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Environmental Assessment

Lemiti Fuels Reduction Project and Forest Plan Amendment #19

Clackamas River Ranger District, Mt. Hood National Forest

Clackamas and Marion Counties, Oregon

The project is located in T.7 S., R.8 E.; T.8 S., R.8 E.; T.7 S., R.8.5 E.; T.8 S., R.8.5 E.; Willamette Meridian.

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Aerial image of dead lodgepole pine trees (Photo credit - Alan Dyck. 10/2010)

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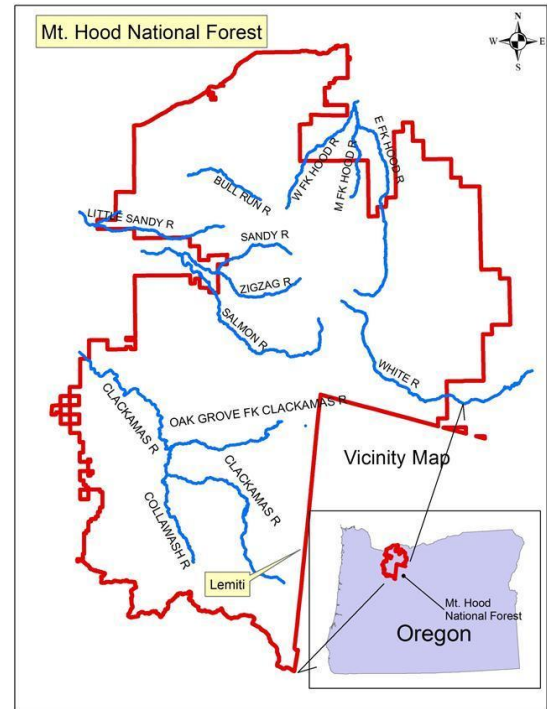
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Summary

The project is located in the Clackamas River Ranger District, Mt. Hood National Forest, Oregon. The Mt. Hood National Forest proposes a fuels reduction project in stands of dead lodgepole pine trees. The Mt. Hood National Forest is referred to as ‘the Forest’ in this document.

The purpose of this project is to reduce fuels, minimize resource impacts from fire, provide for enhanced firefighter safety, and enhance the productive capacity of the forest. Other opportunities that can be accomplished at the same time include enhancing forage for deer and elk and accomplishing needed road work.

A Forest Plan amendment (Amendment #19) is included in this document to change certain standards and guidelines. The original wording of these standards and guidelines did not anticipate the widespread insect killed trees and, as written, would hamper the Forest’s ability to achieve Forest Plan goals and objectives. The changes included in this Forest Plan amendment are not permanent and are limited geographically to only the treatments proposed for this project.



The project is directly adjacent to the Confederated Tribes of Warm Springs (CTWS) Reservation.

1.0 INTRODUCTION

1.1 Document Structure

The Forest Service has prepared this document in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This document discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. This document uses a section number system. This paragraph for example is in section 1.1 and may be referred to as s. 1.1. The document is organized into the following parts.

- *Summary*
- *Introduction:* This section includes the purpose of and need for the project, and the agency’s proposal for achieving that purpose and need. This section includes

design criteria. This section also details how the Forest Service informed the public of the proposal and how the public responded.

- *Alternatives:* This section provides a description of alternative methods for achieving the stated purpose. These alternatives are developed based on issues raised by the public and other agencies. Finally, this section provides a comparison of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource. Within each section, the existing situation is described first, followed by the effects of the alternatives. The no-action alternative provides a baseline for evaluation and comparison of the other alternatives.
- *Consultation and Coordination:* This section provides a list of preparers and agencies consulted during the development of this assessment.
- *References and Appendices:* The appendices provide more detailed information to support the analyses presented in the assessment.

Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Estacada Ranger Station in Estacada, Oregon.

1.2 Project Area Location and Management Direction

The proposed project area is located near Lemiti Butte and Lemiti Creek in the Upper Clackamas Watershed. The planning area encompasses approximately 3,140 acres, while treatments would occur on 1,432 acres within this larger area. Maps can be found in Appendix A.

In the early stages of project planning, the planning area boundary was determined; the project area was bounded by the reservation boundary on the east, by the Sisi portion of the Clackamas Wilderness on the west, by the late-successional reserve on the south, and by a stand type change where there are no lodgepole pine stands to the north. Some stands of dead lodgepole pine extend to the west and east and farther south, where they gradually intermix with other live species. All stands within the planning area were considered and examined.

1.2.1 Management Direction

This project has been designed to meet the goals and objectives of the documents listed below. This assessment is tiered to the following Environmental Impact Statements and the listed plans are incorporated by reference.

- The Mt. Hood National Forest Land and Resource Management Plan Record of Decision and Final Environmental Impact Statement (USDA 1990a) and Standards and Guidelines (USDA 1990b), as amended, are referred to as the **Forest Plan**. The FEIS discusses environmental effects for Forest-wide programs

and sets the stage for project level analysis. The Forest Plan contains standards and guidelines applicable to this project. Consistency is addressed in each resource topic of section 3.0.

- The Forest Plan was amended by the Northwest Forest Plan Record of Decision and Final Supplemental Environmental Impact Statement (USDA, USDI 1994a) 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. (USDA, USDI 1994b) (hereafter referred to as the **Northwest Forest Plan** or NFP). The NFP contains standards and guidelines for Matrix, Riparian Reserves and Late-Successional Reserves. Consistency is addressed in certain resource topics of section 3.0.
- The Forest Plan was amended by the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA, USDI 2001).
- The Forest Plan was amended by the 2005 Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program, hereafter referred to as the R6 2005 FEIS. The R6 2005 FEIS culminated in a Record of Decision (USDA 2005). Standards and guidelines from the 2005 FEIS are addressed in section 3.13.

Section 3.1.6 contains some elaboration of the various elements of these plans that provide the basis for this project. For example, the Forest Plan contains the goal of providing fire protection, fuels treatment and pest management programs that are responsive to land and resource management goals and objectives (#22, p. Four-4). It also indicates that an appropriate suppression response will be made to all wildfires (p. Four-25).

1.2.1.1 Land Allocations

There are several land allocations in the project area. The following table shows the acreage inside the planning area. Appendix A contains maps showing the proposed actions, land allocations and other details. Section 1.6 contains a description of how the proposed action overlaps these land allocations.

Allocation	Approximate Acres
Matrix	
B11 – Deer and Elk Summer Range	1,970
B3 – Roaded Recreation	57
C1 – Timber Emphasis	387
A5 – Unroaded Recreation	84
Riparian Reserves	608
Late-successional Reserve	8

The following is a brief summary of the goals of these land allocations. The Forest Plan requires an appropriate fire suppression response for all of these land allocations to limit the size of wild fires. These are all elaborated further in chapter 3.

- The **Matrix** land allocations have primary or secondary goals of maintaining healthy stands and providing forest products through a variety of timber management practices.
 - The **deer and elk summer range** (B11) land allocation is designed to provide high quality habitat. Most of the project area is in this allocation. Since most of the trees are dead in this area it is not possible to meet some of the standards and guidelines for cover. While some marginal cover is provided by dead trees, they are likely to fall in the near future and at that time, the only cover would be provided by saplings. These would provide hiding cover but standards and guidelines for optimal and thermal cover would not be met. There are opportunities to enhance forage. A Forest Plan amendment in 1993 changed the B11 land allocation to its current configuration.
 - The **roaded recreation** (B3) land allocation is designed to provide roaded recreation opportunities including picnicking, dispersed camping and scenic driving. Off-road vehicle use is prohibited in this area based on the 2010 Forest Off-highway Vehicle Management Plan. This land allocation was also changed to its current configuration by the 1993 Forest Plan amendment. Most of the trees in the B3 land allocation in the project area are dead.
 - The **timber emphasis** (C1) land allocation is designed to provide lumber, wood fiber, and other forest products. The primary need is to increase health and accelerate growth while providing forest products now and into the future. The lodgepole pine trees in the C1 land allocation are dead.
- The **unroaded recreation** (A5) land allocation is designed to provide semi-primitive non-motorized recreational opportunities. Most of the original A5 land allocation was absorbed into the Sisi portion of the Clackamas Wilderness and is now the A2 – Wilderness land allocation (it is outside but adjacent to the planning area). The remaining portion of the A5 land allocation is in the planning area. It was not considered suitable as wilderness because it was thinned before. Most of the trees in the A5 area are dead.
- **Riparian reserves** are part of the Aquatic Conservation Strategy and are designed to protect the health of the aquatic system and its dependent species. Riparian reserves are located adjacent to streams and other water bodies and wetlands. The project area has a core wetland but other areas are relatively dry. Where streams cross through the lodgepole pine timber type, most of the trees are dead. (No fuel treatments are proposed in riparian reserves.)

- **Late-successional reserves** are designed to serve as habitat for late-successional and old-growth related species, including the northern spotted owl. The North Willamette LSR Assessment (USDA USDI 1998) contains recommendations for management. (No fuel treatments are proposed in late-successional reserves.)

1.3 Purpose and Need for Action

The purpose of this project is to reduce hazardous fuels to minimize resource impacts from fire, to provide for enhanced firefighter and public safety, to provide for long-term forest productivity, and to enhance the ability to efficiently manage the landscape in the future. Section 1.4 describes the proposed actions that respond to the needs described below. Section 1.5 includes background information and greater elaboration on the connections between the proposed action and the purpose and need.

- **Fire Hazard** - There is a need to reduce potential wildfire hazard because of the accumulation of fuels and dead trees that could result in severe burning conditions and increased risk of spread of wildfire onto neighboring Tribal land. Lightning is common in this area. In the event of a large wildfire, resources (such as soil productivity, riparian values, late-successional habitat, scenery, infrastructure, etc.) would be at risk on both the Forest and the adjacent Confederated Tribes of Warm Springs Reservation. Additionally, fire suppression tactics would be greatly limited due to high levels of risk to fire suppression personnel due to the high resistance to control with the predicted quantity of fuel as dead trees fall. *The desired condition is to have a landscape of primarily live forests with relatively low fire hazard. The goal is to have an appropriate fire suppression response on the stands in the project area. These desired conditions and goals are discussed in the Forest Plan on pages Four-3, Four-4, Four-9 Four-25 & Four-76.* The accomplishment of this objective is measured by the amount of hazardous fuels treated and achieving modeled target flame lengths of four feet to increase opportunities for suppression effectiveness. For more information see sections 1.5.1, 2.4 & 3.1.
- **Safety** - There is a need to enhance firefighter and public safety along the primary access roads by reducing fuels along Forest Service Roads. The planning area is the main route for ingress and egress for the Olallie Lake Scenic Area; a popular back country recreation destination to the south of the project area. This poses an increased threat to public safety if the Olallie Lake Scenic Area needs to be evacuated as well as firefighter safety during fire suppression activities. *The desired condition is to have a landscape where the recreating public and Forest staff are relatively safe and are not trapped by intense wildfire. The goal is to have an appropriate and safe fire suppression response on the stands in the project area. These desired conditions and goals are discussed in the Forest Plan on pages Four-3,*

Four-4, Four-7, Four-25 & Four-78. The accomplishment of this objective is measured by the acres treated adjacent to access roads. For more information see sections 1.5.1, 2.4, 3.1.4, 3.1.6.4 & 3.7.2.1.

- **Forest Productivity** - There is a need to provide for long-term forest productivity and to enhance the agency's ability to efficiently manage the landscape in the future. With no action, the combination of dead trees fallen in a jackstrawed manner and the high density of young trees, this area of the Forest is likely to become physically inaccessible and unmanageable. Fuel treatments are needed to remove the dead trees and to space out the saplings so they have the opportunity to continue to grow and provide the many benefits of a forested landscape. If left untreated, a large intense wildfire would burn these saplings, setting back the process of forest development. There is an additional opportunity to favor minor tree species to enhance the diversity of the residual stand. *The desired condition for the matrix component of the landscape is to have live productive forest stands that can provide wood products now and in the future. These desired conditions are discussed in the Forest Plan on pages Four-3, Four-5, Four-9 Four-26, Four-277 & Four-289.* The accomplishment of this objective is measured by the acres of sapling thinning and the acres of hazardous fuels treated. For more information see sections 2.4, 3.2, & 3.15.

While achieving these primary purposes and needs, there are additional opportunities that can be accomplished at the same time, in or adjacent to some of the targeted stands, where existing conditions deviate from desired conditions.

- **Forage** - There is an opportunity to enhance forage for deer and elk because forage is declining across the landscape. *The desired condition for forage and deer and elk habitat is discussed in the Forest Plan on pages Four-22 & Four-71.* The death of trees has allowed more sunlight to the ground but palatable forage species are rare and the trees will soon fall in a jackstraw manner which would make it difficult for large animals to move through the forest to utilize forage. The accomplishment of this is measured by acres treated for forage enhancement. For more information see sections 1.5.3, 2.4 & 3.4. These sections describe the change over time in the scientific literature and in local forest structure from an emphasis on cover years ago, to a current-day need for quality forage.

During the early stages of this planning effort, the scale of the opportunity to address forage enhancement was considered and was focused on the stands of dead lodgepole pine and not on landscape-scale needs. While the project addresses some of the need for forage it does not attempt to provide all of the forage that deer and elk need.

- **Roads** - There is an opportunity to accomplish needed road work on the roads used to access treatment areas. These opportunities include road maintenance and repair to provide a more efficient and safe transportation system while reducing effects to natural resources. There is an opportunity to replace culverts that are too small with larger structures. *The desired condition is to have a landscape accessed by an appropriate network of roads that provide for management access and visitor safety while minimizing risk to aquatic resources. These desired conditions are described in the Forest Plan on pages Four-3, Four-5 & Four-34 and the Northwest Forest Plan on page C-32.* The accomplishment of this is measured by miles of roads treated. For more information see sections 2.2.1, 2.2.2, 2.2.4, 2.4 & 3.11.

1.4 Proposed Action Overview

The following subsections briefly describe the proposed actions. Section 1.5 includes greater elaboration on the connections between the proposed action and the purpose and need. Section 1.6 contains other detail on land management direction including a table of treatments by land allocation. Section 2.2 contains greater detail on the proposed action including project design criteria (PDCs). Maps are found in Appendix A.

To meet the needs described above, the Forest proposes a mosaic of treatments. Approximately 1,432 acres of fuel treatments would occur.

Fuel treatment harvest – The dead lodgepole pine trees would be cut and removed on 1,262 acres. Additional live trees would also be removed in some areas, leaving the largest trees at approximately 60 to 80 square feet of basal area. While the logs would be removed and utilized, additional fuel treatment would include the yarding of tree tops (bringing the tops and branches in to the landing attached to the yarded logs) and other slash treatments where needed to reduce fuels to the desired level of 10 to 15 tons per acre. Forage plants would be seeded or planted to enhance forage quantity and quality.

Fuel break units – Additional fuel break treatments would occur on 66 acres. These fuel break treatments occur along primary roads and along the reservation boundary. There would be additional emphasis on the treatment of slash, the thinning of live trees to a 12-foot spacing and pruning to reduce ladder fuels. (26 acres overlap the 1,262 acres of fuel treatment – harvest units).

Sapling thinning – While sapling thinning would occur where appropriate in the areas described above, there is an additional sapling treatment area where no logging would occur and where hand treatment only is prescribed on 130 acres where saplings would be hand cut to a 15-foot spacing and piled for later burning.

Roads - Road work is proposed for system roads. This road work is needed to access the proposed treatments and is discussed further in section 2.2.

The project area is bisected by two different routes that access the popular Olallie Lake Scenic Area: 4690 and 4220. There are road maintenance and repair needs on these and other roads that are part of the proposed action. The project would grind the pavement on a rough section of road 4220 and improve the unpaved section. Even though Lemiti Creek is dry in the summer season, it flows with considerable snowmelt in the spring and the culverts on the three road crossings are not large enough to accommodate anticipated flood waters. The project includes the replacement of culverts on 4220 and 4680 and the removal of the crossing on 4220125.

Some temporary road work is needed to access the proposed treatments.

Proposed Action (mileage is approximate)	miles
New Temporary Roads Construct & Rehabilitate	3.8
Existing Road Alignments That Were Once System Roads, Reuse as Temporary Roads & Rehabilitate	1.6
Existing Road Alignments That Were Once Temporary Roads, Reuse as Temporary Roads & Rehabilitate	1.9

Forest Plan Amendment - To achieve the purpose and need, a project specific Forest Plan amendment is proposed for some standards and guidelines (For more information see section 2.2.7). These standards and guidelines cannot be fully met especially in the short term, while meeting the purpose and need for action, given the existing mortality. The changes included in this Forest Plan amendment are not permanent and are limited geographically to only the treatments proposed for this project.

1.5 Background

The following sections have greater detail on the resources highlighted in the purpose and need statements in section 1.3 and provide some rationale for the development of the proposed action in section 1.4.

1.5.1 Fire Hazard

Over the past decades, parts of Oregon and much of the Western United States have experienced large wildfires that have put many assets and resources at risk, including habitat for threatened or endangered fish and wildlife species, critical infrastructure, soil productivity, aesthetics, clean air and other valued components of forests and communities. In recent years, federal land management agencies have been focusing

efforts on treating hazardous fuels and restoring the health of forests to minimize the potential impacts of large scale wildfires.

Most of the project area consists of pure stands of dead lodgepole pine that became established following large stand-replacement fires. Other areas have lodgepole pine interspersed with other conifer species, such as mountain hemlock, Engelmann spruce, Pacific silver fir, and western white pine. Currently, the dead lodgepole pine is standing and a thick carpet of young seedlings and saplings have seeded in. The fire hazard is expected to dramatically increase as dead trees fall and young trees continue to fill in at high densities. Due to this fuel accumulation, the predicted fire intensity would cause wildfires that are difficult, expensive and dangerous to contain at small sizes. There is a high level of concern for firefighter safety in the event of a high-severity wildfire in the area.

Lodgepole pine stands typically become highly susceptible to mountain pine beetle mortality between age 60 and 80 and stand-replacement fires typically occur approximately every 100 years. Adjacent areas with mixed conifer stands are also in a fire regime where stand replacement fires are expected. In the project area, large stands of lodgepole pine trees have been killed by mountain pine beetle creating a significant buildup of hazardous fuels. Stands of dead lodgepole pine cover approximately 2,300 acres of the 3,140 acre planning area. Additional acres of dead lodgepole pine extend to the west into the Sisi portion of the Clackamas Wilderness and to the east into the CTWS Reservation. Over time, as trees fall, there is the potential for lightning or human caused fires to grow large, threatening both federal and Tribal resources. The proximity of these hazardous fuels to CTWS Reservation is of particular concern. Section 1.5.5 contains a discussion of tribal concerns because the dead trees are on both sides of the reservation boundary. The Forest Plan contains direction to honor treaty rights and privileges of Native Americans and to protect and preserve Native American ceded rights (#2, p. Four-2).

These photos show the landscape view and a close up of dead lodgepole pine.



Stand conditions are at the stage where stand-replacement wildfire is imminent. Current land management plans including the Mt. Hood Forest Plan and the

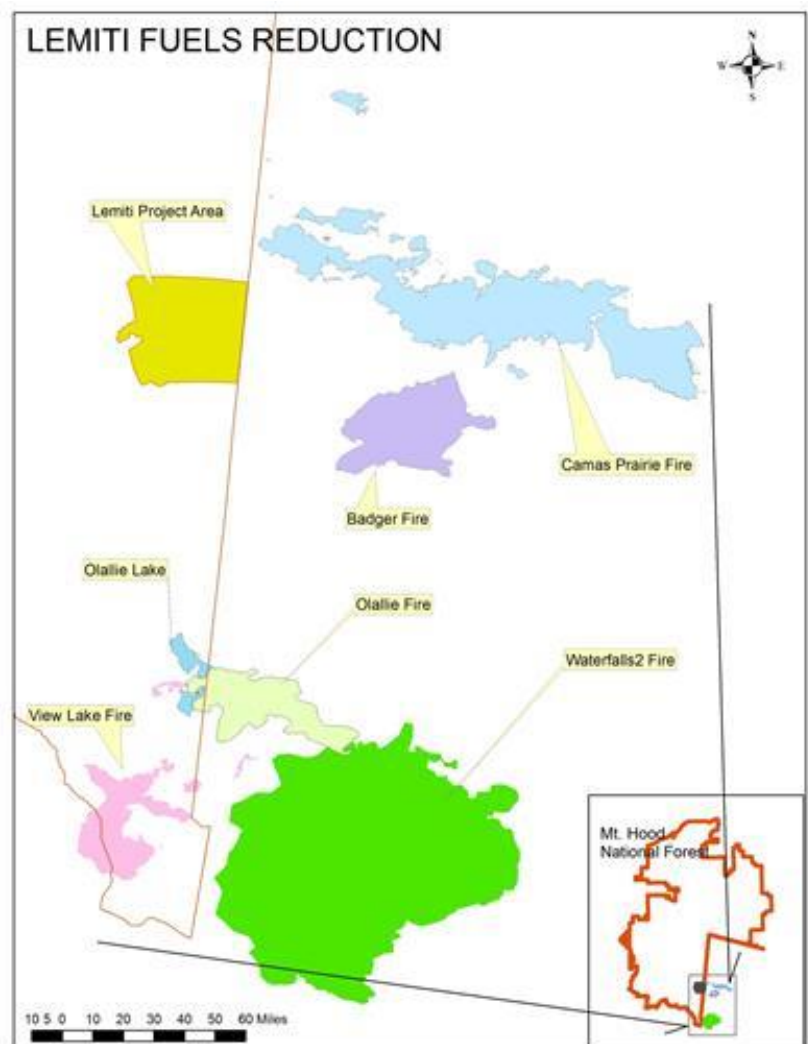
Northwest Forest Plan encourage taking steps to minimize the size and intensity of stand replacement fires.

The following current and expected conditions would influence the severity and intensity of a wildfire.

- Most dead lodgepole pine stands have experienced in-growth of high densities of small trees creating a ladder fuels problem.
- Dead lodgepole pine trees will soon fall in a jackstrawed manner, increasing the fuel load, which in turn increases fire intensity.
- Trees in this area, including dead lodgepole pine, are draped with lichens that are highly flammable in the dry season.
- The area has high lightning occurrence and high risk of human caused ignition.

Some research has shown a reduction of fire hazard when the needles have fallen off dead trees but an increase when trees begin to fall. For example, Meigs (2015) found a strong correlation between mountain pine beetle and additional acres burned in the west Cascades zone.

In August of 2001, a passing weather front ignited 21 lightning fires. Several lightning fires were extinguished when they were small. However, there were too many fires for the available fire suppression forces and several of the small lightning fires converged into one relatively large stand-replacement fire burning on both the Forest and the CTWS Reservation. The Olallie Complex of fires was eventually contained at 2,622 acres. A large portion of these acres burned at high intensity. Previous to this fire, there had been no large stand-replacement fires in the area since Forest Service administration began in 1907, largely due to fire suppression efforts.



In August of 2010, a similar wildfire scenario occurred when lightning ignited several fires. Some were contained, but within two weeks other fires burned together and grew in size. These fires experienced dramatic fire behavior due to the extensive dead trees. The View Lake Fire Complex burned approximately 2,100 acres in the area.

Then, in August of 2011, a similar lightning caused wildfire occurred on the CTWS Reservation. The Badger Fire burned 2,400 acres.

Again, in August of 2012, a similar lightning caused wildfire occurred on the CTWS Reservation. The Waterfalls 2 fire burned southeast of Olallie Butte and consumed approximately 12,000 acres.

Finally, in July of 2014, the Camas Prairie Fire began on the CTWS Reservation very near the Forest boundary near South Pinhead Butte. It was started by lightning and burned to the east. The Camas Prairie Fire was contained at 5,920 acres. Approximately 27 acres of this fire overlap the Lemiti Subwatershed.

Each of these fires led to evacuations and closures of the Olallie Lake Scenic Area due to concerns on the part of the incident managers for potential of rapid spread of the fire through dead lodgepole pine stands in the vicinity and the potential for wind shifts. Fire modeling has shown that the project area has high fire hazard which would continue to increase as the standing dead trees fall.

1.5.2 Past Management

Because the project area has dense stands of relatively low value lodgepole pine, it was not the focus of intense forest management that occurred elsewhere on the Forest. A thinning project was planned in the 1990s which attempted to address the impending insect infestation by removing some trees while they were still alive. While a few trees in these thinned stands remain alive, most of them succumbed to the beetle infestation. Some roads were decommissioned at that time.

1.5.3 Forage

Deer and elk were selected as management indicator species because they are economically important game animals. Deer and elk utilize a wide range of forest types for both foraging and cover. Recent research has indicated that cover is not as important as was once thought and that forage quality and abundance is much more critical. With the reduction in timber harvest on the Forest in the past two decades and continued tree growth, cover habitats now far exceed the desired levels for optimal and thermal cover but openings for forage are becoming scarce. The bulk of the project area is in the B11 Deer and Elk Summer Range land allocation which has goals that may not be achievable in the short term, due to the quantity of dead trees. There is an opportunity to increase the productivity of forage plant species.

1.5.4 Project Development

When the insect mortality in lodgepole pine first became evident, the Forest considered creating a linear shaded fuel break (Cascade Crest Fuel Break). It would have covered several miles between Olallie Lake and road 4230 paralleling road 4220. The Forest worked with the Confederated Tribes of Warm Springs to devise this plan but it was subsequently set aside to develop the current proposed action.

During early planning efforts, 2,430 acres of dead lodgepole pine inside the planning area were identified and considered for treatment. At the time of the scoping letter in April of 2013, the proposed action was trimmed down to 2,300 acres after including relatively narrow riparian protection buffers. After doing some additional preliminary effects analysis and considering scoping input, the current plan was trimmed down to 1,432 acres. The current proposed action has deleted fuel treatments in riparian reserves and deleted fuel treatments in suitable owl habitat to minimize impacts to these resources. These adjustments represent a compromise between key resource concerns and the risk of fire damaging these same resources. These adjustments are consistent with the purpose and need for the project; the analysis shows that the proposed action would still provide an effective fuel treatment.

1.5.4.1 Forest Plan Amendment

The Forest also considered the many standards and guidelines that don't seem to fit the current situation found in the Lemiti area. The standards and guidelines were considered individually and in combination to assess whether a fuel treatment project would be feasible while implementing them fully. Many of the standards and guidelines were developed to constrain and guide regeneration harvest in mature live forests. The extensive mortality in lodgepole pine stands was not envisioned at that time and many standards and guidelines cannot be met, even with no action. The Forest Plan amendment and the exceptions identified at s. 2.2.7.1 and s. 2.2.7.2 are needed. Without them the project would not occur and therefore would be similar to the no action alternative.

1.5.4.2 Economic Viability

During the early stages of this planning effort, the cost of fuel treatments and the economic viability of harvesting dead lodgepole pine was considered. Several factors contribute to a situation that requires planners to carefully examine projects to ensure that they are efficient and viable. Factors include the following.

- Dead lodgepole pine does not have high value. It is likely to be utilized as chips and firewood. Volume removed per acre can be relatively low. These factors make removing this type of material more expensive than larger, live trees. It is assumed that the value of the dead trees would at least partially offset the costs of other fuel treatments and road work.

- Since the decline of old-growth logging in the 1990s, many roads have not received sufficient maintenance and there is sometimes a backlog of road repairs and maintenance that are typically funded by the value of the products removed.
- The area contains several roads that have been decommissioned or rehabilitated that would need to be reopened. Several new temporary roads are needed to access landings and fuel treatment areas. A temporary bridge would be needed at one stream crossing.

Some elements of this fuel reduction project would likely receive supplemental funding from other sources. The Forest has considerable experience packaging high cost portions of a project, such as road repairs, with lower cost portions to gain operational efficiency and to develop a project that is likely to receive bids. While there remains some uncertainty about the value of the dead trees compared to operational costs, there has been interest expressed by potential bidders that have examined the area and can utilize dead lodgepole pine.

In addition to the concern about the viability of harvesting dead lodgepole pine trees now, there is a concern about long-term management of these stands if no action is taken. With no action, the combination of dead trees fallen in a jackstrawed manner and the high density of young trees, this area of the Forest is likely to become physically inaccessible and unmanageable. Fuel treatments are needed to reduce fire hazard and to remove the dead trees and to space out the saplings so they have the opportunity to continue to grow and provide the many benefits of a forested landscape. If left untreated, a large intense wildfire would likely burn these saplings, setting back the process of forest development. While most of the saplings are lodgepole pine, there are some other species such as hemlock and Douglas-fir that can be favored to enhance the diversity of the residual stand.

1.5.5 Tribal Coordination

Several years ago the Forest attempted to plan a linear shaded fuel break in response to the fire hazard in conjunction with the Confederated Tribes of Warm Springs, to protect tribal resources both on and off the reservation from wildfire. Several field trips and office meetings were held between the Forest and the Tribes over several years to address the fire hazard issue. The fuel break project was canceled: many public comments received at that time suggested a focus on the dead lodgepole pine area instead, and the Forest is now proposing the actions displayed in this document.

If no action is taken, a large scale wildfire could impact resources on the Forest and tribal historic properties, first foods, medicinal plants and other resources. Large wildfires on the Forest/Reservation boundary have happened in past and are likely to happen again. The tribes have concerns about the risk to resources on the CTWS Reservation but they also have concerns about resources on the National Forest. The fuel treatment would occur on their usual and accustomed lands. It would provide protection for usual and accustomed lands, as well as the adjacent CTWS Reservation

and ceded lands. The tribes have treaty rights in this area for hunting and the gathering of medicinal plants and first foods such as roots and huckleberries. The fuel treatment would also protect spiritual values. If no action is taken, a severe wildfire in this area would result in the loss of and diminished access to the traditional ways and values of the tribes. There would be a high potential for the tribes to feel a significant loss to their traditional way of life.

1.6 Land Allocations for Treatment Areas

Section 1.2.1 describes the land allocations present in the planning area and their goals. This table shows the acreage inside proposed treatment areas. Appendix A contains maps showing the proposed actions, land allocations and other details.

Allocation	Approximate Acres
Matrix	
B11 – Deer and Elk Summer Range	1,273
B3 – Roaded Recreation	33
C1 – Timber Emphasis	48
A5 – Unroaded Recreation	78

1.6.1 Forest Plan Amendment and Exceptions

The Forest Plan contains management goals and desired future condition statements that direct how the Forest is to be managed (p. Four-1 to Four-44). It also contains standards and guidelines that were designed to guide projects to meet management goals and move the landscape toward the desired future condition. Standards and guidelines were primarily written to address traditional timber sales, and they often do not adequately address wide-spread mortality due to insect infestation, fuel breaks or high fire hazard situations. The current stand conditions are so far outside the range of desired future conditions that large scale treatments are needed that were not envisioned when the standards and guidelines were written.

This project arose in response to uncontrollable circumstances: the insect infestation and the resulting high fire hazard. Portions of the project are in areas that would not normally have been targeted for intensive timber management. While the fuels reduction would involve tree removal, the primary goals are to aid in the suppression of wildfires, to restore forest productivity and to provide for firefighter and public safety. The Forest Plan directs the suppression of wildfires to protect resources.

This analysis weighs the localized impacts of fuel treatments with the landscape-wide benefits of reduced wildfire impacts to determine the achievement of management goals and desired future conditions. Forest Plan Amendment #19 is proposed which would amend several visual quality standards and guidelines, plus some that deal with

snags and down logs. Section 2.2.7.1 describes the standards and guidelines that would be amended with the rationale. Section 2.2.7.2 summarizes exceptions for “should” standards and guidelines as described in the Forest Plan (p. Four-45). The applicable resource topics in Chapter 3 also include a discussion of these standards and guidelines.

1.6.2 Other Relevant Management Direction

Roads Analysis

A Forest-wide Roads Analysis was completed in 2003 (USDA 2003). Section 3.11 discusses roads for this project and how they relate to the Forest-wide analysis.

Watershed Analysis

The Upper Clackamas Watershed Analysis (1995) is incorporated by reference and summarized in section 3. While the lodgepole pine trees were mostly alive in 1995, the Forest recognized the impending insect mortality and subsequent fire risk. This project is consistent with the recommendations of the watershed analysis (page 62-63). It recommends reducing the potential for large stand replacing fires that could affect scenic quality and visitor safety.

1.7 Decision Framework

The deciding official will review this document in order to make the following decisions and determinations.

- What the optimal method of accomplishing the purpose and need (s. 1.3) for this project should be;
- Whether or not Forest Plan amendments or exceptions are appropriate for standards and guidelines;
- Whether the selected alternative should be modified in any way;
- What design criteria or best management practices should occur;
- Whether this action is in compliance with the Forest Plan as amended and Forest Service policies and procedures.

1.8 Public Involvement

Beginning in 2006, the Forest began an ongoing dialogue with the Confederated Tribes of Warm Springs to develop a plan to protect tribal resources both on and off the reservation.

A scoping process to request public input for this project was conducted. Letters describing the proposed project and requesting comments were sent out on September 21, 2012 and April 15, 2013. The project has also appeared in the Forest's schedule of proposed actions (SOPA). Public field trips were conducted on October 26, 2012 and August 13, 2013 to visit the project area and discuss the purpose and need and issues. The legal notice for the 30-day comment period for this project was published in The Oregonian on August 7, 2015. Responses to comments are included in Appendix B. A list of persons and organizations that were sent notice is in the analysis file along with a list of commenters and the complete text of comments.

This project is subject to the new objection regulations. Section 428 of The Consolidated Appropriations Act of 2012 included a provision establishing a pre-decisional objection process (36 CFR 218) for projects and activities implementing land management plans in lieu of the post-decisional appeal process (36 CFR 215) used by the agency since 1993. This project does not qualify under the Healthy Forest Restoration Act and is subject to the Project-Level Pre-Decisional Administrative Review Process (Objection process) as identified in 36 CFR 218, Subparts A and B.

Rather than being able to seek higher-level review of unresolved concerns after a project decision has been made under 36 CFR 215 (Appeal process), those who are eligible will be able to seek that review before the project decision has been signed under 36 CFR 218 (Objection process). The Forest Service believes that considering public concerns before a decision is made aligns with our collaborative approach to public land management and increases the likelihood of resolving those concerns resulting in better, more informed decisions. The Forest Service also believes this will aid in our efforts to be more efficient with documenting environmental effects.

Individuals and entities who submit timely, specific written comments regarding a proposed project or activity during any designated opportunity for public comment may file an objection. Opportunity for public comment on this project includes scoping and a 30-day comment period. Written comments are those submitted to the Responsible Official or designee during a designated opportunity for public participation provided for a proposed project. Specific written comments should be within the scope of the Proposed Action, have a direct relationship to the Proposed Action, and must include supporting reasons for the responsible official to consider.

1.8.1 Issues and Concerns

While many concerns were raised with scoping, field trips and the 30-day comment period, they are not considered key issues for the purpose formulating fully developed alternatives. 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 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. None of the comments received were considered issues. Concerns identified during scoping were used to refine the proposed action as well as the effects analysis presented in Chapter 3. The following highlights some of the concerns raised by the public. Included are some commonly asked questions that arose from comment letters, public field trips and collaborative meetings with italicized responses.

1.8.1.1 Beetles/Fire Hazard

Public comments raised concerns about the role of beetles and fire in the high Cascade ecosystems. They stated that mountain pine beetles are a native species and the patches of dead trees are a natural feature of dynamic forests. They stated that these stands are recovering on their own as saplings grow. They stated that a stand replacement fire would be expected and even desirable in this area and actions to prevent it are unlikely to be successful. They stated that salvage logging would create a drier climate.

Isn't fire natural and shouldn't wildfires be allowed to burn?

The natural fire regime for the project area is one where large stand replacing fires burn and kill most trees. However past fire suppression, insect mortality in lodgepole pine and the ingrowth of ladder fuels has created a situation where wildfires would burn more intensely and get larger than would have been expected a few decades ago. Large, intense wildfire is not the desired condition for this landscape at this time. The landscape is managed for many human values such as scenery, clean air, recreation, safety and huckleberries. It is also managed to provide habitats for rare species. The Mt. Hood Forest Plan as amended by the Northwest Forest Plan requires an appropriate suppression response for all wildfires in this area to protect these values. Changing the policy to allow fires to burn is outside the scope of this analysis.

Hasn't the fire hazard decreased somewhat since the needles have fallen off the dead trees?

Needles have fallen from most dead trees at this point. However, the greatest fire risk would come in the next few years as dead trees fall in a jackstraw pattern. These down trees combined with young saplings would result in a fire situation that would likely be too dangerous for fire suppression forces.

Won't the fire hazard return as dense young trees regrow? Aren't fire return intervals relatively long and unpredictable in this landscape, so it is unlikely that the area treated to reduce fuels would experience fire and provide the desired benefits during the brief time that treatments may be effective? How likely would the treatment be successful at avoiding stand replacing fire?

Agency fire personnel have experience in this area with suppression of large lightning caused fires in similar fuel types and believe that it is highly likely that this area would experience extreme fire behavior soon, a risk that increases when the dead lodgepole pine trees fall. Part of the proposed action is to manage the regrowth density to extend the duration of effective fuel treatments. Even with fuel treatments, wildfires are still likely to occur in this area because many untreated stands would remain. The intent is to reduce the intensity of a fire so that fire suppression forces can safely operate to keep fires small.

Isn't it normal for this type of eruption of mountain pine beetle populations?

The typical cycle of lodgepole pine succumbing to mountain pine beetle and then burning in stand replacing fires has likely occurred in this area for thousands of years. However, allowing wildfires to burn is not the goal for this area at this time. The forest is managed for a wide range of human and resource values and, in the event of a wildfire, suppression forces would be at greater risk protecting these values if no action is taken to moderate the fuels hazard.

Won't the forests that are being affected by the mountain pine beetles recover on their own? Aren't complex and diverse old forests most likely to develop from complex and diverse young forests?

While seedlings and saplings have begun to grow in this area, they are not likely to survive to maturity if fuels treatments are not completed to reduce the risk of small fires becoming large. In the lodgepole pine stand type, it is very unlikely that stands would transition to old growth because of the cyclic nature of the interaction of beetles and fire.

Will the proposed fuel treatment stop a wildfire?

The project is not intended to stop a wildfire. It is intended to aid in the suppression of a wildfire. It would be a place where fire suppression forces could safely work. The intent is to create a situation where fire suppression forces could keep a fire smaller than what would occur with no treatment.

Won't logging increase fire hazard by increasing surface fuel loads from fine woody debris left from logging operations?

This project is not traditional logging. Tree tops, branches and other fuels would be treated to remove the hazard. Fuel modeling and previous experience shows that flame lengths would be approximately four feet after treatment.

Will the lodgepole pine area transition to old growth on its own?

This is not likely to occur. The lodgepole pine area has no evidence that old-growth size trees have ever occurred on the site. There has likely been a recurring cycle of insects killing trees followed by fire and the regrowth of a new stand for many centuries. Some have suggested that the presence of mountain hemlock saplings in the understory is proof of the stand transitioning to old growth. During sapling thinning, species other than lodgepole would be favored for diversity. The

likelihood of saplings surviving to maturity would be greater with fuel treatment compared to no action. Species composition is not the primary factor influencing fire regimes or fire return intervals.

Even though some commenters stated that ecological process including insect mortality and fire should proceed without intervention, the analysis shows that the proposal is a prudent action to deal with the dead lodgepole pine and the associated fire risk. These comments were considered, and the impacts and benefits of this approach are documented in the No-Action Alternative. In response to this concern, additional fire modeling was conducted and summarized in this document to clarify and explain the hazards and risks.

1.8.1.2 Snags

Public comments raised concerns about snags. They stated that salvage logging would exacerbate the snag gap that would occur before young trees can grow to become large snags. They stated that no one can predict which snags are most likely to persist the longest so it is best to retain all large snags. They stated that dead trees are required by cavity nesting animals and that large woody debris is often removed during salvage logging.

Aren't dead trees and down logs required by many animals including cavity nesters? How long will dead lodgepole pine trees remain standing?

Dead lodgepole pine trees are relatively small (4-16 inches diameter) and do not stand very long after dying. These are not considered large snags nor would they result in large woody debris when they fall. Sufficient quantities of snags and down logs would be retained in the project area and across the landscape to provide for species dependent on these habitat features. The lodgepole pine trees have already started to fall and most will likely fall within 10 years.

Even though some commenters stated that snags are important elements of a diverse landscape, the dead lodgepole pine trees in the project area are very common in this landscape. They are relatively small and do not function the same way large snags do in terms of their habitat potential and their longevity. The analysis shows that even after implementation of the proposed action there would be sufficient snags across the landscape to meet the needs of species dependent on small snags. Within the project area, there are approximately 140,000 snags outside the proposed treatment units plus many more in adjacent landscapes. These comments were considered, and the impacts and benefits of retaining all snags are documented in the No-Action Alternative. Because of this concern, the proposed action was adjusted, and areas such as suitable owl habitat and riparian reserves would receive no treatment, retaining all of the snags there. Some large snags would be created by tree topping. For more information see section 1.5.4.

1.8.1.3 Unroaded Areas

Public comments raised concerns about unroaded and undeveloped areas. They stated that the project area includes some ecologically significant unroaded areas along the crest of the Cascades that should be conserved and where natural ecological processes should be allowed to flourish. They stated that these areas would be best served by restoring natural ecological processes with no intervention. They stated that road building in these areas would cause fragmentation, soil compaction, erosion and the spread of invasive species.

Aren't remote places like these relatively good places to let natural processes like fire play out without significant intervention?

Large intense wildfire is not the desired condition for this landscape at this time, as described by the Mt. Hood Forest Plan as amended by the Northwest Forest Plan. The landscape is managed for many human values such as scenery, clean air, recreation and safety. It is also managed to provide for rare species such as spotted owl habitat in adjacent late-successional reserves. The Forest Plan requires an appropriate suppression response for all wildfires in this area to protect these values. The project area is adjacent to the CTWS Reservation: allowing fires to burn here would jeopardize Tribal values and resources.

The analysis also shows that many of the resource issues normally associated with unroaded areas, such as intact old-growth stands, pristine scenery, and key areas of wildlife refugia are not present in the proposed treatment areas. The project area includes 78 acres in A5-Unroaded Recreation. This project is consistent with the road related standards and guidelines for this land use allocation which direct that no permanent system roads be built. The project area does not include any inventoried roadless areas or potential wilderness areas.

No treatment in the A5 land allocation was considered, and the impacts and benefits of this approach are documented in the No-Action Alternative.

1.8.1.4 Roads

Public comments raised concerns about road construction. This is similar to the comments above at section 1.8.1.3, however this discussion is not specific to unroaded areas. They stated that road building would cause fragmentation, soil compaction, erosion and the spread of invasive species. They stated that there would be insufficient value in the timber to pay for rehabilitating the roads. They stated that the impacts of temporary roads are not temporary and can be long-lasting.

The majority of fuel treatments would require road construction. The few treatments that do not need road construction, by themselves, would not provide the desired fire hazard reduction and would not meet the purpose and need. The Forest would not implement this small area by itself because it would be ineffective. The temporary

roads proposed with this project would be built and rehabilitated after use the operator. The project area has relatively gentle slopes, and because the roads would be rehabilitated after use, the risk of substantial sedimentation of streams is very low. While the roads would be rehabilitated, the impacts would not immediately cease but would gradually dissipate as vegetation becomes established. These comments were considered, and the impacts and benefits of this approach are documented in the No-Action Alternative.

1.8.1.5 Economic Feasibility

Public comments raised concerns about economic feasibility. They stated that it would be difficult to grow commercially viable timber in the Mountain Hemlock Zone. They stated that salvage logging does not have enough value to pay for the cleanup of slash resulting in increased hazard.

Even though some commenters question the economic viability of the project, the analysis shows that the proposal is a prudent action to deal with the dead lodgepole pine and the associated fire risk. The cost of fire suppression would be greatly reduced with the proposed action. Because of this concern, the proposed action was adjusted to address cost effectiveness. For example, most of the slash treatment would be accomplished by yarding tops to the landing for disposal. Road work was also carefully examined to ensure that the minimum cost options were included to provide for safe access and resource protection.

1.8.1.6 Protection of Trails

A public comment raised a concern about old trail alignments in the area.

Old trails that are historically relevant have been identified and would be protected to the extent practical by retaining blaze trees and by crossing them only at designated approved locations.

2.0 ALTERNATIVES

This chapter describes and compares the alternatives considered for this project. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. The Proposed Action is described in s. 1.4 and is sometimes referred to as Alternative B.

2.1 Alternative A - No Action

Under the no-action alternative, current management plans would continue to guide management of the area. No fuels treatment, harvest or other associated actions would be implemented to accomplish project goals. Fire hazard would continue to increase as trees fall in a jackstrawed manner. Fires would get large because of the high level of fuels and the resulting flame lengths would put suppression forces and the public at risk. Additionally, no wood products would be provided. The No-action Alternative would not repair roads or address substandard culverts, and would not provide additional forage for deer or elk. The resource topics included in Chapter 3 discuss the effects of no action and the resources that would be at risk with a large intense fire. They include impact to scenery, increased stream sedimentation, soil damage, loss of northern spotted owl habitat, loss of the timber resource, risk to public visitors, and the potential for fires to spread to the CTWS Reservation and damage resources there.

2.2 Alternative B - Proposed Action

To meet the purpose and need described in section 1.3, the Forest proposes a mosaic of fuels treatments. Approximately 1,432 acres of fuel treatments would occur.

Fuel treatment harvest – Dead lodgepole pine trees would be cut and removed on 1,262 acres. Additional live trees would also be removed in some areas to reduce ladder fuels and to achieve desired flame lengths. Some live trees would be pruned to reduce ladder fuels. Treated stands would remain fully stocked with live trees even though in most areas the live tree component is in the sapling size class. The live tree component fits into the following categories.

- Some areas have abundant, very small saplings underneath the dead lodgepole pine, which are primarily lodgepole pine with inclusions of hemlock. Most of these saplings are one inch or less in diameter. This type describes approximately 75% of the treatment area.
- Some areas have live small conifer inclusions under the dead lodgepole pine, including hemlock which average approximately 4 inches diameter with some trees up to 12 inches diameter. This type describes approximately 20% of the treatment area.
- Some areas have live medium sized conifer inclusions mixed with the dead lodgepole pine, including hemlock and Douglas-fir trees over 12 inches diameter. This type describes approximately 5% of the treatment area.

Where live trees are removed, the largest trees would be retained. Adjacent to roads 4220 and 4690, live trees including saplings would be retained at a spacing of approximately 12 feet. Elsewhere, live sapling would be would be thinned to approximately 15 feet apart and larger live trees would be retained at a variable

spacing of approximately 60 to 80 square feet of basal area. Where live lodgepole pine saplings are present, other tree species would be favored for retention where appropriate.

While the logs would be removed and utilized, additional fuel treatment would include the yarding of tree tops (bringing the tops and branches in to the landing attached to the yarded logs). Ground-based logging systems would be used. The goal of fuel treatment is to bring the level of fuels to 15 tons per acre but there are likely some areas that would be as low as 10 tons per acre. The Forest's goal is to remove and utilize as much of the material as is economically viable to provide a useable forest product. The material that is not removed would be piled for later burning.

Fuel break units – Additional fuel break treatments would occur on 66 acres. (26 acres overlap the 1,262 acres of fuel treatment /harvest units). These fuel break treatments occur along roads 4220 and 4690 and along the reservation boundary. There would be additional emphasis on the treatment of slash and pruning to reduce ladder fuels. Along these roads, live trees would be retained at a spacing of approximately 12 feet. Stumps would be cut as low as practical.

Sapling thinning – While sapling thinning would occur on parts of the areas described above, there is an additional sapling treatment area where no logging would occur and where hand treatment is prescribed on 130 acres. Saplings would be spaced to approximately 15 feet apart and piled for later burning where appropriate. Repeated treatments may be needed over time particularly in the Fuel break units to maintain proper spacing if new trees seed in.

Forage – Follow up treatments include seeding palatable species. Forage enhancement is proposed because of the Forest Plan goal of providing high quality summer rearing habitat in the B11 – Deer and Elk Summer Range land allocation.

Soil Decompaction – Following fuel treatment, primary skid trails, landings and temporary roads would be decompacted to a depth of 18 inches to provide better growing conditions and meet Forest Plan standards and guidelines for soil productivity.

Snag Creation – Following fuel treatment, some mature live trees would be topped within or adjacent to fuel treatment units to create snags. These would be created farther than one tree-height from system roads. The quantity and locations would be determined after fuel treatments are completed. Since much of the treatment area has few if any mature live trees, this treatment is not designed to meet snag standards and guidelines on a per acre or per units basis but is intended to be consistent with the amended Forest Plan standards and guidelines that emphasize a landscape scale approach to snag management (s. 2.2.7.1).

2.2.1 System Road Reconstruction and Maintenance

System road reconstruction and maintenance are needed to prepare roads for safe hauling of forest products and includes grinding of pavement to convert sections of haul roads to aggregate surfacing, spot rocking, cleaning culverts, brushing and blading. Costs are discussed in section 3.11.

2.2.2 System Road Changes

Additional road work is proposed that is above and beyond what is needed for the safe removal of forest products. Even though Lemiti Creek is intermittent, it has high flows during snow melt and several culverts are insufficiently sized for the seasonal flows and some have been damaged by logs.

Road 4220125, shown in this photo, is a loop road that has been closed at one end but is open at the other end near this crossing. The proposed action would involve decommissioning a short section of the road by pulling out two side-by-side culverts at Lemiti Creek and installing a berm. The rest of the road would remain on the system as a closed road.



The crossings of Lemiti Creek and roads 4220 and 4680

would be replaced with a larger structure capable of handling the spring flows.

Road 4690030 would be closed with a berm to reduce road maintenance costs.

2.2.3 Temporary Roads

Temporary roads are roads that are built or reconstructed to access landings and are rehabilitated upon completion of logging until they are needed again. Maps in Appendix A show the location of these roads.

For this document, the term rehabilitation is used to describe the type of closure that is standard practice now for temporary roads. After use, temporary roads are bermed at the entrance, water barred, decompacted and roughened as needed with the jaws of a loader or excavator, and debris such as rootwads, slash, logs or boulders are placed on the surface where available.

Some road alignments from previously decommissioned system roads are referred to as temporary roads if they are used again and rehabilitated after use. The reuse of existing alignments is consistent with Forest Service policy as described in Forest Service Manual 7703.22. Because past practices for closing temporary roads and past practices for system road decommissioning varied and differ from current practices, the existing alignments used as temporary roads are all different and unique (s. 2.2.4). Some of them have small trees or brush growing on them while many do not. Even with vegetation growing on them, these road alignments are considered the best place to temporarily reestablish a road because it results in less total ground disturbance compared to building another road somewhere else to access the fuel treatments.

2.2.4 Temporary Road Construction and Reconstruction

Unit	Miles	Notes	* indicates additional notes below
1	0.5	Was system road, old 4230035	
1	0.5	New Temporary Road	
2	0.1	New Temporary Road	
4	0.1	Was system road, old 4230037	
4	0.5	New Temporary Road	
6	0.8	Existing Temporary Road Alignment	
6	0.2	New Temporary Road	
6	0.2	New Temporary Road	
10	0.4	Existing Temporary Road Alignment	
12	0.2	New Temporary Road	
13	0.1	New Temporary Road	
18	1.0	Was system road, old 4220130*	
18	0.2	New Temporary Road	
22	0.4	New Temporary Road	
24	0.8	New Temporary Road	
26	0.7	Existing Temporary Road Alignment	
28	0.6	New Temporary Road	
	7.3		

*Originally, this was a primitive dirt road that was build many decades ago that had a ford crossing of Slow Creek. It was not constructed for logging but was used for logging for the first time in 2000. At that time, a temporary culvert was installed for one summer's use and it was removed and part of the road was decommissioned. Since this road is likely to be needed for more than one season, a Forest Service owned, reusable bridge would be installed at the crossing of Slow Creek. The bridge would sit on untreated timber sills on either side of the creek. The bridge would be installed and removed within the established ODF&W in-stream work window for the watershed and construction activities would adhere to applicable Best Management Practices. This bridge work would cost \$18,600 for construction and removal of this temporary road crossing. The eastern end of this road was decommissioned (1 mile)

and the western end remains an open system road (0.73 mile).

2.2.5 Landings

The project includes the use of landings. Landings are areas on or directly adjacent to roads where logs are brought to be loaded onto log trucks. Landing sizes vary based on the logging system and the types of equipment that need to be safely accommodated. It is anticipated that most material would be chipped and removed in chip vans. These operations require sufficient space for the chipping equipment and room to turn around chip vans. Average landing size is expected to be larger than a typical landing to allow room for tractors to come and go, a loader to sort logs, and room for a log deck.

Some treatment areas have been partially logged before and have existing landings that would be reused. Some existing landings have brush or small trees growing on them that would need to be removed.

2.2.6 Project Design Criteria

These are practices that are part of the proposed action. They were developed to minimize effects to resources but do not necessarily eliminate all impact. The effects and benefits of these practices are included in Chapter 3. In some cases they are standard practices that are used in all similar projects and in other cases they are specifically tailored to this project based on site-specific factors such as the underlying land allocation and associated standards and guidelines. Some of these practices are a project-specific implementation of the National Core Best Management Practices (BMP) Technical Guide (USDA 2012) to minimize impacts to water quality. Effectiveness is addressed in s. 3.9.5.3. The National Core BMP Program was developed to improve agency performance and accountability in managing water quality consistent with the Federal Clean Water Act (CWA) and State water quality programs, and represents the best available science regarding best management practices. The 2012 Technical Guide (USDA 2012) is incorporated by reference and detailed in the BMP checklist in the project file.

In this section the ‘dry season’ is generally June 1 to October 31 depending upon seasonal conditions, and the ‘wet season’ is the rest of the year.

A. Riparian Reserves

A1. Standard streamside riparian widths of two site-potential tree heights for fish bearing streams and one site-potential tree height for other streams would be expanded where appropriate to include areas with high water table such as wetlands, or seasonally saturated soils. Site-potential tree height for this project is 150 feet. *National Core BMP Technical Guide – Plan 3 and Veg 3.*

B. Tree Felling in riparian reserves

B1. Except for danger trees, there would be no tree felling or fuels treatment in riparian reserves. *National Core BMP Technical Guide - Plan 3 and Veg 3.*

C. Skidding, Yarding and Equipment Use

C1. Landings would only be used if they are outside the riparian reserves. Existing landings would be used where feasible. Landings would be limited to the area needed for safe and efficient yarding and loading operations and would have proper drainage. Where necessary, straw bale catchments or silt fences would be used to minimize sediment transport to road ditches or streams. The catchments would be located to intercept runoff from the landing prior to reaching any road ditch or stream. *National Core BMP Technical Guide - Plan 3, Veg 2, Veg 3, Veg 4 and Veg 6.*

C2. Landings used in the wet season, may need to be surfaced with aggregate material, dependent upon soil moisture conditions. *National Core BMP Technical Guide - Veg 2, Veg 3, Veg 6 and Veg 7.*

C3. Existing skid trails would be reused to the maximum extent possible. *National Core BMP Technical Guide - Plan 3, Veg 2, Veg 3, Veg 4 and Veg 6.*

C4. Skid trails would not be constructed through areas with a high water table or located down swale bottoms. *National Core BMP Technical Guide - Plan 3, Veg 2, Veg 3, and Veg 4.*

C5. All ground-based skidding equipment would be confined to pre-approved skid trails, temporary roads and landings during yarding. Existing skid trails would be reused where possible unless they are hydrologically connected to a naturally occurring stream channel.

Where new skid trails are needed: skid trails would be spaced a minimum of 150 feet apart except where converging; skid trails would be located to minimize the alteration of surface hydrology; skidding would generally be on slopes less than 30%. *National Core BMP Technical Guide – Veg 2 and Veg 4.*

C6. Mechanical harvesting equipment used for tree falling would be limited to a single pass on each pathway unless operating on approved skid trails. Mechanical harvesting equipment would generally operate on slopes less than 35%. *National Core BMP Technical Guide – Veg 2 and Veg 4.*

C7. Rutting within skid trails would not exceed 12 inches in depth over more than 10 percent of a designated skid trail system. *National Core BMP Technical Guide – Veg 2 and Veg 4.*

C8. Landings that are used by the operator would be subsoiled to a depth of at least 18 inches or decompacted to a depth of at least 18 inches with a loader or excavator.

C9. In units adjacent to roads 4220 and 4690, where temporary roads are constructed or reconstructed into units and away from these roads, landings would be at least 150 feet away from roads 4220 and 4690.

D. Temporary Road Construction and Reconstruction

D1. New temporary roads would not be constructed within 200 feet of any stream. *National Core BMP Technical Guide - Plan 3, Road 1, Road 5, Veg 2, Veg 3 and Veg 6.*

D2. Emphasize the reuse of existing road alignments rather than the construction of new roads where appropriate. Where stream crossings are needed on existing alignments, they would be designed to minimize impacts to aquatic resources. *National Core BMP Technical Guide - Plan 3, AqEco 2, Road 1, Road 5, Road 7, Veg 3.*

D3. Temporary roads and landings adjacent to system roads would not obstruct ditch lines. Temporary obstructions of ditch lines or drainage ways may be approved if French drains or drivable dips are installed to provide effective drainage and prevent erosion. *National Core BMP Technical Guide – Road 1, Road 2, and Road 5.*

D4. Rock would only be used when necessary to reduce erosion, puddling and compaction on landings and temporary roads. To provide an efficient substrate for vegetative growth and water infiltration, rock would be removed and/or incorporated into the roadbed by ripping or scarification following harvest activities. *National Core BMP Technical Guide – Road 1, Road 5, Veg 2 and Veg 6.*

D5. Temporary roads and landings that are used by the operator would be subsoiled to a depth of at least 18 inches or decompacted to a depth of at least 18 inches with a loader or excavator. Cross-drains or water bars would be installed every 150 feet, or more frequently where slopes exceed 5%. Actual placement distances may vary with topography to ensure proper drainage. Available logging slash, logs or root wads would be placed across the road and landing surface. Where slash, logs or root wads are not available in sufficient quantities, bare soils would be seeded and mulched. Post-harvest motorized access to temporary roads would be prevented by construction of a berm (minimum height of 4 feet). *National Core BMP Technical Guide – Road 5, Road 6, Veg 2 and Veg 3.*

E. System Road Renovation, Reconstruction, and Maintenance

E1. Limit soil disturbing road renovation and reconstruction activities to the dry season, unless the road segment has no hydrologic connection. *National Core BMP Technical Guide - AqEco 2, Road 3, Veg 2, and Veg 3.*

E2. During road maintenance activities, existing desirable vegetation (e.g. grass) growing in ditches that discharge to streams would not be removed unless an effective sediment trap is installed and maintained until vegetation is reestablished. This does not restrict brush or tree cutting that leaves roots intact. The fill slopes at stream crossings would be vegetated or otherwise stabilized such that road surface sediments are retained prior to entering the stream channel. Roads approaching stream crossings would have adequate cross drainage to divert potential ditch sediment toward slopes where material can be trapped. Stream crossings that do not fully meet these standards would be repaired, reconstructed, or mitigated as directed by the District Ranger based on input from the unit fish biologist, hydrologist or soil scientist by inclusion of erosion control measures such as silt fences, straw bales, matting, mulch, slash, water bars, grass seed [or other products], etc. This work would occur prior to the wet season. *National Core BMP Technical Guide – Road 4.*

E3. Material removed from ditches would not be graded onto the road surface where the road surfaces are within 100 feet of a stream. Material that must be removed from ditch lines within these distances would be removed and stored farther than 100 feet of a stream and where they cannot flow directly to a stream. *National Core BMP Technical Guide – Plan 3, AqEco 2, Road 4, Veg 2, and Veg 3.*

E4. Excavated materials from ditch cleaning or other operations would be disposed of at approved sites. Material would be spread evenly over an appropriate area in non-conical shaped piles with a maximum layer thickness of three feet. Bare material would be seeded and mulched at the completion of operations. *National Core BMP Technical Guide – Road 4.*

E5. Woody material removed from stream channels during culvert maintenance would be retained in the stream network. Typically this would entail repositioning wood located upstream from a culvert to a location downstream of the culvert. *National Core BMP Technical Guide –AqEco 2, Road 4, Road 7 and Veg 3.*

E6. Where water is needed for dust abatement, road maintenance, reconstruction or construction, it shall not be withdrawn from streams or rivers classified as Listed Fish Habitat. Water may be withdrawn from other streams as long as the flow is not reduced by more than 50% (visually estimated). Suction hoses would have screens with maximum openings of 1.75 mm for woven wire or 3/32 inch for perforated plate.

F. Timber and Rock Transport (Haul)

F1. Haul would be stopped immediately, even in the dry season, if road use is causing rutting of the road surface, ponding of water on the road, failure of any drainage structure, or any other action occurs which increases the sediment delivery to a stream. Roads would be restored or repaired before haul resumes. *National Core BMP Technical Guide – AqEco 2, Road 1, Road 4, Veg 2, Veg 3 and Veg 7.*

Wet Season Haul

F2. Haul would not occur on native surfaced roads during the wet season unless roads are sufficiently frozen. *National Core BMP Technical Guide – Road 1, Road 4, Veg 2, Veg 3 and Veg 7.*

F3. Haul may occur during the wet season on paved roads or on aggregate surfaced roads if the following criteria are met: Haul routes would be inspected weekly, or more frequently if weather conditions warrant. Inspections would focus on road surface condition, drainage maintenance, and sources of soil erosion and sediment delivery to streams. If sediment traps are used they would be inspected weekly during the wet season and entrained soil would be removed when the traps have filled to $\frac{3}{4}$ capacity. Removed materials would be deposited in a stable site which is not hydrologically connected to a stream. *National Core BMP Technical Guide – Plan 3, AqEco 2, Road 1, Road 3, Road 4, Road 7, Veg 2, Veg 3 and Veg 7.*

F4. One means to estimate when it is too wet for haul is to measure precipitation on site. Generally haul would not occur when there has been 1.5 inches of precipitation or greater within any given 24 hour period as measured at the lowest elevation aggregate road. A temporary rain gauge may be installed near the transport route; otherwise precipitation would be measured at a nearby RAWS or SNOTEL station. The District Ranger with input from a unit fish biologist, hydrologist or soil scientist would consider precipitation quantity along with a visual inspection of roads and professional judgment to indicate when haul should be stopped to prevent road related impacts to streams. *National Core BMP Technical Guide – Plan 3, AqEco 2, Road 1, Road 3, Road 4, Road 7, Veg 2, Veg 3 and Veg 7.*

F5. To protect the integrity of roads, haul would not occur when the temperature of the road surface, as measured at the lowest elevation along the route on system roads, is between 28 and 38 degrees F. or when it is determined that freeze-thaw conditions exist along the route. *National Core BMP Technical Guide – Road 4.*

F6. If snowplowing occurs, snow would be removed in a manner which protects the transportation resource and all other adjacent or connected resources. Upon

completion of snowplowing, windrows and snow berms would be removed or breached to avoid accumulation or channelization of snow melt on the road. Breaching would avoid the discharge of water from the road into streams or onto erosive slopes. Any loss of roadway surfacing materials as a result of snowplowing operations would be replaced in kind by the operator. The operator would repair or replace any roadway structures that are damaged as a result of snowplowing operations. *National Core BMP Technical Guide – Road 8 and Veg 7.*

G. Soil and Erosion

G1. No operation of off-road ground-based equipment would be permitted in the wet season. It applies to off-road ground-based equipment such as tractors, skidders, harvesters or equipment used for fuels treatment. The District Ranger may waive this restriction if soils are dry, frozen or snow covered, based on input from a soil scientist.

If soil moisture exceeds 20%, waivers may be considered for operations on approved skid trails as long as ruts do not exceed 12 inches in depth over more than 10 percent of a designated skid trail system.

For frozen conditions waivers may be considered if the following conditions are met.

Soil not frozen	Need 10 inches of machine-packed snow
2 inches of frozen soil	Need 6 inches of machine-packed snow
4 inches of frozen soil	No snow cover necessary

National Core BMP Technical Guide - Veg 2, Veg 4, and Veg 7.

G2. Erosion control measures would be implemented to prevent off-site movement of disturbed or exposed soil associated with road and landing construction and use (including cutbanks, fills, ditches, etc.) on road segments that have the potential to directly or indirectly deliver sediment to any stream channel. Erosion control measures include silt fences, straw bales, matting, mulch, slash, water bars, grass seed [or other products], etc. This work would occur prior to the wet season. *National Core BMP Technical Guide – Veg 2, Veg 3, Veg 4, Veg 5 and Veg 6.*

G3. Erosion control measures would be implemented to prevent off-site movement of disturbed soils from logging, fuel treatments, road rehabilitation and other uses not described in G2. Areas of soil displacement on steep slopes resulting from yarding systems would be treated to prevent rill and gully erosion and possible sediment delivery to stream courses. Where appropriate, erosion control treatment on bare soils may include water bar placement, hillslope contouring, creating small ditches or diversions to redirect surface water movement, scattering slash on

disturbed soils, placement of mulch, and application of approved seed. Mulch may be used on slopes greater than 20%. Effective ground cover would be installed prior to October 1 of each year. The coverage of effective ground cover would be sufficient to prevent off-site movement of soils as guided by Forest Plan standard FW-025 and by Forest Service Handbook 2509 (R6 supplement). *National Core BMP Technical Guide – Veg 2, Veg 3, Veg 4, Veg 5 and Veg 6.*

G4. Native plant materials are the first choice in revegetation of bare soils, [e.g., blue wildrye (*Elymus glaucus*), California brome (*Bromus carinatus*), slender hairgrass (*Deschampsia elongate*), and broadleaf lupine (*Lupinus latifolius*)]. Non-native, non-invasive plant species may be used if native plant materials are not available or as an interim measure designed to aid in the re-establishment of native plants.[e.g., annual ryegrass (*Lolium multiflorum*) and Madsen sterile wheat.] Non-native invasive plant species would not be used.

H. Invasive species

H1. All off-road equipment is required to be free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds prior to coming onto National Forest lands. Contracts would include provisions to minimize the introduction and spread of invasive plants. These provisions contain specific requirements for the cleaning of off-road equipment.

H2. Gravel or rock used for roads would come from weed free sources.

H3. Road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants would be conducted in consultation with invasive plant specialists.

H4. Seed used for erosion control or other reasons would preferably be grown under government-supervised contracts, or certified by the state of Oregon to assure noxious weed free status. In certain cases, non-certified seed may be used if it is deemed to be free of Oregon State Class A & B noxious weeds.

H5. When straw and mulch are utilized for erosion control, it would be annual ryegrass straw or spring wheat straw certified by the State of Oregon, or would originate from fields which grow State of Oregon certified annual ryegrass seed, or originate from Willamette Valley Oregon fields which grow only annual ryegrass seed for large-scale commercial seed production. In place of straw, wood fiber mulch may be used.

National Core BMP Technical Guide – Veg 4.

I. Road Decommissioning and Rehabilitation

National Core BMP Technical Guide – Road 6 and Road 7.

I1. For road removal projects within riparian areas, recontour the affected area to mimic natural floodplain contours and gradient to the greatest degree possible. If

natural contours are greater than 2 to 1 ratio, then slopes would be shaped to a 2 to 1 ratio or less.

I2. For those road segments immediately adjacent to the stream or where the road fill is near the wetted stream, consider using sediment control barriers such as certified weed-free straw bales or silt fencing between the project and the stream.

I3. Where decompaction is prescribed, 50-75% of the road surface would be decompacted through the sub-grade and native vegetation could be placed on road surface no more than one layer deep. The road surface would be decompacted to a minimum depth of 18 inches.

I4. Following earthwork, the disturbed area would be treated as described in PDC G3 above. Where slash is not available, mulch would be applied at approximately 2,000 pounds per acre or so that there is completed coverage of the bare soil surface and the mulch is 4 inches deep. If seed is applied, it would during conditions favorable for germination.

I5. Drainage features would be spaced to hydrologically disconnect road surface runoff from stream channels.

I6. Dispose of slide and waste material in stable sites out of the flood prone area. Waste material other than hardened surface material (asphalt, concrete, etc) may be used to restore natural or near-natural contours.

I7. Minimize disturbance of existing vegetation in ditches and at stream crossings to the greatest extent possible.

I8. Conduct activities during dry-field conditions – low to moderate soil moisture levels. Road decommissioning activities would be suspended if there is more than one inch of rain in a 24 hour period or more than two inches of rain for the entire storm event as defined as precipitation in the last 48 hours at the Red Box RAWS Station (<http://www.wrh.noaa.gov/mesowest/getobext.php?sid=RXFO3&table=1&banner=off>). If this site is not functioning, then use the information at the Peavine Ridge SNOTEL site (<http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=&sid=PVRO3&num=168&raw=0&dbn=m&banner=off>), or as determined by the Contracting Officer. Project operations would be suspended if soil moisture is recharged and streamflows rise above baseflow levels (Clackamas River at Three Lynx above 2,000 cfs).

I9. The Oregon Department of Fish and Wildlife Guidelines for Timing of In-Water Work would be followed. Exceptions to these guidelines for timing of in-water work may be requested from appropriate regulatory agencies. Culvert removal would only occur when streams are dry.

I10. At culvert removal sites, the road would have waterbars or other drainage features constructed to route surface water away from the newly excavated slopes.

I11. Dispose of side-cast material in stable sites out of the flood prone area. Native soils and rock used to construct the road may be used to restore natural or near-natural floodplain and bankfull contours, which were altered by the road and associated ditches and structures.

J. Wildlife

J1. Northern Spotted Owl - There are restrictions during the breeding season for certain activities based on the type of activity and the distance to activity centers. Details on the restrictions and rationale are in the U.S. Fish and Wildlife Service's Letter of Concurrence. Restrictions apply to the use of chainsaws and heavy equipment (393 yards) between March 1 and July 15. (This only affects a few acres of units 4 and 12). Burning is also restricted during this period within 768 yards of activity centers. This burning restriction applies to several units including parts of units 4, 6, 12 and 20.

J2. Deer and Elk Summer Range - Noise generating activities such as harvest, road construction and fuels treatment would not occur between April 1st and July 30th (the fawning, calving and rearing season) in the B11 Deer and Elk Summer Range area.

J3. Snags & Down Wood - Dead lodgepole pine trees are very common in this area. The snags from other tree species would be retained in all units where safety permits.

The project would emphasize the retention of lodgepole pine snags in riparian reserves and other areas outside harvest and fuels treatment units.

Decayed down logs from tree species other than lodgepole pine currently on the forest floor may be retained where fuel tonnage objectives are met.

K. Operations

K1. Spill Prevention - An approved Spill Prevention Control and Containment Plan (SPCCP) would be created as required by contract clause G.3.4.1, which describes measures to prevent or reduce impacts from potential spills. The SPCCP would include a description of the hazardous materials that would be used; and a spill containment kit would be located on-site. All trucks used for refueling would carry a hazardous material recovery kit. All vehicles and machinery would be free of petroleum leaks. Any leaks that occur would be immediately repaired. Power equipment would be refueled at least 150 feet from water bodies to prevent direct delivery of contaminants into a water body. If local site conditions do not allow for a 150-foot setback, then refueling would be as far away as possible from the water body. For all immobile equipment, absorbent pads would be used. All petroleum products being transported or stored would be

in approved containers meeting Occupational Safety and Health Administration standards and Oregon Department of Transportation. All vehicles hauling more than 300 gallons of fuel would have an approved communication system with which to report accidental spills. Any contaminated soil, vegetation or debris must be removed from National Forest System lands and disposed of in accordance with state laws. *National Core BMP Technical Guide – Road 10.*

K2. Contracts would contain provisions for the protection of **heritage resource** sites found during project activities. In the event that sites are located during implementation, project activities would be halted until consultation with the Forest Archeologist can determine appropriate site-specific mitigation. Protection measures would be developed in consultation with the Oregon State Historic Preservation Officer (SHPO), appropriate Tribes, and, if necessary, the Advisory Council on Historic Preservation.

K3. Culturally-modified trees would be flagged individually and avoided. Harvest trees would be felled directionally away from flagged trees.

K4. All designated historic trails requiring protection, including the Skyline Trail, would be protected by retaining all designated blaze trees and the inclusion of an equipment exclusion buffer. The buffer would be 30 feet wide on each side of the trail. Harvest and fuel treatment could occur within the buffer but ground-based equipment would be excluded except at approved crossings. Trees would be felled away from the trail and away from blaze trees. Slash piles would be located outside the buffer. If blaze trees are considered hazardous, they may be cut above the blaze.

L. Roads

L1. **Signing** - All signing requirements on roads that are open for public use within the Forest would meet applicable standards as set forth by the Manual of Uniform Traffic Control Devices (MUTCD). Some roads accessing State and County highways may require additional signing to warn traffic of trucks entering onto or across the highway. Temporary Roads and National Forest System Roads (system roads) which are designated for ‘project use only’ would be signed at the entrance to such roads with “Logging Use Only” signs and make every reasonable effort to warn the public of the hazard and to prevent any unauthorized use of the road.

L2. **Clearing** - National Forest System Roads that are open to the public and which have asphalt or bituminous surfacing would have the traveled way cleared of materials introduced by project operations that pose a hazard to safe travel. These materials include, but are not limited to, mineral soil, rock, limbs, bark, wood chips, or trash.

L3. Steel tracked equipment would not be operated on asphalt or bituminous surfaced roads unless they are first protected by matting materials such as wood chip or crushed rock.

L4. Temporary roads and landings located on or intersecting system roads that are asphalt or bituminous surfaced would have 3" minus or finer dense graded aggregate placed at the approach to prevent surface damage. The material would be placed so that the approach flares are wide enough to accommodate the off-tracking of vehicles entering onto or leaving the site.

L5. Temporary roads and landings adjacent to aggregate surfaced system roads could introduce mineral soil contamination which would degrade and reduce the load bearing capacity of the aggregate road surface. All appropriate measures would be taken to prevent or reduce such contamination. If contamination occurs, the operator would repair contaminated areas with specified aggregate surfacing.

N. Fuel Treatment and Burning

Prescribed fire burn plans would follow the Interagency Prescribed Fire Planning and Implementation Procedures Guide 2008 as well as the Best Smoke Management Practices to minimize smoke effects.

N1. Machine or hand piles would be no less than 6 feet high by 6 feet in diameter by 6 feet wide and would be no greater than 20 feet wide by 20 feet long by 12 feet high. Landing piles may be larger.

N2. Most existing and created slash material up to 6 inches in diameter would be piled. Some larger material may also be piled.

N3. It is likely that some existing or created slash up to 6 inches in diameter would be too scattered or not feasible to pile and would remain on the ground and not in piles. This material would be lopped and scattered to within 18 inches of the ground and would not exceed 15 tons per acre.

N4. Pieces over 6 inches in diameter that are not piled would be lopped and scattered so that they lie on the ground.

N5. Piles would be created away from large live leave trees to reduce scorch and/or mortality during pile burning.

N6. Adhere to smoke management direction provided by the Oregon Department of Forestry.

N7. Implement prescribed fire using meteorological conditions, including favorable smoke mixing days, discontinuing ignition early to reduce or eliminate smoke during inversion conditions, and burning piles in cool wet weather.

N8. Implement prescribed fire prescriptions that increase combustion efficiency and reduce smoldering. Burn when fuels are dry. Piles would be covered if necessary. Minimize dirt in piles.

N9. Conduct smoke monitoring as defined in the monitoring element of the prescribed fire burn plan.

2.2.6.1 Monitoring

Prior to and during implementation, a multi-stage process is used on the Forest to ensure that a project is implemented as planned. Before beginning the on-the-ground contract preparation process, which includes layout of the units, designating the trees to retain, and cruising the timber, forestry technicians and field crew members meet with the Interdisciplinary Team (IDT) to transition to the implementation phase of the project. Resource specialists identify any resource concerns in individual units or highlight any key project design criteria on a unit-by-unit basis. After the field work 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 & Implementation Crosswalk Form. The purpose of the crosswalk is to ensure that all components of the NEPA Decision, including the project design criteria and terms and conditions from consultation, are incorporated into the contract. For each required component of the NEPA decision, the crosswalk identifies how and what stage in the process the component would be addressed (e.g., during field work, contract, contract administration, post contract monitoring). The information generated from the crosswalk 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.

Prior to advertisement, a final review is conducted to ensure that the contract is prepared with the proper contract provisions and language; the project design criteria are properly inserted and contractually enforceable; and the contract and appraisal meets Forest Service Handbook, Forest Service Manual and Stewardship Guide (where applicable) regulations and direction. This final review may be informal or may be formalized in a Forest-level review or “Plan-in-Hand.” “Plan-in-Hand” reviews are randomly selected and may or may not include this project. The goal of this formal review is to monitor and evaluate forest resource management prescriptions, to measure compliance with goals and objectives, and to make adjustments when needed. The “Plan-in-Hand” review is summarized in a letter to the Forest Supervisor which is included in the final appraisal/contract packet.

During implementation, the Contract 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 contract 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 Contract 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 contract 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 project to conduct monitoring and to help insure that the project is being implemented as intended by the NEPA decision.

Monitoring is also conducted at the Forest level as part of the Forest Plan implementation, including monitoring of noxious weeds and BMPs. 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.

The project would be part of a pool of completed units available for randomly selected BMP monitoring. More detail on monitoring can be found in sections 3.9.5.3-5.

2.2.7 Proposed Forest Plan Amendment and Exceptions

Due to the changed conditions from widespread insect mortality in lodgepole pine stands, several Forest Plan standards and guidelines would not be achieved as written and a project-level Forest Plan amendment is proposed. If the existing condition does not meet a standard but the proposed action does not move the area farther away from desired conditions, then a forest plan amendment is not needed. There is also the need for exceptions to “should” standards and guidelines, but since those do not require a Forest Plan amendment, they are addressed in a separate section (s. 2.2.7.2). The changes included in this Forest Plan amendment and exceptions are not permanent and are limited geographically to only the treatments proposed for this project. Additional elaboration on the rationale and the effects of the amendment and exception are included in each resource section in chapter 3.

2.2.7.1 Amendment of Standards and Guidelines with Rationale

Changes are shown in *italic* for additions and ~~striketrough~~ print for deletions. Greater detail on the rationale can be found for each resource in section 3. The amended standards and guidelines below would apply to the Lemiti project and would be temporary.

Standard and Page	Text of Standard	Amendment	Rationale for Deviation
FW-553 p. Four-107 Visual Resource Management	Management Area VQOs shall be prescribed as summarized in table Four-22.	Management Area VQOs shall <i>should</i> be prescribed as summarized in table Four-22. Table Four-22 is changed to require Modification for the B3 and A5 land allocations.	The Partial Retention VQO prescribed on 33 acres of proposed fuel treatment on the B3 land allocation, and the Retention VQO prescribed for 78 acres of proposed fuel treatment on A5 would be changed to Modification. The rest of Table Four-22 would not change including the Modification VQO for B11 and C1, and the Partial Retention VQO for A9 and B7. A map in Appendix A shows the proposed treatments in relation to the existing VQOs. These areas have already been partially logged and scenery has been altered by this logging and by the insect killed trees. Fuel treatments and cutting dead lodgepole pine would be visually evident for several years. The two areas that would change are not isolated viewsheds but part of a longer driving experience through a landscape with a Modification VQO where visitors encounter old clearcuts and other altered scenery with frequent dead trees. Section 3.7.5.1 has more detail on the rationale.
B3-013 p. Four-230 Roaded Recreation	All management activities shall meet the visual quality objective of Partial Retention as seen from open roads, high recreation use areas and water bodies.	All management activities shall <i>should</i> meet the visual quality objective of Partial Retention <i>Modification</i> as seen from open roads, high recreation use areas and water bodies.	This is applicable in the B3 land allocation. This standard is similar to FW-553 except that it identifies the viewer position. Fuel treatments and cutting dead lodgepole pine would be visually evident for several years. Part of unit 20 is in the B3 allocation. There are no high use recreation areas or water bodies but there are open roads in the B3 area. Section 3.7.5.2 has more detail on the rationale.
FW-163 p. Four-68 Forest Diversity	A continuous supply of hard snags for community structural diversity shall be maintained in harvested areas.	A continuous supply of hard snags for community structural diversity shall <i>should</i> be maintained in harvested areas <i>at the landscape scale</i> .	Abundant lodgepole pine hard snags are available at the landscape scale. Dead lodgepole trees are expected to fall within 10 years. Adjacent stands of mature trees would be able to provide a continuous supply of hard snags. Section 3.3.10.1 has more detail on the rationale.
FW-166 p. Four-68 Forest Diversity	A continuous supply of down woody material shall be maintained in harvested areas.	A continuous supply of down woody material shall <i>should</i> be maintained in harvested areas <i>at the landscape scale</i> .	Lodgepole pine down logs would be abundant at the landscape scale. Dead lodgepole trees are expected to fall within 10 years. Adjacent riparian reserves, Wilderness and stands of mature trees would provide a continuous supply of down woody material. Section 3.3.10.2 has more detail on the rationale.

Standard and Page	Text of Standard	Amendment	Rationale for Deviation
FW-218 p. Four-74 Wildlife	Wildlife tree prescriptions shall provide for all primary cavity nesting species indigenous to the treated site.	Wildlife tree prescriptions shall <i>should</i> provide for all primary cavity nesting species indigenous to the treated site <i>at the landscape scale</i> .	Abundant lodgepole pine snags are available at the landscape scale but they are not large enough to provide for most cavity nesting species. Adjacent stands of mature timber would provide larger snags. Section 3.3.10.3 has more detail on the rationale.
A5-001 p. Four-159 Unroaded Recreation	All management activities shall meet the semi-primitive non-motorized Recreation Opportunity Spectrum class.	All management activities shall <i>should</i> meet the semi-primitive non-motorized <i>roaded modified</i> Recreation Opportunity Spectrum class.	This is applicable in the A5 land allocation. Approximately 78 acres of this land allocation which has already been partially logged, would be treated. The area would be visually altered. In the long term, the area would likely meet the semi-primitive non-motorized recreation opportunity spectrum as young trees grow. Section 3.7.5 has more detail on the rationale.
B3-001 p. Four-230 Roaded Recreation	All management activities shall meet roaded natural Recreation Opportunity Spectrum class, or less developed settings.	All management activities shall <i>should</i> meet roaded natural <i>modified</i> Recreation Opportunity Spectrum class, or less developed settings.	This is applicable in the B3 land allocation. Approximately 33 acres of unit 20 overlap this land allocation. The area would be visually altered and until the site grows young trees it would not likely meet the roaded natural Recreation Opportunity Spectrum. Section 3.7.5 has more detail on the rationale.

2.2.7.2 Proposed Forest Plan Exceptions

Standard	Text of standard	Rationale for Deviation
FW-033 p. Four-50 Soil Productivity	At least 15 tons per acre of dead and down woody material in east side vegetation communities and 25 tons per acre in west side communities should be maintained and evenly distributed across managed sites.	While the treatment area near the crest of the Cascades, drains toward the west, the vegetation and the fire hazards are like those on the east side of the Forest. The project objectives are to reduce residual fuels to between 10 and 15 tons per acre. On more typical, wetter, west side stands, large rotting down logs make up a large percentage of the desired 25 tons per acre without substantially affecting fire hazard. Retaining 25 tons per acre would not be consistent with the fuels reduction objective. Section 3.8.9.1 has more detail on the rationale.
FW-215 p. Four-74 Wildlife	Where new timber harvest units occur (e.g. regeneration harvest and commercial thinning), wildlife trees (i.e. snags and green reserve trees) should be maintained in sufficient quantity and quality to support over time at least 60% of the maximum biological potential of primary cavity nesting species, e.g. woodpeckers.	Abundant lodgepole pine snags are available at the landscape scale but they are not large enough to provide for most cavity nesting species. The project would remove small dead trees that are very abundant across the landscape. This exception would emphasize the management of snags outside treatment units in adjacent areas such as riparian areas and Wilderness. There are other similar snag related standards and guidelines such as FW-164, 165, 169, 230 and 231. Some live trees would be retained. Section 3.3.9.2 has more detail on the rationale.

Standard	Text of standard	Rationale for Deviation
FW-062 p. Four-53 Water	Not more than 35% of an area available for vegetative manipulation should be in a hydrologically disturbed condition at any one time.	The dead trees have created a potential hydrologic impact by reducing live canopy cover. The dead trees, even when they start to fall, do provide some mitigation for rain-on-snow events and the fuel treatments would change that. However the risk of larger wildfires to hydrology with no treatment would have greater impact. Section 3.9.5.1 has more detail on the rationale and the use of the Aggregate Recovery Percentage model used for this calculation.
FW-064 p. Four-53 Water	Watershed impact areas at the subbasin or area analysis level (i.e., typically 3000 to 6000 acres) should not exceed 35 percent.	The dead trees have created a potential hydrologic impact by reducing live canopy cover. The dead trees, even when they start to fall, do provide some mitigation for rain-on-snow events and the fuel treatments would change that. However the risk of larger wildfires to hydrology with no treatment would have greater impact. Section 3.9.5.1 has more detail on the rationale and the use of the Aggregate Recovery Percentage model used for this calculation.
FW-219 p. Four-74 Wildlife	An average total of at least 6 logs per acre in decomposition classes 1, 2 and 3 should be retained in all project activity areas. There are other similar down wood related standards and guidelines such as FW-167, 169, 221-229.	The project would retain logs at the level of 10 to 15 tons per acres. At the landscape scale, there would be sufficient down logs to provide for wildlife habitats. Section 3.3.9.3 has more detail on the rationale.
FW-556 p. Four-113 Visual Resource Management	The prescribed VQO should be achieved within one year after completion of any project activities.	It is not likely that the prescribed VQO levels would be achieved until small trees regrow. It may take approximately 10 years for trees to grow tall enough for the area to be considered visually recovered. Section 3.7.4.1 has more detail on the rationale.

2.3 Other Alternatives Considered

Section 1.6.1 discusses issues and concerns that were received from the public. These issues were used to refine the proposed action, including the project design criteria, and to frame the analysis for this project. For example, during the early planning phases a broader range of treatment areas was considered, but after scoping, field trips with interested publics, and further interdisciplinary discussion, several areas were eliminated from consideration including treatments in riparian reserves, treatments in mature forest habitats, and treatments in suitable owl habitat. For further information on the development of the proposed action, see section 1.5.4.

2.3.1 Bark made ten suggestions and indicated that the Forest consider these as separate alternatives or in combination. Since Bark has not advocated for any of the following items at the exclusion of the others, they are considered together and separately where appropriate. Most of the proposed fuel treatments (88%) would be eliminated by these suggestions when combined. The few treatments that would remain (approximately 180 acres) would not provide sufficient fire hazard reduction and therefore would not meet the purpose and need. The Forest would not implement this small area by itself because it would be an ineffective fuel treatment. The suggestions below were considered separately.

- Provide a clear timeline and funding mechanism for road closures and removals at Lemiti Butte and include in EA. *This is not an action item that could be included in an alternative. Temporary roads are not built or rehabilitated using appropriated funds from the agency budget. The work is covered by an appraisal allowance and is supported by the value of the forest products removed. The rehabilitation of temporary roads is required by the contract and is not contingent upon receiving money from an outside source. Temporary road rehabilitation is completed after use and prior to the following winter; it is completed before the contract termination date.*
- Explain how the project will be funded, including specific amounts from the different Budget Line Items in the MHNF annual budget. *This is not an action item that could be included in an alternative. It is also outside the scope of this analysis. Other than planning and administrative costs, projects are not funded by the agency's appropriated budget. The work is covered by an appraisal allowance and is supported by the value of the forest products removed. Some items such as large culvert replacements may be funded by retained receipts.*
- Consider moving forward with this project in a way that does not require building roads into significantly large roadless areas (1,000 acres or more). *There are some blocks of land that do not contain roads but they are too small and do not meet the Forest Plan definition of roadless areas. This suggestion would eliminate approximately 980 acres of fuel treatments or 68% of the total. This suggestion was considered separately but was not fully developed because the effects to unroaded and undeveloped landscapes were found to be*

minimal and because the remaining treatments would not result in an effective fuel treatment. While Bark did not suggest completing the fuel hazard reduction work in this area using helicopters, it was considered but not developed because the value of the products removed would not cover the very high cost of helicopters and because helicopters are not capable of completing the other fuel manipulations that are needed.

- *Eliminate all areas to the west of road 4220 because this area does not have very much lodgepole pine and is transitioning to old growth. This would eliminate 255 acres of fuel treatments or 18% of the total. A portion of the area to the west of 4220 was deleted during early planning stages (the area between units 13 and 14) because it was considered suitable spotted owl habitat. Other areas were retained because they were not suitable spotted owl habitat and because treatment is needed to meet fire hazard reduction goals. This suggestion was considered separately but was not fully developed because the effects to stands with mature trees were found to be minimal and the remaining treatments would not result in an effective fuel treatment.*
- *Establish a 21-inch diameter limit on cutting trees within fuel breaks. Diameter limits are rarely appropriate because a one-size-fits-all diameter does not adequately address spacing and ladder fuel treatments. While small trees would be removed and the larger trees retained, the Forest Plan does not recognize 21 inches as a special size class. This suggestion was considered separately but was not fully developed because the impacts to trees over 21 inches diameter were found to be minimal and because it would provide a similar level of resource protection when compared to the proposed action and is therefore not substantially different from the proposed action in that respect.*
- *Establish a 21-inch diameter limit on cutting both green trees and snags (including lodgepole) in proposed treatment areas. Diameter limits are rarely appropriate because a one-size-fits-all diameter does not adequately address spacing and ladder fuel treatments. While small live trees would be removed and the larger trees retained, the Forest Plan does not recognize 21 inches as a special size class. Snag species other than lodgepole pine would be retained where safety permits. There are no lodgepole pine snags greater than 21 inches. In Bark's comment letter a photo of a large western white pine snag was incorrectly identified as lodgepole pine. There are occasional large western white pine, Douglas-fir and mountain hemlock snags all of which would be retained regardless of their size where safety permits. This suggestion was considered separately but was not fully developed because the impacts to trees over 21 inches diameter were found to be minimal and because it would provide a similar level of resource protection when compared to the proposed action and is therefore not substantially different from the proposed action in that respect.*

- Retain a viable understory of mixed conifer species including seedlings and saplings in all units. *This suggestion is part of the proposed action and was fully developed in that alternative. This suggestion was considered separately but was not fully developed because it would provide a similar level of resource protection when compared to the proposed action and is therefore not substantially different from the proposed action in that respect.*
- Place “skips” around groups of multiple intact green conifers with less lodgepole mortality. *Skips were not prescribed because the ladder fuels that would remain would put the live trees at greater risk of crown fire. This suggestion was considered separately but was not fully developed because it would provide a similar level of resource protection with slightly reduced fire hazard effectiveness when compared to the proposed action and is therefore not substantially different from the proposed action in that respect.*
- Remove Unit 22. This stand does not have much dead lodgepole pine and it should be deleted because it does not fit the EA’s description of ‘dense standing lodgepole pine with a thick carpet of young seedlings and saplings.’ *This unit is approximately 47 acres. The EA describes that the project is centered on the large stands of dead lodgepole pine but also describes that a portion of the treatment area includes a mixed conifer stands with a large component of live trees (s. 2.2). The proposed fuel treatment would remove the small trees and retain the larger ones. Stands such as unit 22 are included because they have high levels of fuels including ladder fuels that are proposed for treatment as part of a suite of treatments that work together to create a broader landscape scale effective fuel treatment project. This suggestion was considered separately but was not fully developed because the impacts from unit 22 were found to be minimal and because it would provide a similar level of resource protection with slightly reduced fire hazard effectiveness when compared to the proposed action and is therefore not substantially different from the proposed action in that respect.*
- Remove Unit 14. This stand is the smallest treatment unit and includes some mature trees similar to the adjacent stand that was deleted. It does not have much dead lodgepole pine and it should be deleted because it does not fit the EA’s description of ‘dense standing lodgepole pine with a thick carpet of young seedlings and saplings.’ *This unit is approximately 9 acres. The EA describes that the project is centered on the large stands of dead lodgepole pine but also describes that a portion of the treatment area includes a mixed conifer stands with a large component of live trees (s. 2.2). The adjacent stand was deleted because it was determined to be suitable northern spotted owl habitat. Unit 14 was found to not be suitable habitat. The proposed fuel treatment would remove the small trees and retain the larger ones. Stands such as unit 14 are included because they have high levels of fuels including ladder fuels that are proposed for treatment as part of a suite of treatments that work together to create a broader landscape scale effective fuel treatment*

project. This suggestion was considered separately but was not fully developed because the impacts from unit 14 were found to be minimal and because it would provide a similar level of resource protection with slightly reduced fire hazard effectiveness when compared to the proposed action and is therefore not substantially different from the proposed action in that respect.

- 2.3.2** Oregon Wild advocated for eliminating treatments in the unroaded and undeveloped area shown in a map they provided. They suggested the deletion of units that would use previously decommissioned roads and the deletion of all new roads. *The suggested deletions would eliminate most of the project (80%) leaving approximately 280 acres treatable. This action would not result in an effective fuel treatment and therefore would not meet the purpose and need for the project. Oregon Wild's suggestions were considered, and the impacts and benefits of this approach are documented in the No-Action Alternative.*

2.4 Comparison of Alternatives

This section presents a comparative summary of principal activities and the environmental effects for the alternatives being considered in detail. The summary is limited to the effects on the project's purpose and need, Forest Plan standards and guidelines, and other resources measurably affected and considered important for an informed decision.

	Alternative A - No Action	Alternative B - Proposed Action
Purpose and Need Indicators		
Fire Hazard (s. 1.3 & 3.1)		
Acres of hazardous fuel treated	0	1,432 ac.
Flame length	Up to 19+ ft. Averaging 8 feet.	Less than 4 ft.
Forest Productivity (s. 1.3 & s. 3.2)		
Acres of sapling thinning	0	130 ac. of sapling thinning only, and 1,262 acres of fuel treatment and sapling thinning.
Acres of hazardous fuel treated	0	1,432 ac.
Safe Access (s. 1.3 & s. 3.7)		
Acres treated adjacent to access Roads	0	17 ac.

	Alternative A - No Action	Alternative B - Proposed Action
Forage (s. 1.3 & s. 3.4)	Forage for deer and elk would continue to decline across the landscape. Trees would fall in a jackstrawed manner restricting deer and elk ability to access forage.	Forage for deer and elk would improve across the landscape particularly where forage seed is applied.
Road maintenance, repair and (s. 1.3, s. 3.11, s. 2.2.1)	0	33.7 miles. Culverts would be resized.
Summary of Actions (s. 1.4)		
Acres of fuel treatment to meet purpose and need	0	1,432 ac.
Miles of new temporary roads constructed and then rehabilitated	0	3.8
Miles of old road alignments reconstructed and then rehabilitated	0	3.5
Miles of system roads maintained	0	33.7
Public Issues and Concerns		
Beetles/Fire Hazard (s. 1.8.1.1). <i>Beetle mortality and fire are natural and should be left alone.</i>	No fuel treatment intervention. Allowing fires to burn is inconsistent with Forest Plan.	Non-intervention of beetle mortality would occur in riparian reserves and Wilderness. Elsewhere, fuel treatments would reduce fire hazard.
Snags (s. 1.8.1.2). <i>Snags are important and should be left alone.</i>	Abundant small snags at the stand and landscape scales. Small snags would likely fall within 10 years.	Abundant small snags at the landscape scale. Small snags would likely fall within 10 years.
Unroaded areas (s. 1.8.1.3). <i>Unroaded and undeveloped areas are important and should be left alone.</i>	Unroaded and undeveloped areas would have no additional road construction and an abundance of small snags and eventually jackstrawed down wood.	Unroaded and undeveloped areas would have temporary roads and landings constructed and rehabilitated after use. Unroaded and undeveloped ecosystem process would occur in the Wilderness. There are no designated roadless areas in the project area.
Roads (s. 1.8.1.4). <i>Roads cause unwanted impacts and should not be built.</i>	No roads would be constructed, reconstructed or repaired.	3.8 miles of new temporary roads would be constructed and 3.5 miles of existing temporary road alignments would be reconstructed. They would be rehabilitated and closed after use.
Economic Feasibility (s. 1.8.1.5). <i>The low value of timber will not pay for cleanup and fuel reduction.</i>	Fire suppression actions would be very expensive.	Fire suppression would be safer and more effective. The yarding of tops attached to removed products would get most of the fuels to the landing where it can be burned. Low valued forest products are not expected to finance all fuel treatments. The area is suitable for timber management. Young saplings would result in full stocking.

	Alternative A - No Action	Alternative B - Proposed Action
Protection of Trails (s. 1.8.1.6). <i>Old trail alignments should be protected.</i>	Jackstrawed trees would fall across historic Skyline Trail.	There are no system trails within the project area. Segments of the historic Skyline Trail are located within the project area and would be protected but jackstrawed trees would fall.
Effects Summary		
Fuels and Fire Hazard (s. 3.1).	Fire hazard would gradually increase as dead trees fall in a jackstraw manner. Fires could not be safely suppressed – fires would get larger with extreme fire behavior. Indirect suppression tactics would be used. Greater affect to resources and values in and adjacent to the planning area including on CTWS Reservation.	Fire hazard would be reduced. Fire suppression would be safer; direct suppression during initial attack would result in smaller fires that would burn with lower intensity. Greater protection to resources and values in and adjacent to the planning area including on CTWS Reservation. Fire would burn in a mosaic pattern at the landscape scale because not all hazards are treated.
Stand Growth and Productivity (s. 3.2)	With jackstrawed fallen trees and dense saplings growing through them, forest stands may become unmanageable. Saplings would have greater likelihood of burning.	Stands would be restored to appropriate stocking with saplings that are free to grow. Saplings would have greater level of protection because fires would be kept smaller. With no jackstrawed trees, the area would be manageable in the future.
Snag Management (s. 3.3)	There would vast areas with small snags. Higher fire risk compared to proposed action resulting in more acres burned and more snags.	Plan amendment would focus on landscape scale snag habitat. Project would remove small snags in treatment areas, but sufficient snags would remain in riparian reserves and other areas.
Deer and Elk Habitat (s. 3.4)	Trees falling in jackstrawed manner would restrict animal movement. Forage would be low quality and difficult to utilize.	Plan amendment would deemphasize importance of cover. Forage seeding would enhance quantity and quality of forage.
Northern Spotted Owl (s. 3.5.1.3)	No short-term effect. Larger fires would likely burn adjacent suitable owl habitat.	May affect, but not likely to adversely affect in the short term. Smaller fires would provide greater protection to adjacent suitable owl habitat.
Sensitive Species (s. 3.5.2, s. 3.10.5, s. 3.12)	No short-term impact. Larger fires would likely burn adjacent habitat.	In the short term, project may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing for bald eagle and western bumblebee. Smaller fires would provide greater protection to adjacent habitat.
Survey and Manage (s. 3.5.4, s. 3.10.5 & s. 3.12)	No short-term impact. Larger fires would likely burn adjacent habitat.	No species present. Smaller fires would provide greater protection to adjacent habitat.

	Alternative A - No Action	Alternative B - Proposed Action
Pileated Woodpecker (s. 3.5.3.1)	No short-term impact. Larger fires would likely burn adjacent habitat.	Would not contribute to a negative trend in viability on the Forest. Smaller fires would provide greater protection to adjacent habitat.
American Marten (s. 3.5.3.2)	No short-term impact. Larger fires would likely burn adjacent habitat.	Would not contribute to a negative trend in viability on the Forest. Smaller fires would provide greater protection to adjacent habitat.
Unroaded and Undeveloped Character (s. 3.6)	Areas would remain roaded and undeveloped. Values associated with unroaded and undeveloped areas may be compromised during attempts to suppress wildfire with machinery.	Areas would have stumps, skid trails, temporary roads and other signs of human activity. Unroaded and Undeveloped areas are relatively small and the project would overlap most of the identified blocks. Fires would be kept smaller providing greater protection to adjacent areas.
Scenery (s. 3.7)	The visual quality is altered by large stands of dead trees that would soon fall in a jackstrawed pattern. Larger fires would likely burn adjacent scenery.	Forest Plan visual quality standards would be amended to Modification on 111 acres. Project actions would be visible. Stumps, temporary roads and landings would not likely meet Partial Retention or Retention visual quality objectives but would meet Modification especially after 10 years of sapling growth occurs. Scenery may improve sooner compared to no action. Wildfires would be kept smaller, benefitting scenery both in the treated areas and adjacent stands.
Recreation (s. 3.7)	Recreation opportunities would continue to be altered due to high mortality within the project area and the safety and access issues created by dead trees falling in a jackstrawed pattern. Visitors would be at risk with extreme fire behavior adjacent to the road during evacuations.	Fuel treatment activities would impact recreation opportunities in the short term by affecting scenery. Wildfires would be kept smaller, benefitting scenery and recreational opportunities both in the treated areas and adjacent stands. Road repair would improve recreational access to the Olallie Lake Scenic Area to the south. Visitors would have safer evacuation routes in the event of a wildfire.
Soil Erosion (s. 3.8.5)	Fires would be larger and burn with greater intensity causing erosion, particularly where fires expand on to steeper slopes.	Establishment of effective ground cover would minimize erosion. Treatments would occur on relatively flat terrain. Fires would be kept smaller and would burn with lower intensity. Due to flat ground, erosion would be minimal.
Detrimental Soil Disturbance (s. 3.8.6)	Existing skid trails would not be restored. Fires would be larger and burn with greater intensity causing 5 to 25% detrimental soil condition. Fire suppression impacts would be greater.	5 to 15% detrimental soil condition. Existing skid trails would be decompacted. Fires would be smaller with lower intensity.

	Alternative A - No Action	Alternative B - Proposed Action
Organic Matter (s. 3.8.7)	Fires would be larger and burn with greater intensity consuming duff and small woody debris. Charred trees/logs would decompose very slowly.	Designated skid trails would minimize duff disturbance. 10 to 15 tons of down woody debris would be retained for soil productivity. Fires would be smaller with lower intensity.
Water Quantity (s. 3.9.2)	Dead trees do not provide much amelioration for rain-on-snow events.	Little change due to removal of dead trees.
Water Temperature (s. 3.9.3.1)	Fires would be larger and burn with greater intensity. Greater likelihood of fire burning through riparian reserve and resulting in increased temperature.	No change. Buffers are sufficient to provide full shade to streams. Fuel treatments provide better protection for riparian reserves.
Sediment (s. 3.9.3.3)	Fires would be larger and burn with greater intensity. Sediment with modeled fire size would increase sediment over 400 times greater than the base line.	PDCs would minimize activity created sediment. Fire size would be smaller.
Fisheries ESA Listed Fish Habitat (s. 3.10.6)	No Effect in the short term. Fires would be larger and burn with greater intensity. Increased erosion and stream temperatures could affect fish.	No Effect in the short term. Smaller fires would provide greater protection to downstream habitat.
Fisheries MSA Essential Fish Habitat (s. 3.10.6)	No Effect in the short term. Fires would be larger and burn with greater intensity. Increased erosion and stream temperatures could affect fish.	No Effect in the short term. Smaller fires would provide greater protection to downstream habitat.
Management Indicator Species – Fish (s. 3.10.2)	No Effect in the short term. Culverts would remain an impediment to fish movement. Fires would be larger and burn with greater intensity. Increased erosion and stream temperatures could affect fish.	No Effect in the short term. Smaller fires would provide greater protection to downstream habitat and resident fish. Culverts would be replaced with larger structures.
Aquatic Conservation Strategy (s. 3.10.8)	Fires would be larger and burn with greater intensity compromising aquatic values.	Project is consistent with ACS. Smaller fires would provide greater protection to aquatic resources.
Transportation (s. 3.11)	No roads would be maintained or repaired.	Roads would be maintained and provide safe and efficient access to the Forest.

	Alternative A - No Action	Alternative B - Proposed Action
Botany (s. 3.12)	No species were found.	No species were found. May Impact Individuals or habitat but is not likely to lead to a trend toward federal listing for species where habitat is present.
Invasive Species (s. 3.13)	No change. Several invasive plants are present	PDCs would minimize spread of existing invasives and would minimize the introduction of new species.

3.0 ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Cumulative Effects

- 3.0.1 A discussion of cumulative effects is included for each resource where appropriate. Cumulative effects are impacts on the environment that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. If the proposed action would have little or no effect on a given resource, a more detailed cumulative effects analysis is not necessary to make an informed decision.

The land area and the time scale used for cumulative effects analysis varies by resource depending on factors such as how far in space and time the direct and indirect effects are manifested. These are explained for each resource topic in Section 3. The analysis considers the impact of activities on other ownerships where appropriate. The only other ownership in the project area is the CTWS Reservation.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

The cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach.

- A catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), as well as by natural processes of

growth and recovery since. Trying to isolate the individual actions that continue to have residual impacts would be nearly impossible.

- Providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions.
- Focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed to those effects.
- The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.
- The cumulative effects analysis in this document is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

“CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives would add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)”

Each resource includes a discussion of how information on past projects was considered. For the reasons discussed above, the analysis of past actions is primarily based on current environmental conditions. Some resources utilize the current GIS vegetation layer which includes information on current condition of forest stands as

they have been affected by events such as forest fires, past regeneration harvest and road construction as well as the growth that has occurred since.

3.0.2 Other Factors

Other types of projects or activities that are not included in the proposed action but may occur because they are authorized by other documents are also considered where appropriate including road decommissioning, gathering of special forest products, and recreational uses. Where there are recent, ongoing or foreseeable future projects, they are identified in each applicable resource section and included in the analysis, depending on the cumulative effects analysis area which is unique for each resource.

3.1 FUELS AND FIRE HAZARD

This section elaborates on the Purpose and Need (s. 1.3) and the overview provided at section 1.5.1. It summarizes the Silviculture and Fuels specialist reports which are incorporated by reference.

The Lemiti Fuels Reduction Project lies within a high elevation plateau near the crest of the Cascade mountain range. The terrain ranges from flat to gently rolling, with no discernible watershed or viewshed boundary. Historically, lightning is thought to have caused the stand-replacing fires where



lodgepole pine became established by natural seeding.

Diseased, beetle-killed, down and live fuels provide vertical continuity from the ground to continuous intermingled tree crowns. Dead limbs and branches from the crown to the bole remain on both live and dead trees in the mid and overstory canopy. Many trees are draped by thick and matted mosses and lichens which dry very quickly. In addition, dense growth of understory trees and ground vegetation contribute to the continuous fuel ladder. Due to this fuel accumulation, the predicted fire intensity would present wildfires with high resistance to control, that are

difficult, expensive and dangerous to contain at small sizes. There is a high level of concern for firefighter safety in the event of a high-severity wildfire in the area.

3.1.1 Disturbance Ecology

In lodgepole pine stands, approximately 99% of the lodgepole pine overstory has been killed by the mountain pine beetle infestation. For many centuries, mountain pine beetle followed by fire have the primary natural disturbance agents that have shaped the vegetation composition of the project area.

A natural fire regime is an integration of disturbance attributes including type, frequency, intensity, duration, and extent. The historic fire regime is an important reference point used to assess changes in vegetative patterns and the associated risks of uncharacteristic fire. The five natural (historic) fire regimes are classified based on the average number of years between fires (fire frequency) combined with the severity (Hann 2003). Lodgepole pine stands are typically classified in fire regime IV: mountain pine beetle infestations usually begin at stand age 60 to 80 and stand-replacement fires occur approximately every 100 years. Parts of the project area are classified as Fire Regime IIIC characterized by 100 - 200 year frequency with mixed severity. The remainder of the project area is fire regime V where stand replacement crown fires are expected. Because several fire regimes are adjacent and intermingled, a fire that begins in one would likely burn through multiple types.

The Mt Hood National Forest has been divided into eleven fire ecology groups based on vegetation, fire frequency, and behavior (Evers 1994). The project area is primarily in Fire Group 7, which is typically dominated by lodgepole pine with a fire frequency of 100-300 years. Stand-replacement crown fire is the pre-settlement and current expected fire behavior for this group. Evidence points toward the trend of stand conditions conducive to a wildfire.

- Approximately 99% of the lodgepole pine trees have been killed
- Lodgepole pine stands have experienced in-growth of high densities of shade tolerant small trees, creating ladder fuels
- Trees in this area are draped with lichens that are highly flammable in the dry season.

These circumstances cumulatively create a high fire-hazard situation. There is also a high likelihood of ignition from lightning or humans.

3.1.1.1 Fire Science

Some public commenters have suggested that there is some disagreement in the scientific community about whether areas such as this represent a real fire hazard. The relevant literature has been examined and the science supports treatments in the Lemiti area. Some research has shown a reduction of fire hazard when the needles

have fallen off dead trees but an increase when trees begin to fall. The following is a brief summary of the scientific literature considered.

- Meigs (2015) found a strong correlation between mountain pine beetle and additional acres burned in the west Cascades zone.
- A study by Harvey (2013) found that lodgepole pine forest burned in the 1988 Yellowstone Fires where plots in which >50% of the trees had evidence of mountain pine beetle outbreak within the prior 20 years were more likely to have burned as a crown fire.
- A paper by Omi (2003) examined areas that had fuel treatments prior to a wildfire and found that "the overall trend is that wildfires burn less severely in stands where fuels have been treated as compared to adjacent untreated controls."
- Another paper by Omi (2004) examining several fuel treatment studies found that "there is little disagreement in the positive outcomes demonstrated by the few investigation of fuel treatment efficacy that have been conducted to date."
- A paper by Lynch (2006) found that when dead lodgepole had fallen there was a significant correlation with burn pattern.
- A paper by Simard (2010) found that, "At longer time periods (10 to 40 years post-outbreak), understory tree growth may create ladder fuels that promote torching, and the opening of the stand could result in higher wind speeds and temperatures, and lower moisture content of surface fuels, which may increase surface fire intensity and possibly also increase torching, crowning and overall fire intensity." They also found that the Torching Index (wind speed needed to initiate torching) was "reduced to zero at 35 years post-beetle, indicating that in these stands, passive crown fires may be initiated even without wind."
- A paper by Jenkins (2008) found that "the highest fire hazard is presumed to exist in post-epidemic stands due to heavy fuel loading by large diameter materials coupled with the presence of regeneration and extreme fire weather conditions."
- A paper by Thompson (2013) found that fuel treatments are likely to reduce the number of large fires, fire sizes, and large fire suppression costs.
- A paper by Westerling (2006) found that climate change since the mid-1980s resulted in a shift toward unusually warm springs, longer summer dry seasons, drier vegetation and longer fire seasons. They found that middle and high elevation forest types such as lodgepole pine where fire exclusion has had little impact on natural fire regimes, but where an advance in spring produces relatively dry conditions and intense fire behavior.
- A paper by Mitchell (1998) found that lodgepole pine trees attacked by mountain pine beetle began falling soon after death. Approximately 50% fall within 9 years and 90% within 14 years.

Some research papers discount the value of personal observation; considering it anecdotal, unpublished and not scientific. The interdisciplinary team and other contributors to the planning of this project include Forest staff and Confederated Tribes of Warm Springs Reservation staff with considerable experience on the fire line. While fire scientists, ecologists and other academics publish papers about fire, they have little or no first-hand experience with fighting fire or viewing the intensity

of fire while it is happening in conditions similar to that at Lemiti. On the other hand, contributors to this assessment have years of experience with fire suppression, with implementing prescribed fuel treatments, and with computer modeling based on local conditions. Local fire and fuels contributors and other interdisciplinary team members have viewed the flame lengths and intensity of fire burning through stands like the ones at Lemiti, have viewed intense crown fires drop to the ground when fires encountered an area that had previous fuel treatments, and have contributed their expertise during post-fire rehabilitation efforts. The Lemiti project has been developed by considering both published science and local expertise.

3.1.2 Fireline Intensity

While fire is naturally occurring event, particularly in lightning prone areas, there is a concern about fire size and intensity. Fires that burn the majority of the vegetation over extensive areas can have undesired environmental effects and can move onto the adjacent CTWS Reservation. There is a concern about firefighter and public safety.

Fireline intensity is widely used as a means to relate visible fire characteristic and interpret general suppression strategies. A visual indicator of fireline intensity is flame length (Rothermel 1983). The following flame length classes and interpretations are widely accepted standard.

Fireline Intensity	Flame Length	Notes
Low	< 4 feet	Direct attack the head and flanks with crews; handlines should stop fire spread.
Moderate	4-8 feet	Fires are too intense for direct attack on the head by persons using hand tools. Handline cannot be relied on to stop fire spread. Equipment such as dozers, engines, and retardant aircraft can be effective.
High	8-11 feet	Fires may present serious control problems such as torching, crowning, and spotting. Control efforts at the fire head are likely ineffective. This fire would require indirect attack methods.
Very High	> 11 feet	Crowning, spotting, and major fire runs are probable; control efforts at the head are likely ineffective. This fire would require indirect attack methods.

3.1.3 Computer Simulations

Stand examinations were completed in 2012 to collect fuels, surface and vegetation data.

The stand examination data was used with the Forest Vegetation Simulator (FVS) program to model treatments and their expected flame lengths (Crookston 2003). This model is intended to compare alternatives. Actual fire size and location cannot be predicted because of the variables such as ignition location, fuel moisture, wind

direction and wind velocity. But a representation of what is likely to occur can be modeled with relative certainty. The Wildfire Decision Support System (WFDSS) was used including three modeling modules: Basic Fire Behavior, Short Term Fire Behavior and Fire Spread Probability (FSPro).

Several simulations were performed across the different stand types and structural conditions in the project area to test achievement of project objectives. The objectives of the project fuel treatment are a flame length of 4 feet or less with no active crown fire. Simulations showed the proposed treatments were needed to achieve these objectives.

Modeling also showed that large blocks of fuel treatment were important to make a difference at the landscape scale. Fuel breaks would be placed as shown on maps in Appendix A, where ladder fuels and ground vegetation would be removed along project area roads and the Forest boundary.

After treatments, the project area would be evaluated and where areas remain above 15 tons per acre, there would be follow up treatments that may include machine piling or hand piling.

3.1.4 Direct and Indirect Effects

Large intense wildfires pose a risk to resources, including fish and wildlife habitat, culturally and Tribal significant resources, infrastructure, soil productivity, scenery, clean air and other valued components of forests. The impacts and benefits of the alternatives are addressed in each resource section (s. 3). This section focusses on predicted fire size and intensity and safety issues related to fire suppression and public access (s. 1.3).

3.1.4.1 No-Action Alternative

The risk of stand-replacing wildfire is a potential outcome in the project area. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be larger with no action, and there would be greater risk of fires crossing onto the CTWS Reservation.

Stands throughout the project area have accumulated surface and ladder fuels that could threaten overstory trees and adjacent stands in the event of a wildfire. Stands in the project area have accumulations of fuels that pose a hazard to many ecosystem functions and characteristics. In the event of a high severity wildfire, many trees that are now alive would be killed. This includes saplings, the few remaining live older trees in the lodgepole pine stands, and live trees in adjacent stands.

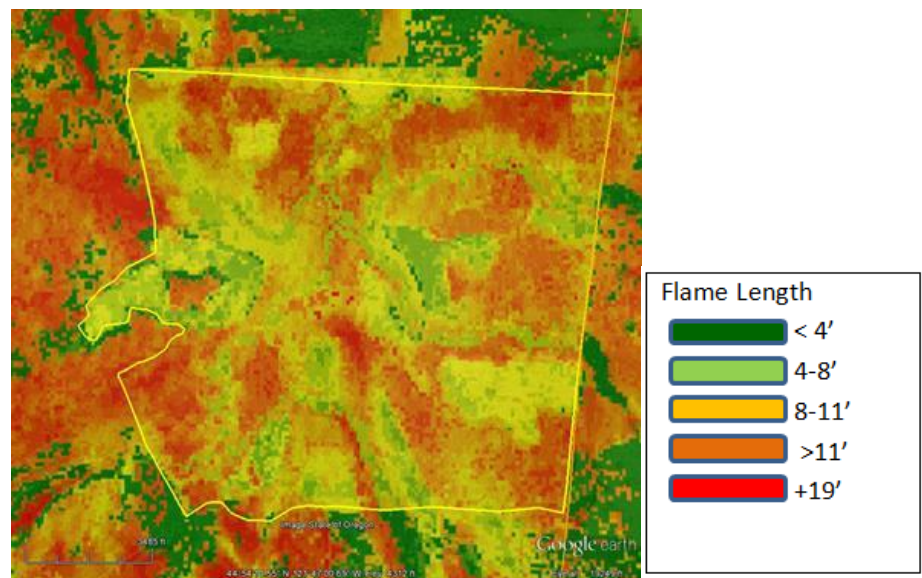
The current, standing dead trees pose a moderate risk potential because there is essentially no foliage present to carry or sustain a crown fire. However, the potential for intense wildfire occurring would increase in the coming years as dead standing

trees continue to fall and add to the current hazardous fuel accumulation. Studies in Oregon found that lodgepole pine trees attacked by mountain pine beetle began falling soon after death. Approximately 50% are expected to fall within 9 years and 90% within 14 years (Mitchell 1998).

With no action, flame lengths would be approximately 8 feet. Fire suppression tactics would be greatly limited due to high levels of risk to fire suppression personnel due to the high resistance to control with the predicted quantity of fuel as dead trees fall. Indirect suppression methods would likely be needed, increasing the size of fires.

The planning area is the main route for ingress and egress for the Olallie Lake Scenic Area; a popular back country recreation destination to the south of the project area. Extreme fire behavior adjacent to this road would pose an increased threat to public safety. The road is narrow and the Olallie Lake Scenic Area would need to be evacuated at the same time suppression forces are mobilizing on the same road or using it as a control line for burn out operations.

This image shows the Basic Fire Behavior Model predicted flame lengths for no action.



3.1.4.2 The Proposed Action

Fuel treatments would alter the fuel profile by reducing the vertical continuity of fuels, breaking up surface fuels, and increase the average canopy base height. In addition, fuel treatments would modify growing environments for trees and other forest vegetation and create temporary changes in large portions of the project area's vegetative structure.

Following treatment, flame lengths would be less than four feet. The proposed treatments would reduce the high fuel hazard risk on approximately 45% of the project area. This would result in a mosaic of vegetation conditions in the project area. Treatments would change the area from a high fuel hazard to moderate fuel hazard. This could reduce the intensity and potential spread of a wildfire allowing for

more effective suppression activities. The potential fire behavior would become manageable by ground-based fire crews.

The fuel breaks along roads and the Forest boundary between would improve fire control opportunities and reduce the risk of the spread of fire by treating, removing, or modifying vegetation, and debris.

The level of change in the fuel loading and stand structure would have a direct impact on the likelihood of crown fire initiation and spread. Crown fire initiation is dependent on three factors: surface fire intensity, live crown base height, and foliar moisture content (Van Wagner 1977). Assuming all other factors remain constant, the reduction in the surface fuels in the treated stands would cause a decrease in the surface fire intensity and thereby lower the chance of crown fire initiation.

The removal of some of the coniferous understory and pruning would increase the canopy base height making crown fire initiation less likely. The reduction in stand density may allow greater wind penetration into the stand which could increase surface spread rates.

For a given rate of spread, there exists a critical minimum crown bulk density below which continuous crowning cannot be sustained. Density management in live trees would result in a situation where higher winds and a higher rate of spread would be required to sustain crowning.

The FSPro Fire Behavior Model predicts average fire size. For ignitions at Lemiti Butte, fires would average 174 acres in size compared to 2,890 acres with no treatment, and the largest predicted fire size would be 1,378 acres compared to 10,889 acres with no treatment.

The proposed treatments including the fuel breaks along roads would provide for increased safety along the main route for ingress and egress for the Olallie Lake Scenic Area. If a fire were burning in the area, the flame lengths would be sufficiently low to allow evacuation of the recreating public.

3.1.5 Cumulative Effects

Because wildfires can be large, the appropriate scale for cumulative effects analysis consists of the two drainages that overlap the project: Lemiti Creek and South Fork Lemiti Creek. These combine to total 11,744 acres. This includes 3,508 acres of the CTWS Reservation, and 794 acres of Wilderness. There are no other private ownerships to include. This analysis area is appropriate because it is large enough to encompass the size of a typical wildfire in this area and includes most of the dead lodgepole expanse. The time frame for the discussion is quite long – approximately 100 years which represents the typical fire return interval for fires in the lodgepole pine type.

The analysis includes all past management actions including timber harvest and road construction. There are no ongoing actions in the project area. The only foreseeable action would be the potential for salvage in the Camas Prairie Fire on the CTWS Reservation. In 2014, 27 acres of the much larger Camas Prairie Fire burned inside the cumulative effects analysis area.

The current proposed actions are the only known actions on the Forest in the analysis area that would affect fire behavior. Part of the CTWS Reservation is within the cumulative effects analysis area. At this time, there are no known actions on the reservation that are foreseeable. Tribal managers are seeking funding to conduct some fuel treatments on the reservation but this funding is not certain and there is insufficient site specificity to conduct an analysis because treatment type, size, and location are unknown. If treatments are funded, it is likely that they would be complimentary to the treatments occurring on the Forest and would serve to provide more effective fire hazard reduction.

While it is not possible to predict the exact size a fire might attain with or without fuel treatment, the proposed action would result in smaller fires with lower flame lengths. These fires can be directly attacked by hand crews resulting in reduced suppression related resource impacts compared to no action which would likely require heavy equipment and indirect attack methods.

Cumulative effects of the proposed action when added to the impacts of wildfire and of fire suppression tactics, would not be substantial, and the effects would be lower compared to no action.

3.1.6 Forest Plan Consistency

The following section addresses management goals, desired future conditions and standards and guidelines from the Forest Plan that relate to fire and fuels. Page numbers are from the Forest Plan unless otherwise noted. The numbered sections provide the text from the Forest Plan as amended, and the italicized text is an explanation of how this project fits with those management goals, desired future conditions and standards and guidelines.

- 3.1.6.1** Provide fire protection, fuels treatment and pest management programs that are responsive to land and resource management goals and objectives. (#22, p. Four-4)

The proposed action would contribute toward this goal because a fuel treatment and fuel breaks would reduce fire size and intensity, aid in the suppression of wildfires and would minimize risk to resources.

- 3.1.6.2** Many forest management goals include the direction to “protect, maintain or enhance” resources such as riparian areas, water quality, soil productivity and wildlife habitat.
(# 6, 7, 9 and 12, p. Four-2&3)

These resources would be better protected because risk of damage from wildfire would be reduced.

- 3.1.6.3** Honor treaty rights and privileges of Native Americans. Protect and preserve Native American ceded rights and privileges to access and use the Forest for traditional religious values. (#2, p. Four-2)

The proposed action was developed in cooperation with the tribes.

- 3.1.6.4** Provide safe, efficient access for the movement of people. (#17, p. Four-3)

The proposed action would provide for the safety of fire suppression forces and would increase the safety of users of the Olallie Lake Scenic Area in the event of an evacuation due to a wildfire.

- 3.1.6.5** An appropriate suppression response will be made to all wildfires. When fire suppression forces reach the wildfire, they will apply the appropriate fire suppression strategy which allows for the control of the fire with minimum cost plus damage to the resources affected. (p. Four-25)

The proposed action would result in a situation where fire suppression forces would be able to safely suppress a wildfire. Wildfires are expected to be smaller, suppression costs would be reduced and there would be reduced impact to resources.

- 3.1.6.6** In Riparian Reserves the goal of wildfire suppression is to limit the size of all fires. (Northwest Forest Plan Standards and Guidelines p. C-18)

The proposed action would result in smaller wildfires and reduced overall impact to riparian resources.

- 3.1.6.7** In late-successional reserves (LSR) the goal of wildfire suppression is to limit the size of all fires. Until a fire management plan is completed for late-successional reserves, suppress wildfire to avoid loss of habitat in order to maintain future management options. (Northwest Forest Plan Standards and Guidelines p. C-18)

The proposed action is outside but directly adjacent to the LSR. The proposed action would result in smaller wildfires and reduced overall risk of fires spreading into LSRs. The risk to habitat of late-successional dependent species would be reduced. A fire management plan was completed as part of the LSR assessment (chapter 5). It contains recommendations to continue the suppression of wildfire to avoid the loss of habitat.

- 3.1.6.8** Major goals for managing LSRs within the Northwest Forest Plan are to maintain and protect late-successional forest ecosystems from loss due to large scale fire, insect and disease epidemics, and major human impacts. (North Willamette LSR Assessment Fire Management Plan, p. 5-1)

The project would not occur in but is adjacent to the LSR. The proposed action is consistent with this recommendation of the LSR Assessment because it would provide some protection to adjacent LSRs.

- 3.1.6.9** The southern part of the Upper Clackamas LSR (Olallie Lake Scenic Area) and the area directly north, lie in an area called the “Cascade Lightning Belt.” Increasing tree spacing and reducing residual fuel loading will reduce the probability of a stand replacing fire and reduce the impacts should one start. (North Willamette LSR Assessment Fire Management Plan, p. 5-8)

The proposed action is consistent with this recommendation of the LSR Assessment.

- 3.1.6.10** Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuels management activities could be damaging to long-term ecosystem functions. (Northwest Forest Plan Standards and Guidelines, Riparian Reserves #FM1, p. C-35)

Fire regimes are near their historic range for the project area. Traditionally, large stand-replacing fires burned every one to two hundred years. One or more large stand-replacing fires are likely to occur in the near future based on fuel conditions and common lightning storms. Given the resources at risk in this area, the strategy of suppression is appropriate.

- 3.1.6.11** Dead, down woody material loading levels shall be managed to provide for multiple resource objectives (FW-265, p. Four-77).

Multiple resource objectives have been considered in the development of fuel reduction prescriptions, including PDCs to minimize impacts of treatment, and the reduction of wildfire risk which has the potential to minimize impact to resources such as soil productivity, scenery, key habitats and riparian areas. The proposed action would minimize the risk to multiple resources by keeping fires smaller.

3.1.7 Standards and Guidelines Exceptions

- 3.1.7.1** At least 15 tons per acre of dead and down woody material in east side vegetation communities and 25 tons per acre in west side communities should be maintained and evenly distributed across managed sites (FW-033, p. Four-50).

Section 3.8.9.1 has a discussion of the rationale for this exception. While the treatment area near the crest of the Cascades, drains toward the west, the vegetation and the fire hazards are like those on the east side of the Forest. The project objectives are to reduce residual fuels to between 10 and 15 tons per acre. On more typical, wetter, west side stands, large rotting down logs make up a large percentage of the desired 25 tons per acre without substantially affecting fire hazard. Retaining 25 tons per acre in the lodgepole pine zone would not be consistent with the fuels

reduction objective. The retention of 25 tons of wood that is relatively small, dry and flammable would not be consistent with the project's goal of reducing flame lengths to less than 4 feet and would not be consistent with the Forest goal described at section 3.1.6.1.

3.1.8 Effects of Forest Plan Amendment #19.

The following amended standard is related to fuels and fire hazard.

3.1.8.1 FW-166 p. Four-68 - Forest Diversity

Original Text - A continuous supply of down woody material shall be maintained in harvested areas.

Revised Text - A continuous supply of down woody material should be maintained at the landscape scale.

Lodgepole pine down logs will be abundant at the landscape scale. Dead lodgepole trees are expected to fall within 10 years. Adjacent riparian reserves, Wilderness and stands of mature trees will provide a continuous supply of down woody material. The changes made to this and other standards and guidelines emphasize the retention of these elements at a broader landscape scale as opposed to requiring them to be retained in each acre within treatment units.

The emphasis of providing woody debris at the landscape scale allows for the development of an effective fuel treatment. While some areas such as riparian reserves would continue to have high levels of fuels as dead lodgepole pine trees fall, this fuel accumulation would be linear and broken on either side by fuel treatments. In the event of a fire, the riparian reserve would likely burn with greater intensity, but the fuel treatments on either side would allow suppression forces to contain the fire. The quantities of down woody material are further elaborated in other standards and guidelines where exceptions are proposed including FW-033 which requires 25 tons per acre and FW- 219 which requires six down logs in various decomposition classes (s. 2.2.7.2). These standards and guidelines are more applicable to areas where down woody material can be retained without dramatically affecting fire hazard.

3.2 STAND GROWTH AND PRODUCTIVITY

The related topic of soil productivity is addressed in section 3.8.

Both the Mountain Hemlock and Pacific Silver Fir Plant Association Zones encompass the project area which is composed primarily of stands of lodgepole pine, true fir, mountain and western hemlock, and Douglas-fir. There is a high incidence of insect mortality in lodgepole pine and low to moderate levels of disease. Even with

the wide-spread mortality in lodgepole pine, most of the stands are overstocked with seedlings and saplings; primarily lodgepole pine with inclusions of hemlock and scattered other tree species.

The forest types in this area are some of the harshest forested environments along the Cascade Crest, known for short, cool, dry summers subject to frequent frost and long winters with persistent deep snowpacks. The growing season is short and soils tend to be cold, shallow, and low in productivity. These conditions and repeated fire favor the presence of lodgepole pine. Lodgepole pine stands typically become highly susceptible to mountain pine beetle mortality between age 60 and 80 and stand-replacement fires typically occur approximately every 100 years.

The understory consists of thick carpets of lodgepole pine saplings with mountain hemlock, western white pine, and true fir mixed (2 inches to 8 feet in height). A shrub layer of huckleberry and occasional rhododendron can be found sparsely scattered throughout as well as in concentrated patches in areas of mixed conifer. The herbaceous layer is comprised of beargrass and a host of cool to dry mesic-site low-growing species.



3.2.1 Direct and Indirect Effects

3.2.1.1 No-Action Alternative

The project area is mostly in the Matrix land allocation where active forest management is desired and expected. There is a need to provide for long-term forest productivity and to enhance the agency's ability to manage the landscape in the future. With no action, the combination of dead trees fallen in a jackstrawed manner and the high density of young trees, this area of the Forest is likely to become physically inaccessible and unmanageable. With high levels of tree density, the live trees would be at risk to density-related mortality due to the competition for moisture



and nutrients. If left untreated, a large intense wildfire would burn the saplings and other live trees, setting back the process of forest development.

The photos above and below show examples lodgepole pine stands beginning to fall in a jackstrawed manner. After all the dead trees fall, this situation would lead to an impenetrable tangle that cannot be practically managed and where extreme fire behavior would be expected.



3.2.1.2 The Proposed Action

The treatments in the Matrix land allocation would remove the dead lodgepole pine. This would eliminate the potential for jackstrawed trees that would otherwise be an impediment to forest management if no action were taken. The thinning of dense saplings would provide the appropriate spacing for long-term forest productivity. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be smaller and burn with lower intensity, and there would be lower risk of loss of saplings and other live trees. Fuel treatments would enhance forest productivity and allow saplings and other live trees the opportunity to continue to grow and provide the many benefits of a forested landscape.

3.2.2 Cumulative Effects

The effects of fuel treatments on stand growth and productivity are generally experienced or expressed within the treated area; therefore the analysis area for

cumulative effects would be the treatment unit boundaries. The time scale for cumulative effects analysis is quite long: alterations made during fuel treatment have the potential to benefit health and growth many decades into the future. The potential for stands to be burned by wildfire are addressed in section 3.1. This cumulative effects analysis addresses the impact of treatment with the absence of fire.

The existing condition includes past actions as they have affected growth including previous logging and road construction. There are no other owners or entities performing actions inside the units to consider. There are also no foreseeable future projects occurring inside the units to consider. While there may be future logging or other management within the units, there are no current proposals with sufficient site specificity to conduct an analysis. Because the impact of the proposed action on growth and productivity is a beneficial one, and there are no other additive impacts to consider, there would be no cumulative effects.

3.2.3 Forest Plan Standards and Guidelines

Mt. Hood Forest Plan References

Forestwide Timber Management Standards and Guidelines - FW-306 to FW-385, page Four-86

Mt. Hood FEIS pages IV-50 to IV-76

Northwest Forest Plan - Matrix Standards - page C-39

3.2.3.1 Forest openings created by the application of even-age harvest methods (e.g. clearcut, shelterwood or seed tree harvest) should not exceed 60 acres in the west side-cascade Douglas-fir forest type and 40 acres in the other forest types (i.e. non Douglas-fir and eastside-Cascade types). (FW-349, p. Four-89).

The proposed treatment is a salvage fuel reduction action and the size of the units is determined by the extent of the mortality. Dead lodgepole pine trees would soon fall and even with no action, openings would be quite large. The treatment areas already have a fully stocked seedling and sapling components which would remain after treatment. This standard is met because areas are no longer considered created openings when saplings are fully stocked and more than 4.5 feet tall (FW-359).

3.2.4 Effects of Forest Plan Amendment #19.

The following amended standard is related to forest productivity.

3.2.4.1 FW-166 p. Four-68 - Forest Diversity

Original Text - A continuous supply of down woody material shall be maintained in harvested areas.

Revised Text - A continuous supply of down woody material should be maintained at the landscape scale.

Section 3.3.10.2 has more detail on the rationale. The emphasis of providing woody debris at the landscape scale allows for the development of an effective fuel treatment and results in an area that can be managed for forest productivity in the matrix.

3.3 SNAG and DOWN WOOD MANAGEMENT

This section summarizes the wildlife report and the stand data in the analysis file. In terms of down wood management, this section focuses on the wildlife value of down wood, while other sections discuss other aspects of down wood including section 3.1 that addresses fire hazard and section 3.8 that addresses soil productivity.

Across the Forest large snags and downed wood exist at lower levels than the historic range of variability due to large stand replacing fires early in the 20th century, past timber harvest and firewood cutting. Between the years of 1870 to 1920, roughly 300,000 acres or nearly one third of the Forest was burned by stand replacement fires. There has also been approximately 350,000 acres harvested since 1900. The combination of large scale stand replacing fires and harvest acres have contributed to the current situation where almost 60% of the forest is in a “mid stage” of stand development with relatively few large snags. However, in recent years large wildfires have burned around the Forest and in the Bull of the Woods Wilderness creating some concentrations of snags.

3.3.1 Methodology

The analysis of current and predicted future conditions of snag and downed wood habitat uses knowledge about the wildlife species that rely on habitat that exists in the area along with modeling snag development into the future under different management actions. This information is combined with field reconnaissance for verification, and relevant “best available science” factors embedded in the models and analysis.

This snag and down wood analysis is based on standards and guidelines from the Forest Plan as well as the DecAID Advisor tool. The Upper Clackamas Watershed is used for the analysis for historic and current snag levels because stand level analysis does not provide a meaningful measure for snag and down wood dependent species. Management for snags and down wood is compared to unharvested stands, which represent historic conditions.

DecAID is a planning tool intended to advise and guide managers in their analysis to conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen 2003). It also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. DecAID was developed to collect and synthesize the best available science on wildlife relationships with dead wood (Mellen 2003). DecAID is designed to be applied at scales of at least the subwatershed or larger watersheds, sub-basins, physiographic provinces, or landscape

administrative units such as Ranger Districts or National Forests. DecAID is not intended to directly predict occurrence of wildlife at the scale of individual forest stands or specific locations.

This advisory tool focuses on several key themes prevalent in recent literature.

- Decayed wood elements consist of more than just snags and down wood, such as live trees with dead tops or stem decay.
- Decayed wood provides habitat and resources for a wider array of organisms and their ecological functions than previously thought.
- Wood decay is an ecological process important to far more organisms than just terrestrial vertebrates.

Tolerance levels in DecAID are broken into 30, 50 and 80th percentiles that represent the likelihood that a species such as pileated woodpecker would use land with a given level of snags. (For an explanation of Tolerance Levels, please refer to the DecAID website (<http://www.fs.fed.us/r6/nr/wildlife/decaid/pages/What-is-a-tolerance-level.html>)).

3.3.2 Lemiti Fuel Reduction Project Area

Most of the Lemiti project area consists of large stands of lodgepole pine trees that have been killed by mountain pine beetle. Most stands are virtually pure, dead lodgepole pine. The dead lodgepole pine is standing, but has been dead for several years and young saplings have seeded in. The beetle epidemic has run its course in this area leaving approximately 99% of the lodgepole pine overstory dead. The standing dead trees average about ten inches diameter. Beetle killed lodgepole pine trees are expected to soon begin falling in a jackstrawed manner. The fire hazard is expected to dramatically increase as dead trees fall and young trees continue to fill in at high densities. For many centuries, mountain pine beetle followed by fire are the primary natural disturbance agents that have shaped the vegetation composition of the project area.

The Lemiti project area encompasses approximately 3,140 acres and lies within the Upper Clackamas Watershed. The watershed is 100,557 acres and falls in the habitat type identified in DecAID as the Mixed Montane Conifer zone. The dead lodgepole pine habitat encompasses approximately 4,216 acres (4.2%) of the watershed. There is additional dead lodgepole pine habitat nearby, but outside the watershed. The primary and secondary cavity nesting species for this habitat type are pileated woodpecker, northern flicker, hairy woodpecker, and red-breasted nuthatch. However, the dead and small diameter lodgepole pine sub-habitat is not expected to support these species as utilization of snags increases with the size of the snags. This sub-habitat could potentially support black-backed woodpecker as discussed below.

3.3.3 Project Elements That Could Affect Snags and Down Wood

The Lemiti project proposed action would remove virtually all of the dead lodgepole pine trees on 1,262 acres within the project area. The few large diameter snags from species other than lodgepole pine that occur in the project area would be retained where safety permits. Downed woody material would be retained at the level of approximately 10 to 15 tons per acre. The project would also create snags by topping trees in the larger size classes (s. 2.2).

3.3.4 Existing Condition

The DecAID analysis for the Lemiti project area was conducted on the watershed scale for the 'Mixed Montane Conifer' for vegetation condition areas identified as 'small/medium trees (diameter of 10-19 inches).' Conditions for the Upper Clackamas Watershed are described in the table below.

Mixed Montane Conifer /Small-Med. Tree Habitat Type	30% Tolerance Level	50% Tolerance Level	80% Tolerance Level
Snags $\geq 10''$ Diameter	10 per acre	16.6 per acre	32 per acre
Down Wood Cover $\geq 5''$ diameter	2.5 percent	3.9 percent	7.9 percent

Analysis for large tree habitats was not conducted because the proposed Lemiti project would not affect any current large snags or large downed wood nor would it contribute to future large snags or downed wood. Estimates from field reconnaissance completed by the silviculturist and wildlife biologist indicate that the proposed fuel treatment units contain snag numbers above the 80% tolerance level and downed wood percentage above the 50% tolerance level for the Mixed Montane Conifer, small to medium tree habitat type.

A Gradient Nearest Neighbor (GNN) analysis was completed for snag and downed wood resources. GNN uses satellite imagery to determine vegetation condition, and in this case to determine the amount of snags and downed wood from satellite imagery. This analysis tool provides a way to review the current distribution of snag and downed wood condition in relation to the historic range of variability.

The analysis shows that currently, 55% of the watershed is above the reference condition and 34 % is below the reference condition in the small snag habitat type. It also shows that 32% of the watershed is above the reference condition and 71% is below the reference condition in the small log habitat type.

3.3.5 Direct and Indirect Effects to Snags and Downed Wood

3.3.5.1 No Action

Lodgepole pine is present in the Lemiti project area for a number of reasons including topography, elevation, climate and fire history. The project area lies in a large topographic depression that traps cold air and creates a frost pocket. Lodgepole pine is well-suited to these cold growing conditions compared to other conifer species. The project area would continue to provide the current levels of snags and downed wood in the very near term. Within the next few years, it is expected that downed wood levels would dramatically increase as the lodgepole snags continue to fall. With no active management, stands would transition into dense stands of saplings with jackstrawed down trees which would increase the risk of stand-replacing wildfire. Stand replacing fires would likely create new snags by killing live trees. If a fire does occur, the saplings of other conifers such as mountain hemlock and Douglas-fir would likely not survive, and the new stand, initiated by fire, would start out being dominated by lodgepole pine again. These other species, if they continue to grow would create a more diverse community capable of providing larger long lived snags. If stand replacing fires occur, they would likely spread into adjacent riparian reserves, Wilderness, late-successional reserves, and the CTWS Reservation killing the live trees there.

With the no action alternative, the Forest would continue to manage the road and trail system for public safety which includes the felling of danger trees.

3.3.5.2 Proposed Action

The Lemiti project proposed action would remove virtually all standing dead lodgepole pine trees on 1,262 acres within the project area. This represents about 30% of the dead lodgepole pine habitat in the watershed. No treatments would occur in riparian reserves or within northern spotted owl core nesting areas. There would still be abundant small snags across the landscape as large areas with dead lodgepole pine trees would be retained including in riparian reserves, in the adjacent Wilderness, and in late-successional reserves to continue to provide for diversity and complexity.

This image shows the extent of lodgepole pine mortality inside the riparian reserve which is delineated by yellow lines.



The dead lodgepole trees removed would be small in size and not of great value to cavity nesting species as utilization of snags increases with the size of the snags. The tendency is for cavity-nesting birds to use snags of larger size than smaller snags, even with cavities, overall (Zack 2002). The few large diameter snags from species other than lodgepole pine that occur in the project area would be retained where safety permits. The project would also create snags by topping trees in the larger size classes (s. 2.2). Downed woody material would be retained at the level of approximately 10 to 15 tons per acre.

Fuels treatments in the Lemiti project area would break up the fuel continuity and reduce the risk of a landscape scale fire event, which would reduce the risk to individual large snags and trees. In untreated areas there would continue to be an increased risk from wildfire, although breaking up the fuel continuity across the landscape would reduce the risk of a larger scale wildfire event. Reduced fire risk would result in fewer snags created by fire across the landscape.

The removal of small snags from 1,262 acres within the Lemiti project area would not substantially reduce the small snag level across the 100,557 acres of the Upper Clackamas watershed. The fuel reduction project would maintain sufficient quantities of snag and down wood habitat at the landscape scale and therefore ***would not contribute to a negative trend in viability on the Forest for species dependent on these features.***

There are few large down logs in the lodgepole zone. Decayed down logs from tree species other than lodgepole pine currently on the forest floor may be retained where fuel tonnage objectives are met. In addition, large amounts of downed wood will soon be added across the landscape in untreated areas as the dead lodgepole pine trees begin to fall.

Lemiti project activities may have the potential to affect additional snags outside of treatment units if they are considered hazardous. If snags are felled for safety reasons outside of treatment units they would be retained onsite as downed wood.

3.3.6 Cumulative Effects to Snags and Downed Wood

The Clackamas River Watershed is used as the analysis areas for cumulative effects. This area encompasses 100,557 acres and includes portions of the CTWS Reservation. The analysis area is large enough that direct effects from the Lemiti project would not likely be felt outside this area. Approximately 27 acres of the recent Camas Prairie Fire overlap the analysis area.

The time frame used to include or exclude actions varies by the type of action. Some impacts are long lasting such as past regeneration harvest that removed snags and down logs. It would take approximately 100 years for these areas to grow trees large enough to replace the large snags that were removed across the watershed.

This analysis relies on current environmental conditions as a proxy for the impacts of past actions because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. Across the Forest snags and downed wood exist at lower levels than the historic range of variability due to large stand replacing fires early in the 20th century, past timber harvest and firewood cutting. Between the years of 1870 to 1920, roughly 300,000 acres or nearly one third of the Forest was burned by stand replacement fires. There have been 350,000 acres harvested since 1900. The combination of large scale stand replacing fires and harvest acres as well as recent mountain pine beetle epidemics have contributed to the current situation where almost 60% of the forest is in a “mid stage” of stand development with relatively few large snags. However, in recent years large wildfires have burned around the Forest and in the Bull of the Woods Wilderness creating some concentrations of snags. There are no ongoing actions to include in the analysis. The only foreseeable actions that would affect snags would be the potential for salvage in the Camas Prairie Fire on the CTWS Reservation. Approximately 27 acres of the fire overlap the analysis area. Tribal managers are seeking funding to conduct some fuel treatments on the reservation but this funding is not certain and there is insufficient site specificity to conduct an analysis because treatment type, size, and location are unknown. If treatments are funded, it is likely that they would be complimentary to the treatments occurring on the Forest and would serve to provide more effective fire hazard reduction. In terms of snags, any treatments on the reservation would likely occur in similar stands of dead lodgepole pine and would not substantially affect large snags.

The Forest has regularly conducted aerial surveys and mapped mortality from insect and disease. The cumulative mortality from insect and disease regularly creates new snags and downed logs. The mapped mortality does demonstrate the extant of natural mortality of trees that is creating snag and downed wood habitat across the Forest.

This mortality creates an environment that is sustaining for snag and down wood dependent species.

While large snags are currently limited, but improving, across the Forest and the Upper Clackamas Watershed, DecAID analysis shows that small snags are plentiful and well distributed across the landscape with current levels mostly above the reference condition. The removal of small snags from 1,262 acres within the Lemiti project area would not substantially reduce the small snag level across the 100,557 acres of the watershed. Overall there would be a net reduction of small snags, however snag and downed wood management on a watershed and larger scale would maintain viability of species that depend on snags and downed wood.

3.3.7 Species of Concern for Snags

Various species use snags; they are discussed in section 3.4. However, one species, the black-backed woodpecker is addressed here because of its reliance on habitats similar to those found in the Lemiti project area.

Black-backed woodpeckers are residents from Alaska across Canada to Newfoundland, southward to California, northern Wyoming, Wisconsin, northern New York, and Maine (Dixon 2000). In Oregon and Washington habitat for this species is found in mixed conifer and lodgepole pine stands in the higher elevations of the Cascade Range, primarily on the eastside. Throughout its range, black-backed woodpecker distribution and abundance is closely associated with recent stand replacing fires and insect out-breaks (Bonnot 2009)(Rumble 2002). In the absence of fire, areas of beetle outbreak might serve as the only substantial source of habitat (Bonnot 2009). The Lemiti project area has abundant habitat for the species. However, the mountain pine beetle epidemic within and adjacent to the project area has run its course. Nearly all of the mature lodgepole pine in the area has been dead for several years and have entered the 'gray phase' where the bark is sloughing off and the trees are beginning to fall. The mountain pine beetle requires live, mature pine trees to complete its life cycle and for its next generation to continue. That cycle has been broken do to the lack of mature, live lodgepole pine habitat. Black-backed woodpeckers require trees with an active beetle infestation for foraging.

Black-backed woodpecker populations are 'eruptive' as reflected in their densities in burned habitat. Population densities peak after stand replacing fire during the second post-fire year (Dixon 2000). One year later, densities decline by nearly half and continue to decline each year thereafter (Dixon 2000). Black-backed woodpeckers respond similarly in a beetle killed stand (Bonnot 2009)(Rumble 2002).

No Action – With no action, development of ladder fuels and trees falling would increase the risk of stand-replacing wildfire. Where stand-replacing fires expand into other stands and kill live trees, there would be increased habitat for black-backed woodpeckers. In the absence of fire, areas of beetle outbreak might serve as the only substantial source of habitat; however this declines each year post outbreak because

black-backed woodpeckers require trees with an active beetle infestation for foraging. The recent Camas Prairie Fire has provided some habitat for this species.

Proposed Action - Nearly all dead lodgepole pine trees within the treatment units would be removed for the fuels reduction project to be effective. All snags would be retained in riparian areas and other untreated areas within the project area as well as in the adjacent wilderness and untreated land on the CTWS Reservation.

In addition, in July of 2014, the Camas Prairie Fire began on the CTWS Reservation very near the Forest boundary near South Pinhead Butte and approximately one mile from the Lemiti project area. It was started by lightning and burned to the east. This fire was contained at 5,920 acres. While portions of this burned area may be salvage logged, the fire still provides some of the preferred habitat for black-backed woodpeckers.

3.3.8 Forest Plan Standards and Guidelines

3.3.8.1 Black-backed Woodpeckers

The Northwest Forest Plan standards and guidelines were amended in 2001 by the Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, (USDA USDI 2001). This document has a relevant provision that relates to snags for black-backed woodpeckers (and three other species not present in the project area).

Maintain adequate numbers of large snags and green-tree replacements for future snags within the four species' ranges in appropriate forest types. Where feasible, green-tree replacements for future snags can be left in groups to reduce blowdown. Specifically, snags over 20 inches dbh are particularly valuable for these species. Snags over 20 inches dbh may be marked for cutting only after retaining the best available snags (considering size, longevity, etc.) in sufficient numbers to meet 100 percent of potential population levels of these four species. It is recognized, however, that safety considerations may prevent always retaining all snags. For the longer term, provide for sufficient numbers of green trees to provide for the full (100 percent) population potential of each species. The 100 percent population potential for black-backed woodpeckers is 0.12 conifer snags per acre in forest habitats; these snags must be at least 17 inches dbh (or largest available if 17 inch dbh snags are not available) and in hard decay stages, and must be provided in stands of mixed conifer and lodgepole pine in higher elevations of the Cascade Range. (Standards and Guidelines - page 34)

The 100 percent population potential level for black-backed woodpeckers would be met because there would still be an abundance of snags across the landscape to meet the habitat needs for this species. The project would also create snags by topping trees in the larger size classes (s. 2.2).

3.3.8.2 FW-216

This standard suggests that at least 40 percent of the maximum biological potential of cavity nesting species shall be maintained through time at the landscape scale. (p. Four-74).

This level of snags would be met because there are an abundance of snags that would not be treated across the landscape including those in riparian reserves, the adjacent Wilderness and in the late-successional reserves. The project would also create new wildlife trees and replacement snags.

3.3.9 Exceptions to Standards and Guidelines

3.3.9.1 At least 15 tons per acre of dead and down woody material in east side vegetation communities and 25 tons per acre in west side communities should be maintained and evenly distributed across managed sites, (FW-033 p. Four-50).

This is a soil standard. In terms of wildlife, the project has an emphasis of providing woody debris at the landscape scale allows for the development of an effective fuel treatment. The project objectives are to reduce residual fuels to between 10 and 15 tons per acre. On more typical, wetter, west side stands, large rotting down logs make up a large percentage of the desired 25 tons per acre without substantially affecting fire hazard. The project area does not have large rotting down logs and retaining 25 tons per acre of smaller material would not be consistent with the fuels reduction objective. In terms of wildlife, there would be sufficient down wood at the landscape scale.

3.3.9.2 Where new timber harvest units occur (e.g. regeneration harvest and commercial thinning), wildlife trees (i.e. snags and green reserve trees) should be maintained in sufficient quantity and quality to support over time at least 60% of the maximum biological potential of primary cavity nesting species, e.g. woodpeckers, (FW-215 p. Four-74). There are other snag related standards and guidelines such as FW-164, 165, 169, 230 and 231.

Abundant lodgepole pine snags are available at the landscape scale but they are not large enough to provide for most cavity nesting species. The project would remove small dead trees that are very abundant across the landscape. This exception would emphasize the management of snags outside treatment units in adjacent areas such as riparian areas and Wilderness. Some live trees would be retained. These other standards and guidelines also suggest snags or wildlife trees be retained within harvest units. Exceptions for these are needed because the emphasis is to provide these features across a broader landscape.

3.3.9.3 An average total of at least 6 logs per acre in decomposition classes 1, 2 and 3 should be retained in all project activity areas, (FW-219, p. Four-74). There are other similar down wood related standards and guidelines such as FW-167, 169, 221-229.

The project would retain some decayed logs but would remove recently fallen logs to reduce fuel loading. These other standards and guidelines also suggest down logs be retained within harvest units. Exceptions for these are needed because the emphasis is to provide these features across a broader landscape. These standards and guidelines are more applicable to mature stands where large logs are decaying and becoming incorporated into the soil substrate and where they can be retained without dramatically affecting fire hazard. Trees that fall in a jackstraw manner are not readily incorporated into the soil substrate because most of them are held off the ground and are likely to burn before they decay. In terms of wildlife, there would be sufficient down wood at the landscape scale.

3.3.10 Effects of Forest Plan Amendment #19.

The following amended standards and guidelines are related to snags and down wood.

3.3.10.1 FW-163 p. Four-68 Forest Diversity

Original Text - A continuous supply of hard snags for community structural diversity shall be maintained in harvested areas.

Revised Text - A continuous supply of hard snags for community structural diversity should be maintained at the landscape scale.

Providing a continuous supply of hard snags requires live trees of the appropriate size, some of which would die over time from various causes. Abundant lodgepole pine hard snags are available at the landscape scale but dead lodgepole pine trees are not long lasting and are expected to fall within 10 years. Adjacent stands of mature trees will be able to provide a continuous supply of hard snags. The changes made to this and other standards and guidelines emphasize the retention of these elements at a broader landscape scale as opposed to requiring them to be retained in each acre or within each treatment unit. Many stands have a relatively pure dead lodgepole pine component with few or no live mature trees of other species. Snags of species other than lodgepole pine would be retained where safety permits. Where live mature trees occur they would be retained at rates that would meet fuel reduction objectives and would provide a component of live trees some of which would likely die over time. After fuel treatment, some snags would be created by topping mature trees. The project would meet this amended standard by providing a sufficient number of snags over time at the landscape scale.

3.3.10.2 FW-166 p. Four-68 Forest Diversity

Original Text - A continuous supply of down woody material shall be maintained in harvested areas.

Revised Text - A continuous supply of down woody material should be maintained at the landscape scale.

Providing a continuous supply of down woody material requires live trees of the appropriate size, some of which would die over time and fall. Lodgepole pine down logs will be abundant at the landscape scale. Dead lodgepole trees are expected to fall within 10 years. Adjacent riparian reserves, Wilderness and stands of mature trees will provide a continuous supply of down woody material. The changes made to this and other standards and guidelines emphasize the retention of these elements at a broader landscape scale as opposed to requiring them to be retained in each acre or within each treatment unit. The original standard is more applicable to areas where down woody material can be retained without dramatically affecting fire hazard. Where live mature trees occur they would be retained at rates that would meet fuel reduction objectives and would provide a component of live trees some of which would likely die over time and fall to provide large down logs. After fuel treatment, some snags would be created by topping mature trees which would eventually fall. The project would meet this amended standard by providing a sufficient quantity of down woody material over time at the landscape scale.

3.3.10.3 FW-218 p. Four-74 Wildlife

Original Text - Wildlife tree prescriptions shall provide for all primary cavity nesting species indigenous to the treated site.

Revised Text - Wildlife tree prescriptions should provide for all primary cavity nesting species indigenous to the treated site at the landscape scale.

Abundant lodgepole pine snags are available at the landscape scale but they are not large enough to provide for most cavity nesting species and they would soon fall. Adjacent stands of mature timber would provide larger snags. The changes made to this and other standards and guidelines emphasize the retention of these elements at a broader landscape scale as opposed to requiring them to be retained in each acre or within each treatment unit. Snags of species other than lodgepole pine would be retained where safety permits. Where live mature trees occur they would be retained at rates that would meet fuel reduction objectives and would provide a component of live trees some of which would likely die over time. After fuel treatment, some snags would be created by topping mature trees. The project would meet this amended standard by providing a sufficient number of wildlife trees over time at the landscape scale.

3.4 DEER AND ELK MANAGEMENT

This section summarizes the wildlife report and the stand data in the analysis file. Deer and elk were selected as Management Indicator Species because they are economically important game animals (USDA 1990).

Deer and elk utilize a wide range of forest types for both foraging and cover. Elk appear to be more sensitive to the effects of forest management and are most often used to represent the general habitat requirements of both species. Forest Plan standards and guidelines have minimum requirements for optimal and thermal cover habitat components. Thermal cover for 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. During the 1980s and when the Forest Plan was written, wildlife managers considered cover to be crucial to deer and elk survival and production. More recent research has indicated that cover is not as important as was once thought and that forage quality and abundance is much more critical. Studies have shown that thermal cover does not enhance elk survival and production, and is not required by elk where food is available, and thermal cover does not compensate for inadequate forage conditions (Cook 1998). High summer and fall forage quality is critical to elk reproduction, survival, and population growth (Cook 2013). The increased importance of available forage abundance and quality compared to thermal cover has also been supported by nutritional and physiological studies of black-tailed deer (Parker 1999). With the reduction in timber harvest using regeneration methods on the Forest in the past two decades, continued tree growth, and suppression of fire, cover habitats now far exceed the desired levels for optimal and thermal cover but openings for forage are becoming scarce making forage a limiting factor on the Forest.

Both species migrate using summer and winter ranges. Elk and deer migration is due to habitat and forage accessibility in the summer and winter months. Summer range areas occur at higher elevations from spring through early winter and continue until the snow depth drives them out. On the Forest, winter range areas are typically below 2,800 feet in elevation on the Westside of the Cascades and are areas where elk congregate during the cold season. Deer and elk use natural openings (such as wet meadows) extensively for foraging, breeding and calving.

Roads have long been identified as having impacts on deer and elk populations. Recent studies at the Starkey Project in northeast Oregon (Wisdom 2005) have disclosed even more information on the effects of roads and open road densities on deer and elk. Rowland (2005) summarized the direct impacts of roads and associated traffic on elk, in addition to outright mortality from vehicular collisions as follows: (1) Elk avoid areas near open roads but avoidance varies in response to traffic rates; (2) Elk vulnerability to mortality from hunter harvest, both legal and illegal, increases as open road density increases; and (3) In areas of higher open road density, elk exhibit higher levels of stress and increased movement rates. Rowland (2005) also noted that elk use increased proportionally to farther distances between open roads. He also suggested judicious closing of certain road segments (particularly road spurs) while providing sufficient access for management activities, may retain or create blocks of habitat that serve as security areas for elk.

Across the Forest, road decommissioning and closure over the past two decades has resulted in a landscape where open road density is seldom a concern for deer and elk.

3.4.1 Existing Condition

Most of the project area consists of large stands of lodgepole pine trees that have been killed by mountain pine beetle. Many stands are virtually pure, dead lodgepole pine and some contain a mix of other live tree species such as mountain hemlock. Currently the dead lodgepole pine is standing and young saplings have seeded in. It is expected that the dead trees will soon begin to fall creating dense, jackstraw conditions which would limit the ability of deer and elk to fully utilize the area.

The Lemiti project area is primarily in the B11 - Deer and Elk Summer Range land allocation. This land allocation has several goals including the provision of high quality summer rearing habitat. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices. At the core of this land allocation is an A9 – Key Site Riparian land allocation which is similarly valuable to deer and elk. The streams and wetlands in the Key Site Riparian area are important sources of water in an otherwise very dry landscape. The project area contains no winter range.

The objectives for the B11 land allocation are currently not being met due to the quantity of dead trees that will soon fall. The project area has very little cover. There are a few stands of live mature forest that provide cover and these stands are not proposed for treatment. There is an opportunity to increase the productivity of forage plant species.

Current deer and elk use within the project area is concentrated in small riparian meadows and connective travel corridors. During field surveys, abundant sign of elk and deer use was found throughout the project area, except in an area of densely regenerating lodgepole pine. Elk in particular, seemed to be traveling throughout the project area between the riparian meadows within the project area and larger meadows located on the adjacent CTWS Reservation.

The Lemiti project area open road density is less than 1.5 miles per square mile. The area has some popular hunting camps that were used more when the trees were alive. They are becoming increasingly hazardous places to camp as dead trees fall.

3.4.2 There are several elements of the proposed action that could affect deer and elk, including fuel treatments and removal of dead lodgepole pine trees before they fall, forage seeding, road closures and sapling thinning.

Due to the changed conditions from the widespread insect mortality in lodgepole pine stands, it is likely that several Forest Plan standards and guidelines that relate to deer and elk would not be achieved as written and a project-level Forest Plan amendment

is proposed (For more information see section 2.2.7.1). Section 3.4.4 below addresses the amendment.

3.4.3 Direct and Indirect Effects

3.4.3.1 No Action

The current condition and expected future trend is not optimal for either forage or cover. It is expected that the dead trees would soon begin to fall creating dense, jackstraw conditions which could limit or restrict deer and elk movement through the project area which can also make them more susceptible to predation. Dense stands of saplings would continue to grow increasing the risk of stand-replacing wildfire. Wildfire by itself would not likely harm deer or elk habitat except that it is likely spread into adjacent areas where optimal cover habitat would be destroyed. No roads would be closed or decommissioned. There is very little cover across the project area and this has allowed abundant sunlight to reach the ground increasing forage production, although as trees fall, forage would become increasingly difficult to fully utilize.

3.4.3.2 Proposed Action

In general, the overall effect of the Lemiti project would be beneficial for deer and elk. Removal of the standing dead trees would allow even more sunlight to reach the forest floor and would allow more grasses and forbs to grow which would result in increased forage. Palatable native seed would be spread in appropriate areas. The increased forage opportunities could improve deer and elk production and health in the Lemiti project area and across the subwatershed. The increase in forage opportunities is especially important in summer range where forage in late summer and fall is critical to deer and elk survival through the winter (Cook 2013). Many of the proposed Lemiti treatment units are located in B11 Deer and Elk Summer Range land allocation which provides an opportunity to improve summer range condition by creating more forage opportunities at key locations.

Cover is currently lacking within the project area and Lemiti project activities would not change this condition. Recent research has shown that cover is not as critical as once believed (Cook 1998).

Noise during project activities would cause some displacement resulting in a temporary decrease in use of the area. However, project activities would not all be occurring at the same time, but only in a few places at any one time. The potential disturbance is predicted to be small in scale, temporary in nature, and would only impact a few individuals. Project design criteria would require no noise generating activities such as harvest, road construction or fuels treatment in the fawning, calving and rearing season (April 1 to July 30) in the B11 Deer and Elk Summer Range land allocation.

During implementation of this project, new temporary road construction and old existing temporary roads would be reopened and reconstructed to access several of the units. These roads would not be open to the public and would be closed again following implementation of this project. In addition, currently open road segments totaling 1.0 mile would be closed. The temporary increase in open road density during project operations would likely result in some deer and elk displacement.

Sapling thinning treatment would result in delaying the time when trees would shade out forage plants and would result in long-term benefit as the stands mature into effective cover areas for deer and elk.

3.4.4 Cumulative Effects

The Headwaters Clackamas River subwatershed is used as the analysis areas for cumulative effects. This area encompasses 25,985 acres and includes portions of the CTWS Reservation. The analysis area is large enough that direct effects from the Lemiti project would not likely be felt outside this area. Disturbances such as road construction and timber harvest that have occurred on the adjacent reservation are also considered. Approximately 27 acres of the recent Camas Prairie Fire overlap the analysis area.

The time frame used to include or exclude actions varies by the type of action. Some impacts such as past regeneration harvest would recover gradually over approximately 40 years.

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. The landscape pattern of vegetation within and surrounding the Lemiti project area has been affected by past timber harvest, wildfires, and most recently, widespread stand mortality due to a mountain pine beetle mortality substantially impacting cover and foraging habitat for deer and elk. Past road construction, decommissioning, and maintenance have also contributed to the cumulative effect. These activities and events have created a landscape where cover habitat is severely lacking and forage habitat has substantially increased. These conditions would continue with the implementation of the Lemiti project.

There are no ongoing timber projects within the analysis area to include in the analysis of cumulative effects. The only foreseeable future action within the analysis area would be the potential salvage of approximately 27 acres of trees burned in the Camas Prairie Fire. Tribal managers are seeking funding to conduct some fuel treatments on the reservation but this funding is not certain and there is insufficient site specificity to conduct an analysis because treatment type, size, and location are unknown. If treatments are funded, it is likely that they would be complimentary to the treatments occurring on the Forest and would serve to provide more effective fire hazard reduction. In terms of deer and elk habitat, any treatments on the reservation would not

likely create negative trends for deer and elk populations and may serve to enhance forage quality and remove the potential for jackstrawed down trees that would occur if they took no action. Since deer and elk are important cultural foods, tribal managers are likely to devise fuel reduction strategies that are complimentary to the habitat needs of deer and elk. For these reasons there are not likely to be any substantial cumulative effects for deer and elk.

The current population trend for deer and elk on the Forest is decreasing due to the incremental reduction in early-seral habitat across the Forest (For more information see Forest-wide analysis for Management Indicator Species), and across the subwatershed. This project and others across the broader landscape would enhance forage but would not likely reverse the trend of population decline. For these reasons, the Lemiti project *would not contribute to a negative trend in viability on the Forest for deer and elk.*

3.4.5 Forest Plan Standards and Guidelines

The open road density within the B11 Deer and Elk Winter Range land allocation is currently 0.7 miles of road per square mile, which is substantially less than the 1.5 miles per square mile required by B11-034. There are 1,970 acres of B11 within the Lemiti project area.

The open road density within the Lemiti project area is currently 1.2 miles of road per square mile, which is substantially less than the 2.5 miles per square mile required for inventoried summer range (FW-209). (Inventoried summer range is the area outside the B11 Deer and Elk Summer Range land allocation). There are 1,170 acres of inventoried summer range within the Lemiti project area.

- 3.4.5.1** Ten to 15 percent of the area where vegetation can be manipulated should be maintained in forage condition for deer and elk, e.g. conifer plantations 0 to 15 years of age, (B11-009 p. Four-278).

This is applicable in the B11 land allocation. The insect mortality has resulted in a situation where much more than 15 percent of the area is in an open condition although forage is not high quality in some areas. The rate would be similar for no action and the proposed action. This standard would be met because the proposed action would make forage quality better and would retain access by preventing jackstrawed conditions.

- 3.4.5.2** Timber harvest units should be seeded with high quality deer-elk forage species and fertilized, (B11-012 p. Four-279).

Native species would be seeded to provide forage for deer and elk (s. 2.2).

3.4.6 Effects of Forest Plan Amendment #19.

There are no amendments that directly affect deer and elk.

3.5 OTHER WILDLIFE

3.5.1 Northern Spotted Owl

This section summarizes analysis in the Lemiti Wildlife Report and Biological Evaluation which is incorporated by reference.

The northern spotted owl is federally listed as a threatened species under Section 4 of the Endangered Species Act (ESA). The Forest has consulted on this project with the U.S. Fish and Wildlife Service (USFWS).

The Lemiti Fuels Reduction project is included in a programmatic Biological Assessment (USDA 2013). Formal consultation with U.S. Fish & Wildlife Service has been completed for this project. A Letter of Concurrence dated September 27, 2013 (FWS Reference Number 01EOFW00-2013-0187) (USDI 2013) is incorporated by reference.

3.5.1.1 Habitat Methodology & Existing Condition

This species is typically associated with old-growth forested habitats throughout the Pacific Northwest. Past management activities, such as timber harvest, have reduced or fragmented northern spotted owl habitat throughout its range. The barred owl is an invasive species from the eastern United States and has expanded its range extensively throughout the Pacific Northwest. It is a generalist that can utilize a wide range of habitat types and forest age classes. As a result, overall northern spotted owl population densities have decreased, specifically in areas where habitat reduction is concentrated and where barred owls are present (USDI 2011).

Suitable Habitat consists of forested stands used by spotted owls for nesting, roosting and foraging (NRF). Features that support nesting and roosting typically include a moderate to high canopy closure (60-90%); a multi-layered, multi-species canopy with large overstory trees; a high incidence of large trees with various deformities (large cavities, broken tops, mistletoe infections, and other evidence of decadence); large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for spotted owls to fly (USDA 2013, USDI 2013).

Foraging habitat generally has attributes similar to those of nesting and roosting habitat, but such habitat may not always support successfully nesting pairs (USDI 2011). Trees within foraging habitat may vary in size, and could be of smaller diameter than trees in nesting and roosting habitat depending on site specific

conditions. Together, nesting, roosting or foraging habitat comprise suitable habitat in this document.

There are no proposed actions within suitable habitat. There are six known owl sites within 1.2 miles of proposed activities. Some of the suitable habitat within the project area boundary exhibit marginal habitat conditions due to the lodgepole pine mortality. Of the six known sites, four are below the thresholds set by the U.S. Fish and Wildlife Service for suitable habitat in core or home range areas (USDI 2011).

Dispersal Habitat allows spotted owl movement across the landscape between stands of suitable habitat and for juveniles to disperse from natal territories. This habitat generally lacks the optimal characteristics to support nesting and typically lacks multi-storied canopies, large trees or large snags and down wood. Dispersal habitat generally consists of mid-seral stands between 40 and 80 years of age with canopy cover of 40% or greater and trees with a mean diameter of 11 inches or more (USDI 2011).

There are fifty-nine acres of proposed treatment within dispersal habitat of the Lemiti project area. These acres currently exhibit poor dispersal habitat conditions as the habitat currently consists primarily of dead lodgepole pine. Mountain pine beetle activity has produced low canopy cover percentages throughout most of the project area. Dispersal conditions are scattered, but possible throughout this area; however, the likelihood of owls using this area as functional dispersal habitat or foraging is low due to the lack of canopy complexity.

There is no critical habitat present in the Lemiti project area. There are no stand altering actions proposed in late-successional reserves.

3.5.1.2 Methodology for Disturbance Effects

The U.S. Fish and Wildlife Service has concluded that noise and smoke can result in a disruption of breeding, feeding, or sheltering behavior of the spotted owl such that it creates the potential for injury to individuals (i.e. incidental take in the form of harassment) (USDI 2011). For a substantial disruption of spotted owl behavior to occur, the disturbance and spotted owl(s) must be in close proximity. The northern spotted owl breeding season generally extends from March 1st to September 30th with March 1st to July 15th considered to be critical from a disturbance perspective (USDI 2013).

A spotted owl that may be disturbed at a roost site is presumably capable of moving away from a 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 concern about noise is with breeding behavior at active nest sites.

Seasonal restrictions on certain activities can minimize disturbance.

3.5.1.3 Direct and Indirect Effects - Habitat

No Action

This alternative would not modify any suitable or dispersal owl habitat in core nest areas, home ranges, or other land designations related to northern spotted owls. All conditions of the Lemiti project area would remain the same, in the very short term.

With no active management, saplings would continue to fill in at high density and dead lodgepole pine would fall, resulting in the development of ladder fuels which would increase the risk of stand-replacing wildfire. If stand replacing fire occurs, it would likely spread into adjacent and nearby suitable habitat and dispersal habitat, and would negatively affect nearby owl home ranges, critical habitat and late-successional reserves.

Proposed Action

There would be no effect to suitable habitat. There are fifty-nine acres of proposed treatment within dispersal habitat in the Lemiti project area, however, these acres currently exhibit poor dispersal habitat conditions as the habitat currently consists primarily of dead lodgepole pine.

The proposed action **may affect**, but is **not likely to adversely affect** territorial or dispersing northern spotted owls or their habitat, due to maintaining, by avoidance, all suitable and quality dispersal habitat areas. There would be some short-term impacts to northern spotted owl habitat use and prey species abundance. The project may indirectly benefit barred owls due to their generalist nature.

Fuel treatments would result in reduced fire risk and reduced risk to suitable and dispersal habitat, and would provide greater protection for nearby owl home ranges, critical habitat and late-successional reserves. Because there would be no suitable habitat impacted by project activities and because quality dispersal habitat would be maintained at current levels, it is unlikely that the proposed project activities would impact the health or survival of any birds within or adjacent to the Lemiti project area.

3.5.1.4 Direct and Indirect Effects - Disturbance

No Action

This alternative would not disturb any known owl sites in the Lemiti project area because no project activities would occur. This alternative would have **no effect** on northern spotted owls due to disturbance. If stand replacing fire occurs, it would likely result in smoke that could affect nearby activity centers, however, the likely burning period is outside the critical breeding period.

Proposed Action

The proposed Lemiti project has actions that are within disruption distances for chain saws, heavy equipment, and pile burning. A spotted owl with the potential to be disturbed at a roost site is presumably capable of moving away from a 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 primary concern with disruption is with breeding behavior at active nest sites. Since the Lemiti project was planned to avoid spotted owl habitat, most project activities would occur outside the threshold zone for disruption of nesting. For those actions with the potential to adversely affect spotted owls a seasonal timing restriction would be implemented to mitigate any effect on the owls (s. 2.2.6.J1).

With the seasonal restrictions, all proposed project activities of the Lemiti project area are *not likely to adversely affect* northern spotted owls to the extent that would cause disruption of a spotted owl or breeding pair from normal activities. Minimal disturbance is anticipated. However, since some actions such as road use, may occur within the *disturbance* distance of known owl sites, such actions *may affect, but are not likely to adversely affect*, nesting spotted owls.

3.5.1.5 Cumulative Effects

Cumulative effects are impacts on the environment that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions. The analysis area for cumulative effects is the area within 2.4 miles of the Lemiti project activities. This represents the diameter of a spotted owl home range circle and is appropriate for this project because it brings in all spotted owl home ranges that could be affected by this project. Alterations to owl habitat can be long lasting. The time frame for this cumulative effects analysis goes back to the 1960s, when active management began in this area. This cumulative effects analysis area is 19,579 acres which includes 8,911 acres of CTWS Reservation. There are no other land ownerships within the analysis area. There are no other ongoing projects or foreseeable future projects on Forest Service land within the analysis area. There is potential for future projects or other management in the area, however, there are no current proposals with sufficient site specificity to conduct an analysis.

The Camas Prairie fire occurred in July 2014 on the CTWS Reservation. Approximately 800 acres of this fire occurred within the Lemiti spotted owl cumulative effects analysis area. It is likely that salvage activities would occur within the fire area, but the extent is unknown. No other Tribal ongoing or foreseeable projects within the analysis area are known about at this time. Tribal managers are seeking funding to conduct some fuel treatments on the reservation but this funding is not certain and there is insufficient site specificity to conduct an analysis because treatment type, size, and location are unknown. If treatments are funded, it is likely that they would be complimentary to the treatments occurring on the Forest and would serve to provide more effective fire hazard reduction. In terms of owls, any treatments on the

reservation would likely include treatments in dead lodgepole pine stand and would not likely have a substantial cumulative effect because they would likely avoid suitable habitat.

This analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. The landscape pattern of vegetation within and surrounding the Lemiti project area has been affected by past timber harvest, wildfires, and most recently, widespread stand mortality due to a mountain pine beetle epidemic substantially impacting the habitat for spotted owls. Past road construction, decommissioning, and maintenance have also contributed to the cumulative effect. These activities and events have created a landscape where there is marginal quantity, quality and distribution of suitable habitat and dispersal habitat. Some ecologically important features of landscape pattern are: amount of edge habitat, degree of fragmentation of late-successional forest, and amount of interior forest. As fragmentation of a landscape pattern increases, the amount of interior forest habitat decreases and the amount of edge habitat increases which impacts organisms that prefer large patches of interior habitat, such as the spotted owl.

In the Lemiti project area, the limiting factor for spotted owl occupancy is the lack of spotted owl suitable habitat, the lack of connectivity between suitable habitat blocks and the lack of dispersal habitat. The mountain pine beetle epidemic has created a landscape where there is marginal quantity, quality and distribution of suitable habitat and dispersal habitat within the project area.

The lodgepole pine forest type is not widespread across the Forest but there are concentrated stands throughout the analysis area and most of what there is has been heavily impacted by mountain pine beetle.

For the Willamette Province the home range is a 1.2 mile radius circle (2,955 acres) centered on the historic nest site. The analysis area includes the home range of six historical nest sites. Incidental take would be presumed to occur when suitable habitat is removed from a home range and if suitable habitat is less than 40% of the home range. Currently, three of the six known sites in the project area are below the 40% threshold. However, across the broader landscape, 35 of 46 known nest sites are above the threshold in the Upper Clackamas Watershed.

A core nest area has been defined as the area within a home range that receives disproportionately high use (503 acres or 0.5 mile radius circle) centered on the historical nest site. Incidental take would be presumed to occur when suitable habitat is removed from a core nest area and if suitable habitat is less than 50% of the core. Four of the six known owl sites in the analysis area have core nest areas that are currently below the 50% threshold in suitable habitat. However, across the broader landscape, 30 of 46 nest sites are above the threshold in the Upper Clackamas Watershed.

The Lemiti project would not remove any suitable habitat. It is also likely that the Camas Prairie Fire salvage would not move suitable habitat to unsuitable. The two owl home range circles that overlap the Camas Prairie Fire are already below the take threshold.

The road decommissioning, maintenance, and construction along with the fuel break treatments would have very little impact on northern spotted owls because it modifies but does not remove the function of any habitat. There could be some impact from disturbance from the use of heavy equipment but this would be minor since all equipment is used only during the daytime and has no impact on spotted owl survival, reproduction, or feeding. In addition, to further mitigate the chance of disturbance, seasonal restrictions would be in effect in appropriate treatment units.

The cumulative effect of the Lemiti fuels treatment project when added to these other actions, would be negligible and would not impact northern spotted owl survival, reproduction, feeding, or care of young. The USFWS has determined that the cumulative effects of the proposed Lemiti project *may affect*, but are *not likely to adversely affect the northern spotted owl* (USDI 2013). The project would not result in any incidental take of owls because no suitable habitat would be altered.

3.5.1.6 Consistency with Direction and Regulations

This project is consistent with the Northwest Forest Plan and with the Revised Northern Spotted Owl Recovery Plan (USDI 2011). No treatments are proposed in late-successional reserves. The Recovery Plan recommends the revitalization of forest ecosystems through active management, including actions that reduce the effect of severe fires.

The Following Mt. Hood National Forest Land and Resource Management Plan Standards and Guidelines that apply to the Proposed Action 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-175 - Habitat for threatened, endangered and sensitive species shall be protected and/or improved.
- FW -176 - A Biological Evaluation has been prepared.
- 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.

3.5.2 Region 6 Sensitive Species

A biological evaluation has been developed by a wildlife biologist to address the potential effect of activities on sensitive species. The objective is to avoid a trend toward Federal listing under the ESA. This section summarizes the biological evaluation which is incorporated by reference.

The most recent Region 6 Sensitive Species wildlife list (effective 1 December, 2011) was reviewed and 26 species that may occur in or near the Mt. Hood National Forest were identified. Although each of these species are known to or could potentially occur in or near the Mt. Hood National Forest, not all of them have potential to occur in the Lemiti project area. A pre-field wildlife review was completed using Heritage database records, district data, literature reviews, communication with district personnel and the Forest Plan to identify which species would may occur in the project area. The species that have neither habitat nor documented occurrences within the Lemiti project area are eliminated from further discussion here because the project would have no impact upon them. In addition, five aquatic/riparian obligate species with potential habitat are also eliminated from further discussion here because the fuel treatment activities would not occur within riparian habitat and there would be little or no impact on them. Two sensitive species (bald eagle and western bumblebee) are discussed in detail in the Biological Evaluation and summarized below because they have potential habitat that may be impacted by the proposed action.

3.5.2.1 Bald Eagle (*Haliaeetus leucocephalus*)

Bald eagles are closely associated with water and are rarely seen far from aquatic environments. Most suitable nesting habitat occurs around the major reservoirs or along major rivers in the Forest. Key winter habitat components for the bald eagle on the Forest include perch sites, roost sites away from human disturbance, and an adequate food supply. The large conifer landscape throughout the Forest provides suitable roosting habitat.

The nearest known active nesting occurs on Timothy Lake approximately 13 miles to the north of the project area. There are no known concentrations of wintering eagles (winter roost sites) anywhere within the project area. Bald eagles, during migration, are common and can occur sporadically throughout the project area and temporary roost sites during migration are determined more by the availability of carrion than any other factor. Human disturbance due to roads and trails may affect eagles, but most human use is concentrated in the spring, summer and fall, therefore effects to wintering bald eagles is likely to be minimal.

With the proposed action, migrating or wintering bald eagles are likely to avoid the Lemiti project area due to equipment noise. No nesting or roosting sites occur within one mile of the project area; therefore, no impacts to nesting or roosting habitat are anticipated. The primary winter food source, deer carrion, would continue to be

available. Habitat for its primary winter food source of deer carrion would continue to be available in the project area and treatment activities proposed for the project area would enhance deer habitat and may increase deer numbers, adding a beneficial incremental impact for the eagle.

With no action, there would be increased risks from high intensity wildfire which would likely spread into the late successional and riparian stands resulting in a loss of eagle roosting habitat. In the absence of stand replacing fire, habitat for this species is expected to increase, although open water and availability of carrion during the winter months would remain the primary limiting factor for the species in the project area.

The proposed action **may adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend toward federal listing.** Individuals may be subjected to short-term disturbance due to management activities. Mortality due to this project is not likely to occur and it is not expected to threaten populations. Populations of wintering eagles would likely continue to be well supported in and around the Forest.

3.5.2.2 Western Bumblebee (*Bombus occidentalis*)

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. While the western bumblebee was historically known throughout Oregon and Washington, it is now largely confined to high elevation sites and areas east of the Cascade Crest (Cameron 2011, Xerces Society 2012).

Bumblebees nest in pre-existing holes in the ground, such as abandoned rodent holes. Bumblebees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones (Goulson 2003). Like other bumblebees, the western bumblebee has three basic habitat requirements: suitable nesting sites for the colonies, nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer and fall), and suitable overwintering sites for the queens.

The primary threats to the western bumblebee at the sites where it currently exists in Oregon and Washington include: pathogens from commercial bumblebees and other sources, impacts from reduced genetic diversity, and habitat alterations including conifer encroachment into meadows (resulting from fire suppression), grazing, and logging. Other threats include pesticide use, fire, agricultural intensification, urban development and climate change (Thorp 2008).

The western bumblebee has been documented on the Forest, though not within the Lemiti project area. Flowering plants are widespread throughout the project area and are abundant within the riparian areas.

Direct mortality of individuals could potentially occur during project activities. The proposed project may also impact western bumblebees by temporarily impacting flowering plants during fuels treatment activities, road maintenance, road decommissioning, and road closures. Reducing this food source would reduce the ability of foraging bumblebees to find nectar at these sites which is a required food source for young bumblebees. It is expected that these plants would regenerate within a few years and that the bumblebees would have other nectar plants available within the project area.

The proposed action may impact current and potential nest sites with heavy equipment during project activities, temporarily reducing the number of nests and potential future nest sites and, therefore, reducing the number of bumblebees that this area could support in the short term. The number of available nest sites would likely recover within a few years after treatment as holes are created by burrowing animals.

The untreated portions of the Lemiti project area including riparian areas would continue to provide a food source and would also continue to provide nesting and hibernating habitat. Additionally, the adjacent Wilderness as well as the CTWS Reservation provide habitat and allow for bumblebees to recolonize the impacted areas within the project area as foraging and nesting habitat return.

With no action, there would be no impact to bumblebee nesting, foraging, or overwintering habitat.

At the broader landscape scale, genetic diversity and connectivity between colonies is a concern for the bumblebee. The main threats to this species are agriculture and urban development, livestock grazing, and broad scale insecticide application (Thorp 2008). Actions that could affect bumblebees in the watershed include logging and fuel treatments. These actions 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 bumblebees. As habitats become fragmented, the population could diminish and inbreeding becomes more common. This in turn decreases the genetic diversity and increases the risk of population decline.

Most actions that affect bumblebees are short term because flowering plants typically recover quickly and new holes are created by burrowing animals. Populations of this species would still persist at the watershed scale. Large areas of potential habitat would continue to provide bumblebee habitat including riparian reserves, meadows, Wilderness areas and late-successional reserves.

The proposed action **may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing.** Western bumblebees may be subjected to a temporary reduction in flowering plants and nesting sites as well as potential direct mortality due to proposed project

activities. While the number of bumblebees in the project area may be slightly reduced, this reduction would be temporary as flowering plants and nest sites begin to recover again after project activities are complete.

The proposed action is consistent with Forest Plan direction relevant to sensitive species.

3.5.3 Management Indicator Species

Of the Forest's wildlife management indicator species likely present in the project area, northern spotted owl, deer, elk are addressed in other sections. Pileated woodpecker and American marten are discussed here. At the time of the Forest Plan, this species was known as the pine marten, but the species name has changed to American marten.

3.5.3.1 Pileated Woodpecker (*Dryocopus pileatus*)

This species was selected as a Management Indicator Species because of its association with mature and over-mature habitat, and their need for large snags and decadent trees (USDA 1990).

Pileated woodpeckers use mature and older, closed canopy stands for nesting and roosting, but may use younger (40 to 70 years), closed-canopy stands for foraging if large snags are available; large snags and decadent trees are important habitat components for pileated woodpeckers on the west side of Oregon and Washington (Hartwig 2004, Mellen 1992).

There are pockets of late-seral forest within the project area, though none are proposed for treatment. Effects to snags including snag standards and guidelines are addressed in section 3.3. Due to past timber harvest and large stands of dead lodgepole pine, there is not enough habitat present in the project area to support populations of late seral, large home range species such as pileated woodpecker.

With no action, there would be minimal impact to pileated woodpecker habitat. However, fires would be larger compared to the proposed action which could burn into adjacent pileated woodpecker habitat.

With the proposed action, potential for any direct effects on pileated woodpecker would be minimal because treatment units are not within preferred pileated habitat. The treatment units are dead lodgepole pine stands that are small in diameter and have open canopies while pileated woodpeckers depend on large tracts of dense, mature and late-successional stands with large snags and a closed canopy.

There are no cumulative impacts for pileated woodpecker because there is little high quality pileated habitat in the project area and none proposed for treatment. The current trend for pileated woodpecker is increasing (For more information see Forest-

wide analysis for Management Indicator Species). The Lemiti project *would not contribute to a negative trend in viability on the Forest for pileated woodpecker*.

The proposed action is consistent with standards and guidelines for pileated woodpecker (which are located in the B5 land allocation portion of the Forest Plan) because there is no B5 land allocation in the Lemiti project area. Standards and guidelines for snags are addressed in section 3.3.8.

3.5.3.2 American Marten (*Martes americana*)

This species was selected as a Management Indicator Species because of its association with mature and over-mature habitat, and their need for large snags and large amounts of down wood (USDA 1990).

American marten are typically associated with late-seral coniferous forests with closed canopies, large trees, and abundant snags and down woody (Zielinski 2001). Coarse woody debris is an important component of marten habitat. Large logs and other structures provide protection from predators, access to the subnivean (i.e., beneath the snow) space where most winter prey are captured, and protective thermal conditions, especially during winter (Buskirk 1994).

Activities such as timber harvest and road construction that fragment, dissect, and isolate habitats are the largest threats to marten. Fragmented habitats attract habitat generalist predators like the great-horned owl, coyote, and bobcat which can all prey on marten. In addition, fragmentation eliminates the connectivity and creates isolated individuals and populations which are more susceptible to extirpation.

There are pockets of late-seral forest within the project area, though none are proposed for treatment. Snag and down wood effects and standards and guidelines are addressed in section 3.3. Within the project area there is not enough habitat present to support populations of late seral, large home range species such as marten.

For no action, effects would be similar to that of the pileated woodpecker. If stand replacing fire occurs, it would likely spread into adjacent areas where some optimal habitat may be destroyed.

With the proposed action, potential for any direct effects on marten would be minimal because treatment units are not within preferred marten habitat. There would be no additional habitat fragmentation with project activities as the treatment units are not considered marten habitat. The marten depends on dense mature and late-successional stands with coarse woody debris and greater than 50 percent canopy cover. These conditions are not present in treatment units.

There are no cumulative impacts for marten because there is no high-quality marten habitat in the project area. The current trend for American marten is stable (For more information see Forest-wide analysis for Management Indicator Species). The Lemiti

project *would not contribute to a negative trend in viability on the Forest for American marten.*

The proposed action is consistent with standards and guidelines for American marten (which are located in the B5 land allocation portion of the Forest Plan) because there is no B5 land allocation in the Lemiti project area. Standards and guidelines for snags and down wood are addressed in section 3.3.8.

3.5.4 Survey and Manage Species

A biological evaluation has been developed by a wildlife biologist to address the potential effect of activities on survey and manage wildlife species.

In January 2001, a Record of Decision for Amendments to the Survey and Manage, Protection Buffer and other Mitigation Measures Standards and Guidelines (2001 amendment) was signed (USDA 2001).

The Lemiti project applies the Survey and Manage species list published in December 2003 under direction resulting legal action and a district court's remedy order issued on 18 February 2014 (*Conservation Northwest v. Bonnie*, W.WA No. C08-1067-JCC) and thus meets the provisions of the 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*, as modified by the 2014 court order. Pre-disturbance surveys were not conducted for the Lemiti project because no potential habitat is present in the treatment areas.

The proposed action is consistent with survey and manage standards and guidelines. Effects to black-backed woodpecker are included in the snag section (s. 3.3.7).

3.5.5 Migratory Landbirds

A biological evaluation has been developed by a wildlife biologist to address the potential effect of activities on birds of concern. Species of landbirds that have potential habitat in the project area are categorized in two groups.

Old growth/mature forest associated species - Northern Goshawk, Vaux's Swift, Brown Creeper, Winter Wren, Varied Thrush, and Hermit Warbler.

Mixed conifer, open forest - Blue Grouse, Rufous Hummingbird, Northern Flicker, Olive-sided Flycatcher, Hammond's Flycatcher, and Purple Finch.

3.5.5.1 No Action - Alternative A does not propose management activities at this time and therefore would not alter habitat conditions for these species. Existing vegetation conditions would continue to follow natural successional pathways, and bird populations would respond accordingly. Currently, most of the Lemiti project area is

standing dead lodgepole pine. There would be incrementally increasing risks from high intensity wildfire which would likely spread into the late-successional and riparian stands resulting in a loss of habitat for most birds reliant on old growth/mature habitats. Wildfire may benefit species associated with more open forest types.

3.5.5.2 Proposed Action - For the bird species that are associated with old growth/mature forests, there would be no effects as there are no treatments proposed in this type of habitat. For the bird species associated with a more open, mixed conifer forest, the removal of standing dead lodgepole pine associated with this project may affect habitat for individual migratory birds, but is not expected to have a measurable effect on their overall habitat or populations because of the amount of adjacent untreated habitat in the project area and across the broader landscape. There would be untreated areas such as riparian reserves and adjacent Wilderness. It would be expected to see some shifts in species composition post treatment within the project area, however, any effects would be short-term as more structurally diverse conditions are expected to return as these stands develop over the next 20 to 30 years. Habitat changes proposed by this project would not compromise the persistence of this group of species in the vicinity of the project area or throughout their ranges.

3.5.5.3 Cumulative Effects to Land Birds

The analysis area for land birds is the entire Mt. Hood National Forest because birds are wide ranging and can select areas to nest or forage over a very wide landscape.

Across the landscape, recent and ongoing fuel treatments, thinning, and road decommissioning may have an effect both positive and negative on land bird use of the Forest. There would be some loss of productivity for some species and there may be some increase in productivity for other species that favor more open stands. Road decommissioning would likely result in improved conditions for most bird species due to increased solitude. The proposed action combined with other actions and events would not likely impact the viability of any migratory landbirds because sufficient habitats are present across the landscape. The Forest has abundant areas with limited management such as Wildernesses.

The project is consistent with the Migratory Bird Treaty Act of 1918 and Executive Order 13186 that address practices that protect these species.

3.5.5.4 Effects of Forest Plan Amendment #19.

There are no amendments that directly affect these species.

3.6 UNROADED AND UNDEVELOPED CHARACTER

During public scoping, comments were received about unroaded and undeveloped areas. The proposed action involves both fuel treatment and temporary road construction in areas that are relatively ‘undeveloped’ and ‘unroaded.’ These terms have different meanings for different people: the absence of certain types of roads and certain types of logging activities may be considerations and sometimes a minimum size is considered. This section addresses existing Wilderness, Inventoried Roadless Areas, Potential Wilderness, and other areas with unroaded and undeveloped character. Recreation and scenery are addressed at section 3.7.

3.6.1 Wilderness

The Sisi Butte portion of the Clackamas Wilderness, which was created in 2009, is adjacent to the fuel treatment project. The project area is outside the Wilderness and all treatments are outside the Wilderness. Unit 10 touches the Wilderness boundary and the other elements of the project are separated from the Wilderness by roads. Unit 10 has been partially logged before and is relatively open with dead lodgepole pine trees. The Wilderness boundary was intentionally drawn to exclude this area because of the previous logging that occurred in 2003.

Neither the Wilderness legislation nor the Forest Plan require buffers that would affect management outside the Wilderness. There are no system trails, streams or other recreational features or destinations in the Wilderness. The area’s most dominant feature, Sisi Butte has a gated road to the top, a fire lookout tower and an electronic tower which are all outside the Wilderness. There is a large area of dead trees within the Wilderness east of Sisi Butte. The Wilderness provides 3,245 acres of undeveloped forest lands with a low to moderate opportunity for challenge and risk due to its small size and convoluted shape and because of the close proximity to roads on all sides and development at the top of Sisi Butte.

In the event of a wildfire, it is likely that a fire could burn from the Wilderness to other parts of the Forest and it is also likely that a fire could burn into the Wilderness. The Forest Plan requires an appropriate fire suppression response for all land allocations including Wilderness. Because the Sisi portion of the Clackamas Wilderness is so small, and because there are many resources at risk including facilities at the top of Sisi Butte, it would not be feasible or appropriate to allow fires to burn.

Since the Wilderness has many dead trees and will have increasingly high fire hazard as trees fall, there is the possibility of a lightning fire ignition starting in the Wilderness and spreading to the east. The fuel treatments would break the continuity of fuels between the Wilderness and the CTWS Reservation reducing the likelihood of fire spreading to the reservation.

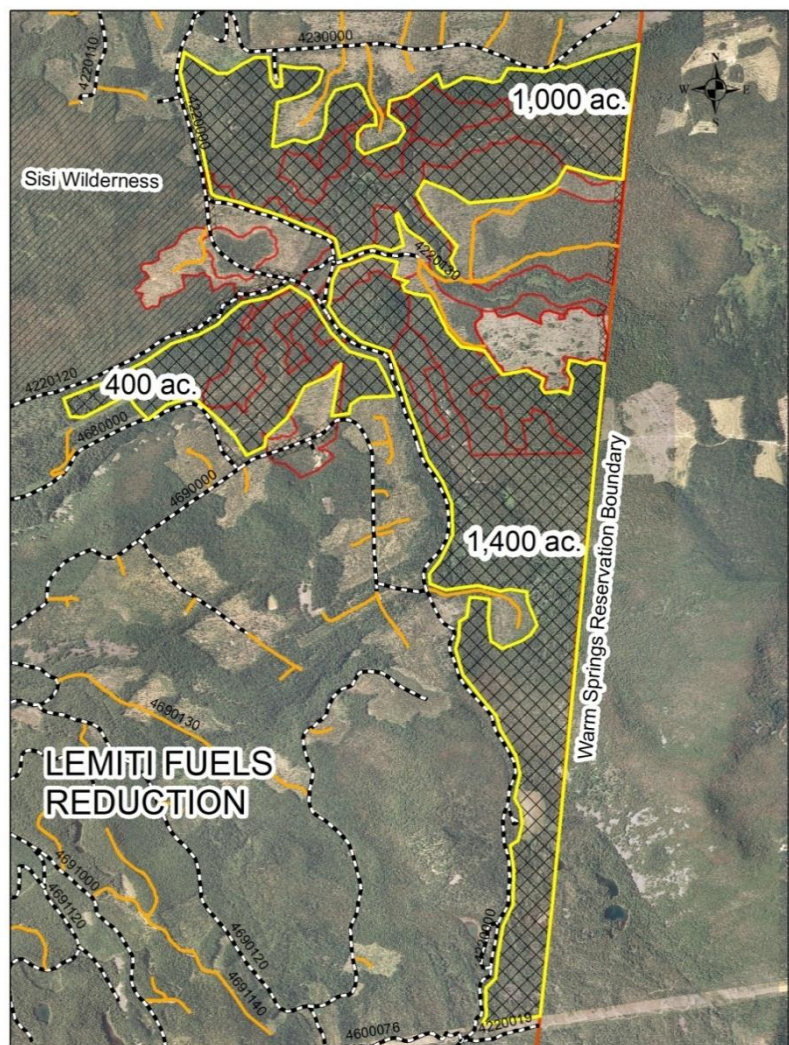
3.6.2 Inventoried Roadless Areas (IRAs) and Potential Wilderness

The proposed fuel treatments are not in or adjacent to any Inventoried Roadless Areas or Potential Wilderness identified in the Forest Plan. The nearest fuel treatment unit is more than 3 miles from the nearest Inventoried Roadless Area with many roads in-between. Potential Wilderness is defined by FSH 1909.12 chapter 71. The project area does not meet Forest Service criteria for Potential Wilderness because the unroaded/undeveloped portions of the landscape are less than 5,000 acres in size, are not contiguous to existing wilderness, and are not self-contained ecosystems. Changing or reassessing these is outside the scope of project-level planning.

3.6.3 Unroaded and Undeveloped Character

In this document, the terms “unroaded” and “undeveloped” are used to denote any areas that are not already Wilderness, an Inventoried Roadless Area or a Forest Service Potential Wilderness. Unroaded and undeveloped areas are portions of the landscape that do not contain forest roads (36 CFR 212.1). ‘Forest roads’ have been called system roads, classified roads or forest development roads: they are a part of the Forest’s network of roads necessary to protect, administer, and use the national forest system and its resources. Other roads may or may not be present such as temporary roads, user created roads, or old decommissioned roads. Unroaded and undeveloped areas generally do not contain developments such as rock quarries, power lines, campgrounds or logged areas that have changed the character of the area.

The following section focuses on what is “special” about the unroaded and undeveloped parts of the project area. No minimum acreage size is used to exclude areas



from this discussion.

Much of the project area burned very intensely approximately 100 years ago. No salvage logging occurred. The area reseeded gradually over time, much of the area came back to relatively pure stands of lodgepole pine. These areas were likely mid seral or younger before they burned because there is no evidence of charred large stumps or large down logs. This burned area includes part of what is now the Sisi portion of the Clackamas Wilderness. The fuel treatment touches on three separate unroaded and undeveloped blocks ranging in size from 400 to 1,400 acres. This acreage includes only the portion on Forest: two of the blocks touch the reservation boundary and if unroaded and undeveloped acreage on the CTWS Reservation were included the areas would be much larger. The Tribes allow certain uses such as use of the Pacific Crest Trail on the reservation, but other uses are discouraged or prohibited. The analysis of cumulative effects below includes disturbances created by past harvest and road construction. There are no other current planned projects or any foreseeable future projects that would affect these blocks.

The following statements describe the look and feel of the unroaded and undeveloped portions of the area and what uses occur.

- The portion near proposed fuel treatments is used primarily for roaded recreation, firewood gathering and hunting. The roads also serve as the primary route to Olallie Lake; a popular recreation area. Olallie Lake is over 5 miles from the fuel treatment area.
- Visitors encounter a large area of dead lodgepole pine trees killed by mountain pine beetles. Many of the dead trees adjacent to open roads were hazardous and have been felled.
- The dead lodgepole pine stands would soon fall in a jackstrawed manner making it difficult to walk through the area.
- The project area has relatively flat topography.
- The streams in the project area are intermittent and do not have catchable-size fish.
- There are no viewpoints or scenic vistas.
- The area receives some use by snowmobiles in the winter - both on forest roads and off roads including routes that traverse the unroaded and undeveloped blocks.
- Olallie Meadow Campground is two miles from the fuel treatment area and lies adjacent to the 1,400-acre block. It is not used much because virtually all of the trees in and around the campground are dead.
- The Pacific Crest Trail crosses the south end of the 1,400-acre block but does not come near any fuel treatments.
- The area received some use by Off-Highway Vehicles (OHV) but is not considered a heavily used area. The terrain is gentle making it possible for the development of unauthorized user created routes. The Forest's OHV Management Plan prohibits OHV use in this area.
- The south edge of the 1,400-acre block is a large power line with two sets of metal towers. The power lines create a crackling buzzing noise.

- The forest stands are relatively uniform mid-seral lodgepole pine and mixed conifer stands that average approximately 12 inches in diameter.
- There is little old-growth in the unroaded and undeveloped blocks.
- In this analysis, unroaded and undeveloped areas are bounded by roads, developments and the CTWS Reservation boundary. The centers of the unroaded and undeveloped blocks have the greatest solitude while the edges have a more roaded and developed feel.
- The shapes of the blocks are shown on the map above. Some of the blocks have convoluted shapes as they wrap around forest roads and clearcuts. One way to describe the degree of convolution is comparing the ratio of the block perimeter to that of a square of similar acreage. If the block were square it would have a ratio of 1 to 1; the greater the ratio, the greater the convolution.

Block	Ratio
1,000 ac.	3.9:1
1,400 ac.	4.3:1
400 ac	2.3:1

3.6.4 Direct and Indirect Effects

The measure of change for this issue is the acres treated and miles of road constructed. The following table shows the actions that would occur in each block.

Size of Block	Acres of Fuel Treatment	Miles of temporary road
1,000 ac.	290	1.0
1,400 ac.	215	1.2
400 ac.	80	0.3

The proposed action would alter some of the unroaded and undeveloped character of the project area. Cutting trees, disturbance from logging equipment, fuels treatment, landings and road construction would

affect unroaded and undeveloped values. The blocks would either be diminished in size and may continue to provide unroaded and undeveloped benefits or they may no longer provide these benefits.

The following discussion focuses on several key resources that are often considered well provided for in unroaded and undeveloped blocks and lacking in other parts of the developed landscape. Some of these topics relate to standards and guidelines that are documented in other sections.

- High quality or undisturbed soil

Soils are addressed in s. 3.8. The soils were affected by intense fire. Landings, roads and skid trails would result in some soil impact. Soil impacts would be within the limits set by Forest Plan standards and guidelines for long-term productivity.

- High quality water and sources of public drinking water

Water quality is addressed in s. 3.9. There are very few streams in the project area. The flat terrain and project design criteria combine to minimize the risk that sediment would reach any stream. The project is in the Clackamas Watershed which provides drinking water for many people. Water is removed from the Clackamas River more than 40 miles downstream with several reservoirs in-between. The project would affect less than a tenth of one percent of the watershed. In the event of a large wildfire, the fuel treatment would minimize impacts to water quality by keeping fires smaller.

- High quality air

Air quality is addressed in s. 3.14. The unroaded and undeveloped blocks are too small to have an airshed that would be unaffected by surrounding air pollution sources. Since the blocks are bounded by aggregate or unsurfaced forest roads, dust from vehicles would penetrate into the unroaded and undeveloped blocks. The high traffic levels experienced in the summer months by vehicles going to Olallie Lake cause dust that penetrates into the forest. The proposed action includes slash and woody debris treatments. Operators would be encouraged to remove this material. If it is not removed it would be piled and burned resulting in some smoke during the late-fall burning season. In the event of a large wildfire, fuel treatment would reduce impacts to air quality in unroaded and undeveloped blocks because fires would be kept smaller.

- Diversity of plant and animal communities

Diversity is addressed in s. 3.2.1.2, s. 3.3, s. 3.10.4, s. 3.10.8.1 and s. 3.10.8.8. The treatment area is a relatively uniform stand of dead lodgepole pine trees. The proposed action would leave some snags and down wood. In the event of a large wildfire, fuel treatment would minimize impacts to the diversity of plant and animal communities in unroaded and undeveloped blocks because fires would be kept smaller.

- Habitat for threatened, endangered, proposed, candidate, and sensitive species

Northern spotted owls and sensitive species are addressed in s. 3.5. The proposed action would not remove habitat for the threatened northern spotted owl. The fuel treatment would also not likely affect the owl's ability to disperse across the landscape. The project would not lead toward listing of sensitive species.

Fish are addressed in s. 3.10. The proposed action would have no effect on threatened fish species.

Botanical species are addressed in s. 3.12. No rare or sensitive botanical species were found during project surveys. In the event of a large wildfire, fuel treatment

would minimize impacts to rare and sensitive species that might be in adjacent stands because fires would be kept smaller.

- Habitat for those species dependent on large, undisturbed areas of land

Wildlife is addressed in s. 3.3, s. 3.4 and 3.5. The edge effect of surrounding forest roads, clearcuts and power lines, and the noise generated by vehicles on adjacent forest roads reduce the habitat effectiveness of these unroaded and undeveloped blocks for species that need unfragmented habitat and solitude. The proposed action would reduce the size of the unroaded and undeveloped blocks. The convoluted nature of some of the unroaded and undeveloped blocks makes the core interior sections relatively small. Species that require large undisturbed areas of land would find similar forest types in the nearby Sisi portion of the Clackamas Wilderness.

In the event of a large wildfire, fuel treatment would minimize impacts to species that dependent on large, undisturbed areas of land because fires would be kept smaller. Fuel treatment would reduce the risk of fires that start outside the Wilderness from moving into the Wilderness.

- Primitive, Semi-Primitive Non-Motorized, and Semi-Primitive Motorized classes of dispersed recreation

Recreation is addressed in s. 3.7. The Recreation Opportunity Spectrum (ROS) objective for the area proposed for fuel treatment in the unroaded and undeveloped blocks is Roaded Natural. The unroaded and undeveloped blocks are relatively small and the surrounding forest roads and clearcuts, and the noise generated by vehicles on adjacent forest roads affects the opportunity for solitude. This would also be the case with no action.

The temporary roads would be rehabilitated after use; therefore there would be no long-lasting change to vehicular access, or the number or type of social encounters. The project's primary effect on recreation would be changes to scenic quality and the degree of naturalness encountered by visitors. The proposed action would not change the allocated recreational uses of the area. With no action, dead trees would fall in a jackstrawed pattern which would impede most forms of recreation.

In the event of a large wildfire, fuel treatment would minimize impacts to recreation in unroaded and undeveloped blocks because fires would be kept smaller.

- Reference landscapes

Similar landscapes are present in abundance on the Forest in places such as the Sisi Butte portion of the Clackamas Wilderness, the Salmon-Huckleberry

Wilderness, the Roaring River Wilderness, and in portions of the Olallie Lake Scenic Area. These areas provide opportunities for researching and experiencing these landscapes and are much larger than the unroaded and undeveloped blocks in the project area. The proposed action would provide a different reference landscape available for research or observation: one where the effectiveness of fuel treatment in reducing wildfire impacts can be studied.

- Natural appearing landscapes with high scenic quality

Scenery is addressed in s. 3.7. The widespread dead trees have affected the quality of scenery at the landscape scale. There are no primary viewpoints. The unroaded and undeveloped blocks are not a large enough portion of the viewshed to create a sense of unbroken wildness. In the event of a large wildfire, fuel treatment would minimize impacts to scenery because fires would be kept smaller.

- Traditional cultural properties and sacred sites

Heritage Resources are addressed in s. 3.17.1. This project was developed in cooperation with the Confederated Tribes of Warm Springs. They are concerned that a large wildfire would impact cultural properties and sacred sites.

- Other locally identified unique characteristics

No other unique characteristics have been identified.

3.6.5 Cumulative Effects

Past actions including road construction and logging have created the boundaries of the unroaded and undeveloped blocks. These blocks are used here as the boundary for cumulative effects analysis. No other foreseeable actions would occur in the unroaded and undeveloped blocks.

At the landscape scale, the Forest has approximately 315,000 acres of unroaded and undeveloped areas in Wilderness and another 35,000 acres in Inventoried Roadless Areas. This represents approximately 1/3 of the Forest. The values provided by unroaded and undeveloped landscapes are well represented on the Forest.

3.6.6 Forest Plan Goals, Standards and Guidelines

There are no specific standards and guidelines for unroaded and undeveloped blocks. The standards and guidelines for the resource topics discussed in s. 3.6.4 are discussed in their respective sections of this document. The proposed Forest Plan amendment would not directly affect unroaded issues.

3.7 RECREATION AND SCENERY

This section discusses developed recreation, dispersed recreation, impacts to scenery and visual quality. Wilderness values are addressed in section 3.6.1.

3.7.1 Existing Condition

Recreational use within the project area includes dispersed camping, dispersed hiking, hunting, berry picking and scenic driving. The roads within the project area also provide access to the popular Olallie Lake Scenic area, the Sisi portion of the Clackamas Wilderness, and the nearby Pacific Crest Trail.

Developed Recreation - There are no developed recreation sites within the project area. However, roads 4220 and 4690 which cross through the project, are the primary access roads to the Olallie Lake Scenic Area to the south, which has eight developed camp grounds, the Olallie Lake Lodge and access to many lakes and trails including the Pacific Crest Trail. The Olallie Lake Scenic Area receives approximately 30,000 visitors each year, mostly in the summer months. Olallie Lake is 6.5 miles from the project area. Road 4220 has a section of pavement that has deteriorated and has many pot holes. It also has a section after the pavement ends, that is primitive and rough. Access, in terms of developed recreation management on road 4220, is limited because the road is almost impassable for large recreational vehicles, garbage trucks, toilet pumping trucks and other service providers accessing the eight campgrounds in Olallie Lake Scenic Area. Access is better via road 4690, but it is a much longer route for those coming from Highway 26 and the Timothy Lake recreation area.

Dispersed Recreation - Within the project area, there are popular dispersed camping sites near Lemiti Creek and road 4220130. There are other dispersed campsites within the project area used primarily by hunters. An unmaintained old alignment of the historic Skyline Trail traversed this area; it was later replaced by the Pacific Crest Trail which crosses through the CTWS Reservation approximately ½ mile to the east of the project area. Many of the dispersed campsites and the historic trail are currently surrounded by large stands of dead trees which make them less attractive for use by recreationists and increase the hazard.

Visual Quality - Much of the project area is relatively flat and only small portions can be seen from open roads. Along portions of roads 4220 and 4690, visitors pass through a landscape with views of clearcuts, plantations, past logging and large stands of dead trees. The visual impact of vast areas of dead trees is softened somewhat by an understory of green saplings. Some of the dead trees closest to the road have been removed because they were hazardous. The visual quality of the project area has been altered by these actions and events. Within the planning area, roads 4220, 4690 and to a lesser extent, road 4680 are the primary roads used by recreationists.

Unroaded Recreation - The unroaded recreation land allocation (A5) is designed to provide semi-primitive non-motorized recreational opportunities. Most of the

original A5 land allocation was absorbed into the Sisi portion of the Clackamas Wilderness and is now the A2 – Wilderness land allocation. The remaining portion of the A5 land allocation is in the planning area. It was not considered suitable as wilderness because it was thinned before. Most of the trees in the A5 area are dead.

Roaded Recreation - The roaded recreation land allocation (B3) is designed to provide roaded recreation opportunities including picnicking, dispersed camping and scenic driving. Most of the trees in the B3 land allocation in the project area are dead. The only open road in this land allocation is road 4690. Off-road vehicle use is prohibited in this area based on the 2010 Forest Off-highway Vehicle Management Plan. Due to the lack of live forest cover, few open roads and altered scenery in this allocation, it does not currently provide high quality roaded recreation opportunities.

3.7.2 Direct and Indirect Effects

3.7.2.1 Alternative A – the No Action alternative would make no changes to the existing conditions in the short term. However, as time goes by, changes would occur as documented below.

Developed Recreation – The access roads to the Olallie Lake Scenic Area and the developed campgrounds there would likely continue to deteriorate, because of limited funding available for road maintenance. If similar levels of maintenance occur in the coming years as has been conducted in the recent past, the roads would become hazardous for campers, recreationists and service vehicles. As roads continue to deteriorate from heavy use and lack of maintenance, it is likely that road 4220 would not be passable by recreational vehicles, passenger cars or service vehicles. The dead stands within the project area, combined with the high tree mortality within the Olallie Lake Scenic Area to the south, puts visitors and facilities at risk from wildfire. Roads 4220 and 4690 are the only available evacuation routes for Forest visitors in the event of a fire. Due to road conditions, the driving is slow normally and would be worse when encountering fire suppression vehicles.

Dispersed Recreation – As dead trees fall in a jackstrawed manner, there would continue to be adverse impacts to dispersed camping, hunters and other forest visitors. These impacts include increased danger of snags falling on dispersed campsites, and users would likely shift to landscapes with greater relative attractiveness. Walking in the forest would be impeded by jackstrawed trees. In the event of a wildfire, dispersed recreation would be impacted until a new stand becomes established. These effects would occur across the project area including in the Unroaded Recreation land allocation.

Visual Quality – The current visual quality has been altered by high levels of tree mortality, past harvesting and danger tree removal along roads. This situation would continue. There would be continued deterioration of visual quality as the dead trees fall. Where understory saplings fill in, these effects would be softened. In the event of a wildfire, scenery would be impacted until firelines are rehabilitated and

revegetated and until a new stand of trees becomes established. No action would result in larger fires and increased intensity. It would result in fire suppression tactics that would impact scenery including greater use tractor fire lines and extensive burn out tactics along primary roads compared to direct attack tactics with hand crews and narrower hand firelines with the proposed action.

3.7.2.2 Alternative B – Proposed Action

Developed Recreation – The proposed action would have no direct effects to developed recreation since there are no developed sites within the project area. There would be indirect benefits to developed recreation because of improved driving conditions on road 4220 with project related road improvement work. This would help provide more efficient and safer access for recreationists in passenger vehicles, recreational vehicles and service vehicles. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action and would result in reduced risk to visitors in the event of an evacuation of the Olallie Lake Scenic Area along roads 4220 and 4690. Fuel treatments and road repairs would result in some short-term impacts to recreationists during project implementation.

Dispersed Recreation – The proposed action would remove dead hazardous trees around dispersed recreation camp sites. It would also avoid the jackstraw pattern of fallen trees and create a managed stand of young trees that are accessible to those walking in the forest. Fuel treatments would result in some short-term impacts to recreationists during project implementation with noise and equipment use. The ground disturbance at landings, temporary roads and skid trails would become less evident over time as ground cover becomes reestablished. The road work planned within the project area would also improve conditions for dispersed recreationists driving through or accessing the area. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action and would result in reduced impacts to dispersed recreation compared to no action. These benefits would occur across the project area including in the Unroaded Recreation land allocation.

Visual Quality – The existing scenery in the area has already been altered by the vast areas of dead trees, past logging, and the roadside danger trees that have been removed. In the first ten years, the scenery would be additionally impacted by the proposed fuel treatments, harvest, temporary roads and landings. However, once ground cover is reestablished on bare soils and young trees grow to cover stumps, bare ground and any remaining slash, these impacts would be reduced. As this recovery takes place, there would be a healthier attractive forest within the project area much sooner than would occur with no action. Consistency with VQO objectives is addressed in section 3.7.4.

In the event of a wildfire, scenery would be impacted until firelines are rehabilitated and revegetated and until a new stand of trees becomes established. The proposed action would result in reduced fire size and intensity and would result in reduced impacts to scenery compared to no action. It would result in reduced fire suppression impact to scenery because direct attack with hand crews would likely be feasible, compared to greater use tractor fire lines and extensive burn out tactics along primary roads with no action.

3.7.3 Cumulative Effects

Since the Lemiti landscape is relatively flat, the spatial analysis area for cumulative effects is a ¼ mile buffer around treatment areas. This is approximately the farthest distance that can be seen from within treatment units. This delineation is also appropriate because the project cannot be seen from any of the primary viewer positions identified in the Forest Plan. The ground is so flat and removed from primary viewer positions that forest visitors would not see the proposed fuel treatments and other actions at the same time from the same position. The temporal frame for the analysis would extend to the point in time where saplings are sufficiently dense and large enough to provide a visual screen to block views of stumps, landings and skid trails. This is likely to occur approximately 10 years after fuel treatments occur due the dense nature and size of existing saplings and other small trees.

There are no other ongoing or foreseeable future actions on the Forest within this zone or within this time frame. Part of the CTWS Reservation is within the cumulative effects analysis area. At this time, there are no known actions on the reservation that are foreseeable. Tribal managers are seeking funding to conduct some fuel treatments on the reservation but this funding is not certain and there is insufficient site specificity to conduct an analysis because treatment type, size, and location are unknown. If treatments are funded, it is likely that they would be complimentary to the treatments occurring on the Forest and would serve to provide more effective fire hazard reduction. In terms of recreation and scenery, any treatments on the reservation would not have a cumulative effect because the reservation is not managed for general public recreation or access and very few people venture cross-country to get close enough to the reservation boundary to see treatments on both ownerships at once. Treatments that may occur on the reservation would not be visible from open roads due to the area's flat topography.

In terms of recreation and scenery across a broader landscape, visitors that approach and pass through the project area have already traversed a landscape with close-up views of recent clearcuts, landings, plantations and large stands of dead trees. Even as they pass the project area on their way to the Olallie Lake Scenic Area, they continue to see close up views of recent clearcuts, landings, plantations, a large scale power line and more dead trees. To the casual observer, the proposed fuel treatments would not seem out of character when considered with the broader landscape scale recreational and scenic experience.

Past actions and insect killed trees have affected scenery and recreation as described in the existing condition section above and the proposed action would create some additional alterations. However it is not likely that other actions would contribute substantially to cumulative effects for recreation and scenery.

3.7.4 Forest Plan Standards and Guidelines

Mt. Hood Forest Plan References

Forestwide Standards and Guidelines - FW-453 to FW-468, page Four-98 and FW-552 to FW-597, page Four-107.

The Forest Plan identifies designated viewsheds which are the areas seen from listed viewer positions along primary roads, campgrounds, trails and rivers (page Four-222). The project area does not include any of these designated viewsheds because it is not seen from the listed viewer positions. However, each land allocation has an assigned visual quality objective.

3.7.4.1 FW-556 & 557

FW-556 indicates that the prescribed VQO should be achieved within one year after completion of any project activities. FW-557 allows for short-term deviations from prescribed visual quality objectives due to catastrophic events such as fire, windstorm, earthquake and insect damage. An exception is therefore appropriate for FW-556. The existing widespread insect killed trees does not meet the prescribed VQOs and in some cases the proposed treatments would have some additional impact in the short term while resulting in reduced fire hazard and a long-term prospect of recovering scenery. Existing live saplings and new trees that are likely to seed into disturbed areas would result in visual recovery over time. It may take approximately 10 years for trees to grow tall enough for the area to be considered visually recovered. The dead trees have caused a situation where scenery has been altered and the extra time is needed for young trees to grow and scenery to recover. The proposed action would achieve the VQO of Modification within approximately 10 years.

3.7.4.2 FW-581 p. Four-115

This standard indicates that wood residue treatment, and other fire and fuel management activities shall be designed to achieve prescribed VQOs. The Forest Plan amendment described below changes the VQO on 111 acres where fuel treatments are proposed to Modification. The rest of the project treatments were already prescribed for Modification.

Fuel treatments and cutting dead lodgepole pine would be visually evident for several years. With the exception described in s. 3.7.4.1 for FW-556, it is expected that the visual quality objective of Modification would be achieved in approximately 10 years as young trees grow.

The primary viewer positions for the project area are road 4220 and 4690 which are access routes to the Olallie Lake Scenic Area. Slash piles in the foreground of these roads and landings would be visible for several years until young trees grow. These areas are not isolated viewsheds but part of a longer drive where visitors encounter old clearcuts and other altered scenery with frequent dead trees. In many units, temporary roads would be built and landings there would be at least 150 feet away from roads 4220 and 4690.

For these reasons, the project is consistent with this standard.

3.7.4.3 B11-008 p. Four-278

This standard indicates that all management activities shall achieve a visual quality objective of Modification as viewed from open roads. This standard applies to the B11 land allocation (1,273 acres of proposed fuel treatment).

Fuel treatments and cutting dead lodgepole pine would be visually evident for several years. Landings and slash piles would be evident until the material is burned or removed and small trees grow up to screen the area.

The only open roads are road 4220, 4220130 and 4690. Slash piles in the foreground of these roads and landings would be visible for several years until young trees grow. Visitors coming to the B11 Deer and Elk Summer Range area for hunting currently encounter a vast area of dead trees which are unappealing and hazardous for hunting camps. The proposed action would remove the hazardous trees and would avoid the jackstrawed pattern of falling trees that would otherwise be an impediment to hunting access. With the exception described in s. 3.7.4.1 for FW-556, it is expected that the visual quality objective of Modification would be achieved in approximately 10 years as young trees grow.

For these reasons, the project is consistent with this standard.

3.7.5 Effects of Forest Plan Amendment #19.

To achieve the purpose and need, a project level Forest Plan amendment is proposed to reword some standards and guidelines (For more information see sections 1.6.1 & 2.2.7.1). These standards and guidelines cannot be fully met especially in the short term, given the existing mortality and the treatments that are needed to address fire hazard. The following amended standards and guidelines are related to recreation and scenery, are temporary, and are only applicable to the Lemiti project.

3.7.5.1 FW-553 p. Four-107 Visual Resource Management

Original Text - Management Area VQOs shall be prescribed as summarized in table Four-22.

Revised Text - Management Area VQOs should be prescribed as summarized in table Four-22. Table Four-22 is changed to require Modification for the B3 and A5 land allocations.

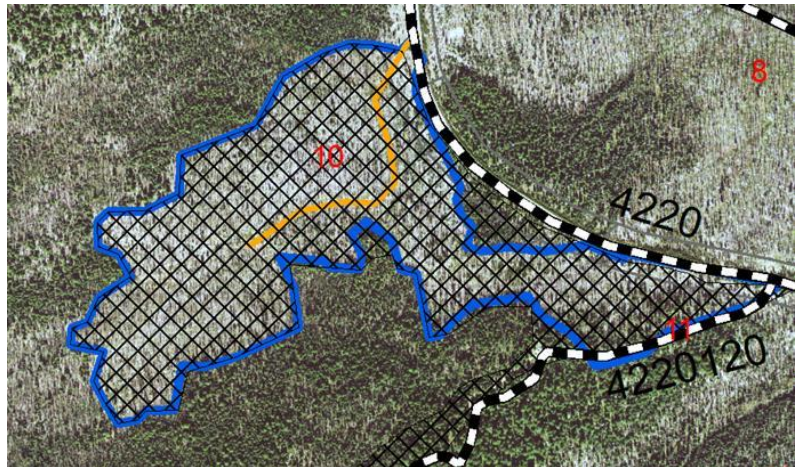
The Partial Retention VQO prescribed on 33 acres of proposed fuel treatment on the B3 land allocation, and the Retention VQO prescribed for 78 acres of proposed fuel treatment on A5 would be changed to Modification. The rest of Table Four-22 would not change including the Modification VQO for B11 and C1, and the Partial Retention VQO for A9 and B7. A map in Appendix A shows the proposed treatments in relation to the existing VQOs. Each of the areas proposed for change have an open road as the land allocation boundary where Modification is already prescribed for the other side of the road.

The project area is not included in any designated viewsheds because it is not seen from any of the primary viewer positions identified in the Forest Plan in Table Four-23 (p. Four-110). FW-553 identifies VQOs based on land allocation and not based on primary viewer positions. In some cases, other standards and guidelines contained in each land allocation section identify viewer positions.

While FW-553 does not identify viewer positions, a similar standard at A5-014 specifies that achievement of VQOs would be measured as seen from trails, high recreational use areas, and water bodies within the A5 allocation boundaries (s. 3.7.4.9). There are none of these viewer positions present in this A5 land allocation.

This image shows the extent of mortality. The A5 land allocation is shown in hatch marks and Unit 10 is outlined in blue. An old temporary road alignment is shown in yellow.

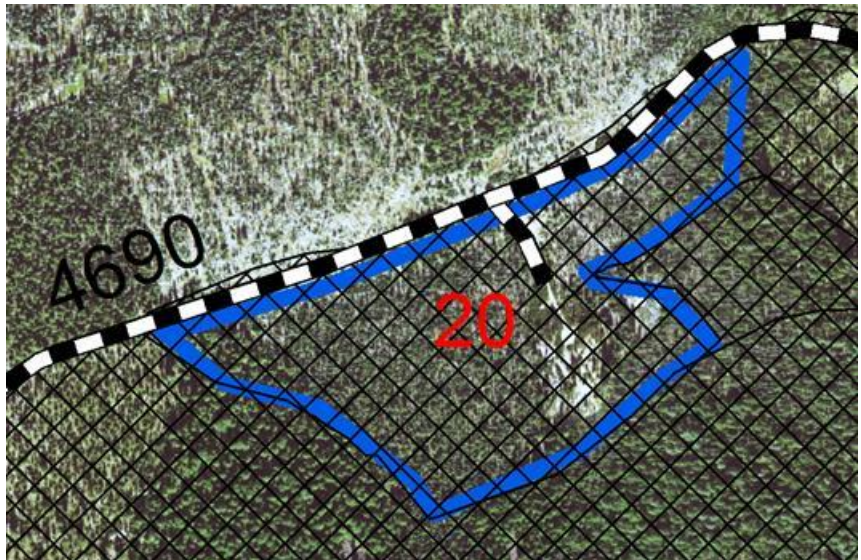
This photo shows how unit 10 looks as viewed from road 4220. While the foreground saplings on the road's edge partially obscure the view of the ground, many of them would be removed during road maintenance brushing. Many of the dead trees that were adjacent



to road 4220 have been felled as danger trees and were removed as firewood.

Roaded Recreation - The roaded recreation land allocation (B3) is designed to provide roaded recreation opportunities including picnicking, dispersed camping and scenic driving. Most of the trees in the B3 land allocation in the project area are dead. The only open road in this land allocation is road 4690. Off-road vehicle use is prohibited in this area based on the 2010 Forest Off-highway Vehicle Management Plan. Due to the lack of live forest cover, few open roads and altered scenery in this allocation, it does not currently provide high quality roaded recreation opportunities.

This image shows the extent of mortality in the B3 land allocation which is shown in hatch marks. Unit 20 is outlined in blue.



This photo shows how unit 20 looks as viewed from road 4690. The taller trees are all dead lodgepole pine trees. Many of the dead trees that were adjacent to road 4690 have been felled as danger trees and were removed as firewood.



Fuel treatments and cutting dead lodgepole pine would be visually evident for several years. Modification indicates that an activity may dominate the characteristic landscape but must, at the same time, utilize natural established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground (Forest Plan Glossary page 19).

While foreground vegetation or roadside screens can sometimes block the view of management actions that are farther away, it is not typically considered when determining consistency with visual quality objectives. Foreground vegetation could be cut, blow down in a wind event or burn and therefore is not considered permanent and should not be relied upon exclusively to mitigate visual impacts. Young trees that grow up after disturbance are considered to provide visual recovery when they average 20 feet tall. The photos above show that the saplings would provide some amelioration of scenic impacts but they are not 20 feet tall and some may be removed during fuel reduction treatments and road maintenance.

FW-557 allows for short-term deviations from prescribed visual quality objectives due to catastrophic events such as fire, windstorm, earthquake and insect damage. With the exception described in section 3.7.4.1 for FW-556, it is expected that the visual quality objective of Modification would be achieved in approximately 10 years as young trees grow.

The viewer positions for the project area are road 4220 and 4690 which are access routes to the Olallie Lake Scenic Area. The two small areas that would have a changed VQO are seen from these roads. However, these areas have already been partially logged and scenery has been altered by this logging and by the insect killed trees. The two small areas that would change are not isolated viewsheds but part of a longer driving experience through a landscape with a Modification VQO where visitors encounter old clearcuts and other altered scenery with frequent dead trees.

Changing the project to meet the original standard would result in the deletion of 111 acres of fuel treatment. It would also reduce the effectiveness of the overall fuel treatment particularly the element of the purpose and need that is directed at enhancing safety. One of the project goals is to enhance firefighter and public safety along the primary access roads by reducing fuels along Forest Service Roads that access the Olallie Lake Scenic Area. Deleting these treatments would reduce the connectivity and effectiveness of the proposed roadside fuel treatments while not substantially improving the overall scenery experienced by travelers to the Olallie Lake Scenic Area.

3.7.5.2 B3-013 p. Four-230 Roaded Recreation

Original Text - All management activities shall meet the visual quality objective of Partial Retention as seen from open roads, high recreation use areas and water bodies.

Revised Text - All management activities should meet the visual quality objective of Modification as seen from open roads, high recreation use areas and water bodies.

This is applicable in the B3 land allocation (33 acres of proposed fuel treatments). This standard is similar to FW-553 except that it identifies the viewer position. Fuel treatments and cutting dead lodgepole pine would be visually evident for several years. There are no high use recreation areas or water bodies in the B3 area but the area is seen from road 4690 which receives a fair amount of recreation traffic from visitors heading to the Olallie Lake Scenic Area.

The 33 acres of fuel treatment have already been partially affected by the removal of danger trees and by the insect killed trees. The small area that would change is not an isolated viewshed but part of a longer driving experience through a landscape with a Modification VQO where visitors encounter old clearcuts and other altered scenery with frequent dead trees. The opposite side of the road has a Modification VQO and has been altered by past logging and by insect killed trees.

Slash piles in the foreground of these roads and landings would be visible for several years until young trees grow. With the exception described in s. 3.7.4.1 for FW-556, it is expected that the visual quality objective of Modification would be achieved in approximately 10 years as young trees grow.

Changing the project to meet this standard would delete 33 acres. It would also reduce the effectiveness of the overall fuel treatment particularly the element of the purpose and need that is directed at enhancing safety. One of the project goals is to enhance firefighter and public safety along the primary access roads by reducing fuels along Forest Service Roads that access the Olallie Lake Scenic Area. Deleting these treatments would reduce the connectivity and effectiveness of the proposed roadside treatments.

3.7.5.3 A5-001 p. Four-159 Unroaded Recreation

Original Text - All management activities shall meet the semi-primitive non-motorized Recreation Opportunity Spectrum class.

Revised Text – All management activities should meet the roaded modified Recreation Opportunity Spectrum class.

This is applicable in the A5 land allocation (78 acres of proposed fuel treatments). The 78 acres have been visually altered due to previous thinning and by insect killed trees.

Semi-primitive Non-motorized is a recreational opportunity characterized by a predominantly natural or natural-appearing environment of moderate to large size. Motorized recreation is not permitted, but local roads used for other resource

management activities may be present on a limited basis (Forest Plan Glossary, p. 25).

Roaded Modified is a recreational opportunity characterized by predominantly natural appearing environments with high evidence of the sights and sounds of humans. Such evidence may not harmonize with the natural environment. Resource modification and utilization practices are evident and may not harmonize with the natural environment (Forest Plan Glossary, p. 25).

No permanent roads would be constructed. In the long term, the area would likely meet the semi-primitive non-motorized recreation opportunity spectrum as young trees grow.

Changing the project to meet this standard would delete 78 acres. It would also reduce the effectiveness of the overall fuel treatment particularly the element of the purpose and need that is directed at enhancing safety. One of the project goals is to enhance firefighter and public safety along the primary access roads by reducing fuels along Forest Service Roads that access the Olallie Lake Scenic Area. Deleting these treatments would reduce the connectivity and effectiveness of the proposed roadside treatments.

3.7.5.4 B3-001 p. Four-230 Roaded Recreation

Original Text - All management activities shall meet roaded natural Recreation Opportunity Spectrum class, or less developed settings.

Revised Text – All management activities should meet roaded modified Recreation Opportunity Spectrum class, or less developed settings.

This is applicable in the B3 land allocation. Approximately 33 acres of unit 20 overlap this land allocation.

Roaded Natural is a recreational opportunity characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Resource modification and utilization practices are evident but harmonize with the natural environment (Forest Plan Glossary, p. 25).

Roaded Modified is a recreational opportunity characterized by predominantly natural appearing environments with high evidence of the sights and sounds of humans. Such evidence may not harmonize with the natural environment. Resource modification and utilization practices are evident and may not harmonize with the natural environment (Forest Plan Glossary, p. 25).

The area would be visually altered and until the site grows young trees, it would not likely meet the roaded natural Recreation Opportunity Spectrum.

Changing the project to meet this standard would delete 33 acres. It would also reduce the effectiveness of the overall fuel treatment particularly the element of the purpose and need that is directed at enhancing safety. One of the project goals is to enhance firefighter and public safety along the primary access roads by reducing fuels along Forest Service Roads that access the Olallie Lake Scenic Area. Deleting these treatments would reduce the connectivity and effectiveness of the proposed roadside treatments.

3.7.5.5 Summary

These changes to standards and guidelines and the exception discussed above recognize the current impact to scenery and recreational opportunities caused by insect killed trees and the potential impact over time with no action such as jackstrawed fallen trees and increased wildfire risk. In the long term, scenery and recreational opportunities would recover as young trees grow. The reduction of fire risk has the potential to minimize impacts to scenery and recreational opportunities since fires would be smaller. Fuel treatments and the cutting and removal of dead lodgepole pine would be visually evident for several years. Visual Quality Objectives would be changed to Modification for this project only. This VQO allows activities that may dominate the characteristic landscape (Forest Plan Glossary page 19).

The current stand conditions are so far outside the range of desired future conditions that large scale fuel treatments are needed that were not envisioned when the standards and guidelines were written.

While the proposed action would result in some additional short term impacts to recreation and scenery, fuel treatments would help achieve long-term improved visual quality and improved recreational opportunities. This recovery may occur sooner compared to no action with its associated jackstrawed down trees and the elevated fire hazard. The proposed action would return the landscape to the desired condition expressed by the current Forest Plan standards and guidelines for Visual Quality Objectives and Recreation Opportunity Spectrum Objectives sooner compared to no action. In the first ten years, there would be large scale evidence of ground-disturbing activities. However, once ground cover is reestablished on disturbed soils and young trees grow to obscure stumps, bare ground and any remaining slash, these impacts would be reduced.

3.8 SOIL PRODUCTIVITY

This section summarizes the soil specialist report and data in the analysis file. This section details potential effects to the soil resource for the proposed treatment units. Other sections cover related topics including the water quality (s. 3.9) and fisheries (s.

3.10).

Soil productivity is the inherent capacity of the soil resource to support appropriate site-specific biological resource management objectives, which includes the growth of specified plants, plant communities, or a sequence of plant communities to support multiple land uses.

3.8.1 Methodology

Seven soil types are mapped within the Lemiti planning area. Each soil type is assessed for many risks and hazards called management ratings (e.g. erosion risk, compaction hazard, etc.), which are located in the Mount Hood National Forest Soil Resource Inventory (SRI), (Howes 1979). Interpretations are based on observations of soil characteristics at sites representative of the entire soil mapping unit.

Because of the scale of the SRI (1 inch per mile), soil properties can vary significantly within a mapping unit and on-site investigations are often required to refine or modify interpretations. Qualified soil scientists adjust management interpretations to reflect on the ground conditions and provide resolution to the soil map units at a site-specific scale.

Priority stands were chosen for field evaluation and validation of SRI soil mapping. Appropriate map changes were made to reflect field observations. With updated and validated soil mapping, pertinent management interpretations should be more accurate and therefore provide high confidence when determining levels of risk.

The methodology used to gather data for this effects analysis included a review of previous soil reports and mapping in the area, field visits, and aerial photo interpretation. In addition, previous field experience, and professional observation and knowledge of how soils respond to the proposed types of management actions were used to predict impacts.

3.8.2 Analysis Area

The analysis areas for soil resources for direct, indirect and cumulative effects are the boundaries of the stands proposed for thinning, the boundaries of the fuel break, and decommissioned road locations. These are appropriate boundaries because actions outside the treatment unit boundaries would have little or no effect to soil productivity within the treatment units, and the actions within and adjacent to the treatment boundaries would have little or no affect to soil productivity elsewhere. In terms of the time scale, road construction that has occurred since the early 1900s and timber harvest in 2000 have created soil impacts that remain today.

Elements of proposal that could affect soil productivity

For this project, the following actions have the potential to adversely affect soil

productivity: actions that disturb soil such as the skidding and yarding of logs, the use of mechanical tree harvesting equipment, the construction and reconstruction of temporary roads and landings, the creation of a fuel break, and the burning of slash piles.

The analysis also considers restorative actions and the design criteria and best management practices that are intended to minimize the extent of detrimental soil impacts. For example: existing roads, landings and skid trails would be reused where feasible, equipment would be restricted to appropriate slopes, and roads and primary skid trails would be decompacted.

3.8.3 Measures

For this analysis three measures are used to assess impacts; accelerated erosion, soil disturbance and organic matter.

Accelerated Erosion

Natural, or geologic erosion, is erosion of the earth surface under natural or undisturbed conditions. It includes loss of soil particles from weathering processes and by forces of water, wind, and gravity. Natural erosion occurs at a relatively uniform rate except during extreme natural events when large quantities of soil can erode in short periods of time. Under natural conditions, vegetation and other effective ground cover retards erosive processes. Removal of vegetation, concentration of overland flow, or interception of subsurface flow by harvest, road building, or other ground moving activities disturbs natural conditions and the erosion rate accelerates. Accelerated erosion is the increase in soil erosion and sediment production over natural erosion.

Soil erosion can directly affect soil productivity by reducing soil depth and volume, resulting in a loss of nutrients and water holding capacity. An indirect effect from soil erosion is runoff from bare areas carrying soil particles to water bodies where it becomes sediment. Sedimentation is addressed in the water quality section (s. 3.9.3.3). The erosion hazard rating is based on bare surface soil properties that affect detachability, such as climate, slope gradient and length, soil texture and structure, permeability of the surface soil, and hydrologic characteristics of the soil and bedrock materials. Management ratings for erosion risk follow the variability of the soils across the landscape, with some soils mapped with a moderate erosion risk, others with slight, and many in between. Although ratings are a good preliminary analysis tool, in actuality almost any soil regardless of rating can become more erosive than rated depending on site-specific circumstances. Soils with a slight erosion risk rating that are compacted and bare can become erosive even on gentle slopes. Conversely, erosive soils occurring on steep slopes in this analysis area may be stable for decades because of sufficient protective groundcover (vegetation, tree needles, leaves, wood, rocks, etc.). The naturally occurring background levels of erosion and sedimentation are discussed at section 3.9.3.3. Accelerated erosion is measured by acres of exposed soil.

Soil Disturbance

Soil productivity and soil water storage capacity can be affected by compaction, puddling, displacement, erosion and severe burning. These conditions, if severe enough can result in soils that have low levels of porosity, reduced root penetration, increased runoff, reduced infiltration, reduced soil water storage capacity, reduced soil water availability, reduced nutrient availability, and reduced levels of mycorrhizae and other soil organisms. Soil disturbance is measured by percent of units in detrimental soil condition.

Not all soil disturbance is wide-spread or severe enough to be considered detrimental: the Forest Service Manual contains guidance on the size and intensity of disturbance sufficient to cross the threshold to detrimental soil condition.

Organic Matter

Soil fertility and soil biological systems would properly function if certain components are present, such as appropriate levels of organic matter. Organic matter includes all of the material on the forest floor such as duff, leaves, twigs and coarse woody debris. Poor or non-functioning soil biological systems may lead to difficulties in revegetation efforts, a decline in existing desirable vegetation, or a reduction of long-term site productivity. Soil biology involves complex interactions occurring between organisms and their soil habitats, including physical and chemical characteristics. Organic matter is measured by acres of soil organic layer removed.

3.8.4 Effects Analysis

Existing condition and direct, indirect, and cumulative effects for the three soil measures are addressed in each section below. The current condition described in the analysis below incorporates all past actions that have occurred within the analysis areas which correspond to the proposed thinning unit boundaries. There are no other ownerships to consider within the analysis areas. There are also no foreseeable future actions to include. While there may be future treatments, there is no proposal now for future actions that have sufficient site specificity to conduct an analysis.

3.8.5 Erosion

3.8.5.1 Existing Condition

Due to the gentle relief and infiltration rates of glacial till, surface erosion potential is slight over most of the project area and moderate on the few areas with slopes 25% or greater (approximately 5% of the fuel treatment acres). Subsoil erosion potential is low to moderate on the gentle slopes, and moderate on slopes greater than 25%.

Ground cover can be used as an indication of erosion risk. All proposed fuel treatment units have between 75% to 100% groundcover, which means that erosion risks are low to non-existent. Existing surface erosion is mainly confined to exposed soil on some segments of unpaved road surfaces, and some road cutbanks, and road ditches.

3.8.5.2 Direct and Indirect Effects

Soil erosion can directly affect soil productivity by reducing soil depth and volume, resulting in a loss of nutrients and water holding capacity. An indirect effect from soil erosion is runoff from bare areas carrying soil particles to water bodies where it becomes sediment, and can decrease water quality (For more information see s. 3.9 and 3.10). Other negative effects occur such as decreased air quality from dust (silt size soil particles) carried in the atmosphere.

3.8.5.3 Alternative A – No Action

Erosion rates within the analysis area would remain as they are in the short term. Over time, as bare areas become revegetated, erosion levels would decrease.

If a large scale wildfire were to occur, some soil erosion is expected off of the high and moderate burn severity sites. Flatter gradient slopes have a low to moderate susceptibility to surface soil erosion. The steeper and longer length slopes that burn with a high burn severity have a high susceptibility to surface soil erosion. Because of the uneven terrain, small depressions, and anticipated downed trees and islands of unburned vegetation, detached soil would not be transported very far down slope. Fires may also occur with the proposed action, but with no action, fires are likely to be larger and burn with greater intensity.

3.8.5.4 Alternative B – Proposed Action

Soil erosion risk would increase with the proposed action where soil is exposed during implementation. The Lemiti units generally have gentle to moderate slopes, so even if the potential for erosion may be moderate, eroding materials would not move far before redeposition occurs. On units prescribed for ground-based mechanical felling systems where slopes are greater than 25%, the potential for erosion increases.

Bare soil would be exposed as logs are dragged on top of the soil and machines travel over the ground surface. Approximately 10 acres of temporary roads, 8.6 acres of landings not on existing road surfaces, and 105 acres of felling and yarding area would be used or reused. Some of this acreage was disturbed during past harvest, and much of the area currently has effective ground cover. A total of approximately 124 acres would have potential accelerated erosion as a result of fuel treatment activities. If left bare, disturbed areas, particularly where slopes are greater than 25%, may become potential chronic sources of sediment until successfully revegetated or sheltered by an effective ground cover. Effective ground cover such as down logs, slash or mulch would minimize erosion (s. 2.2.6.G). Slash and mulch are considered effective in the short term as ground cover until vegetation in the form of grass, shrubs or trees become established either from direct reseeding or through natural seeding.

Actual resource damage (accelerated erosion or sedimentation) is dependent on ground cover and weather events that 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 which limit the amount of soil exposure, or which re-establish ground cover after soil is exposed, are implemented to lessen erosive energies. The use of PDCs for stream protection buffers, designated skid trails, and establishing effective ground cover by applying logging slash or seed, fertilizer, and straw mulch on the disturbed soils reduce erosion features and disturbance, and results in a low potential for soil to be moved to streams and a low potential for substantive effects to soil productivity.

The road decommissioning would have a beneficial effect on long-term erosion rates and water quality. These projects would increase infiltration capacity of the roadbeds, resulting in a reduction in overland flow, establishment of effective ground cover on the road surfaces and allow for revegetation.

3.8.5.5 Cumulative Effects – Erosion

See section 3.8.4 for discussions of analysis areas and time frames for cumulative effects analysis. In some areas, past ground disturbance including clearcut logging, and road and landing construction, ground cover was removed. Since then, the stands have regrown groundcover protecting the soil surface and erosion has decreased. Existing surface erosion is mainly confined to exposed soil on some segments of unpaved road surfaces, and some road cutbanks and ditches.

The fuel treatment projects would result in a temporary reduction in effective ground cover on temporary roads, primary skidtrails, landings, yarding corridors, and to a lesser extent on ground between primary skidtrails.

Best Management Practices and design criteria would result in little erosion from the proposed action combined with past actions because sufficient ground cover would be applied or retained. The cumulative effects of the proposed actions when combined with past actions and foreseeable future actions would not be substantial and sapling trees and other vegetation are expected to continue growing and developing at appropriate rates.

3.8.6 Soil Disturbance

3.8.6.1 Existing Condition

The percentage of area in a detrimental soil condition varies from stand to stand due to the occurrence, manner, and extent of past grazing, recreation, timber harvest and fuel treatment activities. Portions of eight proposed fuel treatment harvest units (units 6, 8, 10, 16, 18, 20, 24, 26) had previous thinning during Lemiti Resale between 2000 and 2004. All units were logged using ground based felling and yarding machinery, and some were then machine piled and burned. The majority (72%) of acres in the proposed fuel treatment harvest units have had no previous timber management activity.

Most of the soil types in the area are only moderately susceptible to detrimental compaction. The medium texture that dominates these soil types, along with the high rock content, makes them somewhat resilient to compaction. The majority of readily observable detrimental ground disturbances in the field were soil displacement on old skid trails, landings, and temporary roads. The temporary roads used during Lemiti Resale were decompacted with that contract.

Existing detrimental soil condition was calculated to range from 0% to 15.3% in the proposed fuel treatment harvest units. The remaining portions of the proposed units have soils in good condition. It is estimated that 1 of the 17 units exceed the Forest Plan standard of 15% detrimental condition. The estimated percent area of existing detrimental soil condition in each of the fuel treatment harvest units can be found in the analysis file.

Direct and Indirect Effects

3.8.6.2 Alternative A – No Action

No further losses or gains in soil productivity in the short term or long term are expected with this alternative, barring an occurrence of a large-scale wildfire. Detrimental conditions in the units would remain. Existing temporary logging roads and landings that are in a detrimental condition would not be used or restored, and would likely remain in a detrimental condition for the foreseeable future. Detrimental soil compaction and displacement would remain localized to existing system and temporary roads, skidtrails, landings, and dispersed recreation sites.

In the long term, percent disturbed soil condition would slowly decline as compacted areas move toward recovery due to physical and biological processes, but the rate would largely be dependent on root growth of vegetation, the resilience of the soil, and the intensity of the disturbance. The effects of soil displacement on skid trails, roads and landings would last a long time because soil formation is a slow process, on the order of hundreds of years or more.

If a large scale wildfire were to occur, it is estimated (based on observations made after the Olallie Complex fires) that approximately 5 to 25 % of the surrounding area may be in a severely burned detrimental soil condition. Fire suppression activities (tractor trails, helicopter landings, handline, fire camps, etc.) would increase the extent of detrimental condition. Fires may also occur with the proposed action, but with no action, fires are likely to be larger and burn with greater intensity.

3.8.6.3 Alternative B – Proposed Action

Changes to disturbed soil condition were estimated. Calculations included actions such as reusing existing landings, temporary roads, and skid trails where feasible,

rehabilitating temporary roads, landings and primary skidtrails, and decommissioning system roads.

A net increase in disturbed soil condition is predicted where more skidtrails, landings and roads would be constructed than already exist. It is estimated that the direct effect of the proposed action including the decompaction of primary skidtrails, landings and temporary roads would be an increase of approximately 3.5% to 5% in detrimental soil condition. A spread sheet in the analysis file has a calculation for each unit. The range of estimated changes in detrimental condition created by the proposed action is shown in the table below.

There would be no accompanying measureable decrease in site productivity in the units. Decompaction and establishment of effective ground cover on landings, skidtrails and temporary roads would initiate recovery of productivity and increase soil water storage.

3.8.6.4 Cumulative Effects – Soil Disturbance

The table below shows a summary of detrimental soil conditions. Unit data is in a spread sheet in the analysis file and is incorporated by reference.

Past Actions	Direct Effect Proposed Action (Fuel Treatment Harvest and decompaction of primary skidtrails, landings and temporary roads)	Cumulative Effect
0 % to 15.3 %	3.5 % to 5 %	5 % to 14.9 %

Since old skid trails would be reused and decompacted, the total cumulative effect would decline in some units. The cumulative effects of the proposed actions when combined with past actions and foreseeable future actions would not be substantial and trees and other vegetation are expected to continue growing and developing at appropriate rates.

3.8.7 Organic Matter

3.8.7.1 Existing Condition

The soil resources in the project area support forested conifer stands within the pacific silver fir zone. Plant associations include such indicator species as lodgepole pine, mountain hemlock, grouse huckleberry, and beargrass. These plant species indicate a cold, harsh climate and nutrient poor soils. The climate is drought and frost-prone. Inherent soil productivity is low. The productivity is limited by the frigid soil temperature regime which results in a relatively low nutrient cycling ability, and the high coarse fragment content of the soil profile and compacted till layer which limit the effective rooting depth.

Nutrient cycling is very important in this ecosystem. Plant associations run on low nutrient budgets that are highly dependent on recycling of the nutrients that are present. Due to the somewhat low temperatures, decomposition rates are slow. Areas with stony soils have limited rooting space. This results in less soil volume for microbial nutrient cycling and makes the soil more prone to leaching of mobile nutrients. Substantial organic matter accumulation has not occurred due to the relative youth of these soils. The low organic matter content along with the medium to coarse soil texture make these soils susceptible to loss of nutrients through leaching and a low cation exchange potential (a measure of the capacity of a soil to retain and release nutrients). Precipitation and rapid snowmelt in late spring flush the soil of mobile nutrients.

Surface litter layer is sparse to thin, ranging from one-eighth to three inches thick. Litter layer is thinnest in areas where lodgepole pine is the most prevalent trees species, or previous timber management activities have occurred. Soil fertility is low and is closely tied to the input of needles, branches, and other woody debris. Most soil nutrients are concentrated in the top 12 inches and are closely tied to the amount of organic matter present. In some areas the upper topsoil horizon has up to 60% of its volume occupied by very fine plant roots.

Typically the surface soil layers found in portions of the project area are naturally hydrophobic (water repellant) to a moderate degree when they are dried out, due to the high root volume in the surface horizons. They become less hydrophobic once they are wetted. These soils do not wet easily. Soils on South Pinhead Butte, just northeast of the project area were observed to be dry, even in spring, just after snowmelt.

Compaction, puddling, displacement, erosion and severe burning of soils have the potential to affect individuals and populations of soil organisms including mycorrhizal fungi, soil dwelling arthropods, nematodes and bacteria. Loss of organisms occurs through direct destruction from equipment operations and from loss of habitat or substrate. These losses are usually localized to the area of forest floor and/or topsoil disturbance, e.g. a skid trail. Portions of eight of the seventeen proposed fuel treatment units have been logged previously, and therefore have localized changes of soil organism communities at disturbance sites where organic matter was removed or moved.

The organic component of soil is extremely important in long-term soil productivity. It is an important source of soil moisture-holding capacity and nutrient storage. Organic matter provides a favorable microsite for many microbes in the rhizosphere (the volume of soil immediately affecting/affected by plant roots).

Timber removal, site preparation, and slash disposal systems can reduce the nutrient capital of forested ecosystems (Clayton 1985). Nutrient loss is greatest when intensive utilization is involved (Jurgensen 1990)(Leaf 1979).

When a forest floor is exposed through timber removal or wildfire, there is a sharp increase in solar radiation and an accompanying reduction of transpiration. The forest canopy buffers the forest floor from large temperature, moisture, and nutrient fluctuations. Removal of timber results in a more extreme microclimate which results in large temperature, moisture and nutrient fluctuations in soils. Where the canopy is dead, fluctuations of moisture and temperature would not be as pronounced. Timber harvest activities can reduce ectomycorrhizal populations which are important for nutrient and water uptake by plants and root pathogen resistance. Changes in soil microclimate results in changes in microbial populations and organic matter decomposition.

Direct and Indirect Effects

3.8.7.2 Alternative A – No Action

Forest organic litter input, organic decomposition rates, duff layer development and soil fauna and microbe activity would be unchanged. Organic matter decomposition and nutrient cycling is influenced substantially by temperature and moisture which would remain unchanged. Soil fauna and microbe activity would remain stable. Organic materials would be subject to disturbances such as windthrow, fire and climatic change. Over time, the standing dead trees would fall. These stands would eventually produce substantial quantities of small woody debris and small decaying logs on the ground.

A wildfire of high or moderate burn severity would consume large amounts of organic matter and reduce the nutrient capital of the site. Fine fuels and branches would be consumed but most of the trunks would remain. The charred down logs and standing burned trees would decay more slowly than non-charred wood. Fires may also occur with the proposed action, but with no action, fires are likely to be larger and burn with greater intensity.

3.8.7.3 Alternative B – Proposed Action

Duff disturbance would be minimized where designated and existing skid trails are used in ground-based yarding operations, and where harvesters travel over slash when traveling away from designated skidtrails. Soil microbial populations would likely be reduced initially in areas of exposed soils. The net export of nutrients and carbon from the ecosystem by fuel treatment harvest would reduce soil fertility and impact nutrient cycling. Branches and needles that have already fallen from the dead lodgepole pine throughout the units should help maintain carbon and nutrient levels. Organic material would be displaced on approximately 124 acres of soil exposed during mechanical felling, yarding and landing and road construction and reconstruction operations.

The proposed Forest Plan amendment would require down woody material to be retained at 10 to 15 tons per acre. This level would be achieved. The project Design Criteria address re-establishment of effective ground cover on exposed soil areas.

Road decommissioning would increase soil organic matter within roadbeds where the road surfaces are decompacted and coarse woody debris is placed within the road prism.

3.8.7.4 Cumulative Effects – Organic Matter

In the analysis area, previous timber harvest, fuel treatment, and road construction activities have resulted in reduced duff and large woody debris levels, and a probable change in soil organism communities in disturbed areas.

The cumulative effect of additional disturbance from the proposed action added to the existing condition would slightly increase displacement of organic material on exposed soils, increase numbers of coarse woody debris logs the size of stand material, and reduce the decay cycle timeframe of rotting down logs that are moved or run over by equipment.

A sufficient tonnage of branches and down logs left after harvest is completed is expected to remain on site to provide for organic matter input to the ecosystem once all activities are complete.

The cumulative effects of the proposed actions when combined with past actions and foreseeable future actions would not be substantial and trees and other vegetation are expected to continue growing and developing at appropriate rates.

3.8.8 Forest Plan Standards and Guidelines

Mt. Hood Forest Plan References

Forestwide Soil Productivity Standards and Guidelines - FW-22 to FW-38, page Four-49
Mt. Hood FEIS pages IV-11, and IV-155 to IV-167

FW-22 to 23	Some areas are currently over 15%, but the restoration techniques would result in a level below 15%.
FW-24	Minimization of rutting would be achieved through the BT6.6 and CT6.6 or similar provisions in the contract.
FW-25	Ground cover would be maintained at the prescribed levels.
FW-28 to 30	Rehabilitation would be accomplished on skid trails, roads and landings used by the operator.
FW-31 to 34	Sufficient woody debris would be left on site including logs, tops and branches. See below for exception.
FW-037	Many aspects of the project include design features that limit disturbance to the soil's organic horizon: existing temporary roads, landings and skid trails would be reused where appropriate.

3.8.9 Proposed Forest Plan Exceptions

3.8.9.1 FW-033 - Soil Productivity

This standard indicates that at least 15 tons per acre of dead and down woody material in east side vegetation communities and 25 tons per acre in west side communities should be maintained and evenly distributed across managed sites.

While the treatment area near the crest of the Cascades, drains toward the west, the vegetation and the fire hazards are like those on the east side of the Forest. The project objectives are to reduce fuels to between 10 and 15 tons per acre. On more typical, wetter, west side stands, large rotting down logs make up a large percentage of the desired 25 tons per acre without substantially affecting fire hazard. Retaining 25 tons per acre would not be consistent with the fuels reduction objective nor would it be representative of a typical lodgepole pine stand.

The retention of 25 tons of woody debris per acre would likely result in fire conditions similar to those described for no action, where flame lengths are too high for safe fire suppression actions. This level of fire intensity may also harm soil productivity.

3.8.10 Effects of Forest Plan Amendment #19

The following amended standards and guidelines are related to soil productivity.

3.8.10.1 FW-166 p. Four-68 - Forest Diversity

Original Text - A continuous supply of down woody material shall be maintained in harvested areas.

Revised Text - A continuous supply of down woody material should be maintained at the landscape scale.

Section 3.3.10.2 has more detail on the rationale. The revised text allows for some woody debris and logs to provide for nutrient cycling while allowing the fuel treatment prescription to be effective. Down woody material that is decayed to the point where it is becoming incorporated into the soil would also be retained.

3.9 WATER QUANTITY AND QUALITY

This section summarizes the water quality specialist's report and data in the analysis file. After this section presents some background information, it discusses water quantity (s. 3.9.2), temperature (s. 3.9.3.1), and sediment (s. 3.9.3.3). There is additional discussion on related topics in the Fisheries (s. 3.10) and Soil Productivity (s. 3.8) sections.

3.9.1 Background

The project is within the Upper Clackamas River Watershed (Hydrologic Unit Code (HUC) 1709001102).

Note: In other documents the term ‘field’ is used to describe the size of a watershed, such as 5th field, 6th field or 7th field. Since that terminology may be confusing and is used differently by different agencies, this document uses the term ‘watershed’ to describe the 5th field size, ‘subwatershed’ to describe 6th field size, and ‘drainage’ to describe the 7th field size.

The project is within the Headwaters Clackamas River subwatershed, and is within both the Lemiti Creek and South Fork Lemiti Creek drainages.

The Lemiti project area varies in elevation from 4,080 to 4,660 feet with average annual precipitation amounts varying from 74 to 78 inches per year. Approximately 30 to 35% of the precipitation within the project area falls as snow.

3.9.1.1 Watershed Condition Framework

The Watershed Condition Framework (WCF) is a nationally consistent reconnaissance-level methodology for classifying watershed condition, using a comprehensive set of 12 indicators that are surrogate variables representing the underlying ecological, hydrological, and geomorphic functions and processes that affect watershed condition. Primary emphasis is on aquatic and terrestrial processes and conditions that forest management activities can influence. The WCF provides an outcome-based performance measure for documenting improvement to watershed condition at forest, regional, and national scales. The Mount Hood National Forest was assessed in 2010.

The watershed condition rating for the Headwaters Clackamas River subwatershed indicates that it is functioning properly. Of the 12 core indicators, the only one that is rated as poor in this subwatershed is aquatic habitat. This indicator addresses aquatic habitat condition with respect to habitat fragmentation, large woody debris, and channel shape and function.

Other Watershed Conditions

A study of the Northwest Forest Plan’s effectiveness at improving aquatic conditions, included an assessment the effect of vegetation change on hydrologic response, especially peak flows and their effects on channel morphology (Lanigan 2012). The subwatershed is in excellent condition for this parameter.

The Clackamas River has excellent water quality relative to administrative standards (Oregon Administrative Rules, Chapter 340, Division 41, Department of

Environmental Quality). Water quality sampling conducted within the past 5 years shows that the mainstem and tributaries have very low concentrations of measured constituents (USDA 1995).

In general, the water in the watershed can be classified as very good.

The temperature regime of the tributaries and mainstem Clackamas River upstream of the Collawash River is also indicative of cold, spring fed systems. Water temperature of the mainstem Clackamas River rarely exceeded 11°C with frequent temperatures in the 8 to 10°C range.

The Clackamas River tends to have the most stable and coolest temperature regime within the subbasin upstream of North Fork Dam.

All measured water temperatures within the watershed met Department of Environmental Quality water quality standards for water temperature (OAR Chapter 340, Division 41, Department of Environmental Quality) (USDA 1995).

Sediment levels within the substrate of streams are relatively low and are within acceptable limits for salmonid production. The Upper Clackamas River system has very low bedload movement.

Approximately 400,000 people get water from the Clackamas River (Clackamas River Water Providers). The project area only provides a small fraction of this water since it is mixed into the water of several other rivers and streams before it reaches the water providers. The Collawash River joins the much larger Clackamas River just upstream of the Action Area. Downstream of the project area, the Clackamas River is joined by many small streams plus the Collawash River, Oak Grove Fork, Fish Creek, Roaring River, South Fork Clackamas River and North Fork Clackamas River before reaching Estacada. The project area contains portions of the surface water drinking water source areas for the City of Estacada.

There is no area of Key Watershed within the Lemiti Planning Area.

3.9.2 Water Quantity

Peak streamflows of large magnitude in and downstream of the analysis area are generally generated by rain-on-snow events. The transient snow zone is estimated to occur between 1,500 feet and 4,200 feet elevation in the project area. Record floods occur predominantly during November through January, caused by accumulated snow at lower elevations followed by a rapid rise in temperature, unusually high-elevation freezing levels, and heavy rainfall. Even though most of the treatment areas are above 4,200 feet, the area is assessed as if it were in the rain-on-snow zone to account for the potential shifts that may occur with climate change.

Changes in hydrologic processes associated with management activities can be grouped into two classes according to causal mechanisms. One class consists of

change resulting from removing forest vegetation through harvest. A second class consists of changes in hydrologic processes that control infiltration and the flow of surface and subsurface water. This latter class is dominated by the effects of forest roads (USDA 1993).

3.9.2.1 Aggregate Recovery Percentage Methodology and Existing Condition

The Aggregate Recovery Percentage (ARP) has been used to represent the proportion of a watershed in a "hydrologically mature" condition. By measuring the percent of an area in a hydrologically recovered condition, the ARP model evaluates the risk of increased peak flows from rain-on-snow events. In stands with little or no forest canopy within the transient snow zone, more snow accumulates which can then be melted quickly when a warmer rain occurs.

The ARP model ranks recovery from 0 to 100, with 100 being fully recovered. Stands that have trees greater than 8 inches in diameter and over 70% canopy cover are considered hydrologically recovered. In this area it takes approximately 40 years after regeneration harvest for a stand to be considered fully recovered.

The ARP analysis also addresses many other factors including the following.

- All past timber harvest, road construction, rock quarries, and other openings such as power lines;
- Projects that are under contract but not yet completed;
- Recent wildfires;
- Roads that have been recently decommissioned and others that are planned for the near future; (As these road beds begin to grow trees and close in they would become hydrologically recovered but this process would take approximately 40 years for full recovery.)
- Other ownership
- Other foreseeable actions. (While it is likely that there would be thinning or other stand management in the future, there are no other current proposed actions to include in the ARP calculation at this time. Future actions cannot be known site specifically at this time. The appropriate consideration of cumulative effects for unspecified future project would be at the time an environmental analysis is conducted for those future projects.)

The ARP value was calculated for the year 2016; the estimated time of project implementation. The Headwaters Clackamas River subwatershed analyzed for this project is 25,985 acres and is the same area as used for the Watershed Condition Framework Assessment.

The tree mortality associated with the mountain pine beetle has affected peak flows. The dead trees are now in the grey phase. This loss of canopy greatly reduces snow interception and canopy snow sublimation, leading to increased snow accumulation on the ground. The

area will soon be in the fallen tree phase. As trees fall, the complete loss of canopy eliminates snow interception and solar shading. Reduced solar shading during this stage would likely lead to advanced snowmelt and result in earlier peak flows (Pugh 2012).

Existing Condition

The beetle killed areas are assessed at a 10% recovery level based on observation of residual live trees. The current level of hydrologic recovery for the subwatershed is 79%. At this level, there is no concern for increased peak stream flows associated with changes in snow accumulation and melt.

3.9.2.2 Stream Drainage Network Extension Methodology and Existing Condition

Changes in hydrologic processes that control infiltration and the flow of surface and subsurface water are dominated by the effects of forest roads. The relatively impermeable surfaces of roads cause surface runoff that bypasses longer, slower subsurface flow routes. Where roads are in-sloped to a ditch, the ditch extends the drainage network, collecting surface water from the road tread and intercepting any subsurface water exposed by roadcuts, and then transporting it to streams quicker than the norm. These changes in hydrologic processes are assessed by estimating the extension of the stream drainage network associated with roads.

Even though a heavily roaded watershed may receive the same amount of precipitation compared to a watershed with few roads, it is transported through the system much more quickly, resulting in higher peak discharges and resultant increases in stream power. This increased stream power can more effectively erode the streambed and banks. Because the total amount of water remains relatively constant, base flows decrease because the rapid runoff reduces the total amount of water that can infiltrate and be stored in the soil (Castro 2003).

For this analysis the key process of concern is associated with inboard ditches delivering runoff to a stream where a road intercepts the stream. The increase in channel length due to the inboard ditch was calculated as the length of the ditch directly connected to the stream up to the next ditch relief structure. The subwatershed is estimated to have a 4% extension of the stream drainage network.

The minimum detectable change in peak flow is ± 10 percent for site-scale analysis. Percentage changes in peak flow that fall in this range are within the experimental and analytical error of flow measurement and cannot be ascribed as a treatment effect (Grant 2008). Since this process increases flow routing efficiency and may result in increased magnitude of peak stream flows, the 10% threshold was used to set a level of concern associated with this process. The project area would be well below this threshold for concern.

Summary

The area is below thresholds of concern for hydrologic recovery, the Northwest Forest Plan Assessment of Vegetation Change on Hydrologic Response indicated that the subwatershed is close to the excellent condition for this process, and stream drainage network extension is below the threshold of concern for this process. Since all these assessments are at or below the threshold of concern for impacts it is assumed that management related activities have not had an impact on peak streamflows or their effects on stream channel morphology.

3.9.2.3 Direct and Indirect Effects - Water Quantity

No Action Alternative

Currently, assessments for changes in processes that impact peak streamflows are below the threshold of concern for impacts and it is assumed that past management related activities are not impacting peak streamflows or their effects on stream channel morphology.

Existing road-related effects would remain.

There are dead lodgepole pine stands with an associated fuels and fire hazard in the project area. Currently the dead lodgepole pine is standing and young saplings have seeded in. The fire hazard is expected to dramatically increase as dead trees fall and as young trees continue to fill in at high levels of density. The predicted fire intensity would be difficult, expensive and dangerous to contain.

Historical vegetation and fire ecology data from 1914 characterized a large area in the Headwaters Clackamas River Subwatershed as a burned area. The area is similar to the current range of lodgepole pine. If a wildland fire within the project area occurred similar to that detailed on the 1914 map, impacts to peak streamflows would be expected.

Watersheds with adequate ground cover and adequate rainfall sustain stream baseflow conditions for much or all of the year and produce little sediment and erosion. Fire can affect hydrology by consuming ground cover and vegetation, altering infiltration by exposing soils to raindrop impact, or temporarily creating water repellent soil conditions, thus reducing soil moisture content. Runoff plot studies show that, when severe fire produces hydrologic conditions that are poor, surface runoff can increase more than 70% and erosion can increase by three orders of magnitude (Neary 2005).

Baseflow is likely to decrease when the watershed condition deteriorates as a consequence of intense fire, and more excess precipitation leaves a watershed as overland flow. In extreme situations, perennial streams that are sustained by baseflow, dry up and become ephemeral (Neary 2005).

The impacts on peak streamflows associated with a large wildland fire, were assessed using a Fire Hydrology model. With no action, a high severity fire could increase peak streamflow by 60%.

A study completed by Oregon State University showed that there would be increased snow accumulation in a burned forest, but that the snow melted several weeks earlier than in the unburned forest, mainly due to the warming effect of soot particles and burnt woody debris from charred trees accumulating on top of the snow surface (Gleason 2012).

Current projections for climate change in the Pacific Northwest call for significant reductions in summer streamflows, primarily due to reductions in spring snowpack. The reductions in summer streamflow may be exacerbated by snow disappearing several weeks earlier in a burned forest (Gleason 2012).

With no action, there would not be any roads maintained, improved or decommissioned. There would not be any stormproofing of roads or any closures, therefore, the road related effects would continue to occur.

Proposed Action

The following table shows the change in ARP values associated with project implementation.

ARP Values Associated with Implementation of the Proposed Action

Subwatershed	Mechanical Treatment Acres	Pile and Burn Acres	ARP Percentage - Current Condition	ARP Percentage - Proposed Action	Percent Reduction in ARP Associated With Implementing Proposed Action
Headwaters Clackamas River	1,262	66	79	78	1

If this area is examined as a transient snow zone hydroregion, to account for potential climate change effects, the change in ARP associated with the project would not likely cause stream channel instability or increases in peak flows associated with vegetation manipulation alone.

Stream channel network extension remains the same. The project area would remain below the threshold for concern.

3.9.3 Water Quality

The Clean Water Act (CWA) protects water quality for many uses. In an effort to support the CWA, the Forest conducts a variety of monitoring and inventory programs to determine status of meeting state water quality standards as well as other regulatory and agency requirements.

By direction of the CWA, where water quality is limited, DEQ develops Total Maximum Daily Load (TMDL) plan to improve water quality to support the beneficial uses of water. For water quality limited streams on National Forest System lands, the USDA Forest Service provides information, analysis, and site-specific planning efforts to support state processes to protect and restore water quality. The Clackamas Subbasin TMDL was approved by the Environmental Protection Agency on September 29, 2006. This TMDL addresses stream temperature.

The Forest developed a Water Quality Restoration Plan (WQRP) to serve as the TMDL Implementation Plan for the Willamette Basin TMDL. Under the WQRP the protection and recovery of water quality depends on implementation of the Forest Plan as amended. Key to this strategy are the standards and guidelines and the Aquatic Conservation Strategy (ACS) objectives for the protection, restoration, and active management of riparian areas.

There are no Section 303(d) listed streams from Oregon's 2010 Integrated Report Assessment Database and 303(d) List in or adjacent to the project area.

3.9.3.1 Stream Temperature

Stream temperatures can be affected by processes that remove stream shade, alter channel structure, or alter the flow regime.

The natural watershed parameters that are most influential in determining stream temperature include: solar radiation, air temperature, stream width, stream depth, shading and groundwater inflow. Forest practices can affect temperature, such as removal of riparian vegetation.

With respect to stream shade in the areas impacted by the mountain pine beetle, as trees fall, there would be reduced shade. Within the Headwaters Clackamas River subwatershed the streams that appear most impacted by the mountain pine beetle outbreak include Lemiti Creek, South Fork Lemiti Creek and Slow Creek. With increased solar radiation reaching the streams in these locations there is the potential for elevated stream temperatures.

Based on the data collected, Slow Creek is the only stream that exceeds State temperature standards. The continuous stream temperature data collected in Lemiti Creek near the mouth indicate that this stream meets State temperature standards. Since Slow Creek is a tributary of Lemiti Creek, the mixing of the waters of the two streams and South Fork Lemiti Creek and ground water inputs result in sufficient cooling.

3.9.3.2 Direct and Indirect Effects - Temperature

No Action Alternative

With no action, there would continue to be impacts to stream shade associated with tree mortality and tree fall in the areas impacted by the mountain pine beetle. However, impacts to channel structure or the streamflow regime are not anticipated. Elevated stream temperatures in Slow Creek, Lemiti Creek and South Fork Lemiti Creek would be anticipated from the reduction in stream shade and increased solar radiation interception in these areas.

Outside of the mountain pine beetle impacted areas the conditions associated with stream shade, channel structure and streamflow regime would remain static with the potential for increased stream shade so stream temperatures in these areas would be expected to remain the same or slightly lower.

If there was a large wildland fire, it would be expected that there would be elevated stream temperatures in Lemiti Creek, South Fork Lemiti Creek, Slow Creek and other streams depending on the extent of the fire, because shade producing live trees would be killed. It would also set back the development of the new stand as saplings would be killed. Severe wildfires not only eliminate shade, but soot particles and burnt woody debris can increase stream temperature because they absorb more radiant energy for a longer period of time (Gleason 2012).

Proposed Action

Road construction or reconstruction activities within the riparian reserves include reconstruction of approximately 890 feet of the road alignment of the decommissioned 4420130 road across Slow Creek. The proposed road construction activities may impact stream shade through the falling of danger trees or the clearing of vegetation to accommodate the delivery, construction and installation of the temporary bridge across Slow Creek.

The 300-foot buffers on fish bearing streams and 150-foot buffers on all other streams maintain the primary shade zone.

As with the no-action alternative there are impacts to stream shade anticipated associated with tree mortality and tree fall in the areas impacted by the mountain pine beetle. This mortality and tree fall is not anticipated to be accelerated by activities associated with the proposed action.

The project is designed to reduce hazardous fuels and strategically apply treatments that may improve the probability of success for initial and extended attack efforts in the event of a high-severity wildfire within the planning area.

While it is not feasible to predict the exact size or location of a wildfire, the fuel treatments are likely to result in fewer acres burned at lower intensity, and it is more likely that riparian areas would remain intact.

3.9.3.3 Stream Channel Condition and Sediment

The hydraulic transport capacity of streams within the watershed appears to exceed the sediment delivery rates. Based on the acreage of the Headwaters Clackamas River Subwatershed and the calculated median background sediment yield there would be on average an estimated 260 tons of inherent sediment yield per year.

In the subwatershed there are no areas classified as high risk for landslides and only 7% of the area is classified as moderate risk, indicating the risk for sediment projection from mass wasting processes is low.

Roads are another potential source of coarse and fine sediment to surface water in the area. Sediment yield associated with the existing road system for the subwatershed is approximately 194 tons per year.

Sediment Routing

Sediment delivery from the road surface erosion is episodic and is expected to be spread out over time and space. Water and sediment routing in channels is controlled by large debris which may create a stepped profile.

The overall storage capacity serves to buffer the sedimentation impacts on downstream areas when there are pulses of sediment input to channels. Scattered debris in channels reduces the rate of downstream sediment movement and tends to feed sediment through the stream ecosystem in a slow trickle, except in cases of catastrophic flushing events.

These studies indicate that the episodic input of sediment associated with road surface erosion is metered by the stream system to provide a steady output of sediment.

Stream Survey Data

In-channel fine sediment was evaluated based on stream surveys that have been completed in the project area. Areas where surface fines (material less than 6 millimeters) exceed 20 percent of the substrate were identified. The survival of salmonid embryos decreases in this condition.

Lemiti Creek, reach 4 (1.3 miles long), and Clackamas River reach 7 (1.8 miles long) are identified with >20% surface fines (material less than 6 mm). The stream surveys completed on the Clackamas River and Lemiti Creek found fine particles less than 2 millimeters at 24% for a reach of the Clackamas River and 21% for one of the Lemiti Creek reaches.

3.9.3.4 Direct and Indirect Effects - Sediment

No Action Alternative

Sediment delivery to streams in the project area would remain at current levels or may increase associated with the deteriorating road network. Segments of the current road network would see minimal levels of maintenance due to limited road maintenance funds. Longer intervals between maintenance with reduced funding may pose a risk of failure and may contribute sediment to streams. Vegetation that impedes erosion and sediment delivery would be retained. No roads would be maintained, improved, or decommissioned.

If there was a large wildland fire, there would be additional sediment delivery to the stream systems. When severe fire produces hydrologic conditions that are poor (<10% of the ground surface covered with plants and plant litter), surface runoff can increase more than 70% and erosion can increase by three orders of magnitude (1000 times greater) (Neary 2005).

Within a watershed, sediment and runoff responses to wildfire are often a function of burn severity and the occurrence of hydrologic events. Even severely burned areas would have minimal soil loss in the absence of rainfall. However, when a major rainfall event follows a large, high burn severity fire, a significant hydrological response and erosion are likely (Neary 2005).

Post-fire soil erosion amounts vary not only with rainfall, but also with burn severity, topography, soil characteristics and amount of vegetative recovery. Sediment yields in the first year after a fire range from very low in flat terrain without major rainfall events, to extreme, in steep terrain affected by high-intensity thunderstorms (Neary 2005).

The median sedimentation rate of 17 tons per acre for the zone associated with the Headwaters Clackamas River Subwatershed was used to assess the post fire sediment yield in the area.

	Acres	Erosion Rate (tons per acre)	Annual Erosion (tons)
Headwaters Clackamas River Base Erosion	25,985	0.01	260
Modeled fire based historic fire size	6,833	17	116,161

Proposed Action

Some ground disturbing activities in this alternative have the potential to dislodge soil particles which in turn may increase erosion. These activities include new temporary road construction and reconstruction, landings, skid trails and areas of road maintenance and repair. Amounts of erosion and sediment delivery are expected to

be small due to maintaining protective groundcover along with implementation of Project Design Criteria (PDC).

Access roads and associated haul routes were evaluated and road maintenance activities were identified with an objective to prevent sediment delivery to streams. Similar to road and landing construction, soil disturbing road maintenance activities would be limited to the dry season (generally June 1 to Oct. 31 dependent upon soil moisture conditions). Maintenance activities identified include the placement of new aggregate surfacing where necessary, blading, removing debris, brushing out encroaching vegetation, removing berms, and ditch and culvert inlet cleanout where needed. Aggregate road surfacing can minimize the amount of fine sediment from road surfaces entering streams following haul, especially during and following rainfall events.

Road maintenance prior to haul includes: placement of new aggregate surfacing where necessary; insuring that the fill slopes at stream crossings are vegetated or otherwise stabilized such that road surface sediments are retained prior to entering the stream channel; roads approaching stream crossings would have adequate cross drainage to divert potential ditch sediment toward slopes where material can be trapped.

Road maintenance prior to haul would help maintain the designed drainage of the road surface which reduces the potential for larger sediment inputs. Some road maintenance activities have the potential to increase road related erosion and sediment during rainfall events. This increase is associated primarily with blading, ditch cleaning and culvert cleaning. Implementation of project design criteria (PDC) that include installation of erosion control measures to minimize or eliminate sediment introduction into streams would further reduce the risk of sediment introduction. Any sediment delivered to streams during these activities would be minimal, short-term duration, and undetectable at a sub-watershed or watershed scale. The probability of any degradation to water quality caused by sedimentation due to road construction, reconstruction and maintenance is extremely low.

Hauling would not measurably increase the amount of fine sediment in streams. The roads along the haul route have for the most part well vegetated road ditchlines that allow any eroded soil to be stored adjacent to the roads. The potential for sediment input into streams along the haul routes would further be minimized by permitting haul only when conditions would prevent sediment delivery to streams.

Generally haul would not occur when there has been 1.5 inches of precipitation or greater within any given 24 hour period as measured at the lowest elevation aggregate road. Precipitation quantity along with a visual inspection of roads and professional judgment would be used to indicate when haul should be stopped to prevent road related impacts to streams. Haul would be stopped immediately, even in the dry season, if road use is causing rutting of the road surface, ponding of water on the

road, failure of any drainage structure, or any other action occurs which increases the sediment delivery to a stream.

The 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. Decompacting the road surface during rehabilitation or decommissioning activities loosens the soil, thus making it more likely to be mobilized during the first significant run-off period unless the road is on relatively flat terrain, not near streams, or sufficient ground cover (mulch, woody debris, etc.) is provided. Project Design Criteria are in place to insure that the turbidity levels and sediment inputs are minimized.

Project design criteria and associated BMPs for road rehabilitation and decommissioning would reduce the risk of sediment entering any stream course. The impacts to water quality caused by sedimentation due to road construction, reconstruction, maintenance, or road decommissioning, if any, would be short-term and undetectable at the watershed scale.

The decommissioning of system roads has the potential for short-term impacts with long-term benefits for sediment reduction. The project includes culvert removal associated with road decommissioning but it also includes the replacement of two other culverts to improve aquatic conditions. There is the potential to deliver sediment into stream channels during culvert work, but since all three culverts are in the intermittent section of Lemiti Creek, there is ample time during the dry season to do this work, thereby minimizing sedimentation. There would likely be a short-term flush of turbidity during the first flow event at each culvert location.

Road related activities with potential to change sediment yields including temporary road construction and associated rehabilitation, and system road decommissioning are summarized in the table below.

Estimated Sediment Yield from Roads – Headwaters Clackamas River Subwatershed

No Action Alternative	Proposed Action
194 tons per year	190 tons per year

This net reduction includes the increase in sediment from road construction and rehabilitation and the reduction of sediment from road decommissioning and rocking native surfaced roads. The sediment yield was modeled with the assumption that all road work would happen in one year. It is actually more likely that road work would be spread out over several years as different fuel treatment units are accessed. Sediment from these roads would continue to accrue in subsequent years but the level of sediment predicted for the year of activity would gradually taper off as a result of ground cover placed on road surfaces and as vegetation regrows.

Fuel treatment and timber harvest alone, particularly on gentle slopes, are not likely to result in measurable erosion or sedimentation (Litschert 2009). Sediment delivery is minimized by including stream protection buffers, locating skid trails away from streams, maintaining high surface roughness downslope of water bars, scattering slash on disturbed soils, placement of mulch, and application of approved seed.

With these design criteria, fuel treatment and harvest are expected to have minimal effect on sedimentation.

The project is designed to reduce hazardous fuels and strategically apply treatments that may improve the probability of success for initial and extended attack efforts in the event of a high-severity wildfire within the planning area. The project would also minimize the impacts of fire on streams and riparian areas adjacent to but outside of the project area.

With implementation of the proposed action impacts to sediment yield associated with a large wildfire similar to what has occurred in the past, would be minimized by reducing the fire size and reducing the burn severity in areas that do burn.

3.9.4 Cumulative Effects for Water Quantity and Quality

The Headwaters Clackamas River subwatershed is used as the analysis areas for cumulative effects. This area encompasses 25,985 acres. It incorporates the Clackamas River over 3 miles downstream of the confluence of Lemiti Creek and over 5 miles downstream from the lowest element of the proposed action which is far enough that direct effects from the Lemiti project would not likely be measurable.

The time frame used to include or exclude actions varies by the type of action. Some impacts are considered permanent with no modeled recovery such as permanent roads, quarries and the power line right-of way. Some impacts such as regeneration harvest would recover gradually over approximately 40 years.

Past disturbances considered in the analysis of cumulative effects include fires, insect mortality, timber harvest, quarries, power lines and road construction. Disturbances such as road construction and timber harvest that have occurred on the adjacent CTWS Reservation including the recent Camas Prairie Fire, are also considered.

There are no other ongoing or foreseeable future actions on the Forest within this zone or within this time frame. Part of the CTWS Reservation is within the cumulative effects analysis area. At this time, there are no known actions on the reservation that are foreseeable.

There are no ongoing timber projects within the analysis area to include in the analysis of cumulative effects. The analysis tracks projects by name that were implemented between 2000 and the present. The analysis includes harvest before 2000 even though it is not tracked by name.

There are no foreseeable future projects on the Forest to consider. While there may be future logging or other management within the watershed, there are no current proposals with sufficient site specificity to conduct an analysis.

Projects or actions that were considered in the evaluation of cumulative effects include danger tree removal, ongoing road maintenance, BPA power line corridor maintenance, recreation site, trail, and associated public use, fish habitat restoration projects including log and boulder and gravel placement in streams using heavy equipment.

3.9.4.1 Cumulative Effects for Water Quantity

The ARP value reflects the cumulative recovery of all stands in the watershed combined with the cumulative impact of all actions that have affected hydrologic recovery. It is a weighted average of the modeled recovery status of a multitude of stands. While the fuels reduction treatments of the proposed action would likely be spread out over several years, it is modeled here as occurring in 2016 which is the earliest potential harvest date.

The cumulative effects for water quantity using the ARP method, is 78%.

Cumulative effects pertaining to peak flow increases are not expected because changes to hydrologic recovery as projected by the ARP model are very small. Since no new permanent or temporary roads are being constructed that have a hydrological connection to any water source, there is little potential for peak flow increases due to the more rapid routing of water by road drainage ditches.

Since the cumulative impact of vegetation removal associated with all activities is minimal, there are no substantive cumulative effects anticipated for water quantity.

3.9.4.2 Cumulative Effects for Stream Temperature

Activities associated with the Lemiti Fuels Reduction Project are not expected to increase water temperature because there are no vegetation management activities in the riparian reserves. As described in the direct and indirect effects section, this project would maintain or improve existing water temperatures. Fuels reduction activities have the potential to minimize the fire size and reduce the burn severity in areas that do burn resulting in less impacts to stream temperature associated with a wildfire in the area. Ongoing actions all have the potential to impact stream shade and associated stream temperature, however these activities would be dispersed in time and space (and all these activities would have water quality protection Best Management Practices in place to control impacts to stream temperature). Because the stream buffers were found to be sufficient to prevent any increase in water temperature, there would not likely be any substantial or measurable cumulative effect.

3.9.4.3 Cumulative Effects for Sediment

Ongoing actions all have the potential to impact sediment, however these activities would be dispersed in time and space and all these activities would have water quality protection Best Management Practices in place to control impacts to stream sedimentation.

Temporary road construction and reconstruction, culvert removal and replacement, fuel treatments, logging and haul associated with this project (with project design criteria implemented) have the potential to introduce a very limited amount of sediment to the stream system. The system road decommissioning has the potential to reduce chronic sources of sediment. The cumulative effects of this project when added to other past actions and ongoing actions would not likely be substantial or contribute to a downward trend for water quality in local streams or downstream rivers because the quantities of sediment introduced from this project and the quantities of sediment removed would be small compared to the overall sediment load for the drainage. No detrimental cumulative effects are expected.

3.9.4.4 Trends

In terms of water quantity and quality, the following restoration actions at the broader landscape scale, have cumulatively contributed to a trend of stable or improving aquatic conditions.

- In-stream restoration projects including the reconnection of side channels, and the addition of wood and boulders.
- Replacing undersized culverts with larger ones that allow improved fish passage and the ability to withstand larger flood events.
- Decommissioning roads.
- Managing riparian reserves for shade, large wood recruitment, and the development of late-successional conditions.
- Managing Off-Highway Vehicle use to avoid erosion near sensitive streams.
- Managing stream diversions for irrigation to minimize effects to fish.
- Treating hazardous fuels to minimize the impact of wildfire on riparian areas and fish.
- Removal of a dam that blocked fish passage.

The Lemiti project is integral to this trend. With no action, a high severity wildland fire, similar to what has occurred here in the past, has the potential to create over 100,000 tons of sediment in the first year. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action and would result in much less sediment and greater protection to the recovering riparian areas.

3.9.5 Forest Plan Consistency

Forestwide Water Standards and Guidelines - FW-54 to FW-79, page Four-53
Mt. Hood FEIS pages IV-22, IV-47, IV-155 to IV-167

Several standards and guidelines address water quality in terms of sediment and temperature (FW-054, FW-060, FW-097, FW-109, and FW-111).

Summer water temperatures exceed State standards in Slow Creek, a tributary of Lemiti Creek (State of Oregon LASAR data). Fine sediment standards are exceeded in Lemiti Creek based on stream surveys. Dead lodgepole pine along streams has resulted in little shade. During the summer, Lemiti Creek dries up and flow is subsurface. Water emerging downstream is much cooler. No fuel treatment or logging would occur in riparian reserves. A Forest Plan amendment is not needed for these standards and guidelines because the proposed action would not increase stream temperature and may benefit stream temperature by reducing fire risk. Similarly, the proposed action would not measurably increase stream sedimentation and may benefit streams by decommissioning roads and reducing fire risk and the sediment that would result.

FW-63

This standard indicates a maximum watershed impact area of 35% for major drainages (now called watersheds) for lands available for vegetative manipulation. This standard would be met because after project implementation the watershed impact area for the Upper Clackamas Watershed would be approximately 22%.

3.9.5.1 Forest Plan Exceptions

FW-062 & 064

These standards indicate a maximum watershed impact area of 35% at the drainage scale for lands available for vegetative manipulation.

Watershed Impact Area

Drainage Name	Current Condition	Proposed Action	Difference
Lemiti Creek	49	52	+3
South Fork Lemiti Creek	15	21	+6

The Lemiti Creek drainage does not meet the standard for a maximum watershed impact area of 35% for either the current condition or the proposed action due to the extensive area of bark beetle mortality. Most of the project area is actually above the commonly accepted rain-on-snow zone and normally wouldn't be included in the calculation of watershed impact areas using the ARP methodology (s. 3.9.2.1). However, due to the potential for climate change to alter the timing of snow accumulation and warm rain-on-snow events, the analysis was conducted for the entire project regardless of elevation.

The increase shown above is primarily due to the removal of dead trees and the relatively small benefit provided by down jackstrawed trees that would otherwise occur with no action.

In the absence of wildfire, the saplings in the fuel treatment units would gradually grow and their canopy would close to the point of full recovery in approximately 40 years. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be larger and would burn with higher intensity with no action, and may substantially impact peak streamflows and aquatic resources. Exceptions are needed for these two standards and guidelines.

3.9.5.2 Effects of Forest Plan Amendment #19.

The amended standards and guidelines would not substantially affect water quantity and quality.

3.9.5.3 The Clean Water Act and Best Management Practices

The Federal Clean Water Act (CWA) (33 U.S.C. § 1251 et seq.) is the foundation for surface water quality protection in the United States. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

The Forest Service, as an agency of the Federal Government, is required to comply with all Federal, State, and local requirements for water pollution control in the same manner and to the same extent as any nongovernmental entity (CWA section 313) (USDA 2012).

Site specific Water Quality Best Management Practices, with the express purpose of limiting non-point source water pollution, are incorporated into the proposed action and associated project design criteria for this project. BMPs were refined to meet National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (USDA 2012).

The following is an excerpt from the National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core BMP Technical Guide (USDA 2012).

The National Core BMPs are deliberately general and nonprescriptive. Although some impacts may be thought of as characteristic of a management activity, the actual potential for a land use or management activity to impact water quality depends on several factors.

1. The physical, biologic, meteorological, and hydrologic environment where the activity takes place (e.g., topography, physiography, precipitation, stream type, channel density, soil type, and vegetative cover).
2. The type of activity imposed on a given environment and the proximity of the activity area to surface waters.
3. The magnitude, intensity, duration, and timing of the activity.
4. The State designated beneficial uses of the water in proximity to the management activity and their relative sensitivity to the potential impacts associated with the activity.

These four factors vary throughout the lands administered by the Forest Service. It follows then, that the extent and kind of potential water quality impacts from activities on NFS lands are variable, as are the most appropriate mitigation and pollution control measures. No solution, prescription, method, or technique is best for all circumstances.

The National Core BMPs cannot include all possible practices or techniques to address the range of conditions and situations on all NFS lands. Each BMP has a list of recommended practices that should be used, as appropriate or when required, to meet the objective of the BMP. Not all recommended practices will be applicable in all settings, and there may be other practices not listed in the BMP that would work as well, or better, to meet the BMP objective in a given situation. The specific practices or methods to be applied to a particular project should be determined based on site evaluation, past experience, monitoring results, new techniques based on new research literature, and other requirements. State BMPs, Forest Service regional guidance, land management plans, BMP monitoring information, and professional judgment should be used to develop site-specific BMP prescriptions.

The Interdisciplinary Team has examined the applicable general National Core BMPs and developed more specific and prescriptive Project Design Criteria (PDCs) to implement the intent of the BMPs.

Some of the PDCs are standard practices and others were tailored specifically for this project based on site-specific conditions. They were developed based on many years of experience and an understanding of recent research. The team evaluated the PDCs and rated their “ability to implement” and “effectiveness.” This analysis is in the hydrology specialist report and is incorporated by reference. Past monitoring on the Clackamas River Ranger District indicated that PDCs were implemented as planned on 85% of the samples and were effective at avoiding impacts to water quality on 94% of the samples. The water quality specialist report contains this analysis in compliance with Appendix H of the Forest Plan. It found that similar levels would likely be experienced for this project. This level of effectiveness was considered in the analysis of effects described above.

3.9.5.4 Forest-Wide Monitoring

To assess compliance with the Clean Water Act, the Forest conducts a variety of monitoring and inventory programs to determine status of meeting state water quality standards as well as other regulatory and agency requirements. In an average year, approximately 75 sites are monitored for water temperature throughout the Forest. In addition, other water quality monitoring occurs at various locations throughout the Forest. This could be turbidity monitoring, in-stream sediment sampling, water chemical sampling, or surveys of physical stream conditions. Currently, approximately 25 miles of physical stream habitat is surveyed every year and to date approximately 1,200 miles of stream have been surveyed. Some of the information collected during these surveys includes the number of pools and riffles, amount of large wood, riparian area condition and types, and numbers of fish and other aquatic organisms. This data is compiled and summarized in Forest Monitoring Reports available on the Forest's web site. The effectiveness of the techniques included as PDCs in this project and on the projects that have been implemented in recent years has been validated because Forest-wide monitoring has shown an ongoing trend of improving conditions for water quality. The PDCs in this project have been refined where appropriate based on past monitoring to make them more implementable and more effective.

3.9.5.5 Project-Level Monitoring

This project would go into a pool of projects to be selected for project level BMP implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. An interdisciplinary team would evaluate whether the site-specific BMPs were implemented and the effectiveness of the BMPs at minimizing impacts to water quality.

Monitoring is used in an adaptive management process to inform and improve management activities so that lessons learned can be used to make future projects better and to share with other appropriate Federal, State and local agencies.

3.10 FISHERIES

This section summarizes the Aquatic Report and Fisheries Biological Evaluation which are incorporated by reference. Fisheries issues such as sediment and water temperature are already discussed in the water quality section (s. 3.9) and are only repeated here where needed to add clarification.

The Action Area is the subwatershed called the Headwaters of the Clackamas River (For more information see maps in Appendix A). The action area is defined for ESA purposes 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).

3.10.1 Methodology

The following methodology was used to determine the level of impact on aquatic species.

- Determine known and suspected locations of aquatic species and designated critical habitat and essential fish habitat 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.
- Overlap the species/habitat locations with project elements to determine which species or habitat could be affected.
- When species or habitat overlap with the project actions, analyze proposed project activities in the context of the habitat elements potentially impacted. For this project, the following was considered.
 - Direct effects to aquatic fauna and habitat from fuel/vegetation treatments.
 - Direct effects to aquatic fauna and habitat from connected actions; i.e. – culvert replacements.
 - Potential increases in erosion and fine sediment input to streams and wetlands compared to existing conditions.
 - Potential project effects to aquatic species or habitat were analyzed and the effects to the biological resource were determined based on professional experience, applicable surveys or studies, consulting with other specialists, and available literature.

3.10.2 Management Indicator Species (MIS)

Because of their relative sensitivity to change, the family of fishes, known as salmonids, was selected as “an indicator species group” for aquatic habitats. 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. It is assumed that if the needs of salmonids are met, the needs of other fish and aquatic species would also be met. Management Indicator Species for the Forest include Chinook salmon, coho salmon, steelhead, coastal cutthroat trout and rainbow trout. A Forest-level analysis of the status of these species and their habitat was conducted in 2011. 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 was conducted at a coarse scale using available GIS data. The project level interdisciplinary team took the Forest-wide data and refined it based on field examinations and local knowledge of habitat conditions.

3.10.3 Existing Condition

Currently the headwaters of Lemiti Creek in the project area, is overwhelmingly dominated by dead lodgepole pine stands. Scattered live lodgepole pine and other conifer species exist within the dead lodgepole pine stands as individual trees or scattered clumps of green trees. In places, dense young lodgepole pine saplings are growing under the dead standing canopy of lodgepole pine trees.

Most of the main-stem Lemiti Creek goes dry in the summer. Lemiti Creek bisects the project area and the project also encompasses the tributaries South Fork Lemiti Creek and Slow Creek. South Fork Lemiti and Slow Creek are intermittent streams with only portions of their channels maintaining perennial flow through the summer.

The small areas of perennial aquatic habitat in South Fork Lemiti and Slow Creek act as important refugia for coastal cutthroat trout and other aquatic biota until fall rains return. There are no anadromous or federally listed species present in the project area or in Lemiti Creek. There are no known Region 6, Regional Forester's aquatic sensitive species found in the project area.

The Lemiti Creek culvert stream crossings on the 4680, 4220, and the 4220-125 all have under-sized culverts and the 4680 and 4220-125 culverts are twin, side by side culverts that are either being damaged by drifting large woody debris (LWD) or are rafting LWD into jams at the culvert inlet. These three culverts crossings are barriers to fish and other aquatic organism passage when water is flowing but are dry stream crossings during summer.

3.10.4 Direct and Indirect Effects

No Action (Alternative A)

With no action, none of the proposed activities would be implemented. Existing habitat conditions for fish and aquatic organisms would remain the same. No ground disturbing actions would take place and there would be no short-term effect to conditions for aquatic species.

Culverts that are undersized and block fish passage would remain in place. These roads would remain at risk to failure during a flood event, and would continue to block fish passage and therefore limit the genetic diversity of resident fish.

In the event of a wildfire, riparian areas and aquatic species would be altered. Sediment would increase and stream temperature would increase. Fires may also occur with the proposed action, but with no action, fires are likely to be larger and burn with greater intensity.

Proposed Action (Alternative B)

The proposed actions would have little direct effect on aquatic species or their habitat. The temporary road and temporary bridge over Slow Creek and the culvert work on Lemiti Creek would have some short-term effect to sediment. Since fuel treatments would not occur in the riparian reserves and road/culvert work would occur during the dry season when Lemiti Creek is a waterless channel, there would be no direct contact or effects to aquatic species from fuel treatments or channel work. The untreated dead and living trees in the riparian reserves would remain as potential sources of in-stream wood and riparian habitat and structural complexity similar to historic stand replacement events. The Lemiti culvert replacement projects would result in long-term benefits to fish and aquatic organisms and their habitat by improving upstream connectivity and by improving routing of large wood and flood flows at the stream crossings.

Most of Slow Creek, a tributary to Lemiti Creek is dry in the summer and fall but with some scattered reaches of perennial flow. The temporary road crossing at Slow Creek is one of the areas with perennial water and habitat supporting coastal cutthroat trout through the dry season. Construction activities to build the temporary road crossing at Slow Creek and hauling material over this temporary bridge would result in disturbance of fish and other small aquatic organisms for a small distance upstream and downstream of the crossing. Possible injury or death of individual fish/aquatic organisms could occur when machinery is crossing the creek and during installation of the temporary bridge. Block nets and electro-fish capture/rescue would be implemented at the temporary crossing prior to installation as a precaution, but could result in a small number of fish being stressed or even killed accidentally. Some immediate short-term disturbance of fish and other organisms would take place from fine sediment that might be disturbed in-stream during construction and fish may exhibit avoidance behavior moving either upstream or downstream a short distance during disturbance from haul.

Fine sediment input into stream habitat can be expected from new culvert replacement work, road decommissioning near stream channels, the temporary road crossing at Slow Creek, and routine road use and maintenance when near stream channels and at stream crossings. The amount of fine sediment produced is anticipated to be low and of short duration because of the time of year when implemented and the utilization of Best Management Practices (BMPs) and project design criteria (PDCs). These practices minimize effects to water quality and aquatic resources but do not necessarily eliminate all impact. They are also designed to meet standards for the federal Clean Water Act. Typical practices are stabilizing, mulching and seeding disturbed soils, and completing work during drier times of year. In applying these practices, any resulting erosion would be negligible.

Indirect effects to downstream anadromous fish may occur. The nearest potential anadromous salmon and steelhead habitat is over three miles downstream of the connected culvert fish passage projects, road work, landings, and nearest fuel

treatment. The dry stream channel on Lemiti Creek dominates this distance of connected stream channel during the summer. Downstream of Lemiti Creek in the Clackamas River, federally listed species, including the threatened Lower Columbia River Steelhead, Lower Columbia River Coho, and Upper Willamette Chinook are found. The Upper Clackamas River also contains threatened bull trout that are actively being reintroduced into the Upper Clackamas River under an “Experimental” population designation.

There would be No Effect to federally listed salmon, steelhead, or bull trout, because of the distance to federally listed fish habitat in the Upper Clackamas River along the dry Lemiti Creek channel, and no treatment in riparian reserves. There would also be no effect to essential fish habitat (Magnuson-Stevens Act).

3.10.5 Sensitive Species and Survey and Manage Species

Potential habitat for sensitive species on the Regional Forester’s Sensitive Species List, is very limited due to the intermittent nature of the streams. Due to the factors described above, any potential impacts would be minimal. Only small portions of the stream network and adjacent areas hold year round water that is required by the aquatic Region 6 Sensitive Species. Surveys for aquatic sensitive species have not been conducted for this project because the dry stream channel and lack of suitable flowing stream or spring-type habitat where there is residual water, make the probability of any of these species being present, extremely unlikely. A determination of No Impact is warranted for sensitive species.

The caddisfly *Namamyia plutonis*, has not been found anywhere on the Mt. Hood National Forest. Although limited information is available on this species and its habitat preferences, a No Impact determination is appropriate since known locations tend to be small streams in densely forested old growth or mature forest watersheds. These conditions are very different from conditions in the Lemiti project area.

List of federally threatened and R6 sensitive fish and aquatic macro-invertebrate species found on the Mt. Hood National Forest and addressed in this Biological Evaluation.

	Listing & Critical Habitat Date	Suitable Habitat Present	Species Present	Alternatives	
Endangered Species Act Listing by ESU/DPS – All Threatened				Alt. 1	Alt. 2
Lower Columbia River steelhead & CH (<i>Oncorhynchus mykiss</i>)	1/06 9/05	N	N	NE	NE
Lower Columbia River chinook & CH (<i>Oncorhynchus tshawytscha</i>)	6/05 9/05	N	N	NE	NE
Clackamas River Experimental - Nonessential Bull Trout Population	6/98 11/10	N	N	NE	NE

<i>(Salvelinus confluentus)</i>					
Upper Willamette River chinook & CH <i>(Oncorhynchus tshawytscha)</i>	6/05 9/05	N	N	NE	NE
Lower Columbia River coho & CH ¹ <i>(Oncorhynchus kisutch)</i>	6/05 1/13	N	N	NE	NE
Forest Service Region 6 Regional Forester's Sensitive Species					
Barren Juga <i>(Juga hemphilli hemphilli)</i>	1/08	N	N	NI	NI
Purple-lipped Juga <i>(Juga hemphilli maupinensis)</i>	1/08	N	N	NI	NI
Dalles Juga <i>(Juga hemphilli dallesensis)</i>	12/11	N	N	NI	NI
Scott's Apatanian Caddisfly <i>(Allomyia scotti)</i>	1/08	N	N	NI	NI
Caddisfly <i>(Namamyia plutonis)</i>	12/11	Unk	Unk	NI	NI

Of the aquatic organisms designated as Survey and Manage species, only the Columbia duskysnail has the potential to occur in the project area. The Columbia duskysnail has been found in approximately a dozen sites in the Clackamas watershed in cold spring and headwater streams. Aquatic habitat in the project area in summer is slow or still-water, warmer residual stream habitats which is not suitable for this species. Because there is no suitable habitat, surveys were not conducted. Riparian reserve buffers provide sufficient protection for aquatic organisms.

3.10.6 Cumulative Effects

Aquatic organisms are affected by the water quantity and quality factors discussed in section 3.9. For this reason, the same analysis area and time frames are used for impacts to fish and other aquatic organisms. The discussion of cumulative effects in section 3.9.4 indicate that there would not likely be substantial changes to water quantity, temperature or sediment, and that there may be benefits as wildfires would likely be kept smaller resulting in greater protection to aquatic organisms.

Several MIS fish species were listed as threatened under the Endangered Species Act due to concerns for their population levels and the condition of habitat and other factors such as commercial fishing and hydroelectric dams. Since the creation of the Northwest Forest Plan, the following factors have contributed to a trend of stable or improving stream habitat on the Forest.

- In-stream restoration projects including the reconnection of side channels, and the addition of wood and boulders.
- Replacing undersized culverts with larger ones or bridges that allow improved fish passage and the ability to withstand larger flood events.
- Decommissioning several hundred miles of roads.

¹ Critical habitat for this species was recently proposed for designation by the NMFS.

- Managing riparian reserves for shade, large wood recruitment, and the development of late-successional conditions.
- Timber harvest has been greatly reduced.
- Managing Off-Highway Vehicle use to avoid erosion near sensitive streams.
- Managing stream diversions for irrigation to minimize effects to fish.
- Treating hazardous fuels to minimize the impact of wildfire on riparian areas and fish.
- A new FERC license agreement for PGEs hydropower facilities.

Recent projects have been designed using the standards and guidelines of the Northwest Forest Plan and its emphasis on restoration in key watersheds. As a result, projects and activities in the subwatershed are not creating measureable impacts to streams or aquatic resources.

The analysis found that the proposed action along with other past and ongoing actions would not have a measurable or substantive effect on aquatic resources because of protections provided by project design criteria including stream protection buffers. Even though there is some impact at the drainage scale, due to the widespread insect mortality, the subwatershed and watershed are recovered hydrologically (s. 3.9.2.3, s. 3.9.5, s. 3.9.5.1). This project would have no effect to listed fish or their critical habitat (s. 3.10.5). For these reasons cumulative effects would not be substantial.

Viability

The PDCs would minimize negative effects of sediment or turbidity. For MIS fish, the direct, indirect and cumulative effects to water quality and the physical habitat for these species are low to immeasurable due to protections provided by PDCs, and the low potential for any sediment to reach streams where these species reside. As such, this project would not contribute to a negative trend in viability on the Forest for MIS fish.

3.10.7 Forest Plan Standards and Guidelines

The Forest Plan contains standards and guidelines for water (FW 054 to 079), riparian (FW 080 to 136), key site riparian (A9-020 to 026), fisheries (FW 137 to 147), and other areas (B7-028 to B7-039). The Northwest Forest Plan has riparian reserve Standards and Guidelines (pages C-031 to 038). The Forest Plan was amended by the 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA, USDI 2001).

The proposed project meets all of these standards and guidelines because of wide protection buffers and Best Management Practices. In the long term, the proposed action would provide enhanced protection from intense wildfire and would allow riparian areas to recover from the current widespread mortality.

While some short-term impacts have been disclosed, the following section explains in detail how the Aquatic Conservation Strategy objectives would be met.

3.10.8 Aquatic Conservation Strategy

The Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan (USDA and USDI 1994) was developed to restore the health of watersheds and aquatic ecosystems. The ACS objectives are detailed on page B-11 of the Northwest Forest Plan. At B-10, the Northwest Forest Plan indicates that, to meet the intent of the ACS, management activities should either maintain the existing condition or lead to improved conditions in the long term.

The no-action alternative would maintain the current conditions and would result in a high fire hazard situation, particularly as dead trees fall.

The following discussions for each of the nine ACS objectives are based on the analyses found elsewhere in this document, particularly in sections 3.9 and 3.10 which focus on key aquatic parameters or indicators.

3.10.8.1 ACS Objective 1 - Watershed and Landscape-Scale Features

Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

The vegetation in the action area, including riparian reserves, has been changed as uniform stands of relatively small lodgepole pine trees have died. A reoccurring process of insect mortality, wildfire and regeneration to lodgepole pine, has resulted in a landscape with little mature forest adjacent to streams, minimal aquatic cover habitat, and little large down wood, few large snags, and few live trees. (s. 1.5.1, 3.3).

In the long term, the proposed action would provide enhanced protection from intense wildfire and would allow riparian areas to recover from the current widespread mortality. No fuel treatments would occur in riparian reserves. Large areas with dead lodgepole pine trees would be retained across the landscape including in riparian reserves, in the adjacent Siskiyou portion of the Clackamas Wilderness, and in late-successional reserves to provide for diversity and complexity. The hydrologic recovery of the subwatershed would progress as saplings continue to grow at appropriate spacing. (s. 1.5.1, s. 3.2, s. 3.9.2.1)

For these reasons, the objective of maintaining and restoring watershed and landscape-scale features would be met for this project since landscape and watershed scale features for protecting aquatic systems would remain intact, would be functional, and would be maintained into the future.

3.10.8.2 ACS Objective 2 - Connectivity Within and Between Watersheds

Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

Connectivity in the project area has been disrupted by roads that cross streams with culverts that are undersized and partially impassable to aquatic organisms. The vegetation in the action area, including riparian reserves, has been changed as uniform stands of relatively small lodgepole pine trees have died. Reduced shade may have broken some connections for dispersal of terrestrial riparian dependent species such as salamanders. (s. 1.5.1, s. 3.10.3)

The project area has streams which have segments that go dry in the summer. Due to climatic and geologic factors, the action area has a relatively sparse network of streams, springs and wet areas to provide for spatial connectivity for aquatic and riparian dependent species. (s. 3.10.3)

In the long term, the proposed action would provide enhanced protection from intense wildfire and would allow riparian areas to recover from the current widespread mortality. No fuel treatments would occur in riparian reserves. New temporary road construction would not cross streams or follow streams closely. Roads that are constructed or reconstructed would be temporary and would be rehabilitated after use. Reconstructed temporary road alignments have minimal connectivity to streams. The crossing at Slow Creek would be a temporary bridge that would not alter connectivity within or between watersheds. The project would enhance connectivity by replacing undersized culverts. As these enhancements are made, spatial and temporal connectivity at the site scale would be restored to more natural flowpaths. (s. 1.5.1, s. 3.1.4, s. 3.10.3)

For these reasons, the objective of maintaining and restoring connectivity within and between watersheds would be met for this project because it would lead to improved conditions in the short term with replacement of undersized culverts as well as maintaining conditions in the long term.

3.10.8.3 ACS Objective 3 - Physical Integrity

Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

The vegetation in the action area, including riparian reserves, has been changed as uniform stands of relatively small lodgepole pine trees have died. In the event of an

intense wildfire, there could be changes to the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action.

The physical integrity of aquatic systems has been affected by the construction of roads with undersized culverts. (s. 2.2.2, s. 3.10.4)

New temporary road construction would not cross streams or follow streams closely. Roads that are constructed or reconstructed would be temporary and would be rehabilitated after use. Reconstructed temporary road alignments have minimal connectivity to streams. The crossing at Slow Creek would be a temporary bridge that would be removed and the site restored after use to minimize changes to the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations. The project would enhance a more natural channel configuration by replacing undersized culverts. Changes in peak streamflows associated with vegetation manipulation and roads were assessed and it was determined that peak flows would not likely cause stream channel destabilization or impacts to the physical integrity of the aquatic system. (s. 2.2.2, s. 2.2.3, s. 2.2.4, s. 3.9.2.1)

For these reasons, the objective of maintaining and restoring physical integrity of aquatic systems would be met for this project because it would lead to improved conditions in the short term with replacement of undersized culverts as well as maintaining conditions in the long term.

3.10.8.4 ACS Objective 4 - Water Quality

Maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Summer water temperatures exceed State standards in Slow Creek. Dead lodgepole pine along streams has resulted in little shade. During the summer, Lemiti Creek dries up and flow is subsurface. Water emerging downstream is much cooler. Fine sediment standards are exceeded in Lemiti Creek based on stream surveys. This is likely a natural situation based on the area's geology, because very little management induced erosion has been observed up stream of this area. (s. 3.9.3.1, s. 3.9.3.3)

An intense wildfire would affect water quality. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action. No fuel treatment would occur in riparian reserves. The quality of water would be

maintained by following PDCs that include restrictions on wet season logging and haul, equipment slope restrictions and erosion control methods. (s. 3.1.4, s. 3.9.3)

PDCs for logging and road construction and maintenance would insure that project activities minimize sediment delivery. There would be some short-term localized increases in sediment delivery associated with temporary roads, culvert removal and other actions; however the level of sediment is very low compared to the natural background sediment level in the action area. The short-term sediment impacts associated with the temporary roads would also be spread out in time and space. (s. 3.9.3.4)

For these reasons, the objective of maintaining and restoring water quality would be met for this project because it would lead to improved conditions in the long term.

3.10.8.5 ACS Objective 5 - Sediment Regimes

Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Fine sediment standards are exceeded in Lemiti Creek based on stream surveys. This is likely a natural situation based on the area's geology, because very little management induced erosion has been observed up stream of this area. (s. 3.9.3.3)

Peak stream flows were examined by assessing the effect of vegetation manipulation and roads on peak stream flows individually and in combination and it was determined that implementation of the project would not impact the timing, volume, rate or character of sediment input, storage or transport. The subwatershed and watershed have many stands not affected by dead lodgepole pine and are recovered hydrologically. Implementation of project activities including fuel treatments, repairing roads, rehabilitating reused temporary roads and replacing undersized culverts are not anticipated to have any impact on base stream flows. (s. 3.9.2.1)

The project would implement PDCs that include restrictions on wet season logging and haul, equipment slope restrictions and erosion control methods. Stream protection buffers would trap material away from streams. New roads would not cross streams. Road repairs and maintenance, would result in a road system that minimizes sedimentation. (s. 3.9.3.3)

For these reasons, the objective of maintaining and restoring sediment regimes would be met for this project because the elements of the sediment regime including timing, rate, volume and character would protect the existing condition and be maintained into the future.

3.10.8.6 ACS Objective 6 - In-Stream Flows

Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration and spatial distribution of peak, high, and low flows must be protected.

The Lemiti Creek drainage has a relatively high level of vegetation impact, primarily due to the extensive area of bark beetle mortality. Most of the project area is above the commonly accepted rain-on-snow zone and normally would not be thought of as affecting hydrologic processes (s. 3.9.2). However, due to the potential for climate change to alter the timing of snow accumulation and warm rain-on-snow events, the analysis was conducted for the entire project regardless of elevation. In the absence of wildfire, the saplings in the fuel treatment units would gradually grow and their canopy would close to the point of full recovery in approximately 40 years. At the broader landscape scale, the subwatershed and watershed are considered hydrologically recovered. Dead lodgepole pine trees, whether standing or down, do not offer much protection from rain-on-snow events, therefore, in the absence of fire, the no action alternative and proposed action are not dramatically different. (s. 3.9.2.1)

Peak stream flows were examined by assessing the effect of insect mortality, vegetation manipulation and roads on peak stream flows individually and in combination and it was determined that implementation of the project would not impact the timing, magnitude, duration or spatial distribution of in-stream flows. Hydrologic recovery would continue to improve, and the in-stream flow regime, including the magnitude of flows would be maintained. The subwatershed would continue hydrologic recovery beyond the minimum levels identified in the Forest Plan and benefits to in-stream habitat for fish and other aquatic organisms would continue. Implementation of project activities including fuel reduction, repairing roads, rehabilitating reused temporary roads and replacing undersized culverts are not likely to have any negative impact on base stream flows. An intense wildfire would affect in-stream flows. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action. With no treatment, it is more likely that a wildfire would kill the saplings that are present in the dead lodgepole pine stands, setting back recovery there, and it would also be more likely that a wildfire would burn into areas of live mature trees, which could have a dramatic affect to peak stream flows. (s. 3.9.2.3)

For these reasons, the objective of maintaining and restoring in-stream flows would be met for this project because it would lead to improved conditions in the long term.

3.10.8.7 ACS Objective 7 - Floodplain Inundation

Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

The timing, variability and duration of water table elevation in key wetlands may have been altered by the widespread adjacent dead lodgepole pine.

These areas are inside riparian reserves which would not have any fuel treatment. In the coming decade, most of the dead lodgepole pine is likely to fall. By physically protecting these areas and by also protecting the timing, magnitude, duration and spatial distribution of peak, high, and low flows as described in Objective #6, the timing and duration of floodplain inundation and water table elevation in wetlands would be maintained. The subwatershed would continue hydrologic recovery beyond the minimum levels identified in the Forest Plan as young stands grow, resulting in long-term restoration of floodplain habitats and water tables.

An intense wildfire could affect the timing, variability, and duration of water table elevation in wetlands. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action. With no treatment, it is more likely that a wildfire would kill the saplings that are present in the dead lodgepole pine stands, setting back recovery there, and it would also be more likely that a wildfire would burn into areas of live mature trees, which could have a dramatic affect to peak stream flows. (s. 3.9.2.3, s. 3.10.4)

For these reasons, the objective of maintaining and restoring flood plain inundation and water tables would be met for this project because it would maintain the existing condition and the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

3.10.8.8 ACS Objective 8 - Species Composition and Structural Diversity of Plant Communities

Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Riparian structure has been altered by the widespread mortality in lodgepole pine stands. Most of the dead trees will fall within the next decade in a jackstrawed manner. Saplings are growing in riparian reserves (s. 1.5.1, 3.10.3)

No fuel treatment would occur in riparian reserves. An intense wildfire could set back the recovery of riparian vegetation. While it is not possible to predict the exact

size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action. With no treatment, it is more likely that a wildfire would burn into riparian areas including some that have live mature trees. (s. 3.10.4)

For these reasons, the objective of maintaining and restoring species composition and structural diversity of plant communities would be met for this project because it would lead to improved conditions in the long term.

3.10.8.9 ACS Objective 9 - Well-Distributed Populations of Native Species

Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

Riparian dependent species have been affected by the widespread mortality in lodgepole pine stands. Aquatic and riparian species may have been affected by the death of trees that provided shade, resulting in elevated stream temperature.

Across the broader landscape, there is an ongoing trend of improving watershed conditions as trees and vegetation regrow, as roads are decommissioned and as uniform riparian vegetation is made more diverse.

No fuel treatment would occur in riparian reserves. An intense wildfire could set back the recovery of native aquatic and riparian-dependent species. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller and would burn with lower intensity with the proposed action. With no treatment, it is more likely that a wildfire would burn into riparian areas including some that have live mature trees, further affecting aquatic and riparian-dependent species and setting back their recovery. (s. 3.10.4)

For these reasons, the objective of maintaining and restoring well-distributed populations of native species would be met for this project because it would lead to improved conditions in the long term.

3.10.8.10 ACS Summary

ACS Objectives and effects for each alternative

ACS Objectives	Effect to ACS Objectives by Alternatives	
	No Action*	Proposed Action*
#1 Watershed & Landscape-Scale Features	M	M
#2 Connectivity Within and Between Watersheds	M	R
#3 Physical Integrity	M	R
#4 Water Quality	M	M

#5 Sediment Regimes	M	M
#6 In-Stream Flows	M	M
#7 Floodplain Inundation	M	M
#8 Species Composition & Plant Communities	M	M
#9 Well Distributed Native Populations	M	M

R = “Restore” which means the actions would result in acceleration of the recovery rate;

M = “Maintain” which means that the function of an Objective does not change by implementing the actions or recovery would continue at its current rate; and

D = “Degrade” would mean changing the Objective to a declined condition.

*While it is not feasible to predict the exact size or location of a wildfire, the fuel treatments are likely to result in fewer acres burned at lower intensity, and it is more likely that riparian areas would remain intact, compared to no action. In the event of a large intense wildfire, some of the ACS objectives would be degraded and that degradation would be greater with no action.

While some short-term impacts to aquatic resources have been disclosed, the impact would be minimal and in most cases undetectable at the subwatershed scale. The project would lead to improved water quality and enhanced riparian and watershed conditions in the long term because of the following.

- No treatment would occur in riparian reserves, resulting in no change to stream shade or woody debris recruitment to streams. It would also minimize the potential for sediment transport to streams.
- Fuel treatments would provide for lower risk of riparian and watershed impact in the event of a wildfire.
- The replacement of undersized culverts would reduce road and sediment risks in the event of a flood event and would lead to improved water quality.
- System road repairs and maintenance would allow for safe use while ameliorating water quality issues.

For these reasons, the objective of maintaining existing conditions or implementing actions that restore watershed and landscape-scale features in the long term would be met for this project. This project is consistent with the Aquatic Conservation Strategy Objectives.

3.10.9 Effects of Forest Plan Amendment #19.

The amended standards and guidelines would not substantially affect water quantity and quality. The amendment would not result in impacts to fish, other aquatic species or riparian dependent species due to the protections provided by stream buffers and PDCs.

3.11 TRANSPORTATION

This section summarizes the Transportation Report which is incorporated by reference. A Roads Analysis has been developed at the Forest scale (USDA 2003) titled Roads Analysis: Mt. Hood National Forest (Roads Analysis). It documents 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. These documents are incorporated by reference and summarized below as they relate to the project area. The project area was covered by a previous road decommissioning environmental assessment in 2009 which implemented the high priority recommendations from the Forest-Wide Roads Analysis.

In addition to the Forest Roads Analysis, this project is further focused by project specific information obtained by observations and measurements taken in the field during the 2013 summer and autumn field season. This project level analysis is intended to document the effects of and on National Forest System Roads within the project area, and helps ensure that the future road system can be one that is safe, environmentally sound, efficient, and cost effective from a transportation perspective.

The Commensurate Share Policy (FSH 7709.59-63.4) is used to determine maintenance and reconstruction responsibilities for any project that has commercial haul. Under this policy, all competing users would be assessed their commensurate share of responsibility for maintenance and reconstruction. The commensurate share of responsibility for any given commercial haul is determined by examining typical structural degradation of roads under heavy haul.

For considering structural design of the subgrade, base, and surfacing of roads, the weight-per-axel loading of typical log haul trucks over the life of the timber sale is calculated using an estimated volume of timber passed over each segment of roadway. The result of this calculation is used to determine structural degradation and maintenance needs of the road system. The calculation is based on the Normal Operating Season, generally from June 1st through October 31st, and excepts unusual conditions which may occur, such as higher than normal moisture content or frozen subgrade.

3.11.1 Existing Conditions

The Forest's transportation system provides multi-use access for trans-forest

travelers, the recreating public, commercial users, and administrative users. System roads within the Forest range from Maintenance Level 5 (commonly paved or continuously dust controlled for travel at speeds of nominally 35 mph) to Maintenance Level 1 (storage roads closed to public traffic and not maintained for use), and include asphalt paved roads, aggregate (gravel) surfaced roads, improved (stabilized or pit-run aggregate) roads, and native surface roads. Maintenance for these roads is conducted utilizing appropriated funding, which is prioritized to focus on maintenance for those roads which accommodate higher levels of traffic and are commonly used by passenger vehicles. The maintenance and reconstruction of roads used primarily for commercial use is provided through the contract and is funded by the value of the timber removed.

However, across the Forest funding for road maintenance is lower than the level needed to properly maintain the nearly 3000 miles of open roads on the Forest. The Forest-wide Roads Analysis identified, for approximately half of the road system existing at that time, the need to change maintenance levels to lower standards, to store roads in a maintenance level one category, or to decommission roads.

Funding levels for road maintenance over the past decades have resulted in a backlog of uncompleted road maintenance and repairs. This has resulted in roads that are overgrown with vegetation, have non-functional or poorly functioning drainage systems, have travel surfaces in disrepair, and have multiple subgrade or road base failures.

System roads within this planning area are Maintenance Level 1 and Maintenance Level 2 roads, which include bituminous treated roads, aggregate surfaced roads, improved roads, and native surface roads. In addition to roads within the planning area, National Forest System Roads (NFSRs) that would be utilized to access the planning area range from Maintenance Level 1 to Maintenance Level 4 roads.

Maintenance Level Descriptions

- 1 – Road is treated for hydrologic stability and placed in storage for administrative use at a future time. Road is not maintained for public use.
- 2 – Conditions are suitable for high clearance vehicle travel at prudent driving speeds less than 15 mph.
- 3 – Minimum conditions are provided for passenger car use. Surface provides moderately convenient travel at prudent driving speeds between 15 and 25 mph with corresponding surface roughness tolerated.
- 4 – Higher consideration than level 3 is given to comfort and convenience of the passenger car and commercial user at prudent driving speeds above 25 mph with positive surface drainage and surface that is cross sloped or crowned.

Appropriated funding tends to be allocated to maintaining the higher volume roads designated as Maintenance levels 3, 4, and 5. Consequently roads with lower level maintenance designations have been largely neglected despite of the volume of traffic

that they receive. For example, road 4220, which leads to the popular Olallie Lake Scenic Area, receives relatively large amounts of traffic but maintenance has not been funded. Along roads 4220120, 4230, 4680, and 4690, vegetative growth along the roadside has begun to encroach upon the road prism, limiting sight distances around curves and creating a hazardous condition for road users. Ditch lines and drainage structures along the roadway are blocked by trees which have grown in excess of 4 inches in diameter, causing these drainage features to operate inadequately or fail, resulting in ponding and surface erosion that increases the delivery of sediments and contaminants to streams and degrades water quality. Even paved roads such as road 4220 have developed numerous large potholes and begun to deteriorate to a point where passage by high clearance vehicles is difficult and passage by commercial heavy haul vehicles would be hazardous under current conditions. Other aggregate and native surface roads such as roads 4220120, 4230, 4680, 4690, and 4220 from mile post 4.92 to mile post 6.73 have eroded and degraded to a point where the road is hazardous to navigate even in a high clearance vehicle. These roads are severely potholed, rutted, and exhibit signs of erosion.

While road conditions have deteriorated due to minimal maintenance and high recreational use, the hauling of heavy material has the potential to affect roads. Haul outside of the Normal Operating Season has the potential to cause substantial detrimental effects on the transportation system. Heavy haul of materials is the most impactful action regularly applied to the transportation resource. The amount of moisture present in the subgrade or base course of a road is a primary concern. Given the existing conditions and life expectancy of these National Forest System Roads, heavy haul under wet weather conditions could compromise the structural integrity of the road prism. Haul over the roadway during wet weather conditions has the potential to weaken the load bearing capacity of aggregate surfaced as well as asphalt surfaced roads. Once compromised, even normal traffic during wet weather conditions is likely to cause further damage. Continued heavy haul on compromised roads with saturated or near saturated subgrades would accelerate the rate of damage to the transportation resource as well as to other natural resources.

Under freeze/thaw conditions, haul has the potential to damage the road system's structural integrity as well. As frost penetrates into the road prism, it draws moisture from the road bed up into the road base and subgrade materials, saturating the aggregate nearly to or beyond its plastic limit. As the water freezes and expands, it breaks apart the particles in the aggregate reducing the roadway compaction and degrading the aggregate's design gradation. Under these conditions, a truck at or near the legal limit of 80,000 pounds traveling over the road surface would produce five times more stress on the travel way than it would during optimum moisture conditions.

Direct and Indirect Effects

3.11.2 No Action

The No-Action Alternative would involve no haul of wood products, no road reconstruction, no road decommissioning no culvert replacement and no contract related road maintenance. 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 project area. The only wear and tear that would occur would come from recreation and administrative use; normally in passenger vehicles.

Lack of road maintenance would result in adverse effects with respect to both safety and the environment. Road surface, road subgrade, and road base failures present physical hazards to drivers and reduce a driver's ability to maintain positive control of a vehicle. Roadways obscured with brush present an additional safety hazard to road users due to decreased sight/stopping distance. The increases potential for erosion and sedimentation are addressed in section 3.9.

In the longer term, if maintenance and minor repairs continue to be deferred, the condition of system roads would deteriorate to the point where major repairs are needed. Many uses of the road system would be hindered including recreation, Wilderness access, special forest product gathering, fire suppression activities and utility infrastructure access.

This alternative would not include system road status changes such as road closures or decommissioning, and consequently, there would be no displacement with respect to the transportation system users. The current use pattern of roads within the planning area would not change in the short term. Volume of public use on this system would not change over the near term, but roads would likely continue to deteriorate and would become less safe because funding for road maintenance is very limited.

3.11.3 Proposed Action

The needed repair and maintenance items discussed in section 2.2.1 would be performed by the contractor prior to and during operations for haul roads. Some road repairs are needed above and beyond the scope of what is considered road maintenance. It would also be performed by the contractor prior to haul to bring the road up to acceptable standards in order to ensure safe transport of products and to provide for the protection of the Forest's natural resources and its transportation resource.

Proper road maintenance and timely repairs result in an improved transportation system with respect to both safety and the environment. Road surface, road subgrade,

and road base failures would be repaired to minimize physical hazards to drivers and reduce the potential for erosion.

3.11.3.1 System Road Treatments

Road	Road Length	Description
4200	22.50	Danger Tree Felling if needed: not likely needed as this road is a main recreation route and examined regularly for danger trees. Brushing
4220 From 4200 to 4230	2.72	Danger Tree Felling if needed: not likely needed as this road is a main recreation route and examined regularly for danger trees. Brushing, Asphalt Cold Patch @ MP 0.99
4220 From 4230 to 4220.130	2.20	Brushing, Clean 8 Culverts, Grinding pavement - 2.1 miles
4220 From 4230.130 to 4690	1.81	Brushing, Blading, Clean 10 Culverts, 600 cubic yards Spot Rock, Danger Tree Felling if needed: not likely needed as this road is a main recreation route and examined regularly for danger trees.
4220.120	0.10	Brushing, Blading.
4220.125	0.50	Blading, 30 cubic yards Pit Run
4220.130	0.73	Blading, 140 cubic yards Pit Run
4230	1.33	Blading, 280 cubic yards Spot Rock, Danger tree felling, Specified Road Clearing
4680	0.15	Blading, Brushing, Danger tree felling
4690	1.49	Brushing, Blading, 100 cubic yards Spot Rock, Danger Tree Felling if needed: not likely needed as this road is a main recreation route and examined regularly for danger trees.
4690.030	0.10	Brushing, Blading, 50 cubic yards Pit Run, Pit & Quarry Development (1 acre)

The roads within the project area were designed for hauling during the normal operating season. Since commercial haul under this proposal would be limited to relatively dry conditions, stresses produced by heavy haul would result in normal wear and tear that does not create undo cost and damage to resources. The Project Design Criteria (PDCs) address the suspension of haul 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.

In addition to National Forest System Roads, the project intends to utilize temporary roads. Temporary roads are constructed upon stable native soils and are intended for project use only. These temporary access roads are built or reconstructed in order to access landings needed for logging, and are rehabilitated upon completion of logging in each unit.

To minimize impacts to the environment and natural resources, pre-existing temporary road alignments and alignments of previously decommissioned system

roads are utilized wherever practical. In some places, new temporary roads are proposed to access landings where existing system roads and old alignments are not adequate for accessing landing locations. Section 2.2.4 contains a table showing the temporary roads.

After use, temporary roads would be bermed at the entrance, water barred, and decompacted as needed with the jaws of a loader or excavator. Debris such as root wads, slash, logs, or boulders would be placed near the entrance and along the first portion of the road. These are standard practices for temporary roads to prevent use by motor vehicles.

PDCs, BMPs, and engineering design standards are used to control, minimize, and mitigate for the known detrimental effects of our National Forest System Roads and temporary roads. Over the last 60 years, research and experience supporting the design, construction, and maintenance of forest roads has focused on minimizing the impacts of these roads on the environment, and a wealth of information exists on the physical effects of roads on hydrologic and geomorphic processes. Key findings of many studies have uncovered factors that can lessen negative effects of roads by better integrating engineering approaches with the knowledge of road effects (USDA 2001) (Rice 1992) (USDA 1989) (Swift 1984) (USDA 1980).

Given these measures, the Proposed Action 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 users, commercial users, recreational users, and trans-forest travelers, while decreasing the potential for contamination and sediment delivery to streams and waterways. A road's life span is extended by regular maintenance.

3.11.4 Cumulative Effects

The spatial scale analyzed for cumulative effects is the planning area and haul roads outside the planning area, and the temporal scale is five to ten years based on the anticipated effects associated with road maintenance activities.

No wood fiber harvest activities have taken place in the project area within the last five to ten years. There are no foreseeable future actions that would affect roads. Ongoing recreation traffic contributes to the wear of project area roads. The proposed action would result in increased effectiveness and overall value of the Forest's transportation system while minimizing impacts to other resources.

3.11.5 Forest Plan standards and guidelines

All Proposed Actions related to the Forest Transportation System are consistent with the Transportation Standards and Guidelines; A5-031 through A5-034, A9-033 through A9-037, B3-035, B7-051 through B7-059, B11-033 through B11-036, C1-

039, and FW-407 through FW-437.

The Forest-wide Roads Analysis (2003) and the project specific transportation analysis documented above, implement guideline FW-416.

All temporary roads constructed for project use would be rehabilitated 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 contract.

3.11.5.1 Effects of Forest Plan Amendment #19.

None of the proposed changes would affect the transportation system.

3.11.6 Road and motorized trail statistics for the planning area

Route Miles, Stream Crossings, and Routes in Riparian Reserves	Existing Condition	Proposed Action	Change
Project Action Area Acres (Non-Wilderness)	3,140	3,140	0
Action Area Acres Open to Motorized Cross-country Travel	0	0	0
Grand Total Motorized Route Miles: System	6.6	6.5	-0.1
1. Total Miles of Roads	6.6	6.5	-0.1
a. Miles designated as open yearlong	5.3	5.2	-0.1
b. Miles designated as open seasonally	0	0	0
c. Miles designated as closed yearlong	1.3		
2. Total Miles of Motorized Trails	0	0	0
a. Miles of designated roads open year round for use of OHVs	0	0	0
b. Miles of designated road open seasonally for use of OHVs	0	0	0
c. Miles of trail available for use by OHVs < 50 in wide	0	0	0
d. Miles of trail available for use by OHVs > 50 in wide	0	0	0
e. Miles of trail designated for motorcycle use	0	0	0
3. Total Miles of Routes in Riparian Reserves	2.1	2.0	-0.1
a. Total miles of designated open OHV trails in RRs	0	0	0
b. Total miles of designated open roads in RRs	2.1	2.0	-0.1
c. Total miles of designated closed OHV trails in RRs	0	0	0
d. Total miles of designated closed roads in RRs	0	0	0
4. Total Stream Crossings by Designated Route	4	3	-1
a. Total number of open OHV trail stream crossings	0	0	0
b. Total number of open road stream crossings	4	3	-1
c. Total number of closed OHV trail stream crossings	0	0	0
d. Total number of closed road stream crossings	0	0	0
5. Total Miles of Designated Routes Available to OHVs	0	0	0

3.12 BOTANY

A biological evaluation and botany specialist report have been prepared by an agency botanist to address the potential effect of activities on special status/sensitive species; they are incorporated by reference and summarized below. The objective is to avoid a trend toward Federal listing under the ESA.

This section addresses special status/sensitive species including fungi, bryophytes, lichens and vascular plants on the Regional Forester's Special Status/Sensitive Species list. It also addresses survey and manage species. Invasive species are discussed in s. 3.13.

No federally listed endangered or threatened plant species, or plant species proposed for federal listing, are known to occur on the Forest.

Intuitive-controlled field surveys were conducted to protocol for botanical species in 2013. No sensitive species or survey and manage species were found.

Surveys to detect the presence of most fungi species are not considered practical because of the variability in fruiting-body production from year to year. Therefore, fungi (other than *Bridgeoporus nobilissimus*) were not targeted during field surveys.

Survey & Manage species are considered to be closely associated with late-successional/old-growth habitat. In many cases, however, that is not the only habitat in which they are found. Since these species are considered rare or uncommon, there may be important populations within younger stands, particularly those with relic habitat components (i.e., biological legacies such as older large-diameter trees) as in the proposed Lemiti fuels reduction project area. Stands nearby the areas proposed for fuels reduction contain biological legacies (e.g., older, large-diameter trees), which create structural complexity (substrates and niches) that promote biological (animal and plant) diversity, create potential habitat for certain Survey & Manage species, and increase the likelihood of species being present. However, the areas being proposed for fuels reduction are characterized by lodgepole pine stands which were not late-successional/old-growth even when they were alive.

3.12.1 Direct and Indirect Effects

The elements of the proposed action that could affect botanical species include logging, fuels treatment, and the removal of trees for road, landing and skid trail construction. For the proposed action, there may be some potential effects to species even if they were not found during surveys.

Where habitat is present for special status/sensitive species that were not found during field surveys there is still the potential to alter their habitat. Habitat is likely present for 25 vascular plants, 19 bryophytes, 3 lichens, and 18 fungi. Because it is possible to miss present species during surveys, the action would have an effects

determination of **May Impact Individuals or habitat but is not likely to lead to a trend toward federal listing** for species where habitat is present.

With no action there would be no potential for impact to any special status/sensitive species or survey and manage species unless the area burns. While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be larger with no action, and there would be greater risk to special status/sensitive species.

3.12.2 Cumulative Effects

The analysis areas for botanical species for cumulative effects are the fuel treatment units and the areas directly adjacent to them, including riparian reserves. These are appropriate boundaries because actions more than a few hundred feet outside the unit boundaries would have little or no effect to botanical species within the units, and the actions within the unit boundaries would have little or no effect to species elsewhere. The time scale for cumulative effects analysis is quite long: but active management of stands only began in 2000 and the effects of those treatments persist today. The Biological Evaluation has discussions of the rarity of species across the Forest and Region based on impacts from all past actions and habitat availability.

Project design criteria, including the retention of live trees and no treatment in riparian reserves, would minimize impacts to special status/sensitive species or survey and manage species that may be present but were not discovered. The proposed action would not likely contribute substantially to changes to species across their range and it is not likely to lead to a trend toward federal listing.

3.12.3 Forest Plan Standards and Guidelines

Mt. Hood Forest Plan References

Forestwide Threatened, Endangered and Sensitive Plants and Animals Standards and Guidelines - FW-170 to FW-186, page Four-69

The appropriate surveys and analysis has been conducted for sensitive species as described in FW-176.

The project is consistent with the January 2001 *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines*. This project utilizes the December 2003 species list. This list incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews.

3.12.3.1 Effects of Forest Plan Amendment #19.

None of the proposed changes would affect botanical species.

3.13 INVASIVE SPECIES

This section addresses invasive plants. A biological evaluation and botanist report have been developed by a botanist to address the potential effect of activities on invasive species; they are incorporated by reference and summarized below. Invasive plants are sometimes called noxious weeds.

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 the proposed 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 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. Like the 2005 FEIS, the 2008 FEIS seeks to protect human health and the environment from the adverse effects of invasive plant treatment by minimizing risks to human health; drinking water; and botanical, terrestrial wildlife, and aquatic species. The design criteria in Section 2.2.6 related to invasive species were developed from the recommendations of these plans.

3.13.1 Introduction

Non-native plants are species that have been introduced either intentionally or unintentionally to areas where they do not naturally occur. Most invasive non-native plants in the Pacific Northwest originate from Europe and Asia. The predators and diseases that control these plant species in their native habitats are not present in the habitats where they have been introduced. Unchecked by predators or disease, such plants may become invasive and dominate a site, displacing native plants and altering a site’s biological and ecological integrity. For example, invasive plants can reduce biological diversity, displace entire native plant communities, decrease and degrade wildlife habitat, alter fire regimes, change hydrology, disrupt mycorrhizal associations, alter nutrient dynamics, and increase soil erosion. Invasive plants can also poison livestock and reduce the quality of recreational experiences.

3.13.2 Risk Assessment

The risk level for the introduction, establishment and spread of invasive plants/noxious weeds is moderate for this project. The following species of concern are present on the District.

Species Name	Common Name
<i>Alliaria petiolata</i>	garlic mustard
<i>Brachypodium sylvaticum</i>	false brome
<i>Centaurea stoebe</i> (= <i>C. maculosa</i>)	spotted knapweed
<i>Centaurea diffusa</i>	diffuse knapweed
<i>Cirsium arvense</i>	Canada thistle
<i>Cirsium vulgare</i>	bull thistle
<i>Cytisus scoparius</i>	Scotch broom
<i>Geranium lucidum</i>	shining crane's-bill
<i>Geranium robertianum</i>	herb Robert
<i>Hedera helix</i>	English ivy
<i>Hieracium aurantiacum</i>	orange hawkweed
<i>Hieracium pratense</i>	meadow hawkweed
<i>Hypericum perforatum</i>	St. John's-wort
<i>Hypochaeris radicata</i>	hairy cat's-ear
<i>Senecio jacobaea</i>	tansy ragwort

During botanical surveys, no invasive plants were found within the fuel treatment units.

Some of these species (e.g., Canada thistle, bull thistle, Scotch broom, St. John's-wort, tansy ragwort) are widely established regionally and management objectives are to control infestations on a case-by-case basis. However, the others are considered "ecosystem-altering" species because of their ability to quickly overrun and alter natural habitats and negatively affect ecosystem functions. Garlic mustard, false brome, orange hawkweed, meadow hawkweed, spotted knapweed, and diffuse knapweed, are not at all widely established; so early detection followed by rapid response (implementation of control measures) is recommended to check the spread of these species.

3.13.3 Direct and Indirect Effects

With no action there would be less potential for the spread of invasive species, including noxious weeds; however, they may continue to spread even with no action because of vehicles traveling on open roads. Vehicles, people, and animals can transport invasive plant seed and other plant propagules (e.g., stem and root fragments) capable of generating new plants. In the event of a wildfire, invasive species may expand into the disturbed area.

With the exception of the “ecosystem-altering” invasive species listed above, the other invasive plant species are common along roadsides, in old landings, in clearcuts, and in other areas with a history of ground disturbance throughout much of the Clackamas River Ranger District. With the proposed action, vehicles and heavy equipment can be a vector for the spread of invasive plants along roads and from roads into forest and forest openings. The Lemiti area may be less at risk of invasion by these species because of its relatively high elevation (4,300-4,500 feet) on the Cascade crest: the colder and relatively drier climate and the short growing season (winter snows arriving in November and snowpacks persisting until late May) may deter these invasive plant species from colonizing, which more typically occur at lower elevations.

Species with a moderate to high likelihood of being introduced would be Canada thistle, bull thistle, hairy cat’s-ear, Scotch broom, St. John’s-wort, and tansy ragwort. These species are common and widespread on the Forest.

The project design criteria in Section 2.2.6 would reduce the spread of invasive plants. Design criteria s. 2.2.6.C would minimize soil disturbance, s. 2.2.6.G would prevent erosion and specifies the use of weed-free erosion control methods, and s. 2.2.6.H would require the cleaning of equipment and other practices to minimize the spread of weeds. These PDCs implement the standards and guidelines of the Region 6 FEIS for Preventing and Managing Invasive Plants (USDA 2005). The FEIS rates the effectiveness of these practices and explains the rationale for the effectiveness ranking. The use of native plant materials (particularly locally collected seed, cuttings, and divisions, and nursery-grown seedlings propagated from them) in revegetation of bare soils and the utilization of certified straw and mulch are considered highly effective at minimizing the spread of invasives. The cleaning of off-road equipment and the use of gravel from weed-free sources are ranked as moderately effective. PDCs also minimize ground disturbance using techniques such as restricting machinery to approved skid trails and yarding tops to landings instead of doing mechanical slash piling. The application of native grass seed to disturbed areas would result in desired plants occupying the site, making it less likely that invasive plants would come in.

3.13.4 Cumulative Effects

The analysis areas for invasive plant management for cumulative effects are the thinning units and the areas directly adjacent and the roads leading to the project. The time scale for cumulative effects analysis is quite long: some impacts from years ago when roads were constructed, persist today. There are no ongoing or foreseeable future actions to include in a cumulative effects analysis.

There are no other ongoing or foreseeable future actions on the Forest within this zone or within this time frame.

The 2005 Record of Decision and FEIS for Preventing and Managing Invasive Plants and the 2008 Record of Decision and FEIS for Site-Specific Invasive Plant Treatments for the Mt. Hood National Forest and Columbia River Gorge National Scenic Area provide additional cumulative effects discussion across a broader landscape. The former applies to all national forests in the Pacific Northwest Region (Region 6).

Other ongoing actions across the Forest include the spraying of certain invasive plant hot spots approved by the 2008 Record of Decision. There are no potential spray areas in or directly adjacent to fuel reduction units. The Oregon Department of Agriculture treats populations of Japanese knotweed, spotted and diffuse knapweed, rush skeletonweed, herb Robert, and Canada thistle that are scattered in the Clackamas District annually or biennially depending on the species and population persistence. A number of these populations are located along haul routes. Several roads are planned for decommissioning or closure after the treatment is finished. Closing these roads to public access may reduce the potential for invasive plants spread by the recreating public and their vehicles.

A number of the species listed above are relatively common along roadsides. Generally, these and other common, widespread invasive plant species associated with roads are not targeted for treatment because other species have been ranked with a higher priority. Species targeted for treatment are those that are highly invasive and capable of altering ecosystems (e.g., Japanese knotweed, false brome, garlic mustard) and relatively new invaders that are on the increase (e.g., shining crane's-bill and herb Robert). Populations for some common and widespread invasive plant species are targeted if they threaten other natural resources (e.g., riparian areas, wetlands, rare plant sites) or can spread easily because of their location in or along frequented campgrounds, trails, and parking areas. The proposed action and all of the existing contracts that use the same roads have similar contract provisions to minimize the likelihood of spreading existing species or introducing new invasive species from outside the project area. Practices such as the washing of equipment and the use of certified weed-free straw for erosion control and the use of certified weed-free seed for revegetation have been found to be effective in reducing the introduction, establishment, and spread of unwanted species.

3.13.5 Forest Plan Standards and Guidelines

Mt. Hood Forest Plan References

Forestwide Standards and Guidelines - FW-382, page Four-92

Standards and Guidelines from the Preventing and Managing Invasive Plants Record of Decision, Appendix 1.

The project is consistent with the standards and guidelines of the Preventing and Managing Invasive Plants Record of Decision including provisions to clean off-road equipment and the use of weed free mulch.

3.13.5.1 Effects of Forest Plan Amendment #19.

None of the proposed changes would affect invasive species.

3.14 AIR QUALITY

The following actions have the potential to affect air quality: burning slash; exhaust generated by vehicles, equipment, or chainsaws; and dust created by vehicles that drive on aggregate surface and native surface roads.

The following are areas of concern for smoke and pollution intrusion: Portland/Vancouver Metropolitan Area, Mt. Hood Wilderness, Bull of the Woods Wilderness, Salmon–Huckleberry Wilderness and Mt. Jefferson Wilderness. The small Sisi Butte portion of the Clackamas Wilderness has no trails and receives very little use relative to other Wilderness Areas. The analysis area includes a large airshed that incorporates both the east and west sides of the Mt. Hood National Forest, due to the projects location at the crest of the Cascades.

3.14.1 Methodology

National Ambient Air Quality Standards (NAAQS) and thresholds for criteria pollutants are established by the US Environmental Protection Agency (USEPA) to protect public health (ODEQ, 2011). For the purpose of analyzing the air quality effects of prescribed fire and wildfire, this report focusses on NAAQS standards for Particulate Matter 10 (PM10) and PM2.5. These small particulates can be inhaled and cause respiratory problems, especially in smoke sensitive portions of the population, such as the young, elderly, or those predisposed to respiratory ailments. Coarse particles can accumulate in the respiratory system and aggravate health problem such as asthma. Fine particulates, which penetrate deeply into the lungs, are more likely than coarse particles to contribute to the health effects associated with hospital admissions.

The Oregon Department of Environmental Quality (ODEQ) Air Quality Division is responsible for protecting Oregon's air quality. ODEQ monitors air pollution to ensure that communities meet the national ambient air quality health standards (NAAQS), to report hourly levels to the public, and to protect Oregon's pristine views (ODEQ, 2011).

The effects of PM10 and PM2.5 particles are reductions in visibility due to absorption and scattering of light by suspended particles. Almost all smoke particles from wildfire and prescribed fire, residential wood stoves and fireplaces, industrial boilers, field burning, diesel combustion, and other combustion processes can be characterized as fine particulate, primarily PM2.5 (ODEQ, 2011).

3.14.2 Existing Condition

The 2010 Oregon Air Quality Data Summary is the most current information available for the Mt. Hood and Mt. Jefferson areas. The Air Quality Index (AQI) report spans June through September and shows that the both areas have an AQI of “good” with 100 percent of the days within this category.

3.14.3 Direct and Indirect Effects

No Action

With no action, Class I airsheds would likely be impacted by large wildfires that are difficult to contain due the widespread dead lodgepole pine that would soon fall in a jackstrawed pattern. Based on previous fire patterns, a wildfire is likely to burn in August when recreation use is high.

Proposed Action

The fuel treatment is designed to provide for the safety of fire suppression forces and to reduce the likely size of fires compared to no action. If a fire does occur, there would be effects to air quality in the airshed but they would likely be reduced compared to no action.

In fuel treatment units, logs would be removed and the tops of trees would be brought to the landing. They would either be removed as biomass or piled and burned.

The burning of slash piles would be implemented during fall, winter or early spring. Traditionally, pile burning prescribed fires are conducted when the ground is frozen or saturated. This reduces the potential of smoldering and creeping into adjacent fuels. Also, these time periods are during reduced recreation season. Prescribed burning would occur when the weather conditions would minimize visibility effects to Class I airsheds.

Air quality throughout Oregon has steadily continued to improve and this trend is likely to continue with implementation of the Proposed Action prescribed fire treatment. During implementation of Proposed Action prescribed fire treatments short-duration (several hours to several days) increased in particulate levels and smoke exposure would be expected.

Health effects to humans are directly related to exposure to smoke. Effects from prescribed fire would be limited primarily to agency personnel conducting the burning.

3.14.4 Cumulative Effects

Cumulative effects to Air Quality are possible when combined with other particulates that share the airshed. Air quality can be affected by actions such as forest fires and controlled burning elsewhere on the Forest, on the CTWS Reservation, on private lands and lands managed by other agencies. Field burning, smoke from household wood stoves, smoke from camp fires, motor vehicle exhaust and smoke stack sources from industry also affect air quality.

There are no other ongoing or foreseeable future actions on the Forest within this zone or within this time frame. Part of the CTWS Reservation is within the cumulative effects analysis area. At this time, there are no known actions on the reservation that are foreseeable.

The projects considered in this cumulative effects analysis include other fuel reduction projects on the Forest and areas that overlap this airshed. Many thinning units are logged each year in the airshed and incidental quantities of debris typically end up coming to the landing where it is piled and burned. On the east side of the Forest, broadcast burning and other smoke producing fuel reduction actions occur periodically.

The proposed action and other projects that involve burning in the airshed would affect air quality but would not likely be experienced in substantial quantities in the Wildernesses or adjacent communities due to the timing of burning as described above. There is a low likelihood of this project contributing to a substantial cumulative effect to air quality.

3.14.5 Mt. Hood Forest Plan References

Forestwide Air Quality Standards and Guidelines – FW-39 to FW-53, page Four-51
Mt. Hood FEIS pages IV-19, and IV-155 to IV-167.

The analysis above shows that the project would be consistent with air quality standards and guidelines FW-039 through FW-053.

The Oregon Smoke Management Plan, which is administered by the Oregon State Forester, regulates the amount of forestry related burning that can be done at any one time. The amount of burning that can occur on any one day depends upon the specific type of burning, the tons of fuel loading to be ignited, and the atmospheric conditions available to promote particulate matter mixing and transportation of smoke away from sensitive areas. Through compliance and cooperation in the implementation of the Oregon Smoke Management Plan, the Proposed Action would comply with the following laws and regulations.

- The Federal Clean Air Act (CAA), which is the primary legal basis for air quality regulations across the country.
- Oregon Smoke Management Plan, OS477.013, as administered by Oregon Department of Forestry.

- Oregon State Implementation Plan (The Federal Clean Air Act Implementation Plan)
- Oregon Administrative Rules OAR 629-0048-0001: Smoke Management Rules.
- Oregon Visibility Protection Plan for Class I Areas, OAR 340-200-0040, Section 5.2.
- Forest Service Best Smoke Management Practices 2012
- Forest Service Manual 2500-Watershed and Air Management, Chapter 2580-Air Resource Management. The project would minimize the impacts on air quality through compliance and cooperation with Federal, state and local air regulations to prevent significant adverse effects of air pollutants, mitigation of adverse impacts from prescribed fire on air resources through the application of Best Smoke Management Practices, and protection of air quality related values within Class I areas.

Prescribed Fire Burn Plans

As required by Agency policy (Forest Service Manual 5100 - Fire Management, Chapter 5140 Fire Use) and through inclusion, the 2008 Interagency Prescribed Fire Implementation Procedures Guide, a site-specific prescribed fire burn plan would be developed for all prescribed fire units in the Proposed Action area. Prescribed fire plans are implementation documents to ensure that purposes and need goals and resource management objectives identified in the Proposed Action are clearly defined, that site-specific prescriptions are developed to meet these goals and objectives, and to ensure plans and mitigations are in place to mitigate against undesirable fire effects, including smoke intrusions into sensitive airsheds, visibility impairment to Class I and II airsheds, and human health effects.

PDCs would be incorporated into prescribed fire burn plans where appropriate.

3.14.5.1 Effects of Forest Plan Amendment #19.

The amended standards and guidelines do not directly address air quality. However, to the extent that they allow the development of effective fuel treatments, they would therefore result in reduced effects to air quality since wildfires would be kept smaller compared to no action.

3.15 ECONOMICS

One of the aspects of the purpose and need (s. 1.3) and one of the dual goals of the Northwest Forest Plan is to provide a sustainable level of forest products for local and regional economies and to provide jobs. The Northwest Forest Plan Final Environmental Impact Statement has an in-depth analysis of the economic basis behind the goal of providing forest products for local and regional economies. It also contains an analysis of the social and economic benefits and impacts of preservation,

recreation and other values. To benefit local and regional economies, timber is offered to bidders. For contracts to receive bids they must have products that prospective purchasers are interested in and they must have log values greater than the cost of harvesting and any additional requirements.

The purpose of this analysis is to provide a comparison of the alternatives.

The no-action alternative would not provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies now and in the future. It would not provide the employment associated with road repair or decommissioning.

The proposed action would provide for jobs associated with logging and mill operations and would contribute to meeting society's forest product needs. The NFP (p. 3&4-297) contains an analysis of employment in the timber industry. The annual incremental contribution of each million board feet of timber is approximately 8.3 jobs.

The purpose and need (s. 1.3) is not solely to create jobs but to provide forest products consistent with the Northwest Forest Plan goal of maintaining the stability of local and regional economies. Jobs are only a part of that equation. Treatment is needed to keep forests healthy and productive to provide wood products now and in the future – people need and use wood products. Approximately 17 MMBF of wood products would be produced now and stands would be made healthier and more productive for future management. With no action, the dead trees would fall in a jackstrawed pattern raising fire hazard and also making the area virtually unmanageable.

The goal of the project is to aid in the suppression of wildfires. The value of the dead trees in this area is very marginal. The economic analysis shows that the value of the removed products exceeds costs. But this situation is tenuous because of the nature of deteriorating dead trees and the increased costs if trees fall before operations begin. There is a chance that some of the project elements would require supplemental funding. For example, the replacement of culverts and the decommissioning of system roads is not made necessary by the proposed fuel reduction project and it is likely that this work would be funded by other sources.

While it is not possible to predict the exact size a fire might attain with or without fuel treatment, it is likely that fires would be kept smaller at less cost and with less risk of crossing onto the CTWS Reservation. The impacts and benefits to other resources with the proposed treatment are discussed in their respective sections of this document.

3.15.1 Forest Plan standards and guidelines

Forest Plan References

Forest Management Goals - 19, page Four-3, page Four-26, FEIS page IV-112
Northwest Forest Plan Standards and Guidelines page A-1, and FSEIS pages 3&4-288 to 318

The proposed action is consistent with Forest Plan goal to efficiently provide forest products.

3.15.1.1 Effects of Forest Plan Amendment #19.

The amended standards and guidelines do not directly address economics. However, to the extent that they allow the development of effective fuel treatments, they would therefore result in reduced costs of fire suppression since wildfires would be kept smaller compared to no action.

3.16 CLIMATE CHANGE

3.16.1 Introduction – 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 because they are well documented elsewhere and are outside the scope of this analysis.

This project was not specifically designed to mitigate or respond to potential climate change. This section qualitatively addresses aspects of the project that may affect carbon emission or sequestration and how the project may help or hinder the forest's ability to deal with climate change. This analysis does not attempt to quantify carbon emission or sequestration.

3.16.2 Existing Situation

This project involves fuels treatments and removing logs for utilization in wood products. Rapidly growing forests are recognized as a means of carbon sequestration (FAO 2007). Forest health and growth issues are discussed in section 3.2.

3.16.3 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.

- Hot intense stand replacement fires have burned in the project area in the past and are likely to burn again. If climate change results in drier summers with earlier spring snow melt, wildfires would likely become more frequent, more intense and larger (McKenzie 2004) (Westerling 2006). This type of wildfire would convert vast quantities of woody biomass into gaseous carbon dioxide and would kill most trees and plants. While it is not possible to predict the exact size a fire might attain with or without fuels treatment, it is likely that with fuels treatment, fires would be kept smaller and less gaseous carbon would be released into the atmosphere. Smaller fires would result in fewer trees and plants killed. Unburned areas would have live trees that continue to sequester carbon and fuels on the ground in unburned areas would sequester carbon into the soil.

Recent research published in *Landscape Ecology* titled, “Climate change adaptation strategies for federal forests of the Pacific Northwest, USA: ecological, policy, and socio-economic perspectives (Spies 2010) makes the case for fuel treatments. It suggests managing wildfire to protect habitats and species at risk. This involves: (1) suppressing wildfires where they threaten critical old-forest habitat patches and elements; (2) treating stands by altering forest densities, composition and diameter distributions; (3) increasing spatial heterogeneity to create landscapes and ecosystems that are more resilient to fire, insects and disease and (4) using tactical treatments, such as shaded fuel breaks, to alter fire behavior and provide defensible spaces from which to fight fires.

- The project would result in the removal of dead trees. However, some debris and woody material that cannot be feasibly removed would be piled for eventual burning. Pile burning would release carbon dioxide into the atmosphere. The No-action Alternative would not have any planned burning.
- Fossil fuel is used by equipment such as saws, tractors and log trucks. The no-action alternative would not have planned fuel use. Larger fires with no action would result in fire suppression actions including tractors and helicopters that use fuels.
- If biomass removed is used to generate electricity or to create biofuels, it may result in reduced reliance on fossil fuels to power vehicles or generate electricity (Bare 2005) (IPCC 2007).

- If firewood is removed and used to heat homes, it may result in reduced reliance on fossil fuels (Bare 2005) (IPCC 2007).
- Thinning of saplings would enhance the growth of the residual trees and would sequester more carbon than would occur with stands that are too dense and stagnate (Millar 2007) (Spittlehouse 2003).
- Thinning of seedlings would result in trees that are resilient and better able to withstand stresses such as dry summer conditions (Millar 2007). The No-action Alternative would result in trees that are stressed by moisture competition.

The no action alternative would not result in carbon emissions from vehicles or planned burning but would result in continued risk of wildfire.

The Forest is comprised of about 1.1 million acres. The proposed action equates to approximately 0.2% of the Forest. This scope and degree of change would be minor relative to the amount of forested land as a whole. A project of this magnitude would have such minimal contributions of greenhouse gasses that its impact on global climate change would be infinitesimal. Therefore, at the global scale, the proposed action's direct and indirect contribution to greenhouse gasses and climate change would be negligible.

In addition, because the direct and indirect effects would be negligible, the proposed action's contribution to cumulative effects on greenhouse gasses and climate change would also be negligible.

The Intergovernmental Panel on Climate Change (IPCC) has summarized the contributions to climate change of global human activity sectors in its Fourth Assessment Report (IPCC 2007). The top three anthropogenic (human-caused) contributors to greenhouse gas emissions (from 1970-2004) are: fossil fuel combustion (56.6% of global total), deforestation (17.3%), and agriculture/waste/energy (14.3%). IPCC subdivides the deforestation category into land use conversions and large scale deforestation. Deforestation is defined as removal of all trees for conversion of forest into agricultural land or developed landscapes (IPCC 2000).

This project does not fall within any of these main contributors of greenhouse gas emissions. Forested land would remain forested and not converted to agriculture or development. In fact, forest stands would be treated to minimize the size and intensity of wildfire and therefore promote the continued growth of seedlings and saplings to restore the area to a vigorous forested condition that can continue to support trees and sequester carbon in the long term.

This project is also consistent with IPCC recommendations for land use to help mitigate climate change. The 2007 IPCC report summarizes sector-specific key mitigation "technologies". For the forestry sector, the report recommends forest management including management to "improve tree species" and increase biomass. The proposed action is consistent with these recommendations because it would enhance the health and growth of seedlings and saplings.

Timber management projects can influence carbon sequestration in three main ways: (1) by increasing new forests (afforestation), (2) by avoiding deforestation, and (3) by manipulating existing forest cover (managed forests). Land-use changes, specifically deforestation and regrowth, are by far the biggest factors on a global scale in forests' role as sources or sinks of carbon, respectively (IPCC 2000). Projects that create forests or improve forest conditions and capacity to grow trees are positive factors in carbon sequestration. The proposed action falls into this category.

The proposed action would result in some carbon emissions and some carbon sequestration. The benefits to forest health and resiliency with the proposed action would allow stands to adapt to the future climate (s. 3.2).

3.16.4 Effects of Forest Plan Amendment #19.

The amended standards and guidelines do not directly address climate change. However, to the extent that they allow the development of effective fuel treatments, they would therefore result in reduced smoke emissions since wildfires would be kept smaller compared to no action.

3.17 OTHER REQUIRED DISCLOSURES

3.17.1 Heritage Resources

Section 106 of the National Historic Preservation Act of 1966 requires documentation of a determination of whether each undertaking would affect historic properties. The Forest operates under a programmatic agreement between the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation for consultation on project determination. Consultation with SHPO was completed for this project.

Surveys have been conducted for this project and are discussed in heritage report number 2014-060609-001. The report found that the project would have no effect on archaeological resources.

Contracts would contain provisions for the protection of sites found during project activities. Based on the proposed protective measures, the project meets the criteria in the Programmatic Agreement for "Historic Properties Avoided" determination (Stipulation III (B) 2).

This action is consistent with Forest Plan goal to protect important cultural and historic resources. The proposed Forest Plan amendment would not affect heritage resources.

3.17.2 Consumers, Civil Rights, Minority Groups, Women, and Environmental Justice

Executive Order 12898 directs agencies to identify and address disproportionately high and adverse human health or environmental effects of projects on certain populations. This includes Asian Americans, African Americans, Hispanics, American Indians, low-income populations and subsistence uses. The Civil Rights Act of 1964 prohibits discrimination in program delivery and employment. There are communities with minorities and low-income populations that may be affected by the project. The town of Detroit is approximately 20 miles away and Estacada is 40 miles away. Directly adjacent to the project is the CTWS Reservation. The proposed action was developed in cooperation with the Tribal Council of the Confederated Tribes of the Warm Springs. The tribes are concerned that a large scale wildfire could impact tribal historic properties, first foods, medicinal plants and other resources.

There are no known areas of religious significance in the area. There are no known special places for minority or low-income communities in the area. Individuals may work, recreate, gather forest products or have other interests in the area. Neither the impacts nor benefits of this project would fall disproportionately on minorities or low-income populations.

No disproportionate impacts to consumers, civil rights, minority groups, and women are expected from this project. Treatments 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. No adverse civil rights impacts were identified. There would be no meaningful or measurable direct, indirect or cumulative effects to environmental justice or civil rights. The proposed Forest Plan amendment would not affect consumers, civil rights, minority groups, women, or environmental justice.

3.17.3 Floodplains and Wetlands

The Clean Water Act of 1977 and subsequent amendments established the basic structure of regulating discharges of pollutants into waters of the United States. The Environmental Protection Agency (EPA) has the authority to implement pollution control programs and to set water quality standards for all contaminants in surface waters. The EPA delegated implementation of the CWA to the States; the State of Oregon recognizes the Forest Service as the Designated Management Agency for meeting CWA requirements on National Forest System lands. The proposed action is in compliance with the Clean Water Act as described in s. 3.9.

There would be very limited impacts to floodplains or wetlands from this project. Areas with a high water table have been identified and excluded from fuel treatment. The impacts to wetland and floodplains are discussed in Section 3.9. Due to the PDCs and BMPs which are aimed at minimizing the impacts to wetlands and floodplains, there would be minimal direct and indirect effects.

The amendments to standards and guidelines do not directly affect floodplains or wetlands. However, to the extent that they allow the development of effective fuel treatments, they would therefore result in greater protection to riparian areas and wetlands since wildfires would be kept smaller compared to no action.

3.17.4 Geologic Stability

This section summarizes the stability specialist report which is incorporated by reference and summarized below.

The landslide hazard level in the project area is very low. No mapped landslides occur within or near the project area.

Fuel treatment, logging and road construction or reconstruction would have no effect on slope stability because the area is so flat.

All treatments are consistent with Forest Plan Geology standards and guidelines. The proposed Forest Plan amendment would not affect geologic stability.

3.17.5 Air Quality

The Clean Air Act as amended in 1977 addresses the air quality in Wilderness areas. All planned ignitions are 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. The OSMP, which is administered by the Oregon State Forester, regulates the amount of forestry related burning that could be done at any one time. Also, in compliance with the Clean Air Act, the Forest Service is operating under the Oregon Administrative Rule (OAR) 629-43-043. The proposed action is in compliance with the Clean Air Act as described in s. 3.14.

3.17.6 National Forest Management Act

The National Forest Management Act (NFMA) of 1976 requires that the Agency develop land management plans. It also requires the Forest to determine the suitability of a specific land area for timber management and contains other requirements that are built into Forest Plan standards and guidelines. The proposed action was developed to be in full compliance with NFMA via compliance with the Forest Plan, as amended. This document contains numerous references as to how this

project complies with Forest Plan, as amended, and the Silvicultural Prescription in the Analysis File contains a discussion of compliance with NFMA's requirement to identify lands unsuited for management.

3.17.7 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 and the Confederated Tribes of Grand Ronde were contacted in reference to this Proposed Action.

The proposed amendments to standards and guidelines would benefit tribal values and resources. To the extent that they allow the development of effective fuel treatments, they would therefore result in greater protection to the reservation since wildfires would be kept smaller compared to no action.

3.17.8 Inventoried Roadless Areas, Unroaded and Potential Wilderness Areas

The proposed project is not in an Inventoried Roadless Area. The project area does not meet Forest Service criteria for Potential Wilderness because the unroaded/undeveloped portions of the landscape are less than 5,000 acres in size, are not contiguous to existing wilderness, and are not self-contained ecosystems. For more information see section 3.6. Changing or reassessing these is outside the scope of project level planning.

3.17.9 Prime Farmlands, Rangelands, and Forestlands

None of the alternatives would have an adverse impact to the productivity of farmland, rangeland, or forestland. No reductions in long-term productivity are expected. For more information see section 3.8. The proposed Forest Plan amendment would allow for lower intensity and smaller fires which would benefit the productivity of forest soils.

3.17.10 Potential or Unusual Expenditures of Energy

The No Action alternative would not require any expenditure of fuel or energy. The Proposed Action would require expenditures of fuel for workers to access the project area and to operate equipment. Overall, the proposed action would not result in any unusual expenditure of fuel (s. 3.16). The proposed Forest Plan amendment would not affect energy expenditures.

3.17.11 Irreversible and Irretrievable Commitments of Resources

Irreversible commitments of resources are those that are forever lost and cannot be reversed. Irretrievable commitments of resources are considered to be those that are lost for a period of time and, in time, can be replaced. The use of rock for road

surfacing is an irreversible resource commitment; however rock quarries have sufficient capacity to provide for the long-term needs for surfacing rock. The proposed Forest Plan amendment would not result in an irreversible or irretrievable commitment of resources.

3.17.12 Conflicts with Plans, Policies, or Other Jurisdictions

The proposed action would not conflict with the plans or policies of other jurisdictions, including the Tribes. It would not conflict with any other policies and regulations or laws, including the Clean Water Act, Clean Air Act, Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, or National Historic Preservation Act. Refer to the following sections for discussions regarding these laws.

- Section 3.9.5.3 – Clean Water Act;
- Section 3.5.1 and 3.10 – Endangered Species Act;
- Section 3.10 – Magnuson-Stevens Fishery Conservation and Management Act;
- Section 3.17.1 – National Historic Preservation Act; and
- Section 3.14 – Clean Air Act

3.17.13 Competing and Unwanted Vegetation

The Record of Decision and Mediated Agreement for the "Managing Competing and Unwanted Vegetation" Final Environmental Impact Statement (USDA 1998) no longer apply to invasive species management. They have the objective of reducing the reliance on herbicides and prescribed burning for reforestation purposes.

The project does not involve the use of herbicides. The project also does not involve traditional logging that would create slash that could impede tree planting. The stands consist of dead trees with an understory of overstocked seedlings and saplings. The proposed action involves the removal of trees and yarding of tops to landings in a manner that protects a sufficient number of seedlings and saplings.

For this project, the landscape is already in a situation where action is needed to minimize the impact of intense wildfire due to the widespread insect mortality. There is not a substantial shrub component that would contribute to fire hazard or compete with young trees.

Site Analysis

The threshold of concern is when fuels burning under typical wildfire conditions would result in flame lengths greater than four feet. With no action, current and expected fuel profiles (after trees fall in a jackstrawed pattern) would result in an intense wildfire with very high flame lengths.

No Action

With no action, the fuel treatment would not occur and intense wildfires would likely get larger than they would with the fuel treatment.

Proposed Action

The proposed fuel treatment would reduce the size of wildfires, it would reduce smoke, and it would provide greater safety to firefighters and the public. It would also result in the proper spacing and protection from fire of the seedlings and saplings that are present in the stand. The goal of the project is to maximize utilization of removed material and to minimize the quantity that would need to be burned. However, some slash and tree tops would likely be burned at landings or in hand piles. Burning would be conducted when favorable smoke dispersal conditions are expected. Site-specific burning plans would be developed including a job hazard analysis to reduce exposure to hazards such as use of power tools, fire and walking in difficult terrain. This project is consistent with the Record of Decision and Mediated Agreement for Managing Competing and Unwanted Vegetation. The proposed Forest Plan amendment would not affect competing or unwanted vegetation.

4.0 CONSULTATION AND COORDINATION

The Forest Service consulted the following Federal, State, and local agencies and tribes during the development of this assessment.

4.1 FEDERAL, STATE, AND LOCAL AGENCIES

U.S. Fish and Wildlife Service	National Marine Fisheries Service
Oregon Historic Preservation Office	Portland General Electric
South Fork Water Board	Clackamas River Water
Mt. Scott Water District	Oak Lodge Water Board
City of Gladstone	Bureau of Land Management
City of West Linn	Clackamas River Basin Council
City of Estacada	Oregon Department of Fish and Wildlife
City of Lake Oswego	Clackamas County
City of Oregon City	Environmental Protection Agency

Consultation with the U.S. Fish and Wildlife Service is documented in section 3.5.1.
Consultation with the Oregon Historic Preservation Office is documented in section 3.17.1.

4.2 TRIBES

Confederated Tribes of Warm Springs
Confederated Tribes of Grand Ronde

4.3 LIST OF PREPARERS

Jeff Goldberg – Westside Zone Wildlife Biologist, Mt. Hood National Forest. Jeff has a B.S. degree in Wildlife Biology and Management from Humboldt State University and an A.S. degree in Wildlife & Fisheries from Feather River College. Jeff has worked as a professional Wildlife Biologist for the Forest Service for 12 years in California, South Dakota, and Oregon. He has also worked as a Wildlife Biologist for the BLM and in the private sector. Jeff has many years of experience as a fire resource advisor.

Jeremy Goers – Westside Zone Assistant Fire Management Officer, Fire and Fuels, Mt. Hood National Forest. Jeremy has a B.A. in English Literature from University of Montana. He has worked as a wildland fire fighter since 1997 with the Forest Service in Montana, Bureau of Land Management, Alaska Fire Service and currently with the Forest Service in Oregon. He is qualified as an Incident Commander Type 3, Division Group Supervisor, and Prescribed Fire Burn Boss Type 2. These positions take him all over the United States providing management on large fire incidents and prescribed fires. Jeremy has many years of experience on the fire line, with fire planning, fire modeling, and implementing prescribed fuel treatments.

Gwen Collier - Soil Scientist. Gwen has a B.S. in Biology and Environmental Science from Willamette University and a B.S. in Soil Science from Oregon State University. She has worked for the Forest Service for 33 years in Oregon, Washington and Idaho. She is a specialist in soil science and hydrology. Gwen has participated for many years on post-fire Burned Area Emergency Recovery (BAER) teams.

Tom Horning - Supervisory Fish Biologist; B.S. Environmental Interpretation from Colorado State University, 1978; A.A.S. in Natural Resources Conservation from Morrisville State College – State University of New York, 1971. Tom has worked over 31 years with the Forest Service including as a Biological Technician in fisheries in Colorado and Oregon from 1988 – 1992 and as a Fish Biologist at the Mt. Hood National Forest from 1992 to the present.

Tom DeRoo - Geologist. Tom graduated from the University of Washington in 1978 with a B.S. in Geology. He has worked as a geologist for the Forest Service for 36 years in Washington and Oregon, including 28 years on the Forest.

Alan Dyck - Forest Wildlife Biologist. Alan has a B.S. in Wildlife Management from Humboldt State University, 1980 and an A.A. from Orange Coast College 1978. Alan has worked on the Mt. Hood National Forest since 2000. He has also worked for the Natural Resources Conservation Service from 1996-2000 and the US Army as a Wildlife Administrator for eight years. Alan started his career on the Cottage Grove Ranger District in Oregon as the District's wildlife specialist in 1980. Alan has many years of experience with fire aviation.

Glenda Goodwyne - Forester, Certified Silviculturist. Glenda has B.S. Forest Management from Oregon State University, 1985 and an A.A.S. Forest Management from Tuskegee University, 1980. She completed Silviculture Institute at Oregon State University/University of Washington in 1998, and is certified as a silviculturist and most recently re-certified in 2011. Glenda has worked as a forester with the Forest Service for 30 years in Oregon, Washington, and California. Glenda has many years of experience on the fire line and as resource advisor.

Kathleen Walker – Westside Recreation Program Manager, Mt. Hood NF. Kathleen has a B.S. in Forest Management and a minor in Forest Soil Science, from Colorado State University, 1983. She worked as a Forest Planner on the Fremont NF from 1984-1986 and a Timber Sale Planner on the Mt. Hood NF from 1986-1992. She has been a Recreation Planner and Manager on the Mt. Hood NF since 1992.

Lucas Jimenez - Roads Project Engineer. Certified as an Engineer in Training (EIT) and Land Surveyor in Training (LSIT) through the California State Board for Professional Engineers and Land Surveyors. Received specialized training for the design and construction of Low-Volume Roads through the United States Marine Corps Engineer Specialist's Course, Fort Leonard Wood, MO. Lucas has 15 years of experience as a Civil Engineering Technician and Survey Crew Chief, along with 5 years of experience in construction inspection.

David Lebo - Westside Zone Botanist, Mt. Hood National Forest. B.A. Frostburg State College; M.A. University of Montana; M.S. University of Washington (forest ecology). David specializes in forest ecology and botany with a particular interest in cryptogamic botany (fungi, lichens, and bryophytes). He has worked for the Forest Service for two decades in Washington and Oregon including a six-year stint as interagency ecologist for the BLM and Forest Service in the Klamath Basin in southern Oregon.

Ian Turner - Forester, Logging Systems. Ian has B.S. in Forest Ecosystem Management from the University of Idaho, 2000 and an A.A.S. Forest Resource Technology from Mt. Hood Community College, 1994. He completed the SALHI - Sale Area Layout & Harvesting Institute at Oregon State University/University of Idaho in 2004. Ian has worked as a forester with the Forest Service for 20 years in Oregon, Washington, and California. Ian has many years of experience on the fire line and as resource advisor.

Jim Roden - Writer/Editor. Jim has a B.S. in Forest Management from Northern Arizona University. He has worked as a forester for the Forest Service for 36 years in Wyoming, California, Idaho and Oregon. He is a specialist in timber sale planning and geographic information systems. Jim has many years of experience on the fire line and as aerial observer, resource advisor and in fire planning.

Todd Parker – Hydrologist. Todd has a B.S. in Forest Management and a B.S. in Business Management from Oregon State University, 1981. He has been the Hydrologist on the Columbia Gorge and Zigzag Ranger Districts since 1992. He has considerable experience with watershed resources, watershed restoration and geographic information systems. Todd has participated for many years on post-fire BAER teams.

Mark Boyll - Botanist. Mark earned his BS in Botany at Oregon State University. In addition to vascular plants his areas of expertise include lichenology, mycology and myxomycology. He has worked for the Forest Service in Oregon, Washington, California, Montana and Idaho since 1989.

Debbie Ortiz – Archaeologist. Debbie graduated from New Mexico State University in 2010 with a Master's Degree in Archaeology. She has worked as an archaeologist for the Forest Service on Mt. Hood for 8 years.

4.4 REFERENCES

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