pioneer, or early seral species (see the Silviculture Specialist Report, available in the project record, for a definition of early seral). Rehabilitation following the Government Flats Complex Fire included the use of native seed to revegetate dozerline and handline, to mitigate the spread of these species.

3.8.3 Effects Analysis/Environmental Consequences

Alternative 1 - No Action (Direct and Indirect Effects)

The No Action alternative would have few effects. Under this alternative, hazard trees would be felled along roads within the project area. None of the Restoration Thin treatments, associated (fuels treatments) or connected actions (temporary roads) would take place. No reforestation activities would take place.

Under this alternative, hazard trees would be removed along roads with known populations of invasive species and non-native grasses. Mechanical operations along the road may promote the spread of these competitive species, which could indirectly influence sensitive species and suitable habitat.

Alternative 2 - Proposed Action (Direct and Indirect Effects)

The Proposed Action would involve cutting trees, temporary road building, and landing construction, which would cause a reduction in canopy and stems. This would provide favorable light conditions for invasive species establishment. Harvest activities (yarding material), deep ripping, and grapple piling, could expose and compact soils which would provide a seedbed for invasive species establishment. The soil conditions within the project area have already been degraded by the fire, and by fire suppression activities which may have introduced invasive seed or propagules.

Conceivably, all the harvest treatment acres would become more susceptible to some degree of a weed establishment opportunity, as a result of this action. Some acres would be more susceptible compared to others. Areas of moderate to high severity burns are more vulnerable because much of the competing native vegetation has been destroyed. The level of disturbance activity also determines the risk of weed introduction and infestation. For example, the acres of ground based skid trails and landings would be highly disturbed ground leading to the best opportunity for weed establishment. The hazard tree units are more likely to promote weed establishment, since infestations are more commonly found on roadsides where light conditions are more favorable than dense canopy. Project Design Criteria associated with the Proposed Action would provide mitigation for the introduction and spread of invasive species through the cleaning of equipment, use of weed-free materials, and restoration with native seed. Known infestations would be treated prior to implementation. There would be little to no effect from reforestation treatments.

Alternative 3 – Snag Retention (Direct and Indirect Effects)

The Snag Retention alternative would have few effects. Under this alternative, hazard trees would be felled along roads within the project area. Restoration Thin treatments in areas of moderate and high severity burns would not occur. Reforestation activities would take place.

Under this alternative, hazard trees would be removed along roads with known populations of invasive species and non-native grasses. Mechanical operations along the road may promote the spread of these competitive species, which could indirectly influence sensitive species and suitable habitat.

As with the Proposed Action alternative, all the harvest treatment acres (unburned to low severity) would become more susceptible to some degree of a weed establishment opportunity, as a result of this action. This alternative would treat fewer acres within habitat which is less vulnerable to weed introduction and infestation. Unburned and low severity burned acres have a lower risk of weed establishment. The amount of ground disturbance would be less than the Proposed Action alternative. As discussed above, Project Design Criteria associated with the Proposed Action would provide mitigation for the introduction and spread of invasive species through the cleaning of equipment, use of weed-free materials, and restoration with native seed. Known infestations would be treated prior to implementation. There would be little to no effect from reforestation treatments.

Cumulative Effects

The area considered for this analysis occurs within the Upper Mosier Creek and North Fork Mill Creek 5th field Watersheds. These areas contain similar habitats and native species of concern, and also contain infestation sources of invasive species. Recent and planned projects considered in cumulative effects are the Government Flats Complex Fire, fire suppression activities, completed North Fork Mill Creek Restoration Opportunities sale activities, harvesting activities within The Dalles Watershed, The Dalles Watershed Fuelbreak projects, and ongoing road maintenance. The timeframe considered is from 2008 when the North Fork Mill Creek Sale was proposed, and for 5 years into the future, which is a reasonable amount of time to see the result of these cumulated effects within the project area.

There are direct and indirect effects from this project relating to soil disturbance and potential invasive species spread.

The fire resulted in significant loss of vegetative ground cover in areas of moderate to high severity burn. Suppression activities also created disturbance areas. Invasive plant species are likely to invade these disturbed sites more rapidly than the native species can regrow. It is possible that invasive species would spread further as a result.

The North Fork Mill Creek and Dalles Watershed activities may also have increased the risk of weed introduction. Previous timber sale activity has created unnatural openings in the forest with sparse understory and disturbed soil. These areas are quickly populated by invasive and non-native pioneer species, and serve as a source for other infestations. Invasive species such as diffuse knapweed, spotted knapweed, yellow toadflax, Canada and bull thistle are known to occur within these areas, and may have increased populations and seed source due to soil disturbance. These projects overlap in space within the North Fork Mill Creek Watershed and would overlap in time as the projects are implemented.

Without additional control, the risk of invasive weed invasion due to these cumulative effects could lead to a high. Measures may be taken to greatly reduce these cumulative effects. Monitoring and aggressive weed treatment immediately after discovery would lessen the impact and spread of new noxious weed species. The Burned Area Emergency Response (BAER) report for the Government Flats Complex Fire includes monitoring for invasive species and non-native plants within 56 acres of native bunchgrass meadows bisected by or adjacent to roads and that were burned over. Treatment would include manual and herbicide treatments followed by

seeding with native plant species appropriate for this area. Project Design Criteria, as discussed above, would mitigate for the introduction and spread of invasive species. Under the 2008 Site-Specific Invasive Plant Treatment EIS, roadside populations would be treated regularly depending on the need and level of infestation. These combined actions would lower the risk of invasive species spread within the project area.

3.8.4 Noxious Weed Risk Assessment

The proposed projects have a **MODERATE** risk of introducing or spreading known populations of noxious weeds. The process for risk ranking is detailed below.

Forest Service Manual (FSM) direction requires that Noxious Weed Risk Assessments be prepared for all projects involving ground-disturbing activities. For projects that have a moderate to high risk of introducing or spreading noxious weeds, Forest Service policy requires that decision documents must identify noxious weed control measures (Project Design Criteria – PDC’s) that would be undertaken during project implementation (FSM 2081.03, 11/29/95). The identification of PDC’s is also consistent with the Region 6 Invasive Plant EIS/ROD (2005) and the Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon EIS/ROD (2008).

Factors considered in determining the level of risk for the introduction or spread of noxious weeds are:

_____ **HIGH**

Has to be a combination of the following three factors:

1. Known weeds in/and or adjacent (~ 100 feet) to the project area, in large quantities (High density/acre).
2. Any four or more of vectors # 1 - 8 in the immediate project area.
3. Project operation activities not able to avoid weed populations.

 X **MODERATE**

Has to be a combination of the following three factors:

1. Known weeds in/and or adjacent (~ 100 feet) to the project area, in moderate quantities (Moderate density/acre).
2. No more than three of vectors #1-8 present in the immediate project area.
3. Project operation activities are not able to avoid weed populations.

_____ **LOW**

Has to be one or the other or both factors:

1. No more than two of vectors # 1 - 8 present in the immediate project area.
2. No Known weeds in/and or adjacent (~ 100 feet) to the project area without vectors

*Vectors (if contained in the project proposal) ranked in order of weed introduction risk:

1. Heavy equipment (implied ground disturbance)
2. Importing soil, cinders, or gravel
3. OHV/ATV’s (mountain bikers, motorcycles, 4-wheelers etc.)

4. Grazing livestock (long-term disturbance)
5. Pack animals (short-term disturbance)
6. Plant restoration (active restoration, soil scarification, seeding, etc.)
7. Recreationists/General Public (hikers, hunters, camping, mushroom/firewood gathering)
8. Forest Service/contractor project vehicles

3.8.5 Consistency Determination

Forest Service Policy

Alternative 1 (No Action), Alternative 2 (Revised Proposed Action) and Alternative 3 (Snag Retention) are consistent with the following Forest Service Standards:

- **FSM 2900 – Invasive Species Management.**
Development of weed prevention practices is supported by U.S. Forest Service noxious weed policy FSM 2900. Forest Service policy is to prevent the introduction and establishment of noxious weed infestations, determine the factors that favor establishment and spread of noxious weeds, analyze weed risks in resource management projects, and design management practices to reduce these risks (FSM 2903.3, 4).
- **FSM 2070 – Vegetation Ecology.**
Policy for selection, use, and storage of native and non-native plant materials that are used in the revegetation, restoration and rehabilitation of National Forest System Lands. FSM 2070.3 promotes the use of appropriate native plant materials, restricts the use of non-native, non-invasive plant materials, and prohibits the use of noxious weeds.
- The USDA Forest Service Guide to Noxious Weed Prevention Practices identifies development of practices for prevention and mitigation during ground-disturbing activities such as forest vegetation management and road management (V.1 2001, pages 12-13 and 17) which are included in the Project Design Criteria for this project.

Executive Orders

Alternative 1 (No Action), Alternative 2 (Revised Proposed Action) and Alternative 3 (Snag Retention) are consistent with the following Executive Order:

- Executive Order 13112 on Invasive Species (February 1999) requires federal agencies to use relevant programs and authorities to prevent the introduction of invasive species and not authorize or carry out actions that are likely to cause the introduction or spread of invasive species unless the agency has determined-- and made public--documentation that shows that the benefits of such actions clearly outweigh the potential harm. All feasible and prudent measures to minimize risk of harm would need to be taken in conjunction with the actions.

3.8.6 Summary of Effects by Alternative

Alternative 1 (No Action) would have a low risk of weed introduction. Hazard tree removal would disturb ground in areas which already have populations of weeds, but equipment would not enter forested areas.

Alternative 2 (Proposed Action) would have a moderate risk of weed introduction. The harvesting activities would create disturbed conditions for invasive species growth, and the equipment may introduce seeds or propagules from nearby roadside sources.

Alternative 3 (Snag Retention) would have a moderate risk of weed introduction. The harvesting activities create disturbed conditions for invasive species growth, and the equipment may introduce seeds or propagules from nearby roadside sources.

3.9 Transportation

More information is available in the project record including the full transportation analysis file as part of the Transportation Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.9.1 Analysis Assumptions and Methodology

The original analysis, completed in July 2008, relied upon the Forest Service “Reduced Road Reconstruction Policy” as the guiding principle for analysis of the transportation system within its project area. The basis for that analysis is still valid and applicable, and the North Fork Mill Transportation Report (Huskey, 2008) is the starting point for this analysis. It is included in the original project record on file at the Hood River Ranger District Office in Parkdale, Oregon. In addition to the stated policy, this analysis also relies upon the Roads Analysis: Mt. Hood National Forest (Roads Analysis) which has been developed at the Forest scale (USDA Forest Service, 2003). This document conducted a full analysis of the transportation system at the Forest level and considered the effect of the National Forest System Roads on riparian areas and flood plains, impediment to fish passage at road stream crossings, slope stability, surface erosion and sediment delivery, water quality of municipal water supplies, threatened or endangered species, special habitat connectivity, invasive species and noxious weeds, and operational budgetary constraints. The 2003 Roads Analysis has in turn been utilized to inform the development of road Access and Travel Management Guidelines (ATMs) and to develop Road Management Objectives (RMOs) for each segment of road on the Mt. Hood National Forest. Road management decisions at the Forest and District levels are informed by this analysis and adhere to these guidelines and objectives wherever feasible. This document is incorporated by reference into this specialist report and is available on the Forest website at: <http://www.fs.usda.gov/main/mthood/landmanagement/planning>.

Determination of road maintenance or reconstruction needed to safely conduct operations associated with the Proposed Action was made utilizing the standards and guidelines set forth in the following documents with authority under 36 CFR Parts 212, 251, 261, and 295:

- Roads Analysis: Mt. Hood National Forest;
- Forest Service Manual (FSM) 7700 – Travel Management;
- FSM 7710 – Travel Planning;
- FSM 7730 – Transportation System Road Operation and Maintenance

- Highway Safety Act of 1966 (P.L. 89-564) in compliance with applicable Highway Safety Program Guidelines, as specified in the Memorandum of Understanding found in FSM 1535.11;
- Forest Service Handbook (FSH) 7709.55 – Travel Analysis Handbook;
- FSH 7709.58 – Transportation System Maintenance Handbook; and,
- FSH 7709.59 – Transportation System Operations Handbook.

All of these documents are available in the project record, located at the Hood River Ranger District in Parkdale, Oregon or on the Forest Service website at:

<http://www.fs.fed.us/im/directives/>.

3.9.2 Changed Conditions

The fire in the Government Flats area altered the transportation system in the project area in several ways, with direct effects resulting from fire, fire suppression, and emergency reconstruction activities.

In areas of moderate to high severity burn the fire has caused the mortality of many trees that remain standing, but can be expected to fail and fall in the near future. These “imminent failure potential” trees that are within proximity to roadways present a hazard to human life due to direct impact or associated impact debris (shrapnel effect), and can fail at any time without warning. Forest Service Region 6 Danger Tree Roadside Policy regarding these “hazard trees” is outlined in Forest Service Manual 7730 – Region 6 Supplement to the Transportation System Road Operations and Maintenance. This policy guides the Forest to prioritize and treat these hazards within an appropriate time period or to close affected road segments in the interest of public safety. Given the height of the hazard trees in the area and the slopes of the ground that they stand on relative to roadways, identified roadway hazards exist up to 200 feet away from the roadway itself. The hazardous condition in this area is not only extensive in terms of area, but severe in terms of the duration of exposure to the hazard when considering potential commercial or administrative operations in the area. Regular commercial activity within the area greatly increases the odds of an operator being affected by a tree failure versus the odds during times of normal traffic volume on these roads. Likewise, a single operator working in the area is much more likely to be affected by a tree failure since he will expose himself to the hazard more frequently over an extended duration of time than the average traveler on these roadways.

In addition to the creation of hazard trees, emergency fire suppression activities produced elevated traffic levels consisting of heavy haul of personnel, equipment, and water; which in turn created elevated wear on road surfaces and road subgrades without the benefit of pre-haul maintenance work. As a result of this heavy haul several routes suffered deterioration to a condition below that which was analyzed in the original North Fork Mill Creek Restoration Opportunities Environmental Analysis (EA) from 2008. Due to this unexpected road deterioration, a Road Maintenance Task Order was issued under the Forest’s existing Road Maintenance Indefinite Delivery Indefinite Quantities (IDIQ) Contract to repair roadway damage. The following table details the work that was completed under the Task Order:

Table 3-42: Government Flat Complex Road Rehabilitation Task Order (NFSR = National Forest System Road)

Road #	Description of Work	Quantities
NFSR 1700000	<ol style="list-style-type: none"> 1. Blade and shape existing aggregate on gravel portion starting at MP 4.0 and ending at MP 4.8 2. Blade and shape road starting at MP 8.7 and ending at MP 14.0. 	0.8 MI 5.3 MI
NFSR 1720000	<ol style="list-style-type: none"> 1. Blade and shape existing aggregate starting at MP 0.0 and ending at MP 8.0. 	8.0 MI
NFSR 1720190	<ol style="list-style-type: none"> 1. Blade and shape road starting at MP 0.0 and ending at MP 1.7 N.F. Mill Bridge. 2. Starting at bridge over South Fork Mill Creek, reshape existing water bars. 3. Open one 18" culvert. 	1.7 MI 4 EA 1 EA
NFSR 1720191	<ol style="list-style-type: none"> 1. Shape road to drain starting at MP 0.0 and ending at MP 1.5. 2. Reshape water bars with leadout ditch. 3. Clean four 18" culverts 	1.5 MI 6 EA 4 EA
NFSR 1720192	<ol style="list-style-type: none"> 1. Reshape road to drain starting at MP 0.0 and ending at MP 1.6. 2. Reshape nine water bars. 	1.6 MI 9 EA
NFSR 1720193	<ol style="list-style-type: none"> 1. Reshape existing pit run on road starting at MP 0.0 and ending at MP 0.4. 2. Reshape water bars. 	0.4 MI 4 EA
NFSR 1700662	<ol style="list-style-type: none"> 1. Blade and Shape existing aggregate starting at MP 0.0 and ending at MP 3.0. 	3.0 MI
NFSR 1700660	<ol style="list-style-type: none"> 1. Blade and shape road starting at MP 0.0 and ending at MP 2.3. 	2.3 MI
NFSR 1710000	<ol style="list-style-type: none"> 1. Blade and shape road starting at MP 0.0 and ending at MP 0.2. 2. Smooth cat trail around the cattle guard at junction with 1711 road. 	0.2 MI 1 LS
NFSR 1700661	<ol style="list-style-type: none"> 1. Close berm at MP 1.20. 	1 LS
NFSR 1711630	<ol style="list-style-type: none"> 1. Reshape road to drain starting at MP 0.0 and ending at MP 2.7. 2. Reshape six water bars. 	2.7 MI 6 EA
NFSR 1711623	<ol style="list-style-type: none"> 1. Block/close non-system road that ties into 1700661 road (MP 0.19 berm). 	1 LS
NFSR 1711000	<ol style="list-style-type: none"> 1. Blade and shape road starting at MP 0.0 and ending at MP 1.0. 2 Clean culverts. 	1.0 MI 2 EA
NFSR 1711640	<ol style="list-style-type: none"> 1. Remove berm at start of road. 2. Reshape road to drain starting at MP 0.0 and ending at MP 0.4. 3. Place berm at MP 0.4 to close road. 	1 LS 0.4 MI 1 LS
NFSR 1710640	<ol style="list-style-type: none"> 1. Blade and shape starting at MP 0.0 and ending at MP 0.6 FS boundary. 	0.6 MI
NFSR 1710645	<ol style="list-style-type: none"> 1. Shape 100 foot section at the end of road. 	1 LS

Road #	Description of Work	Quantities
NFSR 1710644	1. Berm road closed at MP 0.6. and at FS boundary at MP 1.2.	2 EA

With the work shown in the table above completed, the deterioration of the roadways resulting from fire suppression activities will be mitigated to such an extent that regular pre-haul and during haul maintenance approved under the North Fork Mill Creek Restoration Opportunities EA would suffice to provide safe passage for commercial use, assuming that Hazard Tree treatments occur prior to future use. Due to the burning of existing vegetation, however, typical roadside brushing operations could be deemed unnecessary on a case-by-case basis for each system road.

3.9.3 Effects Analysis

Alternative 1 (No Action) - Direct and Indirect Effects

This alternative would treat the existing hazard trees created by the changed condition, addressing imminent threats to safety and infrastructure. With respect to access and displacement, this would result in overall use patterns in the area returning to their pre-changed condition state, and therefore increase access while decreasing displacement within the affected areas.

The No Action Alternative would involve no further haul of commercial wood fiber within the areas of a changed condition from the Roan and Eques Stewardship Sales. Since heavy haul of materials is the most impactful action regularly applied to the transportation resource, the No Action Alternative would result in no additional wear and tear on the roads within the affected area. Also, this Alternative would preclude road maintenance activities that were to occur under the existing Roan and Eques stewardship contracts. This system road maintenance work would then become deferred maintenance assigned a low level of priority in the overall road maintenance plan for the Forest.

Since this alternative would preclude continued cutting of wood fiber in affected areas, there would be no need for the construction or reconstruction of temporary roads. This would be considered a beneficial effect with respect to habitat connectivity, potential erosion, and soil compaction. Since there would be no need for access to affected units, the absence of temporary roads would have no direct impact to the transportation resource.

Alternative 2 (Proposed Action) - Direct and Indirect Effects

With regard to access and displacement, the Proposed Action would treat the existing hazard trees created by the changed condition. This would result in overall use patterns in the area returning to their pre-changed condition state, and therefore increase access while decreasing displacement within the affected areas.

Commercial haul of materials and road maintenance work, as well as possible road reconstruction projects, can be expected to take place on NFSRs 1700, 1700660, 1700661, 1700662, 1710, 1710640, 1710644, 1710645, 1711, 1711623, 1711630, 1711640, 1711650, 1720, 1720190, 1720191, 1720192, and 1720193. The roads within the project area were

designed for hauling timber during the Normal Operating Season. Moisture content in the materials of the road base and road subgrade must remain below the soil plasticity limit (AASHTO, 2006; T-87, T-89, T-90, T-99) to remain within design parameters. Road status changes such as decommissioning or closure of these roads, which have been analyzed under the original North Fork Mill Creek Restoration Opportunities Proposed Action would be delayed until completion of operations under the Proposed Action.

For the purpose of this analysis, in order to quantify expected stresses, the weather during the Normal Operating Season is expected to behave within measured norms for the local area (<http://www.weatherbase.com/weather/weather.php3?s=664853&refer=&cityname=Mount-Hood-National-Forest-Oregon-United-States-of-America>). Then the moisture content of materials within the subgrade of the roadways remains within design parameters. Since commercial haul under this proposal would be mostly limited to the Normal Operating Season, the stresses produced by heavy haul is expected to result in relatively normal wear and tear that does not create undue cost and damage to resources. The Forest Service can also regulate the cause of these types of negative effects through timely enforcement of contract provisions that require log haul to be suspended when wet weather conditions make continued haul unsafe, would contribute to stream sedimentation, or would threaten the integrity of the road's surface or subgrade. The Project Design Criteria/Mitigation Measures (PDCs) would further mitigate the adverse effects of wet weather or winter condition haul.

Road repairs along NFSR 1711630 would allow for water conveyance in a manner that reduces the sediment contribution of the roadway to natural water bodies. However, the costs associated with needed road maintenance and reconstruction are substantially higher than that which could be supported by traditional levels of appropriated road maintenance funding at the District level, and continue to require alternative funding sources to complete (See USDAFS 2003 Roads Analysis).

With continued log haul, prescribed maintenance and reconstruction work would still be needed within the project area commensurate with the prescriptions given in the original analysis. Recent maintenance work completed under an IDIQ Contract Task Order has returned the road system to conditions comparable to conditions which existed prior to the changed condition, and the anticipated effects of proposed road maintenance work connected with the Proposed Action would not alter the previously analyzed effects to any measurable extents.

Alternative 3 (Snag Retention) - Direct and Indirect Effects

With regard to access and displacement, this action alternative would treat the existing hazard trees created by the changed condition. This would result in overall use patterns in the area returning to their pre-changed condition state, and therefore increase access while decreasing displacement within the affected areas.

Commercial haul of materials and road maintenance work, as well as possible road reconstruction projects, can be expected to take place on NFSRs 1700, 1700660, 1700661, 1700662, 1710, 1710640, 1710644, 1710645, 1711, 1711623, 1711630, 1711640, 1711650, 1720, 1720190, 1720191, 1720192, and 1720193. Per the stewardship contract, the Contractor is obligated to conduct only his commensurate share of maintenance on each road that is used for

commercial haul of materials, with the commensurate share being calculated based on quantities of material hauled over each segment of road. Since this alternative utilizes the same roads for commercial haul of wood fiber, maintenance would be required along the same routes. However, since the quantity of materials hauled under this action alternative would be substantially less than that analyzed under the original North Fork Mill Creek Restoration Opportunities EA and also substantially less than that analyzed under Alternative 2, the amount and intensity of maintenance work conducted would be correspondingly less by proportion. But since the quantity of roads and road miles does not differ, the needed maintenance activities would have to be prioritized by risk to health and safety at the expense of maintenance conducted to protect natural resources or mitigate environmental concerns. As an example, roadside brushing and road surface blading for sight distance and road navigability would take priority over activities such as culvert cleaning and ditch cleaning that facilitate drainage and reduce erosion (FSM 7730 – Transportation System Road Operation and Maintenance).

Road repairs along NFSR 1711630, while intended to address water conveyance in a manner that reduces the sediment contribution to natural water bodies, also improves navigability of this rough and steep roadway, thereby addressing safety and health concerns. Therefore these road repairs would remain a high priority and be a required component in this action alternative.

Cumulative Effects for Alternatives 2 and 3

The spatial scale analyzed for cumulative effects is the changed condition area, and the temporal scale is five to ten years based on the anticipated effects associated with road maintenance activities and hazardous condition treatments. Roads require regular maintenance to function effectively because maintenance work, by definition, has a limited effect over time. The duration of these effects would vary case-by-case depending on the road surface, geologic stability of the site, type and volume of traffic, and weather conditions, but road maintenance work conducted at any given time can be expected to contribute to the effective functionality of a road prism for an average of about three to five years, in this area, before some road functions begin to deteriorate appreciably.

There are multiple projects that have effects which overlap in time and space with this project. Operations under the Lokai Stewardship Project, which is associated with the original North Fork Mill Creek Restoration Opportunities EA, are expected to continue as planned. The transportation resources within this sale area were not affected by the changed condition. Within the next five to ten years, the Forest Service can expect to see harvest and restoration activities occurring in conjunction with the proposed The Dalles Watershed II project that will overlap in time and space with this proposed action. Commercial haul of materials and road maintenance work, as well as possible road reconstruction projects, can be expected to take place over some of the same roads. Road status changes such as decommissioning or closure of these roads, which has been analyzed under these projects, would be delayed until completion of operations to avoid waste and inefficient use of government funds. This project has very similar Project Design Criteria to protect resources and mitigate erosion and sediment delivery to streams, and must comply with all clean water Best Management Practices and conform to accepted engineering design standards. Therefore, it is assumed that these activities would have similar or identical effects with respect to the Transportation Resource.

Given the spatial and temporal boundaries, it is expected that private wood harvest activities would take place on the adjacent lands and inholdings. These activities would conduct haul over roads within the project area that may overlap in time and space with the haul associated with this project. While the Forest Service does not have enough data to accurately measure the effects of these private industry activities, the Forest Service utilizes Road Use Permits issued to these private companies to implement similar requirements for road maintenance and road use regulations that mimic the transportation Project Design Criteria. Because permitted private haul on Forest roads is mostly limited to collector routes and primary haul routes, the maintenance work that would be conducted under this Proposed Action and maintenance work conducted by private parties would have very limited overlap in time and space and any cumulative effects produced by maintenance work is expected to be negligible. Therefore, it is assumed this type of haul would have similar or identical effects as the Proposed Action with respect to the transportation resource.

3.9.4 Consistency Determination

The Proposed Action, with respect to the transportation resource, has been reviewed for consistency with the Mt. Hood Land and Resource Management Plan (Forest Plan). All Proposed Actions related to the Forest Transportation System are consistent with the Forestwide Transportation Standards and Guidelines; A2-102 through A2-104, A4-036, 038, 042, and 044, B1-008, B1-077 through B1-079, B2-053 through 055, B2-058 through B2-062, B3-035, B5-032, 033, and 035, FW-407 through FW-411, FW-413 through FW-416, FW-419 through FW-434, and FW-436.

The Forest-wide Roads Analysis (2003) and the project specific transportation analysis documented in this report implements guideline FW-416.

All temporary roads constructed for project use under the Proposed Action would be obliterated and/or blocked and treated to meet or exceed the standards of FW-433 and FW-436.

All other standards and guidelines under the Forest Plan are specifically addressed and enforced through contract provisions included with each individual timber sale, stewardship project, or public works contract and/or the stated Project Design Criteria.

3.9.5 Summary of Effects

Summary of Effects - No Action

No road reconstruction or maintenance would be conducted along these road segments or along routes accessed by these roads due to the termination of the project under which the work was to be completed. No construction of temporary roads within the affected areas would take place. Road decommissionings analyzed under the original Proposed Action could still take place, but would require alternative funding sources to implement.

Lack of road maintenance would have several measurable detrimental effects on the Forest's transportation resource. As deferred maintenance would continue to increase while funding for road maintenance continues to decrease, the condition of system roads within the project area

would begin to deteriorate over time, resulting in increased cost to the taxpayer. Road maintenance issues are likely to become road reconstruction issues in times of immediate need. Fire suppression activities, search and rescue operations, and utility infrastructure maintenance/repair activities would be hindered to varying degrees. Forest access for recreation, trans-forest travel, administrative needs, and research in the local area is already being negatively impacted by reduced safety and navigability of the roadways and would continue to decline in the absence of road maintenance and road maintenance funding that is typically provided for by timber purchasers or stewardship contractors.

Unused or little used aggregate and native surface roads that are proposed for closure or decommissioning would be overtaken by vegetation in time, and effectively decommission themselves. This represents a savings to the taxpayer. Artificial drainage structures would remain, however.

Summary of Effects - Alternatives 2 and 3

Alternatives 2 and 3 would treat an identified hazard to public safety that has resulted from the changed condition. Treatment of hazard trees in the area would allow the local transportation infrastructure to continue functioning as intended and re-establish access for public, administrative, and permitted uses. These alternatives would also allow for the implementation of needed road maintenance and reconstruction work that would serve to improve the functionality of drainage and erosion control systems that are incorporated into the infrastructure.

The Best Management Practices (BMPs) associated with this project together with the applicable road maintenance specifications (USDAFS, 2008) meet or exceed all requirements set forth by the State of Oregon for mitigating and minimizing environmental impacts of road maintenance and road reconstruction under OAR 629-625-0000 and per “Oregon Department of Forestry, State Forests Program, Forest Roads Manual”, 2000.

As such, these alternatives would result in increased effectiveness and overall value of the Forest’s transportation system with minimal effect on other resources. Road maintenance and reconstruction work increases the safety and navigability of open system roads for administrative and commercial users while decreasing the potential for contamination and sediment delivery to streams and waterways.

3.10 Fuels Management and Air Quality

More information is available in the project record including the full fuels analysis file, as part of the Fuels Management Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.10.1 Methodology

This report will analyze how the down natural fuels related resources would be affected by the management actions proposed by the U.S. Forest Service. Professional judgment and stand level data was incorporated in determining the project’s potential effects. Analyses were based on the

photo series tool.

The Photo Series for Quantifying Natural Forest Residues in Common Vegetation Types of the Pacific Northwest (USDA Forest Service General Technical Report PNW – 105) was used to interpret data collected during field surveys in the North Fork Mill Creek planning area. The Photo series GTR PNW – 105 was used for predicting natural down woody fuels in the planning area. National Forests in Region 6 use GTR PNW – 105 for assessing natural down wood fuels.

3.10.2 Changed Conditions

The Government Flats Complex Fire burned approximately 10,706 acres. Roughly 2500 acres were on the Hood River Ranger District. The Government Flats Complex Fire was a comprised of a mixed severity burn. Approximately 945 acres at high severity, 2453 acres at moderate severity, 6301 acres of low severity, and 1809 acres unburned. Soil burn severity levels were based on BARC maps from the Government Flats Complex Fire. Refer to Silviculture Specialist Report, available in the project record at the Hood River Ranger District, for burn severity definitions.

Fuels

In the high to moderate burn severity areas fire regimes have moved from condition class 3 to condition class 1. In these areas ground fuel consumption was high, areas that had fuel model 9 and fuel model 10. After the government flat fire were moved to fuel model 2. Refer to fuels Specialist Report, available in the project record at the Hood River Ranger District, for fuel model definitions. Now, after the fire, the area has an estimated 2 to 10 tons per acre. The majority of the ¼ inch to 10 inch ground surface fuels was consumed during the fire. In areas of high severity, the over story tree mortality is 100%.

Fire Regimes

Before the Government Flats Complex Fire, the planning area was roughly divided into four Fire Regimes: Fire Regime I 50 – 100 year mixed severity, Fire Regime IIIA 100 – 200 years mixed severity, Fire Regime III B 100 – 200 years stand replacing, and Fire Regime IIIC. Fire regime refers to the nature of fire occurring over long periods and the prominent immediate effects of fire that generally characterize an ecosystem. All four of these fire regimes areas consist of a full range of fuel loadings from light to heavy. These loadings are dependent on such factors such as stand type, stand condition, fire history, and past management practices. Fire Regimes in the North Fork Mill Creek planning area are all capable of sustaining a stand replacing wildfire. Condition classes are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components, such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, timber harvesting, grazing, introduction and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities. These fire regimes and condition classes are described in more detail in the North Fork Mill Creek Fuels Report (Segovia, 2008). The Government Flats Complex Fire rest fire regime and condition class in areas of moderate to high burn severity. The fire regime and condition class in areas of low severity to unburned remains unchanged, and the original analysis in the Fuels Specialist Report

(2008) remains unchanged. The fire regime and condition class are summarized in Table 3-43 below.

Table 3-43: Fire Regime Condition Class within the Planning Area

Fire Regime Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low. Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate;
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Risk of loss of key ecosystem components are moderate Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high

Air Quality/Smoke Management

Air quality is of particular concern on the Mt. Hood National Forest Airsheds. Airshed is defined as a geographical area that, because of topography, meteorology, and climate, share the same air (Boutcher 1994; Forest Plan, Glossary-1). Portions of the Mt. Hood Wilderness are federally designated as a Class I Airshed (Forest Plan, FW-046, and FW-047). The Mt. Hood Wilderness is six miles southwest of the planning area. The Badger Creek Wilderness, a Class II Airshed is nine miles south of the planning area. The City of the Dalles is a state receptor site is 12 miles northwest of the planning area. Management activities shall comply with all applicable air

quality laws and regulations, including the Clean Air Act and the Oregon State Implementation Plan (Forest Plan, FW-040). Also, in compliance with the Clean Air Act, the Forest Service is operating under the Oregon Administrative Rule OAR 629-43-043. The Forest Service is complying and would continue to comply with the requirements of the OSMP (Oregon Smoke Management Plan), which is administered by the Oregon Department of Forestry. No changed condition resulted from the Government Flats Complex Fire or other regulation, law or policy since the original analysis was completed. As such, this will not be analyzed further in this report. For a full analysis of air quality/smoke management, please refer to the North Fork Mill Creek Fuels Report (Segovia, 2008).

3.10.3 Effects Analysis

No Action Alternative

Fuels

Under the No Action Alternative the landscape of the planning area would be left in its current condition. Fuel loadings would continue to increase consistent with vegetation succession and mortality from the Government Flats Complex Fire. Disturbance would be primarily from tree mortality (see the Silviculture Specialist reports for more details). Fire suppression activities would continue to exclude natural fire from this area. Felling of Hazard tree along road sides in the Government Flat fire would increase fuel loadings above Forest Plan standards.

Fire Regime

Under the No Action Alternative, stands in a condition class one would continue to move towards a condition class two and three, departing from its historical range. The risk of losing key ecosystem components is elevated, which adds to the possibility of reduced effectiveness of fire suppression modules and fire personnel to safely suppress wildland fires in condition class three regimes.

Direct and Indirect Effects for Alternatives 2 and 3

Chapter 2 in the Environmental Assessment identifies treatment prescription for the Alternative 2 – Proposed Action and Alternative 3 – Snag Retention that would be implemented, including fuels treatments (hand piling, machine piling, pile burning, and mastication) that would be implemented after the vegetation treatments were completed.

Fuels

The objectives of the fuel treatment in the planning area are to limit the potential for natural and activity created fuel to sustain and/or carry a high intensity fire, while maintaining appropriate levels of organic material to provide for nutrient recycling and/or habit needs. In order to meet the 3 to 10 percent ground cover requirement, material in the 3 to 9 inch size class would also need to be left on site. Estimated to be left on site are 26.7 tons per acre, which exceeds Forest Plan standards and guides for fuel loading (FW-33). Excess activity fuel left on the surface is not anticipated to be a problem in a year due to natural decomposition.

Harvest activities under the Alternatives 2 and 3 would increase fuel loading. Each unit would have a field reconnaissance after harvest activities have been completed to determine fuel

loadings. If the fuels inventories indicate that the fuel loading is in excess of 10 to 26.7 tons/acre, machine piling and/or handpiling would be the preferred method of reducing slash concentrations. Machine piles should be located on skid trails and landings to minimize organic soil damage. Placing machine piles on disturbed soils reduces the possibility of a fire burning outside the harvest unit (Frandsen, 1997).

All pile burning would be scheduled in conjunction with the State of Oregon to comply with the Oregon Smoke Implementation Plan (FW-040) and to minimize the adverse effects on air quality. Pile Burning prescriptions would be developed to minimize the potential for adverse effects. Implementation of these measures would ensure compliance with the Clean Air Act.

Fire Regime

The stands proposed for thinning and fuels treatments range in classification from condition class 1 through condition class 3. The proposed treatments in these stands would move those areas into a state more indicative of condition class 1. Overall, this alternative would result in moving, or maintaining the project area in a state that has fuel loadings and vegetation attributes more indicative of historic conditions.

Cumulative Effects:

Past actions affecting the project area under this alternative are past timber harvesting and insect infected trees. Additional past, connected reasonable foreseeable future actions that could affect the fuels profile include in Chapter 3 of the North Fork Mill Creek Revised EA. There is no other past, present and reasonable foreseeable future actions that the Forest Service, other agencies, or private parties are considering for implementation that would change or alter the fire regime condition class or produce cumulative impacts from a fire standpoint in the project area. The cumulative effects analysis considered projects within the fire perimeter over the next 5 years.

Since the project area is currently in fire regime condition class 1 and 2 and would not change post implementation, there are no direct or indirect impacts as a result of this project. As such, there are no cumulative effects for this project.

3.10.4 Consistency Determination

Management activities implemented under the Proposed Action would comply with all applicable laws and regulations, including:

- Alternatives 2 and 3 comply with the following Mt Hood Land and Resource Management Plan standards and guidelines: FW-039, FW-044, FW-041, FW-044, FW-046, FW-047, FW-052 and FW-053 through incorporating mitigations into applicable prescribed pile burn plan prescriptions. FW-033 would be met in high to moderate burn severity areas. Along roadsides where hazard tree felling would occur, the Forest Plan standard would be exceeded. In order to treat along the roadside and not increase fuel loading, a Forest Plan exemption is needed for Forest Plan standard A3-024.
- Forest Service Manual 5100 – Fire Management, Chapter 5140 – Fire Use and through incorporation the 2008 *Interagency Prescribed Fire Planning and Implementation*

Procedures Guide (2008 Guide). FSM 5140 requires that the planning, approval, and implementation of all prescribed fire projects comply with the 2008 Guide. All Pile fire treatments described in the Proposed Action would be planned, approved, and implemented through a site specific prescribed pile burn plan.

3.10.5 Summary of Effects

Under the No Action alternative fire regimes and condition class would continue to be subject to natural occurring process. Fuel loadings in the short term would be meet forest standards but would increase over time.

Under the Alternative 2 – Proposed Action and Alternative 3, the fire regimes and condition class would be maintained and moved toward historical levels. Vegetation would move towards conditions that would have occurred under a natural disturbance regime. The action alternatives would enhance the effectiveness of the neighboring fuels reduction projects.

3.11 Recreation

More information is available in the project record including the full recreation analysis file, as part of the Recreation Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.11.1 Analysis Assumptions and Methodology

The following factors are being analyzed for the changed condition analysis as a result of impacts of the Government Flats Complex Fire to the project area: general dispersed recreation, camps, trails and off-highway vehicle (OHV) use. Impacts to recreation have been reviewed on a case-by-case basis and described in more detail in the Effects Analysis/Environmental Consequences section of this report. Comparisons of these factors can be drawn between this report and the *Recreation and Visual Quality Report for the North Fork Mill Creek Collaborative Stewardship Project* (Slagle, 2008).

The lands impacted by the Government Flats Complex Fire are classified as C1 (Timber Emphasis) and B10 (Deer and Elk Winter Range) in the Mt. Hood Land and Resource Management Plan (Forest Plan). C1 covers 11% of the project area and B10 covers 85% of the project area. The remaining 4% of land mass falls under Research Natural Area (A3), Semi-Primitive Roaded Recreation (A6), Special Old Growth (A7), and Special Emphasis Watershed (B6). The recreation analysis will focus on C1 and B10 as these land use allocations make up the vast majority of the planning area. Treatments falling under the other Land Use Allocations are limited to hazard tree removal to protect public health and safety. The C1 and B10 classifications encourage dispersed recreation opportunities. Trail use, berry picking, skiing, driving for pleasure and hunting are examples of activities that are encouraged within these areas. Timber management activities can temporarily interrupt recreation activities, but structures and facilities must be protected. According to the Mt. Hood Land and Resource Management Plan (Forest

Plan), winter recreation is discouraged during the winter with human access to the area restricted between December 1 and April 1 to reduce human interaction with wintering deer and elk on B10 lands. Developed recreation facilities may occur, but do not exist within the project area.

3.11.2 Changed Conditions

Changed conditions to the following recreational opportunities identified in the North Fork Mill Creek Stewardship Project will be discussed: general dispersed recreation, camps, trails and Off-highway vehicles (OHVs).

General Dispersed Recreation

Dispersed recreation occurs to an extent throughout the impacted area. Effects to activities including skiing, berry picking, hunting, and driving for pleasure vary depending on the severity of the burn in specific locations within the project area. The Government Flats Complex Fire did not change any conditions related to snowmobiling within this area, as such, this recreation opportunity will not be discussed further. See the *Recreation and Visual Quality Report for the North Fork Mill Creek Collaborative Stewardship Project* (Slagle, 2008) for an analysis of snowmobile use.

The impact of the fire to cross-country skiing opportunities was minimal. There are no trails groomed for cross-country ski use in the area, however, individuals could potentially cross-country ski on the road system across the general forest within the affected area. The burn had little to no impact to this type of use except for the visual impact of the burned landscape (see the Visual Quality Specialist Report, available in the project record at the Hood River Ranger District for more details). Overall, the impact from the fire on winter use is minimal, as people are not directed to the area as a winter use location and little use was known to occur in the past.

Berry picking and hunting opportunities were reduced in the burned areas, especially in the areas severely burned by the Government Flats Complex Fire. Berries and prey may not be available in these locations for a short period of time. These activities have been popular within the project area due to the open nature of the vegetation and the gently sloping hillsides making this particular area more accessible than most of the rest of the Hood River Ranger District which is steep and heavily vegetated.

Impacts to recreationists who drive for pleasure should be minimal as no roads were created or destroyed by the Government Flats Complex Fire, however, there will be some impacts to scenery viewed from vehicles, especially in the areas that were moderately to severely burned.

Camps

The project area is popular with equestrians, however, Gibson Prairie Horse Camp, the epicenter of this activity, was not impacted by the Government Flats Complex Fire. Some dispersed camping opportunities along roads within the project area may have been impacted by the fire.

Trails

The North Section Line Trail was the only developed system trail impacted by the Government Flats Complex Fire. Approximately 500 feet of trail was utilized for fireline construction to

prevent the fire from crossing to the west side of the trail. Fortunately, the fire did not cross the trail and impacts to the trail due to fireline construction were mitigated. However, the location of fireline construction will be noticeable to trail users in the short term. No other system trails were impacted by the Government Flats Complex Fire.

Off-highway Vehicles (OHV)

There has been no change to authorized OHV use due to the Government Flats Complex Fire. OHV use is has not been permitted within the project area since 2010. Furthermore, the Surveyors Ridge Trail North of the power lines, which was open to motorized use when the North Fork Mill Creek Restoration Opportunities Project was analyzed, is no longer open to OHV use. This change occurred in 2010 as a result of the Off Highway Vehicle Management Plan, including Forest Plan Amendment #17. As such, OHV use will not be discussed further in this report.

3.11.3 Effects Analysis/Environmental Consequences

No Action Alternative (Alternative 1)

General Dispersed Recreation

There would be no impacts to cross-country skiers as there would be no changes in conditions permitting cross-country skiing within the project area.

Berry picking and hunting would be impacted in the short term, especially in the high severity burn areas as berries would not be available for a couple of seasons and game may move out of the area for a short period of time until food and cover becomes more readily available. Over time, opportunities for berry picking and hunting should improve as vegetation naturally comes back to all areas impacted by the burn and improved soil productivity should lead to increased berry production and food and cover for game. There may be minimal to low effects to berry production and hunting in areas of low to moderate severity burn. These activities are available in other locations on the forest. It is possible that some berry pickers and hunters would choose to go elsewhere to engage in these activities. As a result, other areas on the forest may see an increase in these activities.

Driving for pleasure may be impacted in the short term by road closures for hazard tree removal. In the long term it would benefit as hazard trees would be removed from road corridors making this activity safer and improving the viewshed.

Camps

Any dispersed campsites within the burn area may have been scorched leaving behind snags and severely damaged vegetation which may die making campsites less desirable for campers seeking shade. Over time, vegetation may be replaced by regeneration.

Trails

Under the No Action Alternative, recreationists utilizing the North Section Line trail would see the visual effects of fire scars. The burn area is visible from these trails and recreationists would see the impacts of the fire to the area.

Proposed Action (Alternative 2)

General Dispersed Recreation

Similar to the No Action Alternative, there would be no impacts to cross-country skiers as there would be no changes in conditions permitting cross-country skiing within the project area.

Berry picking and hunting would be impacted in the short term, especially in the high severity burn areas and areas where thinning and reforestation would occur. In these areas berries may not be available for a couple of seasons and game may move out of the area for a short period of time until food and cover becomes more readily available. Over time, opportunities for berry picking and hunting should improve as vegetation naturally returns and improved soil productivity should lead to increased berry production and food and cover for game.

Driving for pleasure may be impacted in the short term by road closures for hazard tree removal. In the long term it would benefit as hazard trees would be removed from road corridors making this activity safer and improving the viewshed.

Cumulative Effects

The following items were considered when analyzing cumulative effects for recreation: previous North Fork Mill Creek Restoration Opportunities projects, ongoing road and trail maintenance, and future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Proposed Action within the planning area. The projects considered were analyzed due to their potential to impact recreation within the planning area. Other projects were not considered as they would not have an impact on recreation within the planning area.

Under the Proposed Action, there would be no cumulative effects to general dispersed recreation including cross-country skiing and driving for pleasure since there were no direct or indirect effects. Also, there would be no cumulative effects for berry picking and hunting since the projects considered for the cumulative effects analysis do not overlap in time or space with the short-term impacts to these dispersed recreation opportunities.

Camps

Temporary road closures for hazard tree treatments could impact access to dispersed campsites within the planning area. Hazard tree removal along roadways could make existing campsites safer if they were impacted by the burn and exist close to the road prism. Also, harvest activities and reforestation could improve dispersed camping over the long term providing newly vegetated areas that would be desirable to campers.

Cumulative Effects

The following items were considered when analyzing cumulative effects for recreation: previous North Fork Mill Creek Restoration Opportunities projects, ongoing road and trail maintenance, and future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Proposed Action within the planning area. The projects considered were analyzed due to their potential to impact recreation within the planning area.

Other projects were not considered as they would not have an impact on recreation within the planning area.

The Proposed Action would lead to minimal cumulative effects for camps when considered along with other projects within the planning area. The Proposed Action could lead to hazard tree removal along the road system earlier than if there was a no action alternative, making camps safer sooner.

Trails

The Proposed Action would have minimal impacts to trails. Indirect effects to trails would include the visual impacts of the burn area. These locations are minimal along the North Section Line Trail.

Cumulative Effects

The following items were considered when analyzing cumulative effects for recreation: previous North Fork Mill Creek Restoration Opportunities projects, ongoing road and trail maintenance, and future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Proposed Action within the planning area. The projects considered were analyzed due to their potential to impact recreation within the planning area. Other projects were not considered as they would not have an impact on recreation within the planning area.

There would be no cumulative effects to trails as a result of the Proposed Action.

Snag Retention (Alternative 3)

General Dispersed Recreation

Similar to the No Action Alternative and the Proposed Action, there would be no impacts to cross-country skiers as there would be no changes in conditions permitting cross-country skiing within the project area.

Berry picking and hunting would be impacted in the short term, especially in the high severity burn areas as berries would not be available for a couple of seasons and game may move out of the area for a short period of time until food and cover becomes more readily available. Over time, opportunities for berry picking and hunting should improve as vegetation naturally comes back to all areas impacted by the burn and improved soil productivity should lead to increased berry production and food and cover for game. There may be minimal to low effects to berry production and hunting in areas of low to moderate severity burn. These activities are available in other locations on the forest. It is possible that some berry pickers and hunters would choose to go elsewhere to engage in these activities. As a result, other areas on the forest may see an increase in these activities.

Driving for pleasure may be impacted in the short term by road closures for hazard tree removal. In the long term it would benefit as hazard trees would be removed from road corridors making this activity safer and improving the viewshed.

Cumulative Effects

The following items were considered when analyzing cumulative effects for recreation: previous North Fork Mill Creek Restoration Opportunities projects, ongoing road and trail maintenance, and future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Snag Retention Alternative. The projects considered were analyzed due to their potential to impact recreation within the planning area. Other projects were not considered as they would not have an impact on recreation within the planning area.

Under the Snag Retention Alternative, there would be no cumulative effects to general dispersed recreation including cross-country skiing and driving for pleasure since there were no direct or indirect effects. Also, there would be no cumulative effects for berry picking and hunting since the projects considered for the cumulative effects analysis do not overlap in time or space with the short-term impacts to these dispersed recreation opportunities.

Camps

Temporary road closures for hazard tree treatments could impact access to dispersed campsites within the planning area. Hazard tree removal along roadways could make existing campsites safer if they were impacted by the burn and exist close to the road prism. Over time, new vegetation would return to scorched campsites.

Cumulative Effects

The following items were considered when analyzing cumulative effects for recreation: previous North Fork Mill Creek Restoration Opportunities projects, ongoing road and trail maintenance, and future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Snag Retention Alternative. The projects considered were analyzed due to their potential to impact recreation within the planning area. Other projects were not considered as they would not have an impact on recreation within the planning area.

The Snag Retention Alternative would lead to minimal cumulative effects for camps when considered along with other projects within the planning area. The Proposed Action could lead to hazard tree removal along the road system earlier than if there was a no action alternative, making camps safer sooner.

Trails

The Snag Retention Alternative would have minimal impacts to trails. Indirect effects to trails would include the visual impacts of the burn area. These locations are minimal along the North Section Line Trail.

Cumulative Effects

The following items were considered when analyzing cumulative effects for recreation: previous North Fork Mill Creek Restoration Opportunities projects, ongoing road and trail maintenance, and future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Snag Retention Alternative. The projects considered were analyzed due to their potential to impact recreation within the planning area. Other projects were not considered as they would not have an impact on recreation within the planning area.

There would be no cumulative effects to trails as a result of the Snag Retention Alternative.

3.11.4 Consistency Determination

Table 3-44: Consistency with Forest Plan Standards and Guidelines

Standards & Guidelines	Relevant Element of Proposed Action (Alternative 2)	Relevant Element of Snag Retention Alternative (Alternative 3)	Do the Alternatives Meet Standard as currently designed?
For B10 allocations, B10-002 states that human access should be restricted between December 1 and April 1 to reduce interaction with wintering deer and elk.	All B10 lands would remain closed between December 1 and April 1.	All B10 lands would remain closed between December 1 and April 1	Yes
For C1 allocations; C1-001 states that dispersed recreation opportunities shall be provided, including hiking and trail use. C1-002 states these activities may be altered or temporarily precluded in localized areas to facilitate timber management.	Some access would be restricted during harvest/hazard tree removal for public safety.	Some access would be restricted during hazard tree removal for public safety.	Yes

3.11.5 Summary of Effects by Alternative

General Dispersed Recreation

Under the No Action Alternative, there would be limited to no impacts to general dispersed recreation. Cross-country skiing would not be impacted as there would be no change in areas open and closed to these activities. Hunting and berry picking would be impacted in the short term in locations where the burn was moderate to severe decreasing vegetation. In the long term, these activities would benefit from the burn. Driving for pleasure would not be impacted by the No Action alternative as there would be no changes to the open road system.

Similarly, under the Proposed Action, effects would be minimal. Differences would be that Hazard Tree Treatments could close system roads having a direct effect on driving for pleasure.

Under the Snag Retention Alternative effects to recreation would be minimal. Similar to the Proposed Action, impacts would be related to closures for Hazard Tree Treatments to improve public health and safety.

Camps

Direct effects to camps may exist regardless of the chosen alternative. These impacts may include scorched earth and snags in existing dispersed campsites. Indirect effects under both alternatives may include impacts to views if the burn area is visible from these campsites.

The main difference between the No Action Alternative and the other two alternatives would be that hazards may be reduced at dispersed campsites if they fall within locations where Hazard Tree Treatments would occur. Under the Proposed Action harvest and planting could improve existing dispersed campsites near these locations or create new locations desirable for dispersed campers. The Proposed Action Alternative meets Forest Standard C1-001.

Trails

Trails would be minimally impacted by all three alternatives. Indirect impacts would include the view shed as recreationists could see the burn from the North Section Line trail. This would be the case with each alternative.

3.12 Visual Quality

More information is available in the project record including the full recreation analysis file, as part of the Visual Quality Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.12.1 Analysis Assumptions and Methodology

Impacts to visual quality by the No Action and Proposed Action alternatives have been reviewed on a case-by-case basis and described in more detail in the Effects Analysis/Environmental Consequences section of this report. Comparisons of these factors can be drawn between this report and the *Recreation and Visual Quality Report for the North Fork Mill Creek Collaborative Stewardship Project* (Slagle, 2008).

The lands impacted by the Government Flats Complex Fire are classified as C1 (Timber Emphasis) and B10 (Deer and Elk Winter Range) in the Mt. Hood Land and Resource Management Plan (Forest Plan). C1 covers 11% of the planning area and B10 covers 85% of the planning area. The remaining 4% of land mass falls under Research Natural Area (A3), Semi-Primitive Roaded Recreation (A6), Special Old Growth (A7), and Special Emphasis Watershed (B6). The visual quality analysis will focus on C1 and B10 as these land use allocations make up the vast majority of the planning area. Treatments falling under the other land allocations are limited to hazard tree removal to protect public health and safety. Visual Resource Management for lands classified as C1 (Timber Emphasis) is defined as allowing management activities with a Visual Quality Objective (VQO) of Modification as viewed from open roads. Visual Management for lands defined as B10 (Deer and Elk Winter Habitat) is defined as allowing management activities that achieve a VQO of Modification as viewed from open roads during the summer.

The Modification VQO indicates that management activities may visually dominate the original characteristic landscape. However, activities of vegetative and landform alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type.

3.12.2 Changed Condition

Prior to the fire, the planning area showed evidence of previous harvest activities including clear cuts and partial cuts. Stand conditions impacted by the fire vary depending on the severity of the burn. Areas that received high severity burn are heavily impacted visually. These areas are characterized by red needles, scorched ground and boles, and white, ashy snags. Areas of moderate and lower severity burns exhibit minor amounts of blackened tree boles, blackened ground and tree-crown scorch.

The planning area including one trail will be analyzed under this Visual Quality Report: the North Section Line Trail. Views of the planning area from this trail fall under middle ground in the Forest Plan (1320 feet to 5 miles). Views from middleground must achieve the Modification VQO. In some locations, middleground views were impacted by the Government Flats Complex Fire as burn scars are visible from certain locations along the North Section Line Trail.

3.12.3 Effects Analysis/Environmental Consequences

No Action Alternative (Alternative 1)

The No Action Alternative would not have any additional visual impacts on areas where the burn was high to moderate. Visual impacts resulting from moderate to severely burned landscape would continue under this alternative. These impacts are of a natural character and would slowly evolve over time as vegetation returned to these areas. Under B10 visual diversity of vegetation would remain present with evidence of timber harvest prevalent and evidence of fire occurrence present. Under C1 there would be stands of trees in various stages of development arranged in mosaic patterns showing influence of landform, productivity, and management objectives, open views, obvious human activities, and views of distant mountain peaks. This applies to the North Section Line Trail as well.

Proposed Action (Alternative 2)

The Proposed Action would result in visual impacts from restoration thin, hazard tree, and reforestation treatments. These activities would be visible in various locations within and adjacent to the planning area. They would not deviate from Forest Plan Standards meaning that management activities may visually dominate the original characteristic landscape. The reforestation treatments may increase the rate at which vegetation returns to the planning area and view shed. Also, hazard tree reduction within the planning area could improve vistas. This applies to the North Section Line trail as well.

Cumulative Effects

The following items were considered when analyzing cumulative effects for visual quality: previous North Fork Mill Creek Stewardship Projects, ongoing road and trail maintenance, and

future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Proposed Action within the planning area. The projects considered were analyzed due to their potential to impact visual quality within the planning area. Other projects were not considered as they would not have an impact on visual quality within the planning area.

Under the Proposed Action, these items would have an impact on the planning area and view sheds adjacent to the planning area falling under middleground. Combined with the Proposed Action, these actions would not deviate from Forest Plan standards. They would move towards desired future conditions as harvest activities would promote visual diversity of vegetation, open views, obvious human activities, and views of distant mountain peaks. Road and trail maintenance would have no impact to cumulative effects under the Proposed Action while hazard tree harvesting could improve view sheds.

Snag Retention Alternative (Alternative 3)

The Snag Retention Alternative would result in visual impacts from restoration thin, hazard tree, and reforestation treatments. These activities would be visible in various locations within and adjacent to the planning area. They would not deviate from Forest Plan Standards meaning that management activities may visually dominate the original characteristic landscape. The reforestation treatments may increase the rate at which vegetation returns to the planning area and view shed. Also, hazard tree reduction within the planning area could improve vistas. This applies to the North Section Line trail as well.

Cumulative Effects

The following items were considered when analyzing cumulative effects for visual quality: previous North Fork Mill Creek Stewardship Projects, ongoing road and trail maintenance, and future hazard tree harvest along the road systems. These items were considered over a five year time frame before and after the Proposed Action within the planning area. The projects considered were analyzed due to their potential to impact visual quality within the planning area. Other projects were not considered as they would not have an impact on visual quality within the planning area.

Under the Snag Retention Alternative, these items would have an impact on the planning area and view sheds adjacent to the planning area falling under middleground. Combined with the Snag Retention Alternative, these actions would not deviate from Forest Plan standards. They would move towards desired future conditions as harvest activities would promote visual diversity of vegetation, open views, obvious human activities, and views of distant mountain peaks. Road and trail maintenance would have no impact to cumulative effects under the Proposed Action while hazard tree harvesting could improve view sheds.

3.12.4 Consistency Determination

The proposed project is located on lands defined as C1-Timber Emphasis, and B10-Deer and Elk Winter Range, in the Mt Hood Forest Plan. The following table lists the Standards and Guidelines from the Forest Plan pertinent to the No Action and Proposed Action alternatives.

Table 3-45: Consistency with Forest Plan Standards and Guidelines

Standards & Guidelines	Relevant Element of Proposed Action	Relevant Element of Snag Retention Alternative	Do the Alternatives Meet Standard as currently designed?	Data Used for Analysis
FW-556 states that VQO's should be achieved within one year of any project activity. Short term deviations from prescribed VQO's may occur due to catastrophic events, e.g. fire	Activity debris, temporary roads, landings, skid trails in near foreground need to be mitigated within one year of close of activity.	Activity debris, temporary roads, landings, skid trails in near foreground need to be mitigated within one year of close of activity.	Yes	Skid trail and temporary road components on the Proposed Action. Proposed schedule for slash disposal.
FW-584, 586, describe VQO of middle ground (1320 feet to 5 miles) for views from North Section Line Trail	Proposed treatment areas are in middle ground from this trail. Contrasting and diversified tree species should remain after treatment, and resultant stands should blend with surrounding landscape.	Proposed treatment areas are in middle ground from this trail. Contrasting and diversified tree species should remain after treatment, and resultant stands should blend with surrounding landscape.	Yes	Examination of similar treatments in other areas. Visit to trails to check on visibility of proposed treatment areas.
For B10 allocations; Management activities shall achieve a Modification VQO as viewed from roads open during the summer.	Management units need to blend with the surrounding landscape.	Management units need to blend with the surrounding landscape.	Yes	Similar treatments accomplished on the Ranger District.

Standards & Guidelines	Relevant Element of Proposed Action	Relevant Element of Snag Retention Alternative	Do the Alternatives Meet Standard as currently designed?	Data Used for Analysis
For C1 allocations; Management activities shall achieve a VQO of Modification as viewed from open roads; local roads and temporary roads are exceptions.	Management units need to blend with the surrounding landscape.	Management units need to blend with the surrounding landscape.	Yes	Similar treatments accomplished on the Ranger District.

3.12.5 Summary of Effects by Alternative

Under the No Action Alternative, the effects resulting from the Government Flats Complex Fire would continue throughout the planning area. These effects would not deviate from the Forest Plan as discussed in Standard FW-556 which states that conditions can deviate from standards for extended periods of time as a result of catastrophic events such as wildfire. As such, visual impacts from the fire are natural in character and would slowly evolve over time.

Under the Proposed Action alternative, the visual impact from the burn would be similar to the No Action Alternative although, reforestation may increase the rate at which vegetation returns to the planning area and view shed. Furthermore, hazard tree reduction within the planning area could improve vistas.

Under the Snag Retention Alternative effects resulting from the Government Flats Complex Fire would continue throughout the planning area. These effects would not deviate from the Forest Plan. Visual impacts from the fire are natural in character and would slowly evolve over time. Reforestation may increase the rate at which vegetation returns to the planning area and viewshed. Visual impacts from minimal hazard tree removal would be negligible.

3.13 Cultural Resources

More information is available in the project record including the full cultural analysis file, as part of the Cultural Resources Specialist Report. This information is incorporated by reference and is located in the project record, located at the Hood River Ranger District.

3.13.1 Analysis Assumptions and Methodology

Heritage resources include structures, sites, and objects that reflect the prehistory, protohistory, and history of people. The analysis area for heritage resources in this Revised EA is the area of ground disturbance as described in the Proposed Action. Ground disturbance includes treatments using heavy machinery associated with logging, burning, and temporary road construction.

The National Historic Preservation Act and the National Environmental Protection Act both require consideration be given to the potential effect of federal undertakings on heritage resources. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered into a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

The proposed activities of the North Fork Mill Creek Revised EA Project include tree removal, slash piling and burning, planting, temporary road construction, and possibly firewood cutting involving heavy machinery and ground disturbance. The revised EA proposes to treat 50%, or approximately 1,009 acres of area burned by the fire. All but approximately 37 of these acres were previously surveyed for heritage resources and documented in either the North Fork Mill Creek Project report (2008-060606-0012; Dryden 2008) or the report for The Dalles Watershed Fuel Break Part 2 (2007-060601-0002 (Dryden 2007). Portions of the previous project were being implemented at the time of the fire, while other portions of the project were not. The report for the North Fork Mill Creek project determined that the project would have no effect on heritage resources with the implementation of the recommended protective measures. The report for The Dalles Watershed Fuel Break Part 2 project determined that the project would not adversely affect heritage resources; the Oregon SHPO concurred with the determination of effect. The original reports and Oregon SHPO concurrence are available in the project record, located at the Hood River Ranger District in Mount Hood-Parkdale, Oregon. The original heritage reports are incorporated by reference into this report.

The previous surveys and findings retain their validity under the 2004 PA, despite any change in conditions. Heritage resource surveys were conducted for the 37 acres of additional hazard tree treatments and documented in Heritage Resource Report 2014/060606/0005 (Dryden 2014). Heritage resources potentially affected by the fire were also revisited and documented in the same report.

3.13.2 Changed Condition

Wildfires can affect heritage resources by consuming combustible artifacts. In intensively-burned areas, wildfires can affect the integrity of lithic scatters when large cavities left behind by

burned tree roots may increase erosion. Heritage resources can also be affected by the construction of fire control lines by bulldozer or by hand, and by mop-up efforts. Heritage resources may also be affected by later rehabilitation efforts. Wildfires may also enhance ground visibility and increase site vulnerability from vandalism.

Heritage resources potentially affected by fire, fire-suppression efforts, or by proposed fire rehabilitation actions were revisited. Eight of the previously documented heritage resources were revisited for this project, and heritage resource surveys were conducted for any additional unsurveyed treatment areas. One historic road (666EA0294) was documented as a result of the surveys. Site monitor forms were completed for revisited sites. No monitor forms were completed for isolated finds, which are considered insignificant heritage resources.

Isolate 661IS0051 consists of one quartz point midsection, a small quartz core, and a flake widely scattered over a large area. Ground visibility is excellent (75 to 100%) in the location of the isolate. The fire had burned intensively across the area, and a bulldozed road closure had recently been constructed during firefighting efforts. An inspection of the area proved negative for the presence of additional lithic materials.

The remains of the Mill Creek Lookout (661EA0057) were inspected during fire suppression efforts. The site is situated in mostly open grasslands atop the summit of Mill Creek Ridge, but a portion does descend to the north into forested lands. The fire had burned intensively across the site; two piles of milled lumber from the tower remains could not be located. A road descending down the ridge from the lookout remains had been closed by bulldozed soil and rock. An inspection of the bulldozed closure and surrounding area was negative for the presence of cultural materials. No features had been noted in the vicinity of the road closure on the site sketch map.

Site 666NA0198 is an open-air lithic scatter situated on open grasslands. A shallow fire control line constructed by hand was found to pass through the northern portion of the site. Two large cavities left by burned stumps were observed within the site boundaries. An inspection of the fire control line was negative for the presence of cultural materials. A recommendation was made to exclude the site from the construction of drainage dips or other scarification for proposed rehabilitation; however, native grass seeding of the fire line could occur.

Site 666EA0154 consists of seven quaking aspen trees with dendroglyphs. A deep fire control line constructed by hand was found to pass through the site. An inspection of the fire control line was negative for the presence of cultural materials within the fire line. Rehabilitation proposals included native grass seeding; no restrictions were recommended concerning the planned rehabilitation efforts.

Precontact lithic scatter site 666NA0205 consists of six lithic artifacts scattered over 0.9 acres. The site is situated in an area that experienced low to moderate fire intensity. No fire control lines were situated near the site; the site was not revisited for this project.

Multi-component site 666MC0211 consists of a sparse scatter of lithic flakes and the remains of a possible logging camp. The site is situated in an area that experienced low to moderate fire

intensity. No fire control lines were situated near the site; the site was not revisited for this project.

Isolated find 666IS0212 consists of a single isolated lithic artifact. Hand-constructed fire control line was found to pass through the general area of the find. An inspection of the fire control line and nearby road proved negative for the presence of cultural materials.

Multi-component site 666MC0213 consists of one lithic flake and considerable historic debris. A cabin is shown in this general location on a 1912 Oregon National Forest Map. The site is situated in an area that experienced low to moderate fire intensity. No fire control lines were situated near the site; the site was not revisited for this project.

Multi-component site 666NA0214 consists of a possible spokeshave and two fragments of angular waste. Four additional flakes were observed at the site. A historic component to the site consists of ceramic and glass fragments, including amethyst glass and Chinese ceramics. The site is situated in an area that experienced low to moderate fire intensity. No fire control lines were situated near the site; the site was not revisited for this project.

Isolated find 661IS0303 consists of a single isolated lithic artifact. A bulldozed fire control line was found to pass through the general area of the find. An inspection of the fire control line and nearby road proved negative for the presence of cultural materials.

Isolated find 661IS0341 consists of a single cedar plank inscribed with cadastral survey section information. The plank is nailed to a pine tree and situated next to a bulldozed fire control line. The North Section Line Trail (661EA0340) is a historic trail that dates to the 1939. Portions of the trail have been relocated in the past, while other portions have been affected by past logging and fire suppression efforts. A bulldozed fire control line was found to cross the trail in at least two locations. Rehabilitation proposals include restoring the trail tread in its original alignment, obliterating the bulldozer line adjacent to the trail, and seeding the area with native grasses. No restrictions were recommended concerning the planned rehabilitation efforts.

Slobber Drive (National Forest Service Roads [NFSR] 1711-630 and 1720-192) consists of a historic road that appears to be related to a trail dating to ca.1912, and local oral traditions place the construction of the road ca.1889 with its association with Hansens Mill. No roads are shown in this location on the 1884 General Land Office plat map; only a trail is shown in the location of the road on 1912 and 1919 National Forest Maps. The feature is not shown as a road until 1939.

The fire burned intensely over the road, denuding vegetation and exposing the road to erosion. Pull-out areas had been added in a few key locations to allow for the passage of fire vehicles during fire suppression activity. Rehabilitation proposals include the application of gravel where the road is especially vulnerable to erosion or puddling, the construction of drainage dips, and seeding with native grasses. The road would remain in its current alignment. Recommendations concerning rehabilitation of the road excluded the construction of drainage ditches or widening.

3.13.3 Effects Analysis

No Action (Alternative 1) Direct and Indirect Effects

Under the No Action Alternative, heritage resources would only be affected by decay and other natural and physical forces that are already occurring. This alternative would have no effect on heritage resources.

Proposed Action (Alternative 2) Direct and Indirect Effects

Isolated find 661IS0051 was previously determined to be ineligible for inclusion on the National Register of Historic Places. No protective measures are required or recommended for ineligible heritage resources.

The Mill Creek Lookout 661EA0057 is situated within an area proposed for reforestation and hazard tree removal. A 30-meter (approximately 100-foot) buffer zone would be reflagged around the site perimeter for the exclusion of heavy equipment. The area is open grassland and no planting would occur during reforestation efforts. The project as proposed would have no effect on site 661EA0057.

Site 666EA0154 consists of seven quaking aspen trees with dendroglyphs. No timber treatment is proposed within the vicinity of site 666EA0154. The project as proposed would have no effect on site 666EA0154.

Site 35WS341 (666NA0198) is an open-air lithic scatter situated on open grasslands. No timber treatment is proposed in the vicinity of the site for the current project. The project as proposed would have no effect on site 35WS341.

Precontact lithic scatter site 666NA0205 is located adjacent to a harvest unit. A 100-foot buffer zone for the exclusion of heavy machinery would be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Treatment of vegetation by hand and hand piling and burning can occur. The project can proceed with no effect to site 666NA0205.

Multi-component site 666MC0211 is located adjacent to a harvest unit. A 100-foot buffer zone for the exclusion of heavy machinery would be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Treatment of vegetation by hand and hand piling and burning can occur. The project can proceed with no effect to site 666MC0211.

Multi-component site 666MC0213 is located adjacent to a harvest unit. A 100-foot buffer zone for the exclusion of heavy machinery would be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Treatment of vegetation by hand and hand piling and burning can occur. The project can proceed with no effect to site 666MC0213.

Multi-component site 666NA0214 is located adjacent to a harvest unit. A 100-foot buffer zone for the exclusion of heavy machinery would be flagged around the site. Any trees harvested near

the buffer zone should be felled directionally away from the buffer zone. Treatment of vegetation by hand and hand piling and burning can occur. The project can proceed with no effect to site 666NA0214.

Isolated find 666IS0212 was previously determined to be ineligible for inclusion on the National Register of Historic Places. No protective measures are required or recommended for ineligible heritage resources.

Isolated find 661IS0303 was previously determined to be ineligible for inclusion on the National Register of Historic Places. No protective measures are required or recommended for ineligible heritage resources.

Isolated find 661IS0341 would be re-flagged and avoided during hazard tree removal. The project would have no effect on isolate 661IS0341.

The North Section Line Trail (661EA0340) is a historic trail that dates to the 1939. No timber treatment is proposed in the vicinity of site 661EA0340. The project as proposed would have no effect on site 661EA0340.

Slobber Drive (Forest Service Roads 1711-630 and 1720-192) consists of a historic road that appears to be related to a trail dating to ca.1912. Timber treatments proposed along Slobber Drive include roadside hazard tree removal, reforestation (planting), and thinning followed by planting. Existing log landings would be re-used, and heavy equipment would not be allowed off of NFSR 1711-630 for the roadside hazard tree removal. Blading and shaping of the road surface has occurred throughout the past and would be allowed. No new log landings would be allowed adjacent to the road; however, short timber skid trails would be allowed deeper into the areas proposed for reforestation or thinning. Log landings would be situated away from Slobber Drive within the units proposed for reforestation treatments. Temporary roads would be rehabilitated and revegetated after project completion. Similar protective measures were previously employed during hazard tree treatments along the historic Cloud Cap Road (Gnarl Ridge Log Salvage Project 2009-060606-0019; Dryden 2009). On January 6, 2012, the Oregon State Historic Preservation Office (SHPO) concurred that the protective stipulations would result in no adverse effect to the road (SHPO Bibliographic Number 22979). It is our opinion that these proposed Project Design Criteria (PDC) would also retain the historic character of NFSR 1711-630 and 1720-192 for no adverse effect to site 666EA0249.

Snag Retention (Alternative 3) Direct and Indirect Effects

Activities associated with Alternative 3 would be reduced in scope and effects from the Proposed Action (Alternative 2). Effects to Heritage Resources would be identical to the effects discussed for the Proposed Action since all the sites remain within treatment units.

Cumulative Effects

For heritage resources, any effects are limited to site specific locations. Any cumulative effects would also be limited to heritage resources situated within proposed areas of ground disturbance. The PDC for the Proposed Action resulted in no direct or indirect effects to heritage resources since there are no significant heritage resources affected by any alternatives. For cumulative

effects, all projects shown in Chapter 3 of the Revised EA were considered; however, none of the proposed projects involve heritage resources situated within the proposed project areas. Also, heritage resources are generally avoided for all federal undertakings with no cumulative effects. Because this project would have not adversely affect heritage resources eligible for the NRHP and none of the projects considered for potential cumulative effects overlap the affected area, there would be no cumulative effects to heritage resources as a result of implementing any of the action alternatives.

The consultation for the Heritage Resource Survey results and recommendations for the project have been completed in accordance with the 2004 PA and submitted to the Oregon SHPO for review; the results of the SHPO review are pending.

3.13.4 Consistency Determination

The project would not impact any significant heritage resources. Based on the proposed protective measures, the project meets the criteria in the Programmatic Agreement for “No Adverse Effect” determination (Stipulation III (B) 5).

This action is consistent with the Mt. Hood Land and Resource Management Plan (Forest Plan) goals to protect important heritage resources. Heritage resource inventories were conducted in compliance with the 2004 PA during the project planning stage (FW-602 and FW-606), the field survey results were fully documented (FS-608), and the potential effects to heritage resources from the proposed projects were assessed (FW-609, FW-610). Heritage resources potentially affected by project activities were evaluated as ineligible for inclusion on the NRHP (FW-612). All records and documents concerning heritage resources for the project are kept on file at the Hood River Ranger District, Mt. Hood National Forest (FW-626).

3.13.5 Summary of Effects by Alternative

Under the No Action Alternative, heritage resources would continue to be subject to naturally occurring processes.

Under the Proposed Action, protective measures previously prescribed as part of the initial North Fork Mill Creek project for heritage resources 35WS341, 661EA0057, 666EA0154, 666MC0211, 666MC0213, 666NA0205, and 666NA0214 consist of flagged boundaries excluding heavy machinery and would be adequate to protect these sites from the modified project.

Isolated finds 666IS0051, 661IS0303, 666IS0212, and 666IS0209 were determined to be ineligible for the National Register of Historic Places; no protective measures are required or recommended for ineligible heritage resources.

Hand-constructed fire control line passed through heritage resource sites 35WS341 and 666EA0154. No timber activity is proposed in the vicinity of 666EA0154. Site 35WS341 would be reflagged for the exclusion of heavy machinery.

No timber treatments are proposed near the North Section Line Trail (661EA0340).

The project can proceed as proposed with no effect to the heritage resources discussed above.

Slobber Drive (666EA0249) is situated within areas proposed for timber treatments, and the road would be used for timber hauling. Project Design Criteria concerning the treatment of this road include:

- No new culverts, turn-outs, or ditches would be added.
- Existing log landings would be re-used, with no new landings adjacent to the road.
- Heavy machinery would not be allowed off of the road surface within the roadside hazard tree removal areas.
- Blading and shaping of the road surface would be allowed.
- No road widening would occur.
- Spot graveling may occur as needed.
- Skid trails may be constructed from Slobber Drive to access timber within units scheduled for reforestation. Landings would be situated away from the road in these areas. The skid trails would be rehabilitated and revegetated after project completion.

These stipulations are similar to those previously employed for hazard tree removal along the Cloud Cap Road. With the recommended Project Design Criteria, the project can proceed as proposed with no adverse effect to Slobber Drive (666EA0249).

3.14 Climate Change

3.14.1 Existing Condition

A growing body of scientific evidence and climate modeling indicate that climate change is occurring. While there are no specific projections for the project area, the situation would likely be one where the summers are drier and the snow melts earlier in the spring (Bare 2005, Mote 2003, Mote 2005, Dale 2001). There are some who believe that climate change is not occurring or that it is not human caused. This document is not intended to present arguments on any of these theories as they are well documented elsewhere.

This project was not specifically designed to mitigate or respond to potential climate change. This section addresses aspects of the project that may affect carbon emission or sequestration and how the project may impact the forest's ability to deal with climate change. This analysis will not attempt to quantify carbon emission or sequestration.

This project involves the thinning of plantations and thinning for forest health improvements in second growth stands. Rapidly growing forests are recognized as a means of carbon sequestration (FAO 2007). Forest health and growth issues are discussed in Section 3.1, Vegetation Resources.

3.14.2 Effects Analysis / Environmental Consequences

No Action – Direct, Indirect and Cumulative Effects

As no vegetative manipulation would occur and no burning would take place the current carbon sequestration rates would remain unchanged and no additional carbon would be released into the atmosphere. The No Action alternative would not result in carbon emissions from vehicles or burning and would result in the retention of relatively slow growing trees. The mortality that results would be retained on site (see Sections 3.1, Vegetation Resources and 3.2, Wildlife for more details).

Alternatives 2 and 3 – Direct, Indirect and Cumulative Effects

This project is not likely to have direct localized effects on climate. By its very nature, the discussion of a project's effect on climate change is indirect and cumulative because the effects occur at a different time and place, and because the scale of the discussion is global. Since it is not reasonable to measure a project's global impact, the discussion here focuses on key elements of forest management discussed in the scientific literature.

For this proposal, the following actions have the potential to affect carbon emissions or sequestration:

- Thinning to enhance the health of the residual stand would result in trees that are better able to withstand stresses such as dry summer conditions (Millar 2007, Spittlehouse 2003).
- Variable density thinning with skips and the retention of minor species would result in stands that are resilient and better able to respond to whatever changes come in the future (Millar 2007).
- Fossil fuel would be used by equipment such as saws, tractors, skyline yarders and log trucks. It would be possible for some of this equipment to use biofuels if available and priced competitively.
- Logging debris at landings would be burned on site or transferred to a bio-energy facility to use in generating power. Residual and/or natural fuel accumulations would be burned through underburning, pile burning, and jackpot burning. All of these activities would release carbon into the atmosphere.
- Utilizing trees to create long-lived wood products would sequester carbon. (IPCC 2007, FAO 2007, Stavins 2005, Upton 2007).

To summarize, the action alternatives would result in some carbon emissions and some carbon sequestration. The benefits to forest health and resiliency with the action alternatives would allow stands to better respond and adapt to the future climate variation or change.

3.15 Environmental Justice and Civil Rights

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

The communities of Mt. Hood/Parkdale, Odell and Hood River are 5 to 20 miles to the east and southwest of The Dalles Municipal watershed. The Dalles abuts the northeast end of the municipal watershed. Other communities that may have an interest in the proposal would include Maupin, Madras, Redmond, and Bend to the south and Sandy, Gresham and Portland to the West. Census data confirm that the larger communities have minorities and low-income populations that may be affected by activities in the watershed. However, no specific concerns regarding minorities or low-income populations or communities were identified during the public information process.

The North Fork Mill Creek project area is located on usual and accustomed land for the Confederated Tribes of Warm Springs (as is all of the Mt. Hood National Forest). The Treaty of 1855 granted the Confederated Tribes of the Warm Springs (CTWS) the right of “usual and accustomed” gathering of traditional native plants and “special interest” use. According to the Ethnographic Study of the Mt. Hood National Forest, no traditional use areas have been identified in this planning area. No activities are proposed that would preclude any granted rights. Fieldwork by the Interdisciplinary Team has revealed that huckleberries exist in only occasional small, isolated patches throughout the area and do not offer any significant potential for enhancement. Therefore, the proposal to implement fuels reduction project would not have any adverse effect on members of the CTWS.

Although there is no formal tracking system, based on observations, it is suspected that many of the foliage/greenery permits are sold to low-income individuals and minorities. This project is not expected to affect these users because the majority of the disturbance is not in areas where permit harvesting is restricted as the watershed is closed to all public access. Therefore, it is anticipated that this proposal would not have any negative effects on special forest product gatherers.

3.16 Other Required Disclosures

3.16.1 Conflicts with Plans, Policies or Other Jurisdictions

This project would not conflict with any plans or policies of other jurisdictions, including the Tribes. This project would not conflict with any other policies, regulations, or laws, including the Clean Water Act (see Section 3.4), Endangered Species Act (see Sections 3.2, 3.5 and 3.7), National Historic Preservation Act (see Section 3.13) and Clean Air Act (see Section 3.10). Other potential conflicts with plans, policies, or other jurisdictions are discussed below.

3.16.2 Floodplains and Wetlands

There are no impacts to wetlands, because none of the proposed activities are located in wetlands. Due to the steepness of the topography, small stream size and confined nature of streams in this area, floodplain width is fairly limited. The 100-year floodplain on all first order tributaries is estimated to be less than 15 feet wide in general. On North Fork Mill Creek, the 100-year floodplain is estimated to be generally less than 50 feet wide, while smaller streams such as Mosier Creek are about 20 to 30 feet wide. There only activity proposed within the floodplain is hazard tree falling. There should be a limited number of these and any hazard tree that would be dropped within the Riparian Reserve would be left on-site and would continue to provide floodplain function. The impacts to floodplains are discussed in Section 3.4, Water Quality.

3.16.3 Air Quality

Section 3.10, Fuels Management and Air Quality describe the impacts associated with pile burning on air quality. Pile burning would have a minimal impact on local airshed/air quality. Piles would be burned under conditions that minimize impacts to protected and sensitive areas, and would move smoke away from populated areas in the least amount of time. Currently, and in the future, all planned ignitions are and would be conducted according to the Operational Guidance for the Oregon Smoke Management Program (OSMP). The Operational Guidance contains the direction for meeting the terms of the OSMP. The Environmental Protection Agency has approved the OSMP as meeting the requirements of the Clean Air Act, as amended.

3.16.4 Consumers, Civil Rights, Minority Groups, Women, and Environmental Justice

Executive Order No. 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, directs Federal agencies to address effects accruing in a disproportionate way to minority and low income populations. No disproportionate impacts to consumers, civil rights, minority groups, and women are expected from this project. Salvage logging, commercial thinning and hazard tree removal work would be implemented by contracts with private businesses. Project contracting for the project's activities would use approved management direction to protect the rights of these private companies. Section 3.15 contains more information on Environmental Justice.

3.16.5 Treaty Resources and Reserved Indian Rights

No impacts on American Indian social, economic, or subsistence rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. The Confederated Tribe of Warm Springs was contacted in reference to this Proposed Action. More information on consultation with the tribes is available in Chapter 4.

3.16.6 Inventoried Roadless Areas, Unroaded and Potential Wilderness Areas

There will be no impacts to Inventoried Roadless Areas (IRA) as none exist within or near the project area. The project area contains no unroaded or potential wilderness areas as the project

area has a well-developed road system maintained for management activities, including recreation and timber harvest.

3.16.7 Prime Farmlands, Rangelands, and Forestlands

None of the alternatives would have an adverse impact to the productivity of farmland, rangeland, or forestland since none of these lands are located within the project area.

3.16.8 Potential or Unusual Expenditures of Energy

The No Action alternative would not require any expenditure of fuel or energy. The action alternatives would require expenditures of fuel for workers to access the project area, use power equipment, and to utilize the logging systems. Jet fuel use for helicopter operations would also occur. Overall, the action alternatives would not result in any unusual expenditure of fuel.

3.16.9 Irreversible and Irrecoverable Commitments of Resources

Irreversible commitments of resources are those that are forever lost and cannot be reversed. Irrecoverable commitments of resources are considered to be those that are lost for a period of time and, in time, can be replaced. There are no irreversible or irrecoverable commitments of resources associated with this project.

3.16.10 Conflicts with Plans, Policies, or Other Jurisdictions

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with . . . other environmental review lands and executive orders.”

Based on information received during scoping, informal consultation meetings, and analysis in the EA, none of the alternative under consideration would conflict with the plans or policies of other jurisdictions, including the Confederated Tribes of Warm Springs. This project would not conflict with any other policies and regulations or laws, including the Clean Water Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, Clean Air Act, and National Historic Preservation Act. Refer to the following sections for discussions regarding these laws:

- Section 3.4 Water Quality – Clean Water Acts;
- Section 3.2 Wildlife and Section 3.5 Fisheries and Aquatic Fauna – Endangered Species Act;
- Section 3.5 Fisheries and Aquatic Fauna – Magnuson-Stevens Fishery Conservation and Management Act;
- Section 3.10 Fuels Management and Air Quality – Clean Air Act; and,
- Section 3.13 Cultural Resources– National Historic Preservation Act.

CHAPTER 4 – CONSULTATION AND COORDINATION

The Forest Service consulted with the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

4.1 Federal, State, and Local Agencies

4.1.1 Consultation with the National Marine Fisheries Service (NMFS)

This project **may affect, and is likely to adversely affect (LAA)** Middle Columbia River steelhead, but would have a long-term **beneficial effect (BE)** due to reforestation activities that would mitigate potential negative effects of the Government Flats Complex Fire and would improve habitat in North Fork Mill Creek over time. The falling of hazard trees into North Fork Mill Creek is consistent with the large wood placement category of the Endangered Species Act – Section 7 Programmatic Consultation Conference and Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for Reinitiation of Aquatic Restoration Activities in the States of Oregon and Washington (ARBOs II) (NMFS Consultation Number: NWR-2013-9664) from both the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (CY2013 – indefinite end point). As such, no additional consultation is required.

4.1.2 Consultation with the US Fish and Wildlife Service (FWS)

The effects to spotted owls for this project were consulted on with the U.S. Fish and Wildlife Service through formal consultation on FY 2007-2008 activities within the Willamette province that have the potential to adversely affect spotted owls due to habitat modification and disturbance (FWS reference: 1-7-06-F-0179). The conclusion by the US Fish and Wildlife Service is that these projects are not likely to jeopardize the continued existence of the spotted owl or result in the destruction or adverse modification of spotted owl critical habitat.

The full reference is: Biological Opinion for Effects to Northern Spotted Owls (*Strix occidentalis caurina*) from the Willamette Planning Province Fiscal Year 2007 – 2008 activities that have the potential to adversely affect, due to habitat modification and disturbance, on U.S. Department of the Interior; Bureau of Land Management, Eugene District and Salem District, and the U.S. Department of Agriculture; Mt. Hood National Forest, Willamette National Forest and the Columbia River Gorge National Scenic Area (FWS Reference Number 1-7-06-F-0179).

The effects to spotted owls and critical for this revised project were included in a letter for reinitiation of consultation, which was submitted to the U.S. Fish and Wildlife Service in August 2014. Consultation will be completed prior to signing any decision for this project.

4.1.3 Consultation with the Oregon State Historic Preservation Officer (SHPO)

The National Historic Preservation Act requires consideration be given to the potential effect of federal undertakings on historic resources. This includes historic and precontact cultural resource sites. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, Region 6 of the Forest Service entered an agreement in 2004 with the Oregon State Historic Preservation Office and the Advisory Council on Historic Preservation. In accordance with the agreement, surveys of The North Fork Mill Creek Revised project area have been conducted. Based on the results of the surveys, a No Effect determination has been made for this project. The consultation for the Heritage Resource Survey results and recommendations for the project have been completed in accordance with the 2004 programmatic agreement and submitted to the Oregon SHPO for review. SHPO concurred with these findings on July 30, 2014 (SHPO Bibliographic Number: 26540).

Cultural resource surveys were conducted on a planning area scale and documented in Heritage Resource Report 2008/0606060/0012 and 2007/060601/0002. Survey methodology was conducted in accordance with the 2004 agreement between Region 6 of the Forest Service, the State Historic Preservation Office (SHPO), and the Advisory Council on Historic Preservation (ACHP).

4.2 Tribes

The North Fork Mill Creek Restoration Opportunities planning area that is on National Forest System lands is located on usual and accustomed land for the Confederated Tribes of Warm Springs (as is all of the Mt. Hood National Forest). The Treaty of 1855 granted the Confederated Tribes of the Warm Springs (CTWS) the right of “usual and accustomed” gathering of traditional native plants and “special interest” use. According to the Ethnographic Study of the Mt. Hood National Forest, no traditional use areas have been identified in this planning area. No activities are proposed that would preclude any granted rights. Fieldwork by the Interdisciplinary Team has revealed that huckleberries exist in only occasional small, isolated patches throughout the area and do not offer any significant potential for enhancement. There are no other known traditional native plant communities within the proposed project area. Therefore, the proposal to implement this project would not have any adverse affect on members of the CTWS.

Confederated Tribes of the Warm Springs Indian Reservation was consulted on this project and did not raise any issues with the proposed project.

4.3 List of Preparers

The following is a list of Interdisciplinary Team (IDT) members who assisted in the development of the Environmental Assessment.

Role	2008 IDT Members	2014 IDT Members
IDT Leader / NEPA Specialist	Jennie O'Connor	Jennie O'Connor Card
Fire / Fuels Specialist	Leo Segovia	Leo Segovia
Silviculturist	Kim Smolt	Whitney Olsker
Roads Engineer	Ken Huskey (retired)	Lucas Jimenez
Soil Scientist	John Dodd	John Dodd
Hydrologist	Mark Kreiter	Mark Kreiter
Fish Biologist	Gary Asbridge Darcy (Morgan) Saiget	Darcy Saiget
Wildlife Biologist	Patty Walcott	Patty Walcott
Botanist / Invasive Species	Susan Nugent	Christina Wessler
Range	Dan Fissell	Dan Fissell
Recreation / Visual Quality	Kevin Slagle (retired)	Claire Pitner
Heritage Resource Specialist	Mike Dryden	Mike Dryden
Aquatic Conservation Strategy	Mark Kreiter	Darcy Saiget
GIS Maps	Joyce Vandebrook (retired)	Whitney Olsker

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APPENDIX 1: North Fork Mill Creek Changed Condition Analysis – Best Management Practices for Water Quality Protection

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
<p>Plan-2. Project Planning and Analysis</p>	<p>Use the project planning, environmental analysis, and decisionmaking processes to incorporate water quality management BMPs into project design and implementation.</p>	<p>The project planning, environmental analysis, and decisionmaking process is the framework for incorporating water quality management BMPs into project design and implementation. The process should identify likely direct, indirect, or cumulative impacts from the proposed project or management activities on soils, water quality, and riparian resources in the project area. Project documents (plans, contracts, permits, etc.) should include site-specific BMP prescriptions to meet water quality objectives as directed by the environmental analysis. Project planning should ensure that activities are consistent with land management plan direction; State BMPs, floodplain, wetland, coastal zone; and other requirements including CWA 401 certification, CWA 402 permits, and CWA 404 permits; wilderness or wild and scenic river designations; and other Federal, State, and local rules and regulations.</p>	<p>Hydrologists, fish biologists, geologists, and soil scientists evaluate watershed characteristics and estimate response to proposed activities. The project is designed to include site-specific prescriptions for each area of water quality concern. The subsequent contract would include provisions to meet water quality criteria and other resource protection requirements as provided by the Preliminary Assessment (PA).</p> <p>The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC</p>	<p>Throughout the planning process</p> <p>The IDT reviewed the list of recommended methods from the BMP Technical Guide and developed project level PDCs based on the methods where applicable</p>	<p>High</p>	<p>High based on experience and fact</p>	<p>Monitored throughout the NEPA planning process.</p> <p>The project will be in a pool of timber/stewardship sale projects where District Rangers will conduct a “Plan in Hand” review on a minimum of one timber/stewardship sale within each zone every other year. The goal of the review is to monitor and evaluate forest resource management prescriptions to measure compliance with goals and objectives, determine effects, and adjust subsequent management actions when needed as required by Forest Service Manual direction.</p> <p>The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs, as described in implementation and responsibility.</p> <p>This project would go into a pool of similar projects to be selected for project level BMP implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. If selected an IDT would evaluate whether the site-specific BMPs were implemented and the effectiveness of the BMPs.</p>

¹ 2012 National Core BMP Technical Guide

² PDC = Project Design Criteria. See Section 2.4 in the Preliminary Assessment for a full list of the required PDC for this project.

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
Plan-3. Aquatic Management Zone Planning	To maintain and improve or restore the condition of land around and adjacent to waterbodies in the context of the environment in which they are located, recognizing their unique values and importance to water quality while implementing land and resource management activities.	The land around and adjacent to waterbodies plays an important ecologic role in maintaining the structure, function, and processes of the aquatic ecosystem. These areas provide shading, soil stabilization, sediment and water filtering, large woody debris recruitment, and habitat for a diversity of plants and animals. The quality and quantity of water resources and aquatic habitats may be adversely affected by ground-disturbing activities that occur on these areas. Protection and improvement of soil, water, and vegetation are to be emphasized while managing these areas under the principles of multiple use and sustained yield. Designation of a zone encompassing these areas around and adjacent to a waterbody is a common BMP to facilitate management emphasizing aquatic and riparian-dependent resources. These management zones are known by several common terms such as streamside management area or zone, riparian management area, stream environment zone, and water influence zone. For purposes of the National Core BMPs, these areas would be referred to as AMZs. Local regulation often stipulates the area and extent of AMZs and may be listed in land management plans; biological opinions, evaluations, or assessments; and other regional or State laws, regulations, and policies.	<p>The AMZ requirements are identified by an interdisciplinary team during the environmental analysis. The project is designed to include site-specific BMP prescriptions for the prevention of sedimentation and other stream damage from construction and operations.</p> <p>The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs during construction and operations on regular basis and would have the authority to provide direction and/or take action if construction or operations are not conducted according to the PDC.</p>	Throughout the planning process and PDC A-1, A-6 and A-8	Moderate to High	Moderate to High based on literature, experience and fact	Same as previous BMP.
Road-1. Travel Management Planning and Analysis	Use the travel management planning and analysis processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water	Road management related planning includes travel analyses as well as consideration of road management objectives and maintenance levels to address access needs and adjustments for projects. Planning occurs at scales that range from forestwide assessments and plans, to watershed scale or project-level analyses, to individual road	Hydrologists, fish biologists, geologists, soil scientists and roads project engineers on the IDT for the project evaluate the road network and develop PDCs to avoid, minimize, or mitigate adverse effects to soil, water quality, and	Throughout the NEPA planning process	High	High based on experience	Same as previous BMP.

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
	quality, and riparian resources during road management activities.	activities. Effects to soil, water quality, and riparian resources are evaluated during planning and balanced with the social, economic, and land management needs of the area. Appropriate protection and mitigation measures are considered when soil, water quality, and riparian resources may be adversely impacted. Project-level travel analyses are conducted to inform decisions and facilitate vegetation, fire and fuels, rangeland, recreation, minerals, or other management actions. Such analyses contain detail on the condition of individual roads. Road Management Objectives (RMOs) are developed and documented for each system road and include the intent and purpose in providing access to implement the land management plan. In addition to considering route needs at the site scale, RMOs also document the purpose of the road (access needs) along with operational maintenance levels and objectives.	<p>riparian resources during road management activities.</p> <p>The subsequent contract to implement the project will include provisions to meet water quality criteria and other resource protection requirements during road management activities.</p> <p>The IDT will coordinate with the personnel developing the contract to insure that PDCs associated with the BMP are incorporated into the contract</p> <p>The Forest Service Contracting Officer or his/her designee would monitor the implementation of the PDCs during project implementation on regular basis and will have the authority to provide direction and/or take action if construction or operations are not conducted according to the project design criteria.</p>				
Road-3. Road Construction and Reconstruction	Avoid or minimize adverse effects to soil, water quality, and riparian resources from erosion, sediment, and other pollutant delivery during road construction or reconstruction.	During road construction and reconstruction activities, vegetation and ground cover is removed exposing soil to erosion. Temporary and long-term erosion control and stormwater management measures are necessary to reduce erosion and maintain overall slope stability. These erosion control measures may include vegetative and structural practices to ensure long-term stability of the area.	Same as previous BMP.	Throughout the NEPA planning process PDC A-3, A-4, A-5	High	Moderate to High based on literature, experience and fact	Same as previous BMP.
Road-4. Road	Avoid, minimize, or mitigate adverse	Control of road use and operations and appropriate maintenance can protect road	Same as previous BMP.	Throughout the NEPA	High	Moderate to High based on	Same as previous BMP.

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
<p>Operations and Maintenance</p>	<p>effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.</p>	<p>investment and soil, water quality, and riparian resources. Periodic inventory and assessment that determine road condition are used to determine operational controls and maintenance needs. Operational objectives and activities are documented in the RMOs. In travel management decisions, roads open to motorized vehicle use are designated by allowed vehicle class and, if appropriate, by time of year. Road operations include administering permits, contracts, and agreements, controlling allowed use, maintaining roads in closed status, and revising maintenance levels and seasonal closures as needed. Road closures and restrictions are necessary because many forest roads are designed for dry season use. Many local roads are not surfaced; while others have some surfacing but little to no base. Such roads can be damaged by use during wet periods or by loads heavier than the road was designed to convey. Properly maintained road surfaces and drainage systems can reduce adverse effects to water resources by encouraging natural hydrologic function. Roads and drainage systems normally deteriorate because of traffic, weather, and age. In addition, roads occasionally become saturated by groundwater springs and seeps after a wildfire or unusually wet periods. Many such conditions can be corrected by timely maintenance. While routine maintenance is needed to ensure the road performs as designed, however, it can also be a source of soil disturbance, concentrated flow, sediment production, and slope instability if done improperly. Lower impact maintenance techniques may be desired to minimize disturbance of stable sites.</p>		<p>planning process</p> <p>PDC T-3, T-5, A-3, A-4, A-5, A-12</p>		<p>literature, experience and fact</p>	

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
Road-5. Temporary Roads	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.	Temporary roads may be used in situations where access needs are short-term and the roads can be constructed without requiring advanced engineering design or construction practices to avoid, minimize, or mitigate adverse effects to resources. Practices related to road location and stormwater and erosion control should be applied to temporary roads. Temporary roads are to be decommissioned and the area returned to resource production after the access is no longer needed.	Same as previous BMP.	Throughout the NEPA planning process PDC T-2	High	Moderate to High based on literature, experience and fact	Same as previous BMP.
Road-7. Stream Crossings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent waterbody crossings.	Crossings should be designed and installed to provide for flow of water, bedload, and large woody debris, desired aquatic organism passage, and to minimize disturbance to the surface and shallow groundwater resources. Construction, reconstruction, and maintenance of a crossing usually requires heavy equipment to be in and near streams, lakes, and other aquatic habitats to install or remove culverts, fords, and bridges, and their associated fills, abutments, piles, and cribbing. Such disturbance near the waterbody can increase the potential for accelerated erosion and sedimentation by altering flow paths and destabilizing streambanks or shorelines, removing vegetation and ground cover, and exposing or compacting the soil. Use of heavy equipment has a potential for contaminating the surface water from vehicle fluids or introducing aquatic nuisance species.	Same as previous BMP.	Throughout the NEPA planning process PDC A-5, A-12	High	Moderate to High based on literature, experience and fact	Same as previous BMP.

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
<p>Road-10. Equipment Refueling and Servicing</p>	<p>Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during equipment refueling and servicing activities.</p>	<p>Many activities require the use and maintenance of petroleum-powered equipment in the field. For example, mechanical vegetation management activities may employ equipment that uses or contains gasoline, diesel, oil, grease, hydraulic fluids, antifreeze, coolants, cleaning agents, and pesticides. These petroleum and chemical products may pose a risk to contaminating soils, surface water, and groundwaters during refueling and servicing the equipment. BMP Fac-6 (Hazardous Materials) provides additional guidance for handling hazardous materials.</p>	<p>Same as previous BMP.</p>	<p>PDC A-3, A-4</p>	<p>High</p>	<p>Moderate to High based on literature, experience and fact</p>	<p>Same as previous BMP.</p>

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
<p>Veg-1. Vegetation Management Planning</p>	<p>Use the applicable vegetation management planning processes to develop measures to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during mechanical vegetation treatment activities.</p>	<p>Vegetation on NFS lands is managed for a variety of purposes to achieve land management plan desired conditions, goals, and objectives for many resources. Planning for vegetation management generally follows a sequence of steps. The gathering and assessment of data involves evaluating the current condition of the vegetation compared to land management plan desired conditions, goals, and objectives. Potential vegetation treatment options to move the site towards desired conditions are developed and compared. Detailed treatment prescriptions are prepared to implement the preferred treatment option. The project is subjected to the National Environmental Policy Act (NEPA) analysis process where alternatives are developed and effects are analyzed. A decision is made and implemented. During the development of vegetation treatment prescriptions and alternatives, site specific measures consistent with BMP guidance to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resource are identified and included in the project as design criteria or mitigation measures. These BMP prescriptions are incorporated into the timber sale contract, stewardship contract, or project plan. Vegetation management for scheduled timber harvest on NFS lands has additional specific requirements from the National Forest Management Act that are incorporated into the project in the planning process. Scheduled timber harvest can occur only where watershed conditions would be maintained, lands can be adequately restocked within 5 years after final regeneration harvest, and water quality would be protected.</p>	<p>Same as previous BMP.</p>	<p>Throughout the planning process</p>	<p>High</p>	<p>High based on experience</p>	<p>Same as previous BMP.</p>

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
<p>Veg-2. Erosion Prevention and Control</p>	<p>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.</p>	<p>Prevention and control of erosion on areas undergoing mechanical vegetation treatments is critical to maintaining water quality. The process of erosion control has three basic phases: planning, implementation, and monitoring. During planning, areas subject to excessive erosion, detrimental soil damage and mass failure can be identified and avoided. Also during planning, treatments can be designed and units laid out to minimize or mitigate damage to soils, streambanks, shorelines, wetlands, riparian areas, and water quality. Planning for erosion control is addressed in BMP Plan- 2 (Project Planning and Analysis) and BMP Veg-1 (Vegetation Management Planning). Suitable erosion control measures are implemented while the mechanical vegetation treatment is ongoing and following project completion. Inspection and maintenance of implemented measures would ensure their function and effectiveness over their expected design period. The potential for accelerated erosion or other soil damage during or following mechanical treatments depends on climate, soil type, site conditions, and type of equipment and techniques used at the site. Erosion control measures are grouped into two general categories: structural measures to control and treat runoff and increase infiltration and nonstructural measures to increase ground cover. Many erosion control handbooks, technical guides, and commercial products are available. Both structural and nonstructural measures require onsite expertise to ensure proper design and implementation to conform to local site characteristics.</p>	<p>Same as previous BMP.</p>	<p>Throughout the NEPA planning process</p> <p>PDC S-1, S-2, S-3, S-4, A-5, A-9</p>	<p>High</p>	<p>High based on literature, experience and fact</p>	<p>Same as previous BMP.</p>

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
<p>Veg-3. Aquatic Management Zones</p>	<p>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in the AMZ.</p>	<p>Designation of an AMZ around and adjacent to waterbodies is a typical BMP to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Mechanical vegetation treatments are a tool that can be used within the AMZ to achieve a variety of resource-desired conditions and objectives when implemented with suitable measures to maintain riparian and aquatic ecosystem structure, function, and processes. Depending on site conditions and resource desired conditions and objectives, mechanical vegetation treatments in the AMZ could range from no activity or equipment exclusion to purposely using mechanical equipment to create desired disturbances or conditions. When treatments are to be used in the AMZ, a variety of measures can be employed to avoid, minimize, or mitigate soil disturbance, damage to the waterbody, loss of large woody debris recruitment, and shading, and impacts to floodplain function.</p>	<p>Same as previous BMP.</p>	<p>Throughout the NEPA planning process PDC A-1 through A-4, A-7 through A-10</p>	<p>Moderate to High</p>	<p>Moderate to High based on literature, experience and fact</p>	<p>Same as previous BMP.</p>
<p>Veg-4. Ground-Based Skidding and Yarding Operations</p>	<p>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.</p>	<p>Ground-based yarding systems include an array of equipment from horses, rubber-tired skidders, and bulldozers, to feller or bunchers, forwarders, and harvesters. Each method can compact soil and cause soil disturbance, though the amount of impact depends on the specific type of equipment used, the operator, unit design, and site conditions. Ground-based yarding systems can be designed and implemented to avoid, minimize, or mitigate potential adverse effects to soils, water quality, and riparian resources.</p>	<p>Same as previous BMP.</p>	<p>Throughout the NEPA planning process PDC S-1 through S-4, A-2 through A-4, A-9</p>	<p>Moderate to High</p>	<p>Moderate to High based on literature, experience and fact</p>	<p>Same as previous BMP.</p>

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
Veg-6. Landings	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of log landings.	Log landings, in general, are the site of intense activity, serving as the endpoint of yarding operations, the setup location of large equipment (such as skyline yarders), loading areas for log trucks, and fueling and maintenance locations for heavy equipment. To accommodate all this activity, landings tend to be large, and their soils generally become compacted, rutted, and disturbed much more than the rest of the project area. Thus, landings have a high probability of being a source of concentrated overland flow containing sediment and other pollutants.	Same as previous BMP.	Throughout the NEPA planning process PDC S-1, T-2	High	High based on literature, experience and fact	Same as previous BMP.
Veg-7. Winter Logging	Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from winter logging activities.	Winter logging on frozen or snow-covered ground is a common BMP in the colder regions of the country to avoid or minimize soil, watershed, riparian, and wetland impacts. Winter logging is not without risks of watershed effects. Unknowingly operating in wetland or riparian areas when the snow cover is inadequate can cause damage to soil and vegetation. Skidding or hauling on roads when the roadbed or the soil is not sufficiently frozen can cause soil compaction and rutting. Inadequate installation and maintenance of erosion controls before snowmelt and spring runoff can cause accelerated erosion and damage to roads.	Same as previous BMP.	Throughout the NEPA planning process PDC T-1	Moderate	High based on experience	Same as previous BMP.

BMP Title ¹	Objective	Explanation	Implementation and Responsibility	Project Details and PDC ²	Ability to Implement	Effectiveness	Monitoring
<p>Veg-8. Mechanical Site Treatment</p>	<p>Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling the introduction of sediment, nutrients, chemical, or other pollutants to waterbodies during mechanical site treatment.</p>	<p>Mechanical treatments are used to remove or reduce the amount of live and dead vegetation on a site to meet management objectives, such as site preparation for reforestation, fuel treatments to reduce fire hazards, wildlife habitat improvement, recreation access, utility corridor maintenance, and other activities that require removing vegetation from specified areas on a periodic and repeated basis. Mechanical treatments include cutting and piling; chipping or mulching; roller chopping or masticating using heavy equipment; and pushing over vegetation. Disturbance from mechanical site treatments can expose and compact soils, resulting in accelerated runoff and erosion.</p>	<p>Same as previous BMP.</p>	<p>Throughout the NEPA planning process PDC F-1, S-5, A-7</p>	<p>High</p>	<p>High based on experience</p>	<p>Same as previous BMP.</p>

Criteria for Rating “Ability to Implement” and BMP “Effectiveness”

These estimates are general, given the range of conditions throughout the Forest. More specific estimates are made at the project level when the specific BMPs are developed.

Ability to implement

Provides a qualitative estimate of the ability of the Forest Service to implement the BMP. The following index is used to rate the ability to implement as either High, Moderate or Low:

- **High:** Almost certain the BMP can be implemented as planned.
- **Moderate:** Greater than 75% certainty the BMP can be implemented as planned.
- **Low:** Less than 75% certainty the BMP can be implemented as planned.

Effectiveness

Provides a qualitative assessment of the expected effectiveness that the applied measure would have on preventing or reducing impacts on water quality and beneficial uses. The effectiveness of each BMP would be evaluated with an index that rates the effectiveness of each BMP as either High, Moderate, or Low.

- **High:** Practice is highly effective (90%) and one or more of the following types of documentation are available:
 - Literature/Research - must be applicable to area.
 - Administrative studies-local or within similar ecosystem.
 - Experience- judgment of an expert by education and/or experience.
 - Fact-obvious by reasoned (logical) response.
- **Moderate:** Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time; or logic indicates that this practice is highly effective, but there is little or no documentation to back it up.
- **Low:** Effectiveness unknown or unverified, and there is little or no documentation; **or** applied logic is uncertain in this case, **or** the practice is estimated to be less than 75% effective.

Effectiveness of BMPs are based on guidance from the National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide (USDA, 2012), models, literature, research, 25 years of monitoring implementation of projects on National Forest Lands in the Northwest and professional experience.

Models include:

- Water Erosion Prediction Project (WEPP) (USDA Forest Service, 1999).

Other Applicable BMP Software:

- Erosion Draw 4.0 (Erosion Control Standards and Construction Drawings – Salix Applied Earthcare, 2002)

Relevant research includes:

- Effectiveness Of Timber Harvest Practices For Controlling Sediment Related Water Quality Impacts (Rashin et. al. 2006).

Appendix 1: BMPs for Water Quality Protection

- Sediment Trapping by Streamside Management Zones of Various Widths after Forest Harvest and Site Preparation (Lakel and others, 2010).
- Reduction of soil erosion on forest roads (Burroughs and King, 1989)

Monitoring Includes:

- **BMP Monitoring Studies, Mt. Hood National Forest:** Various administrative monitoring studies were planned and implemented from 1997 through 2004. Monitoring for BMP implementation and effectiveness was performed on a wide variety of BMPs, ranging from riparian reserve protection to temporary road construction. Monitoring results are summarized in the Forest Plan Monitoring and Evaluation Reports for Fiscal Years 1997 through 2004. BMP monitoring completed during this period indicates that overall the BMPs monitored were prescribed and implemented as planned, resulting in adequate soil and water protection in most instances.

A Forest wide monitoring report was produced in 2014, summarizing BMP monitoring results from 2013 (USDA Forest Service 2014). “Of the 36 Core BMPs monitored for implementation on all projects, 89 percent were implemented fully as prescribed.” Twenty one Core BMPs specifically pertaining to ground based vegetation management were monitored and found to have 95 percent of the measures fully implemented. “Of the 38 Core BMPs monitored for effectiveness, 87 percent were fully effective at preventing or minimizing the effects of activities to aquatic and water resources as prescribed.” Twenty one Core BMPs specifically pertaining to ground based vegetation management were monitored and found to have 95 percent of the measures fully effective. The one measure that was not implemented (temporary road rehabilitation) “resulted in some observable surface erosion, but transport of sediment off-site to a water body had not occurred and because of its location there was no potential for it to do so.”

- **Best Management Practices Evaluation Program (BMPEP), 1992-2002 Monitoring Results (Draft Report). USDA Forest Service, Pacific Southwest Region, Pacific Southwest Region:** This draft report summarizes the results of the USDA Forest Service, Pacific Southwest Region, Best Management Practices Evaluation Program (BMPEP), from 1992 to 2002. Past monitoring completed as part of the BMPEP program has validated the effectiveness of BMPs in mitigating the effects of forest management activities on water quality.

Monitoring done during the Mount Hood National Forest administrative studies cited generally correlates well with the extensive monitoring done during the BMPEP monitoring program in the Pacific Southwest Region. .

Professional Experience - A small group of local professionals further refined assignments of “Ability to Implement” and “Effectiveness” ratings for PDC and BMP based on experience. This group consisted of a Soil Scientist with over 25 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest, a Fisheries Biologist with over 23 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest and a Hydrologist with over 25 years of professional experience in planning, monitoring and implementation of a variety of Forest Service projects in the Pacific Northwest. The resource professionals assessment of the ‘Ability to Implement’ and

Appendix 1: BMPs for Water Quality Protection

“Effectiveness” ratings for BMPs was validated with the area Forest Service Representative who has 25 years of experience administrating Forest Service Timber Sale Contracts.

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APPENDIX 2: Response to Comments

Comment Number	Comment	Response to Comment
1-1	Isn't there some way to utilize the CE process as framework to move forward with this project; it is a stewardship project of National Forest lands and the stewardship contracts.	Given the size of the project (greater than 250 acres) and the potential impacts to Federally listed threatened or endangered species or designated critical habitat, this project was not analyzed under a categorical exclusion.
3-1	Of the six sales that took place, three had been fully implemented according to the North Fork Mill Creek letter sent out by the Forest Service on February 6, 2014. What is meant by fully implemented? How do the fully implemented sales compare to the surrounding burned area? Did they in fact act as a fuel break? Is there evidence that those areas did the job they were intended to do?	The fuels reduction activities, including all required stewardship projects, have been completed for the three fully implemented sales (Appy, Buckskin & Clyde Stewardship Sales). The fuels reduction activities include thinning, mechanically reducing the fuel loadings, rehabilitating temporary roads, and precommercial thinning. The Government Flats Complex fire did not burn through the Appy, Buckskin or Clyde sale areas. When the fire burned through the already thinned stands in Roan, they did not function as an adequate fuel break given the size of completed operations and fire behavior. Only approximately 33% of the sale had been implemented.
3-2	Is there another way (besides salvage logging) to compensate the contract bids for the two units that were sold and burned?	The Forest Service could exercise the contractual provisions in the Integrated Resource Timber Contract (IRTC) to pay the timber purchasers for the timber currently under contract. Cancelling the stewardship sales was an alternative considered, but eliminated from detailed study (see EA Section 2.8). Only implementing the restoration thinning, and not the salvage logging, was analyzed in Alternative 3-Snag Retention Alternative.
3-3	The original desired future conditions were created pre-fire and did not take into account the value in early successional forests. Can that plan be reconsidered? What would it look like if it were?	The original desired future condition was reviewed as part of the changed condition analysis, described in EA Section 1.4, in order to validate that it was still applicable to the project given the change condition resulting from the Government Flats Complex fire. The interdisciplinary team used a flow chart (EA Figure 1-5) to address the question as to what should be considered in the changed condition analysis and what specific changes are needed to the original proposed action.

Comment Number	Comment	Response to Comment
3-4	Is it good for forest health to thin stands of healthy trees surrounding a severely burned area?	The impacts to forest health associated with thinning trees adjacent to high to moderate severity burn areas was fully disclosed in EA Section 3.1, Vegetation Resources. The analysis found that all conditions within the low severity and unburned areas in the fire perimeter, including the impacts associated with thinning, have not changed from the original analysis conducted in 2008. The original analysis found that the treatments would "improve species diversity, move the stand composition toward historical conditions, while improving the resilience to fire and improving forest health."
3-5	Conserving all available northern spotted owl (spotted owl) habitat should be a priority. While there is some evidence that spotted owls are capable of adapting to natural disturbances such as wildfire, Clark, Anthony, and Andrews (2013) found that in instances where past thinning, wildfire, and salvage logging were combined spotted owl site occupancy rates declined 64% over a three year period, compared to 25% site occupancy decrease in a study of an unburned area of the South Cascades. This means that there is already a higher rate of extinction in habitat that was severely burned, and salvage logging will only exacerbate the problem.	The impacts to Northern spotted owls, including the impacts associated with salvage logging, are fully analyzed and disclosed in Section EA 3.2.2.1. The impacts to Northern spotted owl critical habitat also are fully analyzed and disclosed in Section EA 3.2.2.2. It is estimated that these units would again provide dispersal habitat approximately 20 years after harvest, but it would be many decades before it would again provide suitable nesting habitat. The analysis also found that the removal of this habitat would not prevent owls from dispersing between territories since the impacts to dispersal habitat are considered at the landscape scale. These effects to spotted owls and critical for this revised project were included in a letter for reinitiation of consultation, which was submitted to the U.S. Fish and Wildlife Service in July 2014. Consultation will be completed prior to signing any decision for this project.
3-6	While reforestation addresses one option that might assist forests in a more rapid regeneration which would benefit owls, reforestation would also require roads to be reopened and rebuilt, as well as hazardous tree removal, which harms the overall landscape.	No temporary roads would be reopened or rebuilt to implement the reforestation treatments. Two temporary roads that are already constructed on-the-ground would be utilized to implement these treatments, if possible, prior to being rehabilitated. This has been clarified in EA Section 2.2.1 and EA Table 2-4. The only hazard trees that would be felled as part of the reforestation treatments are those that would be need to facilitate safe tree planting operations, according to all State of Oregon and Federal (OSHA) safety standards. These trees would be left on-the-ground and used as contour trees whenever possible. Also, these trees would be used to provide micro-siting for planted tree seedlings. The impacts associated with reforestation are fully analyzed and disclosed by each resource area in Chapter 3 of the EA.

Comment Number	Comment	Response to Comment
3-7	<p>Dwarf mistletoe has been a prevalent problem in the North Fork Mill Creek area. Stated as an issue of concern in the Purpose and Needs in 2008, it is also briefly addressed as a continuing issue in Alternative 2. However, dwarf mistletoe infected douglas fir trees have been found to be a favored nesting site for spotted owls in Washington and Oregon.</p>	<p>Dwarf mistletoe would be reduced as part of the restoration thinning treatments that were originally proposed in the North Fork Mill Creek Restoration Opportunities EA (2008) and carried forward in this project. Some trees with dwarf mistletoe would remain in the project area. If no action is taken, the continued infestation and mortality from dwarf mistletoe would continue adding to the already abundant fuel loadings and ladder fuels. By maintaining high tree competition, stems would continue to grow in height, but diameter growth would continually slow. These trees would become more dependent on neighboring trees for support. When trees develop in this manner, they are more likely to blow down in large groups or if drought conditions persist, which would also add to the existing fuel loading. The impacts to wildlife species of removing trees with dwarf mistletoe were fully analyzed and disclosed in the original North Fork Mill Creek Restoration Opportunities EA (2008) and incorporated by reference in this analysis.</p>
3-8	<p>Not only does reforestation require hazard tree removal and roads to be built in an area that is already going to be prone to heavy erosion due to loss of trees and shrubs, it also accelerates the growth of trees which reduces the amount of time the forest spends in the early successional phase. Many species require early successional forests for nesting and food sources, such as the whiteheaded woodpecker, lewis' woodpecker, pileated woodpecker, and the western bumblebee.</p>	<p>The creation of early seral habitat as a result of the fire is discussed in EA Section 3.1.2. Overall, 93% of the early seral habitat created by the fire would remain on the landscape because no action is proposed in those areas. Where planting would occur, early seral forests would still persist on the landscape until the establishment of the new cohort of trees. Under the No Action Alternative, early seral habitat could persist for a century or more in some places of moderate to high burn severity areas, depending on the success of natural regeneration. The beneficial use of the newly created early successional habitat as well as the impacts associated with reforestation are discussed for each wildlife species. See EA Section 3.2.4.1 for whiteheaded woodpecker, Section 3.2.4.2 for Lewis' woodpecker, Section 3.2.4.3 for Western bumblebee, and Section 3.2.6.2 for Pileated woodpecker. The analysis showed that reforestation was a beneficial impact to Pileated woodpeckers and did not have a negative impact to the other species. Also, see response to Comment #3-6.</p>

Comment Number	Comment	Response to Comment
3-9	Furthermore, the proposed trees to be planted are not species that are currently dominant species. The types of trees that Alternative 2 proposes to plant (western white pine, western larch, and ponderosa pine) tend to be more resistant to fire, mistletoe, and laminated root rot than douglas fir and stopping all of those natural processes is in the best interest of the timber industry. While douglas fir trees in the area tend to host dwarf mistletoe, I would argue that this area adapted to an abundance of such trees as shown by the relationship between spotted owls, douglas fir, and dwarf mistletoe. Changing the species composition of the forest changes established relationships between flora and fauna.	The reforestation would not eliminate all Douglas fir trees. The species selected are intended to return the stands to more historic disturbance regime with fire resistant species, as described in EA Section 3.1, Vegetation Resources. To ensure that seedlings are adapted to the area, local seed is used for all species in reforestation following guidelines for seed transfer rules (FSH 2409.26b,60) within seed zones. All reforestation activities would be with tree species that are commonly found in the present forest types and are fire resilient.
3-10	Reforestation is an action that would to get the forest back the Forest Service’s desired future condition. However, that plan was created prior to the Government Flats Complex Fire, and expecting the burned area of forest to become what the Forest Service planned for it prefire is unrealistic. The original desired future conditions also did not take into account the value in early successional forests.	See response to Comment #3-3 and Comment #3-8.
3-11	Thinning already burned stands of trees is incredibly harmful to the forest for several reasons. First, there is a great need for viable trees and other plants to reseed the area. Removing any trees from these areas removes trees that could help reseed, as well as harming any shrubs or herbaceous plants that are in the way.	Restoration thinning treatments are located on low severity to unburned areas. These thinning treatments would leave 30 to 60 percent canopy cover, as described in the North Fork Mill Creek Restoration Opportunities EA (2008). These units would be naturally regenerated by the remaining trees. The impacts associated with the Restoration Thinning treatments are fully analyzed and disclosed for each resource area in Chapter 3 of the EA.
3-12	Second, removing dead and dying trees limits the amount of downed wood and snags. Russell, Saab, Dudley, and Rotella (2006) found that salvage logging that removed over half the snags in an area contributed to a significant increase in erosion as well as shortening the longevity of remaining snags in an area. Many species depend on snags of a larger diameter, and these are the snags that would most likely be removed due to their commercial value and hazard status.	All alternatives remove snags from the landscape. Alternative 1 removes 12,500 snags, Alternative 2 removes 37,600 snags, and Alternative 3 removes 13,700 snags as described in Chapter 2 of the EA. The impacts of removing dead and dying trees on the amount of downed wood and snags are analyzed and disclosed in EA Section 3.2.3, Snag and Down Log Associated Species. The impacts to the species dependent on snags and downed wood are discussed throughout EA Section 3.2, Wildlife. The impacts of removing dead and dying trees on erosion and sedimentation is analyzed and disclosed in EA Section 3.3, Soil Productivity and EA Section 3.4, Water Quality.

Comment Number	Comment	Response to Comment
3-13	Third, creating the infrastructure necessary to remove trees causes further damage to an area that is already sensitive. There have been many studies that directly link additional erosion to roads in the forest (Ochterski, 2004). Wildfires also have been linked to increased levels of erosion (Parise & Cannon, 2012).	The action alternatives, including all connected actions, are fully analyzed in Chapter 3 of the EA. The connected actions include the use of 0.3 miles of temporary roads that are already constructed on-the-ground. Also, the vegetation treatment would utilize already disturbed areas as much as possible, including the use of available roads, skid trails existing from past activities and dozer line from the fire suppression activities. The impacts associated with these connected actions on erosion and sedimentation are disclosed in EA Section 3.3, Soil Productivity and EA Section 3.4, Water Quality. Overall, "the short-term sedimentation risk would be low under Alternative 2 and Alternative 3 due to existing road conditions, BMP [Best Management Practices] and PDC [Project Design Criteria]." Also, "under Alternative 2 and Alternative 3, the long-term sedimentation risk would be low due to BMP and PDC and recovery of effective ground cover."
3-14	Fourth, noise disturbance caused by machines can harm species attempting to use the area.	The impacts of the noise disturbance to Northern spotted owls are analyzed in EA Section 3.2.2.1. Overall, "the sound from project activities would not adversely affect the breeding behavior of spotted owls during their critical breeding period because no heavy equipment, chainsaw use, or helicopter use would occur within the 35 to 120 yard disruption distances. Some activities would take place during the critical nesting season between March 1 and July 15, but these activities would be beyond the disruption distance of an actively nesting spotted owl pair or beyond the disruption distance from the nest patch of a predicted site."

Comment Number	Comment	Response to Comment
4-1	<p>Will there be any comment on an EA? Is this still an HFRA project? Has there been any collaboration about salvage logging? Have the collaborative partners been informed about the adverse ecological effects of salvage logging? Have they discussed the implications of the newly designated critical habitat?</p>	<p>This Environmental Assessment (EA) is not being completed under the Healthy Forest Restoration Act authority; it is being completed under the new 218 Objection Regulations. As such, a final EA and draft Decision Notice & Finding of No Significant Impact will be released to begin the objection period. All of the original Mill Creek Collaborative Group members are on the mailing this for this project and were informed of the Notice & Comment period. No additional collaboration has been done for this project; however, the project does build on the previous collaborative work of the Mill Creek Collaborative Group as discussed in EA Section 1.71. Since additional collaborative group meetings were not held as part of this project, the group has not discussed effects association with salvage logging or the implications of the newly designated critical habitat. Both of these issues are fully disclosed and analyzed in Chapter 3 of the EA.</p>
4-2	<p>We continue to be concerned about the removal of the large trees infected with mistletoe. See our prior comments/objections attached. Mistletoe treatments are neither needed nor effective. Treating mistletoe requires killing and removal of the very thing we are trying to protect (large, old trees). In 2008, Oregon Wild objected to the removal of large trees, including those infected with mistletoe. They state, "The proposed action would remove large trees infected with mistletoe while failing to recognize that mistletoe-infected trees provide a variety of ecological benefits such as food, cover, and nesting platforms [for] birds and other small animals". Also, Oregon Wild asserts that mistletoe "will not be effectively removed by removing a few trees"; rather, a "stand replacing fire is the only way that mistletoe will likely ever be effectively removed".</p>	<p>See response to Comment #3-7. In addition, the response to the Objection filed in 2008 still applies to the restoration thinning portions of this project. In 2008, the Regional Forester found that the impacts to the Dwarf mistletoe had been adequately addressed in the EA. The objection response stated: "The Environmental Assessment (EA), on page 3-34, recognizes "that important interactions exist between dwarf mistletoe and animals (Hawksworth and Wiens, 1996). Birds, porcupines, squirrels and other animals eat seeds, shoots, and other parts of the plants. The dense branch masses ("witches brooms") caused by dwarf mistletoe provide cover and nesting sites for some birds and mammals. It is stated on page 3-35 of the EA that thinning in an infected stand does little to slow the infection, because the understory is already infected, and management options are few. It further states that infection is expected to continue to increase as long as the source of infection exists, and describes that fire was historically the mechanism that kept dwarf mistletoe in check. The effects analysis on page 3-43 describes a reduction in dwarf mistletoe populations and a decrease in the rate of spread by girdling infected large overstory trees."</p>

Comment Number	Comment	Response to Comment
4-3	Salvage logging is ecologically harmful and has no place in critical habitat where the goal is to protect and restore complex forest habitat, especially things that take a long time to develop such as large trees and snags.	The impacts of salvage logging on Northern spotted owl critical habitat is fully analyzed and disclosed in EA Section 3.2.2.2. The analysis found that "the life history needs of the spotted owl would continue to be met at the subunit, unit, and range-wide scale and these CH [critical habitat] units would continue to function as demographic support to the overall population, as well as providing connectivity between other CH units and subunits" for Alternative 2. See response to Comment #3-5 and Comment #3-12 for more information.
4-4	We have concerns about changing this project based on changed circumstances. If any change is warranted, the FS should cancel the contract and let succession proceed without delay or intervention, or, in the alternative, modify the contract to remove fewer trees, build less road, and generally proceed more cautiously in this fire-affected landscape. "Existing contractual obligations" should be reviewed and reconsidered in light of the fact that the fire has just done a lot of "ecological work" that logging was intended to accomplish (e.g. stand density reduction, reduce mistletoe hosts).	Cancelling the stewardship sales was an alternative considered, but eliminated from detailed study. EA Section 2.8 was added in response to comments received. Only implementing the restoration thinning, and not the salvage logging, was analyzed in Alternative 3-Snag Retention Alternative. See response to Comment #3-3 for explanation of the changed condition analysis.
4-5	Jerry Franklin and other scientists make clear that salvage logging is not restoration, but that if logging does occur, the same trees should be removed after a fire as before the fire. In other words, it may be OK to remove small trees that have grown in as a result of fire exclusion (in dry forest types), but it remains important to retain ALL of the large snags and live trees.	Alternative 3-Snag Retention was designed to minimize the number of snags removed from the landscape in order to follow the recommendations resulting from the DecAID analysis as much as possible while addressing the safety hazards along the roads (see Section 3.2, Wildlife for more information). Snags would only be removed to meet health and safety objectives, including the Occupational Safety and Health Administration (OSHA) standards. As such, no thinning would take place on the moderate to high severity burn areas. Also, EA Section 3.2.3, Snag and Down Log Associated Species discloses and analyzes the effects of removing large snags, including the impacts associated to snag-dependent species.

Comment Number	Comment	Response to Comment
4-6	Salvage logging and replanting is also contrary to the goal of fire hazard reduction because it will tend to create continuous dense fuel conditions.	Both EA Section 3.1, Vegetation Resources and EA Section 3.10 Fuels Management and Air Quality analyze the effects of not taking action (no salvage logging or replanting) as well as the impacts of salvage logging and replanting as compared to fuel loading. For Alternative 1, the EA Section 3.1 states: "with no vegetation treatments the stand would remain in dense overstocked conditions and maintain high fuel loadings and ladder fuels that put the stands at high risk for stand replacing events." Also, the EA discloses that "harvest activities under the Alternatives 2 and 3 would increase fuel loading. Each unit would have a field reconnaissance after harvest activities have been completed to determine fuel loadings. If the fuels inventories indicate that the fuel loading is in excess of 10 to 26.7 tons/acre, machine piling and/or handpiling would be the preferred method of reducing slash concentrations."
4-7	Please do not look at hazard tree removal as an excuse to put more logs on trucks. Felling and leaving large trees should be the first option, especially in reserves. Roadside hazard tree removal should be limited to high-traffic roads, and should be limited to actual imminent hazard trees that have a high chance of falling on the road.	The Hazard Tree treatments would remove any tree that is classified as a hazard tree and that is predicted to strike or damage the road up to 200-feet from either side of the center line of the road. All hazard (danger) trees evaluation and identification must follow the "Field Guide for Danger Tree Identification and Response" (Toupin et al. 2008). No trees would be removed from Riparian Reserves. On lands within Riparian Reserves (Units 87, 106A, 107A, and 108A), the hazard trees would be felled and left on-the-ground in order to comply with the Northwest Forest Plan. Also, trees needed for soil stability or soil productivity would be felled and left on site.
4-8	Replanting conifers will likely harm spotted owl recovery because it will truncate important successional pathways and reduce the complexity of the future stands that develop after fire. If replanting must be done, the FS should plant diverse species, at low density, and in a patchy configuration. Lots of complex woody structure should be retained.	See response to Comment #3-8 and Comment #3-9.

Comment Number	Comment	Response to Comment
4-9	Spotted owls are known to often forage (and sometimes nest) in fire-affected habitat areas. It is also known that spotted owls are less likely to use fire-affected forests that have been salvage logged. Since this project is in critical habitat for the northern spotted owl, the FS should do more to protect and retain habitat elements including all live trees, all large damaged trees and snags, and complex forest attributes that develop naturally after fire.	The EA Section 3.2, Wildlife incorporates into the effects analysis the study showing that Northern spotted owls are less likely to use habitat that is burned and salvage logged. The EA states: "Results from three radio-telemetry studies of spotted owls in post-fire landscapes indicate that spotted owls use forest stands that have been burned, but generally do not use stands that have been burned and logged. California spotted owls tracked 4 years post-fire in burned, unlogged stands had 30 percent of their nonbreeding-season roost locations within the fire's perimeter (Bond et al. 2010); selected low-severity burned forests for roosting during the breeding season (Bond et al. 2009); and selected low-, medium-, and high-severity burned forests for foraging within 1.5 km of the nest or roost site, with the strongest selection for high-severity burned forest (Bond et al. 2009). However, for spotted owls in stands that had been harvested post-fire, infrequent foraging in stands burned with low-, medium-, and high-severity fires was restricted to areas with live trees such as those in riparian areas (Clark 2007), and use shifted away from burned stands during 3 years post-fire (King et al. 1997)." The EA continues on to state: "Based on these studies and because there is sufficient suitable habitat adjacent to the burned area to support a nesting pair of owls, the removal of post fire habitat would reduce available foraging on 280 acres from Restoration Thin treatments and Hazard Tree treatments." See response to Comment #3-5 for more information.
4-10	Since large snags take a very long time to grow and recruit, salvage logging should retain all large snags.	See response to Comment #4-5.
4-11	Any salvage logging proposal must also carefully disclose and balance all detrimental effects and alleged beneficial effects of salvage logging and connected actions like road building.	EA Section 2.2, Revised Proposed Action discloses the details associated with the Restoration Thinning treatments and all connected actions associated with salvage logging. EA Chapter 3 discloses the impacts associated with these actions by resource area.

Comment Number	Comment	Response to Comment
4-12	The agency often compares their proposed snag retention levels to the <i>average</i> number of snags across the landscape, without recognizing that after a significant disturbance such as fire “the rate of input [of snags] to the CWD pool is 100-1000x the rate expected for an unburned steady-state forest (Harmon et al 1986). Even afterwards, in the next 5 or 6 years, the rate of input is still 5 or 10 or even 100 times that steady-state rate.”	The analysis contained in EA Section 3.2.3 details the current condition and number of snags created by the fire. This analysis follows the methodology outlined in the DecAID Advisor. Overall, "the Mill Creek Watershed as a whole was analyzed for historic and current snag levels because stand level analyses do not provide a meaningful measure to snag and down wood dependent species. Habitats created by fire represent a small percentage of landscapes, and therefore, the analysis for fire created dead wood habitats need to be conducted on a scale larger than just the burned area. Impacts to snags and down wood in proposed treatment units would be compared to unharvested stands which represent historic conditions. To best provide for the largest number of snag dependent species, management objectives should mimic natural conditions and the distribution of unharvested areas across the landscape."
5-1	After a fire, the Forest Service has an option to reimburse companies if the proposed work does not meet the original goal of the project.	See response to Comment #4-4.
5-2	In this case the fire thinned the forest, reduced fire risk and created new habitat.	In order to assess the changed conditions to the landscape resulting from the Government Flats Complex Fire, the Interdisciplinary Team used a flow chart (EA Figure 1-5) based on the Adaptive Management Model from Forest Service Handbook (FSH) 1909.12, Chapter 20. This flow chart helps to address the question as to what should be considered in a changed condition analysis and what specific changes are needed to the original proposed action. Chapter 3 of the EA includes a Changed Condition description of the impacts from the fire, as well as analysis of Alternative 1-No Action Alternative for each resource area.
5-3	Current science asserts that salvage logging has NO ecological benefits, and in fact removes legacy features (such as standing dead trees) that promote species diversity in burned areas.	See response to Comment #4-11.

Comment Number	Comment	Response to Comment
5-4	Ecologically unjustifiable salvage logging in post-fire habitat will have negative impacts on Northern spotted owls and Lewis' woodpecker.	The impacts to wildlife species from salvage logging are fully disclosed and analyzed in EA Section 3.2, Wildlife Species. See response to Comment #3-5 and Comment #4-9 for summary of effects to Northern spotted owls. Overall, "Lewis' woodpeckers do not appear to rely on these high density patches since this species is most commonly found in open woodlands and the most important breeding habitat is open canopies with large diameter dead or dying trees. Nesting habitat would be provided since high density patches of snags would remain in the hazard tree units and untreated burned areas which are adjacent to more open stands that will provide the necessary foraging habitat." See EA Section 3.2.2.1 for Northern spotted owls, EA Section 3.2.2.2. for Northern spotted owl critical habitat, and EA Section 3.2.4.2 for Lewis' woodpecker for more information.
10-1	Also, by leaving the land undisturbed, there is less erosion which allows for faster recovery for both the land and the wild animals who rely on it.	See response to Comment #3-13.
10-2	Are our forests covered by insurance? Or would paying the reimbursement be cheaper in the long run?	See response to Comment #4-4.
11-1	The harvesting of the burnt trees is likewise disturbing nature as the burnt trees become homes for insects that birds such as woodpeckers live off of.	The impacts to wildlife species from salvage logging are fully disclosed and analyzed in EA Section 3.2, Wildlife Species. Overall, "While snags within this habitat type are below historic levels at the watershed and at the Forest scale, white-headed woodpeckers do not appear to rely on these high density patches and may rely more on the presence of large ponderosa pine. Based on the average home range size within the fragmented habitat, and the amount of suitable habitat within the analysis area, the proposed project would not impact more than one territory." For more information, see response to Comment #5-4, EA Section 2.4.1 for White-headed Woodpecker and EA Section 3.2.4.2 for Lewis' woodpecker.

Comment Number	Comment	Response to Comment
11-2	Fires also trigger all sorts of things such as seeds that have lain dormant for years awaiting the newly found sunlight. Logging equipment by it's very destructive nature prevents nature's natural healing by destroying these new plants.	The impacts associated to natural regeneration are fully disclosed and analyzed in EA Section 3.1, Vegetation Resources. "Due to the early establishment of competing brush, even if seed is disseminated across the moderate and high burn severity areas in years following the fire, tree seedlings would be at a competitive disadvantage. Without active reforestation, desirable conifers have a small window for establishment amid rapidly growing shrubs (Shatford et al. 2007, Sessions et al. 2004)." The EA also discloses the impacts of ground disturbance associated with logging operations and tree removal on the natural regeneration.
11-3	By it's very nature logging and the subsequent replantings replace diversity with a monoculture. From a timber company perspective this might seem to be a good thing. But from the view of nature I'm not so sure.	See response to Comment #3-9.
11-4	By preventing nature from doing what it does we have no idea how much we may be losing. It might be destroying the habitat of bees that pollinate plants by eliminating the small flowering bushes that regenerate quickly after a fire as their root systems survive though the above ground plant is burnt.	The impacts of salvage logging on Western bumblebees are fully disclosed and analyzed in EA Section 3.2.4.3. Overall, "the total number of acres impacted would not exceed 107 acres since most of the activities are within heavily timbered units or within the moderate to high severity burned areas and do not currently provide foraging habitat or nest sites. This impact represents less than one percent of the Forest Service owned lands within the Mill Creek Watershed."
13-1	The current science asserts (and the Forest Service acknowledges) that there are no ecological benefits to salvage logging (Hutto 2006, Noss et al. 2006), but the Forest Service asserts there are "valid socio-economic reasons for conducting post-disturbance logging, such as economic recovery of potential lost value". <i>PA at 2-29</i> . Bark believes that the ecological damages imposed by the salvage component of this project vastly outweigh the economic gains . . .	The activities proposed for the North Fork Mill Creek Revised project and analyzed in the EA were designed to balance both the ecological and economic concerns presented by the post-fire conditions in the planning area, as described in EA Section 2.6, Scientific Controversy for Salvage Logging. The action alternatives analyzed in detail were designed to look at this balance. Alternative 2-Revised Proposed Action was designed to fully meet the purpose and need for action "to meet the existing contractual and economic obligations within the existing Roan and Eques stewardship sales." While Alternative 3-Snag Retention was designed to minimize the number of snags removed from the landscape based on the recommendations resulting from the DecAID analysis (see EA Section 3.2, Wildlife for more information on DecAID).

Comment Number	Comment	Response to Comment
13-2	Since the fire, the high to moderate burn severity areas have been converted to an early seral forest habitat; habitat that is well recognized for providing a multitude of beneficial functions and processes, such as complex food webs, nutrient cycling, and high structural complexity (Noss et al. 2006, Swanson et al. 2010).	See response to Comment #3-8.
13-3	Scientific evidence regarding spotted owls in northwestern California and in Oregon found that stable or positive trends in survival and reproduction could be correlated with substantial patches structures associated with high-intensity fires in their territories because these types of structures (native shrubs, snags, and large downed logs) are suitable for a key owl prey species, the Dusky-footed Woodrat (Franklin et al. 2000, Olson et al. 2004).	See response to Comment #3-5, Comment #4-3 and Comment #4-9.
13-4	The woodpecker [White-headed woodpeckers and Lewis' woodpeckers] is severely threatened by salvage logging of burned forests, which provide the snags the birds need to survive.	See response to Comment #3-8, Comment #5-4 and Comment #11-1.
13-5	And approximately 20 percent of all bird species in the Pacific Northwest depend on snags for nesting and feeding; the abundance of snag-dependent birds is correlated with the density of suitable snags (Boleyn, et. al., 2002). These forest structures would most likely be removed due to their commercial value and safety hazards.	See response to Comment #3-12, Comment #4-5 and Comment #4-12.
13-6	Due to the ground impacts of salvage logging, there would also be a reduction in the number of natural seedlings where this would occur (Donato et al. 2006). Inclusion of the “moderate to high severity burn” units will put the project area at a deficit when it comes to habitat and essential provisions for regrowth.	EA Section 3.1, Vegetation Resource and EA Section 3.3, Soil Productivity analyze the impacts of salvage logging on the soil conditions and natural reforestation. "Due to the ground impacts of salvage logging, there may be a reduction in the number of natural seedlings where activities occur (Donato et al. 2006). The use of ground-based machinery would disturb established vegetation mostly on implemented skid trails and landings. However, soil disturbance would be limited within the proposed treatment units due to the Project Design Criteria (see EA Section 3.3). Salvage is planned to occur in as quickly as possible following the fire, so any existing natural regeneration would not be well established and planting would occur approximately up to four years following salvage activities. Seedlings would be around the same age or older than the natural regeneration, giving the seedlings a good chance of growing above the competition of non-tree vegetation." Further, EA Section 3.2, Wildlife analyze the impacts on and availability of habitat following salvage logging.

Comment Number	Comment	Response to Comment
13-7	<p>The Forest Service's Integrated Service Contract (IRC), which has standard language that seems to be included in every timber sale contract Mt. Hood National Forest enters into, provides ample room for contract modification based on a number of considerations, including changed circumstances.</p>	<p>Provision C.1.3.3 of the Integrated Resource Timber Contract (IRTC) covers Damage by Catastrophe. Catastrophic Damage as used in an IRTC "is major change or damage to Included Timber on Contract Area, to Contract Area, to access to Contract Area, or a combination thereof: (a) Caused by forces, or a combination of forces, beyond control of Contractor, occurring within a 12-month period, including, but not limited to, wind, flood, earthquake, landslide, fire, forest pest epidemic, or other major natural phenomenon and (b) Affecting the value of any trees or products meeting Utilization Standards, within Contract Area and estimated to total either: (i) More than half of the estimated timber volume stated in A.2 or (ii) More than two hundred thousand cubic feet (2,000 CCF) or equivalent." This contract provision is the foundation for the purpose and need for action for this EA. Provision I.3.1 of the IRTC covers Changed Conditions. Changed Conditions under an IRTC are defined as: "When it is agreed that the completion of certain work or other requirements hereunder would no longer serve the purpose intended because of substantial change in the physical conditions of Contract Area or Included Timber since the date of this contract, the requirements shall be waived in writing. The estimated cost of such waived work or other requirement shall be charged to Integrated Resource Account." This provision is used to cover changes in law, regulation or policy (e.g., changing of a species list under the Endangered Species Act), rather than a catastrophic act which falls under provision C.1.3.3.</p>

Comment Number	Comment	Response to Comment
13-8	<p>The ability of the Mt. Hood National Forest to modify contracts was discussed at length in <i>Oregon Natural Res. Council Action v. U.S. Forest Serv.</i>, regarding six timber sales in the Mt. Hood and Willamette National Forests. See 445 F. Supp. 2d 1211, 1219 -20 (D. Or. 2006). . . . The Court did not read the contracts or the relevant case law and regulations to impose such constraints on the Forest Service. For example, the Borg Timber Sale contract specifies that the Forest Service may terminate the contract upon a determination that “continuation of all or part of this contract would ... [c]ause serious environmental degradation or resource damage.” This clause derives from the Forest Service regulation which provides that timber sale contracts may be cancelled upon a determination “that operations thereunder would result in serious environmental degradation or resource damage.” 445 F. Supp. 2d 1211, 1220, citing 36 C.F.R. § 223.116(a)(5); see also <i>City of Tenakee Springs v. Clough</i>, 915 F.2d 1308, 1312 (9th Cir.1990) (acknowledging Forest Service's authority to cancel timber contracts).</p>	<p>This court case dealt with the implementation of the 2001 Survey and Manage Record of Decision, rather than the implementation of an IRTC. In this project, under all action alternatives, all relevant law, regulation and policy are being met. This project is consistent with the National Forest Management Act, including the Forest Plan and Northwest Forest Plan, and Endangered Species Act as described in the draft Decision Notice.</p>
13-9	<p>The contract and regulations provide for reasonable compensation to the private party for cancellation in these circumstances. <i>Tenakee Springs</i>, 915 F.2d at 1312; 36 C.F.R. § 223.116(a)(5). The contract and regulations also allow for modification of timber contracts, with compensation, to prevent environmental damage. <i>Tenakee Springs</i>, 915 F.2d at 1312; 36 C.F.R. § 223.113. These are terms included in the IRC. See IRC, Contract 2400-13, I.3.3(a)(i).</p>	<p>IRTC Provision I.3.3 (i) states that a contract may be modified or cancelled "To prevent environmental degradation or resource damage, including, but not limited to, harm to habitat, plants, animals, cultural resources, or cave resources." The impacts associated with this project have been fully analyzed and disclosed in Chapter 3 of the EA as well as in the draft Finding of No Significant Impact. The analysis did not reveal any significant environmental damage to implementing the project as designed, including all Best Management Practices and Project Design Criteria. See response to Comment #4-4 for discussion on cancelling the stewardship contracts.</p>
13-10	<p>Moreover, in addition to the Forest Service's ability to modify contracts to prevent serious environmental degradation, the IRC explicitly allows for contract modification or termination based on changed circumstances or catastrophe. See IRC, Contract 2400-13, I.2.2; I.3.1-2.</p>	<p>See response to Comment #4-4, Comment #13-7, and Comment #13-9.</p>

Comment Number	Comment	Response to Comment
13-11	Thus, there is little to no legal basis for MHNH to suggest it <i>has to</i> offer a commercial salvage component of this sale.	IRTC states: "Forest Service agrees to sell and permit Contractor to cut and remove Included Timber and Contractor Agrees to purchase, cut and remove Included Timber and complete required stewardship projects." The remainder of the contract is the terms and conditions to meet this statement. The legal basis is the IRTC which needs to be implemented in its entirety, as described above. Specifically, see Provisions C.1.3.3 (see response to Comment #13-7), D.3.2 Rate Redetermination after Catastrophic Damage, I.2.2 Termination for Catastrophe, and I.3.2 Modification for Catastrophe. IRTC Provision I.3.2. requires the Forest Service, in consultation with the Contractor, to review "Any areas of catastrophe-affected live and dead timber meeting Utilization Standards and having undesignated timber so situated that it should be logged with the designated timber." An environmental analysis is needed to determine the adjustments, if any, that are required under the IRTC.
13-12	Alternative 3 is designed to actually follow recommendations of DecAID analysis, with no thinning in moderate to high severity burn areas.	Alternative 3-Snag Retention was designed to minimize the number of snags removed from the landscape in order to follow the recommendations resulting from the DecAID analysis as much as possible while addressing the safety hazards along the roads. EA Section 3.2.3, Snag and Down Log Associated Species describes the DecAID recommendations in relation to Alternative 3. See response to Comment 4-5 for more information.
13-13	Since large snags are required for the habitat requirements of Westside indicator species but are in short supply due to past and present management the Forest Service should exclude stands with high snag densities from harvest and apply buffers on key snags. Bark requests that the Forest Service pursue an alternative which follows recommendations of their DecAID analysis for the NFMCR project area.	Alternative 1-No Action Alternative fully follows the recommendations of the DecAID analysis, as described in EA Section 3.2.3. "There would be a short-term increase in snag numbers as additional trees die from fire damage. Over the long-term, the number of snags would decrease creating a gap in time when little snag habitat would exist (primarily in stand replacement areas) because there are few green trees of sufficient size to provide recruitment." "Under the No Action alternative, the 80 percent tolerance level would be met for this WHT [wildlife habitat type]."

Comment Number	Comment	Response to Comment
13-14	How well did the occurrence of low severity fire entering these units already accomplish this purpose and need? There has obviously been some natural thinning as a result of the fire, which created quarter acre to two acre openings, in conjunction with existing openings from root rot pockets and beetle kills. The agency agrees that creating artificial gaps in these areas is now unneeded due to fire activity within the units. The agency also asserts "no increase to fire hazard" (PA at 2-33) as a result of dropping these units.	The information in the comparison of alternatives is being misinterpreted. EA Table 2-5 has been clarified. Under Alternative 1, "No canopy fuels would be removed. Fire hazard from canopy fuels would not be reduced and there would be no reduction in the fire rate of spread." See response to Comment #3-3 and Comment #5-2 for more information on the changed conditions.
13-15	Under the NFMCR proposal, the agency asserts that mortality from Dwarf mistletoe would continue in unburned to low severity burn areas, adding to fuel loadings. Alternative 2 would remove large, Dwarf mistletoe infected trees from these areas. Through this proposal, the agency seems to undervalue the variety of ecological benefits of mistletoe such as food, cover, and nesting platforms birds and other small animals (Watson, 2001). . . . Mistletoe is not a problem for forest health, it only a problem if the agency is just managing for timber volume in the Mill Creek area. Mistletoe is native in the NFMCR project area and will not be effectively removed by thinning.	See response to Comment #3-7, Comment #3-9 and Comment #4-2.
13-16	. . . The fuel reduction units that contained untreated slash burned severely. The movement of fuel from trees to the ground during logging operations has the potential to increase fire severity, as well as the fact that these treatments open up the forest to greater drying and wind penetration.	The timber purchaser was actively working in the Roan Stewardship Sale prior to the Government Flats Complex fire. The purchaser was evacuated from the stewardship sale due to fire activity. The slash piles in these units were freshly created and met the requirements specified in the original North Fork Mill Creek Restoration Opportunities EA (2008). See response to Comment #3-1 for more information on the impact to the other sales analyzed in the 2008 EA.
13-17	We would encourage the Forest Service to consider a two-year slash treatment deadline as part of this project.	The slash piles are required to follow the Project Design Criteria F-1 to F-3 (see EA Section 2.4). These PDC do not include a time frame for treatment.

Comment Number	Comment	Response to Comment
13-18	Forage would increase, but there would not be enough cover for it to be fully utilized by deer and elk. Since the goal for deer and elk winter range is to provide high quality deer and elk habitat for use during most winters, this type of treatment seems inconsistent with the agency’s own desired conditions for this area. Please address this in the EA.	The impacts to deer and elk, including impacts to cover and winter range, are fully disclosed and analyzed in EA Section 3.2.6.1, Mule Deer and Elk. Overall, "the loss of thermal cover in the proposed units would alter the distribution and use of habitat by deer and elk in the project area. During the summer, fewer animals would be expected to use the area since it would be relatively open. Forage would increase, but would not occur close enough to cover for it to be fully utilized by deer and elk. Most of the lost thermal cover characteristics in the stands should be regained in the next 40 to 50 years."
13-19	Despite the lack of knowledge about how many Northern spotted owls are present in the area, and where their nest sites are, the PA claims that the NFMCR “may affect, and is likely to adversely affect spotted owls”. . . . These are stark assumptions, and ones in which the agency should be more upfront about their lack of data. . . . Given the low probability of detection in one year, Bark recommends at least one year of surveys be used to determine site occupancy before management that could be detrimental to the spotted owl is undertaken in potentially occupied habitat. (Lee et. al., 2012). Until this data exists, the 70 acres of dispersal habitat and 15 acres of suitable habitat should be dropped from this project.	The analysis followed the protocol for Northern spotted owl surveys, as described in EA Section 3.2.2.1. "Since there are few recent surveys for spotted owls that show the locations of active nest sites on the Forest, historical spotted owl information is used. Historical nest sites are used because studies show that nests are used for many years and when a site has been found to be unoccupied during surveys, it can be subsequently utilized by a different pair of owls years later. In addition to historic sites, predicted nest sites are used to analyze the effects of the proposed project on spotted owls. The predicted sites are used for areas with incomplete or no spotted owl survey information. The purpose of using predicted sites is to estimate spotted owl numbers and distribution within unsurveyed habitat for purposes of assessing the effects of a proposed project on spotted owls. These predicted sites are based on factors known to influence the carrying capacity of a given area for spotted owls." The impacts to Northern spotted owl dispersal and suitable habitat is analyzed in EA Sections 3.2.2.1 and EA Section 3.2.2.2.
13-20	We would like to point out that these types of major disturbances are vital to creating the complex landscapes that exist in forest ecosystems, and that naturally created, extended early-successional habitat in this area is not necessarily a bad thing. Additionally, the type of species the Forest Service claims will benefit from reforestation (brown creepers and other snag-dependent species) will not benefit in the short-term from their habitats being removed as “hazard-trees”.	See response to Comment #3-8 and Comment #3-9.

Comment Number	Comment	Response to Comment
13-21	<p>During discussions regarding the Lava Timber Sale, the Stew Crew recommended the Forest Service look to the burn to see how the huckleberries were responding and whether there were better huckleberry picking opportunities in the burn area. We request that the EA investigate whether this habitat was made more locally available with the recent fire. As indigenous communities often used fire as the tool for managing huckleberries, it makes sense to start here before trying to create habitat elsewhere that may only exist until the canopy closes again.</p>	<p>The overall purposes of this project are to meet the existing contractual and economic obligations within the existing Roan and Eques stewardship sales, to conduct a changed condition analysis to determine if changes to the original decision are required, and to improve safety on National Forest System roads within the burned area of the Government Flats Complex Fire (see EA Section 1.3). As such, huckleberry enhancement is outside the scope of this EA.</p>
13-22	<p>Included in the reforestation areas are 91 acres of the stewardship projects (Roan and Eques) which were actively thinned before the fire. Please address the reasoning for this activity in the EA. It perplexes us that reforestation is warranted in areas which have recently been managed with thinned forest as a goal.</p>	<p>These acres have high to moderate burn severity resulting from the Government Flats Complex Fire. EA Section 3.1, Vegetation Resources discusses the need to plant these areas: "In the moderate to high severity burn areas, regeneration could be established from seed from adjacent stands, seed from the surviving large trees, existing cone/seed crop at the time of the fire, or dissemination by other means such as wind. While some seed sources still exist on the edges of moderate and high burn severity areas, natural regeneration potential is likely to be hindered by the aggressive establishment of brush and other non-tree vegetation. In areas where the seed source was lost, little to no natural regeneration is expected. Natural tree regeneration is expected to consist mostly of grand fir, which could persist under the shrub layer for decades, with some Douglas-fir, western larch, and ponderosa pine. Artificial regeneration of ponderosa pine, western white pine, and western larch from local seed sources would move the forest towards a mixed conifer forest." All high to moderate burn severity areas would be reforested as part of this project under both Alternatives 2 and 3.</p>
13-23	<p>Bark believes that the best way to reduce the risk of future fire in the project area is to remove roads which provide pathways to human-caused ignitions, and requests that the Forest Service assess its ability to reduce road density within this area through decommissioning.</p>	<p>The overall purposes of this project are to meet the existing contractual and economic obligations within the existing Roan and Eques stewardship sales, to conduct a changed condition analysis to determine if changes to the original decision are required, and to improve safety on National Forest System roads within the burned area of the Government Flats Complex Fire (see EA Section 1.3). As such, road decommissioning is outside the scope of this EA.</p>

Comment Number	Comment	Response to Comment
13-24	To the best of Bark's knowledge (specifically in regards to timber sales), "project level BMPs implementation and effectiveness monitoring as per the National BMP Monitoring Protocol" has not occurred on Mt. Hood National Forest since 2004, and there is absolutely no assurance that it will happen for the NFMCR Timber Sale.	A Water Quality Best Management Practices (BMP) Monitoring Report for Fiscal Year 2013 was completed in 2014 and has been incorporated in EA Section 2.9.3 and EA Section 3.4. Also, EA Section 2.9.3 outlines the monitoring requirements for BMPs: "BMP monitoring may be conducted on projects after treatment is complete. . . . Projects to monitor or specific monitoring sites are selected in a manner that results in objective and representative data on BMP implementation and effectiveness. Often, a random or systematic random selection procedure is used to choose monitoring locations across a forest or grassland where specific activities or BMPs are targeted. This project would go into a pool of similar projects to be selected for project level BMPs implementation and effectiveness monitoring as per the National BMP Monitoring Protocol."
13-25	This is especially disconcerting since the PA claims that monitoring of the logging activity may need to occur daily, or more due to the complex soil types in the area. The PA also states that "feller bunchers, track mounted shears, etc., would be restricted to skid trails once soil moistures are such that even one or two trips are causing detrimental soil damage" <i>PA at 2-22</i> . Again, we cannot feel confident that this type of activity will be implemented if we are not first confident that the on-site monitoring will occur.	As outlined in EA Section 2.9.3, the monitoring would occur through the Sale Administration process. "During implementation, the Sale Administrator in conjunction with the Forest Service Representative and Contracting Officer are responsible to ensure that the contract is administered properly throughout all stages of implementation. The sale administration team monitors compliance with the contract which contains the provision for resource protection, including but not limited to: seasonal restrictions, snags and coarse woody debris retention, stream protection, erosion prevention, soil protection, road closure and protection of historical sites. The Sale Administrator records observations demonstrating compliance as well as any concerns/issues on inspection reports that are signed by both the Forest Service and Purchaser Representative. The inspection reports would also document any resolutions that have been identified. As needed during the implementation process, the sale administration team may request a resource specialist or Line Officer to come for a field visit to discuss a resource issue that has been identified. Also, a resource specialist may visit a sale without a formal request to conduct monitoring and to make sure that the project is being implemented as directed by the NEPA decision."
14-1	Restoration thinning was ineffective in limiting fire spread in units 52, 58, and 13. In parts of these units, leave trees were consumed by the fire. One expects this will result in quicker establishment of brush.	See response to Comment #13-22.

Comment Number	Comment	Response to Comment
14-2	Heavily burned areas have considerable shade provided by residual trees. The shade, if not removed by logging, will slow brush development and buffer young trees from weather extremes.	See response to Comment #2-3, Comment #11-2 and Comment #13-22.
14-3	Brush, slash from previous logging, and dense vegetation because of fire exclusion will make the area susceptible to repeated burns.	See response to Comment #13-17.
14-4	Contracts which sold logging rights to timber damaged by the Government Flats Fire should be honored. However, no more restoration thinning contracts should be let without a long range plan which extends the rotation and gives up the idea of intensive timber management.	The overall purposes of this project are to meet the existing contractual and economic obligations within the existing Roan and Eques stewardship sales, as discussed in EA Section 1-3. Both sales were awarded prior to the Government Flats Complex fire. No other stewardship contracts are proposed as part of this project.
14-5	Planting should be limited to areas where fire resistant species have a chance of outgrowing the brush competition. Tree spacing should be farther apart than standard distances. Otherwise let natural regeneration do the job.	See response to Comment #2-3, Comment #11-2 and Comment #13-22.
15-1	The Mill Creek burn area though it has been logged before, is very important for various bird species, some of them threatened or endangered. I urge for the Forest Service to take no action on the timber sale, and to take every measure to protect a legacy of old, rich forests and maximum habitat space for plants and animals.	Under the No Action Alternative, the only action that would take place is the felling of hazard trees (also known as danger trees) that pose an imminent threat to human safety or infrastructure. The goal for felling these hazard trees would be to re-open the road for administrative and public use. See EA Section 3.1, No Action Alternative for more information. See response to Comment #3-5, Comment #5-4 and Comment #11-1 for information on wildlife species.
15-2	I feel that this timber sales (Jazz) will, along with the salvage logging, affect the sensitive post-fire habitat will have negative impacts to species like Northern spotted owls, Lewis' woodpeckers and white-headed woodpeckers.	See response to Comments #3-5, Comment #3-7, Comment #3-8, Comment #3-14, Comment #4-3, Comment #4-9, Comment #5-4 and Comment #11-1.