



United States Department of Agriculture

Crystal Clear Restoration Environmental Assessment



Photo of the Crystal Clear Planning Area (Photo Credit: Olsker, 2016)



Forest Service
Mt. Hood National Forest
Barlow & Hood River Ranger Districts

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1. Introduction

We are proposing to provide forest products from approximately 12,000 acres of National Forest System lands on the Barlow and Hood River Ranger Districts of the Mt. Hood National Forest. Forest products would only be removed from locations where there are forest health and fuel loading concerns.

We prepared this environmental assessment to determine whether effects of the proposed activities may be significant enough to prepare an environmental impact statement. By preparing this environmental assessment, we are fulfilling agency policy and direction to comply with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. For more details of the Proposed Action, see Section 2 of this document.

Numbers (e.g., acres and miles) used throughout this EA were generated using spatial data (i.e., geographical information systems) and the Forest Service's INFRA database. All numbers should be considered as approximate values; therefore, any potential discrepancies with numbers are a result of rounding number values and/or differences in data sources.

1.1. Location of the Proposed Planning Area

The planning area is located on the Barlow and Hood River Ranger Districts of the Mt. Hood National Forest (the Forest) in Wasco County, Oregon. The planning area includes approximately 24,000 acres, which is in parts of the White River, White Horse Rapids-Deschutes River, and Beaver Creek watersheds (see Figure 1). The area considered in this project is geographically bounded in the south by the land ownership boundary with the Confederated Tribes of Warm Springs Reservation (see Figure 2). To the east, the project area is delineated by private land; and to the west, the project area is geographically defined by Clear Lake and the recreation sites immediately adjacent to this lake. The northern portion of the project area is bounded by the White River Wild and Scenic River corridor, as well as the White River Wilderness.

As described in the Wasco County Community Wildfire Protection Plan (CWPP) (Hulbert, December 21, 2005), the Juniper Flats Wildland Urban Interface (WUI) is located within the eastern portion of the project area (see Figure 3). Approximately 6,000 acres of the Juniper Flats WUI is located in the eastern portion of the planning area. Immediately adjacent to the south of the project area, on the Confederated Tribes of Warm Springs Reservation, is the Warm Springs WUI.

US Highway 26 runs through the planning area, serving as a major cross-state highway. Within the planning area, this highway sees approximately 7,000 annual average daily traffic, as reported by ODOT's Traffic Volumes on State Highways in 2015.

The legal description for this project is T. 4 S., R. 8.5 E., section 36; T. 4 S., R. 9 E., sections 25-29, 31-36; T. 4 S., R. 10 E., section 31; T. 5 S., R. 8.5 E., section 1; T. 5 S., R. 9 E., sections 1-15; T. 5 S., R. 10 E., sections 3-11, 13-26; and, T. 5 S., R. 11 E., sections 8, 17-20, 30; Willamette Meridian.

Figure 1. Vicinity map

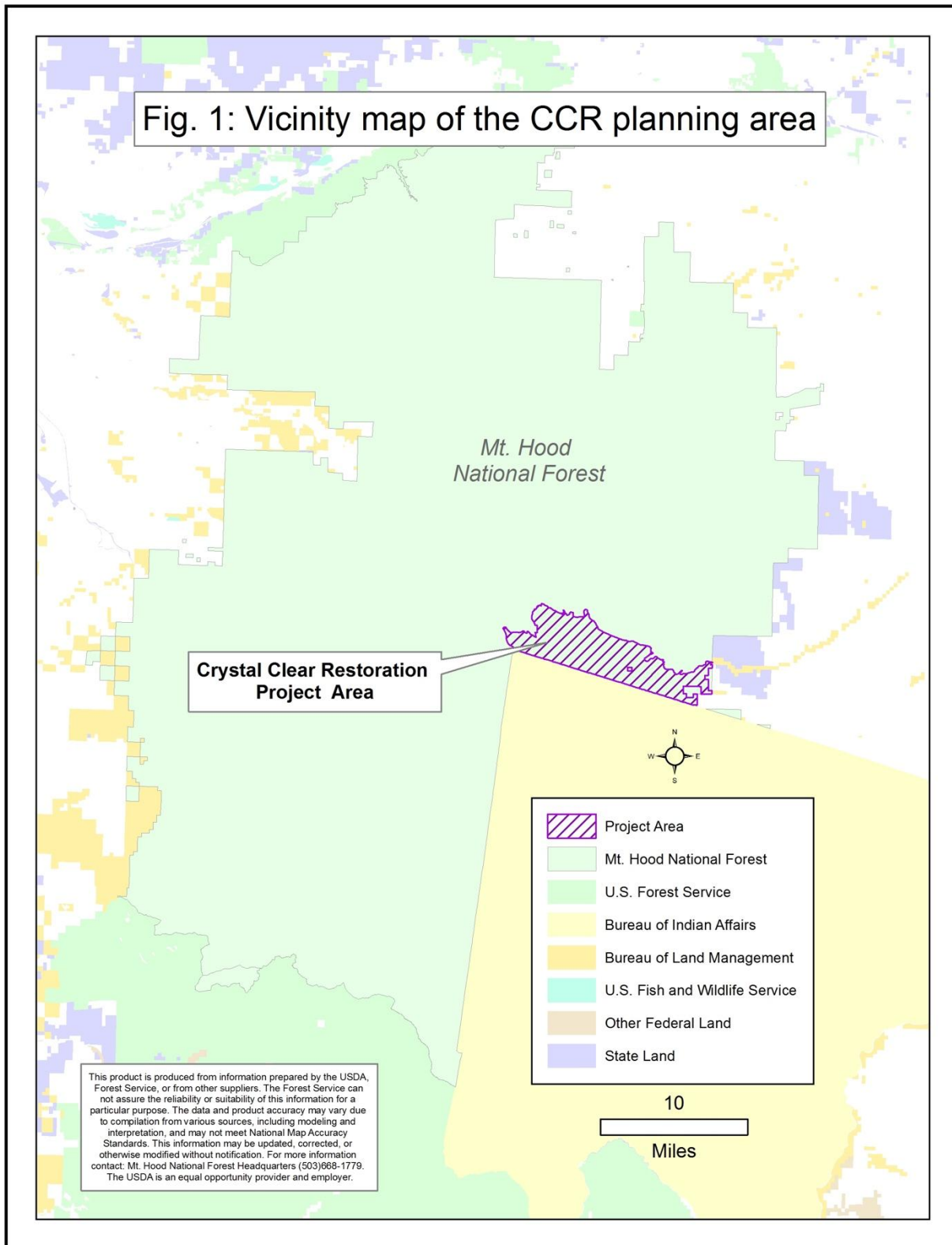


Figure 2. Project area map

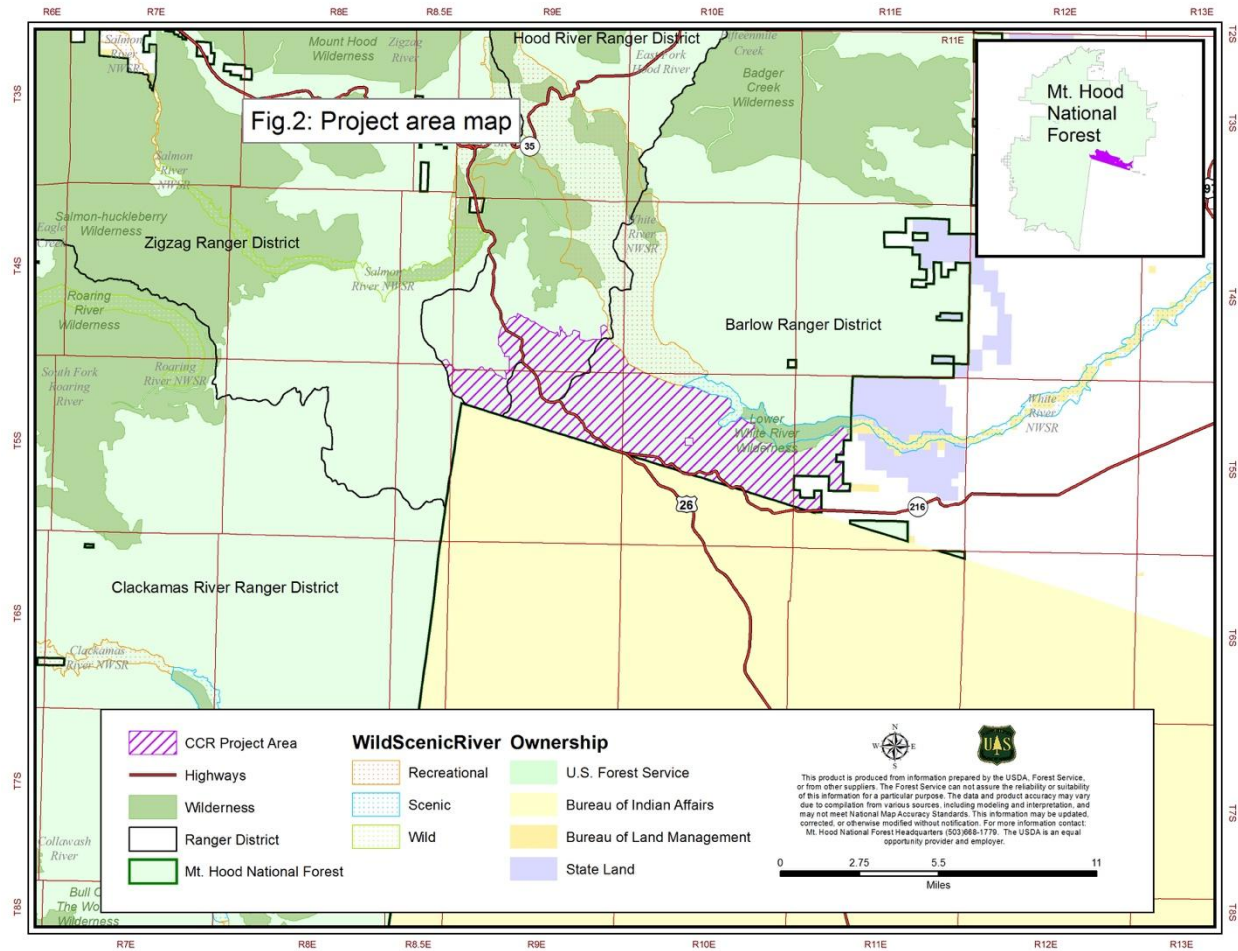
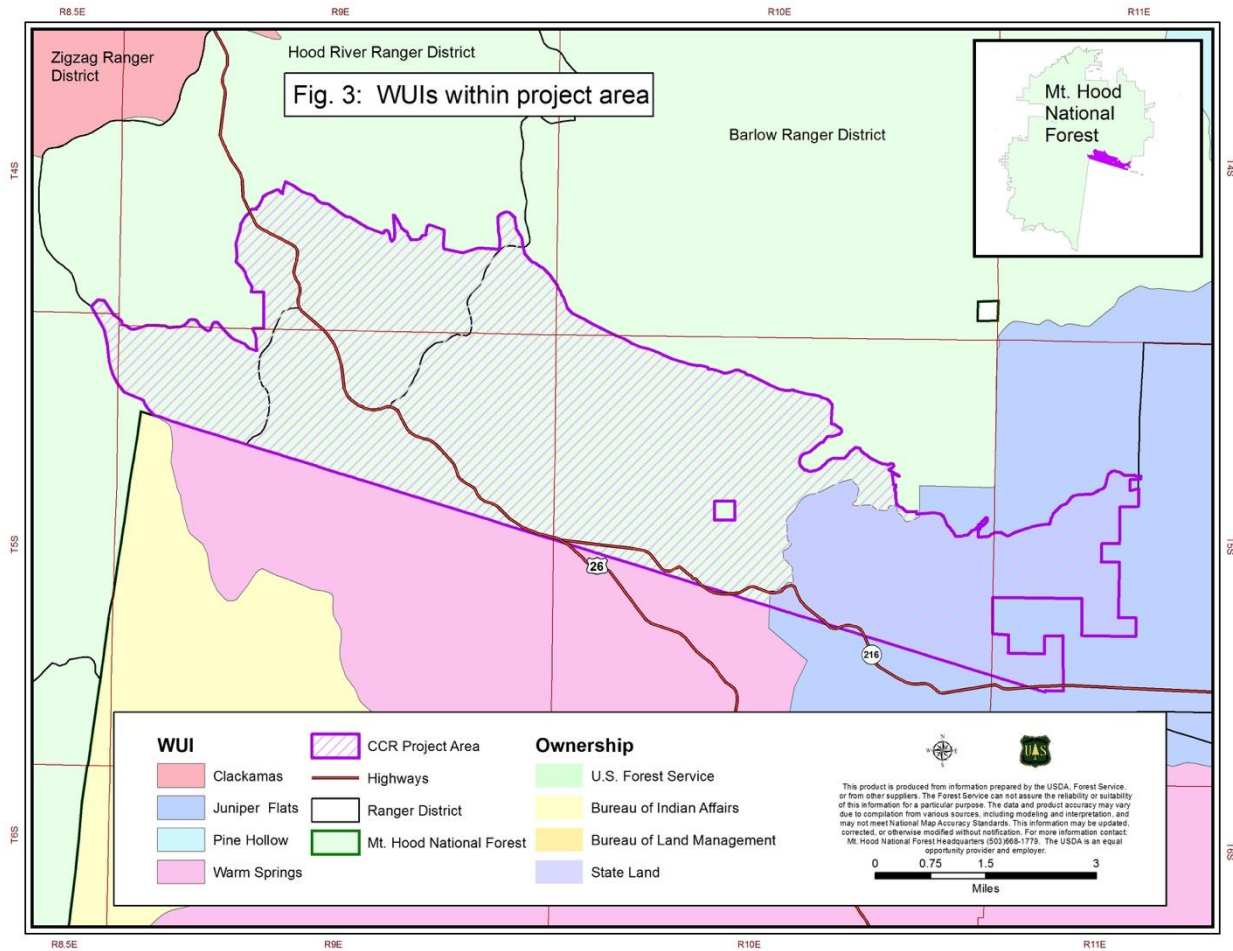


Figure 3. Map of WUIs within the project area

1.2. Current Conditions

Information regarding the vegetative conditions of the larger landscape of the planning area is provided in the White River Watershed Analysis (USDA Forest Service, 1995). However, site-specific information about the stands is provided in stand records and field surveys conducted from the 1970s to 2000s, as well as field reviews specifically conducted for this project in 2016. The project record at the Barlow District Ranger Office contains this detailed documentation on individual stand conditions. Also, more information about the current vegetative conditions in the planning area is discussed in further detail in Section 3.1.2.

The majority of planning area falls into two climatic zones: 1) Transition, and 2) Eastside. The Transition zone of the planning area is dominated by several species including, but not limited to, ponderosa pine, Douglas-fir, western larch, western white pine; and the climax species are grand fir and western hemlock. The Eastside zone of the planning area has similar vegetative species as the Transition zone, however, it has different climax species of Douglas-fir, ponderosa pine, and Oregon white oak.

As indicated in the White River Watershed Analysis (USDA Forest Service, 1995), there are notable changes in the nature and condition of the vegetation in the planning area compared to historical conditions (i.e., the period prior to Euro-American occupation defined as 1855). Most of these changes are associated with the consequences of European settlement of the area, large wildfires and salvage

activities, and other timber harvest activities beginning in the early part of the 20th century. The current vegetation differs from historical conditions primarily in terms of landscape patterns. Instead of a large, continuous area dominated by one or two stand types, the landscape currently has a mosaic of stand types. The forest structure in the planning area is dominated by small-diameter trees that are considered to be early-seral stands. Also, the planning area has small pockets of understory reinitiation and mature stem exclusion, but they are not dominant stand conditions in this area, which would have been likely prior to 1900.

Additionally, over the last century, past management practices within the planning area have resulted in stands that tend to be overstocked. Stand density has been found to exert a strong influence on forest susceptibility to insects and diseases (Powell, 1999). Thus, there are non-native insects present in the planning area, in particular, the balsam woolly adelgid, which has the potential to slowly eliminate true fir species from the ecosystem. Also, over the last decade, the planning area has developed pockets of mortality associated with the Douglas-fir beetle and mountain pine beetle. Since outbreaks of insects are most commonly associated with overcrowded stands, the existing conditions of highly stocked Douglas-fir plantations within the planning area are at a higher risk for Douglas-fir beetle outbreak. Similarly, the highly stocked mixed-conifer stands within the planning area are at a higher risk for western pine beetle outbreak.

Presently, throughout the planning area there are minor occurrences of western hemlock dwarf mistletoe in the overstory. Mistletoe causes decreased height and diameter growth, reductions in seed and cone crops, and direct tree mortality or a predisposition to other pathogens or insects. There is concern that the existing occurrences of dwarf mistletoe in the planning area will continue to spread to the younger western hemlock.

The dense, single-canopied, Douglas-fir-dominated stands in the planning area are perfect conditions for the proliferation of root disease. Currently, most of the stands have some level of root disease present as laminated and/or Armillaria root rot. These root disease organisms cause increased stress, severe reduction in tree growth, and direct or indirect mortality to trees. Current stand conditions have provided an abundance of susceptible species and available habitat for these organisms, and therefore, may cause more severe effects in the planning area than has typically occurred in the past.

The existing vegetative conditions in the planning area (most notably the high density of stands; diseased trees; areas of tree mortality; and non-fire-resistant trees) have resulted in an increased risk of high-intensity wildfire in the dry mixed-conifer stands. As previously mentioned, the planning area is immediately adjacent to several landowners, including the Confederate Tribes of Warm Springs Reservation and the Pine Grove community. Therefore, there is heightened concern that undesirable conditions within the planning area could also adversely impact surrounding communities.

The Juniper Flats WUI, which includes approximately 6,000 acres of the eastern portion of the planning area, was assigned an overall wildfire risk rating of “high” in the CWPP, which is the second highest hazard rating for the communities within Wasco County. In this area, the Pine Grove community is of greatest concern due to the rate of fire occurrence, high density of homes, type of fuel involved, potential for a crown fire, and limited road access. In this area, light, flashy fuel and frequent down-canyon winds often result in fast-moving fires.

The westernmost portion of the planning area, which contains moist mixed-conifer stands, shares a boundary with the Warm Springs WUI on the Confederated Tribes of Warm Springs Reservation. This portion of the Warm Springs WUI, referred to as Compartment 1, was assigned an overall wildfire risk rating of “moderate” in the CWPP. This area received this rating because there are no communities in this location, but it contains powerlines, logging activity, hunting use, wilderness trails, traditional food area

and cultural sites. Immediately adjacent to Compartment 1 on the Reservation is Compartment 6, which contains dry mixed-conifer stands and received an overall wildfire risk rating of “high.” This location adjacent to the planning area contains communities, powerlines, logging activity, hunting use, high traffic volumes, campgrounds, and wood cutting areas. This area received a “high” risk rating based on fuel load hazards, ignition risk, and past fire history.

In regards to recent fire history, over a 20-year period there have been approximately 345 human-caused fires impacting an estimated 3,600 acres within the planning area. The human causes of ignition included: smoking, equipment, abandoned campfires, and arson. Additionally, lightning has created an estimated 118 fires impacting roughly 300 acres.

The portions of the planning area that contain the dry mixed-conifer stands are departed from the natural fire regime. In the moist mixed-conifer stands within the planning area, the canopy structure is dense, which indicates an increased likelihood for crown fires that could result in stand-replacing fires. In sum, the current vegetative conditions within the planning area, particularly the high density of stands, allow for an increase in the probability for a high-intensity, large-scale stand-replacing fire. More information about the current fire and fuels conditions in the planning area is discussed in Section 3.2.

1.3. Desired Conditions

The desired conditions for the planning area are primarily defined by the Mt. Hood National Forest Land and Resource Management Plan (USDA Forest Service, 1990), as amended, the White River Watershed Analysis (USDA Forest Service, 1995), and the White River Late-Successional Reserve Assessment (USDA Forest Service, 1996). Also, information and recommendations contained in the Wasco County CWPP, as well as the Forest’s Strategic Fuel Treatment Placement Plan¹ (USDA Forest Service, 2012), were considered in understanding the desired conditions for this area.

In general, for the moist mixed-conifer stands in the western portion of the planning area, the desired future condition is to have a multi-storied, uneven-aged stand structure with a lower stand density than is currently present. Also, these stands should be more resilient to perturbations, such as insect attack and large-scale fire occurrence. Desired conditions within the moist mixed-conifer stands should not result in a stand-replacing fire event.

Within the dry mixed-conifer stands, the desired condition would be more open two-storied stands. More specifically, conditions should contain a stand structure that allows for the reintroduction of natural fire, and in the long term, natural fire starts can resume their normal processes and be beneficially managed. Overall, conditions within the dry mixed-conifer stands within the planning area should result in lower severity fires.

Because of the current conditions within the project area, in the event of a large wildfire, resources (such as soil productivity, riparian values, late-successional habitat, scenery, and infrastructure) would be at risk on the Forest, adjacent private land, and the adjacent Confederated Tribes of Warm Springs Reservation. The desired condition to have a landscape of primarily live forests with relatively low fire hazard, in which fire suppression personnel can respond appropriately, is discussed in the Forest Plan on pages Four-4, Four-9, Four-25, Four-76 and Four-78. Additionally, 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

¹ In 2012, the Forest developed a Strategic Fuel Treatment Placement Plan to help guide projects spatially identify areas on the Forest where fuel breaks and natural openings could promote an increase in public and firefighter safety; decreased management costs; increase in suppression effectiveness; and disturbances in unit sizes representing the natural disturbance regime.

future. The need for long-term forest productivity is discussed in the Forest Plan on pages Four-3, Four-5, Four-9, Four-26 and Four-289.

1.4. Need for the Proposal

The Northwest Forest Plan directs the Forest to maintain a sustainable supply of timber and other forest products to help preserve the stability of local and regional economies on a predictable and long-term basis (p. 26). Direction to provide forest products at sustainable levels is also provided in the Forest Plan (pp. Four-3 & Four-26). As discussed in Section 1.2, the current conditions in the planning area, specifically the vegetation types, are at high risk of not providing for lasting, sustainable forest products. Stand conditions are currently not able to tolerate severe high-intensity fires, or widespread outbreaks of insect and disease. Therefore, the primary purpose of this project is to keep forests productive to sustainably provide forest products now and in the future, as described in the Forest Plan and Northwest Forest Plan.

In order to maintain a sustainable supply of timber, there is a need for this project to restore resiliency to forested areas. An unhealthy forest that contains stands and fuel conditions prone to large-scale stand-replacement mortality would not meet the agency's management objectives to develop stand species composition and density that is resilient to natural disturbances. Thus, there is a need to remove forest products and make improvements to stand conditions where conditions are no longer desirable. More specifically, a purpose of this project is to create diversity of tree species, size and spacing.

Another objective of this project is to address concerns regarding high-intensity wildfires, specifically in the dry mixed-conifer ecosystem that is within and immediately adjacent to the Juniper Flats WUI. Also, within the moist mixed-conifer stands of the planning area, there is a need to address firefighter safety concerns related to stand-replacing fire events.

In short, the overall purpose for this project is to provide forest products from specific locations within the planning area where there is a need to improve stand conditions, reduce the risk of high-intensity wildfires, and promote safe fire suppression activities.

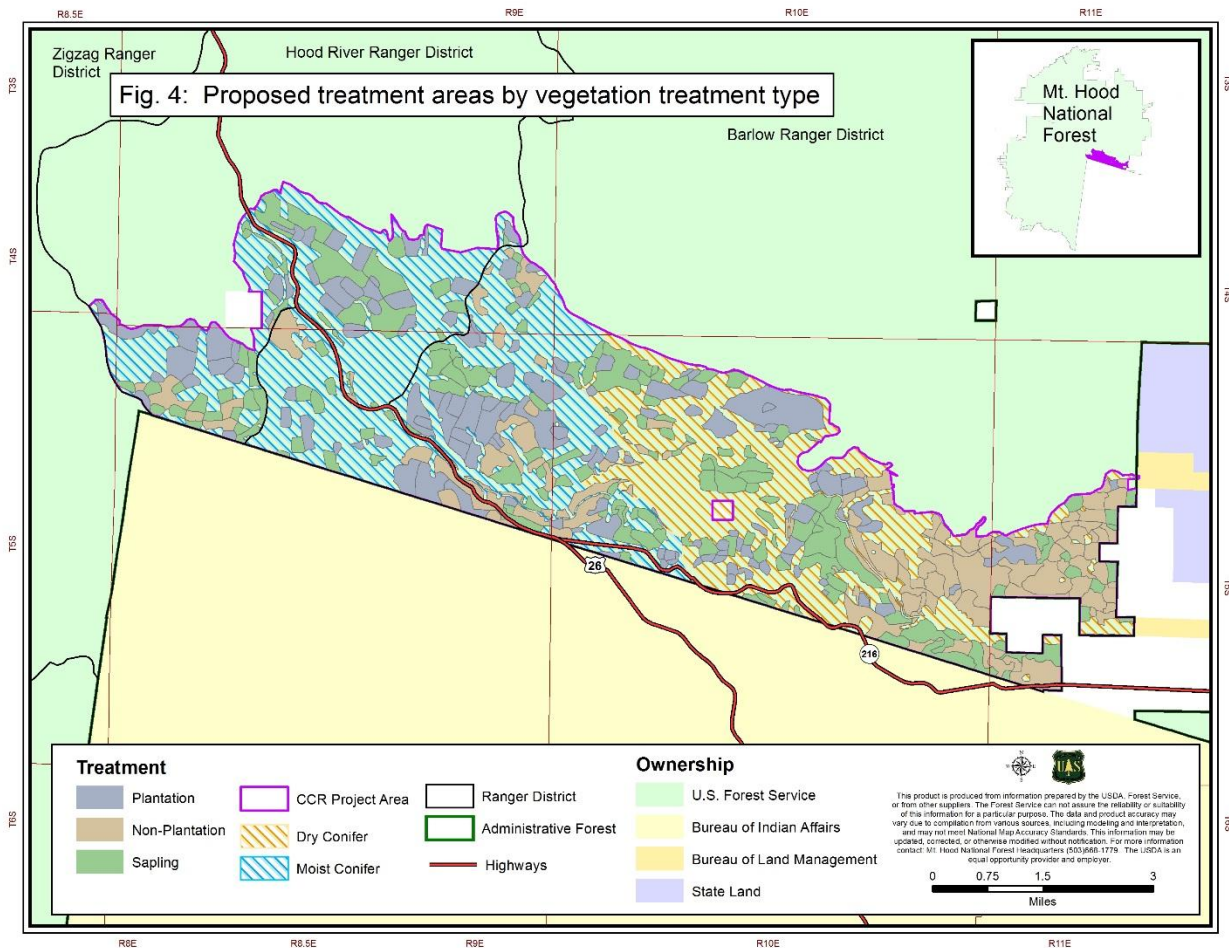
1.5. Summary of Proposed Action

In order to address the objectives outlined above, the Proposed Action would thin approximately 12,069² acres within the planning area (Figure 4). All thinning activities proposed in this project would apply variable density thinning (VDT) to allow for flexible local density levels to achieve overall treatment objectives. Proposed treatment would occur in either dry or moist mixed-conifer forest types, and would place a greater emphasis in areas that were identified as needed for strategic fuel treatment in the Strategic Fuel Treatment Placement Plan (2015). The table below provides an overview of the acres proposed for sapling, plantation, and non-plantation thinning.

² In the draft EA provided to the public for a 30-day comment period, the Proposed Action stated that approximately 12,725 acres would be treated. This number has been updated to approximately 12,070 acres due to two factors: 1) Roughly 50 acres were removed from treatment because they were burned in the Rim Fire in September 2017; and 2) About 605 acres were removed from treatment because they were identified as containing habitat conditions described in Recovery Action 32 in the *Revised Recovery Plan of Northern Spotted Owl* (USFWS 2011), which is further discussed in Section 1.8 and 2.5.

Table 1. Summary of vegetation treatment type by acre

Vegetation Treatment Type	Acres
Sapling Thinning	4,244
Plantation Thinning	4,011
Non-plantation Thinning	3,814
Total	12,069

Figure 4. Proposed treatment areas by vegetation treatment type

In order to facilitate the proposed thinning activities, this project would utilize existing NFS system roads, as well as use approximately 39 miles of temporary roads, of which 85% (or 33.5 miles) would be located on previously disturbed areas, such as old road-bed alignments or off-highway vehicle (OHV) trails. The Proposed Action would also decommission approximately 0.7 mile of road; close approximately 5.6 miles of road; and convert about 1.6 miles of an OHV trail into a road managed as an OHV trail.

The Proposed Action includes various fuel treatments that would be applied once thinning activities have been completed. The proposed fuel treatments include, but are not limited to, pile burning, underburning, jackpot burning, lop and scattering, hand and mechanical piling, masticating, or biomass collection.

The Proposed Action is described in detail in Section 2.

1.6. Management Direction

This project is designed to meet the goals and objectives of the Mt. Hood Land and Resource Management Plan (hereafter referred to as the Forest Plan) (USDA Forest Service, 1990a), as amended. This Environmental Assessment is tiered to the *Mt. Hood National Forest Land and Resource Management Plan Final Environmental Impact Statement* (USDA Forest Service, 1990b) and Record of Decision (USDA Forest Service, 1990c), and incorporates by reference the accompanying Forest Plan. The Forest Plan guides all natural resource management activities and establishes management standards and guidelines for the Forest. It describes resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management. The objectives of the management areas within the proposed treatment areas are discussed below. In addition, management direction for the area is provided in the following Forest Plan amendments:

The Northwest Forest Plan (NWFP) – Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl, and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994);

Survey and Manage – Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (US Forest Service et al. 2001);

Invasive Plants– Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision (US Forest Service 2005); and Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia Gorge Scenic Area in Oregon, including Forest Plan Amendment #16 (US Forest Service 2008); and,

Off-highway Vehicles – Record of Decision for Off-highway Vehicle (OHV) Management Plan, including Forest Plan Amendment #17 (US Forest Service 2010).

Northwest Forest Plan Land Use Allocations

There are three primary Forest Plan land use allocations within the proposed treatment areas: B2-Scenic Viewshed; B10-Deer and Elk Winter Range; and C1-Timber Emphasis (see table and figure below). An overlapping land use allocation within the project area, B5-Pileated Woodpecker/Pine Marten Habitat Area, occurs on approximately 144 acres (or roughly 1%) of the acres proposed for treatment. Where applicable, the more stringent standards and guidelines would apply where land use allocations overlap.

Table 2. Forest Plan land use allocations within proposed treatment areas

Forest Plan Land Use Allocation	Acres (Percent)
B2-Scenic Viewshed	4,354 (37%)
B5-Pileated Woodpecker/Pine Marten*	144 (1%)
B10-Deer and Elk Winter Range	2,161 (16%)
C1-Timber Emphasis	5,557 (46%)

*The B5 areas are inclusions within the other land use allocations. Management direction for B5 predominates over B2, B10, and C1.

Approximately 37% of the treatment area is within the B2-Scenic Viewshed land use allocation, as described by the Forest Plan on pages Four-218 to Four-220. The goal for this land use allocation is to provide attractive, visually appealing forest scenery with a wide variety of natural-appearing landscape features. This management area should utilize vegetation management activities to create and maintain a

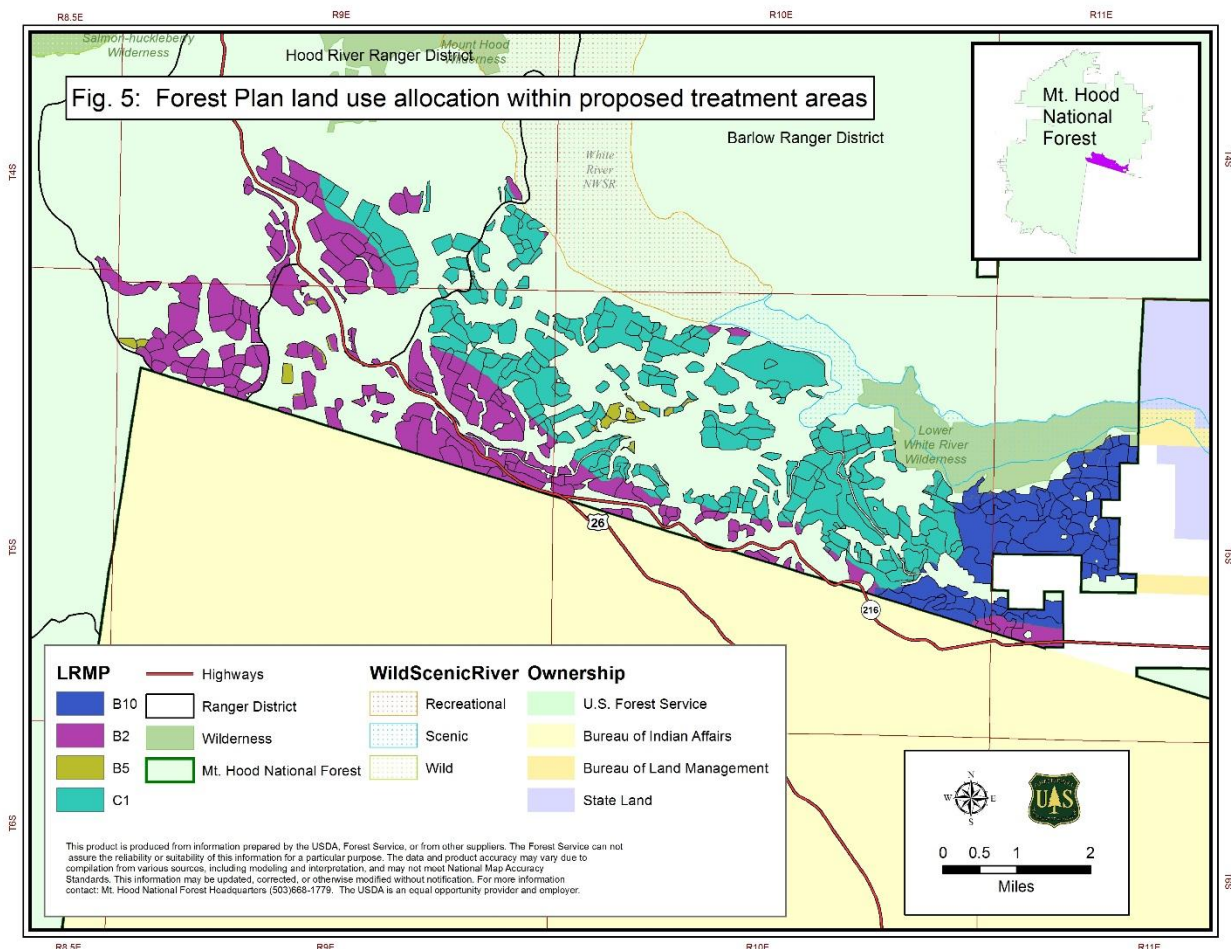
long-term desired landscape character. For this project, Highway 26 serves as the main viewer position from which the visual quality objectives are prescribed.

B5-Pileated Woodpecker/Pine Marten Habitat Area is a land use allocation that overlaps the three primary land use allocations (B2, B10, and C1). The goal of this land use allocation is to provide mature or old growth habitat blocks of sufficient quality, quantity and distribution to sustain viable populations of Pileated Woodpecker and Pine Marten. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices.

The B10-Deer and Elk Winter Range land use allocation accounts for approximately 16% of the proposed treatment area. The goal for this area includes providing high quality deer and elk habitat and stable populations of mule deer and Rocky Mountain elk. Secondary goals are to maintain a healthy forest condition through a variety of timber management practices and provide dispersed summer and developed recreation opportunities.

The main land use allocation containing the proposed areas for treatment (approximately 46% of treatment area) is within the C1-Timber Emphasis land use allocation. The goal for this land is to provide lumber, wood fiber, and other forest products on a fully regulated basis, based on the capability and suitability of the land. A secondary goal is to enhance other resource uses and values that are compatible with timber production (Forest Plan, pp. Four-289 to Four-290).

Figure 5. Forest Plan land use allocations within proposed treatment areas



Northwest Forest Plan Land Use Allocations

In addition to the management direction found in the Forest Plan, the project area is also managed under the Northwest Forest Plan (NWFP). The proposed treatment areas include Late-Successional Reserve (LSR) and Matrix lands (see table below).

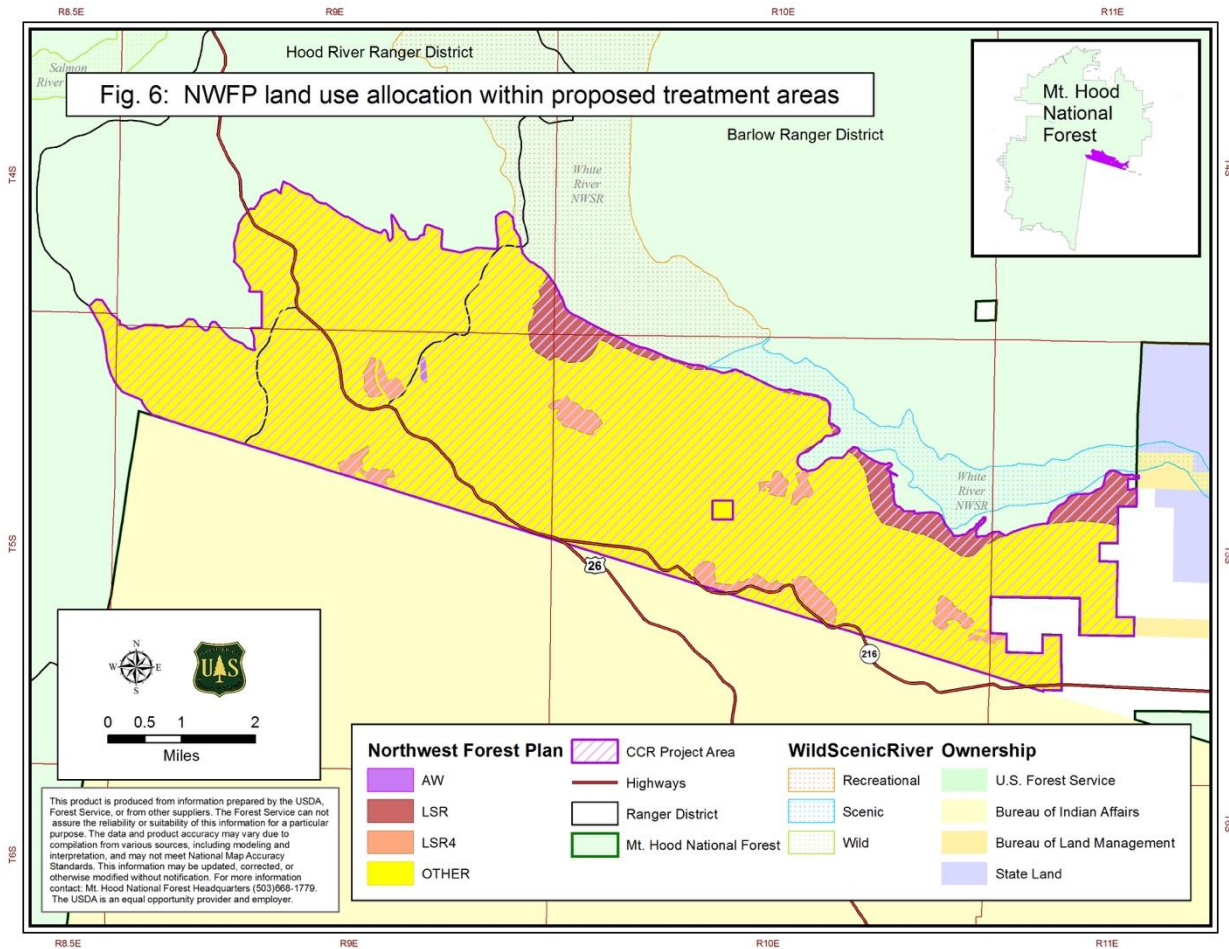
Table 3. NWFP land use allocations within proposed treatment area

NWFP Land Use Allocation	Acres (Percent)
Late-Successional Reserve	440 (4%)
Matrix	11,630 (96%)

Matrix consists of Forest Service lands outside of designated areas (i.e., Congressionally Reserved Areas, Late-Successional Reserves, Adaptive Management Areas, Administratively Withdrawn Areas, and Riparian Reserves).

The LSR, in combination with other allocations and standards and guidelines, are to maintain a functional, interactive, late-successional and old-growth forest ecosystem. An assessment of the White River LSR was completed in 1996 and includes a description of the desired future condition of the eastside zone that the planning area overlaps. This includes “stand structures of Open Park-like, Cathedral and Open Intolerant Multi-story” forest types that will have to “be maintained over time by planned ignition and underburning” (White River LSR Assessment, p. III-1).

Stands proposed for treatment in this project are within the Mustang Landscape Unit of the White River LSR. These stands are predominantly single-story to closed-canopy conditions and are largely void of structure, openings, and species diversity common to dry grand fir plant communities. The Proposed Action would open stands up and move them toward historical density conditions while providing for new age classes and openings large enough to support the natural regeneration of fire-resistant species. To protect important attributes and minor stand components (snags and large down wood) the individual stand prescriptions for the units in the LSR would use stand appropriate diameter limits. Large coarse woody debris would be maintained within and outside the LSR (see list of project design criteria in Section 2.3). The intent of the treatment is not to remove natural disturbance agents from stands like mistletoe and root rot, but to mitigate the impacts they have on the overall stand during a fire event (prescribed or natural).

Figure 6. NWFP land use allocation within proposed treatment areas

Forest Plan Exceptions

The Forest Plan contains management goals and desired future condition statements that direct how the Forest is to be managed (pp. 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 forest health concerns or fire hazard situations. Therefore, in order to achieve Forest Plan goals and objectives, while also meeting the project's purpose and need, several exceptions are proposed for some Forest Plan standards and guidelines.

Exceptions to Forest Plan standards and guidelines are discussed in the Forest Plan on page Four-45, which states that for "should" standards, case-by-case exceptions are acceptable if identified during interdisciplinary project planning, and documented in the environmental analysis. The changes included in these exceptions are not permanent and are limited geographically to only the treatments proposed for this project. All proposed activities were found to be consistent with Forest Plan standards and guidelines, barring the following exceptions:

Organic Matter for Soil Productivity (FW-032 and FW-033): Favorable habitat conditions for soil microorganisms should be maintained for short- and long-term soil productivity. At least 15 tons per acre of dead and down woody material in east side vegetation communities should be maintained and evenly distributed across managed sites.

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

Overall, exceptions are proposed in order to meet the project's objectives for fuel reduction activities associated with areas identified in the Mt. Hood Strategic Fuel Treatment Placement Plan. The best available science³ indicates that 15 tons per acre of dead and down woody material is above what was historically present for the dry mixed-conifer stand types. This exception is not expected to negatively impact the continued soil productivity because these sites are expected to retain a sufficient amount of organic matter in the mineral top soil (see Section 3.5 for the soil analysis of the Proposed Action Alternative). A full list of estimated remaining woody material by unit is identified in Appendix 1.

The need to reduce forest canopy closure is also related to the goal of effective fuel reduction treatments and would only apply to those areas within the dry mixed-conifer communities of the project area. The tree density needed to achieve Forest Plan standard B10-014 for 70 percent canopy closure exceeds the long-term site capability of the dry mixed-conifer communities of the project area. The exception to Forest Plan standard B10-014 would achieve project objectives while simultaneously improving forage opportunities for deer and elk. Additionally, sufficient thermal cover is present throughout the Forest scale. See Section 3.9.3 for additional information.

Other Relevant Management Direction

This Environmental Assessment considers and incorporates, as appropriate, the recommendations of the Strategic Fuel Treatment Placement Plan (2012), White River Watershed Assessment (1995), and the Mt. Hood Travel Analysis Report (2015). This project also considers the direction contained in the Forest Service Manual for the Timber Sale Pipeline Restoration Fund. Each of these items is discussed in brief detail below.

The Mt. Hood Strategic Fuel Treatment Placement Plan (2012) spatially identified areas where fuel treatments, such as buffers and fuelbreaks, could be most effective. In short, this plan recommends the need for a reduction in horizontal continuity of surface and canopy fuels, as well as a reduction in vertical continuity associated with ladder fuel. This plan provided the foundation for the elements of the Proposed Action addressing fuels in both the dry and moist mixed-conifer stands.

This plan identified areas that would protect high-value resources and create fuelbreaks on roads and ridges in order to:

- create opportunities for safe and effective fire suppression activities;
- increase suppression effectiveness in protecting federal and non-federal lands and resources;
- compartmentalize the landscape into blocks that are spatially representative of natural disturbances; and,
- facilitate indirect fire suppression and reduce wildfire costs.

The recommendations in Chapter 6 of the White River Watershed Assessment were considered in this project. The recommendations considered in this project include a suite of desired conditions for multiple resource objectives, such as:

³ For the best available science, refer to the references listed in the Mt. Hood Strategic Fuel Treatment Placement Plan (USDA Forest Service, 2012), which is located in the project record at the Barlow District Office.

- the size, quantity and potential for downed wood after treatments;
- protecting old growth in the crest zone from a stand-replacing wildfire;
- managing for ponderosa pine/Douglas-fir dominated in the dry mixed-conifer areas of the White River LSR; and,
- regular underburning in the dry mixed-conifer areas.

In addition to the recommendations found in the Watershed Analysis, the IDT also considered the recommendations found in the Travel Analysis Report (2015) to determine proposed activities for the Forest's transportation system. The IDT examined all of the roads within the planning area during various stages of the planning process, such as prior to scoping; after scoping; and again, after the 30-day comment period. During each review, the IDT used the following factors, in conjunction with the recommendations of the Travel Analysis Report, to determine the outcome of a road:

- risk of fire start, accessibility for fire suppression or search and rescue operations;
- public and administrative access, including existing special use permits;
- likelihood and timing of future timber and/or fuel treatment;
- level of aquatic risk;
- current road conditions; and,
- future road maintenance needs.

Timber Sales Pipeline Restoration Fund

This project is partially funded by the Timber Sales Pipeline Restoration Fund, or TSPR Fund, which was established by Congress in the Omnibus Consolidated Rescissions and Appropriations Act of 1996 (Pub. L. 104-134; 16 U.S.C. 1611). The primary objectives of this special funding are to:

1. provide for efficient, timely, and cost-effective preparation of non-salvage timber sales;
2. maintain a financially healthy and fiscally-sound, permanent TSPR Fund; and,
3. provide funding to recreation projects.

The TSRP funds are returned to the Forest Service through the sale of timber or stewardship contracts. The law specifically directs that 75 percent of the funds deposited into the TSRP Fund must be used for preparing timber sales; the remaining 25 percent of revenues deposited into the TSPR Fund must be used for recreation maintenance and rehabilitation projects. Additional direction for using this special funding source is described in Forest Service Manual 2434-Timber Sale Pipeline Restoration Fund.

Although some of the other Forests in the Pacific Northwest Region have been using this funding source to aid in timber and recreation projects, this is the first project in which the Forest has used TSPR Funds. To date, the money provided by the TSPR fund has contributed toward the initial timber sale planning, timber sale layout and preparation, as well as NEPA documentation. Upon project completion, the Forest intends to submit proposals to the Regional Forester for recreation projects to address deferred maintenance needs in developed recreation sites and trails in and around the project area. The decision to allocate these funds back to the Forest is at the discretion of the Regional Forester; therefore, these funds may be redirected to other National Forests within the Pacific Northwest Region with higher recreation maintenance and rehabilitation needs.

1.7. Public Involvement

On September 1, 2016, the Barlow District Ranger, Kameron Sam, made a presentation to the Wasco County Forest Collaborative with general information about the project area. This information sharing and the conversation that followed helped provide input to planning team. Following this discussion, on November 4, 2016, a pre-scoping letter providing general project information, potential needs and location was mailed to approximately 160 individuals and groups. This pre-scoping letter was mailed to public in order to provide interested citizens an opportunity to visit the planning area before there was snow on the ground since the scoping letter was planned to be mailed during the winter of 2017. From the pre-scoping efforts, four comments were received, which were from Dick Artley, American Forest Resource Council, Char and Dave Corkran, and Oregon Wild. The comments ranged from asking for additional information to providing recommendations (See Appendix 3).

In addition to the pre-scoping letter, a public field trip was held on November 17, 2016, and coordinated with both the Wasco County Forest Collaborative and the Hood River Stew Crew, a collaborative group on the Hood River Ranger District. However, no members of the public, including participants of the collaborative groups, attended the field trip. The Barlow District Ranger also communicated with landowners adjacent to the project area boundary.

The project was first posted on the Forest's website beginning in October 2016. It was then listed in the Forest's quarterly planning newsletter (Schedule of Proposed Action [SOPA]) beginning in January 2017. On March 1, 2017, a scoping letter providing information and seeking public comment was mailed to approximately 160 individuals and groups. Approximately 12 unique comments were received during the public scoping period and approximately 550 comments were form letters received from members of Bark reiterating the information included in the comments from that group. The unique comments were received from Dick Artley, Steve Kruse, Boise Cascade, Joe Mizner, Rob Chamberlain, Gradey Proctor, Oregon Wild, Bark, American Forest Resource Council (AFRC), Rocky Mountain Elk Foundation, Interfor, and Oregon Department of Fish and Wildlife. Scoping comments ranged from urging additional acres for treatment; treating less acres; utilizing only existing road systems; closing additional roads; impacts to Northern Spotted Owls; limiting impacts from OHV use; and allowing more motorized recreation. Copies of all of the scoping comments are included in the project record, and copies of the unique letters are available on the Forest's website.

On August 25, 2017, a legal notice was published in *The Oregonian* announcing the start of the 30-day comment period on the Preliminary Assessment for this project. A letter was simultaneously mailed out to members of the public; and additional information was posted to the Forest's website. Over 100 letters/emails were received, in which some comments were unique and some were form letters received from members of Bark and AFRC reiterating information included in the comments from those organizations. Appendix 3 of this document provides responses to the comments received. Also, some of the comments are discussed in the following section.

In addition to these scoping efforts, the Forest Service participated in government-to-government consultation as detailed in Section 4 of this document.

1.8. Issues and Concerns

Issues serve to highlight effects or unintended consequences that may occur from the Proposed Action, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the Responsible Official and public to understand. Issues are best identified during scoping early in the process to help set the scope of the actions, alternatives, and effects to consider; but, due to the iterative nature of the NEPA process, additional issues may come to light at any time. Issues are statements of

cause and effect, linking environmental effects to actions, including the Proposed Action (Forest Service Handbook 1909.15, 12.4). Issues are used to generate additional action alternatives to the Proposed Action.

Several concerns and recommendations raised during the scoping and comment periods were addressed as modifications to the Proposed Action, or as changes to the project design criteria. Modifications to the Proposed Action based on public comment are described below as well as in Section 2.5. The following highlights some of the primary concerns raised by the public and how they have been addressed in this EA. While concerns were expressed from the public, none of these concerns were identified as issues for the purpose of formulating fully developed alternatives. However, some comments provided suggestions for alternative methods for achieving the purpose and need, which are discussed in Section 2.5, Other Alternatives Considered.

Temporary Roads

Some commenters expressed concern about constructing temporary roads or re-opening previously decommissioned roads to access treatment areas, which could introduce sediment to streams and result in impairing water quality and aquatic resources.

Approximately 33.5 miles out of the proposed 39 miles of temporary roads would re-trace the alignment of past temporary roads, decommissioned roads, or existing OHV routes. Since the large majority of the temporary roads would be placed on previously-disturbed areas, there is less of a likelihood for sediment to be generated and transported to waterbodies because no new cuts and fills would be created on existing alignments, which are the primary sources of sediment on new temporary road construction. All of the proposed temporary roads that would not be re-traced on previous road or motorized trail alignments, which would be approximately 5.5 miles, are placed in locations where no detectable sediment is likely to be transported to water sources. In order to minimize any potentially undesirable impacts to aquatic resources, these new temporary roads would be strategically located on relatively gentle slopes and would not cross any streams. Also, the Proposed Action would rehabilitate all temporary road alignments after project completion.

The re-use of existing alignments is consistent with Forest Service policy as described in Forest Service Manual 7703.22:

“Motor vehicle use off designated roads, trails, and areas may be authorized by a contract, easement, special use permit, or other written authorization issued under federal law or regulation (36 CFR 212.51(a) (8); FSM 7716.2). This option may be particularly desirable when motor vehicle use off the designated system is associated with a single event or other authorized uses, such as grazing, vegetation management, and hazardous fuels reduction.”

Individuals and groups stated that decommissioned, rehabilitated or overgrown roads should never be used again and that roads in general cause inappropriate environmental impact. However, there is no basis to eliminate all road reconstruction without regard for site-specific circumstances such as road length, landform, proximity to streams, the intensity of actual decommissioning, cost to open and rehabilitate, the impacts of alternate access methods, and the benefits of vegetation and fuels management objectives. The 5.5 miles of new temporary road construction is estimated to impact approximately 10 acres of ground, while the 33.5 miles of the remaining temporary roads would re-disturb about 61 acres of ground along existing access alignments or OHV routes; all temporary roads would be rehabilitated and covered with slash or other effective ground cover after use. The environmental impact of temporary roads has been fully analyzed and disclosed in Section 3; the effects were found to be minimal. Section 2.2.3 discusses the details for these roads and Sections 3.6 and 3.8 discuss the impacts to aquatic resources. The analysis

found the impacts to be sufficiently mitigated by project design criteria (Section 2.3). Also, Forest Plan standards and guidelines would be met and the project would be consistent with the Aquatic Conservation Strategy (Section 3.7).

These comments were considered during the development of the Proposed Action because they highlight the public concern about the effects of roads on the environment. For example, additional road closures, decommissioning and stormproofing were added to the project (see Section 2.2.3); roads that access treatment units were carefully examined for potential to repair problem areas; new temporary roads were carefully located; and the reconstruction of old road alignments was only proposed where minimal impact would occur and where post-use rehabilitation would be effective. Also it was suggested that the agency not decommission roads if they were going to be used again and to not reuse roads that are decommissioned. The Forest considered this advice in the development of the Proposed Action because it only includes road decommissioning where the roads are not likely to be needed again, and stormproofs and closes roads that would likely be needed again.

Northern Spotted Owls

Some comments expressed concern about the impacts of the project on the Northern Spotted Owl and their critical habitat. For example, a commenter requested that the Forest Service align the Proposed Action with Recovery Actions 10 and 32 as outlined in the *Revised Recovery Plan for the Northern Spotted Owl* by removing units from consideration that include high-quality, suitable habitat (USFWS 2011).

Recovery Action 10 states, “Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population” (USFWS 2011, p. III-44). The intent of this action is to protect, enhance, and develop habitat in the quantity and distribution necessary to provide for the long-term recovery of spotted owls. The *Recovery Plan* recommends that Federal land managers work with the US Fish and Wildlife Service to prioritize current and historical spotted owl nest sites for conservation and/or maintenance of existing levels of habitat. The Proposed Action was developed to maintain the highest quality habitat within spotted owl territories. Also, all potential core areas would be maintained above the 50 percent threshold for suitable habitat. Proposed treatments would be placed between patches of the highest quality habitat, which would reduce the likelihood of losing the remaining habitat from wildfire.

Recovery Action 32 recommends land managers work with the US Fish and Wildlife Service to maintain and restore well-distributed, older and more structurally complex multi-layered conifer forests across the spotted owl’s range while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. Recovery Action 32 states, “These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees” (USFWS 2011, p. III-67). The Proposed Action was developed in coordination with the US Fish and Wildlife Service with the goal of maintaining the most suitable habitat while reducing the threat of losing habitat from wildfires. For example, the Proposed Action that was shared with the public during the 30-day comment period did include treatment activities within known spotted owl habitat, as described in Recovery Action 32, located within the central and western portion of the planning area.

During the comment period, one commenter, Bark, highlighted the need for re-assessing where potential spotted owl habitat could be located within the planning area, as described by Recovery Action 32. Upon several additional field visits and discussions with the US Fish and Wildlife Service, the Eastside Wildlife Biologist located acres that met the definition of spotted owl habitat for Recovery Action 32. Therefore, in response to public comment, as well as to better meet project objectives, the Proposed Action has been

updated by removing approximately 605 acres from treatment. This modification to the Proposed Action is also described in Section 2.5. Since the Proposed Action has been updated to respond to public comment and better address the management direction outlined in the *Recovery Plan* for the spotted owl, it was determined that the concerns raised for the spotted owl have been appropriately incorporated into the Proposed Action.

American Marten

Several comments requested protection measures for the American marten⁴. This ranged from Oregon Department of Fish and Wildlife requesting that a canopy cover of no less than 40% be maintained in areas of designated and potential marten habitat, to asking for no treatment in American Marten areas.

In the Proposed Action shared with the public during the 30-day comment period, several acres proposed for treatment within the B5-Pine Marten Habitat Area would have brought the canopy cover to less than 40%. Although this would have still met Forest Plan direction for the B5 management area (p. Four-243, B5-010), the Forest has updated the Proposed Action which no longer includes these acres for treatment. The Proposed Action shared with the public during the comment period proposed to treat approximately 341 acres; whereas the updated Proposed Action described in this document removes roughly 197 acres (or 58%) from treatment.

Currently, the Proposed Action would treat approximately 144 acres within the B5-Pine Marten Habitat Area, representing about 1% of the proposed treatment locations. Of the 144 acres, roughly 48 acres do not provide adequate habitat for this species because they are sapling plantations. Since these stands do not currently provide habitat for the American marten, there would be no direct impacts from treatments on these acres. Of the 144 acres, approximately 96 acres proposed for treatment are stands greater than 100 years of age. However, the Proposed Action within these stands would maintain the mature forest habitat to meet Forest Plan Standards and Guidelines B5-010/011 and B5-021. As a result of implementing the Proposed Action, the analysis shows that the overall habitat for the marten would likely be improved because larger trees would be recruited onto the landscape more quickly in thinned stands. Also, the proposed fuels treatments would reduce the likelihood of habitat being removed by wildfire. Section 3.9 discusses all of the potential effects to the American marten habitat, which were found to be minimal and are not likely to affect the species' viability. Also, the Proposed Action was found to be consistent with the management direction in the Forest Plan. For these reasons, this was not considered to be a key issue which would warrant the development of a wholly separate alternative.

⁴ Please note that the Forest Plan refers to this species as the pine marten.

2. Alternatives

This section describes the alternatives and how they were formulated for the Crystal Clear Restoration Project. This section provides readers and the Responsible Official with a description of the Proposed Action components, project design criteria/mitigation measures, monitoring requirements, and regulatory framework.

2.1 No Action Alternative

Under the No Action Alternative, current management plans would continue to guide management of the area. No forest health or fuel treatments, or other associated actions would be implemented to accomplish project goals, including providing forest products. Therefore, stands within the project area would continue to be highly dense and homogenous. There would also continue to be an accumulation of dead fuel throughout much of the area. Defensible space adjacent to private lands and the Confederated Tribes of Warm Springs Reservation would remain overstocked and would not meet the objectives of the CWPP or the Strategic Fuel Treatment Placement Plan.

With no vegetation treatments, stands would remain in dense overstocked conditions and levels of insect and disease mortality would continue to increase. An increase in stand density would result in competition so that stems would continue to grow in height, but diameter growth would continually slow, reflecting a loss of individual tree health and vigor. These trees would become more dependent on neighboring trees for support and protection from the wind. When trees develop in this manner they are more likely to blow down in large groups or succumb to other stressors like drought or bark beetle infestation.

The No Action Alternative would not implement past decisions, or maintain, repair or close any NFS-System roads. The current use pattern of roads within the planning area would not change. Volume of public use on this system would not change over the near term, but could decrease slightly over time due to decreased navigability of the roads. Administrative use on this system would not change. Taking no action would mean that minimal road maintenance would continue to occur, and no road reconstruction would occur. Lack of road maintenance can result in negative effects with respect to both safety and the environment. Road surface, road subgrade, and road base failures present physical hazards to drivers, reduce a driver's ability to maintain positive control of a vehicle, and increase the potential for the development of erosion hazards on road slopes, including soil slumps and slides due to pooling of water and increased soil saturation in the road bed.

2.2 Proposed Action Alternative

The Proposed Action would thin approximately 12,069 acres. All thinning activities would apply variable density thinning (VDT), which would allow for flexible local density levels to achieve overall treatment objectives. VDT would also allow for an emphasis to be placed on leaving vigorous trees of all sizes with reduced emphasis on spacing. Proposed treatment types would occur in either dry or moist mixed-conifer forest types, and would place a greater emphasis in areas that were identified as needed for strategic fuel treatment in the Mt. Hood Strategic Fuel Treatment Placement Plan.

The Proposed Action would utilize Forest system roads, as well as temporary roads, to facilitate implementation. In many cases, temporary roads are located on roads that have been closed or decommissioned through a previous planning effort, but have never effectively been closed or decommissioned. Therefore, the Proposed Action includes closing roads from previous projects post-implementation. Additionally, the Proposed Action would close additional miles of open system roads.

2.2.1. Vegetation Treatments

Utilizing the recommendations of the Strategic Fuel Treatment Placement Plan, the Proposed Action is described by four different vegetation treatment types:

- 1) Strategic Fuel Treatment in Dry Mixed-Conifer (4,784 acres)
- 2) Forest Health Treatment in Dry Mixed-Conifer (1,640 acres)
- 3) Strategic Fuel Treatment in Moist Mixed-Conifer (3,653 acres)
- 4) Forest Health Treatment in Moist Mixed-Conifer (1,993 acres)

Within each of the four vegetative treatments types, there are three existing vegetative stand conditions (sapling, plantation, and non-plantation) that help define the variability within the four treatment types, which are summarized below.

Variable Density Thinning

All thinning activities would apply variable density thinning (VDT), which would allow for flexible local density levels to achieve overall treatment objectives. VDT would also allow for an emphasis to be placed on leaving vigorous trees of all sizes with reduced emphasis on spacing. Leave tree spacing associated with VDT would vary within and between stands. Density would be measured by basal area, canopy cover, trees per acre, stand density index, or relative density depending on the existing condition, treatment type, and circumstances for each stand. For example, in the strategic fuel treatment in dry mixed-conifer stands, the historical conditions and fuel types dictate the time at which the stand reaches the stem-exclusion stage; thus, a heavy VDT would be prescribed (i.e., wide leave-tree spacing). In other areas, the objective would be to have stands reach the stem-exclusion stage sooner, so these stands would have moderate or light VDT. See Section 3.1 for more details.

Included in VDT are skips and gaps, which are intended to mimic more natural structural stand diversity. Skips are areas where no trees would be removed; gaps are areas where few trees would be retained. The gaps for this project would vary from one to two acres in size, based on the stand-specific conditions and treatment types within each stand. The criteria used to determine the gap size would include percentage of shrub cover present, existing disease pockets, existing shade-intolerant species; and plant association. Gaps are intended to create openings to support regeneration of shade-intolerant species and more rot resistant species while also providing structural diversity. Gap areas would be incorporated into the average target canopy cover identified in Appendix 1. Gaps would be created in root disease pockets or near existing openings, and would be reforested when needed in accordance with site conditions and National Forest Management Act (NFMA) requirements.

In the plantations and non-plantations over 20 years of age, gaps would not exceed two acres and would maintain a minimum of 30% canopy cover in locations where there are species resistant to root rot. Gaps would be focused around current openings or areas with forest health concerns.

Existing Stand Condition

Sapling Thinning

These stands are relatively new plantations that were planted at a high density to ensure tree survival. These areas typically have an overabundance of trees that are small diameter and in very close proximity to each other. In order to develop more resilient stand conditions, treatments in these stands would mechanically thin small trees leaving approximately 80 to 150 trees per acre in the dry forest type and 150 to 250 trees per acre in the wet forest type. The material (slash) generated by this activity would be treated in a variety of methods identified below in the proposed fuel treatments in Section 2.2.2.

Plantation Thinning

Plantations are areas that have been cleared of competing existing vegetation and new trees established by hand- or machine-planting of a seed or sapling. Treatments within these stands would apply VDT from below in even-aged managed units, which is designed to address high density issues that are leading to forest health concerns. These concerns are stress-related mortality, limited species diversity, and limited structural diversity. The overall desire for these treatments would be to move the upland portions of the selected plantations toward more of a late seral-like structure with a large-tree component, which is currently absent in the majority of these stands. The material (slash) generated by this activity would be treated in a variety of methods including, but not limited to, piling and burning, lop and scattering, masticating, or biomass collection.

Non-Plantation Thinning

Non-plantations contain treatment units that are not in sapling areas or existing plantations. Non-plantations may have received intermediate thinning or sapling thinning treatment in the past 15 years, but because the areas do not meet the conditions of plantations, they are not labeled as such. In other cases, these areas have not seen active management activities, but because of past treatments, fire suppression, or other management actions, their conditions have been altered from their natural state. This could include fuel loading above what historical conditions may have been, larger scale insect and disease outbreaks, and higher densities of trees per acre. These areas may have also had past vegetation manipulation, but are no longer actively managed as plantations. These stands may have missed a fire cycle or other disturbance event and have a reduced resiliency to disturbance events in the future.

Strategic Fuel Treatment in Dry Mixed-Conifer (4,784 acres)

Vegetation Thinning

Within the dry mixed-conifer areas that were identified as needed for strategic fuel treatment in the Strategic Fuel Treatment Placement Plan, the desired densities range from 40-100 ft² basal area. The desired basal area would be accomplished throughout the stand, providing for opportunities to have VDT across the stand, thereby achieving multiple resource goals across the project area. The overall desired condition with these treatments would be to move the stands toward a healthier functioning system with fire as the primary disturbance so that the stands have a more historically characteristic outcome.

Within younger plantations, sapling areas would be thinned to approximately 40 to 150 trees per acre, depending on site conditions, to promote and develop more resilient stand conditions and meet the purpose and need of the planning area.

Table 4. Existing and desired future conditions for strategic fuel treatments in dry mixed-conifer stands

Existing Stand Condition	Acres	Existing Basal Area (ft ² /ac)	Desired Average Basal Area (ft ² /ac)	Existing Canopy Cover (%)	Desired Average Canopy Cover (%)	Existing Trees Per Acre	Desired Average Trees Per Acre
Sapling Thinning	1,490	NA	NA	NA	35	200-2,172	60-120
Plantation Thinning	1,214	70-262	40-100	40-70	35	180-2,110	NA
Non-Plantation Thinning	2,077	40-397	40-100	40-80	35	138-2,155	NA

Plantations and non-plantations would use basal area and canopy cover to determine desired outcome. Sapling thinning stands do not have sufficient structure to calculate basal area and would utilize trees per acre to establish desired condition.

Fuel Treatments

The fuel treatment goal for the dry mixed-conifer stands is to reduce the fuel loadings and modify the fuel profiles to more historical conditions. Treatment of any residual surface fuel left over from timber harvest would be machine piled and burned. Underburning could also be used to treat any residual fuel left on harvested units, as well as introducing fire back into the fire-adapted ecosystems to restart fire as a primary disturbance mechanism of the functioning stands. Surface fuel would be reduced to approximately 10-15 tons per acre in the dry plant communities of the planning area.

In some instances, a combination of treatments would occur in the same area. It is likely that an area would need to have initial thinning to reduce the horizontal and vertical fuel prior to safely and effectively applying a suite of prescribed fire techniques. Some of the mechanical fuel treatments that could be utilized in these areas include, but would not be limited to, pile burning, underburning, jackpot burning, lop and scattering (where fuel loading was below ten tons per acre), mechanical piling, masticating, or biomass collection. Biomass collection would include machine piling and removal of materials.

Forest Health Treatments in Dry Mixed-Conifer (1,640 acres)

Vegetation Thinning

Forest health treatments and fuel reduction activities proposed on approximately 1,640 acres of dry mixed-conifer stands would be similar to the proposed activities in the strategic fuel treatment areas. However, in these areas the desired densities range from 60-120 ft² basal area; they would have a higher average canopy cover; and there would be more frequent areas with little to no treatment in order to meet other resource concerns.

Table 5. Existing and desired future conditions for forest treatments in dry mixed-conifer stands

Existing Stand Condition	Acres	Existing Basal Area (ft ² /ac)	Desired Average Basal Area (ft ² /ac)	Existing Canopy Cover (%)	Desired Average Canopy Cover (%)	Existing Trees Per Acre	Desired Average Trees Per Acre
Sapling Thinning	747	NA	NA	NA	40	200-450	60-120
Plantation Thinning	408	47-284	60-120	20-70	40	353-1261	NA
Non-Plantation Thinning	485	106-293	60-120	40-70	40	98-2,459	NA

Plantations and non-plantations would use basal area and canopy cover to determine desired outcome. Sapling Thinning stands do not have sufficient structure to calculate basal area and would utilize trees per acre to establish desired condition.

Fuel treatments proposed in these areas would help forest vegetation remain resilient to uncharacteristic insect, disease outbreaks and high-intensity wildfire. The treatments would be similar to the strategic fuel treatments in dry mixed-conifer, but would allow for higher average densities of surface fuel while still being within the desired future condition.

Strategic Fuel Treatment in Moist Mixed-Conifer (3,653 acres)

Vegetation Thinning

Within moist mixed-conifer areas that were identified as needed for strategic fuel treatment in the Strategic Fuel Treatment Placement Plan, the desired densities would range from 80-150 ft² basal area. The desired basal area would be accomplished throughout the stand, thereby achieving goals throughout the project area. The overall desire for these treatments would be to move the stands towards a more healthy-functioning system that would be more resilient to large scale disturbance.

Within younger plantations, sapling areas would be thinned to approximately 100-200 trees per acre, depending on site conditions, to promote and develop more resilient stand conditions.

Table 6. Existing and desired future conditions for strategic fuel treatments in moist mixed-conifer stands

Existing Stand Condition	Acres	Existing Basal Area (ft ² /ac)	Desired Average Basal Area (ft ² /ac)	Existing Canopy Cover (%)	Desired Average Canopy Cover (%)	Existing Trees Per Acre	Desired Average Trees Per Acre
Sapling Thinning	1,279	NA	NA	NA	NA	250-2,910	100-200
Plantation Thinning	1,427	61-283	80-150	30-80	50	329-2,270	NA
Non-Plantation Thinning	947	80-267	80-150	30-90	50	250-2,491	NA

Plantations and non-plantations would use basal area and canopy cover to determine desired outcome. Sapling Thinning stands do not have sufficient structure to calculate basal area and would utilize trees per acre to establish desired condition.

Fuel Treatments

The goal for the area is to reduce the fuel loadings and modify the fuel profiles. Treatment of any residual surface fuel left over from timber harvest would be machine piled and burned. Jackpot burning could also be used to treat any residual fuel left on harvested units. Surface fuel would be reduced to approximately 20-25 tons per acre in the moist plant communities.

Similar to the dry mixed-conifer fuel treatments, in some instances a combination of treatments would occur in the same area. It is likely that an area would need to have an initial vegetation treatment to reduce the horizontal and vertical fuel prior to safely and effectively applying a suite of prescribed fire techniques.

Mechanical fuel treatments could include, but would not be limited to, pile burning, jackpot burning, lop and scattering, mechanical piling, masticating, or biomass collection. Biomass collection would include machine piling and removal of materials.

Forest Health Treatments in Moist Mixed-Conifer (1,993 acres)

Vegetation Thinning

In these locations, there is an opportunity to create a more heterogenic landscape with more age, species, and structural diversity to meet multiple resource objectives. These areas are not meant to have fire reintroduced, but rather the intent is to move or maintain stands that would be more resilient to natural, larger scale disturbances. Within moist mixed-conifer areas, the desired densities range from 100-200 ft² basal area. The desired basal area would be accomplished throughout the stand, thereby achieving goals across the project area. The overall desire for these treatments would be to move the stands towards a more healthy-functioning system that would be more resilient to large-scale disturbance. In the sapling areas, thinning would occur to promote and develop more resilient stands conditions.

Table 7. Existing and desired future conditions for forest health treatments in moist mixed-conifer stands

Existing Stand Condition	Acres	Existing Basal Area (ft ² /ac)	Desired Average Basal Area (ft ² /ac)	Existing Canopy Cover (%)	Desired Average Canopy Cover (%)	Existing Trees Per Acre	Desired Average Trees Per Acre
Sapling Thinning	728	NA	NA	NA	NA	250-450	120-250
Plantation Thinning	962	54-283	100-200	30-70	60	250-4,371	NA
Non-Plantation Thinning	305	107-312	100-200	40-90	60	451-2,459	NA

Plantations and non-plantations would use basal area and canopy cover to determine desired outcome. Sapling Thinning stands do not have sufficient structure to calculate basal area and would utilize trees per acre to establish desired condition.

Fuel Treatments

Fuel treatments in these areas would be similar to those in the strategic fuel treatment areas, however, treatments would allow for higher average densities of surface fuel to remain, averaging 25-30 tons per acre. Similarly, in some instances a combination of treatments would occur in the same area. It is likely that an area would need to have an initial vegetation treatment to reduce the horizontal and vertical fuel prior to safely and effectively applying a suite of prescribed fire techniques.

Mechanical fuel treatments could include, but would not be limited to, pile burning, jackpot burning, lop and scattering, mechanical piling, masticating, or biomass collection. Biomass collection would include machine piling and removal of materials.

2.2.2. Fuel Treatments

A variety of fuel treatment methods would be used throughout project area. Mechanical fuels reduction treatment is a non-commercial thinning and mechanical brush treatment to promote and develop more resilient stand conditions. The overall goal for the project area is to reduce the fuel loadings and modify the fuel profiles. Treatment of any residual surface fuel left over from timber harvest would be machine piled and burned. Surface fuel would be reduced from approximately 25-55 tons per acres to 10-15 tons per acre on the dry plant communities and from 45-60 tons per acre to 20-25 tons per acre in the moist plant communities.

In both dry and moist mixed-conifer units, a suite of activities could be utilized to bring fuel loading within the ranges described above and outlined in Appendix 1. This could be a suite of multiple activities, or singular actions depending on site and weather conditions and existing fuel loading. This could include hand or machine piling, pile burning, jackpot burning, and swamper burning. In the dry mixed-conifer units, underburning could also be used to treat any residual fuel left within units. However, underburning would not occur within the moist mixed-conifer units.

Across the project area, a combination of treatments could occur in the same location. It is likely that an area would need to have an initial vegetation treatment to reduce the horizontal and vertical fuel prior to safely and effectively applying a suite of prescribed fire techniques. An example would be a dry mixed-conifer unit that is first treated with a vegetation treatment, and subsequently, the slash materials are piled. Burning piles may occur the following year, and would then be followed by a series of underburning several years after the initial treatment.

Some of the primary fuel treatment methods proposed in this project are described below.

Hand Piling

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

Machine Piling

Machine piling is the use of mechanical devices to pile material and residual fuel. Bulldozers are generally more efficient in collecting and piling vegetative debris and creating compact piles. Typical mechanical use on the Forest is grapple piling to reduce soil disturbance.

Pile Burning

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

Jackpot Burning

Jackpot burning involves igniting concentrations of fuel on the forest floor, whether they are natural fuel or fuel resulting from a silvicultural cutting treatment. This differs from piling and burning because the fuel burned in jackpot burning were not collected and placed into piles. However, in areas where jackpot burning would occur there are sufficient concentrations of fuel to accomplish fuel reduction objectives with the existing and created fuel.

Swamper Burning

Swamper burning typically occurs in the rain and can work well when there are a few inches of snow on the ground. These conditions help control fire spread and allow for fuel reduction treatment in areas that, because of slope or other conditions, do not allow for traditional piling and burning of accumulated fuel. This provides a flexible method for reducing down fuels while using the weather to reduce spread risk.

Mowing/Mastication

This treatment consists of mowing the understory of brush, small trees, and other vegetation. A mowing attachment is towed behind a dozer or tractor, or attached to the head of an excavator. The vegetation is

chopped into small pieces and left on the surface. Subsequent underburning can be used to reduce the created fuel.

Underburning

Underburning is the use of prescribed fire underneath existing or residual trees to treat natural and/or created fuel, such as dead woody material, needle litter and dead brush. The majority of the blocks in the project area would require thinning and/or mowing before underburning could be done safely and effectively. In most of the blocks needing to be underburned, the burning would be completed one to four years after the original hand piling or mowing is completed. The underburning is conducted in the spring and fall seasons. A burn plan would be written which outlines the parameters under which the burning would occur. Burn plans are written in accordance with the current Forest Service Manual directives on hazardous fuels management and prescribed fire (FSM 5140), and must meet all required elements prior to approval of the plan by the District Ranger or Forest Supervisor.

2.2.3. Road Treatments

In order to bring the Forest's transportation system into line with current policy, rectify inconsistencies, reduce impacts to natural resources, or reduce maintenance liabilities, all of the NFS roads within the planning area were analyzed to determine if road closures, decommissioning or upgrades were appropriate following the completion of this project. In addition to the roads proposed for closure below, many roads in the planning area have decisions to close them from previous planning efforts, but have not been implemented. Thus, there are roads within the planning area that were decided upon for closure, however, they have never actually been physically closed. As previously stated, the transportation system was examined in light of the recommendations found in the Travel Analysis Report (2015), and considered the aquatic risk ratings defined in the Roads Analysis (2003), coupled with on-the-ground knowledge about the conditions of a road.

Based on the IDT's review of the Forest's road system, the proposed action would decommission approximately 0.7 mile of NFS road, close approximately 5.6 miles of NFS road, and convert 1.6 miles to motorized mixed use (see table below). The four roads proposed for closure would help reduce the open road densities in the project area, reduce impacts to streams and aquatic systems from sediment for high-risk roads, and reduce the risk of human caused wildfires. The roads are currently classified as maintenance level 2 (ML 2), and would be changed to ML 1. However, by maintaining these roads as system roads, if access were needed in the future for suppression or search and rescue operations, little ground disturbing activities would need to occur.

Table 8. Road management included in the Proposed Action

Road Number	Length (Miles)	Existing NEPA status	Existing Physical Status	Post Project Implementation
2110-240	<0.1	Converted to Trail/ Decommissioned	Open Road	Closed Road
2110-240	1.6	Converted to Trail/ Decommissioned	OHV Trail	ML 2 road managed as an OHV Trail

Road Number	Length (Miles)	Existing NEPA status	Existing Physical Status	Post Project Implementation
2131-260	<0.1	Open Road	Open Road	Closed Road
2630-250	0.8	Open Road	Open Road	Closed Road
2630-251	0.5	Open Road	Open Road	Closed Road
2130-223	<0.1	Open Road	Open Road	Closed Road
2110-035	0.1	Open Road	Open Road	Closed Road
4200-011	0.7	Open Road	Open Road	Closed Road
2630-011	1.5	Open Road	Open Road	Closed Road
2130-281	0.23	Open Road	Open Road	Closed Road
2130-017	0.7	Open Road	Closed Road	Decommission Road
2130-270	0.9	Converted to Trail/ Decommissioned	Open Road	Closed Road
2110-230	0.3	Converted to Trail/ Decommissioned	Open Road	Closed Road
4310-011	0.2	Converted to Trail/ Decommissioned	Open Road	Closed Road
2610-026	0.21	Open Road	Open Road	Closed Road

Decommission

The road proposed for decommissioning (2130-017) is currently a spur off of a road that was previously converted to a non-motorized trail. This previous trail conversion has restricted motorized use to this road; therefore, currently, there is no motorized access on this road. In the Proposed Action, this road would be blocked, by using of rocks, earth berms, and/or large logs, so that vehicles would not be able to enter the road. If hydrologic and ecological processes are adversely impacted by the road, then the

decommissioned road would be stabilized and restored to a more natural state utilizing a variety of treatments including ripping the road, removing drainage structures and restoring the natural contour of the slope. This road would also be removed from the Forest's transportation system and no longer receive any maintenance.

Closure

In order to close several roads (approximately 5.6 miles), the entrances would block vehicles from entering the road year-round through the use of gates, rocks, earth berms, and/or large logs. These roads would all become ML 1 roads. As ML 1 roads, basic custodial maintenance would be performed to keep damage to adjacent resources to an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level.

Where needed, a closed road would be stabilized before it would be put into storage. Depending on site conditions, the implementation of this could vary. A closed road remains on the Forest's transportation system and receives minimal maintenance as there is no public traffic allowed.

As shown above in Table 8, twelve roads or portions of roads are proposed to move to ML 1. While the existing physical condition of these roads are open, four of the roads had their maintenance level changed in the OHV Management Plan's Record of Decision (2010) to either decommission or convert to an OHV trail. While these segments of road have OHV Management Plan decisions to decommission them, the implementation of this has not been completed and these roads are currently being used. These specific roads were chosen to be closed for a variety of reasons and are further discussed below.

2130-270 Road

The 2130-270 road has been utilized multiple times in the past ten years for administrative use. With this proposed action, the road would be used to implement this project since it provides access to existing plantations. A purpose-built OHV trail also leads to the existing plantations; however, converting the OHV trail to accommodate this project would degrade the OHV user's riding experience. Because the 2130-270 road is currently physically open, utilizing this road for access would limit the impacts to both the natural resources and the recreation experiences. Because this road would be used for log-haul, the road would be closed as a component of the Proposed Action following implementation.



Figure 7. Picture of the 2130-270 road proposed for closure

2110-230 Road

In the OHV Management Plan, the 2110-230 road was closed to all traffic and was proposed to be decommissioned. Similarly, this road remains physically open on the ground and travels in close proximity to McCubbins Gulch Creek. According to the private landowner, the 2110-230 road is currently the only access to their private land. Working with the Barlow District Ranger, Kameron Sam, the landowner requested that this road continue to provide access to their land. This road closure would restrict public access along the road, but would continue to provide administrative and permitted access if needed.



Figure 8.Picture of the 2110-230 road proposed for closure

4310-011 Road

In the OHV Management Plan, the 4310-011 road was closed to all traffic and was proposed to be decommissioned. This road remains physically open on the ground and provides access to plantations that have been managed in the past and are proposed for treatment in this proposed action. Additionally, there are two special use permits for fiber optic cables (Cascade Utilities and FTV Communications) that utilize this road for maintenance. By proposing to change this road to a closed road, it would restrict public use of the road, repair any damage, and put the road into storage for administrative or permit use only.



Figure 9. Picture of the fiber optic cable sign and 4310-011 road proposed for closure

2110-240 Road

In the OHV Management Plan, the entrance of the 2110-240 road (less than 0.1 miles) was to be decommissioned, and the remainder of the road was to be converted to an OHV trail. Currently the entrance of this trail is steep off of the 2110 road and is being used by OHV users to access the remaining portion of this road that is converted to an OHV trail. There is concern for OHV rider safety at this steep entrance, as well as concerns for impacts to resources. This proposed action would conduct effective entrance management activities along the less than 0.1 miles of existing roadbed. This closure would be conducted in coordination with the proposed vegetation treatments since this segment of road would be utilized for haul and effectively closed following treatment. This road would become a ML 1 road because it would likely be utilized again to implement future activities. This road closure enables the road to remain on the system for administrative use in the future, but blocks it from general vehicle use during the remainder of the year.

The entrance of the 2110-240 road would have an effective road closure implemented, restricting vehicle access from its current location. However, after the entrance closure, the remainder of the existing road (1.6 miles) would become a ML 2 road so that the road could be managed as an OHV trail. This would continue to allow OHVs to utilize the road, as was permitted in the OHV Travel Management Plan.



Figure 10. Picture of the 2110-240 road proposed for closure

Road Maintenance and Reconstruction

Road maintenance and reconstruction is necessary on haul routes identified for this project. Weak areas would be reconstructed as needed. The roads would be repaired to a minimum standard for both safety and resource protection before use. No new permanent road construction would be necessary to implement the Proposed Action.

With regard to which roads should be reconstructed to safely perform operations associated with the Proposed Action, determinations were made by utilizing the direction set forth in the following documents: 36 CFR Parts 212, 251, 261, and 295; Forest Service Manual 7700-Travel Management; and Forest Service Handbook 7709.55-Travel Analysis, 7709.56-Road Preconstruction, 7709.58-Transportation System Maintenance, and 7709.59-Transportation System Operations.

Road maintenance would occur on all roads used for haul of commercial materials (log and rock haul). Road maintenance activities can create limited disturbances contained within existing road prisms. Road maintenance would be conducted prior to and during operations to ensure minimum safety standards and effective roadway drainage. Regular road maintenance activities that would occur on roads designated for haul are as follows:

Brushing – This involves cutting vegetation which encroaches along roadsides to provide visibility to meet minimum sight distances for stopping and maneuvering by vehicle operators. This work includes cutting of vegetation in drainage ditches to a maximum height of six inches.

Blading – This activity includes grading road surfaces to remove irregularities and provide road cross-slopes to ensure sheeting of water from the road travel way. This work, while conducted with the objective of improving or maintaining road drainage, also removes surface wash-boarding and minor potholes, thereby maintaining a vehicle's contact with the road surface and improving an operator's ability to maintain positive control of a vehicle while driving.

Surfacing – This is also known as 'spot-rocking' and involves placement of crushed aggregate or pit-run material over the surface of the road. Placement of processed rock on road surfaces serves to distribute applied loads over a wider area as the load is transferred to the road subgrade. This helps to prevent rutting of the roadway which channelizes water in the road and causes erosion or saturates the road subgrade and compromises the structural integrity of the road. Saturation of road subgrade is the primary cause of catastrophic road failure. Surfacing may also be used for safety on steep grade roads to provide an improved running surface whereby a heavy haul vehicle can better maintain contact with the road surface for improved braking and maneuvering.

Ditch Cleaning – This activity involves removing soils that have collected in ditch lines over time due to deposit of sands and silts from the road surface or sloughing of cut-slope soils, rock, and organics. Ditch cleaning is needed to facilitate proper flow of water away from roads to avoid subgrade saturation. Ditch cleaning results in the removal of existing vegetation from ditch lines over the short term and should be used in conjunction with temporary erosion control and revegetation measures. Typically, material removed from ditches is not suitable for incorporation into road surfaces and must be hauled away and disposed of at approved disposal sites on the Forest or removed from the Forest entirely (end-haul).

Culvert Cleaning – In many cases, culverts that facilitate water conveyance away from roadways become blocked by soils and vegetative debris and need to be cleaned out to ensure proper water flow, both at ditch-drainage crossings and at road-stream crossings. Culvert cleaning may produce temporary, minor soil disturbance at culvert inlets and outlets. Erosion control measures may be used to prevent

downstream sedimentation as-needed, and the need for erosion control measures would be evaluated on a case-by-case basis using best management practices and the project design criteria set forth herein.

Roadway Drainage Maintenance – Also referred to as stormproofing or storm damage risk reduction (SDRR), this involves reshaping existing, or installing new drainage dips and/or water bars in the roadway. These drainage features, as opposed to culverts, are constructed into the roadbed itself. The drainage features are comprised of the existing road’s rock and earthen material which are reshaped to redirect water away from the road surface, and into ditches or onto road-fill slopes. This practice is commonly used on roads that are closed to public traffic, but may also be utilized on steep-graded roads, and roads that receive or are planned for little to no road maintenance in the near future. These features, if existing, would be smoothed out prior to heavy haul during the dry season. Replacement of these features or construction of new features would be accomplished on roads prior to the wet season and at the completion of operations for all roads where these features are designated to occur.

Treatment of Danger Trees – Where roads that are expected to receive higher than normal volumes of traffic during the life of the project are endangered by the potential imminent failure of standing trees, such ‘danger trees’ would be felled to provide for the safety of the public and workers engaged in operations under the Proposed Action.

Road reconstruction activities occur on existing system roads and generally fall within three categories:

- 1) **Heavy Maintenance** – This involves work that is similar to road maintenance activities, but exceeds the work defined in the standard road maintenance specifications. This work is more intensive and causes somewhat greater disturbance than road maintenance work, though still contained within the existing road prism. Examples include roadbed reconditioning, ditch reconditioning, roadside clearing and grubbing, culvert replacement, and road resurfacing (aggregate, bituminous material, or a combination).
- 2) **Road Repairs** – This consists of heavy equipment construction needed to repair or bypass existing roadway failures or failure of existing road features. This work may require detailed engineering design and oversight and can involve excavating, moving, or disposing of large quantities of earth. Examples include full-depth asphalt patches, asphalt pulverization, installing new drainage culverts, underdrain installations, sinkhole repairs, slide removal, deep patch repairs with geotextile, slope stabilization, and road realignments. This work seeks to remain within the existing road prism, but construction limits may extend outside the existing road prism as-needed to complete the work.
- 3) **Constructive Improvements** – This work constructs improvements to an existing system road to meet design objectives for safety or resource protection. It involves detailed engineering design and oversight and can involve excavating, moving, or disposing of large quantities of earth and construction materials. This work may redefine the existing road prism. Examples include road re-alignment, construction of aquatic or terrestrial organism passages (including bridges), hardened low-water fords, earth retaining structures, roadside guardrails, rock-fall arresters, road paving, and road daylighting.

The recommendations outlined in the table below represent work considered to be beyond the definition of maintenance that would be performed on roads that are intended to be used as haul routes. This work would provide for protection of road travel surfaces, provide for sediment mitigation to protect adjacent resources, and provide travel way surfaces that can be maintained. The majority of this work is considered moderate-level road reconstruction, and includes such items as placing additional crushed aggregate on major-haul roads that have exposed soft soils, installation of surface and in-road drainage features in areas

that show erosional problems or have stream crossings, roadside brushing beyond that intended to be performed with maintenance specifications, and placing spot rock in heavily-rutted sections or soft spots in roads to provide for roadbed stabilization.

Roads that do not have descriptions of work can be expected to receive regular maintenance according to the standard “Timber Sale Road Maintenance Specifications” during project operations.

Final design requires further intensive field measurements, and calculations and may vary. Some road work may be accomplished by alternative funding sources and some road failures may not yet be evident. Any adjustments to this listed work would be developed consistent with the project design criteria. All work would be within the existing road structure. Additionally, because of the implementation timeline, additional maintenance activity may be required in the future that is not identified below. However, all maintenance activity would be considered routine maintenance and any work not covered would be evaluated in an additional future NEPA review, as needed.

Table 9. Road reconstruction in the Proposed Action

Road	Length	Description
2110-000	0.14	Replace cattle guard
2110-000	2.2	Replace 18"x40' corrugated metal pipe
2110-013	1.0	Riprap at each of two low-water crossings
2110-250	2.4	Replace 18"x40' corrugated metal pipe
2110-270	2.6	Gate repair; replace 18"x40' corrugated metal pipe with 24" squash pipe
2110-290	0.8	Build riprap mat around existing 18" corrugated metal pipe
2120-320	2.3	Replace 18"x40' corrugated metal pipe
2130-000	4.5	Recondition one pipe inlet; replace four 18"x40' corrugated metal pipes
2131-220	0.8	Replace corrugated metal pipe
2131-221	0.3	Replace corrugated metal pipe
4200-011	0.5	Excavate ditch and fill with riprap at entrance; install drivable dip
4310-000	1.5	Pavement pulverization
4330-000	1.0	Ditch reconditioning

2.2.4. Landings and Logging Systems

The project also includes landings to facilitate all logging systems (ground-based, helicopter, and skyline yarding logging). 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. For similar projects on the eastside of the Forest, the following landing sizes are typical:

- An average ground-based logging landing is 50 feet wide by 70 feet long. The average landing size increases to 100 feet wide by 100 feet long for units with whole tree yarding and fuel reduction projects. This landing size allows room for tractors to enter and leave, a loader to sort logs, and a log deck.
- An average skyline logging landing is 40 feet wide by 70 feet long. The skyline logging landings increase to 40 feet wide by 100 feet long on average for units with whole tree yarding and fuel reduction projects. This allows room for a yarder, a loader to sort logs, and a log deck. Some landings provide access for a tractor unit on one side of a road and a skyline unit on the other side.
- An average helicopter landing size is approximately 100 feet wide by 200 feet long with some additional trees removed for the flight path coming into the landing. Some service landings approximately 60n feet wide by 60 feet long are also needed where helicopters land and refuel. Where possible, helicopter landings utilize existing openings, such as rock quarries or road intersections.

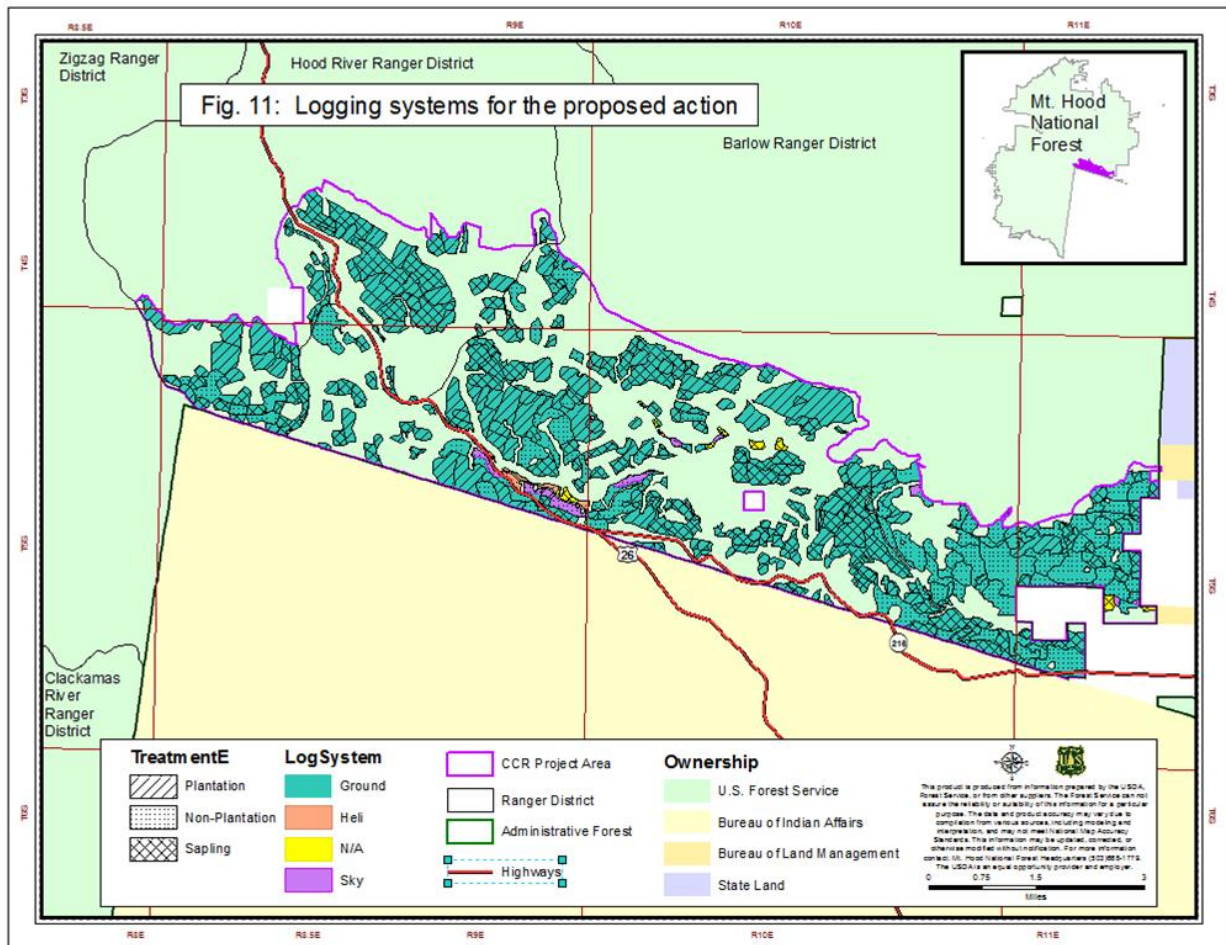
All landings would be located within existing treatment areas for this project. Existing landings would be reused whenever feasible. Many landing locations occur on the existing road system and would require minor maintenance and rebuilding to become functional. Some existing landings have brush or small trees growing on them that would be removed before use. Landing locations are determined using the project design criteria.

Proposed logging systems for the Proposed Action are outlined in Table 10 below, and Figure 11.

Table 10. Logging system by acres in the Proposed Action

Logging System	Acres (Percentage)
Ground Based	11,762 (98%)
Skyline	157 (1%)
Helicopter	59 (<1%)
Not Applicable	84 (<1%)

Figure 11. Map of logging systems for the Proposed Action



2.2.5. Temporary Roads

The Proposed Action includes utilizing approximately 39 miles of temporary roads to facilitate conventional logging systems (ground-based and skyline yarding). For this project, temporary roads to access landings would be built as new temporary roads, or would be reconstructed on existing alignments or OHV trails. All of the temporary roads in this project would be rehabilitated upon completion of all project activities. After use, temporary roads would have culverts removed and be water-barred, decompacted, and roughened as needed with the jaws of a loader or excavator. Also, debris, such as rootwads, slash, and logs or boulders, would be placed near the entrance and along the first portion of the road. In the case where a temporary road is located along an existing OHV trail, work would be conducted to re-contour and re-establish the OHV trail route.

To minimize impacts to the environment, approximately 19 miles⁵ of temporary roads (out of the total of 39 miles being proposed) would be placed on existing road alignments of unauthorized routes or alignments of previously decommissioned system roads. Proposed temporary roads were only located on decommissioned roads that had an aquatic risk rating of low to moderate, as defined in the Roads Analysis Report (2003). In certain instances, previously constructed roadbeds that cross riparian reserves would be used where the effects can be mitigated through the use of project design criteria. It is anticipated that several existing stream crossings over intermittent streams would need to be rebuilt or reused. See Section 3.5, Water Quality for more information regarding these crossings.

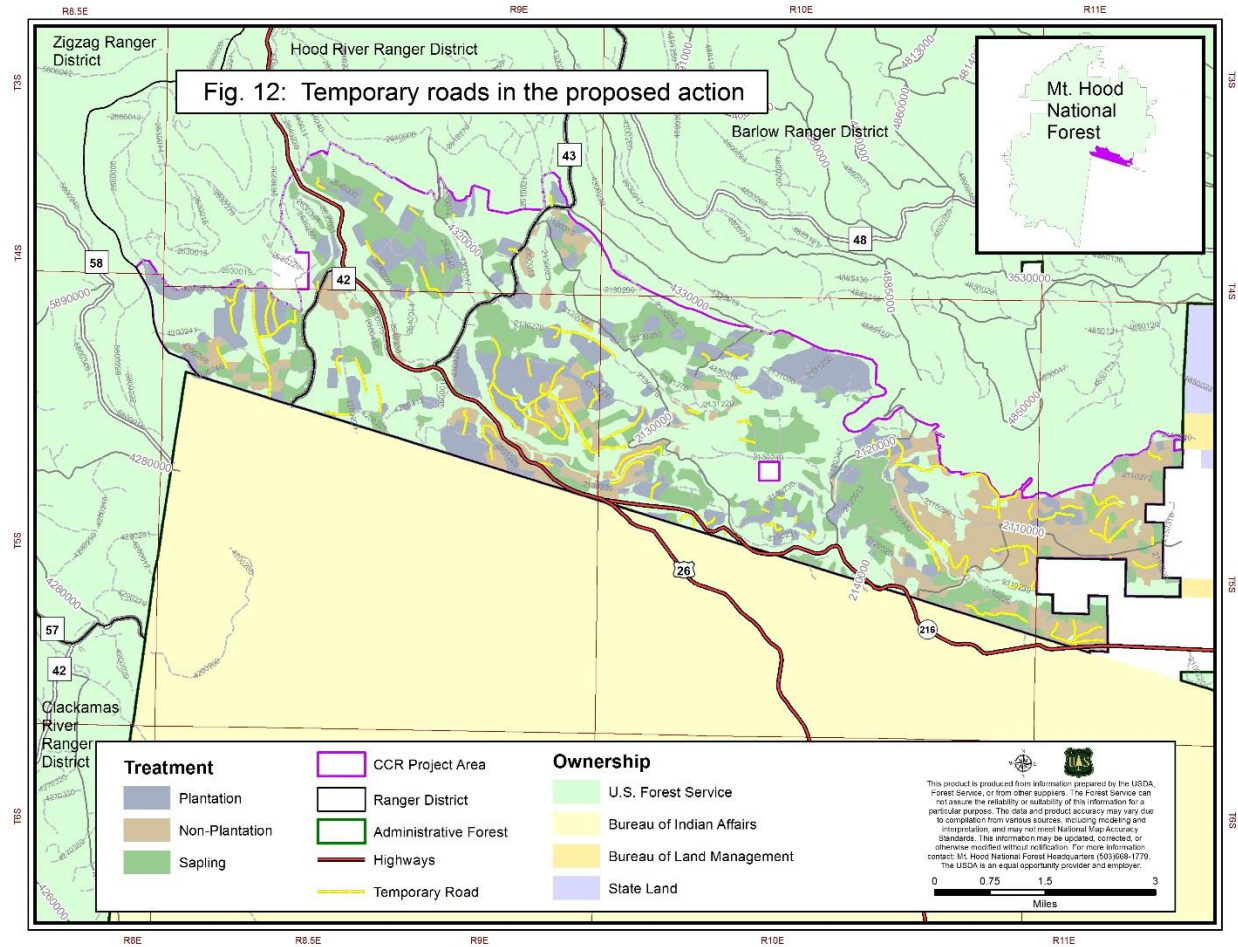
There are cases where it is not feasible or it is undesirable to use the same alignments of unauthorized routes or decommissioned system roads. In some places, in order to protect residual trees, soil, and water, new temporary roads are proposed where existing system roads or old alignments are not adequate for accessing strategic locations on the ground. Approximately 5.5 miles of new temporary roads (out of the total of 39 miles being proposed) are included in the Proposed Action. None of these temporary roads would be constructed within riparian reserves.

As mentioned previously, in some instances there are roads that were identified for converting to an OHV trail in the OHV Travel Management's Record of Decision (2010) that have not actually been converted into an OHV trail (i.e., decommissioned as a system road). Since little to no maintenance or reconstruction would be required to utilize these roads, the Proposed Action would use approximately 14.5 miles of OHV trail as temporary roads. Some of these OHV trails have signs placed designating them as motorized trails; however, no work has been completed to change the characteristics of the roadbed from a road to an OHV trail.

In sum, the Proposed Action would use approximately 19 miles of old road alignments for temporary roads; construct roughly 5.5 miles of new temporary roads; and use approximately 14.5 miles of OHV routes as temporary roads. The exact locations of temporary roads may change during the layout phase of this project, but the total mileage of the temporary roads would not exceed approximately 39 miles. Temporary roads are depicted on a map below; however, they may need to be adjusted during the layout phase. Any changes would have to meet the project design criteria.

⁵ Approximately 8.5 miles of the 19 miles of temporary roads proposed on existing alignments would be converted to OHV trails upon project completion. Converting these 8.5 miles of temporary roads to OHV trails was decided on in the OHV Travel Management's Record of Decision (2010).

Figure 12. Map of temporary roads



2.3 Project Design Criteria/Mitigation Measures

The National Environmental Policy Act defines “mitigation” as avoiding, minimizing, rectifying, reducing, eliminating or compensating project impacts. The following design criteria and mitigation measures are an integral part of this project and would be carried out if the project is implemented under the Proposed Action. The effects analysis in Section 3 is based on these project design criteria (PDC) and mitigation measures being implemented.

2.3.1 Vegetation

- 1) Gap size and distribution (i.e., location and number) would vary depending on stand-specific conditions and treatment types.
 - a) In plantations and non-plantations over 20 years of age, gap sizes would not exceed two acres and would maintain a minimum of 30% canopy cover in locations where there are species resistant to root rot. Gaps should be focused around current openings or areas with forest health concerns.

- 2) Tree planting could occur in gaps of two acres and interplanting would occur only where canopy cover is open enough to support the establishment of shade-intolerant and/or fire-resistant species (i.e., ponderosa pine, western larch, or western white pine).
- 3) Openings would be created in root disease pockets. Openings should be reforested in accordance with site conditions.

2.3.2 Fuels

- 4) Any mechanical slash piling would be done with equipment capable of picking up (grasping) slash material and piling (as opposed to pushing/dozing) thereby meeting the objectives of minimizing detrimental soil impacts. Grapple piles would be covered, to facilitate consumption of piled fuels. Piles should be approximately 6-feet wide at base and approximately 6-feet high as a minimum. An allowance for a small deviation from the stated dimensions would be made as long as this deviation does not jeopardize meeting any other stated goals. Any piling of slash will be kept separate from the chip material.
- 5) Chipped material would have to be spread to a depth of no more than 6 inches and ripped after spread along skid trails and landings.
- 6) All slash needs to be piled and managed, or removed by two years from contract completion (i.e., pile burning, complete pile burning, incineration, and chipping).
- 7) Hand piles would be constructed with enough fine fuels to allow for ignition during fall and winter months, and covered, to facilitate consumption of piled fuels. Piles need to be 6-feet wide at base, 6-feet high as a minimum⁵. An allowance for a small deviation from the stated dimensions would be made as long as this deviation does not jeopardize meeting any other stated goals.
- 8) Piles should be as compact and free of dirt as possible.
- 9) Slash piles should have a sound base to prevent toppling over and should be wider than they are tall. Pile branches with their butt-ends toward the outside of the pile, and overlap them so as to form a series of dense layers piled upon each other. Use a mixture of sizes and fuels throughout the pile. Piles should be kept compact and free of soil and noncombustible material, with no long extensions. Do not construct piles on stumps or on sections of large down logs.
- 10) Pile size and location should be such to minimize damage to residual trees. Piles should be located at least 20 feet inside the unit boundary. Piles should not be placed on or in the following areas: pavement, road surface, ditch lines, the bottom of ephemeral channels, or within perennial or intermittent stream protection buffers.
- 11) Low severity burns⁶ should constitute the dominant type of controlled burn within Riparian Reserves, resulting in a mosaic pattern of burned and unburned landscape.
- 12) Moderate severity burns⁷ are permitted in no more than 20% of Riparian Reserves to invigorate desirable deciduous species.
- 13) If control line is needed within Riparian Reserves; wet line, black line or pre-existing features (roads, trails, etc.) would be used to control prescribed fire perimeter.
- 14) No ignition for underburning should occur within Riparian Reserves.

⁶ Low severity burn is defined as: "Small diameter woody debris is consumed; some small twigs may remain. Leaf litter may be charred or consumed, and the surface of the duff may be charred. Original forms of surface materials, such as needle litter or lichens may be visible; essentially no soil heating occurs."

⁷ Moderate severity burn is defined as: "Foliage, twigs, and the litter layer are consumed. The duff layer, rotten wood, and larger diameter woody debris is partially consumed; logs may be deeply charred; shallow ash layer and burned roots and rhizomes are present. Some heating of mineral soil may occur if the soil organic layer was thin."

- 15) Where fire line is constructed, implement best management practices to reduce erosion and sedimentation risks, including constructing water bars on all fire lines during initial fire line construction where slopes are greater than 20%.

2.3.3 Roads

- 16) 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 would require additional signing to warn traffic of trucks entering onto or across the highway.
- 17) Temporary roads and NFS roads which are designated for 'project use only' would be closed to public use. The contractor should sign 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.
- 18) The use of steel-tracked equipment on asphalt or bituminous surfaced roads is strongly discouraged. If a suitable site for the loading and unloading of equipment and materials is not available, then use of a paved surface may be permitted provided that the contractor uses approved matting materials (such as wood chip or crushed rock) to protect the road surface. Contractor is responsible for restoring roads to existing condition.
- 19) Temporary roads and landings located on or intersecting NFS roads that are asphalt or bituminous surfaced would have 3-inch minus or finer dense graded aggregate placed at the approach to prevent surface damage. The contractor should purchase the material from a commercial source and place the material so that the approach flares are wide enough to accommodate the off-tracking of vehicles entering onto or leaving the site.
- 20) Temporary roads and landings would not obstruct ditch lines. Temporary roads and landings that obstruct ditch lines or drainage ways should be improved by the contractor, prior to commencing operations, with temporary culverts, French drains, drivable dips, or measures that provide effective drainage and prevent erosion.
- 21) On aggregate surfaced roads, mineral soil contamination degrades and reduces the load-bearing capacity of the existing road surface. All appropriate measures would be taken to prevent or reduce such contamination. If contamination occurs, the contractor should repair contaminated areas with specified aggregate surfacing.
- 22) Temporary roads and landings on temporary roads would be scarified before the unit is released. Culverts should be removed and cross-drain ditches or water bars would be installed as needed. Disturbed ground would be seeded and mulched and available logging slash, logs, or root wads should be placed across the road or landing surface. Post-harvest motorized access would be prevented through the construction of a berm, placement of large boulders, or other approved techniques.
- 23) Pit run rock may be used when necessary to reduce erosion, ponding, rutting, and compaction on temporary roads and landings. To provide an efficient substrate for vegetative growth and water infiltration, rock would be removed or incorporated into the soil by decompacting to a depth of 24" or scarifying the roadbed following harvest activities.
- 24) Unsuitable excavation (any excavated soil that is silty, sandy, saturated, frozen, or contains clay, organics, or other deleterious material, or is otherwise unsuitable for use in road construction and maintenance work) derived from road maintenance or construction operations would be disposed of only at Forest Service approved sites outside of 60' from nearest stream bank. Material disposed of should be spread evenly over an appropriate area in non-conical shaped piles with a maximum layer thickness of 4 feet. All disposals should be seeded and mulched at the completion of operations, and prior to the wet season. The wet season is the time of year with light to heavy amounts of precipitation occurring regularly characterized by

- saturated soils and higher stream flows; this includes all days of the year not considered to be the dry season.
- 25) Stockpiles of aggregate intended for use on the project would be staged only at Forest Service approved sites. Materials should be placed in non-conical shaped piles with a maximum layer thickness of 3 feet. Stockpiles should be covered with weighted plastic sheeting when inclement weather is expected to protect it from precipitation and to prevent water quality degradation from runoff.
 - 26) Existing vegetation in ditch lines hydrologically connected to streams (as defined in NWFP) must not be removed unless a sediment control feature such as biodegradable check dams constructed of bio-bags, straw bales, or other materials are installed. Sediment control features would be maintained until the sale is released and left in place.
 - 27) Scheduled soil-disturbing road maintenance or reconstruction should occur during the dry season, unless a waiver is obtained. Dry season is the time of year with light to moderate amounts of precipitation occurring sporadically, characterized by dry soils and lower stream flows, generally June 1 through October 31, but variable from year to year.
 - 28) Follow the appropriate Oregon Department of Fish and Wildlife (ODFW) guidelines for timing of in-water work (in this watershed the in-water work window is July 1 to October 31). Exceptions to the ODFW in-water work windows must be requested by the Forest or its contractors, and subsequently approved by ODFW, U.S. Army Corps of Engineers, and Oregon Division of State Lands.
 - 29) New temporary roads and landings should be located outside of Riparian Reserves. Use of existing facilities within riparian reserves may be allowed if erosion potential and sedimentation concerns could be sufficiently mitigated.

2.3.4 Log and Rock Hauling

- 30) Log and rock haul outside of the dry season would not occur on native surface roads.
- 31) Log haul, rock haul, and transport of heavy equipment may be allowed during the wet season on paved or aggregate NFS roads if approved by the District Ranger with input from the appropriate resource specialist(s), and the following criteria are met:
 - a) Haul routes would be inspected weekly or more frequently as weather conditions may warrant to determine the condition of the road to adequately support heavy haul without undue damage to the transportation resource or other natural resources. Alternatively, the responsible official may give written approval of haul during the wet season.
 - b) Sediment traps would be installed where there are potential sediment inputs to streams. Sediment traps would be inspected weekly by the Timber Sale Administrator (or other delegated qualified government representative) during the wet season and entrained soils would be removed when the traps have filled to 3/4 capacity. Dispose of these materials in a stable site not hydrologically connected to any stream.
 - c) Precipitation amounts, similar to those found during the dry season, are defined as follows: The daily precipitation level remains below the average daily maximum precipitation for the June through October period as measured at the precipitation gage nearest the project area; AND the two-week cumulative total precipitation remains less than the average maximum two-week precipitation levels during the June through October period as measured at the precipitation gage nearest the project area; AND no visible sedimentation is occurring in road ditches or culverts that can be attributed to the haul.
 - d) Haul would cease at any time there is 1.0 inch of precipitation or greater within any given 24-hour period as measured at the lowest elevation along the haul route. To

- measure precipitation, the contractor would install a temporary rain gauge on NFS land near or adjacent to the lowest elevation along the haul route as agreed upon; otherwise, precipitation would be measured according to a local RAWS station as agreed upon prior to beginning operations.
 - e) Haul would cease whenever 24 hours of continuous rain occurs regardless of measured precipitation amounts.
 - f) Haul on established snowmobile routes and haul during weekends and federal holidays would occur only with written approval from the Responsible Official as informed by the Forest Service recreation specialist.
- 32) Log haul and heavy vehicle transport on NFS roads would be prohibited when the temperature of the road surface, as measured at the lowest elevation along the haul route on NFS lands, is above 28 degrees Fahrenheit, and when the temperature as measured at the highest elevation on the active haul route is between 28 and 38 degrees Fahrenheit, or at any time when the designated Timber Sale Administrator determines that freeze-thaw conditions along the haul route exist.

2.3.5 Aquatic

- 33) No ground-based harvesting equipment such as tractors or skidders would be allowed within Riparian Reserves outside of the existing system roads and existing temporary roads.
- 34) Refuel mechanized equipment at least 150 feet from water bodies. Parking of mechanized equipment overnight or for longer periods of time would be at least 150 feet from water bodies or as far as possible from the water body where local site conditions do not allow a 150-foot setback. Absorbent pads would be required under all stationary equipment and fuel storage containers. A Spill Prevention Control and Countermeasures Plan would be prepared by the contractor as required under EPA requirements (40 CFR 112).
- 35) Use erosion control measures (e.g., silt fence, native grass seeding) where de-vegetation may result in delivery of sediment to adjacent surface water. Soil scientists or hydrologists would assist in evaluation of sites to determine if treatment is necessary and the type of treatment needed to stabilize soils.
- 36) Maintain physical and water quality integrity of facilities associated with the spring box and water tank for the Bear Springs water supply during operations.
- 37) Protect or enhance existing dry and wet meadows by not allowing new temporary roads, landings or ground based equipment.
- 38) Any discovered springs, wetlands (jurisdiction or non-jurisdictional) or streams would be provided a site index protection buffer determined by NWFP direction.
- 39) Any discovered fish-bearing streams in the project area would be provided a site index protection buffer determined by NWFP direction.
- 40) Vegetation treatment units would be implemented so that they are adequately spaced in time to result in Watershed Impact Areas (WIA) that are less than a threshold of concern of 35 percent based on the 6th level Hydrologic Unit Code (HUC).
- 41) Erosion control measures would be employed at quarries located within Riparian Reserves (i.e., Jackey Quarry and Alkali Quarry). Erosion control measures include, but are not limited to, infiltrating runoff into the ground so no surface runoff reaches the stream, use of settling ponds, use of erosion control berms and restricting sediment related activities to at least 100 feet from the stream channel.

2.3.6 Soil

- 42) All skid trails would be rehabilitated immediately after harvest activities. Existing landings not associated with temporary roads would have erosion control measures installed following fuels or reforestation treatments.
- 43) Ground-based harvest systems should not be used on slopes greater than 30 percent to avoid detrimental soil and/or watershed impacts.
- 44) Skid trails would be designated and approved prior to logging by the timber sale administrator and would be located on already-disturbed areas where available.
- 45) Where practical, skid trails would avoid ephemeral draws. Crossings would be perpendicular to ephemeral draws.
- 46) If a proposal to implement winter logging is presented, the following should be considered by the Line Officer if the ground is not frozen hard enough and/or insufficient snow depth to support the weight and movement of machinery in moist to wet soil conditions (these are based upon observations and monitoring of winter logging in Sportsman's Park):
 - a. the proposal should be considered on a unit by unit basis using soil types in the area since some soils may be more prone to detrimental damage than others;
 - b. because the margin of difference between not detrimental and detrimental soil damage can be so slim under moist to wet soil conditions, monitoring of the logging activity may need to occur daily, or more, as agreed to by sale administration and soil scientist;
 - c. equipment normally expected to traverse the forest, such as feller bunchers and track mounted shears, should be restricted to skid trails once soil moistures are such that even one or two trips are causing detrimental soil damage out in the unit (i.e., not on landings or skid trails); and,
 - d. due to higher PSI's than track-mounted equipment, no rubber-tired skidders should be used even on skid trails once soils become fully saturated (approach their liquid limit).

2.3.7 Wildlife

- 47) In the event that a new nest is located during the period of the contract, there would be no timber harvest activities, mechanical fuels treatments, or temporary road construction within 65 yards of a Northern Spotted Owl nest patch from March 1 to July 15.
- 48) No burnings may take place within 0.25 mile of a Northern Spotted Owl nest patch between March 1 and September 30.
- 49) No small helicopter operation within 150 yards of a Northern Spotted Owl nest patch from March 1 to September 30. Large (Chinook type) helicopters would not be used for this project.
- 50) No suitable habitat (unmanaged stands) removal would take place between March 1 and July 15.
- 51) No activities would take place within 0.25 miles of a Bald Eagle nest site between December 1 and July 15. The only known site in the planning area is no longer occupied; therefore, this would only apply if a new nest is located.
- 52) An average of six logs per acre in decomposition classes 1, 2 and 3 should be retained in Northern Spotted Owl suitable habitat where available. Logs should be relatively solid, retention of additional hollow and substantially fractured logs should be encouraged, and tops should generally not be included. Logs should be at least 20 inches in diameter at the small end and have a volume of 40 cubic feet. Prior to harvest, Contract Administrators would approve skid trail and skyline locations in areas that would avoid disturbing key concentrations of down logs or large individual down logs where possible.

- 53) Survey and Manage species needing protection would be designated on-the-ground prior to ground-disturbing activities occurring.
- 54) All activities associated with the Proposed Action including noise and smoke-generating activities would be restricted within one mile of a wolf den or rendezvous site from April 1 through July 15.
- 55) If a raptor nest is found, the area would be protected according to the buffers as defined by Forest Plan standards.
- 56) Maintain Forest Plan standards for snag retention.
- 57) No activities would take place in B10-Deer/Elk Winter Range land use allocation between December 1 and April 1. A seasonal restriction for hauling would be in place for roads in this land use allocation.
- 58) In the B5-Pileated Woodpecker/Pine Marten land use allocation, snag creation may occur when the following conditions are met: 1) It is not near an open road; 2) Snag size is 18' DBH and greater; and 3) It would occur after all fuel activities are completed.

2.3.8 Invasive

- 59) It is recommended that “pre-treatment” occur before any harvest activities are implemented along roads 2110, 2120, 2130, 2600, 4300, 4310, and 4330 road systems. Coordination for landing location and skid trails would occur with botanical staff for areas that have high concentrations of invasive species.
- 60) Coordinate with invasive weeds specialist and schedule the implementation of work from infestation-free areas into infested areas rather than vice versa. Equipment cleaning is required before entering and prior to leaving units that have an existing presence of invasive weeds.
- 61) In order to prevent the spread of invasive plants, all equipment would be cleaned of dirt and weeds before entering NFS lands. This practice would not apply to service vehicles traveling frequently in and out of the project area that would remain on the roadway.
- 62) If the need for restoration/revegetation of skid trails and landings is identified, the use of native plant materials is the first choice for meeting this objective where timely natural regeneration of the native plant community is not likely to occur. Non-native, non-invasive plant species may be used in any of the following situations: 1) when needed in emergency conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, 3) if native plant materials are not available, or 4) in permanently altered plant communities.
- 63) If using straw, hay or mulch for restoration/revegetation in any areas, use only certified, weed-free materials.
- 64) Inspect active gravel, fill, sand stockpiles, quarry sites, and borrow material for invasive plants before use and transport. Treat or require treatment of infested sources before any use of pit material. Use only gravel, fill, sand, and rock that is judged to be weed free by District or Forest weed specialists.
- 65) No underburning would occur on treated sites within one year of herbicide treatments including roadside herbicide treatments.
- 66) Where appropriate, a suite of activities including herbicide application, specific areas would be rested from grazing, weed treatment or other applicable activities would be applied pre- and post-treatment activities to limit invasive weed spread.
- 67) No application of herbicide outside of the road prism in the B5-Pileated Woodpecker/Pine Marten land use allocation.

2.3.9 Botany

- 68) Buffer populations of mountain lady slipper (*Cypripedium montanum*) within units 27, 30, 33, and 47 from mechanical harvest activity.
- 69) Create treatment skips at known sensitive fungi sites (multiple species). Maps would be provided to sale administration and fire crews. Preference is for spring underburn activities.
- 70) Treat noxious weeds in stands 2, 6, and 42 prior to and after implementation of proposed actions to reduce the potential for noxious weeds to spread into Wilderness.

2.3.10 Heritage

- 71) A 100-foot buffer zone for the exclusion of heavy machinery would be flagged around all cultural remains on significant heritage resource sites that are situated in areas scheduled for mechanical treatment.
- 72) Ditch crossings would be limited to previous crossings.
- 73) Fire control line would be constructed, using either wet line or hand line, around all fire-sensitive heritage resources.

2.3.11 Recreation

- 74) Developed recreation sites should not be used as landings or for equipment staging and any developed recreation sites impacted should be rehabilitated when treatment is complete.
- 75) Recreation specialist would develop public information materials and outreach plan using a combination of key entry/exit portals, visitor information boards, and outreach via websites and other information sources.
- 76) Implement appropriate temporary closures as necessary to provide for public safety. Post closures at all temporary road access points, and access portals during treatment period(s). Closures and re-route information would be posted at designated OHV trail heads, parking areas, campgrounds and at information kiosks when directed by recreation specialists. Information should also be disseminated to the public by recreation staff.
- 77) Ensure temporary roads not associated with OHV trails are decommissioned to impassible conditions when harvest activities are complete.
- 78) All logging operations which involve helicopter yarding over any roads or open trails would require traffic flaggers for public safety.
- 79) Clearly mark the Lower White Wilderness boundary along any units which abut the boundary. There would be no mechanized or motorized equipment operation within Wilderness, and any portions of trees which fell across the boundary would not be yarded out.

All Trails

- 80) Coordination with all special use permittees regarding location and timing of closure areas and impacted trails should occur during the year prior to implementation. Event calendar and desired routes, or possible reroutes, would be provided prior to contract award.
- 81) When possible, all mechanical brush piles and landings would be located at least 100 feet from trails not authorized for sale use. Hand piles would be located at least 50 feet from trails.
- 82) Within 100 feet of any system trail, skid trails should not run parallel to system trails for more than 100 feet, unless approved by Timber Sale Administrator.
- 83) All trails that intersect units would be flagged prior to thinning operations. Include trails as protected feature in sale map.
- 84) Stumps within five feet of trails would be cut less than three inches to reduce potential hazard to recreationists.

- 85) Whenever possible, any trees felled within one tree length of the trail would be felled away from the trail. Any trees which fell across the trail would be cut or removed to prevent blockage of trails.
- 86) Leave trees would not be marked facing the trail within 50 feet of any system trail.
- 87) Maintain all trail signage, and repair any incidental damage that may occur from operations
- 88) Any trail or trail crossing used for operations (temporary roads, skid trails, fireline, landings, etc.) would be rehabilitated to meet standards associated with its designed use.
- 89) Temporary roads, skid trails, or equipment crossing system trails should be minimized. Any crossing points should be 100 feet apart and occur at right angles to the trail. Location of crossing points should be coordinated with the District Trail Manager.
- 90) Barriers to discourage OHV access off-trail would be installed on any equipment, temporary road, or skid trail crossings of system or non-system trails.

OHV System Trails

- 91) Treatment activity should not impact approximately more than 25% of OHV trails or mixed-use roads at one time; and, scattered, concurrent trail closures should be avoided.
- 92) When possible, maintain higher retention (60% canopy) within 50 feet of system trails designated for OHV use.

Non-Motorized System Trails

- 93) On non-motorized trails, a 100-foot shade buffer would be retained on either side within the planning area. Minimize ground-based yarding within the 100-foot buffer.

2.3.12 Visuals

Stands with a Modification VQO

- 94) Piles should be burned after contract termination.

Stands with a Partial-Retention or Retention VQO

- 95) Temporary roads, landings, piles and skyline corridors should, to the degree practicable, use topographic and vegetation screening as to not be visible from primary travelways (i.e., Highway 26, OR 216 and the White River) and developed recreation sites.
- 96) Piles would be burned within one year of contract termination.
- 97) Landings should be located away from open roads whenever possible. Revegetation of landings and temp roads should begin within one year of contract termination.
- 98) Tree stumps should be cut at heights of six inches or less.
- 99) Leave tree marking, stand tags, and boundary tree marking should not visible within 100 feet of the roadway when treatment is complete.

Foreground stands visible from travelways with a retention VQO

This includes B2-Scenic Viewshed stands visible from Highway 26 or OR-216: 47, 85, 87, 134, 159, 208, 233, 260, 319, 360, 422, 423, 470, 475 (portions), 476 (portions), 501, 502, and 504. This also includes portions of stands visible, and not screened by topography, within 660 feet of visual sensitivity level II trails (#490; #490A; #487): 73, 74, 89, 90, 95, 96, 145, 174, 175, 232, 235, 242, 269, 277, 347, 472, 473, and 47.

- 100) Variable density thinning should be equal to or above 50 ft².
- 101) Sapling stands should not be thinned below 162 trees per acre.
- 102) Mastication should not be used as a treatment method for units: 47, 89, 90, 96, 145, 473, 134, 159, 175, 422, 423, 470, 475, 476, and 504.

- 103) Temporary roads, landings, piles and skyline corridors should, to the degree practicable, use topographic and vegetation screening as to not be visible from designated travelways once harvest activities are complete.
- 104) Temporary roads should only intersect with designated travelways when there are no other viable options. The number of temporary roads which intersect with Highway 26 and OR 216 should be minimized.
- 105) Hand piles are preferred. Any machine-piling should not be visible from the road, or should be located as far away from the road as possible.
- 106) All piles would be completely burned within one year of contract termination.
- 107) Landings should not be visible from designated travelways, or should be located as far away from the highway as possible. If a landing must be placed within 100' of a designated travelways it should not exceed ¼ acre.
- 108) Active revegetation and rehabilitation should begin within one year of contract termination for all landings, temporary roads, fire line and skid trails.
- 109) Tree stumps should be cut at heights of six inches or less; should be angled away from the roadway; and should be covered with duff or topsoil to assist with decomposition.
- 110) Leave tree marking, stand tags, and boundary tree marking should not be visible from the designated travelway when treatment is complete.

2.3.13 Range

- 111) Protect existing range improvements.
- 112) Within one tree length, fall trees away from existing corrals, water developments and range fencing.
- 113) Coordinate with range staff when implementing prescribed fire activities to protect existing range improvements.

2.4 Monitoring Requirements

After the presale work for the timber/stewardship contract is completed, the project moves into the appraisal and contract preparation phase. One of the first steps in the process is to complete the contract project design and implementation crosswalk form. The purpose of the crosswalk is to ensure that all components of the NEPA Decision Notice, including the PDC, Best Management Practices, and terms and conditions from consultation, are incorporated into the timber/stewardship contract. For each required component of the NEPA decision, the crosswalk identifies how and what stage in the process the component would be addressed (e.g., presale, contract, sale administration, post contract monitoring). The information generated from the cross-walk process is used to guide the contract preparation process and to identify any issues that need to be addressed by resource specialists. The crosswalk is usually prepared by the primary person responsible for developing the appraisal and contract, and signed by the District Ranger.

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

Prior to advertisement, a final review is conducted by the interdisciplinary team and the Forest Service Representative (FSR)/Contracting Officer in order to ensure that the contract is prepared with the proper contract provisions and language; the PDC 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.

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

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

Lastly, monitoring is also conducted at the Forest level as part of the Forest Plan implementation, including monitoring of noxious weeds and best management practices. 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. Monitoring reports including these findings as they are available can be found on the Forest's web site at: [Mt. Hood National Forest](#).

Best management practices monitoring may be conducted on projects after treatment is complete. According to The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012), monitoring is one of four steps outlined in the BMP process. Monitoring is used to inform and improve management activities and share with other appropriate Federal, State and local agencies. The Technical Guide states "The Forest Service Nonpoint Source Strategy uses "programmatic monitoring" to evaluate BMP implementation and effectiveness; that is, aside from project administration described above, BMP are not monitored on every project or activity that occurs on NFS lands.

Projects to monitor or specific monitoring sites are selected in a manner that results in objective and representative data on BMP implementation and effectiveness. Often, a random or systematic random selection procedure is used to choose monitoring locations across a forest or grassland where specific activities or Pre targeted." This project would go into a pool of similar projects to be selected for project level BMP implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. If selected, an interdisciplinary team would evaluate whether the site-specific BMP were implemented and the effectiveness of the BMP. Monitoring for each BMP is outlined in Appendix 2: Best Management Practices for Water Quality Protection.

2.5 Other Alternatives Considered

Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. There is some overlap with the concerns discussed in Section 1.8; however, the following describes these in further detail.

Forest Products

Some commenters stated that the Forest should consider including more acres to treat in order to provide greater fuels reduction across a broader landscape and to provide more forest products to the local economy. When the Forest initially began planning this project, it identified more acres that could be treated to provide forest products. In this alternative, approximately 15,122 acres were considered for treatment. However, this alternative was not considered in detail because of the Forest's desire to address the recommendations of the Revised Recovery Plan of Northern Spotted Owl (USFWS 2011).

On page III-16 of the Recovery Plan, it states, "Results from studies suggest that active management projects should explicitly evaluate the short-term impacts to spotted owls and their prey while considering the long-term ecological benefits of such projects, especially in spotted owl core-use areas" (USFWS 2011). The recommendations in the Recovery Plan include avoiding high value habitat, while meeting long-term restoration goals; and in particular, older forest within the core-use area. Also, page III-34 of the Recovery Plan provides guidance that states vegetation management treatments should be emphasized outside of spotted owl core areas where consistent with overall project goals (USFWS 2011). Because the purpose and need for this project is to provide forest products where there is an ecological need to restore and enhance resiliency, the original Proposed Action was updated to remove treatment sites within spotted owl core areas. Section 3.9 further discusses desired threshold levels and spotted owl core areas.

The Proposed Action has been further updated in this EA to more accurately address Recovery Action 32 of the Recovery Plan (USFWS 2011). An additional 605 acres has been removed from treatment because these acres meet the criteria as defined in Recovery Action 32. In sum, this alternative was not analyzed in detail because it did not meet certain recommendations of the Recovery Plan. Currently, the Proposed Action, as updated in this document, provides a balance of meeting the project's objectives for providing forest projects, enhancing forest resiliency, and managing fuels conditions, as well as meeting regulatory direction necessary for the recovery of an ESA-listed species, in which an alternative that treated more acres did not.

Northern Spotted Owls

Comments expressed concern about the impacts of the project to Northern Spotted Owls and their designated critical habitat. In contrast to the alternative described above, some members of the public were also interested in the Forest considering an alternative that treated less acres. However, this alternative was eliminated from detailed study for the following reasons:

- The updated Proposed Action provides a balance of meeting the project's purpose and need and the recommendations in the *Recovery Plan* by removing all treatment activities from spotted owl core areas to maintain above threshold levels and removing locations that meet the habitat conditions described in Recovery Action 32.
- Although the Proposed Action would result in less dispersal and suitable habitat for the spotted owl, the analysis shows that there would still be enough habitat on the landscape to maintain the species' persistence.
- The direction provided in the *Recovery Plan* at pages III-20 and III-68 recommends land management agencies to actively manage habitat to retain spotted owl habitat. For example, the

Recovery Plan states that Forests should “actively manage habitat to meet the overlapping goals of spotted owl recovery, restoration of dry forest structure, composition and process including fire, insects and disease (USFWS 2011; p. III-68).

An alternative that treated fewer acres was not considered in detail because it did not provide any additional assurance that spotted owl habitat would be retained on the landscape. Also, this alternative would not meet the recommendations of the Recovery Plan for land managers to actively restore forest ecological structure and alter fire behavior and severity (USFWS 2011; p. III-20). Because the Proposed Action strikes a balance between the need to provide forest products and establish a more resilient forest with providing adequate protection for the spotted owl’s habitat, an alternative that treated less acres was not considered further.

Temporary Roads

Some commenters stated they had concerns about using temporary roads or reopening old road alignments to access treatment areas where vegetation had begun to re-establish. More specifically, the concern is that temporary road construction would introduce sediment to streams, thereby impairing water quality and aquatic resources. In response to potential sediment delivery to waterbodies, the Forest considered an alternative that eliminated temporary road construction within Riparian Reserves since this is where sediment is most likely to be transported to waterbodies. In this alternative, approximately 1.9 miles located within Riparian Reserves would be removed from the Proposed Action, which would result in removing access to approximately 700 acres. The suggested alternative was considered but not fully developed because of the following factors.

- First, the temporary roads proposed within the Riparian Reserves would be on existing, old road alignments or roads recently converted to motorized trails. Since the 1.9 miles of temporary roads within Riparian Reserves would be on previously disturbed areas, the Eastside District Hydrologist confirmed that any potential delivery as a result of utilizing these access points would be minimal in the short term. Additionally, the analysis indicated that the contribution of sediment to streams within Riparian Reserves would be improved in the long term in relation to the existing condition.
- Implementation of PDC and BMP that include installation of erosion control measures to minimize or eliminate sediment delivery into streams would further reduce the risk of sediment introduction. The probability of any degradation to water quality or fisheries resources caused by sedimentation due to temporary road construction would be minimal. The PDC and BMP included in this project would provide additional assurance that effects in the short term would be minor.
- Lastly, a wetland included in the National Wetland Inventory System could not be located during field reconnaissance. Although considered as part of the Riparian Reserve, approximately 0.12 miles of the 1.9 miles of temporary road construction would not result in any sediment contribution to a waterbody since a wetland does not actually exist at this site.

In sum, since the measurable effects to water quality and aquatic resources would be similar in this alternative and the Proposed Action, it was not considered in detail any further. For a full analysis of the effects to water quality from temporary road construction, see Section 3.6. Also, for the effects to aquatic resources from temporary road construction, please see Section 3.8.

Open Road System

Several commenters proposed specific roads to be closed or decommissioned to meet Forest Plan standards and reduce the potential impact to wildlife. Some of the suggestions included the following

Forest System Roads: 2610-020; 4310-260; 4310-261; 2120-013; 2120-330; 2120-017; 2120-370; 2110-280; 2110-021; 2110-020; and the end of 2110, 2110-270; 2110-272; 2110-220; 2130-281; 4885-150; and 4885-155.

A thorough consideration of the site-specific conditions and uses of each road was conducted to develop the Proposed Action, and roads listed by commenters were found to either be addressed in a previous NEPA document or needed to remain as open roads. However, after the comment period, the IDT re-considered whether or not an alternative could be considered that closed the roads requested by the public by examining each road in relation to: the 2015 Travel Analysis Report, on-the-ground conditions, current NEPA status, maintenance needs of the road related to this project, and the potential need for the road to be used in the future. Upon further review, the Forest concluded that this alternative did not need to be considered in detail because:

- Of the roads requested by the public to be closed, only two of them (2130-281 and 2110-220) within the planning area do not have previous NEPA decisions to be decommissioned, closed or converted to motorized trail. Since the majority of the roads requested for closure already have past NEPA decisions, they do not need to be re-analyzed in this document and therefore, were not considered as part of an additional alternative analyzed in detail. Even though many of these roads with past NEPA decisions have not been implemented, the intent of this project is to honor those past decisions and effectively close those roads upon completion of this project. This is further discussed in Section 2.2.3.
- Regarding Forest Road 2110-220, it provides access to private land; therefore, after communication with the private landowner, it was not considered further for decommissioning or closure.
- Regarding Forest Road 2130-281, upon re-evaluation, the Proposed Action has been updated to change this road from a Maintenance Level 2 to a Maintenance Level 1. Since the Proposed Action has been updated to reflect this change, it does not need to be analyzed as a separate alternative.
- The Proposed Action for this project would close additional miles of road, thereby further reducing the open road density within the planning area. Specifically, the Proposed Action would decommission approximately 0.7 mile of road and close approximately 5.6 miles of road, which would effectively reduce the open road density from 2.6 miles per square mile to 2.5 miles per square mile. Additionally, this project would not result in measurable effects to wildlife species. Section 3.9 discusses the transportation system's potential impacts to wildlife. Since this project already reduces the open road density and the effects to wildlife species were found to be minor, further reducing the open road density was not considered in detail further.

While an alternative was considered that closed additional miles of roads, in particular roads 2130-281 and 2110-220, it was determined that development of a wholly separate alternative to be considered in detail is not necessary because the Proposed Action follows the recommendations of the Travel Analysis Report (2015); the Proposed Action has been updated to close 2130-281; and the Proposed Action already reduces the open road density.

2.6 National Forest Management Act Findings for Vegetation Manipulation

As required by regulations (FSH 1909.12 5.31a), all proposals that involve vegetative manipulation of tree cover for any purpose must comply with the seven requirements found at 36 CFR 219.27(b). All of these requirements are met by the project, as documented in the project record. As a pre-cursor to the silvicultural diagnosis process, stand examinations are conducted to determine existing stand conditions, and a determination of suitability (in regard to management of the stand for timber production) is made for each stand. Stands proposed for harvest treatment were examined for suitability in accordance with 36 CFR 219.13, timber resource land suitability. Stands were found to be suitable for timber management based upon the following:

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

In sum, all silvicultural activities would be implemented only on lands meeting the definition of forest land (16 U.S.C. 1604) and designated as suitable for timber production by the Forest Plan.

2.7 Best Management Practices

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

According to the NWFP, BMP would be incorporated into the implementation of the project. BMP are drawn from General Water Quality BMP, Pacific Northwest Region (November 1988); Draft Environmental Protection Agency Region 10 Source Water Protection BMP for USFS, BLM (April 2005); the Forest Plan standards and guidelines, Northwest Forest Plan standards and guidelines and The National BMP for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012) and professional judgment. The BMP have been adjusted and refined to fit local conditions and then incorporated in the PDC/mitigation measures as described in Section 2.3 as well as the standard contract language for implementing these projects. According to the USFS National Core BMP Technical Guide (April 2012) “Site-specific BMP prescriptions are developed based on the proposed activity, water quality objectives, soils, topography, geology, vegetation, climate,

and other site-specific factors and are designed to avoid, minimize, or mitigate potential adverse impacts to soil, water quality, and riparian resources. State BMP, regional Forest Service guidance, land management plan standards and guidelines, monitoring results, and professional judgment are all used to develop site-specific BMP prescriptions.”

Appendix 2 of this EA details the site-specific BMP for water quality for this project. The appendix includes all the required components of the site-specific BMP as specified in Appendix H of the Forest Plan, including BMP title, objective, explanation, ability to implement, effectiveness, and monitoring. In addition, the site-specific BMP table provides a cross-walk with the PDC and planning process. The refined BMP selected for this project have been found to be implementable and effective based on prior field observations and professional judgment, other pertinent research described in Section 3 of this document, and monitoring on the Forest. These BMP are fully analyzed in Section 3 of this document (see Section 3.6, Water Quality and Section 3.7, Fisheries & Aquatic Fauna).

3. Environmental Consequences

This section presents information on the physical, biological, social, and economic environments of the affected planning area, and the potential direct, indirect and cumulative effects to those environments due to the implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in Section 2. The National Environmental Policy Act defines direct, indirect and cumulative effects as:

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

This Environmental Assessment incorporates by reference the project record (40 CFR 1502.21), including specialist reports, biological evaluations, and other technical documentation used to support the analysis and conclusions in this Environmental Assessment. Analyses were completed for vegetation resources, transportation resources, soils, water quality, fisheries, wildlife, botany, invasive plants, recreation, visual quality, fuel, range, and heritage resources. A Biological Assessment was completed for the Northern Spotted Owl, gray wolf, and Oregon spotted frog. Full versions of these reports are available on the Forest's website and in the project record, located at the Barlow Ranger District office in Dufur, Oregon.

Each of the analyses conducts cumulative effects analysis resulting from this project. Table 11 lists projects considered in the cumulative effects analyses.

Table 11. List of projects considered in the cumulative effects analyses

Past Activities
Timber harvests on federal, county and private lands (including associated road/landing construction)
Road decommissioning and road closures
Aquatic restoration projects
Hi Lynx EA
Bear Knoll Thinning EA
Path EA
Rock EA
Osprey EA
Camas Fencing Project
Ongoing Activities
Timber harvests on federal, county and private lands (including associated road/landing construction)
Road decommissioning and road closures
McCubbins Gulch OHV trail construction and maintenance
Pre-commercial thinning
National Forest system road and trail maintenance
Site-specific noxious weed treatments
Bear Springs Plantation Thinning EA
White River allotment management
Highway 26/216 road maintenance and sanding
Utility corridor operations and maintenance
Special uses (ditches) permits
Snowmobile use
Recreation events permits
Warm Springs fuels reduction projects
Developed and dispersed campsites operations and maintenance
Future Activities
Timber harvests on federal, county and private lands (including associated road/landing construction)
Bear Spring's Conveyance

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 Vegetation Resources

Summary - This section summarizes how vegetation would be affected by the Proposed Action. Stand-level data was utilized in determining the project's potential effects. Generally, the Proposed Action would have a beneficial effect to forest stands both at the site-specific and landscape scale in the short term and long term. Proposed vegetation treatments would help to create stands more resilient to disturbances such as insect, disease, and fire, while also enhancing long-term stand productivity and vigor.

This section summarizes the Silviculture Report which is incorporated by reference.

3.1.1 Analysis Assumptions and Methodology

Information regarding the vegetative conditions of the larger landscape within the project area is largely provided by White River Watershed Analysis. The Existing Condition section below provides an additional summary of this landscape information as related to the project. The analysis area boundary for

disclosing effects at the site-specific level is comprised of the several subwatersheds (including the Clear Creek, Middle Beaver Creek, Wapinitia Creek, and Middle White River) within the White River watershed.

A review of the original ecological conditions was completed in 2017 to ascertain if there has been any large scale or excessive changes to existing conditions described in the White River LSR Assessment. With the use of Gradient Nearest Neighbor (GNN), stand evaluations, insect and disease aerial detection surveys, and past fire history it was determined that the existing condition used as a baseline in the White River LSR Assessment is still valid. Stand prescriptions for the units within the LSR would follow silvicultural direction outlined in the White River LSR Assessment.

Stand records and field surveys conducted in the 1970's, 1980's, 1990's, 2000's, including 2016 were used in this analysis. Data collection and modeling analysis was completed by conducting Common Stand Exams (CSE) within the project area, along with data collected from Forest Service vegetation module, the Forest Vegetation Simulator (FVS), which was used to model forest growth.

Forested Plant Associations of the Oregon East Cascades and Westside Central Cascades of Northwest Oregon were used to analyze the effects of proposed treatments, and stand structure types were used to describe landscape and stand conditions. Plant association classification describes repeating patterns of plant communities that indicate different biophysical environments. The combinations of factors such as moisture and temperature regimes, light, and soil nutrients provide optimal growth conditions for a certain group of plant species. Stand structure types, as described by Larsen and Oliver (1996), were used to describe landscape and stand conditions. Stand pattern is described as the spatial and temporal distribution of trees and other plants within a given stand.

3.1.2 Existing Condition

The project area occurs within the White River watershed. The proposed treatment area is in two different moisture regimes (dry mixed-conifer and moist mixed-conifer) largely in six dominant plant associations:

1. Grand fir/vine maple (*Acer Circinatum*)/vanilla leaf (*Achlys triphylla*) (A1)
2. Grand fir/oceanspray (*Holodiscus discolor*) (A2)
3. Douglas-fir/common snowberry (*Symphoricarpos albus*) (A3)
4. Ponderosa pine/bluebunch wheatgrass (*Agropyron spicatum*) (A4)
5. Western hemlock/vine maple/vanilla leaf (A5)
6. Pacific silver fir (*Abies amabilis*)/ vine maple/ vanilla leaf (A6)

The project area also includes two additional plant associations, which are a mix of species in both moist mixed-conifer and dry mixed-conifer (A7 and A8) areas. A7 makes up less than 3% of the proposed treatment areas and have similar characteristics to the other above mentioned dry plant communities. A8 makes up less than 8% of the proposed treatment areas. Common to the drier mixed-conifer plant associations (refer to Table 12) the overstory would be dominated by Douglas-fir and ponderosa pine with minor components of grand fir and the understory would be dominated by a variety of shrubs like Oregon-grape (*Berberis nervosa*), serviceberry (*Amelanchier alnifolia*), oceanspray, vine maple, greenleaf manzanita (*Arctostaphylos patula*). Currently ponderosa pine is represents 40% of the overstory component with a high shrub component present in the stands that were a part of past harvesting activities. Stands with limited entry over the last century have very little to no understory component. Common to the moist plant associations (refer to Table 12) the overstory would be dominated by Douglas-fir, Pacific silver fir and western hemlock and the understory would be a mix of vine maple, vanilla leaf, and bigleaf huckleberry (*Vaccinium membranaceum*). There is a wide range of site productivity within the project area, with site indices between 75 to 95 feet on low productive sites and 95

to 140 feet on the higher productive sites. Site index is the average height of the dominant and codominant trees on the site, at a given age or base age. The base age for the above mentioned site indices is 100 years. They are usually found on moderate slopes with an average elevation between 3,400 to 4,400 feet within moist mixed-conifer and 2,800 to 3,400 feet within the dry mixed-conifer. There are other plant associations in proposed treatment areas within the project area (refer to Table 12).

Table 12. Existing acres by plant association within proposed treatment stands

Stand Group	Plant Community	Plant Association	Acres within proposed treatment areas
A1	Dry Mixed-Conifer	Grand fir/vine maple/vanilla leaf	2,557
A2	Dry Mixed-Conifer	Grand fir/oceanspray	1,122
A3	Dry Mixed-Conifer	Douglas-fir/common snowberry-ninebark	1,204
A4	Dry Mixed-Conifer	Ponderosa pine/bluebunch wheatgrass	1,490
A5	Moist Mixed-Conifer	Western hemlock/vine maple/vanilla leaf	2,985
A6	Moist Mixed-Conifer	Pacific silver fir/vine maple/vanilla leaf	2,425
A7	Dry Mixed-Conifer	Other Dry Mixed-Conifer PAG mix	466
A8	Moist Mixed-Conifer	Other Moist Mixed-Conifer PAG mix	1,013
TOTAL			13,262
Acreages are rounded and may not agree with overall acreage due to approximations from GIS.			
Units may be comprised of more than one plant association.			

Currently, the project area contains several stand types and conditions with varying age ranges (

Table 13). For stands with heavy past management activities stand conditions range from under 30-year-old plantations to over 80-year-old plantations. In both plant communities the majority of the young plantations have not moved out of the stand initiation stage and are dominated by small size material. Within both plant communities the majority of the older plantations are in the stem exclusion stage and are dominated by small to medium size material.

In the stands that have had past thinning or no harvest activities stand conditions vary depending on plant community. Within the moist mixed-conifer, the majority of stands are in understory reinitiation stage, and are dominated by medium- to large-sized material. These stands also range in age from 50-250 years old. Regeneration in these stands is dominated by shade tolerant species like grand fir, Pacific silver fir, and western hemlock and is averages around 600 trees per acre (TPA). Within the dry mixed-conifer, the majority of stands range in the stem exclusion and understory reinitiation stages and are dominated by medium- to large-sized material. Regeneration in these stands is dominated by shade-tolerant species like grand fir and Douglas-fir, and is averaging around 500 TPA. Common to both communities the stands have an abundance of ladder fuels built up in the understory with very little to no shrub component.

On average, the proposed treatment units are below Forest Plan standards for snags (FW-215). Currently, there is roughly one snag per acre in the moist mixed-conifer and one snag per acre in the dry mixed-conifer stands that are 20 inches DBH and larger. On average the proposed treatment areas have an estimated two snags per acre in the moist mixed-conifer and two snags per acre in the dry mixed-conifer stands 11 inch DBH trees and larger.

Table 13. Existing and desired percent of stand structure within moist and dry mixed-conifer areas of the project area

Stand Structure	Existing Moist Mixed-Conifer	Desired Moist Mixed-Conifer	Existing Dry Mixed-Conifer	Desired Dry Mixed-Conifer
Stand Initiation	15%	8%	16%	0%
Stem Exclusion	51%	5%	50%	0%
Stand Reinitiation	13%	21%	8%	0%
Mature Stem Exclusion	4%	30%	3%	4%
Late-Seral Multistory	<1%	36%	0%	94%

Ecological processes and disturbances directly affect the diversity of plant and animal communities within an area over space and time. Ecological processes and disturbances include nutrient and biomass cycling, forest succession (the change in vegetation over time), weather events (i.e., windstorms), insects, pathogens, fire, and human influences (i.e., timber harvest).

Insects and diseases are natural elements of the ecosystem and can exert equal, if not greater, influence on forest development and conditions than fire. Most of these organisms have co-evolved with their host species over thousands of years. The balance between forests and their major pathogens is dynamic and fluctuates through time. Over time past management practices and a lack of small scale or low intensity disturbances have created densely stocked stands. Stand density has been found to exert a strong influence on forest susceptibility to insects and diseases (Powell, 1999). In addition to native species, there are also non-native insects present in the project area including the balsam woolly adelgid (*Adelges piceae*), which has the potential to slowly eliminate true fir species from the ecosystem. Over time, tree mortality within the Proposed Action treatment areas have been influenced by Douglas-fir beetle, Mountain pine beetle, Western pine beetle, dwarf mistletoe and root disease. Timber harvesting has also contributed to the change in vegetative conditions that have occurred across the project area as well as the rest of the White River watershed.

3.1.3 Effects Analysis

The baseline condition against which changes to the vegetation after thinning treatments would be measured is the existing condition. Criteria used to determine effects on vegetation include:

1. Total acres treated and acres treated within each affected plant association;
2. Changes in forest structure and composition;
3. Effects on residual trees; and,
4. Effects on insect and disease processes and forest vulnerability to these elements.

The proposed roads treatments and all required PDC have no direct or indirect effects to the vegetation. As such, this section only analyzes the impacts of the vegetation management treatment.

No Action Alternative

With no action, there would be no direct effects to the vegetation at the landscape or site-specific scale in the short term. Existing condition, as described above, would be maintained with little change in the current condition relative to forest structure and composition, residual tree densities, or insect and disease processes. In the long term, with no vegetation treatments, the stands would remain in dense overstocked

conditions with no mosaic reinitiation of understory. Risk of uncharacteristically high levels of insect and disease mortality would remain high. Stand density would also continue to increase.

Proposed Action Alternative

At the landscape scale the total effects for this project would be minimal. The total acreage treated represents 7% of the White River watershed. Because the Proposed Action Alternative treats a large portion of the dense dry mixed-conifer plant community within the project area, it moves the overall landscape vegetation towards a condition that would have occurred under natural small and large scale disturbance regimes. The probability of an epidemic level of insect and disease activity across the landscape would be decreased. Stands would be moved to more historic vegetation composition and stand structure, which would help ensure that key ecosystem elements and processes are sustained. The acres of late seral and mature stand classes would remain very similar after treatment, due to the fact that stands would be thinned and would retain the majority of the large overstory trees.

At the site-specific scale, the proposed treatment acres would thin from below using variable density thinning. Over the first fifty years after treatment several forest types would be moved from mostly dense, closed canopy stem exclusion and mature stem exclusion stages towards more open, less dense conditions, stand reinitiation, or open, mature stages within both moist mixed-conifer and dry mixed-conifer. These conditions would have moderate to low canopy cover with openings large enough to stimulate natural regeneration of shade-intolerant tree and shrub species within both plant community types. Species diversity in the overstory, seedling, sapling, and shrub layers is essential to the six dominant plant associations mainly present in the treatment areas. However, in the short term, overstory species diversity would remain limited. Over time, as a diversity of species regenerate and become established, the overstory diversity would increase. By creating openings with variable density thinning, more shade-intolerant trees and shrubs species can become established.

In variable density thinning, selected trees of all sizes down to saplings (i.e., three inches or less in diameter) would be removed. The focus would be on leaving the most vigorous, healthiest trees, and favoring shade-intolerant, more fire-tolerant species. Thinning from below must retain some young trees of desired species if stands are to retain a healthy age structure (Perry et al., 2004). Overall, the average stand diameters would be maintained or increased (Lindh and Muir, 2004).

Fifty years after the Proposed Action Alternative has been implemented, the stand structure would graduate toward a multistory late-seral stage. With vegetation treatments, the stand would be of mosaic understory reinitiation, and mature, open-and-closed stand structures. Over time, stand density would move back into current conditions, with stand structure and composition having more diversity in the overstory and understory, including tree, shrub, forb, and herbaceous species.

After thinning, there is a short term increased risk of bending and breakage of the residual trees from snow loading and windthrow. Trees that have grown for many decades in densely stocked conditions and are relatively small in diameter as a result (i.e., less than nine inches DBH), along with topography, and soil are often more vulnerable to these effects if a thinning occurs and the surrounding “supporting” trees are removed (Mitchell, 2000). However, based on past treatments in similar site conditions and with a comparable treatment density, it is not expected that these effects would be of concern in this area. Utilizing mechanized equipment in stands increases the risk of damage to residual trees from equipment strikes. However, residual tree spacing would be sufficient to allow machinery adequate room to maneuver, which should reduce damage to residual trees.

Within thinning units, there would be few direct effects on existing suitable snags (11-inch DBH and 10 feet tall), as snags would be maintained unless they pose a health and safety risk. In the long term, with

the proposed treatments, stands would be provided a greater number of larger green retention trees for future snag recruitment. Snag densities of trees 20-inch DBH and greater would increase in the future, moving the stands closer to Forest Plan snag density standards (FVS modeling).

By creating less-dense stands with less inter-tree competition, residual trees would benefit from the increased availability of resources. With the increase, trees should be more vigorous and less susceptible to large scale insect outbreaks. Small scale insect activity would continue, including the balsam wooly adelgid, due to the availability of noble fir in plantations. Treatments would favor removal of susceptible species to insect, root rot, and other less fire resistant species. This would create stands that help buffer the effects of outbreaks. Also, with healthier more vigorous trees, mortality resulting from these disturbances would be reduced. Treatments would lower the stand density and would prolong the time they remain at a lower risk of density-related mortality and insect and disease activity.

A direct reduction in dwarf mistletoe populations would occur within treatment areas under the Proposed Action Alternative. This would occur mostly because many of the trees currently being parasitized by dwarf mistletoe would be targeted for removal from the site during the thinning treatment. Dwarf mistletoe would not be eradicated from the project area, but incidents in treated stands would be reduced.

Thinning and small patch openings would reduce root-to-root contact of susceptible species and promote the growth of resistant species or species that have an increased tolerance to root disease, thereby reducing and isolating spread rates and areas. Trees with improved vigor would be more resistant to root disease, as well as the commonly associated insects. Root disease would still remain in the project area, but patches of forest would be restored to include a component of historically present species with natural resistance (Carlson et al. 1995). Treating the root rot pockets with patch cuts and encouraging the growth of root rot resistant species would improve species diversity, move the stand composition toward a more naturally occurring mix, as defined by the plant association, while improving the stand resilience and forest health.

Table 14 and Table 15 compare the action and no action alternatives for both the moist and dry mixed-conifer plant communities. Compared to the No Action Alternative, the Proposed Action would reduce the TPA, basal area, and stand density index (SDI) ⁸ while still increasing stand quadratic mean diameter (QMD) ⁹ in the short term. A lower TPA and basal area result in stands that reflect more natural conditions for these plant associations, and create defensible space around the wildland urban interface, strategic roads, and ridge tops for use during a large scale disturbance event such as fire.

Table 14. Moist mixed-conifer comparison of alternatives over a 100-year period

Time After Treatment	BA		SDI		TPA		QMD		Average Height	
	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action on
2016	192	106	424	193	1228	200	6.6	10.2	96	72
2066	288	280	582	595	1034	1023	8.0	7.3	126	117
2116	298	300	544	526	630	476	10.6	11.4	127	134

⁸ SDI is an index based on the relationship between tree size and the number of trees per acre.

⁹ QMD is the diameter corresponding to the average diameter by basal area.

Table 15. Dry mixed-conifer comparison of alternatives over a 100-year period

Time After Treatment	BA		SDI		TPA		QMD		Average Height	
	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action	No Action	Proposed Action on
2016	200	100	396	173	755	150	8.4	11.6	104	80
2066	260	249	479	473	555	562	10.2	9.0	110	95
2116	280	280	497	466	460	330	11.3	12.8	108	105

The desired future conditions for the stands would be to move them towards a more properly-functioning plant community as defined by White River Watershed Analysis, forest plant association guides, and the White River Late-Successional Reserve Assessment. By moving stands towards the desired future conditions, they would become or maintain a multi-storied uneven-aged stand structure in the moist mixed-conifer communities. Within the dry mixed-conifer, stands would be moved towards a more open two-storied stands. After treatment, the stands should become more resilient to perturbations such as insect attack and large-scale high-intensity fire occurrence because of the reductions in total stand density. In the dry mixed-conifer stands, a stand structure that allows the efficient reintroduction of natural fire is desired, and in the long term, natural fire starts can resume their normal processes and be beneficially managed. Stands should be monitored over the next 50 years to evaluate the response to the thinning and to determine if a re-entry thinning and/or burning is needed maintain or create the desired future conditions.

Economic Review

As described in Section 1.4, providing forest products to local economies through the process of improving stand conditions is part of the overall purpose and need for this project. Goals and direction to support the stability of local and regional economies and to provide forest products at sustainable levels are described in the Northwest Forest Plan and the Forest Plan. 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.

The Proposed Action would provide for jobs associated with logging and sawmill operations and would contribute to meeting society's forest product needs. The NWFP contains an analysis of employment in the timber industry. The annual incremental contribution of each million board feet of timber can be derived as approximately 8.3 jobs¹⁰. It is estimated that an average volume of 7,000 board feet per acre may be produced from the commercial treatment units as a result of this project.

Stands would become more resilient to natural disturbances thereby becoming healthier and more productive in the long term. Ensuring long-term forest health and productivity further supports the need for sustainability in providing forest products. To benefit local and regional economies, timber sales are auctioned to bidders. Timber sale or stewardship contracts for bid must have products that prospective purchasers are interested in and they must have a value that is greater than the cost of harvesting and completing any additional requirements.

Cost effectiveness is an important consideration in the design of the Proposed Action for the proposed vegetation and road treatments. While local, regional, and national economic conditions and market log prices can fluctuate over time, past experience with similar management actions to thin comparable stands

¹⁰ 8.3 jobs is an approximate that is derived from data in the historical and projected volume and employment tables on pages 3&4-296 and 3&4-297 of the NWFP Final Supplemental Environmental Impact Statement, 1994.

with similar prescriptions on the Forest shows that there is expected to be a sufficient benefit relative to the economic value of timber being removed.

Cumulative Effects

Discussions of the cumulative effects are limited to those past, present and reasonably foreseeable activities that have been determined to have a potential cumulative effect on the vegetative resource. Refer to Table 11 at the beginning of this section for a summary of all possible activities that were considered in this cumulative effects analysis for vegetative conditions. Only the vegetation-related proposed projects that overlap with this project area that also have direct or indirect effects are included in the cumulative effects analysis.

The spatial context for the following cumulative effects analysis is the landscape (i.e., White River watershed) and site-specific area where treatments are proposed. The temporal context depends on the past, existing or future activities. If effects from any of these activities overlap in time, then they are analyzed below.

At the landscape scale there are no direct or indirect effects that would cumulate from other projects due to the minimal amount of connectivity with past treatments, in regards to plant communities. The total cumulative effects at the landscape scale for this project would be very nominal, and no cumulative effects are expected as a result of the proposed projects to the vegetation resource. At the project and stand scale, this project is proposing to move more than half of the available dry mixed-conifer acres toward historical conditions. Doing so would have a beneficial effect on the stands by moving them toward a more resilient condition that would allow fire to play a vital role in maintaining stand health, composition and structure.

3.1.4 Consistency Determination

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

As a pre-cursor to the silvicultural diagnosis process, stand examinations are conducted to determine existing stand conditions; and, a determination of suitability (in regard to management of the stand for timber production) is made for each stand. Stands proposed for harvest treatment were examined for suitability in accordance with 36 CFR 219.13, Timber resource land suitability. Stands were found to be suitable for timber management based upon the following:

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

PDC, such as patch openings and risk of windthrow, are written into the design of the Proposed Action Alternative in order to meet Forest Plan direction for even-aged management (Forest Plan standards FW-316 and FW-317, C1-019 through C1-021, and C1-024). Forest Plan guidelines advise timber harvesting shall be completed in a fashion that reasonably assures each harvest area can be adequately restocked within five years after final harvest (FW-358). Interplanting would be used to maintain genetic quality and desired species composition (FW-332). The proposed treatments would be consistent with all of the above mentioned standards and there is no mandatory reforestation.

3.2 Fuels Management

Summary – This section summarizes how fuels and fire would be affected by the Proposed Action. Stand level data was utilized in determining the project’s potential effects. This data was interpreted by a fuels specialist using professional judgment based on direct experience of fire behavior on the east side of the Forest. Overall, the Proposed Action would have a beneficial effect to fuels, in that fuels treatments would reduce flame lengths and fire intensity within the project area. These reductions would allow for suppression tactics that would result in increased safety of suppression personnel. Also, they would allow for a reduction in the level of disturbance to natural resources when compared to indirect attack methods by providing opportunities to confine fires to NFS lands within the project area and increased safety of suppression personnel.

This section summarizes the Fuels Report which is incorporated by reference.

3.2.1 Analysis Assumptions and Methodology

As this section discusses the effects of the Proposed Action on fuels and fire, fuels is defined as the accumulation and distribution of burnable vegetation within the project area including but not limited to live and dead standing trees, brush, and down woody debris.

Several different computer programs and databases were used to analyze the effects of the Proposed Action. The computer programs and modeling systems that were utilized in this analysis include common stand exams (CSE), Forest Service Vegetation (FSVeg) module, Forest Vegetation Simulator (FVS) east cascade variant, the Fire and Fuels extension for FVS (FFE-FVS), Fire Family Plus, Flam Map, ArcFuels, and Real Statistics Resource Pack.

Fuel models outside of the project area were not evaluated for accuracy except for those used in calibration of FlamMap on the Blackburn fire (part of Government Flat Complex) of 2013 which burned in similar fuel types as it reached NFS lands. Both a low-fuel-moisture scenario and moderate-fuel-moisture scenario were utilized for modeling fire behavior characteristics. Specific information on how FVS outputs were used in conjunction with FlamMap and fuel-moisture scenarios can be found in the Fuels Report.

3.2.2 Existing Conditions

Over the past 22 (1993-2013) years there has been an estimated 345 recorded human caused fires impacting an estimated 3,595 acres in the vicinity of the project area. The human causes of ignition included: smoking, equipment, abandoned campfires, and arson. Lightning has created an estimated 118 impacting an estimated 294 acres.

Fire Regime and Fire Regime Condition Class

A natural fire regime is the general classification based on the role fire would play across a landscape in the absence of modern human mechanical intervention with the exception of potential aboriginal fire use (Hann et al. 2008; Agee 1993; Brown 1995). Rice and others (2006) refined previous coarse-scale efforts in delineation of fire regimes and fire regime condition class (FRCC) in northwestern Oregon. The analysis resulted in additional fire regimes and an analysis that is suitable for project scale use (Rice et al. 2006). Due to missing or incomplete fire history and historical fire severity data, departure from frequency and severity condition class were omitted from the study.

Table 16 summarizes the Fire Regimes for the project area.

Table 16. Fire Regimes within the project area

Fire Regime	Return Interval (years)	Severity	Proportion of Project Area (%)
I	0-35	Low	15
IIIA	< 50	Mixed	23
IIIB	50-100	Mixed	30
Fire Regime	Return Interval (years)	Severity	Proportion of Project Area (%)
IIIC	100-200	Mixed	17
IVC	100-200	Stand Replacing	13
VA	200-400	Stand Replacing	1

Fire regime condition class (FRCC) is a measure of departure from reference conditions expressed as a percentage. Table 17 summarizes the FRCC

values for the project area by displaying the percentage of treatment types within each FRCC. The departure from reference conditions can be due to a wide array of ecosystem, vegetation, or fuels characteristics including fire frequency, severity, and pattern (Hann et al. 2010). It is important to note the cause of departure is not limited to natural processes. As disease infestation may change the departure, so too could timber harvest, and grazing.

Table 17. FRCC departure as a proportion of treatment type

Treatment Type ¹¹	FRCC 1 (least departed)	FR CC 2	FRCC 3 (most departed)
Dry Fuel Treatment	28 %	37 %	35 %
Dry Forest Health	51 %	35 %	15 %
Moist Fuel Treatment	95 %	5 %	0 %
Moist Forest Health	97 %	3 %	0 %

The majority of dry mixed-conifer stands are well departed from reference conditions. The Proposed

Action of this project would shift the percentages for these treatment areas towards FRCC 1 which would result in lower severity fires for the area. In contrast, the majority of the moist mixed-conifer stands are within FRCC 1. This would largely indicate a dense canopy structure which could lead to increased potential for crown fires, resulting in stand replacing fires. The Proposed Action Alternative would likely move the moist mixed-conifer stands into a FRCC 2 or 3, which would create a departure from reference conditions while resulting in a decreased potential for large stand replacing fires in the area.

Canopy Structure and Crown Fire Potential

Stand structure plays a substantial role in fire behavior characteristics. Aside from foliar moisture, three components of canopy structure are associated with passive (torching) and active (fire spreading through the crown) crown fire: canopy bulk density (CBD), canopy base height (CBH) and canopy cover (CC). See Table 18 for existing CBD, CBH, and CC.

¹¹ Refer to Sections 1 and 2 of this assessment for more detailed descriptions of treatment types in the low (dry) and moist fuel moisture scenarios.

Table 18. Existing mean CBD, CBH, and CC by treatment type or area

Treatment Type/Area	Existing Mean CBD (kg/m3)	Existing Mean CBH (feet)	Existing Mean CC (%)
Proposed Treatment Units	0.34	3.5	56
Project Area	0.37	3.7	60
Dry Forest Health Treatment	0.32	3.9	55
Dry Fuels Treatment	0.31	3.4	52
Moist Forest Health Treatment	0.36	3.1	58
Moist Fuels Treatment	0.37	3.2	57

Fire Behavior

FlamMap provides numerous fire behavior outputs that model fire behavior characteristics; this analysis focuses on crown fire, flame length, fire line intensity, and rate of spread (ROS).

Crown Fire

FlamMap crown fire activity results are categorized in three categories: surface, passive crown, and active crown. For this section, passive and active fire crown have been combined. The full description of crown fire types can be found in the Fuels Report, which summarizes FlamMap results. Refer to Table 19 for a summary of passive and active crown fire acres between the fuel moisture scenarios. Active crown fire is generally underestimated and transition from passive to active crown fire is a limitation of the model (Stratton, 2004).

Table 19. Existing acres for both fuel-moisture scenarios by treatment type or area

Fuel Moisture Scenario	Treatment Type/Area	Surface Acres (%)	*Crown Fire Acres (%)
Low	Proposed Treatment Units	2,252 (17%)	11,015 (83%)
Low	Project Area	4,237 (18%)	19,768 (82%)
Low	Dry Forest Health	206 (12%)	1,459 (88%)
Low	Dry Fuels Treatment	744 (14%)	4,582 (86%)
Low	Moist Forest Health	530 (24%)	1,697 (76%)
Low	Moist Fuels Treatment	772 (19%)	3,277 (81%)
Moderate	All Treatments	3,618 (27%)	9,649 (73%)
Moderate	Project Area	7,558 (31%)	16,447 (68%)
Moderate	Dry Forest Health	292 (18%)	1,372 (82%)
Moderate	Dry Fuels Treatment	1,300 (24%)	4,025 (76%)
Moderate	Moist Forest Health	801 (36%)	1,426 (64%)
Moderate	Moist Fuels Treatment	1,225 (30%)	2,825 (70%)

*Crown Fire Acres represents both passive and active crown fire combined.

Rate of Spread

Rate of Spread

The Rate of Spread (ROS) is defined as the distance in chains (66 feet) per hour that a fire under specific weather, fuel, and topographic conditions would move in a direction out from a fire perimeter. ROS in the low-fuel-moisture scenario would challenge individual suppression modules comprised of five persons, as shown in Table 20 below.

Table 20. Existing mean ROS for both fuel-moisture scenarios by treatment type or area

Treatment Type/Area	Mean ROS (chains/hour)	Mean ROS (chains/hour)
	Low Fuel Moisture Scenario	Moderate Fuel Moisture Scenario
Proposed Treatment Units	8	2
Project Area	7	2
Dry Forest Health	8	2
Dry Fuels Treatment	6	2
Moist Forest Health	10	2
Moist Fuels Treatment	9	2

Fire Line Intensity

Fire line intensity (FLI) is a measure of heat energy released at the flaming front of the forward rate of spread. Per Rothermel's spread equation, FLI is used to determine flame length.

Table 21 below, describes the thresholds based on FLI and flame length to determine safe engagement fire tactics by suppression personnel. The existing conditions in the project area exceeds the upper end of FLI outputs shown in

Table 22 below.

Table 21. Description of fire line intensity at different flame lengths

Flame Length (feet)	Fire Line Intensity (BTU/ft./sec. ¹²)	Description
<4	<100	Fires can generally be attacked at the head of flanks by persons using hand tools. Hand line should hold the fire.
4-8	100-500	Fires are too intense for direct attack on the head by persons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8-11	500-1,000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head would probably be ineffective.
>11	>1,000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

¹² BTU is an abbreviation for British thermal units. It is used to describe the heat energy of fire, per foot (ft.) per second (sec.) to describe fire line intensity.

Table 22. Existing mean fire line intensity for both fuel-moisture scenarios by treatment type or area

Treatment Type/Area	Mean FLI (BTU/ft./sec)	Mean FLI (BTU/ft./sec)
	Low Fuel Moisture	Moderate Fuel Moisture
Proposed Treatment Units	1,033	131
Project Area	1,071	139
Dry Forest Health	1,015	132
Dry Fuels Treatment	662	112
Moist Forest Health	1,328	137
Moist Fuels Treatment	1,365	152

Flame Length

Flame length is measured as the distance between the top of the flame and the ground midway in the zone of active flaming. Existing conditions for the low-fuel-moisture scenario exceeds direct attack by hand or mechanized direct attack strategies. Under the moderate-fuel-moisture scenario, the flame length is at the limits of hand attack, and likely would require an indirect approach. An indirect approach to fighting fire has the potential to result in an increase of disturbance to soils and other natural resources with the increased use of heavy equipment that is often employed for indirect attack. The likelihood of a crown fire initiated under the low-fuel-moisture scenario is highly probable given the flame length is averaging 16 feet (Table 23) and the mean crown base height is less than four feet (Table 18) the surface is likely to transition to the canopy fuels in a majority of the stands (Table 19) mostly as a passive crown fire, but with an active crown fire component as well.

Table 23. Existing mean flame length for both fuel-moisture scenarios by treatment type or area

Treatment Type/Area	Mean Flame Length (FL) Low	Mean Flame Length (FL) Moderate
	Fuel Moisture (feet)	Fuel Moisture (feet)
All Treatments	16	5
Project Area	17	5
Dry Forest Health	17	5
Treatment		
Dry Fuels Treatment	13	4
Moist Forest Health	19	5
Treatment		
Moist Fuels Treatment	19	5

3.2.3 Effects Analysis

The existing condition is used to measure changes to fuels after proposed treatments. Criteria used to determine effects to fuels (as defined 3.2.1 Analysis Assumptions and Methodology for this section) include:

1. Fire behavior and severity
2. Canopy structure
3. Fuel model

The proposed road treatments and all required PDC have no direct or indirect effects to fuels. As such, this section only analyzes the impacts of the vegetation management treatment to fuels and fire.

No Action Alternative

The No Action Alternative would result in no fuels treatment activities being completed. With No Action, the current stand structure would not be altered and fuel conditions that describe the existing condition would not change substantially. Fire behavior would continue to exceed thresholds for direct suppression actions and there would be an increase over time of the threat of crown fire potential as ladder fuels would continue to build. Fire rate of spread would continue to be low, but intensity would inhibit suppression tactics. In the short term (one to five years), the fire hazard would remain high. Into the future, natural processes would take place increasing the fire hazard with an accumulation of fallen trees and surface fuels (pine needles and other dead vegetation). As the available fuel increases (live and dead), so would the potential for a large stand-replacing wildfire event. Larger, high-intensity fires would put the public and firefighters at an increased risk to injury or death. Suppression costs would increase due to the need to utilize mechanized equipment and aircraft to support fire suppression. Damage to natural resources caused by fire suppression efforts would increase.

Proposed Action Alternative

With the proposed thinning and mechanical fuels reduction treatments, future fires would likely have reduced probability of crown fire, lower flame lengths and reduced intensities that would allow for direct attack by hand crews. Suppression related impacts to natural resources would be moderated compared to the No Action Alternative. Approximately 55% of the project area is proposed for treatment. There is approximately 12,000 acres of dry mixed-conifer within the planning area that would have had frequent low intensity fire as its primary disturbance regime. With more than 6,500 acres of proposed treatment within the dry mixed-conifer plant communities, the Proposed Action Alternative would move more than half of the available dry mixed-conifer acres toward historical conditions from which fire could play a vital role in maintaining stand health, composition, and structure.

Canopy Structure

Under the Proposed Action Alternative, the completed fuels treatments in the dry and moist plant communities would reduce the average crown bulk density (CBD), which reduces the available aerial fuels in the overall treatment area. A reduction in fuels is similarly represented for all treatment types, with the greatest reduction in the dry plant community of about 55% reduced CBD, and only a 6% drop in the moist plant community.

Table 24. Proposed Action treatment mean CBD, CBH, and CC by treatment type/area compared to existing conditions¹³

Treatment Type/Area	Proposed Action Mean CBD (kg/m ³)	Existing Mean CBD (kg/m ³)	Proposed Action Mean CBH (feet)	Existing Mean CBH (feet)	Proposed Action Mean CC (%)	Existing Mean CC (%)
Proposed Treatment Units	0.24	0.34	5.9	3.5	35	56
Project Area	0.31	0.37	5.2	3.7	48	60
Dry Forest Health Treatment	0.14	0.32	8.3	3.9	32	55
Dry Fuels Treatment	0.15	0.31	6.7	3.4	33	52

¹³ Existing condition data are used to compare taking no action to the Proposed Action because with no action, the current stand structure would not be altered, and fuels conditions that describe the existing condition would not change substantially.

Treatment Type/Area	Proposed Action Mean CBD (kg/m ³)	Existing Mean CBD (kg/m ³)	Proposed Action Mean CBH (feet)	Existing Mean CBH (feet)	Proposed Action Mean CC (%)	Existing Mean CC (%)
Moist Forest Health Treatment	0.34	0.36	3.5	3.1	38	58
Moist Fuels Treatment	0.35	0.37	3.7	3.2	39	0.37

Crown Fire Potential

Under the Proposed Action Alternative, crown fire potential decreases as both CBD and canopy cover decrease and Canopy Base Height (CBH) increases. Post-treatment modeling shows a 91% reduction in crown fire acres for the low-fuel-moisture (Table 25) and a 95% reduction of crown fire in a moderate-fuel-moisture scenario (Table 26). Additionally, based on modelling, acres susceptible to crown fire after treatments are applied would be reduced by 70% within the Juniper Flats WUI.

Table 25. Existing condition and Proposed Action treatment comparison for the low fuel moisture scenario

Treatment Type/Area	Post Treatment Surface Acres	Existing vs Post Treatment Surface Fire Change Acres	Post Treatment Crown Acres	Existing vs Post Treatment Crown Change Acres
Proposed Treatment Units	12,336	10,085 (448%)	943	-10,072 (-91%)
Project Area	15291	11,054 (261%)	8,728	-11,040 (-56%)
Dry Forest Health Treatment	1628	1,422 (691%)	37	-1,421 (-97%)
Dry Fuels Treatment	5,254	4,510 (606%)	73	-4,508 (-98%)
Moist Forest Health Treatment	2,110	1,580 (298%)	117	-1,580 (-93%)
Moist Fuels Treatment	3,345	2,572 (333%)	716	-2,562 (-78%)

Table 26. Existing condition and Proposed Action treatment comparison for the moderate fuel moisture scenario

Treatment Type/Area	Post Treatment Surface Acres	Existing vs Post Treatment Surface Fire Change Acres	Post Treatment Crown Acres	Existing vs Post Treatment Crown Change Acres
Proposed Treatment Units	12,799	9,181 (254%)	481	-9,168 (-95%)
Project Area	17,602	10,045 (133%)	6417	-10,031 (-61%)
Dry Forest Health Treatment	1,634	1,342 (459%)	31	-1,341 (-98%)
Dry Fuels Treatment	5,262	3,962 (305%)	65	-3,960 (-98%)
Moist Forest Health Treatment	2,182	1,381 (173%)	45	-1,381 (-97%)
Moist Fuels Treatment	3,720	2,496 (204%)	340	-2,485 (-88%)

Rate of Spread

Within the treated units the post treatment rate of spread (ROS) is reduced from eight and two chains per hour (Table 20) to 1.1 and 0.5 chains per hour from the low and moderate-fuel-moisture scenarios (Table 27). There is a pronounced reduction of ROS in units with an underburning treatment due to a reduction in surface fuel loading. This ROS spread reduction is evident from two fires that have occurred in similar dry plant communities in the Billy Bob Fuels Reduction project area, Star unit 19, fire #126-2010 and #219-2014, which had thinning, mastication, and underburn treatments completed. Both fires were under 0.1 acres in final size, with flame lengths under one foot, and ROS of less than one chain per hour.

Table 27. Post-treatment mean ROS for both fuel-moisture scenarios by treatment type or area compared to existing conditions

Treatment Type/Area	Post Treatment Mean ROS (chains/hour) Low Fuel Moisture	Existing Mean ROS (chains/hour) Low Fuel Moisture	Post Treatment Mean ROS (chains/hour) Moderate Fuel Moisture	Existing Mean ROS (chains/hour) Moderate Fuel Moisture
Proposed Treatment Units	1.1	8	0.5	2
Project Area	3.2	7	1.0	2
Dry Forest Health	0.7	8	0.3	2
Dry Fuels Treatment	0.6	6	0.3	2
Moist Forest Health	1.4	10	0.6	2
Moist Fuels Treatment	1.9	9	0.8	2

Fire Line Intensity

FLI has the greatest impact on fire suppression options, tactics, success and direct fire effects on the plant communities in the treatment area. Flame length is directly related to FLI, and the various fire behavior models use this intensity number to determine if a surface fires FLI would initiate a crown fire (passive or active) based on the canopy characteristics. Within the treated units the post treatment FLI is reduced from 1033 BTU/ft./sec. to 32 BTU/ft./sec. and from 131 BTU/ft./sec. to 6 BTU/ft./sec. in the low and moderate-fuel-moisture scenarios (Table 28). These reductions are sufficient to allow for safer direct attack opportunities within treated units (Table 21).

Table 28. Post-treatment mean fire line intensity for both fuel-moisture scenarios by treatment type or area compared to existing conditions

Treatment Type/Area	Post Treatment Mean Fire Line Intensity (BTU/ft./sec.) Low Fuel Moisture	Existing Mean Fire Line Intensity (BTU/ft./sec.) Low Fuel Moisture	Post Treatment Mean Fire Line Intensity (BTU/ft./sec.) Moderate Fuel Moisture	Existing Fire Line Intensity (BTU/ft./sec.) Moderate Fuel Moisture
Proposed Treatment Units	32	1,033	6	131
Project Area	465	1,071	63	139
Dry Forest Health	18	1,015	4	132
Dry Fuels Treatment	12	662	2	112
Moist Forest Health	30	1,328	6	137
Moist Fuels Treatment	67	1,365	11	131

Flame Lengths

The post-treatment flame lengths are also reduced. Within the treated units, the post-treatment flame length is reduced from 16 chains per hour to 1.3, and from five chains per hour to 0.7 in the low and moderate-fuel-moisture scenarios (Table 29). These reductions are sufficient to allow for safer direct attack opportunities within treated units (

Table 21).

Table 29. Post-treatment mean flame length for both fuel-moisture scenarios by treatment type or area compared to existing conditions

Treatment Type/Area	Post Treatment Mean Flame Length Low Fuel Moisture	Existing Mean Flame Length Low Fuel Moisture	Post Treatment Mean Flame Length Moderate Fuel Moisture	Existing Mean Flame Length Moderate Fuel Moisture
Proposed Treatment Units	1.3	16	0.7	5
Project Area	7.6	17	2.4	5
Dry Forest Health	0.8	17	0.4	5
Dry Fuels Treatment	0.7	13	0.4	4
Moist Forest Health	1.4	19	0.8	5
Moist Fuels Treatment	2.4	19	1.2	5

Cumulative Effects

The analysis of cumulative effects considered the list of past, present and reasonably foreseeable activities in Table 11, found at the beginning of this section. Fire history in the vicinity of the project area is incorporated in the existing condition data analysis. There are no negative effects to fuels from the Proposed Action treatments, therefore there are no cumulative effects. This project would result in incremental positive outcomes that continue to minimize the likelihood for stand-replacing fires in the project area and result in a trend of improving conditions.

3.2.4 Consistency Determination

The Proposed Action Alternative is consistent with the Forest Plan as amended, including all applicable standards and guidelines. 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. Text from the Forest Plan as amended is provided and referenced below, and the bulleted text is an explanation of how this project fits with those management goals, desired future conditions and standards and guidelines.

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 would reduce fire intensity, aid in the suppression of wildfires and would minimize risk to natural resources.

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, pp. Four-2 and Four-3).

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

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).

- Even though treatments are not proposed within Riparian Reserves, the Proposed Action would result in less intense wildfires for the areas around the Riparian Reserves within the project area, and more opportunity for direct attack strategies, likely resulting in a reduction in the overall impact to riparian resources.

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 includes treatments within LSR. The Proposed Action would reduce FLI and crown fire within treated LSR units.

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. (White River LSR Assessment Fire Management Plan, p. v-19).

- The Proposed Action includes treatments within LSR. The Proposed Action is consistent with this recommendation of the LSR Assessment because it would provide protection from large-scale fire through fuels reduction treatments within these areas and areas adjacent to LSRs.

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

- Multiple natural resource objectives have been considered in the development of fuel reduction prescriptions, including PDC 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.

Prescribed fire should be encouraged to achieve deer and elk habitat objectives (p. Four-276).

- The Proposed Action includes unburning.

Manipulation of natural fuel loading may occur and shall be consistent with Management Area management direction (p. Four-276).

- PDC identified in Section 2.3 under the vegetation and silvicultural sections ensure consistency with Management Area direction.

Prescribed fire may be permitted. Use of hand-pile fuel prescriptions should be emphasized in near-foreground areas; exceptions may occur for eastside pine communities (p. Four-228).

- Multiple natural resource objectives have been considered in the development of fuel reduction prescriptions, including PDC to minimize impacts to visual quality objectives.

3.3 Air Quality and Smoke Management

3.3.1 Analysis Assumptions and Methodology

Management activities shall comply with all applicable air quality laws and regulations, including the Clean Air Act and the Oregon State Implementation Plan (SIP) (Forest Plan, FW-040). Also, in compliance with the Clean Air Act, the Forest Service is operating under the Oregon Administrative Rule OAR 629-43-043. The Forest Service is complying and would continue to comply with the requirements of the OSMP (Oregon Smoke Management Plan), which is administered by the Oregon Department of Forestry.

Smoke management is defined as: The management of fuel treatments from forest activities so that there is no or reduced effect to local areas surrounding the project. This primarily deals with impacts to people or air quality.

The effects of smoke management from activity created fuel on the surrounding area and the procedures and guidelines followed when utilizing prescribed fire as a management tool are described below. All Forest-wide Standards and Guidelines for Air Quality FW-039 thru FW-053 (Forest Plan, Chapter 4 pages 51-52) would be followed to minimize problems of Forest burns affecting air quality in local communities. Currently, and in the future, all planned ignitions are and would be conducted according to the Operational Guidance for the Oregon Smoke Management Program (OSMP). The Operational Guidance contains the direction for meeting the terms of the OSMP. The Environmental Protection Agency has approved the OSMP as meeting the requirements of the Clean Air Act, as amended.

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. The amount of burning that could occur on any one day depends upon the specific type of burning, the tons of material to be burned, and the atmospheric conditions available to promote mixing and transportation of smoke away from sensitive areas.

The size class distribution for wood smoke particles is such that 82 percent of the particles range between 0.01 and .099 microns, 10 percent range between 1.0 and 4.99 microns, and 8 percent range between 5.0 and 15.0 microns. The most efficient particle size for scattering light (and thus reducing visibility) ranges between 0.3 and 0.7 microns. The majority (82 percent) of particulate emissions from wood combustion are in the size range that reduces visibility.

The PM (Particulate Matter) 10 (microns) and PM 2.5 (microns) have been established as primary air quality parameters because of potential adverse human health effects. These small particulates could 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 could accumulate in the respiratory system and aggravate health problems such as asthma. Fine particles, which penetrate deeply into the lungs, are more likely than coarse particles to contribute to the health effects associated with hospital admissions.

3.3.2 Existing Condition

Airshed is defined as a geographical area that, because of topography, meteorology, and climate, share the same air (Boutcher 94; MHFP, Glossary-1). Portions of the Mt. Hood Wilderness are federally designated as a Class I Airshed (MHFP, FW-046, and FW-047). The Mt. Hood Wilderness is nine miles northwest of the project area. The Badger Creek Wilderness, a Class II Airshed is approximately eight miles north of the project area. The 2015 Oregon Air Quality Data Summary is the most current information available for the Forest. The Air Quality Index (AQI) report spans June through September and shows that the area

has an AQI of “good” with the majority of days in this category for June, July, and September. Spikes into the unhealthy ranges are influenced largely by forest fires during the month of August.

There is currently only one designated Smoke Sensitive Receptor Area (SSRA) in the Columbia River Gorge National Scenic Area (CRG-NSA), which is over 30 miles north of the project area. Communities near the project area that could be impacted include: Pine Grove (five miles east), Tygh Valley (14 miles northeast), Wamic (11 miles northeast), Maupin (21 miles east), Simnasho (Confederated Tribes of Warm Springs, nine miles southeast) and Dufur (26 miles northeast). Burning activities would only be conducted when predicted and actual atmospheric conditions would minimize the possibility of smoke affecting these areas.

3.3.3 Effects Analysis

No Action Alternative

Because the No Action Alternative does not prescribe any use of fire, there would be no direct effects to air quality from taking no action. However, because there is an increased risk of large-scale wildfire from taking no action, there is the potential for an indirect effect of a reduction in air quality from this alternative.

No action would have the least immediate impact on air quality, as there is no prescribed burning or pile burning. All biomass remain available for consumption by wildfires and it would continue to accumulate, increasing the potential for large amounts of smoke during the summer months, when diurnal inversions can concentrate smoke at low elevations. Wildfires tend to occur at the driest time of the year, and fuel are more completely consumed and typically produce three to five times more emissions than early or late season prescribed fires. These smoke concentrations can have high particulate levels that can cause health problems, or violate summertime Class I and Class II air quality visibility standards for Wilderness areas. The surrounding communities of the Pine Grove, Wamic, Tygh Valley, Maupin, and Simnasho would be impacted by smoke from a wildfire in this area. Past wind patterns have also set up in such a manner as to potentially impact the City of Portland and surrounding communities during a wildfire (Dollar Lake, 2011), under large-scale ignition events. Any biomass that has accumulated is prone to be released back into the atmosphere by either combustion in a wildfire or by decomposition.

Proposed Action Alternative

Because of preventative measures and compliance with OSMP, there would be no long term effects from prescribed burning or smoke from the proposed activities.

To avoid impacting smoke sensitive areas, units would be burned when smoke management forecasts predict mixing heights and transport winds that would carry smoke away from or over these areas. If intrusions occur, no additional areas that could contribute to the intrusion would be ignited and extinguishing burning material may be necessary. Signs would be posted on roads that are near burning operations when visibility could be affected, for public safety if visibility on State or Federal Highways is reduced to less than 750 feet, traffic flaggers and pilot cars would be required. Any particulate emission from prescribed burning would be substantially less per acre than a wildfire.

Smoke management concerns may require that some stands that have proposed underburning be treated by hand- and/or machine-piling. Pile burning could be accomplished during the passage of weather fronts that move smoke out of the area very quickly, whereas underburning requires very specific environmental conditions to implement in order to limit impacts to airsheds and the public, based on daily smoke weather forecasts from the State of Oregon. The SSRA of the CRG-NSA would not likely be impacted

due to prevailing wind patterns during pile burning or underburning, distance from the project boundary, and intervening terrain channeling local wind patterns to the east and northeast.

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 on lands managed by other agencies. Field burning, smoke from household wood stoves, smoke from campfires, motor vehicle exhaust and smoke stack sources from industry also affect air quality.

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. 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.

3.3.4 Consistency Determination

Ambient air quality is defined by the Clean Air Act of 1963 as the air quality anywhere people have access, outside of industrial site boundaries. The Clean Air Act requires the Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) and thresholds for criteria pollutants (Table 30) to control pollution and protect public health, safety, and welfare. Furthermore, the Clean Air Act establishes state-level responsibilities for preventing and controlling air pollution. This project is consistent with the requirements of the Clean Air Act. The Proposed Action Alternative is consistent with the Forest Plan as amended, as well as the Wasco County Community Wildfire Protection Plan, including all applicable standards and guidelines.

Table 30. National ambient air quality standards for PM₁₀ and PM_{2.5}

Pollutant	Averaging Time	NAAQS Violation Determination	Federal Standard Exceedance Level	Washington State Exceedance Level
PM _{2.5}	24-hour	98 th percentile of the 24-hour values determined for each year. 3-year average of the 98 th percentile values	35 µg m ⁻³	35 µg m ⁻³
PM _{2.5}	Annual	3-year average of the annual arithmetic mean	12 µg m ⁻³	15 µg m ⁻³
PM ₁₀	24-hour	Expected number of days per calendar year with a 24-hour average concentration above 150 µg m ⁻³ is ≤1 over a 3-year period	150 µg m ⁻³	150 µg m ⁻³

3.4 Transportation Resources

Summary – Given the resource PDC and BMPs identified in Sections 2.3 and 2.7, the Proposed Action Alternative would result in increased effectiveness and overall value of the Forest’s transportation system while correcting or mitigating detrimental effects on other resources. Road closures and decommissioning would produce direct beneficial effects in terms of erosion prevention and reduced road maintenance liability.

This section summarizes the Transportation Report which is incorporated by reference.

3.4.1 Analysis Assumptions and Methodology

An analysis of the transportation system has been developed at the Forest scale titled Roads Analysis: Mt. Hood National Forest (USDA, 2003). It documents a full analysis of the Forest's transportation system at and, it considered the effect of the NFS 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 Roads Analysis has in turn been utilized to inform the development of travel management recommendations for each segment of road on the Forest developed through an analysis process described in the 2015 Travel Analysis Report (TAR) (USDA, 2015). Road management decisions at the Forest and District levels are informed by these analyses and consider these recommendations and objectives wherever feasible. These documents are also incorporated by reference and summarized below as they relate to the project area.

Across the Forest the historic needs for, and uses of the road system have shifted as timber harvest has declined and other uses, such as recreation, have grown. Steady decline of funding to maintain the system accompanied by the reductions in timber harvest funding for road maintenance have resulted in funding lower than the level needed to properly maintain the open roads on the Forest. 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.

Determination of road reconstruction needed to safely conduct operations associated with the Proposed Action was made utilizing the standards and guidelines set forth in a series of documents with authority under 36 CFR Parts 212, 251, 261, and 295. The list of documents is available in the full Transportation Report.

Measurements and quantities shown in this section were compiled using data from the INFRA database, the Transportation GIS Geodatabase, the Barlow Ranger District Roads and Topography Map, and measurements and observations taken in the field. Costs associated with needed road reconstruction were estimated by utilizing the process and format outlined in "Cost Estimating Guide for Road Construction: Cost Guide Zone 5, Davis Bacon Area 5" (U.S. Forest Service Sub-regional Engineering Organization, 2002) and by applying equipment and labor costs from updated tables of the same cost guide.

Determinations for road status changes (close or decommission) associated with the project's Proposed Action were made in collaboration with the full interdisciplinary team and informed by the Northwest Forest Plan Standards and Guidelines, the Forest Plan, the TAR (USDA, 2015), and the White River Watershed Analysis (USDA, 1995).

3.4.2 Existing Condition

The Forest's transportation system provides multi-use access for trans-forest travelers, the recreating public, commercial users, and administrative users. The majority of roads within the analysis area have been in existence for better than 40 years. 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 all vehicular 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 Levels (ML) are defined as follows:

Road Maintenance Level 5 – Normally, roads are double lane, paved facilities. Some may be aggregate surfaced and dust abated. The appropriate traffic management strategy is "encourage," except that, unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

Road Maintenance Level 4 – Most roads are double lane, and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated. The most appropriate traffic management strategy is "encourage" passenger cars. However, the "prohibit" strategy may apply to specific classes of vehicles or users at certain times; unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

Road Maintenance Level 3 – Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material. Appropriate traffic management strategies are either "encourage" or "accept" passenger cars. "Discourage" or "prohibit" strategies may be employed for certain classes of vehicles or users; unless otherwise specifically authorized, non-street-legal OHV use is prohibited.

Road Maintenance Level 2 – Assigned to roads open for use by high-clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other specialized uses. Log haul may occur at this level. Appropriate traffic management strategies are either to discourage or prohibit passenger cars, or to accept or discourage high-clearance vehicles.

Road Maintenance Level 1 – Assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed 1 year. Basic custodial maintenance is performed to keep damage to adjacent resource at an acceptable level and to perpetuate the road to facilitate future management activities. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Appropriate traffic management strategies are "prohibit" and "eliminate." Roads receiving level 1 maintenance may be of any type, class or construction standard, and may be managed at any other maintenance level during the time they are open for traffic. However, while being maintained at level 1, they are closed to vehicular traffic, but may be available and suitable for non-motorized uses.

Overall, the existing condition of roads within the project area are in fair, moderate, or poor shape. Some system roads have begun to deteriorate to a point where they are overgrown with vegetation, have non-functional or poorly-functioning drainage systems, have travel surfaces in disrepair, and/or have multiple subgrade or road base failures.

The following table presents data concerning acres open to motorized cross-country travel, miles of existing roads and trails, miles of existing roads and trails within riparian areas, and total number of existing stream crossings within the project boundary. Miles by designated use within the project boundary were determined using the transportation GIS database and the Forest's Motor Vehicle Use Map.

Table 31. Existing motorized route designations

Route Miles, Stream Crossings, and Routes in RHCAs	Existing Condition
Project Action Area - Non-Wilderness (Acres)	24,000
Action Area Open to Motorized Cross-country Travel (Acres)	0
Grand Total Motorized Route: System Miles	206.48

Route Miles, Stream Crossings, and Routes in RHCAs	Existing Condition
1. Total Miles of Roads	165.20
a. Miles designated as open yearlong	117.05
b. Miles designated as open seasonally	23.04
c. Miles designated as closed yearlong (ML1)	25.11
2. Total Miles of Motorized Trails	44.49
a. Miles of designated roads open year round for use of OHVs	3.21
b. Miles of designated road open seasonally for use of OHVs	21.79
c. Miles of trail available for use by OHVs < 50 in wide	44.49
d. Miles of trail available for use by OHVs > 50 in wide	0
e. Miles of trail designated for motorcycle use	44.49
3. Total Miles of Routes in Riparian Reserves	16.40
a. Total miles of designated open OHV trails in Riparian	3.21
b. Total miles of designated open roads in Riparian	11.22
c. Total miles of designated closed OHV trails in Riparian	0
d. Total miles of designated closed roads in Riparian (ML 1)	1.97
4. Total Stream Crossings by Designated Route	110
a. Total number of open OHV trail stream crossings	20
b. Total number of open road stream crossings	75
c. Total number of closed OHV trail stream crossings	0
d. Total number of closed road (ML1) stream crossings	15
5. Total Miles of Designated Routes Available to OHVs	69.49

The roads within the analysis area generally have a pattern of use that is common to low-standard roads on the Forest. The use is moderate in the spring, after snowmelt, with various recreational users and wood cutters clearing trees that fell onto roads over the winter. Peak use occurs in the summer with the influx of administrative, commercial, and recreational traffic. Winter brings lowered usage of the roads with arterial through-routes being used mostly by forest visitors seeking access to winter recreation areas.

Construction, reconstruction, and maintenance of NFS roads requires mineral rock resources. Rock sources were developed during the construction of the original road system for the Forest to not only to provide materials for construction, but also to continue to serve as a valuable resource for reconstruction and maintenance needs into the future. Quarries near the project area are: Jackey Quarry, Rimrock Quarry, and Alkali Quarry. Rimrock Quarry is the preferred location for mining pit-run material to use in road maintenance and reconstruction work because of its strategic location within the planning area together with lack of outstanding concerns for water quality and aquatic wildlife in the area. The supply of mineral materials at some of these locations has not yet been exhausted and may continue to be utilized for their intended purpose.

3.4.3 Effects Analysis

No Action Alternative

Taking no action would involve no haul of commercial wood fiber. 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.

A lack of road maintenance and reconstruction exhibits a strong adverse effect 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. There is also an increased potential for erosion and sediment entering streams.

As road maintenance and reconstruction would be deferred, quarry operations would, consequently, also be deferred because an environmental analysis needs to be completed and accompanied by the Responsible Official's decision to take action before operations in the aforementioned quarries can move forward. Taking no action could increase the cost of completing needed road work and the Forest Service would have less control over the prevention and eradication of noxious weeds and invasive species of concern on the Forest.

In taking no action, there would be no timber harvest and no need for the construction or reconstruction of temporary roads. Since there would be no need for access to proposed units, the absence of temporary roads would have no direct effect to the transportation resource.

Taking no action 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. Commercial road use on this system would continue through the issuance of road use permits to facilitate ingress and egress for adjoining or in-held private lands. Volume of public use on this system would not change over the near term, but could decrease slightly over time due to decreased navigability of the roads.

Administrative use on this system would not change, although access would become increasingly difficult due to lack of road maintenance and lack of funding sources with the capability of appropriately addressing road reconstruction issues. Road densities and road use designations would remain unchanged under no action. So, in this respect, the No Action Alternative has no effect.

Proposed Action Alternative

The Proposed Action would involve haul of commercial timber. While heavy haul of materials is the most impactful action regularly applied to the transportation resource, this action is expected to be limited in its

duration and would be accompanied by an increase in road maintenance. The roads within the project area were designed for hauling timber during the dry season and the Proposed Action was analyzed for dry season haul.

Road maintenance would occur on all roads used for haul of commercial materials (log and rock haul). These road maintenance activities create limited disturbances contained within existing road prisms and is conducted prior to and during operations to ensure minimum safety standards and effective roadway drainage. Regular road maintenance activities include brushing, blading, surfacing, ditch cleaning, culvert cleaning, road way drainage maintenance, and treatment of danger trees would occur on roads designated for haul. Road reconstruction activities such as heavy maintenance, road repairs, or constructive improvements would also occur on existing system roads designated for haul.

The preliminary recommendations displayed in the “Treatment Description” column of Table 32 below represent work that would be considered to be beyond the definition of maintenance that would be performed on roads intended to be used as haul routes. A more detailed description of length of treatments on the road systems are available in the Transportation Report. This work would provide for protection of road travel surfaces, provide for sediment mitigation to protect adjacent resources, and provide travel way surfaces that can be maintained. The majority of this work is considered moderate level road reconstruction.

Road maintenance would occur on roads that may be utilized within the project area for haul or other proposed activities. A detailed list of roads where road maintenance would occur and associated estimated costs for road work activities can be found in the Transportation Report. Road maintenance would occur according to the standard Timber Sale Road Maintenance Specifications during project operations. The table below displays road treatment descriptions needed based on the preliminary judgement of transportation engineers. Final design and costs require further intensive field measurements & calculations and may vary. Some road work may be accomplished by alternate funding sources and some road failures may not be evident yet. Any adjustments to this listed work would be developed consistent with the PDC found in Section 2.3.

Table 32. System road treatment

Road	Treatment Description
2110-000	Replace cattle guard
2110-000	500 cubic yards of surface rock, ditch reconditioning, and replace culvert
2110-013	30 cubic yards of riprap at two low water crossings
2110-220	Roadside clearing and ditch reconditioning
2110-240	Temporary erosion control
2110-250	Roadside clearing and ditch reconditioning, and replace culvert
2110-270	Gate repair, roadside clearing and ditch reconditioning, and replace culvert with equivalent squash pipe
2110-290	Build riprap mat around existing culvert, and roadbed reconditioning
2110-330	Clearing and grubbing, and linear grading
2120-320	Roadside clearing and ditch reconditioning, and replace culvert

Road	Treatment Description
2120-340	Roadside clearing and ditch reconditioning.
2120-341	Roadside clearing and ditch reconditioning
2130-000	Asphalt leveling course, roadside clearing and ditch reconditioning, recondition one pipe inlet, and replace four culverts
2130-221	Linear grading, and remove slash
2130-222	Linear grading, and remove slash
2130-223	Linear grading, and remove slash
2130-225	Linear grading, and remove slash
2130-230	Roadside clearing and ditch reconditioning
2130-231	Roadside clearing and ditch reconditioning
2130-260	Roadside clearing
2130-280	Roadside clearing
2131-011	Roadway clearing, and linear grading
2131-014	Roadway clearing, and linear grading
2131-220	Culvert replacement
2131-221	Culvert replacement
2600-471	Roadway clearing, and linear grading
2630-250	Ditch reconditioning, and tree removal
2640-014	Roadway clearing, and linear grading
2640-230	Roadside clearing.
2640-231	Slash removal
2640-235	Roadside clearing, and linear grading
2640-236	Roadside clearing, and linear grading
2640-240	Roadside clearing, and ditch reconditioning
4200-011	Excavate ditch and fill with riprap, and install drivable dip
4200-015	Roadway clearing and grubbing, and linear grading

Road	Treatment Description
4200-016	Roadway clearing and grubbing, and linear grading
4200-033	Roadway clearing and grubbing, and linear grading
4200-034	Roadway clearing and grubbing, and linear grading
4300-240	Tree removal
4300-250	Roadway clearing and grubbing, and linear grading
4310-000	Pavement pulverization between mile posts 0.17 and 1.49
4330-000	Ditch reconditioning

In addition to NFS 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. After use, these types of temporary roads would be bermed at the entrance, water-barred, decompacted, and roughened 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.

Within this planning area there exists an extensive system of OHV trails. In many cases little work has been completed on the ground to restrict or discourage use by highway legal vehicles. The physical condition of these alignments on the ground is no different than some of the open system roads. This alternative proposes to utilize some of the OHV trails as temporary roads. The trails proposed for use exist at varying stages of maintenance and usability as a heavy haul road, and while some may need little to no work to be usable, others may require substantial disturbance. Several PDC have been developed to govern the use of these alignments as part of this project. After use, these types of temporary roads would be rehabilitated to accommodate use of OHVs and placed in a condition which would physically discourage use by highway legal vehicles.

The following table utilized the recommendations of the TAR and serves to move the Forest transportation system toward its desired future condition. Table 33 presents the full list of road status changes scheduled to occur under this Proposed Action Alternative and summarizes the treatment that each road would receive.

Table 33. Proposed road status changes

Road Number	Beg MP	End MP	Length	Status Change
2110-035	0.00	0.18	0.18	Maintenance Level 1 – Already closed in the field
2110-230	0.73	1.09	0.36	Maintenance Level 1 – Relocate existing gate
2110-240	0.00	0.03	0.03	Maintenance Level 1 – Entrance management

Road Number	Beg MP	End MP	Length	Status Change
2110-240	0.03	1.63	1.60	Add as System Road – Was previously converted to trail; return to transportation system at Maintenance Level 2 and place administrative closure prohibiting public access by highway legal vehicles except by contract or special use permit.
2130-017	0.00	0.70	0.70	Decommission – Passive; road is already overgrown to a decommissioned state
2130-223	0.00	0.20	0.20	Maintenance Level 1 – Already closed in the field
2130-270	0.00	0.93	0.93	Maintenance Level 1 – Reverses previous decision (2009 OHV) to decommission the route
2131-260	0.00	0.06	0.06	Maintenance Level 1 – Already closed in the field
2610-026	0.00	0.21	0.21	Maintenance Level 1 – Entrance Management
2630-011	0.00	1.30	1.30	Maintenance Level 1 - Berm & Stormproof
2630-250	0.00	0.91	0.91	Maintenance Level 1 – Stormproof; closure effected by closure of the 2630-011 road.
2630-251	0.00	0.57	0.57	Maintenance Level 1 – Stormproof; closure effected by closure of the 2630-011 road.
4200-011	0.00	0.50	0.50	Maintenance Level 1 - Berm & Stormproof
2130-281	0.00	0.23	0.23	Maintenance Level 1 – Entrance Management

With regard to access and displacement, these decommissioning and road closure status changes affect roads that receive no use by trans-forest travelers and low use by the recreating public. The recreational traffic on these roads is very low, limited mainly to unauthorized OHV use, low levels of dispersed camping, and use by seasonal hunters. Hunters and campers in the area would still be permitted access to their traditional recreational grounds, but would need to access those grounds by means other than motorized vehicles. As this proposed action was formulated with an eye towards the long-term access to management areas by commercial and administrative users, displacement with regard to these users would be negligible.

Cumulative Effects

The analysis area for cumulative effects is the project area and the haul roads outside the planning area. Haul of commercial products over the analyzed transportation system would likely occur over the next 5 to 10 years originating from lands managed by the Confederated Tribes of the Warm Springs or privately owned lands adjacent to the planning area. Both of these entities would be required to obtain a Road Use Permit prior to hauling over these roads, affording the Forest Service the opportunity to request completion of road maintenance or require payment of fees to cover maintenance costs, as well as require implementation of resource protection measures similar or identical to the PDC included with this proposed action.

The long-term impacts of commercial haul and the incremental impacts of public and administrative use would eventually necessitate the reconstruction or decommissioning of any given system road, with said road's life span extended by regular maintenance. The costs associated with road reconstruction are substantially higher than that which could be supported by traditional levels of appropriated road maintenance funding at the District level, and continue to require additional funding sources to complete.

3.4.4 Consistency Determination

The Proposed Action, with respect to the transportation resource, has been reviewed for consistency with the Forest Plan. All proposed actions related to the Forest's transportation system are consistent with the Forest Plan standards and guidelines (FW-407 through FW-437, FW-451, and FW-452, pages Four–95 through Four–97).

- The Forest-wide Roads Analysis (2003) and the TAR (2015) documented in this section implements Forest Plan guideline FW-416.
- All system road decommissioning decisions would be made following the guidance provided under FW-432.
- All temporary roads constructed for project use under the Proposed Action that are not part of the recreational trails system would be obliterated and/or blocked and treated to meet or exceed the standards of FW-433 and FW-436.

All other standards and guidelines under the Forest Plan are specifically addressed and enforced through contract provisions included with each individual timber sale, stewardship project, or public works contract and/or the stated PDC.

3.5 Soil Productivity

Summary – With no action, ongoing activities contributing to detrimental soil disturbance, such as livestock grazing, dispersed recreation, and motorized recreation associated with the McCubbins OHV trail system would likely continue, but levels of detrimental soil disturbance within the project area would remain below 15 percent, thereby meeting Forest Plan standards. Also, the erosion risk and subsequent sediment delivery caused by the Proposed Action activities would be extremely small. Organic matter levels are not expected to be effected in the moist-mixed conifer treatment areas, however localized acreage for organic matter would be lower than Forest Plan standards (FW-032 and FW-033) for the dry-mixed conifer ecotypes.

This section summarizes the Soils Report that is incorporated by reference.

3.5.1 Analysis Assumptions and Methodology

The methodology used to gather data needed for this effects analysis include field visits as well as previous field experience, including monitoring of activities on these and similar soils. Professional observation and knowledge of how soils respond to the proposed types of management actions was used to predict impacts. It is important to note that the previous Bear Springs Thinning planning effort information has some overlap with this plan, and as much of that information was used as was possible.

The analysis area for soil resources for this project are the proposed treatment units. A comparison of alternatives is conducted using applicable Forest Plan standards and guidelines as the method of measure to answer the following questions:

- If the Proposed *Action* is implemented, what assessable *changes* occur to the soil, and of the changes, which do we use in the analysis to describe the *effect*?
- What are the risks to the soil and related/associated values from the Proposed Action?
- Is it possible to reduce risks through mitigations or PDC?
- What are the consequences of taking no action?

For this analysis and project type, the following three criteria are used to assess impacts and as a measure to ensure Forest Plan standards FW-022, FW-023, FW-025, FW-032, FW-033, FW-034 are met.

1. The risk of erosion and subsequent sedimentation of watercourses.
 - a. **Determined by: Erosion Hazard** – The possible impact of concern stemming directly from soil erosion is runoff from bare areas carrying sediment that could affect watercourses. This hazard rating is based upon a particular soils' texture, slope, etc. for bare soil. Effective groundcover is key to reduce a soils erosion risk. Although surface soils across most of the area where activities are proposed are similar, slopes range from nearly level to greater than 30%, thus driving variable risk ratings.
2. The risk of causing detrimental soil conditions such as heavy compaction, displacement, and intense burning that alter water movement through the soil and reduce site productivity.
 - a. **Determined by: Detrimental Soil Condition** – The Forest Plan standard (FW-022, 023) of no more than 15 percent detrimental soil condition in an activity area following project completion would protect site productivity, maintain water movement into and through the soil, reduce erosion risks and associated sedimentation, and protect organic matter. All soils within the planned treatment areas have a low to moderate compaction risk (SRI validated) due to inherent soil properties.
3. The risk of altering the soil biological ecosystem because of insufficient amounts of down woody debris to feed forest carbon and nutrient cycles in the less frequent fire plant communities *or* the burning of uncharacteristically high amounts of organic matter in more frequent fire plant communities.
 - a. **Determined by: Soil Biology (organic matter levels)** – Poor or non-functioning soil biological systems may lead to difficulties in revegetation efforts, or decline in existing desirable vegetation. In and of itself, soil biology is extremely difficult to evaluate because of infinitely complex interactions occurring between organisms and their soil habitats, including physical and chemical characteristics. It is assumed that soil biological systems would properly function given certain habitat components are present, such as non-compacted soils, appropriate levels of organic matter, and types of native vegetation under which the soil developed.

Management actions that displace, severely burn or compact soil or that remove ground cover are considered to result in a greater risk to soil productivity. The analysis also considers restorative actions as well as the PDC and BMP that minimize impact. These actions would include: landing use (some existing landings would be reused and some new landings would be created); skidding with ground based equipment (some would use existing skid trails and some areas would have new skid trails); the use of low impact (low ground pressure) harvester felling equipment; temporary road use (many roads are existing, some would be built on top of already disturbed ground and some would be on previously undisturbed ground); post-harvest temporary road and landing rehabilitation; post-harvest erosion control activities; post-harvest landing slash burning; and road maintenance activities that reduce erosion risk. Other aspects of the Proposed Action would not have a meaningful or measurable effect on soil productivity.

The analysis in this section is based on the following assumptions:

- it is assumed that damage on skid trails would average 12 feet in width;
- the conceptual layout of logging system patterns has been designed to ensure less than 15 percent of the area is impacted (ground disturbance) within each proposed treatment that uses ground-based equipment;
- this project is designed such that no ground-based harvest systems would be used on slopes greater than 30 percent; and,
- undisturbed soils meet the Forest Plan groundcover standards.

3.5.2 Existing Condition

Soil distribution across this planning area is relatively consistent from west to east, with the primary differences being the higher amount of precipitation that soils experience from the farthest west around Clear Lake, to the dryer, far east side at the forest boundary with private land, which is manifested by the change in vegetation types: Moist Mixed-Conifer in the west, and Dry Mixed-Conifer in the east. Soils across the planning area have been derived from old glacial deposits mixed with thin layers of volcanic ash. The thicker glaciated terrain in the west thins down to reveal older remnant landforms in the east. Surface soil textures are sandy and loamy, with a noticeable increase in rock content below about 10 inches. Occasionally, there is a compacted glacial till deposit at depth, but for the most part, soils are freely and well drained except at the far eastern edge, where a clayey subsoil on the older landform tends to perch water into the springtime.

3.5.3 Effects Analysis

No Action Alternative

The risk of erosion within the analysis area would remain unchanged because the amount of groundcover protecting the soil surface from erosional influences is common and widespread. The expected effect is the landscape would respond and change proportionate to the severity of natural events, such as storms or wildfire.

Detrimental Soil Conditions

It is assumed that soils damaged by previous activities would continue to recover and change at an unknown rate as roots, animals, and other influences slowly break up existing compaction. The effect of soil recovery is a gradual increase in available soil.

Organic Matter Levels

Soil organic matter and corresponding soil functions would continue without much change. Similar to erosion risk, the expected effect is that the soils at landscape and site scales would respond and change proportionate to the severity of natural events, such as storms or wildfire. In addition, organic matter decomposition is influenced substantially by temperature, moisture, and fire, thus the rate of decay and cycling would continue accordingly.

It is possible, under certain wildfire scenarios, that erosion risk, soil damage from high-intensity burning, and loss of organic matter could be substantial. It is not possible to predict with any certainty, however. Taken as a whole in the big picture, the existing condition puts soils at a potentially higher risk overall than the proposed actions that reduce fuels and return the landscape to a fire type and return interval, under which they developed prior to fire suppression.

Proposed Action Alternative

Soil Erosion Risk

No active erosion from previous vegetation management was observed during the field reconnaissance for this project. With the Proposed Action, soil erosion risk would increase because bare soil would be exposed during implementation. As the amount of bare, bare/compacted soil increases, so does the risk of soil movement. Actual resource damage (erosion and/or sedimentation) is dependent on 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 are practiced to lessen erosive energies. The effectiveness of these BMPs is discussed by Rashin et.al. (2006) in a publication of the Journal of the American Water Resources Association. Comparing the Proposed Action to their application of studied

BMPs would indicate that the proposed buffers and logging system design criteria would substantially reduce the risk of resource damage should a storm event occur while the ground is exposed. For example, the study showed an assessment of surface erosion and sediment routing during the first two years following harvest indicated a 10 meter (approximately 30 feet) setback from ground disturbance can be expected to prevent sediment delivery to streams from about 95 percent of harvest-related erosion features. The PDC in this project uses setbacks from nearly double to 10 times that distance, in addition to directional felling and hand treatments (i.e., no machinery) that would further reduce erosion features and disturbance. In conclusion, by maintaining proper amounts of protective groundcover along with BMP and PDC, the risk of erosion and subsequent sediment delivery caused by the Proposed Action is extremely small. Thus, all areas proposed for treatments are expected to meet the Forest Plan standard for effective groundcover (FW-025) following ground disturbing activities.

Detrimental Soil Conditions

The results of soil quality field surveys performed over several years can be reviewed in detail in the Soil Report that is incorporated by reference. Generally, most thinning treatments that were monitored between 1999 and 2009 have seen a less than three percent detrimental soil impact. The exception to this being seen in the Chee and Yaka sales from 2003 and 2000 respectively, where percentages were 13 and 6 respectively, while still below the standard of 15 percent. All areas monitored post-logging were within the 15 percent detrimental soil condition standard.

In addition, supplemental monitoring was conducted in summer of 2016 using the newer national protocol. While adequate monitoring data existed in the western half of the planning area, the eastern half required some additional review in order to provide a geographic and proposed treatment cross section to better capture the existing conditions and potential cumulative effects. As a result, 30 proposed treatment areas were evaluated using the Forest Soil Disturbance Monitoring Protocol (Dumroese, D.P., 2009) and outlined by Napper in the Soil Disturbance Field Guide (2009); five in the western half to fill some data gaps, and 25 from about Camas Prairie and eastward, almost to the Forest boundary. The supplemental monitoring report is included in the project file and explains the findings on a proposed unit by unit basis. None of the 30 monitored proposed units exceeded 7% detrimental soil condition.

The conceptual layout of logging system patterns for the proposed treatment areas have been designed to ensure less than 15 percent of the area is detrimentally impacted (ground disturbance) within each individual stand that uses ground-based equipment. Since ground disturbance does not equate with detrimental soil condition, and design already has impact area below 15 percent, it is not expected that any of the proposed treatment areas would exceed the Forest Plan standard. Soils underlying skid trails nearest landings are most likely to incur detrimental damage because they receive the most trips with equipment. Further away from landings, soils are impacted less and less as fewer trips occur over them. The past several years of Forest Plan monitoring results indicate a clear trend in the reduction of detrimental impacts due to the increasing use of low ground impact machinery. Observations during monitoring indicate obvious detrimental impacts on main skid trails and landings that receive numerous trips with higher impact machinery (such as skidders) with much less impact on lateral trails, and within the unit where harvester equipment typically works. As an example, in July 2006, a thinning unit in the West Fork Hood River watershed was yarded with a large log loader. Random shovel probes occurring right behind the machine as it moved through the unit showed no detrimental damage at all, and barely an imprint on the ground.

Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. However, this increase is not expected to exceed Forest Plan standards (FW-22 and FW-23) for detrimental soil conditions. Additionally, there would be no accompanying measurable decrease in site productivity in the units.

Organic Matter Levels

Given the amount of material left standing on site, as well as the expected slash loading, it is likely an increased level of organic matter (tonnage) would be left on the ground versus up in the canopy for site productivity purposes. Sufficient tonnage is expected to remain on site to provide for organic matter input to the ecosystem once all activities are complete. In thinning areas there would be substantial future organic matter left standing in addition to material on the ground, although it is likely that localized acreage would be lower than Forest Plan standards for organic matter in the higher fire frequency areas within the proposed units in the dry mixed-conifer ecotypes. When this occurs, it is not expected to be a substantial impact to nutrient cycling because these are ecosystems where fire typically moved through very quickly, thus retaining substantial organic matter reserves in the mineral topsoil due the way in which they have developed.

The same conclusion applies for the underburning treatments.

Cumulative Effects

Potential cumulative effects projects have been reviewed and two activities overlap in either time or space within the soils analysis areas; McCubbins OHV Trails and grazing. In an effort to try and capture if these two activities would be additive to the Proposed Action, some of the 30 supplemental monitoring units were chosen where these activities overlap. In spite of the existing activities, there was no field evidence to indicate that existing, and therefore future detrimental soil conditions, would exceed Forest Plan standards. Therefore, no adverse cumulative effects are expected. The method of soils analysis is cumulative by nature as explained in the Mt Hood Forest Plan (specifically FW-22). More clearly stated, an area (proposed unit) is evaluated by considering previous damage (if any) that still meets the detrimental condition definition, plus any expected detrimental soil impacts caused by the Proposed Action.

3.5.4 Consistency Determination

The Proposed Action Alternative is consistent with all Forest Plan standards and guidelines with the exception of FW-032 and FW-033 for soil organic matter in the dry mixed-conifer ecotypes. As discussed in the previously, localized acreage would be lower than the Forest Plan standard. The table below discusses this Forest Plan exception in further detail.

Table 34. Project consistency with soils Forest Plan standards

Standard	Paraphrased Description	Proposed Action Discussion
FW-022, FW-023	The combined cumulative detrimental soil impacts occurring from both past and planned activities should not exceed 15% of an activity area.	An increase in detrimental soil condition is not expected to exceed Forest Plan standards based on the current condition, which was evaluated by monitoring past projects within the planning area.
FW-025	In the first year following surface-disturbing activities, the percent effective groundcover by soil erosion hazard class should achieve at least the following levels: Erosion Hazard Class Low to Moderate: 60% Erosion Hazard Class Severe: 75% Erosion Hazard Class Very Severe: 85%	No active erosion from previous vegetation management was observed during the field reconnaissance for this project. While short-term soil erosion risk would increase with the Proposed Action Alternative, all areas proposed for treatments are expected

Standard	Paraphrased Description	Proposed Action Discussion
		to meet the effective groundcover standard following ground disturbing activities through implementing BMPs and PDC that would maintain proper amounts of protective groundcover. The risk of erosion and subsequent sediment delivery caused by the Proposed Action Alternative would be extremely small.
FW-032, FW-033	Favorable habitat conditions for soil microorganisms should be maintained for short and long-term soil productivity. At least 15 tons per acre of dead and down woody material in the eastside vegetation communities should be maintained and evenly distributed across managed sites.	This standard is expected to be met in the moist mixed-conifer treatment units. However, in the dry mixed-conifer types, sites would be less than 15 tons per acre. These dry mixed-conifer sites naturally produce less than 15 tons per acre especially where a high fire frequency would be typical for the area. Therefore a project level exception is necessary to achieve the project's objectives. This exception is not expected to negatively impact the continued soil productivity because these sites are expected to retain a sufficient amount of organic matter in the mineral top soil.

3.6 Hydrology

Summary – This section summarizes the Hydrology Report which is incorporated by reference. Detrimental effects to water quality and quantity would be reduced or eliminated through the use of PDC and BMPs during project implementation. These PDC and BMP are listed in Sections 2.3 and 2.7. Based on the Aggregate Recovery Percentage analysis, watershed impact areas would not exceed the Forest Plan standard. Increased peak flows are not expected from implementation of the Proposed Action. Sediment delivery effects to water quality would be minimal in the short term until vegetation is reestablished at the culvert replacement sites and quarries and immeasurable in the long term. Water temperature would be maintained under the No Action Alternative. The risk of increased stream temperatures is low in the Proposed Action Alternative since no treatments are proposed to occur within the Riparian Reserves, which encompass the primary shade zone. The short-term sedimentation risk would be low for the No Action Alternative because sediment delivery to streams in the project area is expected to remain at current levels. Lack of road maintenance in some areas would lead to increased sediment introduction due primarily to erosion of the road surface. The risk would also be low under the Proposed Action Alternative with the highest risk associated with road maintenance activities, including replacement of approximately ten culverts. Risk for increased peak flow would be low under both alternatives due to meeting Forest Plan Standards and only temporarily increasing the stream channel network miles by less than one percent with implementation of the Proposed Action.

3.6.1 Analysis Assumptions and Methodology

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

GIS analysis and additional modeling were completed for a variety of site conditions and parameters in the project area. The Aggregate Recovery Percentage (ARP) model was used to determine whether watersheds in the project area would meet the Forest Plan standard FW-064 dealing with Watershed Impact Areas (WIA). The ARP model is a standard tool used by many Forest Service resource specialists throughout the Pacific Northwest. The model calculates the “hydrologic recovery” of a watershed, which is based on the amount of human and natural caused vegetation disturbance. This disturbance usually results from timber harvest, wildfire and road building. In addition, some representative sediment erosion and transport concentrations are derived from the Forest Service Watershed Erosion Prediction Project (WEPP) Model. Documentation of the model, assumptions and limitations can be found on the website: <http://forest.moscowfsl.wsu.edu/fswepp>. Some considerations about strengths and weaknesses associated with the analysis approach discussed above are discussed in Table 35.

The following assumptions are utilized in the Water Quality Analysis:

- All PDC and BMP listed Section 2.3 and 2.7 would be implemented and effective as described in the BMP Table in Appendix 2.
- The areas of impact outlined in Section 2 would be the areas of disturbance.
- Monitoring implementation and effectiveness of BMP and PDC would be a component of project implementation.
- All surface water areas have been identified through field work.

Table 35. Strengths and weaknesses of the water quality analysis approach

Analysis Method	Strength	Weakness
Aggregate Recovery Percentage (ARP) Model	Gives a good general idea about potential hydrologic recovery in a basin. Model works well when followed up with field data such as stream surveys.	Model utilizes a number of GIS results and a growth simulation model to determine recovery. These may differ somewhat from what is actually on the ground due to mapping inaccuracies and actual site conditions.
GIS Generated Site Data	Provided more site-specific data for effects analysis. This led to a more accurate effects analysis.	Since layers in GIS are updated as new, more accurate data becomes available, there may be some inaccuracies in current mapping. Accuracy depends on the level of field verification and ownership.
Effectiveness of Aquatic BMP and PDC	Effectiveness of various erosion control measures in reducing erosion is well documented. General effectiveness of buffers in reducing sediment and other impacts is well documented.	Effectiveness of various buffer widths on reduction of effects to surface water is not extensively documented in a wide variety of physical settings.
WEPP Model	Some of the model input parameters can be adjusted to reflect site conditions. This resulted in more accurate representations of potential erosion and sediment delivery. Model results give an actual value for erosion and sediment delivery.	Not able to adjust all of the variables that reflect all of the actual physical conditions in the project area (Geren and Jones 2006). Model results have been documented to underestimate actual amounts of erosion and sediment delivery (Welsh, 2008). The model documentation states that results can be up to + or – 50% of actual

Analysis Method	Strength	Weakness
Stream Inventories	Provide more site-specific data for effects analysis. This data has been collected in a Nationally standardized protocol by trained resource professionals.	amounts. Some of the inventories are older and some conditions may have changed between the time the data was collected and the present time.

3.6.2 Existing Condition

The project is located in the White River watershed with some minor overlap with the White Horse Rapids-Deschutes River and Beaver Creek watersheds. Vegetation includes dry or moist mixed-conifer forest types. Average annual precipitation ranges from 64 inches in the high elevation areas to 22 inches in the lower elevations of the planning area, occurring mostly during the fall and winter months. Elevation in areas proposed for treatment ranges from 2,640 feet to approximately 4,440 feet. The primary aquatic feature in the project area is Clear Creek downstream of Clear Lake.

The proposed project is located primarily within portions of four 6th field watersheds (subwatersheds): Clear Creek, Wapinitia Creek, Middle Beaver Creek and the Middle White River. These subwatersheds were used as the basis for the site-specific analysis, as well as for cumulative effects analysis and compliance with the Northwest Forest Plan (NWFP) Aquatic Conservation Strategy Objectives. All of the activities for the restoration project are subject to all applicable BMP and PDC regardless of their location. A small percentage of the project area is located within four additional subwatersheds: Coyote Creek, Timothy Lake-Oak Grove Fork Clackamas River, Upper Beaver Creek, and Upper White River. Effects are expected to be limited due to the small amount of disturbance and would not be included in the analysis for this document. For the purposes of this analysis, only the four primary 6th field subwatersheds are used for the analysis area and in the remainder of this section.

A total of 46 springs were identified within the project area. Most, if not all, of these have not been investigated yet to a level that would allow them to be classified as jurisdictional wetlands, which are those wetlands identified as within the regulatory jurisdiction of Section 404 of the Clean Water Act (CWA). Areas identified as wetlands for this project were given the appropriate Riparian Reserves per the Northwest Forest Plan and would be protected and excluded from treatment occurring during this project.

The 2012 Oregon State Water Quality Integrated Report is currently the approved document listing water quality impairments for the State of Oregon. Clear Creek is 303(d) listed as water quality impaired for Summer Temperatures for Salmonid fish rearing; however, the TMDL has yet to be initiated (Category 5).

Water temperature data has been collected by the Forest Service in Clear Creek, Camas Creek, Frog Creek and McCubbins Gulch. Additional temperature dataloggers were installed in Clear Creek below the Frog Creek confluence and Camas Creek during the summer of 2016; however, data would not be downloaded until the spring of 2017.

Stream temperatures exceeded the 17.8 °C summer temperature standard for salmonid rearing in all stream reaches monitored at some point in time, except for Frog Creek and in Camas Creek at the confluence with Clear Creek. It should be noted, however, that only one year of data was available for stream temperatures in Frog Creek. Camas Creek in Camas Prairie was recorded to have exceptionally high stream temperatures during the period of record. Of the monitored streams, the only stream that is listed for summer stream temperatures by the Oregon DEQ is Clear Creek.

In order to assess the existing condition and the potential effects on the stream channels in the project area, the streams were classified and rated accordingly based on their Rosgen Channel Type. This stream

classification system, developed by Rosgen, classifies streams into stream types based on entrenchment ratios, width/depth ratios, sinuosity, channel gradient, and channel material (1996).

The width-to-depth ratio is an index of the cross-sectional channel shape, where both width and depth are measured at the bankfull level. Changes in discharge, bank stability, sediment load and/or bedload can rapidly alter the width and/or depth of the channel. Whether a stream erodes downward, or outward, or both, can be influenced by bank shear stress, channel substrate type and the amount of riparian vegetation present on stream banks. Bank vegetation increases the resistance to erosion through its binding effects on banks, with erosion decreasing as the percentage of roots in the soil increases.

Other channel stability factors based on channel type that can be considered include recovery potential, sediment supply, streambank erosion potential, and vegetation controlling influence. When these factors depart significantly from their stable state, it can result in degradation, aggradation, accelerated lateral erosion, avulsion or other channel instability. Ultimately, these instability consequences can lead to a change in channel type and a change in channel sensitivity as well as the other channel stability factors (Rosgen 2009). Table 36 shows broad-level, generalized management interpretations by stream type within the project area.

Table 36. Generalized management interpretations by stream types within the project area (Rosgen 2009)

Stream Names	Stream Type	Sensitivity to Disturbance	Recovery Potential	Sediment Supply	Streambank Erosion Potential	Vegetation Controlling Influence
Frog Creek Headwaters & McCubbins Gulch	B5	Moderate	Excellent	Moderate	Moderate	Moderate
Clear Creek @ mouth & Camas Creek @ mouth	C2	Low	Very Good	Low	Low	Moderate
Clear Creek	C4	Very High	Good	High	Very High	Very High
Frog Creek	E4	Very High	Good	Moderate	High	Very High
Camas Creek	E5	Very High	Good	Moderate	High	Very High

Stream channel types in the project area are influenced by the varying subsurface geology. The project area is dominated by Quaternary volcanic rocks and glacial deposits with minor amounts of recent alluvial deposits and Pliocene sedimentary deposits. Generally, the glacial and alluvial deposits result in less-confined valleys and lower-gradient channel types as compared to the streams on volcanic deposits. Stream surveys conducted within the project area over the past ten years also reflect this generalization (Mt. Hood Stream Surveys 2007, 2009 and 2016).

Forest Plan standard FW-097 indicates that “spawning habitat shall maintain less than 20 percent fine sediments (i.e. particles less than 1.0 millimeter in diameter) on an area weighted average.” The purpose of this standard is to protect spawning habitat and scientific literature directed at impacts of fine sediment to spawning habitat by using a standard based on a definition of fines as <6 mm (see Fisheries Report for more detail). Stream surveys indicate that certain reaches of Camas Creek and McCubbins Gulch Creek exceed the standard of 20 percent fines. McCubbins Gulch Reach 2 has exceptionally high fine sediment with 80% fine sediment indicated by the 2009 stream survey.

Other than streambank erosion from unstable banks, potential sources of coarse and fine sediment to surface water in the area include nearby roads and OHV trails. Road and OHV trail densities (miles of

road per square mile of basin) can be used as a general indicator of potential problems associated with roads and trails. Road densities within a watershed that exceed 1.7 to 3 miles per square mile generally indicate areas with the potential for sediment related problems, although it is possible to have isolated areas of road instability even in areas of low road density (Cederholm et al. 1981; USFS 1996).

Middle White River and Wapinitia Subwatersheds within the National Forest Boundary are below three mi/mi² (miles per square mile) for road densities due in part to past road decommissioning efforts and conversion to motorized trails. Clear Creek and Middle Beaver Creek Subwatersheds have road densities alone that exceed three mi/mi². When motorized trails are added to overall road densities, all four of the analysis subwatersheds have densities that exceed 3 mi/mi². No stream surveys were conducted in Middle Beaver Creek, only approximately four percent of the subwatershed is located on the Forest.

Clear Creek stream survey (2009) results and data collected during the 2016 field season were examined to determine if indications of degradation related to high road or trail densities were detected. These may include a high percentage of fine substrate, channel bank erosion, high width to depth ratio or general comments relating to sediment accumulations observed. The most recent 2009 Clear Creek Stream Survey did not note concerns associated with any of these attributes. Stream surveys conducted in 2009 and in 2016 identified both authorized and unauthorized OHV use as an issue within the Wapinitia Subwatershed within the Forest. Trail and road densities within the Wapinitia Subwatershed exceed 5 mi/mi².

Three grazing allotments intersect the project area, one being the White River Allotment, which has active cattle grazing. The White River Allotment overlaps 83% of the project area. Streambank alteration by hoof shear, trampling, and/or post-holing (all referred to as hoof action in the remainder of this section) has the potential to result in a cutbank or alter channel morphology. Field surveys conducted in 2016 found numerous unfenced wetlands and streams that exhibited hoof action from cattle. The magnitude of streambank alteration from grazing is not currently known, since this is not a component of the range monitoring.

The White River Watershed Analysis recommended initiating a monitoring program that would address this; however, this monitoring program has not been implemented thus far (1995). The White River Watershed Analysis identified multiple water quality issues and made recommendations for improvement projects to address them. Each of these recommended projects were proposed in order to address existing or potential erosion and sediment delivery to streams within the project area. The only one of these projects that has been confirmed to have been completed thus far is exclosure fencing around Camas Prairie. The Little Knoll Resource Management Project Decision from 1986 was to maintain active use of Jackey Quarry while mitigating land management and water quality concerns. Prior to use of this quarry for the project, any remaining mitigations from the Little Knoll Decision would be implemented. Two additional quarries are located within the project area, Rimrock Quarry and Alkali Quarry. Rimrock Quarry is located outside of Riparian Reserves, while Alkali Quarry is located within the Riparian Reserves for an intermittent tributary to Clear Creek.

Forest Plan standard FW-064 states that “Watershed impact areas at the subbasin or area analysis level should not exceed 35 percent” (FW-064) as part of a cumulative watershed effects analysis. In addition, standard FW-063 states that “Within the 15 major drainages on the Forest watershed impact areas shall not exceed 35 percent.” The value of 35 percent is set to disperse activities in time and space, to “minimize cumulative watershed effects” which, in this case, is primarily increased peak flow (Forest Plan Standard FW-061, pg. Four-53). These increased peak flows can cause stream channel damage in the form of increased bank erosion, channel bed scour, channel widening, and sedimentation. Existing Watershed Impact Areas (WIAs) for the analysis subwatersheds range from 5 to 10 percent, well below the 35 percent threshold.

3.6.3 Effects Analysis

No Action Alternative

In general, existing conditions as described would be maintained. Stream temperatures are expected to remain at current levels in the watershed, due to no reduction in streamside shading. No harvest activities would occur in primary or secondary shade zones along all streams, and would continue to fill in with understory vegetation. These densely vegetated riparian areas are more susceptible to high-severity burns due to excess fuel loading. In the event a wildfire burned in this watershed, riparian areas have the potential to burn hot in areas that have high fuel loading.

Sediment delivery to streams in the project area is expected to remain at current levels over the long term; however, if wildfires occur, due to overstocked conditions, especially in even-aged plantations, fire intensities would likely be high, and sediment delivery to project area streams would increase. Roads, and roads converted to trails, with impaired drainage would continue to contribute sediment to streams in the project area. Current high road and trail densities would continue for all of the analysis subwatersheds, resulting in continued bank instability and fine sediment in streams. Existing point source areas for sediment as identified by the White River Watershed Analysis would continue impairing water quality. Vegetation that impedes erosion and sediment delivery would be maintained. In the event a wildfire burned in this watershed, areas that have high fuel loading have the potential to experience high severity burns. As a result of wildfire, a high sediment input to surface water through increased landslides and surface erosion, along with increased stream channel and bank erosion from increased runoff and sediment bulking from ash deposits could be expected.

Proposed Action Alternative

This Proposed Action Alternative would not thin or remove vegetation within Riparian Reserves.

There would not be any treatments, including prescribed fire within Riparian Reserves. Where prescribed fire would occur, fire could back down into the Riparian Reserves, but ignition is not allowed within the Riparian Reserve itself. Tree mortality is not expected from implementation of the Proposed Action in the larger, shade-producing vegetation, so stream shading would be maintained within the primary shade zone. Since Riparian Reserves are not proposed for treatment, Riparian Reserves would continue to have substantial fuel loads in areas where they currently have substantial fuel loads, resulting in continued susceptibility to affects from wildfire.

Due to meeting or exceeding primary shade width recommendations in the Sufficiency Analysis¹⁴, proposed treatments associated with the project are not expected to have a measureable effect on existing stream temperatures (USDA and BLM 2012).

Some ground-disturbing activities have the potential to dislodge soil particles which in turn may increase erosion. These activities include construction or reopening of temporary roads, landings, skid trails, yarding corridors, burn piles and areas of road maintenance and repair. According to the soils analysis, risks of erosion and potential sediment delivery are expected to be small due to maintaining protective groundcover along with implementation of BMP or PDC.

¹⁴ USDA Forest Service, et al. 2004. Sufficiency Analysis for Stream Temperature: Evaluation of the adequacy of the Northwest Forest Plan Riparian Reserves to achieve and maintain stream temperature water quality standards. Portland, OR

The Proposed Action Alternative would utilize approximately 20 miles of temporary roads on existing disturbance, utilize approximately 14 miles of temporary roads that were once system roads that have been converted to OHV trails and would construct approximately six miles of new temporary roads. None of the new temporary road construction would be within Riparian Reserves.

The temporary roads utilizing old alignments would re-trace the alignment of older overgrown road beds. Some of the existing stream crossings have drainage issues that would be addressed either during implementation through temporary drainage improvements or through rehabilitation post-implementation. Of the travelways proposed to be used, approximately 1.9 miles of OHV trails and old, existing alignments are located within Riparian Reserves. No new stream crossings would need to be constructed within Riparian Reserves.

An example of some of the drainage and sediment delivery issues currently existing along temporary roads on converted trails is shown below in Figure 13 and Figure 14 (previous to conversion, this was the FS 4310-011 Road).

This converted trail exhibits various water quality-related concerns, including: a comprised closure allowing access to all vehicles, sediment delivery to two perennial stream crossings, seeps in the road, rutting, lack of surfacing and a failed culvert.



Figure 14. Sediment delivery to a perennial stream channel on a converted trail, temporary road

n.

Some of these closure addressed either during implementation through temporary drainage improvements, or through rehabilitation, post-implementation.



Figure 13. Seep on temporary road on a converted trail surface

Therefore, implementation of the Proposed Action Alternative should improve drainage and reduce sediment delivery on these temporary roads on converted trails relative to the existing condition. Not all drainage improvements that may be needed for a sustainable trail network would be implemented with this project. Some of these improvements would need to take place after implementation as part of the McCubbins Gulch OHV project implementation.

Road density within the analysis area would change in some areas for the short period of time that temporary roads would be in use. These temporary roads would be rehabilitated immediately following vegetation treatment operations as described in the PDC section. Table 37 displays the short-term change in road density.

Table 37. Watershed road and motorized trail density

Watershed	Existing Road/Trail Density (mi/mi ²)	Proposed Action Road Density During Operations (mi/mi ²)	Proposed Action Road Density After Operations (mi/mi ²)
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Clear Creek	4.2	4.7	4.2
Middle Beaver Creek	8.5	8.9	8.5
Middle White River	3.2	3.6	3.2
Wapinitia Creek	5.1	5.8	5.1

Since there are temporary roads crossing streams that need either temporary drainage fixes, or need to have culverts removed after project implementation, some short-term sediment delivery to streams is anticipated. Long term, these drainage repairs should ultimately improve drainage and reduce or maintain current levels of sediment delivery to streams within the project area.

Road maintenance prior to log haul would help maintain the designed drainage of the road surface, which reduces the potential for larger sediment inputs that eventually may enter stream courses. Aggregate road surfacing can minimize the amount of fine sediment from road surfaces entering streams following log haul, especially during and following rainfall events. The following WEPP model runs show the difference in erosion between a 200-foot section of native surface road (road is made from native soil) and a 200-foot section of gravel surface road. All of the model inputs stayed the same except surface material, which was changed from native to gravel surface.

Table 38. WEPP model run showing the difference in erosion between a gravel surface road and a native surface road

Road Surface	Road Prism Erosion
Native Surface Road	136 lbs.
Gravel Surface Road	86 lbs.

Some road maintenance activities and culvert replacement activities on hydrologically connected streams have the potential to increase short term, road-related erosion and sediment, especially during rainfall events. PDC have been identified in order to prevent or reduce sediment delivery to streams. The implementation of PDC and BMPs that include installation of erosion control measures to minimize or eliminate sediment introduction into streams would further reduce the risk of sediment introduction. The probability of any degradation to water quality or fisheries resources caused by sedimentation due to road construction, reconstruction and maintenance is extremely low. These activities would provide an overall long-term benefit by restoring proper function of the road drainage which would reduce erosion and sedimentation.

Log hauling has a low risk of increasing the amount of fine sediment in streams due to the following conditions:

- The roads along the haul route have for the most part, well-vegetated road ditchlines that allow eroded soil to be stored adjacent to the roads.
- 79 percent of the road system is either asphalt or gravel surface which has a lower surface erosion potential than native surface roads.
- Sale administration personnel would restrict log hauling when necessary to minimize water quality degradation. Haul would be stopped if there is rutting of the road surface or a noticeable increase in the turbidity of water draining to the road ditches or at stream crossings.
- Log haul outside the dry season would not be permitted on native surface roads. If log haul occurs outside the dry season, then it is restricted to asphalt surface roads and gravel surface roads, and must meet some additional PDC requirements (PDC #31). This PDC only allows haul outside the dry

season when precipitation amounts are similar to amounts occurring during the dry season, which would further insure minimization of erosion and sediment delivery to streams. In summary, haul outside of the dry season would not occur on road segments that have a higher risk of soil erosion and sediment delivery to stream systems in the area. Haul outside the dry season can occur in certain areas if precipitation amounts are similar to those found during the dry season (see Section 2.3, PDC for more details).

Additional PDC that limit burn severity in Riparian Reserves to primarily low severity with some moderate severity, along with using non-ground disturbing types of fireline, such as wet line, would minimize the potential for sediment introduction, related to burning activities.

Other fuel treatment activities may increase surface erosion in the harvest blocks along temporary roads, landings, skid trails and yarding corridors. The amount of erosion is expected to be low and short-lived due to the implementation of PDC, and it is unlikely that any material would reach the aquatic system due to buffering by the Riparian Reserves.

The use of quarries is also proposed in this project as a material source for project-related road improvement activities. Three quarries are located within the project area that may be used for project-related activities: Jackey Quarry, Alkali Quarry and Rimrock Quarry. Implementation of PDC for quarry use, would result in minimized sediment delivery in the short term, and not measurable in the long term.

Pre- and post-project implementation watershed impact areas (WIAs) for the project are displayed in Table 39. Any value greater than 35 percent would exceed Forest Plan standards identified in FW-064.

Table 39. Pre- and post-watershed impact areas for the analysis area

6th Field Watershed	Current Watershed Impact Area (percent)	Post-Project Watershed Impact Area (percent)
Clear Creek	5	15
Middle Beaver Creek	9	35
Middle White River	3	19
Wapinitia Creek	10	29/33*

* Wapinitia Creek Subwatershed has two post-project Watershed Impact Areas (WIA) that represent the WIA spaced by 10 years apart. This is based on the proposal to treat the units east of the 2110 Road in 2018/2019 and units west of the 2110 Road in 2028/2029.

WIAs in all four analysis subwatersheds are well below the maximum Watershed Impact Area percentage of 35 percent after implementation. Since no WIAs exceed 35 percent, the Proposed Action Alternative is therefore consistent with the WIA standard.

Two temporary stream crossings on existing disturbance not accounted for in the existing road and trail network are anticipated to be used to implement the Proposed Action Alternative. Both crossings are located in the Clear Creek Subwatershed, one is located at the headwaters of a perennial tributary to Clear Creek and the other one is located at the headwaters of an intermittent tributary to Clear Creek. These additional stream crossings would potentially increase the percentage of miles of stream channel due to roads from 14-34% currently, to approximately 14-35% post-implementation of the Proposed Action.

There are two areas where streams would be crossed temporarily during the project. The temporary crossings would follow an existing disturbance route that is not listed as part of the trail or road network for the Forest. These additional stream crossings would potentially increase the percentage of miles of stream channel due to roads by a potential change of up to 1% to an overall range of 14-35% post-implementation. The percentage change would remain low by adhering to BMPs and PDC for the Proposed Action.

Both crossings are located in the Clear Creek Subwatershed, one is located at the headwaters of a perennial tributary to Clear Creek and the other one is located at the headwaters of an intermittent tributary to Clear Creek. These additional stream crossings would potentially increase the percentage of miles of stream channel due to roads from 14-34% currently to approximately 14-35% post-implementation of the Proposed Action BMP and PDC.

Cumulative Effects

Since minimal short-term and no measurable long-term effects to water quality, and no measurable effects to water quantity are expected from implementation of the Proposed Action Alternative, no cumulative effects to water quality and quantity are therefore anticipated.

Since the Proposed Action is anticipated to have no measurable direct or indirect effects to stream temperature or sediment, none of the overlapping projects could be considered to have cumulative effects. Water quantity is included in this section, as potential increased peak flow from vegetation removal is primarily a cumulative effect at the sub-watershed and larger scale, however no cumulative effects are anticipated for water quantity.

3.6.4 Consistency Determination

Numerous existing plans provide guidance for projects in the form of standards and guidelines and recommended BMPs. These documents include the Forest Plan, the Northwest Forest Plan and associated supporting documents and the Middle Columbia-Hood (Western Hood Subbasin) TMDL. The applicable water quality standards and guidelines include: FW-54 to 60, FW-61 to 67, FW-72, FW-75, FW-76, FW-109 to 114, FW-127 to 129, and FW-132 to 136. The applicable Northwest Forest Plan standards and guidelines can be found on pages B-11 and C-31 through C-38.

3.6.5 Best Management Practices and Project Design Criteria

A complete list of PDC and BMP are included in Sections 2.3 and 2.7. BMP and PDC were developed for the analysis of this project using the National Core BMP Technical Guide (USDA Forest Service 2012), in addition to monitoring, field verification, professional judgment, and the best available science. An additional resource for BMP was utilized for this project. This resource is the draft “EPA Region 10 Source Water Protection BMP for USFS, BLM” (EPA, 2005). BMP and PDC are discussed throughout the effects analysis of this section and are the primary mechanism to mitigate potential effects to water quality and quantity from the project.

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

While Table 40 shows a list of PDC, BMP and project design considerations specific to ensuring water quality standards and requirements through project implementation, the full list of PDC and BMPs can be found in Sections 2.3 and 2.7.

Table 40. Select project design¹⁵ considerations, BMP and PDC for water quality

Practice	Initial Project Design Element	BMP/PDC
Maintaining a protection buffer adjacent to perennial and intermittent streams.	X	X
Keeping mechanized equipment at least 100 feet away from streams.	X	X
No new temporary road construction within Riparian Reserves	X	X
No stream crossings on new temporary roads.	X	
Timber haul only during the dry season on native surface roads.		X
Fuel storage and refueling activities only allowed if they are greater than 150 feet from streams or wetlands.		X
Rehabilitation of skid trails after harvest activities		X
No ground-based harvest on slopes over 30%	X	X
Erosion control measures for quarries used located within Riparian Reserves		X
Limit burns within Riparian Reserves to mostly low severity.	X	X

With the implementation of above-mentioned PDC and BMP new temporary roads, landings, skid trails, yarding corridors, road maintenance, log hauling and road repair work are expected to have minimal effect on sedimentation relative to the existing condition.

3.7 Aquatic Conservation Strategy

This section summarizes the Proposed Action's consistency with the Aquatic Conservation Strategy (ACS) objectives from the Water Quality Report, which is incorporated by reference.

In order for a project to proceed, “a decision maker must find that the proposed management activity is consistent with the Aquatic Conservation Strategy objectives” (ROD B-10) from the Northwest Forest Plan Record of Decision. Relevant portions of the range of natural variability are included in the Existing Conditions section 3.6.2. In general, the sensitivity of streams in the project area relies on the stream type, which is a reflection of the stream form, function and underlying geology. McCubbins Gulch is a steeper, more confined channel type (B5) that is moderately sensitive to disturbance; however, due to the level of past and present disturbance, it exhibits highly unstable banks (75%) and high levels of fine sediment deposition. Clear Creek is located within a less-confined channel and valley type with a well-established floodplain (C2) resulting in low sensitivity to disturbance. Frog Creek and Camas Creek are predominately characterized as low gradient, meandering streams with low width/depth ratios and little deposition that are generally very efficient and stable (E4/E5); however, they also possess a very high sensitivity to disturbance. The existing condition of the project area is affected by a combination of many historic and current land uses, including grazing, OHV use, irrigation diversions and vegetation management. Table 41 displays the individual indicators and the effect the alternatives have on those indicators at the 5th, 6th and 7th field watershed scale. Fifth field watersheds are generally large in size (40,000 acres to 250,000 acres), while 6th and 7th field watersheds are smaller (5,000 acres to 40,000 acres and 2,000 acres to 5,000 acres respectively). As indicated in Table 41 ACS Objectives indicators would be maintained.

¹⁵ Initial project design elements were included in the development of the Proposed Action, BMPs were developed using recommendations in the National Core BMP Technical Guide (USDA Forest Service 2012) and the draft “EPA Region 10 Source Water Protection Best Management Practices for USFS, BLM” (EPA, 2005), and site-specific analysis of the project area

Table 41. ACS objective indicators for each alternative

Indicators	Effects of the Actions by Alternative	
	No Action	Proposed Action
<u>Water Quality:</u>		
Temperature	M	M
Sediment	M	M
Chemical Contamination	M	M
<u>Habitat Access:</u>		
Physical Barriers	M	M
<u>Habitat Elements:</u>		
Substrate	M	M
Large Woody Debris	M	M
Pool Frequency	M	M
Pool Quality	M	M
Off-channel Habitat	M	M
Refugia	M	M
<u>Channel Conditions and Dynamics:</u>		
Width/Depth Ratio	M	M
Streambank Condition	M	M
Floodplain Connectivity	M	M
<u>Flow/Hydrology:</u>		
Peak/Base Flows	M	M
Drainage Network Increase	M	M
<u>Watershed Conditions:</u>		
Riparian Reserves	M	M

The abbreviations in the table are defined as: R=“Restore” which means the action(s) would result in acceleration of the recovery rate of that indicator; M=“Maintain” which means that the function of an indicator does not change by implementing the action(s) or recovery would continue at its current rate; and, D=“Degrade” which means changing the function of an indicator for the worse.

The following lists Aquatic Conservation Strategy objectives (ROD B-10) and how the Proposed Action would influence them. Changes described below would be evident at the 6th field watershed or smaller (i.e., site scale) scale:

1. Maintain the Distribution, Diversity, and Complexity of Watershed/Landscape-Scale Features:

All of the Riparian Reserves in the 6th field sub-watersheds comprising this project would be left untreated so their current condition would be maintained, therefore stream shade and stream temperature would not be affected. Riparian Reserves would continue to be susceptible to wildfire; however, the surrounding uplands would have fuel reductions lowering wildfire severity in the uplands and reducing the likelihood of spread to the riparian areas. Equipment is not allowed within Riparian Reserves outside of existing system roads and existing temporary roads, including converted trail temporary roads. No new road crossings of existing crossings in perennial or intermittent streams or wetlands are proposed. Culverts are anticipated to be replaced on system roads; however, drainage on existing roads and trails would improve over the long term.

2. Maintain Spatial and Temporal Connectivity Within and Between Watersheds: All of the Riparian Reserves in the 6th field sub-watersheds comprising the project would be left untreated so their current condition would be maintained.

3. Maintain the Physical Integrity of the Aquatic System, Including Streambanks, Side Channels (Refugia), and Channel Bottom Configurations: This project would meet this objective through PDC aimed at reducing soil compaction and erosion, restricting near-stream ground disturbance and not

treating vegetation with Riparian Reserves next to perennial, intermittent and ephemeral streams which would maintain current levels of snags and wood input.

4. Maintain Water Quality Necessary to Support Healthy Ecosystems: This project would meet this objective through PDC and by not disturbing the Riparian Reserve vegetated buffer along the perennial, intermittent and ephemeral streams in the project area. This Riparian Reserve protection buffer includes the primary shade zone along perennial streams that would maintain stream temperature. The Riparian Reserve protection buffer would also trap any eroded material prior to reaching surface water, thus reducing or eliminating the potential for sediment delivery. The protection buffers in conjunction with PDC aimed at reducing erosion would maintain the sediment levels in the long term.

5. Maintain Sediment Regimes: PDC aimed at reducing soil compaction, erosion and sediment transport, restricting near stream ground disturbance and establishment of protection buffers next to perennial and intermittent streams would minimize sediment introduction in the short and long term. Any sedimentation resulting from road maintenance activities would be short term and most evident at the site scale. Overall sediment production from roads is expected to be reduced since most maintenance activities are aimed at correcting areas that have existing erosion problems.

6. Maintain In-Stream Flows that are Closer to Natural Regimes: This project would maintain the Watershed Impact Area below the 35% Management Plan Standard and Guide which shouldn't result in any peak flow increase from this project. In addition, there would be no new road/stream crossings so there would not be any increase in the stream channel network by implementation of the Proposed Action.

7. Maintain the Timing, Variability, and Duration of Floodplain Inundation: This project would meet this objective through PDC such as establishment of protection buffers next to perennial and intermittent streams which would maintain floodplain and channel roughness and ultimately the timing, variability and duration of floodplain inundation. Maintaining the Watershed Impact Area below the 35% Management Plan Standard and Guide would protect the integrity of the floodplains while minimizing the potential for increased peak flows. In general, floodplains are limited in this area due to the steep nature of the landscape.

8. Maintain the Species Composition and Structural Diversity of Plant Communities in Riparian Areas and Wetlands: 100 percent of the Riparian Reserves in the 6th field sub-watersheds comprising this project would be left untreated so their current condition would be maintained. By not treating the Riparian Reserves, they would continue to be susceptible to wildfire; however, the surrounding uplands would have fuel reductions lowering wildfire severity in the uplands and reducing the likelihood of spread to the riparian areas.

9. Maintain and Restore Habitat to Support Well-Distributed Populations of Native Plant and Riparian Dependent Species: 100 percent of the Riparian Reserves in the 6th field sub-watersheds comprising this project would be left untreated so their current condition would be maintained. By not treating the Riparian Reserves, they would continue to be susceptible to wildfire; however, the surrounding uplands would have fuel reductions lowering wildfire severity in the uplands and reducing the likelihood of spread to the riparian areas. This project would not restore native plant and riparian dependent species within the Riparian Reserves because activities are not proposed within Riparian Reserves.

3.8 Fisheries and Aquatic Fauna

Summary – While Proposed Action activities may have a short-term effect to sediment levels, the Proposed Action Alternative is not likely to contribute to a trend toward federal listing or loss of viability to the population or species.

This section summarizes the Fisheries Report which is incorporated by reference.

3.8.1 Analysis Assumptions and Methodology

The project is located primarily within portions of four subwatersheds: Clear Creek, Wapinitia Creek, Middle Beaver Creek and the Middle White River (Table 42). About 1.5% of the project area is located within four additional subwatersheds: Coyote Creek (0.1%), Timothy Lake-Oak Grove Fork Clackamas River (0.01%), Upper Beaver Creek (0.6%) and Upper White River (0.8%). Of these four minor subwatersheds, the overlapped project area is dominated by drainage divides and only the Upper White River subwatershed includes any Riparian Reserves within the project area. These Riparian Reserves equate to about 0.75 acre at the headwaters of two intermittent tributaries to White River; however, the upstream extent of these streams appear to be extended further than the actual channels based on LiDAR data for the area. Due to the limited area of Riparian Reserves located in the project area and with no proposed activities occurring in these Riparian Reserves, the Upper White River subwatershed will not be analyzed any further. For the purposes of this analysis, only the four primary subwatersheds are used for the analysis area and in the remainder of this section (Table 42).

The project area for the purposes of this section, is defined as the 5th field watersheds and 6th field subwatersheds identified in Table 42.

This section and the Fisheries Report incorporates by reference all relevant Level II Stream Surveys, and Watershed Analyses ([Region 6 Mt. Hood Publications](#)) available for the four 6th field subwatersheds in the project area being evaluated, and all three 5th field Watersheds with aquatic Propose, Endangered, Threatened, and Sensitive (PETS) and other aquatic special status species within the project area. This section and the Fisheries Report also incorporates by reference the Oregon Department Environmental Quality (ODEQ) Water Quality Assessment – Oregon’s 2012 Integrated Report Assessment Database and 303(d) List for Clear Creek, Camas Creek, Frog Creek, and McCubbins Gulch Creek.

Table 42. Subwatersheds where activities are proposed

White River Fifth Field Watershed
Clear Creek
Upper White River (not analyzed any further)
Middle White River
Beaver Creek Fifth Field Watershed
Middle Beaver Creek
Upper Beaver Creek (not analyzed any further)
Coyote Creek (not analyzed any further)
White Horse Rapids-Deschutes River Fifth Field Watershed
Wapinitia Creek
Oak Grove Fork Clackamas River Fifth Field Watershed
Timothy Lake-Oak Grove Fork Clackamas River (not analyzed any further)

3.8.2 Existing Condition

The existing condition is described in terms of the biological requirements for habitat features and processes necessary to support all aquatic life stages of Regional Forester’s Special Status Species list within the project area. There are four major stream channel elements which do have an impact to all life stages of Regional Forester’s Special Status Species within the project area, and are analyzed in this section. They are as follows:

1. Water temperature

2. Stream channel fine sediment
3. In-channel large woody debris (LWD)
4. Pools

The main stream drainages in the project area located in the Clear Creek 6th field subwatershed are Clear Creek and its two main tributaries, Camas Creek and Frog Creek. Indian Creek is the main stream drainage in the project area of the Middle Beaver Creek 6th field subwatershed, and McCubbins Gulch Creek is the main stream drainage in the project area of Wapinitia Creek 6th field subwatershed.

Interior Redband Trout (*Oncorhynchus mykiss gairdneri*) is a Forest Service Region 6 sensitive Special Status aquatic species that is present within the project area. Interior Redband Trout are found within the following major river systems: White River, Clear Creek, Camas Creek, Frog Creek, McCubbins Gulch Creek, and suspected in Indian Creek. Other Region 6 sensitive species and Federally-listed threatened and endangered species are known on the Forest, but individuals or their habitat are not present in the project area, and are not discussed in this section (Table 43).

Survey and Manage species that were surveyed during a multi-year effort from the late 1990's, and from 2010, and 2015, were not found to be present within the project area or its area of influence; therefore, they are not believed to be present in the project area.

The ODEQ Integrated Report (2012) lists Clear Creek from river mile (RM) 0 to RM 15.1 as a Category 5 (water is water-quality limited, and a TMDL is needed) and is listed as a 303(d) stream for not meeting water temperature standards (<64°F or <17.8°C) for summer salmonid fish rearing. The report also listed Clear Creek as Category 3 (insufficient data to determine whether a standard is met) for sediment and flow modification. Camas Creek was also listed in the report as Category 2 (attaining – specific water quality standards are met), and is meeting water temperature standards for summer salmonid fish rearing. The report also listed Camas Creek as Category 3 for sediment. Frog Creek is the largest tributary to Clear Creek and was listed in the report as Category 2, and is meeting water temperature standards for summer salmonid fish rearing. The report did not list Frog Creek for having sedimentation issues, therefore it is considered to be a Category 3 for flow modification.

The report does not list McCubbins Gulch Creek or Indian Creek for stream temperatures. McCubbins Gulch did exceed the summer stream temperature for salmonid rearing during the two years of recorded temperatures. The report did list McCubbins Gulch Creek as Category 3 for sediment and habitat modification. The Forest has no records of temperature monitoring being conducted on Indian Creek. The report did not have Indian Creek listed. The Forest has not conducted a formal Level II stream survey for the approximate 1.5 RM section of the stream located on the Forest, nor has the Forest conducted any Wolman pebble count surveys.

Pool and woody debris counts and comparison data for the creeks is provided in detail in the Fisheries Report. Generally, small sized and large sized woody debris, and pool quality and quantity is present in various densities across the reaches of Clear Creek, Camas Creek, Frog Creek, and McCubbins Gulch Creek. While lacking small and large woody debris density in some areas and abundant in others, woody debris are a source of pool habitat and/or cover for fish especially where they are associated with debris jams. Indian Creek has not been formally surveyed for pool frequency or quality, or large woody debris densities on the approximate 1.5 RM's located on the Forest. The Barlow District Fish Biologist has taken ocular accounts over the last 16 years of Indian Creek stream channel and floodplain wood loading. Levels appear to be adequate to provide and maintain rearing and refugia habitat for the unknown species of salmonid trout present in Indian Creek on the Forest.

3.8.3 Effects Analysis

No Action Alternative

There would be no short-term direct or indirect effects to aquatic habitat or individuals by taking no action. There would be no soil disturbance because logging operations, road maintenance, road construction/closing, or prescribed fire activities would not occur. No riparian vegetation would be disturbed. The existing stream channel and aquatic habitat conditions would stay relatively the same until the next high-flow event occurs. Stream temperature, fine sediment, large woody debris, and pool and refugia habitat throughout the project area would be maintained at existing conditions.

Long-term effects to aquatic habitat or individuals would be maintained or improved. Stand conditions over the landscape would not be improved, and thus desirable stand conditions mentioned in the purpose and need would not be met. Stream temperature would be maintained or would improve over the long term as streamside vegetation continues to grow. Fine sediment inputs to the stream channels within the project area and its area of influence would be maintained at existing conditions. Natural tree mortality would increase large woody debris loading and move the area towards meeting those standards and outlined in the Forest Plan. Pool levels and refugia would increase and be maintained over the long term with the increase of LWD into the stream channel. Hydrologic fragmentation at road crossings would not improve in the project area.

There would be no irreversible or irretrievable effects to aquatic habitat or resources as a result of implementing this alternative.

Proposed Action Alternative

A may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species (MIIH) determination is warranted to resident interior Redband Trout for the Proposed Action Alternative. Following design layout and adhering to PDC and BMPs in the Proposed Action there would be potential for short-term impacts to spawning and rearing habitat, due to the expected short-term (0 to 1 year) pulses of fine sediment from underburning and road maintenance including culvert replacements activities in fish bearing streams in the project area or its area of influence.

Thinning is not proposed to occur within Riparian Reserves, therefore no short-or long-term indirect effects to water temperature would occur in the project area or its area of influence. Underburning is proposed within some Riparian Reserves located in the dry mixed-conifer stands. Proposed underburning would limit overstory tree mortality. PDC and BMPs create a low probability for mortality of over story trees, which presently provide shade to stream channels in the dry mixed-conifer stands. Any stream channel shade loss from over story tree mortality by underburning is expected to be isolated and would not cause an indirect increase in water temperature for the short or long term at the site level, project area level, or subwatershed level.

There is a need to replace culverts (refer to the Transportation Section for additional information) on proposed haul route roads. Streamside vegetation located in the road prism at the road crossings would be removed in order to safely remove and replace culverts. None of the proposed culvert replacements are located on any known fish bearing streams. They are however located on first or second order perennial stream channels and are within 0.5 river miles from fish bearing streams. The loss of isolated temporary (0 to 5 years) shade to the stream channel from the culvert replacement activities would not cause an increase in water temperature for the short or long term at the culvert replacement site level, project area level, or subwatershed level. Other road activities such as use of native and gravel roads and landings, road maintenance including culvert replacement, and the temporary conversion of roads from OHV trail

construction could lead to limited mobilization of sediment particles which could be at risk of entering streams and aquatic habitats. Any impacts to the stream from sediment produced from road activities would be for short-term duration and the effects would not be detectable at the project area, or the 6th field subwatershed level. However, individuals and habitat of aquatic populations, including sensitive Redband Trout may be affected by short-term increases of sedimentation.

Post- Proposed Action implementation sediment inputs from road activities over the short term should improve as needed road maintenance and culvert replacements are completed and underburn areas reestablish new ground cover. Sediment is expected to be maintained or decrease over the long term at the site level, project area level, and Clear Creek, Middle White River, Middle Beaver Creek and Wapinitia Creek 6th field subwatershed level.

Post-Proposed Action implementation water temperature is expected to be maintained or decrease over the long term at the site level, project area level, and Clear Creek, Middle White River, Middle Beaver Creek and Wapinitia Creek 6th field subwatershed level. No short or long-term effects to sediment would occur in the project area or its area of influence from Proposed Action activities because thinning is not proposed within riparian reserves. The proposed underburning in dry mixed-conifer stands would allow a low-severity burn to naturally creep into the riparian reserves. This would cause a mosaic pattern of burned and unburned areas across the riparian reserve. Low severity burned areas are not expected to transport fine sediment to the stream channel. Any impacts to the stream from sediment produced from underburning activities would be for short-term duration and the effects would not be detectable at the project area, or the 6th field subwatershed level. However, individuals and habitat of aquatic populations, including sensitive Redband Trout may be affected in the short term by sedimentation. None of the sediment inputs are expected to be on-going, therefore stream conditions would return to pre-project conditions in a short amount of time.

Because the Proposed Action Alternative for thinning would not enter riparian reserves, there are no short or long term direct or indirect effects to large woody debris levels or to pool quantity. Large woody debris levels are expected to increase over the long term as future streamside trees fall into the stream channel in the project area and 6th field subwatershed level. Pool quality and aquatic refugia could decrease in the short term (0-1 years), due to nonpoint increases of fine sediment in the stream channels during road maintenance, culvert replacement, and post underburn activities occur. Over the long term, fine sediment from activities proposed in the project area are expected to be negligible to pool quality and aquatic refugia. Over the long term, pool quantities and quality could increase as large woody debris falls into the stream channels and creates and maintains new pools in the project area.

Table 43. List of species addressed in this section

Threatened and Endangered Species	Suitable Habitat Present	Species Present	No Action Effects	Proposed Action Effects
Lower Columbia River steelhead & Critical habitat (<i>Oncorhynchus mykiss</i>)	No	No	NE	NE
Lower Columbia River Chinook & Critical habitat (<i>Oncorhynchus tshawytscha</i>)	No	No	NE	NE
Columbia River Bull Trout (<i>Salvelinus confluentus</i>)	No	No	NE	NE
Middle Columbia River steelhead & Critical habitat (<i>Oncorhynchus mykiss</i>)	No	No	NE	NE
Upper Willamette River Chinook & Critical Habitat (<i>Oncorhynchus tshawytscha</i>)	No	No	NE	NE
Lower Columbia River Coho (<i>Oncorhynchus kisutch</i>)	No	No	NE	NE
Essential Fish Habitat for Chinook and Coho Salmon	No	No	NAA	NAA

Regional Forester Special Status Species

Interior Columbia Basin Redband Trout (<i>Oncorhynchus mykiss gairdneri</i> .)	Yes	Yes	NI	MIHH
Pacific Lamprey (<i>Entosphenus tridentatus</i>)	No	No	NI	NI
Coastal Cutthroat Trout (<i>Oncorhynchus clarkii clarkii</i>)	No	No	NI	NI
Scott's Apatanian Caddisfly (<i>Allomyia scotti</i>)	No	No	NI	NI

Endangered Species Act Acronyms:		Essential Fish Habitat Acronyms:	
NE	No Effect	NAA	Not Adversely Affected
NLAA	May Affect, Not Likely to Adversely Affect	AE	Adverse Effects
LAA	May Affect, Likely to Adversely Affect		
LOBA	May Affect, Likely to Only Beneficially Affect		
Regional Forester's Special Status Species List Acronyms:			
Unk	Species presence unknown but suspected		
NI	No Impact		
MIHH	May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species		

Cumulative Effects

The 6th and 5th field watersheds found in the planning area have been heavily managed during the past century for: grazing; irrigation; timber harvesting; road building and decommissioning; fires (wild and

prescribed); recreational activities, such as OHV use; snowmobiles; trails and campgrounds; exotic fish introduction; weed control; utility corridor operations; and, restoration activities. Cumulative effects from these activities in the White River, Beaver Creek, and White Horse Rapids-Deschutes River 5th Field Watersheds have had both a direct and indirect connection to the level of water quality and quantity, which can influence the health of the native resident Interior Redband Trout that are present in the White and White Horse Rapids-Deschutes River Watersheds. The Proposed Action Alternative would result in short-term (0-1 years) pulses of sediment from underburning and road maintenance in fish bearing streams or area of influence; however, because these are expected to be short in duration and immeasurable, cumulative effects from any past, ongoing, or future projects contributing sediment to fish bearing streams would be inconsequential. Furthermore, the Proposed Action would maintain the overall riparian conditions at the 5th and 6th field watershed scale, while maintaining or improving other resource uses in the watershed.

3.8.4 Consistency Determination

The following Forest Plan standard and guidelines were used to guide the effects analysis:

- pool habitat shall be maintained at natural levels or enhanced, FW-89;
- gravel-dominated or low-gradient (i.e. less than 3 percent slope) streams shall maintain one or more primary pools every 5 to 7 channel widths, FW-090;
- boulder/rubble-dominated or moderately steep gradient (i.e. greater than 3 percent slope) streams shall maintain one or more primary pools every 3 channel widths, FW-091;
- spawning habitat (e.g. pool tailouts and glides) shall maintain < 20% fine sediment (i.e. particles <1 mm in diameter) on an area weighted average, FW-097;
- at least 90% of potential and naturally occurring in-channel large woody debris (LWD) shall be maintained, FW-092;
- retention of multi-piece accumulations of LWD and fallen trees with attached root wads should be emphasized, FW-093;
- conifer and hardwood trees necessary for stream bank stability, long-term wood input, and diversity of wildlife and plant communities should be maintained, FW-135. Note this is recognized for Class IV (non fish-bearing intermittent) streams, seeps, springs, and headwaters; and,
- seven (7) day moving average of the daily maximum water temperature shall not exceed 64 ° F (17.8 ° C) unless specifically allowed under a Department-approved basin surface water temperature management plan (Oregon State Water Quality Standard for water temperature, OAR 340-41).

The Proposed Action is consistent with the Forest Plan standards and guidelines because effects would be short term in nature and expected to be negligible for pooling, in large part because of the PDC and BMPs that would be followed during project implementation, and because proposed thinning activities would not occur within Riparian Reserves.

3.9 Wildlife

Summary – This section addresses the wildlife species that are in the project area and summarizes the Wildlife Report which is incorporated by reference. Only those species which may be directly or indirectly affected by the proposed actions are summarized in Table 44 below and discussed in this section.

Table 44. Species in the project area¹⁶

Federally Threatened, Endangered or Proposed Species	Habitat	Presence
Northern spotted owl (<i>Strix occidentalis caurina</i>)	yes	unknown
Northern spotted owl critical habitat	yes	yes
Gray wolf (<i>Canis lupis</i>)	yes	yes
Oregon spotted frog (<i>Rana pretiosa</i>)	yes	yes
Oregon spotted frog critical habitat	yes	yes
R6 Sensitive Species		
Bald eagle (<i>Haliatus leucocephalus</i>)	yes	unknown
White-headed woodpecker (<i>Picoides albolarvatus</i>)	yes	unknown
Fringed myotis (<i>Myotis thysanodes</i>)	yes	unknown
Western bumblebee (<i>Bombus occidentalis</i>)	yes	unknown
Johnson's hairstreak (<i>Callophrys johnsoni</i>)	yes	unknown
Survey and Manage Species		
Dalles sideband (<i>Monadenia fidelis minor</i>)*	yes	yes
Crater Lake tightcoil (<i>Pristiloma arcticum crateris</i>)*	yes	unknown
Evening fieldslug (<i>Deroceras hesperium</i>)	yes	unknown
Puget Oregonian (<i>Cryptomastix devia</i>)*	yes	unknown
Columbia Oregonian (<i>Cryptomastix hendersoni</i>)	yes	unknown
Management Indicator Species		
Mule Deer (<i>Odocoileus hemionus</i>) and Elk (<i>Cervus elaphus nelsoni</i>)	yes	yes
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	yes	yes
American Marten (<i>Martes americana</i>)	yes	yes
Wild Turkey (<i>Meleagris gallopavo</i>)	yes	yes
Western Gray Squirrel (<i>Sciurus griseus griseus</i>)	yes	yes
Other Species of Interest		
Snag and Down Log Associated Species	yes	yes
Neotropical Migratory Birds	yes	yes

* These species are now also considered a Region 6 Sensitive Species in addition to a Survey and Manage Species.

3.9.1 Analysis Assumptions and Methodology

Northern Spotted Owl & Critical Habitat

For a substantial disruption of spotted owl behavior to occur as a result of disturbance caused by the Proposed Action, the disturbance and spotted owl(s) must be in close proximity to one another. Human presence on the ground is not expected to cause a major disruption of behavior because spotted owls do not seem to be startled in those situations. Since spotted owls forage primarily at night, projects that occur

¹⁶ Species listed in this table are known to have habitat or presence within the project area. Species that do not have habitat and do not have presence in the project area are not listed here. A full table can be found in the Wildlife Report.

during the day are not likely to disrupt its foraging behavior. The potential for effects is mainly associated with breeding behavior at active nest sites.

To ensure that more than 86 percent of juvenile spotted owls in the Oregon Eastern Cascades Physiographic Province are able to move away from disturbance without increasing their risk of predation or harm, the critical breeding period is considered to be March 1 through July 15.

The US Fish and Wildlife Service (FWS) has based disruption distances on interpretation of the best available science. The use of heavy equipment and chainsaws could generate noise above ambient levels. Disruption distances of 35 yards for heavy equipment use and 65 yards for chainsaws have been set by the FWS.

Since there are few recent surveys for spotted owls that show the locations of active nest sites on the Forest, historical spotted owl information is used. In addition to historic sites, potential nest sites are used to analyze the effects of the proposed project on spotted owls.

For the Willamette Province, the home range is a 1.2-mile radius circle centered on a nest site. A core area has been defined as the area within a home range that receives disproportionately high use (503 acres or 0.5-mile radius circle from the historic nest).

This analysis uses the stand scale to assess effects for all four physical and biological features (PBFs) that characterize the key components of critical habitat. This scale of analysis is consistent with the current method recommended by the Willamette Province Level 1 Team for addressing effects to critical habitat for consultation. The analysis of impacts has both a temporal scale (would the actions delay or accelerate the development of the PBFs in the stand following treatment) and a qualitative scale (would the life history needs of the spotted owl be better or worse with respect to the PBFs as a result of the treatment).

Effects to the PBFs are evaluated at the scales of the critical habitat subunit, critical habitat unit, and the range of the spotted owl. Therefore, if no notable effects are present at a smaller scale they would not be present at increasingly larger scales and would therefore not be analyzed at the larger scale.

Gray Wolf

A review of scientific literature, relevant to Forest Service managed lands, was conducted in order to make sound decisions about the potential impacts to wolves from management activities. In addition, findings and recommendations were made based on meetings and communications with subject matter experts from partnering agencies (WDFW, ODFW, and FWS) who have experience with monitoring and managing wolf populations in northeast Oregon (USFS 2015). This evaluation concluded that activities that took place outside of one mile from a den or rendezvous site would have no effect on gray wolf.

Oregon Spotted Frog & Critical Habitat

This section uses the definition, by the FWS published February 11, 2016 (81 FR 7214), for “destruction or adverse modification.” For this section, destruction or adverse modification means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or delay development of such features. The Oregon spotted frog was listed as threatened by the FWS in 2014 (USFWS 2014). Watson et al. (2003) summarized the conditions required for completion of the Oregon spotted frog’s life cycle as shallow water areas for egg and tadpole survival; perennially deep, moderately vegetated pools for adult and juvenile survival in the dry season; and perennial water for protecting all age classes during cold wet weather. The Oregon spotted frog inhabits emergent wetland habitats in forested landscapes, although it is

not typically found under forest canopy. Historically, this species was also associated with lakes in the prairie landscape of the Puget lowlands (McAllister and Leonard 1997). This is the most aquatic native frog species in the Pacific Northwest (PNW), as all other species have a terrestrial life stage. It is found in or near a perennial body of water, such as a spring, pond, lake, sluggish stream, irrigation canal, or roadside ditch. Oregon spotted frogs have been found at elevations ranging from near sea level in the Puget Trough lowlands in Washington to approximately 5,000 feet in the Oregon Cascades in western Oregon (Dunlap 1955, Hayes 1997, McAllister and Leonard 1997).

Bald Eagle

The relative sensitivity of bald eagles to human influenced activities during various stages of the breeding season is outlined in Table 45.

Table 45. Nesting bald eagle sensitivity to human activities

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building: December – March	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance often results in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites
II	Egg laying: February – April	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season
III	Incubation and early nestling period (up to 4 weeks): February – May	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to the elements.
IV	Nesting period, 4 to 8 weeks: April – June	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival
V	Nestlings 8 weeks through fledging: June – August	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and would be unable to fly and escape predators.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether, jeopardizing eggs or young. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest.

The bald eagle was removed from the endangered species list in July 2007. It is currently protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The

Guidelines are intended to help minimize impacts to bald eagles, particularly where they may constitute disturbance¹⁷, which is prohibited by the Eagle Act.

White-headed Woodpecker, Fringed Myotis, Western Bumblebee, and Johnson's Hairstreak

Information on these species from the Interagency Special Status/Sensitive Species Program as well as other research was reviewed and summarized to determine how these species use the project area and the impacts that this project would have on these species.

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

Surveys were conducted in the project area in 2016 and 2017 for Survey and Manage Species in compliance with the applicable species survey requirements and management provisions found in the Record of Decision (ROD) and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines 2001.

Deer, Elk, Pileated Woodpecker, American Marten, Wild Turkey, Western Gray Squirrel

This analysis focuses on certain key species and does not specifically address common species except to the extent that they are represented by these management indicator species. Management Indicator Species for this portion of the Forest within the project area include northern spotted owl (see analysis above), deer and elk, pileated woodpecker, American marten, wild turkey, and Western gray squirrel (Table 46).

Table 46. Management Indicator Species for the Project Area

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

Snag and Down Log Associated Species

The White River Watershed as a whole would be analyzed for historic and current snag levels since stand level analysis does not provide a meaningful measure to snag and down wood dependent species. It is further broken down by both the east and west side stand structures, Eastside mixed-conifer and Moist

¹⁷ Disturbance defined in the Eagle Act means to “agitate or bother a bald or golden eagle to a degree that causes or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding or sheltering behavior.”

mixed-conifer. Management for snags and down wood are compared to unharvested stands, which represent historic conditions.

Neotropical Migratory Birds

The methodology for this analysis follows “Incorporating Migratory & Resident Bird Concerns into the National Environmental Policy Act Process Region Six Forest Service & OR/WA Bureau of Land Management” (Bresson 2016).

The FWS Birds of Conservation Concern and the Oregon State list was used when developing the list of species to be considered in the planning process. This analysis was completed in order to evaluate the effects of the agency’s action on migratory birds, focusing first on species of management concern along with their priority habitats and key risk factors.

3.9.2 Existing Condition

Northern Spotted Owl & Critical Habitat

The eastern portion of the planning area is not capable of supporting suitable habitat over the long term. Most of the existing habitat is the result of fire exclusion, which has allowed development of more closed stands than would have naturally occurred. High stocking levels have created moisture stress and increased all trees’ susceptibility to insect, disease, drought, and fire-related mortality.

Spotted owl surveys are being conducted in the project area to determine if these sights are currently occupied. Surveys began in 2016 and would continue through project implementation. No spotted owls have been found to date. Since spotted owls have not yet been found, an analysis of the suitable habitat that is currently available was conducted to estimate the number of territories that the planning area could potentially support. Based on the amount of habitat currently in the analysis area, it was determined that there are potentially 8 home ranges that overlap the project boundary. All of these potential home ranges are currently above the threshold of 50 percent suitable habitat in the core area and all of the territories except 4 and 7 are above 40 percent suitable habitat in the home range (Table 47).

Table 47. Percent of habitat in potential owl territories

Dispersal Only			Suitable	
	Acres	Percent	Acres	Percent
Nest #1				
Nest Patch	0	0.0	70	100
Core Area	1	<1	420	83
Home Range	363	13	1,278	44
Nest #2	Acres	Percent	Acres	Percent
Nest Patch	5	7	65	93
Core Area	91	18	386	77
Home Range	599	21	1,611	56
Nest #3	Acres	Percent	Acres	Percent
Nest Patch	0	0.0	70	100
Core Area	46	9	405	81
Home Range	636	22	1,471	51
Nest #4	Acres	Percent	Acres	Percent
Nest Patch	6	8	62	88

Core Area	38	8	282	56
Home Range	526	18	1,053	36
Nest #5	Acres	Percent	Acres	Percent
Nest Patch	0	0	67	96
Core Area	105	21	326	65
Home Range	563	19	1,549	53
Nest #6	Acres	Percent	Acres	Percent
Nest Patch	0	0	66	94
Core Area	29	6	433	86
Home Range	500	17	1,694	59
Nest #7	Acres	Percent	Acres	Percent
Nest Patch	0	0	70	100
Core Area	129	26	275	55
Home Range	1,113	38	971	34
Nest #8	Acres	Percent	Acres	Percent
Nest Patch	0	0	70	100
Core Area	15	3	422	84
Home Range	119	4	1,676	58

Current critical habitat regulations (USFWS and NMFS 2016) rely exclusively on use of the term “physical and biological features” (PBFs). This section refers to PBFs herein. Although the spotted owl critical habitat designation defined PCEs, they will be referred to as PBFs in this document.

PBFs are described in the critical habitat rule as the specific elements that comprise the physical or biological features needed for the conservation of the spotted owl. These features are the forested areas that are used or likely to be used by the spotted owl for nesting, roosting, foraging, or dispersing (USFWS 2012, p. 71904). The PBFs are the specific characteristics that make habitat areas suitable for nesting, roosting, foraging, and dispersal (USFWS 2012, pp. 71906-71908). A detailed description of each of the four PBF’s can be found in the Wildlife Report which is incorporated by reference. The four PBFs are summarized here:

1. Forest types that support the spotted owl across its geographic range and provides the biotic communities that are known to be necessary for the spotted owl
2. Habitat for nesting and roosting
3. Foraging habitat is essential to provide a food supply for survival and reproduction
4. Habitat to support the transience and colonization phases of dispersal

Of the 12,072 acres of critical habitat proposed for treatments, approximately 2,148 acres are providing only dispersal habitat (PBF 4) and 1,946 acres are providing suitable habitat for spotted owls (PBF 2, 3 and 4). The remaining 7,978 acres are considered non-habitat and are mostly providing PBF 1. These PBFs in the action area are functioning at a landscape scale and could support up to 8 territories.

The Proposed Action is within the East Cascades North, subunit ECN 7. Of the 139,983 acres in this subunit, approximately 139,865 are located on the Mt Hood NF. This subunit is located in Wasco and

Hood River Counties on the east side of the Cascades with a small portion in Clackamas County on the west side of the Cascades. There are approximately 12,072 acres of critical habitat in treatment units.

There are approximately 58,397 acres of suitable habitat within ENC 7. Based on the amount of habitat and the average home range size for this Province, this subunit could potentially support up to 48 territories. Of these territories, 7 rely on habitat within the action area.

Gray Wolf

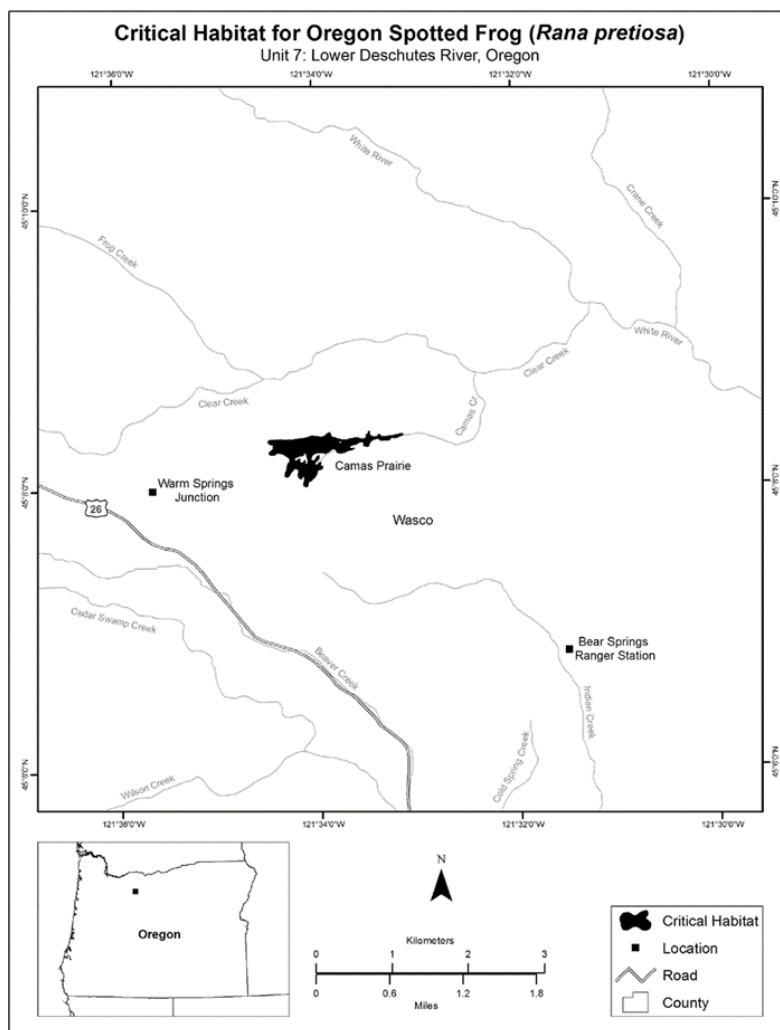
In March 2015, a male wolf from the Imnaha Pack identified as OR25, moved through the Columbia Basin and southern Blue Mountains before traveling west and spending a number of weeks on the Forest. OR25 then traveled south to Klamath County and continues to remain in that area. Because wolves have the ability to disperse over large distances, as in the case of other wolves (OR7 and OR3) that have established territories in southern Oregon, there is the possibility that other undetected wolves have been or may currently be on the Forest. In fact, very recently (December 2017) one wolf was detected on a remote sensing camera in the project area, and two wolves were seen on the same camera in January, 2018. The breeding status of the wolves is unknown at this time.

Oregon Spotted Frog & Critical Habitat

There is one small population of Oregon spotted frogs on the Forest at Camas Prairie, an 82-acre marsh located along Camas Creek in the White River watershed. The Camas Prairie Oregon spotted frogs are the most geographically isolated, and have the lowest genetic diversity of Oregon spotted frogs rangewide (Blouin et al. 2010). The frogs at this location appear to be the only remaining representatives of a major genetic group that is now almost extinct (Blouin et al. 2010). Since 2004, egg mass surveys have been conducted annually, and the population trend has been positive. Based on the 2012 egg mass count, the minimum population size of breeding adults is 152 (Corkran 2012, pers. comm.). Although the population trend has been positive at this location, the number of individuals in the population remains low.

There are 14 separate units designated as Oregon Spotted Frog critical habitat and the Lower Deschutes River unit (Unit 7) is within the project area. The Lower Deschutes River unit consists of 90 acres and includes Camas Prairie and Camas Creek, a tributary to White River, and occurs entirely on the Forest (

Figure 15).

Figure 15. Location of critical habitat unit

Oregon spotted frogs are known to currently occupy this unit. All of the essential physical or biological features are found within the unit but are impacted by conifer encroachment. The essential features within this unit may require special management considerations or protection to ensure maintenance or improvement of the existing nonbreeding, breeding, rearing, and overwintering habitat, aquatic movement corridors, or refugia habitat, as well as to address any changes that could affect these features.

Bald Eagle

There is one historic Bald Eagle nesting territory within the project area. This nest was last occupied in 2003 and has since been abandoned. A pair of eagles has been seen at Clear Lake over the past several years but attempts to locate a nest have been unsuccessful.

White-headed Woodpecker

Table 48 displays summarized data in the 30, 50, and 80 percent tolerance levels for the White-Headed Woodpecker in eastside mixed-conifer. The planning area currently averages small snags at the 50 percent (2.0 per acre) tolerance level and 30 percent (< 1 per acre) tolerance level for large snags.

Table 48. Tolerance levels for snags in Eastside Mixed-Conifer for White-headed Woodpecker*

Wildlife Habitat Type Eastside Mixed-Conifer	30% Tolerance Snags per Acre	50% Tolerance Snags per Acre	80% Tolerance Snags per Acre
Small Trees $\geq 10''$	0.3	1.9	4.3
Large Trees $\geq 20''$	0.0	1.5	3.8

*From DecAID Table EMC_S/L.sp-22

A tolerance level indicates the percentage of individuals that use a particular habitat component. Based on the average home range size of 793 acres in fragmented habitat, the eastern portion of the project area is currently in marginal habitat and may provide enough habitat for 6 to 7 pairs of White-Headed Woodpeckers.

Fringed Myotis

The most common habitats in which this species has been found are oak, pinyon, and juniper woodlands or ponderosa pine and Douglas-fir forest at middle elevations (O'Farrell and Studier 1980, Cockrum et al. 1996, Wilson and Ruff 1999, Ellison et al. 2004). This species is mostly found in dry habitats where open areas are interspersed with mature forests, creating complex mosaics with ample edges and abundant snags. Ideal habitat includes nearby water sources and suitable cliff or snag roost habitat.

The best habitat model for predicting bat presence in an area contained only these variables (the number of snags ≥ 30 cm DBH combined and percent canopy cover), where increasing numbers of snags and decreasing canopy cover increased the probability of bat occurrence (Weller 2000). Abundance of large snags and low canopy cover allows more thermal heating of roosts, easier flight access to roosts, and the ability to readily switch roosts, for predator avoidance, or to find more suitable microclimates (Lewis 1995, Weller 2000).

Some studies have suggested that fringed myotis consume mostly beetles (Rainey and Pierson 1996), but others in the Pacific Northwest have suggested mainly moths (Whitaker et al. 1977). Anecdotal information supports a diet largely of beetles and moths (Turner and Jones 1968, Arizona Game and Fish Department 1997). Given their wing morphology, echolocation patterns, and purported gleaning mode of foraging, it is likely that they forage in interior forest and/or along forest edges.

Western Bumble Bee

Surveys for western bumble bees were conducted by the Xerces Society on the Forest in 2013 and by Forest Service biologists in 2015. A total of 34 locations were surveyed in 2013 and western bumble bees were located at 8 of these locations. In 2015, 24 locations were surveyed and bumble bees were detected at 8 locations, 6 of which were previously unreported locations for this species. In 2016, 23 locations were surveyed and western bumble bees were documented at 6 of these sites. Five of the six sites were new locations for this species. One of the new locations in a meadow adjacent to the Bear Springs Campground within the project area boundary. Previous detections were made adjacent to the project area at Little Crater Lake and Jackpot Meadow.

Johnson's Hairstreak

Johnson's hairstreak occurs within coniferous forests which contain the mistletoes of the genus *Arceuthobium*, commonly referred to as dwarf mistletoe. Larsen et al. (1995) states that old-growth and late-successional second growth forests provide the best habitat for this butterfly, although younger forests where dwarf mistletoe is present also supports *C. johnsoni* populations. All sightings in both Washington and Oregon have been in coniferous forests. The main threats to this species are the reduction of old-growth, insecticide use, and application of herbicides to flowering plants that are nectar sources.

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

Dalles Sideband

Dalles Sideband was found in the planning area during 2016 and 2017 surveys. A buffer has been identified and would be placed around each site found for this species. The size of the buffer may vary depending on the site conditions and would be consistent with the ROD protection buffer direction.

Crater Lake Tightcoil

The Crater Lake Tightcoil may be found in perennially wet situations in mature conifer forests, among rushes, mosses and other surface vegetation or under rocks and woody debris within 10 meters of open water in wetlands, springs, seeps and riparian areas, generally in areas which remain under snow for long periods in the winter. While there is habitat within the boundary of the planning area, there are no treatments in riparian areas.

Evening Fieldslug

The Evening Fieldslug has been reported to be associated with wet meadows in forested habitats in a variety of low vegetation, litter and debris; rocks may also be used. While there is habitat within the boundary of the planning area, there are no treatments in riparian areas.

Puget Oregonian

The Puget Oregonian may be found in mature or old growth forest habitat, typically on or under hardwood logs and leaf litter. Rocks and talus, which are cool and moist beneath, may also be used. These snails are also found on or in the litter under sword ferns growing under hardwood trees and shrubs, especially big leaf maples. Young *C. devia* may also be found under mosses growing on the trunks of big leaf maples, but in these locations young of *Monadenia fidelis fidelis* are more common and may be mistaken for juvenile *C. devia* when very small.

Columbia Gorge Oregonian

The Columbia Oregonian is generally found within 100 m. of streams, seeps and springs east of the Cascade Divide and in the Columbia Gorge. It is typically a riparian associate in these steppe communities. In the Western Cascades, it can also be found in mature forested habitats outside of riparian areas, among small, moist talus, hardwood leaf litter or shrubs, or under logs or other debris.

Deer, Elk, Pileated Woodpecker, American Marten, Wild Turkey, Western Gray Squirrel, Deer and Elk

The project area supports elk and deer for most of the year. Elk cows and calves are in the western portion of the watershed from early spring through late fall. Black-tailed deer are common and relatively abundant in the spring, summer, and fall within the western portion of the planning area. The eastern portion of the planning area is identified in the Forest Plan as inventoried winter range, most of which is in B10 Land Use Allocation. A number of deer and elk spend the winter there depending on snow accumulation. Deer are less likely to be there during periods of heavy snowfall as they are less able to move through deep snow. Forage is available in the planning area, but is generally of low quality due to the lack of un-forested areas.

Elk herds within the project area likely exhibit a close association with riparian habitat in areas of gentle terrain and low open road density. Research on elk in this kind of habitat generally shows that elk spend most of their time in close proximity to a stream or wetland. Low quality forage, lack of wetlands and permanent low-gradient streams are considered one of the limiting factors for elk and possibly deer in the planning area. There are few dry meadows in the planning area, and forage habitat improvement for elk is limited.

The stands in the planning area provide both thermal and optimal cover for deer and elk.

Pileated Woodpecker

The Pileated Woodpecker's association with late seral stages comes from the need for large-diameter snags or living trees with decay for nest and roost sites, large-diameter trees and logs for foraging on ants and other arthropods, and a dense canopy to provide cover from predators. Nest excavation occurs from late March to early May, incubation from May to early June, and fledging in early July.

The mean home range for Pileated Woodpeckers is 1,181 acres with approximately a 9-30 percent overlap (about 200 acres) between territories. Therefore, an average home range with overlap for Pileated Woodpeckers would be approximately 970 acres (Mellen et al. 1992).

From 2014 to 2016, forest stands that meet this metric have increased steadily from 592,470 acres to 596,780 acres. The trend for the pileated woodpecker is increasing at the forest and range-wide scale.

By dividing the acres of Pileated Woodpecker habitat by the average home range with overlap of 970 acres there are 615 potential home ranges on the Mt Hood National Forest. With an average clutch size of 4 (Marshall, D.B. et al. 2003), this would indicate that the summer population of Pileated Woodpeckers could be as high as 2,500 birds including adults and fledglings. Given the amount of habitat available, there may be up to 10 home ranges in the project area when considering unmanaged stands as habitat.

American Marten

In the western United States, the American Marten's distribution is fragmented, and they are closely associated with forested habitats with complex physical structure near the ground. Martens show a preference for forest canopy cover of > 50%. Use of non-forested habitats by martens increases in summer and includes meadows and small harvest units near forest edges, as well as areas above the tree line in western mountains (Buskirk and Ruggiero 1994).

Activities such as timber harvest and road construction that fragment, dissect, and isolate habitats are the largest threats to marten. Fragmentation eliminates the connectivity and creates isolated individuals and populations which are more susceptible to extirpation.

Wild Turkey

Two subspecies of wild turkeys (Merriam's and Rio Grande) are found on the Forest. Wild turkey generally prefer dense ground vegetation next to nesting cover. Open riparian woodlands and forest openings of one to three acres provides good brood habitat. These open areas need to provide for a multitude of forage that supports insects, allows for foraging, and also provides cover in order to avoid predators. Turkeys are present within the eastern portion of the planning area, and there is nesting, roosting, foraging, and brood-rearing habitat within the project area.

Western Gray Squirrel

Gray squirrels have been documented in the planning area and there is both wintering and nesting habitat present. Gray squirrels require a variety of food sources, of which, underground fungi appear to be the most important, as it makes up a major portion of the squirrels' diet year-round; the spread of these fungi play an important role in the health of the forests in which they live. Pine and fir seeds are also eaten all year and almost exclusively in the late summer and early fall. Acorns are eaten from late fall through winter. Ideal foraging habitat for western gray squirrels includes a balance between open conditions that promote acorn and pine seed production, and dense stands with high canopy closure that allows canopy travel by squirrels, provides secure nesting sites, and would produce abundant underground fungi.

Snag and Down Log Associated Species

The project area contains stands of immature plantations less than 80 years old and recently unmanaged stands over 80 years old in the wildlife habitat type (WHT) of Eastside Mixed-Conifer in the eastern portion of the planning area, and Montane Mixed-Conifer in the western portion, as defined in DecAID. Currently, there are roughly 1 snags per acre in the moist mixed-conifer and <1 snags per acre in the dry mixed-conifer 24 inches DBH and larger, and an average of 5 snags per acre in the moist mixed-conifer and 2 snags per acre in the dry mixed-conifer of 12-inch DBH and larger. The current condition of the stands in the project area is below the 30 percent tolerance levels as identified in DecAID¹⁸. The current snags per acre measure within the White River Watershed is well outside that of historical (reference) conditions. Approximately 50 percent of the White River Watershed contains no large snags in eastside mixed-conifer stands. Approximately 22 percent of the watershed has between 0 and 2 large snags per acre and historically that number was 14.2 snags, this is the only category where current conditions exceed that of historic conditions. As is with the large snags, this watershed is deficient in high concentrations of small snags with 9.2 percent of the area having 30 or more snags per acre historically and the area is at 2.4 percent currently.

While current and reference conditions of large down logs in eastside mixed-conifer are comparable, there are some differences. Historically, approximately 64 percent of the White River Watershed had no cover of large down logs and currently, about 50 percent has no large log cover. A similar comparison can be made for small logs in eastside mixed-conifer. In this wildlife habitat type, frequent fires would have consumed much of the down wood which may account for the difference in current vs. reference conditions. There is more down wood currently in the montane mixed-conifer than there was historically with an increase of nearly 17 percent of large down logs from historic conditions. The montane mixed-conifer small log is the only category where reference and current conditions are similar for the percent of the landscape without down wood. There is currently 16.0 percent of the watershed with 8-10 percent cover compared to 6.2 percent historically.

Neotropical Migratory Birds

Close to 30 species of migratory birds occur on the Barlow and Hood River Districts, some of which are present within the project area during the breeding season. Some species favor habitat with late-successional characteristics, such as the Hermit Thrush and Brown Creeper, while others favor early-successional habitat such as the Nashville Warbler or the Williamson's Sapsucker. Other species like the White-headed Woodpecker and Pygmy Nuthatch utilize open ponderosa pine habitat. Sandhill Crane nest in Camas Prairie in the open meadow when it is flooded in the spring and early summer.

¹⁸ Further discussion on DecAID tolerance levels can be found in the Wildlife Report which has been incorporated by reference.

3.9.3 Effects Analysis

Northern Spotted Owl & Critical Habitat

No Action Alternative

With no action there would be no short-term effects to spotted owls under this alternative. In the short term, the units that are providing dispersal habitat (PBF4) would continue to function as dispersal habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the stands could start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. Stands that are functioning as suitable habitat (PBF 2) would continue to function as suitable habitat.

In the long-term, the stands that are currently considered non-habitat for spotted owls would likely become dispersal habitat (PBF 4). Some of the stands may eventually develop nesting habitat characteristics and become suitable spotted owl habitat (PBF 2). However, with no action, it could take as much as 60 to 150 years for these stands to develop into suitable habitat. The potential impacts to critical habitat from wildfire, insects, or disease are greater under the No Action Alternative. If a fire were to move through the area without reducing fuels, it would likely be more severe without treatments.

Proposed Action Alternative

There are 8 potential territories within the analysis area and all of the territories except site numbers 4 and 7 are currently above the home range threshold of 40 percent and all of the core areas are above the core area threshold of 50 percent suitable habitat. Treatment activities that downgrade suitable habitat may affect and are likely to adversely affect spotted owl and would further reduce habitat for owl pairs 4 (9 acres) and 7 (147) below threshold levels within the home range. There are no treatments within any nest patches and all territories would remain above the threshold level of 50 percent in the core area.

Treatment activities that remove dispersal habitat (PBF 4) on 895 acres are not likely to adversely affect spotted owl, but would impact the PBFs at the stand scale. The analysis area currently has approximately 8,771 acres of dispersal only habitat. When combined with the amount of suitable that would also provide for dispersal (19,050 acres), 55 percent of the analysis area is currently providing dispersal habitat. This amount would be reduced by 1 percent to 54 percent. Treatments would not prevent owls from being able to disperse between blocks of suitable habitat within the analysis area and to adjacent suitable habitat outside the analysis area. The location of treatment units and the prescriptions were designed to leave dispersal corridors between areas of suitable habitat.

Treatments would delay the development of PBFs on these acres in the stands following treatment and the life history needs would no longer be met in these units until the stands develop PBFs again in 25 to 75 years. Habitat for PBF 2 and PBF 3 (1,059 acres) would be downgraded to dispersal. These treatments would reduce the PBFs at the stand level and delay the development of these PBFs but the stands would also have a reduced risk of being lost due to fire or insects and disease. The life history needs for foraging and dispersing would still be met in these units.

Because PBF 4 would be removed on 895 acres, and PBFs 2 and 3 would be downgraded on 1,059 acres, these treatment units would no longer provide or would reduce the necessary PBFs for reproduction and survival of the spotted owl, therefore the Proposed Action *may affect, and is likely to adversely affect* spotted owl critical habitat.

Fuels reduction is expected to have both negative and beneficial effects to spotted owl prey species and foraging habitat (PBF 3). Some small mammals may be directly impacted due to smoke or the inability to escape. Treatments may impact vegetation structure and prey species distributions by reducing prey

hiding cover and/or moving prey into adjacent stands. Because fuel treatment activities have the potential to temporarily impact prey species, these activities *may affect and are likely to adversely affect* spotted owl. While underburning and mastication may temporarily impact prey species, these treatments would not change the overall function of the habitat after treatment, and are expected to increase plant vigor and prey species forage production.

The proposed project would create approximately 7.3 acres of openings from the use of new temporary roads in suitable habitat (PBF 2). While some components of habitat would be impacted by the creation of these roads, the function of the habitat at the stand scale would remain the same. Given that up to 7.3 acres of suitable habitat could be impacted by tree removal, temporary road construction *may affect, and is likely to adversely affect* spotted owl.

Barred owls were located in the planning area in 2016 and were found on the Warm Springs Reservation for the last several years (Pers. comm. R. Gearhart). The silvicultural treatments proposed in the planning area would not be expected to expand the range of barred owls since they are already found throughout the planning area and treatments would not be expected to create habitat favored by barred owls over spotted owls.”¹⁹

Gray Wolf

No Action

With no action there would be no increase in human activities in the area. Thinning activities that would increase forage for deer and elk would not take place, and therefore there would be no benefit to wolves.

Proposed Action

No dens or rendezvous sites have been detected on the Forest or within the project area. While the Proposed Action may cause wolves to temporarily avoid the area during project implementation, the Proposed Action could indirectly benefit the gray wolf by increasing the availability of prey within in the planning area, therefore, the proposed project *may affect, but is not likely to adversely affect* gray wolf.

Oregon Spotted Frog & Critical Habitat

No Action

With no action stream temperatures are expected to remain at current levels in the watershed because there would be no reduction in streamside shading. No harvest activities would occur in primary or secondary shade zones along streams and these areas would continue to fill in with understory vegetation.

These densely vegetated riparian areas are more susceptible to high severity burns because of excess fuel loading as a result of long-term fire exclusion. If a wildfire burned in the planning area, riparian areas have the potential to burn hot in areas that have high fuel loading.

Sediment delivery to streams in the project area is expected to remain at current levels over the long term; however, if wildfires occur, due to overstocked conditions, especially in even-aged plantations, fire intensities would likely be high and sediment delivery to streams in the planning area would increase (which would impact PCEs 1, 2, and 3). Roads and roads converted to trails with impaired drainage

¹⁹ The Wildlife Report describes in more detail the management and population trends of the barred owl.

would continue to contribute sediment to streams in the project area (PCEs 1 and 2). Current high road and trail densities would continue for all of the analysis area, resulting in continued bank instability and fine sediment in streams (PCEs 1 and 2).

Proposed Action

Because the primary shade width recommendations are being met or exceeded in the Sufficiency Analysis, proposed treatments associated with the project are not expected to have a measureable effect on existing stream temperatures including those that feed into Camas Prairie. The risk of erosion and potential sediment delivery are expected to be small due to maintaining protective groundcover along with implementation of BMP or PDC. Fuel treatment activities that utilize fire are not expected to introduce additional sediment into surface water. The model results for Camas Prairie indicate that under the Proposed Action, the current WIA of the area draining to the meadow are at approximately 5.6 percent and would increase to an estimated 6.1 percent, which is well below the 35 percent threshold. There are no activities adjacent to Camas Prairie that would increase the amount of sediment reaching the meadow and therefore all PCEs would be maintained.

Because this species is an aquatic frog and all life stages are found in or near perennial bodies of water, individuals of this species would not be found within or directly adjacent to any of the treatment units. Based on the temperature, sediment, and flow analysis, the Proposed Action *may affect, and is not likely to adversely affect* Oregon spotted frog.

There are no treatments in any habitat that provides for cover, shelter, breeding, or rearing for Oregon spotted frogs. No treatments would impact food sources, water, light, or space for population growth. Based on this analysis, the Proposed Action *may affect, and is not likely to adversely affect* Oregon spotted frog critical habitat.

Bald Eagle

No Action

With no action there would be no potential for disrupting eagle foraging or nesting behaviors. No trees would be removed, therefore no perch trees or nesting stands would be impacted.

Proposed Action

There are no proposed treatments directly adjacent to Clear Lake so no perch trees would be removed. If a bald eagle nest is found within the planning area, no activities would take place between January 1 and August 15 within 0.25 miles of the nest in order to reduce the impacts from disturbance to the bald eagles in this territory. Thinning activities could reduce the amount of trees around a nest tree which could reduce the potential for an eagle to utilize the stand for nesting in the future. If a nesting eagle is found, the nest tree would be buffered to protect the stand from tree removal.

The Proposed Action *may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species*. Because of the timing restriction adjacent to any nest found, foraging would not be disrupted during a critical time when adults could abandon the nest or expose the young to predation. This project would not preclude this pair from utilizing this nest and foraging area after treatment is complete.

White-headed Woodpecker

No Action

With no action open large ponderosa pine habitat would remain limited, which is important nesting habitat for this species. High densities of trees and shrubs in the understories would continue to alter what once provided open habitats when fire was more prevalent on the landscape and the number of white-headed woodpeckers in the analysis area would continue to be lower than historic levels.

Proposed Action

Treatments in the eastern portion of the planning area would benefit White-Headed Woodpeckers by opening the stand and reducing the amount of understory and shrubs on the forest floor. The number of White-Headed Woodpeckers in the analysis area would be expected to increase over time under the Proposed Action as habitat conditions for this species improve. Some treatment areas would go from marginally suitable to highly suitable and the number of nesting pairs that could be supported would increase to 12 to 14 nesting pairs. Because habitat would be improved for White-Headed Woodpeckers, the Proposed Action *may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.*

Fringed Myotis

No Action

With no action fringed myotis roosting and foraging habitat would not be impacted. Since fringed myotis utilize open canopies for foraging, this alternative would provide less foraging habitat for the species in the short term than the Proposed Action. The No Action Alternative would have slightly more snags for roosting since none would be cut for safety concerns.

Proposed Action

The Proposed Action would have no impact on hibernacula or mines since these habitats are not in the project area. Some roost trees would be removed, however, large snags would not be cut in the project area unless they pose a health and safety risk. Treatments in the eastern portion of the planning area would benefit fringed myotis by opening the stand and reducing the amount of understory which would improve foraging habitat. Large snags in the adjacent untreated stands would continue to be provided for roosting. Because roosting snags would only be removed for safety concerns and foraging habitat would be improved, the Proposed Action *may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.*

Western Bumble Bee

No Action

With no action there would be no direct impacts to bumble bee nesting, foraging, and over-wintering habitat.

Proposed Action

Treatments may temporarily impact flowering plants and nest sites if nests are located within abandoned bird nests or other structures above ground. Flowering plants and nest sites would increase within a few years after treatment. The temporary reduction in flowering shrubs and nesting sites *may impact individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.*

Johnson's Hairstreak

No Action

With no action there would be no direct impacts to Johnson's hairstreak larval and foraging habitat.

Proposed Action

The Proposed Action could temporarily impact flowering plants during road maintenance and could impact the larval stage by removing large trees with mistletoe. While the number of Johnson's hairstreak in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs increase within a few years after treatments. Because these butterflies can forage for nectar on a variety of flowering plants, the untreated portions of the planning area would continue to provide a food source. These untreated portions of the planning area and many of the treated stands would continue to provide mistletoe for caterpillar habitat. The Proposed Action ***may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.***

Survey and Manage: Dalles Sideband, Crater Lake Tightcoil, Evening Fieldslug, Puget Oregonian, Columbia Oregonian

No Action

With no action there would be no short-term effects to these species under this alternative. The units that aren't providing suitable habitat would continue to be deficient in snag and down wood. Coarse woody levels would remain essentially unchanged. Areas within recently unmanaged stands would continue to provide for habitat. In the long term, the stands that are currently considered unsuitable habitat may eventually develop mature forest characteristics. The risk of fire, insects, and disease within the dry mixed-conifer portion of the project area would remain high. If fire occurs here, habitat would no longer be available in moderate to high severity burned areas when habitat components are consumed.

Proposed Action

Very localized activity may impact a few individuals but would not affect populations due to the buffer that would be placed around each site found for this species. Fuels treatments are not expected to have direct adverse impacts. Some habitat components would be lost from fuels treatments, however Forest Plan standards and guidelines would be met where conditions currently exist. Although this project would reduce some habitat within the project area, a minimum of 120 linear feet of down woody material and 4 snags/acre would be maintained where it currently exists.

Deer & Elk

No Action

With no action, disturbance from human presence and activities within the planning area would remain the same as the current levels. Stand structural development would remain unchanged over the short term; no forage habitat would be created; and thermal and hiding cover for deer and elk would remain the same. In the long term, forage habitat would be reduced within the watershed as open areas are overgrown with tree species. Road densities would remain unchanged.

Proposed Action

The proposed treatments would temporarily remove thermal cover from portions of stands where canopy cover is reduced to below 50%. While there would be a loss of low-moderate quality thermal cover, there would be an increase in forage within these same stands.

Disturbance from treatments that occur during their respective seasons could temporarily displace animals, and have the potential to affect the health of individuals if the disturbance occurs near active calving sites.

The Proposed Action Alternative would reduce the open road density for the project area to 2.48 and would reduce the open road density in summer range to 2.66 miles of open roads per square mile which is still above the Forest Plan Standard of 2.50 miles per square mile.

The current Forest Plan standards and guidelines for winter range thermal cover cannot be achieved through time because the project area falls within the eastern half of the Transition Zone as identified in the White River Watershed Analysis. Thermal cover is defined as a stand of coniferous trees 40 feet or taller with an average crown closure of 70 percent or greater. Forest Plan standard B10-014 calls for 70 percent canopy closure within 10 years after timber harvest treatments. The tree density needed to achieve 70 canopy cover exceeds the long-term site capability of most of the Eastside Zone and some of the Transition Zone. Long-term site capability is tied to the combination of soil, microclimate, and disturbance regimes that permit a stand structure to persist in a stable condition for several decades. No more than 25 percent of the Eastside Zone, and no more than 50 percent of the Transition Zone are capable of maintaining thermal cover characteristics over time. The likelihood of maintaining thermal cover over time is highest on the north aspects of perennial streams and in riparian zones.

The White River Watershed Analysis indicates that observations from similar winter ranges throughout eastern Oregon suggest that open parklike stands dominated by large ponderosa pine or ponderosa pine and Douglas-fir can provide most of the winter thermal needs of deer and elk. Crown closures for the conifers typically vary from 30 to 60 percent. These stands appear to meet both the day and night thermal needs of deer and elk during most weather conditions. These parklike stands are dense enough to reduce wind velocities and snow depths while also allowing more sun light and heat to reach the forest floor. A grassy or grassy and brushy understory provides high levels of forage without requiring the animals to move around, therefore conserving energy. The large boles provide radiation well into the night which also helps with conserving energy. Small patches of conifer regeneration provide hiding cover.

The Proposed Action would not meet the Forest Plan standard B10-014 for 70 percent canopy cover, therefore there is a project-level exception for this standard. The treated stands would provide forage habitat for the next 40-50 until the stands would again provide winter range thermal cover. During the 1980s and 1990s, wildlife managers considered thermal (canopy) cover to be important to deer and elk survival and production. Telemetry data presented at the Elk Modeling Workshop (April 2010) indicated that elk were negatively associated with cover and that openings are far more valuable for elk than cover. With the reduction in regeneration timber harvest, the Forest now has abundant optimal thermal cover, but openings for forage are becoming scarce and declining. Mid and lower elevation plantations have grown dense with trees that shade out forage. There are few dry meadows in the planning area, and forage habitat improvement for elk is limited. This exception to this Forest Plan standard (B10-014) would achieve project objectives while simultaneously improving forage opportunities for deer and elk. Additionally, sufficient thermal cover is present throughout the Forest scale.

Pileated Woodpecker

No Action

With no action there would be no short-term effects to Pileated Woodpecker habitat under this alternative. In 20 to 30 years, the stands could start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. Stands that are functioning as suitable habitat would continue to function as suitable habitat.

Proposed Action

Treatments in the unmanaged stands would impact habitat by reducing canopy cover below 50 percent. The treatment of 1,059 acres would reduce the amount of nesting habitat available for up to one pair of Pileated Woodpeckers. This impact would last for 60 to 80 years until the remaining trees grow and conditions support large enough trees with greater than 50 percent canopy cover.

The number of large diameter snags and down logs that are currently in these treatment units would not be impacted since snags and down logs would be maintained according to Forest Plan Standards and Guidelines.

American Marten

No Action

With no action there would be no short-term effects to American Marten under this alternative. It could take as long as 60 to 150 years for these stands to develop into suitable marten habitat.

Proposed Action

In the long term, habitat for marten would be improved in these stands because larger trees would be recruited onto the landscape more quickly in thinned stands. Treatments in the unmanaged stands in the western portion of the project area would impact habitat by reducing canopy cover below 50 percent.

Sapling and plantation stands do not provide habitat for this species, therefore there would be no direct impacts from treatments in these units. In the long term, habitat for marten would be improved in these stands because larger trees would be recruited onto the landscape more quickly in thinned stands.

At least 160 acres of mature or old growth forest within each 320-acre management unit would be maintained and treatments in 36 acres within B5 would maintain a canopy cover of 50 percent within 10 years after treatments.

Wild Turkey

No Action

Under the No Action Alternative, there would be less forage and hiding cover available for wild turkey compared to the Proposed Action. As stands continue to grow, this habitat would further be reduced.

Proposed Action

The Proposed Action would benefit wild turkey by opening ponderosa pine stands and providing suitable foraging, nesting, brood-rearing, and roosting cover. Thinning activities would open the forest canopy in places and provide a combination of open, mature, mast-producing forests and shrubs, and species of varying ages and sizes that would create a mix of habitats and would increase the number of turkeys that the planning area could support.

Western Gray Squirrel

No Action

With no action western gray squirrel would continue to have an abundance of nesting habitat and mycorrhizal fungi for foraging. Without thinning, the more open conditions required for large pine and seed production would not increase and these would continue to be limited for gray squirrel.

Proposed Action

The Proposed Action would not be expected to reduce the number of western gray squirrels that the planning area could support because thinning and fuels treatments adjacent to untreated stands would continue to provide conditions suitable for both foraging and nesting. The Proposed Action would provide more open conditions that would increase acorn and pine seed production which is also a food source for gray squirrels.

Snag and Down Log Associated Species

No Action

In the short-term, plantations would provide low amounts of down wood cover. Most areas would be below 6.5 percent cover of down wood and therefore be below the 30 percent tolerance level for wildlife habitat. In the next 20 to 30 years, these stands would begin to experience increased stand density and start to become increasingly more susceptible to damaging agents such as insects and diseases. Trees would take more than 70 years to reach the 24-inch size class. The No Action alternative in recently unmanaged stands would recruit a greater number of snags over time in both habitat types compared to the Proposed Action alternative with the exception of small snags ≥ 12 inches DBH in the dry habitat type.

Proposed Action

Under the Proposed Action, the current conditions would remain unchanged. While some snags may be more prone to falling after thinning activities, the amount of snags lost would not be measurable at the watershed scale, which is consistent with Forest Plan standard FW-216. While the Proposed Action Alternative would recruit fewer snags over time compared to the No Action Alternative, with the exception of small snags (≥ 12 inches dbh) in the dry-mixed conifer habitat type, thinning would result in increased growth which would speed the ability of the stands to provide the size of snags and down wood needed to meet Forest Plan standard FW-215. Increased productivity would result in stands that become less susceptible to stress and disease caused mortality over time.

Neotropical Migratory Birds

No Action

There would be no habitat alteration under this alternative. Stand conditions and the composition of migratory bird species dependent on these stands would remain unchanged.

Proposed Action

The effects of thinning in mid-successional stands would most likely have a combination of positive, neutral, and negative impacts on migratory bird use within the stands depending on which species are present. The species that may benefit from thinning in the analysis area include the Olive-sided Flycatcher, White-headed Woodpecker, Williamson's Sapsucker, and Chipping Sparrow. The species that may be negatively impacted by thinning include the Brown Creeper, Swainson's Thrush, and Hermit Warbler.

Cumulative Effects

Projects listed in Table 11 at the beginning of this section were considered in the cumulative effects analysis for this section.

Federally Threatened, Endangered, or Proposed Species

Spotted Owl and Critical Habitat - Timber harvest on federal, tribal, and private land, and utility corridor operations have reduced the amount of suitable habitat (PBF 2) on the landscape and could continue to do so into the future. Private lands and utility corridors are not expected to provide suitable habitat as they are not managed for spotted owl or spotted owl critical habitat. Timber harvest on federal and tribal lands would reduce the amount of habitat (all 4 PBFs) until these stands grow over time and become suitable habitat again.

The cumulative effects to dispersal habitat (PBF 4) would not prevent spotted owls from continuing to forage or disperse throughout the analysis area. The private land to the east is not providing for dispersal of spotted owl and is at the far eastern portion of the species range. Owls would be able to disperse south across Warm Springs lands, and north and west across the Forest.

Gray Wolf - The cumulative effects are similar to the effects of the Proposed Action and would have a combination of positive and temporary negative impacts on gray wolf. Open habitat that would be created from timber harvest, pre-commercial thinning, and plantation thinning would increase the availability of prey within the analysis area. Road closures and decommissioning would benefit wolves by decreasing the amount of human disturbance. The increased human presence from human activities may cause wolves to temporarily avoid the area during implementation of projects.

Oregon Spotted Frog & Critical Habitat - Weed treatments would improve habitat by reducing the amount of non-native vegetation and potentially increasing native vegetation. Grazing practices within this allotment have been modified to eliminate cattle from the meadow (critical habitat) until further studies can be conducted in order to determine the appropriate use of cattle as a management tool for this population of Oregon spotted frog.

Region 6 Sensitive Species

Bald Eagle - Timber harvest has the potential to reduce the amount of nesting stands available for bald eagles. If a stand is too open, eagles may not utilize the area because the birds often prefer less open conditions which prevent a direct line of sight from the nest to adjacent activities. Road closures would benefit eagles by reducing the amount of disturbance in the area, and at the same time, developed and dispersed campsites reduce the possibility of eagles nesting in a given area. The presence of humans often deters eagles from utilizing an area for nesting. Depending on the sensitivity of the nesting eagles to human activities, the cumulative effects may reduce the chances of bald eagles nesting in the area.

White-headed Woodpecker - The Bear Springs Plantation Thinning project and pre-commercial thinning that treated overstocked stands would benefit the white-headed woodpecker by increasing the potential for larger trees on the landscape which provide large snags for nesting habitat, and by temporarily reducing the shrub layer, which in turn, reduces nest predation. Past timber harvest on federal land that targeted large ponderosa pine has contributed to declines in habitat. Fire suppression has led to changes in forest tree species composition and structure with the development of true fir in the understory which has changed the habitat from highly suitable to marginally suitable or non-habitat for white-headed woodpeckers.

Fringed Myotis - There are no known mines or caves that would provide for hibernacula, therefore there are no cumulative effects to these structures. Pre-commercial thinning and the Bear Springs Plantation Thinning project that treated overstocked stands would benefit the fringed myotis by increasing the potential for larger trees on the landscape and opening the canopy which provides foraging. Past timber harvest on federal land that targeted large ponderosa pine has reduced large ponderosa pine which would become the large snags needed for roosting habitat. Hazard tree removal and campsite operations and

maintenance have removed and could continue to remove large snags that provide important roosting habitat.

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

Johnson's Hairstreak - Projects that may increase or improve foraging habitat in the long term include Bear Springs plantation thinning, road closures, pre-commercial thinning, and noxious weed treatments. While weed treatments may benefit butterflies by improving habitat for native flowering plants, butterflies can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides. Depending on the prescription and the condition of the stand before treatments, timber harvest may increase or decrease the amount of foraging habitat available. McCubbins Gulch OHV trail maintenance and livestock grazing reduces the amount of foraging habitat for Johnson's hairstreak. Livestock animals remove flowering food sources and alter the vegetation community. Trail maintenance removes flowering plants but at the same time maintains edges that promote the growth of flowering plants and shrubs

Survey and Manage Species

Timber harvest on federal lands within the analysis area have reduced the amount of habitat for mollusk species on the landscape and could continue to do so until these stands grow over time and can provide large trees and down wood again. In the long term, thinning treatments may accelerate the development of suitable habitat.

Management Indicator Species

Deer and Elk - It is assumed that at least 50 percent of the private land would not provide thermal cover at any given time and there is no thermal cover provided by the utility corridor. However, cover is not considered a limiting factor for deer and elk in the analysis area because much of the Forest's lands are providing cover and very little forage opportunities. Forage availability is more of a limiting factor on the Forest, but is more available off-Forest as a result of regeneration harvest on private lands. Cumulatively, there would be a small increase in forage and a small decrease in cover which would move the forage to cover ratio towards the optimum ratio.

The increase in human presence from OHV trails and developed and dispersed campsites would modify behaviors and may cause some avoidance behaviors by both deer and elk. Deer are expected to be more tolerant of recreation, while elk are less, and may move out of areas at certain times of the year. However, seasonal closures on roads and trails are implemented in the areas for winter range, and for reasons of trail stability. Trails would impact deer and elk but are not anticipated to impact populations.

Pileated Woodpecker - Past timber harvest on federal lands has reduced the amount of habitat in the analysis area. The Bear Springs Plantation Thinning did not reduce the amount of suitable habitat for Pileated Woodpecker on the landscape as it treated smaller diameter stands. Habitat for this species has continued to increase over time across the Forest but the analysis area would likely provide less habitat than other areas of the Forest due to past and present timber harvest

American Marten - Timber harvest on federal land has reduced the amount of suitable habitat for American Marten on the landscape and could continue to do so into the future. Timber harvest on federal lands would reduce the amount of habitat until these stands grow over time and become suitable habitat again.

Wild Turkey and Gray Squirrel - Timber harvest and thinning have opened the forest canopy and increased forage and nesting habitat for turkeys. Depending on the intensity, grazing may permit shrub and seedling establishment and can eliminate some native forbs which would change the food available from forbs to shrubs and reduce available nesting cover.

Timber harvest and thinning have reduced the canopy cover which reduces nesting habitat for western gray squirrel but may also increase pine seed production for foraging. Depending on the intensity, grazing may inhibit the growth of some mycorrhizal fungi (Bethlenfalvay and Dakeasian 1984) which are a food source for gray squirrels.

Other Species of Interest

Snag and Down Log Associated Species - It is not likely that private lands would provide snags and downed wood in the foreseeable future. Other timber harvest activities on Forest Service land would have similar impacts as the Proposed Action. Structural diversity would be improved by initiating a new age class and by creating openings. Thinning would also have an indirect impact by releasing the green retention trees. These retention trees would later become the large diameter snags and downed wood. The blocks of unharvested habitat would provide large snags and down wood while the treated areas of the watershed move toward the mature forest state. The adjacent untreated areas would allow for snag and down wood-dependent species to recolonize habitat as snags and down wood increase in the treated areas.

Neotropical Migratory Birds - The cumulative effects of timber harvest activities are similar to the effects of the Proposed Action and would have a combination of positive, neutral, and negative impacts on migratory birds. Open habitat that would be created could be beneficial for early seral species like the Olive-sided Flycatcher, White-headed Woodpecker and Williamson's Sapsucker. The Swainson's Thrush and Brown Creeper would be negatively impacted by habitat removal.

3.9.4 Consistency Determination

Northwest Forest Plan

The proposed project is consistent with the Northwest Forest Plan and with the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011).

Recovery Action 10: Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl populations.

- The Proposed Action maintains the highest quality habitat within potential spotted owl territories. Treatments would be located outside of core areas or within core areas and maintaining suitable habitat above 50 percent, and between patches of this habitat which would reduce the likelihood of losing the remaining habitat from wildfire, insects or disease.

Recovery Action 32: Because spotted owl recovery requires well distributed, older and more structurally complex multi-layered conifer forests on federal and non-federal lands across its range, land managers should work with the Service to maintain and restore such habitat while allowing for other threats, such as fire and insects, to be addressed by restoration management actions. These high-quality spotted owl

habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees.

- The Proposed Action was developed in coordination with the FWS in order to maintain suitable habitat while reducing the threat of losing habitat from wildfire, insects, or disease. High-quality stands would be retained with suitable and dispersal habitat between these stands for habitat connectivity.

Critical Habitat

The Proposed Action Alternative is consistent with the Critical Habitat Rule that states there is a need to implement science-based, active vegetation management to restore forest health, especially in drier forests in the eastern and southern portions of the spotted owl's range.

- Treatments were placed in areas that would provide a combination of suitable habitat adjacent to fuels reduction units in order to reduce the likelihood of losing habitat from fire, insects and disease. Corridors of dispersal and suitable habitat would provide PBF 4 within and outside of the planning area and untreated stands would continue to provide PBF4 to support transience and colonization phases of spotted owl dispersal. Treatments in non-habitat would accelerate the rate at which PBFs would be attained.

Eight special management considerations or protections were identified for the East Cascades Critical Habitat Unit ECN-7 in the Final C Rule.

1. Conserve older stands that contain the conditions to support Northern Spotted Owl occupancy or high-value Northern Spotted Owl habitat as described in Recovery Actions 10 and 32 (USFWS 2011, pp. III-43, III-67). On Federal lands, this recommendation applies to all land-use allocations (see also Thomas et al. 2006, pp. 284–285).

- The proposed project maintains the highest quality habitat within spotted owl territories as described in Recovery Actions 10 and 32. Treatments would be located between patches of this habitat which would reduce the likelihood of losing the remaining habitat from wildfire, insects, or disease.

2. Emphasize vegetation management treatments outside of Northern Spotted Owl territories or highly suitable habitat;

- The proposed project maintains the highest quality habitat within spotted owl territories as described above under management consideration #1. Treatments would be located between patches of this habitat which would reduce the likelihood of losing habitat from wildfire, insects, or disease.

3. Design and implement restoration treatments at the landscape level;

- The proposed project was designed adjacent to and in conjunction with other treatment areas such as Bear Springs Plantation Thinning and tribal lands in order to achieve landscape-level treatments.

4. Retain and restore key structural components, including large and old trees, large snags, and downed logs; veg retention areas would be used to maintain these elements.

- The proposed project would help to maintain key structural components by reducing fuels and preventing the loss of these components due to fire, insects, and disease. Additionally, the project design includes areas of “no treatment” to maintain these elements. Within treatment areas the project would not remove the largest and oldest trees, would not remove downed logs, and would not cut snags unless required for safety.

5. Retain and restore heterogeneity within stands;

- The proposed project would retain and restore heterogeneity within stands through variable density thinning including skips and gaps. The gaps would open the canopy and allow for the growth of young trees which would create multiple age classes within the stand.

6. Retain and restore heterogeneity among stands;

- The proposed project would retain and restore heterogeneity among stands by having a mosaic of treated units adjacent to untreated areas.

7. Manage roads to address fire risk; and,

- The proposed project would maintain a road system that would accommodate fire suppression activities and would also close temporary roads to eliminate access and reduce human caused fires.

8. Consider vegetation management objectives when managing wildfires, where appropriate.

- The proposed project is specifically designed in order to be able to better manage a wildfire in the event one should start in or near the planning area.

NFMA & Forest Plan

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

The following Forest Plan standards and guidelines that apply to the Proposed Action Alternative and would be met because of treatment unit proximity, placement, prescription, and identified PDC.

- 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 plants and animals shall be protected or improved.
- 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.

Open road densities under the Proposed Action would be reduced. However, the Forest Plan Standard of 2.5 miles per square mile of open roads for inventoried summer range (FW-208) would still not be met. The Forest Plan Standard for open road densities within B10 and inventoried winter range would continue meeting the Forest Plan Standard of 1.5 (B10) and 2.0 (inventoried winter range) miles per square mile.

While the Proposed Action would not meet the Forest Plan Standard of 70 percent canopy cover within 10 years after treatments, (B10-014), the treated stands would provide forage habitat for the next 40-50 until the stands would again provide winter range thermal cover. Over time a reduction in regeneration timber harvest has created abundant optimal thermal cover across the landscape, but openings for forage have become scarce and are declining at mid and lower elevations since plantations have grown dense with trees that shade out forage. Within the planning area, and forage habitat improvement for elk is limited, while treatments may result in less canopy cover within the planning area, treatments would benefit deer and elk by improving forage opportunities.

The Forest wide Standards and Guidelines would be met for B5 American Marten land allocation. At least 160 acres of mature and/or old growth forest habitat shall be maintained within each 320 acre Management Area for American marten (B5-010).

Thinning may have short-term impacts on downed wood quantity and quality, but tree response to thinning is expected to result in increased growth which would speed the ability of the stands to provide the size of snags and down wood needed to continue to meet the Forest Plan standards FW-215, FW-216, FW-219 through FW-223.

FW-219 and FW-223 indicate that stands should have 6 logs per acre in decomposition class 1, 2, and 3 and that they should be at least 20 inches in diameter and greater than 20 feet in length. However, FW-225 and FW-226 indicate that smaller size logs may be retained if the stand is too young to have 20-inch trees. Under the Proposed Action, logs representing the largest tree diameter class present in the stand would be retained.

Currently most of the trees are not large enough to produce snags of the desired size, (22 inches diameter, FW-234), but FW-235 allows the retention of smaller trees if the treated stand is too young to have trees of sufficient size. In this case, snags and green leave trees retained would be representative of the largest size class present in the stand.

Consultation

A formal biological assessment was submitted to the FWS for the effects to federally listed species including northern spotted owl, Oregon spotted frog, and the gray wolf. A signed Biological Opinion was received from the FWS on January 19, 2018.

Other Laws Rules Regulations

The proposed project is consistent with the Eagle Act, the MBTA, and the National Bald Eagle Management Guidelines. The proposed buffer of 0.25 around a bald eagle nest during the breeding season exceeds the 660-foot buffer recommended by the Bald Eagle Management Guidelines.

The Landbird Conservation Strategy objectives include no net loss of suitable habitat and retention of all ponderosa pine trees and snags greater than 20 inches DBH. While some ponderosa pines larger than 20 inches DBH may be cut, they would be removed in areas where there are larger pines and habitat would be improved. No snags would be cut unless they pose a safety risk.

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

3.10 Botany

Summary – This section addresses the rare botanical species that are documented or suspected to occur within the general project area. Only those species which may be directly, indirectly, or cumulatively affected by the proposed actions are considered. There are no known occurrences of federally listed endangered or threatened botanical species on the Forest and the Forest has no habitat recognized as essential for listed plant species recovery under the Endangered Species Act. The actions proposed have direct, habitat-disturbing effects to the target species discussed below. PDC and mitigations would be employed to reduce the direct effects of these actions to acceptable and potentially beneficial results. One objective is to avoid a trend toward federal listing under the Endangered Species Act (ESA).

This section summarizes the Botany Report which is incorporated by reference.

3.10.1 Analysis Assumptions and Methodology

The geographical boundary analyzed during this project was within the Clear Creek, Middle Beaver Creek, Middle White River and Wapinitia Creek 6th field subwatersheds and surveys were limited to the project area. The species considered in this section are listed as sensitive by the Pacific Northwest (Region 6) Regional Forester (revised July 2015) as well as species included in the 2001 Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (henceforth, the 2001 ROD) (USDA, USDI 2001). These are species for which population viability is of concern, as evidenced by current or predicted downward trends in population numbers or density, or by concerning trends in habitat availability that would reduce a species’ distribution. The 2001 ROD is based upon the 2000 Final Supplemental Environmental Impact Statement (SEIS). The 2000 Final SEIS analyzed the effects of applying Survey & Manage mitigation measures during habitat-disturbing activities. The method for which surveys were conducted within the project area followed the seven-step process outlined in the August 17, 1995 Regional Foresters memo for Regions 1, 4, and 6. A pre-field analysis (or pre-field review) is used to determine the probability that TES species, and /or their respective habitats are located within or adjacent to the project area, and to determine the extent and intensity of previous survey efforts. This project proposes to buffer all riparian areas, wetlands and seeps. Since this buffering removes riparian habitat from consideration, no surveys were conducted in riparian areas, and riparian associated species would not be discussed within this analysis.

Multiple surveys were conducted within the project area for botanical species in the R6 Sensitive Species List (2015), and 2001 ROD during the 2016 and 2017 field seasons. Field surveys were conducted using the intuitive controlled method. All survey protocols for 2001 ROD species were followed and in compliance with regional guidelines (VanNorman and Huff 2012). The survey method followed the Survey and Manage standards and guidelines (USDA/USDI, 2001) for Category B fungal species (rare, pre-disturbance surveys not practical). Since strategic surveys were never completed for fungi, equivalent-effort surveys were conducted. All the stands for which this condition applied within the project area were surveyed in the spring and fall of 2016 and in the spring of 2017.

3.10.2 Existing Condition

The project area includes habitat or known sites for several species of sensitive bryophytes, lichens, fungi and vascular plants. Of the 335 sensitive species that are known or suspected to occur or have habitat on the Forest, 108 plant, bryophyte, lichen and fungi species were determined to have historic known sites or suitable habitat within the project area and adjacent watersheds.

The plantation and sapling thin units were composed primarily of Douglas-fir or ponderosa pine trees under 80 years. These stands were consistently overcrowded and shaded, with minimal understory diversity. The units also included large trees over 180 years, but these were leave trees from previous timber harvest activities and did not constitute appropriate old-growth habitat. These sites were not found to be suitable habitat for any target species.

The project also proposes management in units which have had minimal management in the past. These units were determined to have stands with an average age over 180 years. These stands were dominated by large Douglas-fir and ponderosa pine. While these stands were often grazed and heavily shaded, with a sparse understory, they did include the greatest species diversity and abundance. The stands have large down woody material and layers of litter or duff. During fungal surveys, a large diversity of species with both mycorrhizal and saprobic functions were found, suggesting that these areas support a healthy fungal community.

This project has potential habitat for another 76 fungal species within the stands determined to be over 180 years of age and other stands with minimal or no management. There is a reasonable likelihood that these species occur in the project area, but habitat requirements for the majority of those listed are poorly understood or are too broad. The known or potential species are either litter/wood saprobes or form beneficial mycorrhizal associations with living trees. To analyze these habitats, equivalent-effort surveys for fungi were conducted on approximately 2,180 acres of the project, where habitat-disturbing activities are proposed in forested stands over 180 years of age and were required according to 2001 ROD direction. During these surveys, new sites were discovered for *Clavariadelphus ligula*, *Clavariadelphus truncatus*, *Polyozellus multiplex*, *Sparassis crispa*, and *Spathularia flavida*.

There are no known sites for clustered lady's-slipper in this project area. Three populations of mountain lady's-slipper are known within this area. Of those, only two appear have persisted. Surveys were conducted during spring and summer of 2016, within known population areas and adjacent habitat for both species. No new sites were discovered within the project area. The majority of bryophyte or lichen species known or suspected from this project area are limited to riparian areas, seeps or springs. The remaining species are terrestrial or epiphytic. These species were surveyed for during 2016 survey efforts. Only *Nephroma occultum* has a known site within the project area. There are also a number of sites for *Hypogymnia oceanica*, which was removed from the regional forester's list. This species is relatively rare, but appears to persist in plantation and sapling thins as well as old-growth, suggesting that it is not as rare as previously thought. The sites found within the project area are not within appropriate habitat.

The following species are known or suspected to occur east of the Cascades in the habitat types which are found in this project area: *Baeospora myriadophylla*, *Collybia bakerensis*, *Cudonia monticola*, *Cyphellostereum leave*, *Dendrocollybia racemosa* (*Collybia racemosa*), *Galerina atkinsoniana*, *Galerina cerina*, *Galerina heterocystis*, *Gymnomyces nondistincta* (*Martellia nondistincta*), *Mycena overholtsii*, *Pseudaleuria quinaultiana*, *Pseudorhizina californica* (*Gyromitra californica*), *Tremiscus helvelloides*, *Tricholomopsis fulvescens*, *Sowerbyella rhenana*, *Sparassis crispa*, and *Spathularia flavida*.

3.10.3 Effects Analysis

No Action Alternative

With no action all ongoing activities such as livestock grazing, OHV use and maintenance of trails and roads, and utility maintenance would continue to occur. No timber harvest or fuels reduction activities would occur. This would have no impact on sensitive vascular plants, bryophytes, lichens and fungi.

The No Action Alternative would have no direct effects to any of the target species. The forest stands within the project area would remain as described above. There are potential indirect effects to these species as a result of no action. The dense growth of the trees in much of this area results from a lack of natural disturbance and from human fire suppression. As such, there is a high risk of a catastrophic wildfire occurring within this area. Please see the fuels section for more information on this risk. If a high-intensity fire were to burn through this system, the effects to the species described above would be detrimental. For all the species of concern, loss of individuals and habitat are likely. Many areas would be returned to early-seral stand conditions, which do not favor the sensitive species of concern and instead promote the growth of invasive weed species, further reducing the diversity and ecological function of this area.

Proposed Action

While implementing the buffers and treatment design criteria described below, the Proposed Action may directly impact individuals or habitat for sensitive plants, but would not likely contribute to a trend towards federal listing or loss of viability for the population or species (*Cypripedium montanum*, *Cypripedium fasciculatum*, *Lycopodium complanatum*, bryophytes, lichens, and fungi). There may be long-term beneficial impacts for these species from this alternative.

Cypripedium montanum* and *Cypripedium fasciculatum

The populations of mountain lady's slipper within planning units are mapped and would be excluded from harvest activities within patch retention areas (skips). The sites would be excluded from temporary road development, landing or slash pile placements, and underburns would be kept light and patchy within those areas. Burning would only be conducted during the late fall, when the plant has senesced. Though research is not clear on the role that fire plays with these species, timber harvest activities could directly impact these plants through the removal of individuals and the disturbance of soil and litter, if not for the mitigations. These mitigations would protect the populations and nearby shrubs from direct activity. The soil and litter would be lightly impacted by underburning activity. The treatments planned for these units would open the canopy and recreate conditions favorable to the mountain lady's-slipper. The project may directly impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability for the population or species.

Bryophytes and Lichens

A diversity of downed woody materials would be maintained on-site to meet the standards for soil protection and sensitive species habitat. This would serve to protect an acceptable amount of habitat for terrestrial bryophytes and lichens. The project does not propose to remove large, old-growth trees unless spacing and competition are a concern. Snags would be retained to protect wildlife habitat, but may be impacted by prescribed fire. These conditions would protect epiphytic species in appropriate habitat. In addition, the known site for *Nephroma occultum* would be incorporated into a patch retention area and protected.

The retention of snags would protect sufficient quantities of habitat elements for terrestrial species, where otherwise the removal or destruction of dead and decaying logs and large conifers, road or trail construction, or fire would have direct effects and could remove both individuals and habitat. For

epiphytic species, the removal of standing snags or large, living conifers could have the same effect. The project may directly impact individuals or habitat, but would not likely contribute to a trend towards federal listing or loss of viability for the population or species

Fungi

The effects of the Proposed Action to fungi species tiers to the analysis in the 2000 Final SEIS. Management of these species under the 2001 ROD includes the protection of known sites, “equivalent-effort surveys” for Category B fungi in proposed habitat-disturbing projects in old-growth forests, and “Strategic surveys.” Although these mitigations would result in a moderate level of uncertainty that there would be adequate habitat to maintain these species, this management is intended to “provide a reasonable assurance of species persistence” within the Northwest Forest Plan area of Oregon, Washington, and northern California. The Proposed Action is consistent with the 2001 ROD and the Proposed Action is not expected to have significant effects, beyond those already analyzed in the 2000 Final SEIS.

Effects to the 82 known and potential fungi species within this project area were analyzed on pages 241 - 252 in the 2000 Final SEIS. For 77 species the analysis concluded that “while there is a moderate level of uncertainty due to the rarity of the species, and the lack of knowledge of species population biology and the unpredictable nature of disturbance events, all alternatives (considered in the Final SEIS) would provide inadequate habitat (including known sites) to maintain these species.”

There is no new information or changed circumstances that would substantially change the effects described in the 2000 Final SEIS to which this analysis is tiered.

The newly discovered and known sites of target fungi would be buffered from harvest within patch retention areas. In the short term, the Proposed Action may reduce habitat for sensitive mycorrhizal fungi due to host tree removal and a reduction in moisture retention capabilities due to the drying effect of overstory removal (Amaranthus, Parrish and Perry 1989). To meet habitat concerns for all other areas and species, a diversity of downed woody materials would be maintained on-site to meet the standards for soil protection and sensitive mollusk species habitat. Soil disturbance would occur and is limited by the Forest Plan standards for soil protection. Soil compaction resulting from harvesting equipment or the creation of temporary roads and landings can reduce tree root growth and availability for fungi (Amaranthus and Perry 1994). There is also an optimal amount of organic debris and of moisture and too little or too much of either can be detrimental (Harvey, et.al. 1981; O’Dell, et.al. 1993). Where mastication or chipping methods would be applied in these areas, the large down woody material would still be maintained, and the chipped or masticated material would be scattered so as to avoid excessive deposition. Where pile burning would be applied, the known sites for fungi would be avoided. Prescribed fires would still have an impact to litter and debris. Prescribed fire would be applied lightly and patchily to avoid complete consumption of material, while still meeting concerns for fuel loading and wildfire risk. The project may directly impact individuals or habitat but would not likely contribute to a trend towards federal listing or loss of viability for the population or species. Fuels reduction would likely result in reduced levels of wildfire intensity which would benefit species across the planning area.

Cumulative Effects

The area analyzed for cumulative effects serves to include the appropriate habitats for targeted sensitive and rare species as well as the habitats targeted for improvement during these proposed actions within the treatment units and within areas of other connected actions and the areas directly adjacent to them, including Riparian Reserves and other ownerships. The temporal scale of this cumulative effects analysis includes past thinning projects, the ongoing White River Allotment management, the ongoing McCubbins

Gulch OHV Trail Construction and Maintenance project, Utility Corridor Operations and Maintenance, and thinning and fuels reduction proposed as part of this analysis.

Target species within this area have been indirectly impacted through changes to natural stand characters, reduction in species diversity, and the introduction of invasive species. Continuing use of this area for utility corridors and grazing have spread weed propagules and maintenance does not effectively protect sensitive habitats. The harvest of timber and associated activities may have a slight cumulative effect on undetected rare fungi, bryophytes and lichens. Adjacent wilderness and wild and scenic rivers or areas that are not planned to have management actions within them would provide refugia for some species.

These mitigations do not account for the continued use of this area for grazing. Grazing pressure appears to be an important factor in the decline of species within this area. Very little vegetation persists within areas that are open and easily accessed by grazing animals (cattle, elk, and deer). The persistence of protective shrub cover around sensitive plants appears important in maintaining these populations.

Since there would be little negative direct or indirect effect to rare botanical species such as sensitive species and survey and manage species with the Proposed Action or the adjacent actions, there would be no measurable incremental impact and no substantial cumulative effect. However, because it is often difficult to find rare species, it can be presumed that some are present even though not found during surveys. Therefore, as more of the landscape is managed, the risk to undetected individuals becomes incrementally greater with every action.

3.10.4 Consistency Determination

The project is consistent with the survey protocols in the 2001 ROD and the following standards identified in the Forest Plan:

- FW-148, 149 and 150 – “Management activities shall preserve and enhance the diversity of plant and animal communities, including endemic and desirable naturalized plant and animal species. The diversity of plants and animals shall be at least as that which would be expected in a natural forest; the diversity of tree species shall be similar to that existing naturally in the planning area (36 CFR 219.27).”
- FW-162 – “Habitat management should provide for the maintenance of viable populations of existing native and desired non-native wildlife, fish (36 CFR 219.19) and plant species (USDA Regulation 9500-4) well distributed throughout their current geographic range within the National Forest System.
- FW-174 - “Threatened, endangered and sensitive plants and animals shall be identified and managed in accordance with the Endangered Species Act (1973), the Oregon Endangered Species Act (1987), and FSM 2670.”
- FW-175 – “Habitat for threatened, endangered, and sensitive plants and animals shall be protected and/or improved.”
- FW-176 – “Biological Evaluations (FSM 2672.4) shall be prepared for all Forest Service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened or sensitive species.”

The project is consistent with the 2001 ROD and the Forest Plan standards and guidelines because the required surveys and analysis for rare botanical species have been conducted. PDC have been identified to maintain sufficient habitats that would continue to provide for viable populations, and protect known sites.

3.11 Invasive Plant Species

Summary – This section addresses the invasive species that are within the general project area. The harvesting activities would create disturbed conditions for invasive species growth. Fuels reduction and prescribed burning activities would also create disturbed conditions for weed spread. PDC and mitigations are proposed to minimize the high risk of invasive species spread.

This section summarizes the Invasive Species report compiled by the project's botanist. The Invasive Species report is incorporated by reference.

3.11.1 Analysis Assumptions and Methodology

Executive Order (EO) 13112 directs federal agencies to consider the potential effects of invasive species when proposing and planning federal actions. The EO defines invasive species as a species that is 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health. The goal of EO 13112 is “to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.” To achieve this goal, federal agencies should identify those actions they take that may affect the status of invasive species, take positive steps within their authorities to prevent the introduction of invasive species and prevent the spread of existing invasive species, provide for the control of invasive species, and minimize the economic, ecological, and human health impacts that invasive species cause.

Specific invasive plant management direction is found in the 2005 Record of Decision (ROD) for Preventing and Managing Invasive Plants (USDA 2005) as well as the ROD for the Final Environmental Impact Statement (FEIS) for Site-Specific Invasive Plant Treatments for the Forest and Columbia River Gorge National Scenic Area (March 2008). Both of these documents amended the Forest Plan (1990). The 2008 FEIS provides more site-specific guidance for managing invasive plants on this forest. The management direction includes invasive plant prevention and treatment/restoration standards intended to help achieve desired future conditions, goals, and objectives, and is expected to result in a decreased rates of spread of invasive plants while protecting human health and the environment from the adverse effects of invasive plant treatment.

3.11.2 Existing Condition

The Crystal Clear Restoration project area includes many habitat types, but much of the proposed project units have relatively low native species diversity, due to dense canopy closure and grazing use. In addition, there are established populations of the invasive weed species houndstongue (*Cynoglossum officinale*) throughout the project area and small populations of tansy ragwort (*Senecio jacobea*) primarily in the west half of the project. These species are both toxic to mammals, and are not controlled by the grazing of deer or cattle. Well-established populations of these species reduce the understory diversity. Diffuse knapweed (*Centaurea diffusa*), spotted knapweed (*Centaurea stoebe*), medusahead rye (*Taeniatherum caput-medusae*), St. Johnswort (*Hypericum perforatum*) and bull thistle (*Cirsium vulgare*) are found within this project area to a lesser degree. Cheatgrass (*Bromus tectorum*) is found throughout the project area, especially within heavily-disturbed openings or on road shoulders.

3.11.3 Effects Analysis

No Action Alternative

The No Action Alternative would have few short-term effects. None of the thinning treatments, fuels reduction or connected actions (temporary roads) would take place. Conditions of invasive species would continue to persist at similar levels.

There is a high likelihood that this area would experience a stand-replacing wildfire within the next several years. The dense canopies and fuel loading would result in severely burned conditions on the ground. This would create favorable conditions for invasive species colonization and spread.

Proposed Action

The Proposed Action treatments would provide favorable light conditions for invasive species establishment. Harvest activities (yarding material) and grapple piling, could expose and compact soils which would provide a seedbed for invasive species establishment. Machinery moving through infested areas would pick up and move seeds distributed within the soil. Prescribed fire use would also potentially create conditions favorable for the spread of invasive species.

This project has a high risk of invasive species infestation. The existing condition of the project area includes a large population of houndstongue and tansy ragwort, and minor populations of other species. Treatment acres could become more susceptible to some degree of a weed establishment opportunity, as a result of this Proposed Action. Some acres would be more susceptible compared to others. The level of disturbance activity determines the risk of weed introduction and infestation.

PDC associated with the Proposed Action would provide mitigation for the introduction of new weed species, and would prevent the spread of current invasive species into areas without infestation as well as to other areas of the forest. PDC would include cleaning of equipment, use of weed-free materials, and restoration with native seed. Machinery would be washed prior to its arrival on forest land, as well as prior to working within units that have a low weed infestation. As much as possible, treatments would be implemented so as to minimize the spread of weeds. Extreme care needs to be given to removing houndstongue seeds from all clothing, chaps and any other items that the seeds could attach to after working in infested areas. Use of slash or masticated wood material to cover open ground and prevent weed infestation would be utilized.

The combined use of treatments, prevention, and establishment of competitive native species would create improved habitat conditions within this project area.

Long term treatments are not proposed as part of this project, and would be conducted under a separate program and NEPA document (FEIS Site-Specific Invasive Plant Treatments for the Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16).

Cumulative Effects

Previous timber sale activities have created unnatural openings in the forest with sparse understory and disturbed soil. These areas are quickly populated by invasive and non-native pioneer species, and serve as a source for other infestations. The continued use of this area for grazing and recreation activities may have an increased risk of weed introduction or spread, as would proposed activities associated with this project. These projects overlap in space and would overlap in time as the projects are implemented.

Measures may be taken to greatly reduce these cumulative effects. Monitoring and aggressive weed treatment immediately after discovery would lessen the impact and spread of new noxious weed species.

Treatment would include manual and herbicide treatments followed by seeding with native plant species appropriate for this area. PDC, as discussed above, would mitigate for the introduction and spread of invasive species. These combined actions would lower the risk of invasive species introduction within the project area, but would not address the infestations which are present. This would be addressed separately through the FEIS Site-Specific Invasive Plant Treatments for the Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16.

3.11.4 Consistency Determination

The identification of management and prevention is also consistent with the Site-Specific Invasive Plant Treatments for the Forest and Columbia River Gorge National Scenic Area in Oregon FEIS/ROD (2008).

Forest Plan Consistency:

FW-299 - “Noxious weed control projects shall comply with Region Six “Managing Competing and Unwanted Vegetation” FEIS, Record of Decision (1988), and Mediated Agreement (1989).”

FW-300 - “Plants that have been identified as pests by the State Department of Agriculture shall be controlled as described in the Mt. Hood National Forest Noxious Weed Implementation Plan.”

FW-301 - “Implementation of control measures should adhere to the following priorities: Prevention, Early treatment, Maintenance, Correction, No action (per Vegetation Management FEIS, Record of Decision 1988, and Mediated Agreement 1989)”

B2-056 – “Vegetation management adjacent to major travel routes or recreation sites shall be consistent with the Northwest Region (R6) “Management of Competing and Unwanted Vegetation” FEIS, Record of Decision (1988) and Mediated Agreement (1989)”

This project is consistent with Forest Plan standards and guides and other requirements as an invasive species survey was completed, and PDC would be employed during implementation.

3.12 Recreation

Summary – Implementing the Proposed Action Alternative would have direct and indirect effects to a variety of recreation resources including developed recreation, dispersed campsites, dispersed recreation, trails, wilderness, and special uses. Implementing recommended PDC would reduce the magnitude, scope or duration of the impacts associated with the Proposed Action Alternative.

This section summarizes the Recreation Report that is incorporated by reference.

3.12.1 Analysis Assumptions and Methodology

This section examines several different types of recreation resources, including: developed recreation facilities, dispersed recreation, trails, and special use permits. This section also considers the unique management considerations for Wilderness and Wild and Scenic Rivers, which are two types of areas with special congressional designation. Information regarding the existing condition of these resources and their associated recreation use was gathered from various information sources, including: maps, management plans, databases, special use permits, and local managers. Some field surveys were completed during the summer of 2016. In some cases, knowledge of recreation resources within the project area is incomplete. For example, non-system trails or dispersed camping locations within the project area have not been completely surveyed. In these cases, estimates were made based on conditions found in comparable areas and local manager experience.

Proposed actions were analyzed for possible changes and effects to recreation resources or experiences. Impacts to recreation have been reviewed on a case-by-case basis and are described in more detail in the Effects Analysis of this section (3.12.3). The project area was used to determine direct, indirect and cumulative scenic effects. Effects were also considered for portions of the White River Wild and Scenic River corridor and Lower White Wilderness that adjoin the project area. The temporal boundaries used for analyzing the direct and indirect effects were 1-10 years (short term) and 10 – 50 years (long term).

Recreation was also examined in the context of the prescribed management allocations and standards and guidelines under the Forest Plan (USDA 1990). This section also discusses potential impacts to the Recreation Opportunity Spectrum (ROS). ROS assists with the planning and management of recreation on the Forest by arranging possible mixes or combinations of activities, settings, and probable experiences and opportunities along a spectrum or continuum. In the context of this analysis, the ROS settings within the planning area are examined to 1) identify the specific management objectives for each ROS setting and to then 2) determine whether the goals and objectives for each setting would be impacted by the Proposed Action (USDA 1982).

3.12.2 Existing Condition

A variety of recreation activities occur within the planning area. The majority of recreation activity takes place during the spring, summer and fall, however there is some use during the winter.

Within the planning area this ROS is applied to the White River Wild and Scenic River and the immediate foreground for Scenic Viewshed management areas. Interaction between users may be low to moderate but with evidence of other users prevalent. Resource modification practices are evident but harmonize with the natural environment.

The Roaded Modified ROS covers the majority of the planning area. These areas are meant to provide for a range of recreation experiences that are consistent with substantially modified, motorized settings in which the sights and sounds of humans are readily evident and the interaction between users can be from low to high. Recreation experiences and opportunities in these areas often depend on vehicular access off the primary routes via secondary roads. Camping experiences are relatively primitive, with few on-site facilities provided, requiring some self-reliance and use of primitive outdoor skills.

There are developed recreation sites within the planning area. These include McCubbins Gulch Campground, Bear Springs Campground, Clear Creek Crossing Campground and the staging area on Forest Road 2130.

Dispersed recreation occurs throughout the project area, and common activities include: driving for pleasure, hunting, special forest products collection, and camping.

Driving for pleasure is most heavily concentrated along Highway 26 and OR-216. Highway 26 is one of the most popular scenic routes on the Forest. The road offers spectacular views of Mount Hood, steep canyons formed by glaciers and erosion, and spectacular forest. In addition to serving as a primary travel route across the State, the highway provides access to Government Camp, Timberline Lodge, Mount Hood Meadows and many other popular destinations. OR-216 provides access to the Deschutes River which is a popular destination for fishing and whitewater boating.

Dispersed camping occurs in various locations throughout the planning area. There are no amenities such as toilets and picnic tables, but there may be visitor-created developments such as vehicle pullouts and fire rings. The Forest does not have a complete inventory of dispersed campsites within the project area, but local manager experience suggests that there are likely several hundred campsites within the project area. Some dispersed campsites are well developed with a long history of use whereas others might

consist of little more than a fire ring. Known concentrations of dispersed campsites can be found on Forest Road 2110 and its spurs. These sites are often used when nearby developed campgrounds are at capacity or when there is a recreation event in the area.

There are a variety of system trails within the planning area, as shown in Table 49 and on the maps found in the Recreation Report which is incorporated by reference. These trails are maintained by District trail crews, and in partnership with multiple volunteer groups.

Table 49. Trails within the planning area

Trail Name and Number	Permitted Uses	Mileage within Planning Area
Clear Creek Trail #487	Bike, Pack and Saddle, Hike	4.6
Camas Trail #490/#490A	Bike, Pack and Saddle, Hike	3.5
McCubbins Gulch OHV Trails	Bike, Pack and Saddle, Hike, ATV, Motorcycle	60.1
Winter Snowmobile Trails	Snowmobile, XC Ski, Snowshoe	36.6

There are several recreation-related special use permits issued within the planning area. These include mountain biking, running, equestrian trail rides, and dual sport rides. These events utilize Forest roads, trails, and recreation facilities within the planning area. Event details and routes can vary from year to year. Some of the notable events which have consistently occurred in recent years include the Mt. Scott Dual Sport Ride, Black Dog Dualsport Ride, Bear Springs Trap Mountain Bike Race, McCubbins Gulch Scramble, and the Cascade Pacific Council Boy Scout Horse Trek.

The White River is a congressionally designated Wild and Scenic River. The planning area includes 65 acres which are within the Wild and Scenic River boundary, however, the Proposed Action Alternative does not include any activities within these 65 acres. A section of the congressionally-designated Lower White River Wilderness adjoins the project area to the north, however, no activities are proposed within this wilderness area.

3.12.3 Effects Analysis

No Action

There would be no direct effects as a result of selecting the No Action Alternative. An indirect effect of implementing the Proposed Action would be the loss of a potential opportunity to bring the trail tread and experience closer to the designed use for the McCubbins Gulch OHV trails authorized under the 2010 OHV Management Plan. Timber sales typically generate funding which could be used on impacted and nearby trails. With the No Action Alternative, no timber sale funds would be generated and this work would be less likely to occur in the short term. In the long term, roads and existing trails which were recently converted from roads would continue to naturalize and provide a more desirable trail experience.

Proposed Action

None of the proposed actions would occur within developed recreation sites. During implementation, logging trucks and other equipment would use the same roads which provide access to developed recreation sites within, and adjoining the project area. Visitor safety along these roadways would be a concern, and the proposed alternative includes mitigations for road safety.

The proposed activities could affect dispersed campsites and recreation activities within the planning area. In the short term, the primary effect would be that visitor use of dispersed campsites would not be safe or

feasible during implementation of the Proposed Action. Situationally appropriate temporary closure areas, as well as road and trail signage would mitigate this concern. Overall, there could be localized affects to dispersed campsites as a result of the Proposed Action, but the magnitude of the effect would be nominal. There are a large number of dispersed campsites on the Forest and many opportunities would continue to be available for recreationists seeking campsites both inside and outside the project area. A likely short-term effect to dispersed recreationists would be the avoidance of where logging is occurring due to noise and equipment. The overall effect to dispersed recreation activities would be nominal as these types of activities are very adaptive to changes in the landscape as they are generally not dependent on specific sites at the scale of this project. The Proposed Action would be consistent with the recreation opportunity spectrum (ROS) classifications for the planning area.

The Proposed Action would utilize approximately 14.5 miles of existing and 8.5 miles planned OHV trail. These trails would be used as temporary roads, timber haul, and equipment transport. After implementation of project activities, trail tread would be re-established, or in other locations, trails might be realigned to avoid future conflicts. The Proposed Action would have a nominal effect to the trail itself in the short term, and would present opportunities to move the trail tread towards desired conditions in the long term. An indirect effect of implementing the Proposed Action would be the opportunity to complete some of the authorized work with Knutson-Vanderburg Act or stewardship funding. This would bring the trail tread and experience closer to the designed use for the McCubbins Gulch OHV trails. Much of this work would be done in partnership with Mt. Scott Motorcycle Club, Hurricane Racing 44 Trails, and other partner organizations. Also, indirectly temporary roads and skid trails have the potential to be converted to non-system OHV trails by visitors. Creation and use of these non-system trails is prohibited, and non-system trails often have associated resource issues. The Proposed Action includes PDC that would close and rehabilitate any temporary roads or skid trails that were created as a result of implementing the proposed alternative. This would limit the potential for creation of non-system OHV trails.

The magnitude of the impact would be greater to and trails with defined tread and desired trail conditions. A particular concern is the potential disturbance of the trail tread, as a result of road use, timber harvest equipment, or skidding. Another effect would be that of vegetative treatments to the experiential and visual component of the recreationist's experience. Particularly large numbers of cut stumps and trees marked with paint. Many of the trails are old roads which were converted to trail. It generally takes some time, and vegetative growth, for these conversions to develop into the desired trail condition. Any use of these trails for roads or equipment would be a setback to the development of these trails.

In general, most of the Proposed Action activities are not compatible with safe and unrestricted public use on trails. Temporary trail closures would be a PDC. If closures were to occur, it would impact recreationists who desire to utilize the trail. Professional experience also suggests that the magnitude of this impact is greater if recreationists discover that a trail is closed upon arrival at the trailhead. There is also a potential to disrupt or effect recreation events or races within the planning area during project implementation. The project area includes several interconnected trails which are commonly used as loops, so closures on the 17.5 miles of affected trail are likely to close larger portions of the trail system. While trail closures are typically less than a season in duration, proposed actions of this nature are typically overtaken across a several-year time period with some stands being treated one year, while other stands are treated in other years. Thus, the magnitude of the effect to recreationists could be significant if trail closures were not coordinated. The Proposed Action includes PDC for coordination of activities to minimize the effect to recreationists to the degree practicable. This would ensure that while there may be closures there would continue to be trail opportunities within the planning area, and that the public would receive ample notice prior to closures.

The Proposed Action does not include winter operations; however, it is not uncommon to receive waiver requests for winter operations during implementation. Should a waiver request be received it would be important to consider potential recreation effects in the decision to issue or not issue a waiver.

Activities are not proposed within wilderness areas. Boundaries would be clearly marked where units are adjacent to the Wilderness boundary. In the long term, preventing the establishment of non-native and invasive species is a desirable method of preserving wilderness character. PDC to treat equipment prior to operation in units that are adjacent to wilderness would reduce the risk of introducing invasive species to these areas.

Cumulative Effects

Recent projects or activities within the analysis area include several activities outlined below. The analysis area for recreation is the project area boundary. The boundary for the recreation cumulative effects analysis was determined based on the interconnected access to recreational resources such as trailheads, road networks and campgrounds. Table 11 provides a list of projects to be considered in the cumulative effects analyses, including activities on private lands. The Proposed Action would include immediate effects as a result of implementation, however any negative effects would be mitigated with the use of PDC during and after project implementation. Overall, the project would provide beneficial long-term outcomes. Cumulative effects are outlined in Table 50 below for projects and activities that have the potential for cumulative effects to recreation.

Table 50. Cumulative effects to recreation resources

Project Potential	Effects	Overlap in:		Measurable Cumulative	Effect? Extent, Detectable?
		Time	Space		
Ongoing trail maintenance	FS system trails	Yes	Yes	Yes	This project would bring the project area into better alignment with the 2010 OHV Decision. It would likely reduce the number of non-system trails.
Road decommissioning and road closures	Dispersed campsites	Yes	Yes	Yes	This project would bring the project area into better alignment with the 2010 OHV Decision. It would likely reduce the number of non-system trails.
Future hazard tree harvest along roads, trails and developed recreation sites	FS system trails and developed recreation facilities	No	Yes	No	Over time, potential hazard tree harvest along roads and trails would continue. The Proposed Action would likely reduce the level of hazard tree work needed within treated units in the short to midterm.
Ongoing developed recreation site operations	Developed recreation facilities	Yes	Yes	No	None of the activities would occur within developed recreation sites.

3.12.4 Consistency Determination

Forest Plan

The Proposed Action Alternative would be consistent with Forest Plan direction and standards and guidelines.

Recreation Opportunity Spectrum (ROS)

Both alternatives would be consistent with the goals and objectives for Roaded Natural and Roaded Modified classifications. Neither would have more than a nominal effect to the types, settings, quantities or quality of recreation experiences available within the planning area.

2010 OHV Management Plan

Both alternatives would be consistent with the direction set for OHV trails within the planning area under the 2010 OHV Management Plan as well as national Travel Management Policy

White River Wild and Scenic River Designation and Management Plan

Neither alternative would result in activities within the bed or banks of the White River, or within the bed or banks of one of its tributaries. The proposed activities are located outside of the Wild and Scenic River designation and would also not have downstream effects which would invade or unreasonably diminish water quality, free flow or the “Outstandingly Remarkable Values” for which the river was designated.

Lower White River Wilderness

Both alternatives would conform to the 1964 Wilderness Act, 1984 Oregon Wilderness Act, and 2009 Omnibus Public Land Management Act. No motorized or mechanized activity would occur within Wilderness, which would ensure that its undeveloped Wilderness character is preserved. Under the Proposed Action Alternative, mitigations would be taken outside of Wilderness to prevent the spread of noxious weeds into the Lower White River Wilderness and preserve its natural character.

3.13 Visual Quality

Summary – This sections summarizes the Scenery Analysis Report, and effects the Proposed Action may have to visual quality objectives. Overall, there would be no direct effects to scenic resources with no action. While the Proposed Action would reduce canopy cover using variable density thinning (VDT), the range of thinning densities would not result in a negative effect to Visual Quality Objectives (VQOs). The fuels treatments in the Proposed Action would reduce overall levels of downed wood which would benefit VQOs. The Proposed Action would include direct visible human effects including: stumps, landings, temp roads, skid trails, fuels treatments, boundary marking, tree marking and the production of slash debris. The Proposed Action includes mitigations to address these visual effects of actions commensurate with the prescribed VQO for that location.

The Proposed Action would result in new opportunities to complete road to OHV trail conversions. The No Action Alternative would not result in any new opportunities to complete this work.

Portions of the landscape within Scenic Viewshed (B2) management area are not meeting their desired VQO due to the intensity and scale of clearcuts prior to the mid-1990’s. In the short term, the Proposed Action would neither improve nor decrease the VQOs for these stands. In the long term (10+ years), both alternatives would see VQO’s maintained or improved as a result of vegetative growth and natural processes. Specifically, the presence of large trees, diversity of species, and diversity of age and size classes would contribute to scenic resources. This condition would likely take longer to achieve in sapling

stands if no action or treatment occurred. Taking no action has a greater risk of catastrophic wildfire which would negatively affect scenic resources.

The Scenery Analysis Report is incorporated by reference.

3.13.1 Analysis Methodology

The Visual Management System (USDA 1974) and the Scenery Management System provided the primary framework and criteria used for this analysis. Several existing information sources were consulted, primary information sources for existing and historical conditions included:

- Geographic Information Systems (ArcGIS)
- White River Watershed Analysis (USDA 1995)
- White River Late Successional Reserve Assessment (USDA 1996)
- Strategic Fuel Treatment Placement Plan (USDA 2012)

Particular attention was given to the "seen area" of the landscape which is defined as the portion of the landscape visible from a viewer position on a travel route, water body or recreation use area. Initial seen area analysis was completed using Google Earth software. The software includes flattened imagery that provides some basic information about the likelihood of topographic screening on the ground. It also often shows the outlines of past vegetation management (i.e. timber harvest) from an aerial perspective. The ground view feature of the Google Earth software allows for the rough evaluation of visible terrain and landscape features from any viewpoint on the landscape. This feature utilizes the underlying topography to determine line of sight and does not include vegetation or small variations in landscape slope or contour. The inability to take vegetation into account is a limitation of this software as thick vegetation and trees screen on the ground views for much of the project area. Importing stand boundaries for the Proposed Action assists with the determination of potential effects to viewshed corridors. Completing this analysis also helped identify areas where field survey was needed.

Field visits of visual resources were conducted within the project area to verify information gathered from other reports and databases. As evaluation of the visual quality objectives is driven by viewpoint of the observer, particular focus was given to critical viewpoints from the Highway 26 and Highway 216 viewshed corridors identified in the Forest Plan. Specifically, these visits were intended to:

- determine the existing condition of the landscape in relation to its prescribed Visual Quality Objectives (VQO);
- determine scenic attractiveness, stability, and integrity;
- validate information obtained from other sources;
- evaluate the intactness of the landscape and its scenic integrity; and,
- capture the landscape character and unique sense of place.

Information gathered from various information sources, seen area analysis, and field visits was used to determine the existing condition of scenic resources. Proposed actions were analyzed for possible changes and effects to VQOs. The project area was used to determine direct, indirect and cumulative scenic effects. The temporal boundaries for analyzing the direct and indirect effects are 1 years (short term) and 10 – 50 years (long term). Particular attention was given to stands immediately adjacent to or visible from Highway 26 and OR-216.

3.13.2 Existing Condition

Over the past century, there have been human uses of the project area which have had effects to the natural setting and scenic integrity. Until the mid-1970's, most timber harvest entries were partial cuts

where the largest and most valuable trees and species were removed. Beginning in the 1970's, regeneration harvest (mostly clearcuts and shelterwood cuts) became more prevalent. In the mid-1990s, selective thinning and fuels treatments for smaller trees became the preferred practice. These activities all typically involved creation of temporary or permanent roads as well as landing piles for logs. While previously cut stands have started to regenerate, the alteration to the natural setting can still be a visible detractor from the scenic integrity of the landscape. In recent years, recreation use has also increased and has resulted in ground disturbance (i.e. large campsites) which also lowers the scenic integrity of the landscape. Where present, these visible human effects are all largely subordinate to the natural landscape.

The terrain, vegetation, and natural setting create a distinctive landscape which is characteristic of the project area. Although it is often screened by vegetation, Mount Hood is an object of significant visual interest which provides a unique sense of place. The overall landscape possesses a high level of scenic attractiveness, however in some locations its scenic integrity and visual quality objectives have been lowered due to visible human effects.

Table 51. Visual Quality Objectives by management area

Management Areas	Foreground	Middleground	Background
Scenic Viewshed (B2)	Management Area Standards and Guidelines specific to Highway 26, Highway 216, and White River viewsheds		
Deer Winter Range (B10)	Modification	Modification	Modification
Wood Product Emphasis (C1)	Modification	Modification	Modification

The planning area also includes Pileated Woodpecker/Pine Martin Habitat (B5) management areas. This designation overlays with the designations in Table 51 and adopts their prescribed VQOs.

While managed for different purposes, lands that comprise the deer and elk winter range management areas share a modification VQO for all distance zones. There has been a significant amount of past timber harvest activity, OHV use, and trail use within these management areas; and the effects of harvest activity are often visually evident. This harvest activity has created opportunities for viewing distant peaks in some places, which is noted as a desired condition in the Forest Plan. These harvested stands are generally not visible from the Scenic Viewshed (B2) within the project area due to vegetative screening. When they are visible, they are typically located in the middleground or background, and vegetative regrowth has minimized the contrast of harvested stands to unharvested stands. While human modifications are present within this management area they remain visually subordinate to the natural landscape, and these areas currently meet the prescribed modification VQO.

Table 52. Designated viewsheds

Designated Viewsheds	Viewer Position	Foreground (0 to ½ mile)	Middleground (½ mile to 5 miles)	Background (Beyond 5 miles)
Highway 26	As seen from the highway	Retention	Partial Retention	Partial Retention
Highway 216	As seen from the highway	Retention	Partial Retention	Partial Retention
White River	River	Retention	Partial Retention	Partial Retention

Highway 26 and OR-216 are both state highways of importance. Both highways have associated human modifications which are visually evident and detract from the Visual Quality Objectives. The most

noticeable contrasts to the natural setting are the occasional road signs within the right of way. Red cinder gravel is applied to the roadway in the winter for safety, and is visible within the right of way year round. Minor damage to tree bark and foliage from snowplows and blown snow is visible in some locations. The Oregon Department of Transportation occasionally treats brush or other vegetation within the right of way which also results in visible effects to vegetation. The casual observer may focus on the natural setting, and at the normal rate of travel (55mph), the magnitude of these effects is minor.

Overall, the views from Highway 26 and OR-216 are of a scenically attractive landscape dominated by natural line, colors, textures and forms. It is a thickly forested landscape punctuated by changing topography, rock outcroppings, rocky road cuts, and occasional views of Mount Hood. These elements combine to create a sense of place, unique to this portion of the Cascade Range. Some short portions of the road where previous harvest occurred, sapling stands in particular, meet a partial retention VQO and not the prescribed retention VQO. However, the majority of the road meets the prescribed retention VQO for the foreground, and partial retention VQO for the mid-ground and background.

The White River viewshed is intended to protect scenery for portions of the gorge which were not included within the designated Wild and Scenic River boundary (USDA 1994). The identified viewer positions for this viewshed are: looking out from the river itself, looking into the canyon from a viewpoint above Keeps Mill, and from undeveloped viewpoints along forest roads 2110-270 and 4885-160. These stands currently meet the prescribed partial retention VQO. Due to the still-visible effects of past regeneration harvest, stand 319 currently aligns more closely with a partial retention VQO than the prescribed retention VQO.

Multiple designated trails are located entirely within the planning area or intersect with the planning area. Table 53 below lists the trails that cross the planning area as well as their visual sensitivity levels as classified by the Forest Plan. Within these sensitivity levels, visual quality objectives are prescribed for foreground, far foreground, and middleground.

Table 53. Designated trails within the planning area

Trail Name and Number	Sensitivity Level	Foreground	Far Foreground	Middleground
All OHV Trails within planning area	III	Modification	Modification	Modification
487	II	Partial Retention	Modification	Modification
490	II	Partial Retention	Modification	Modification
490A	II	Partial Retention	Modification	Modification

Distance Zones

- Foreground - 660 from each side of the trail unless screened by topography
- Far Foreground - 660 beyond the first 660 feet
- Middleground - Anything visible beyond 1,320 feet from each side of the trail
- Background - Beyond 5 miles from viewpoint

The sensitivity level II trails within the project area currently have well established trail tread and there are few visible impacts along the trail. They are meeting their prescribed retention VQO for the visible foreground.

Many of the sensitivity level III trails within the project area were originally roads which were converted to trail (USDA 2009). Many of these have yet to be actively converted to trail and still have all of the physical and visual characteristics of a road. Regardless of whether or not these trails have the visual characteristics of a trail they remain visually subordinate to the natural landscape. OHV trails in the project area currently meet the prescribed modification VQO.

3.13.3 Effects Analysis

No Action Alternative

There would be no direct effects as a result of implementing the No Action Alternative. An indirect effect of taking no action would be the missed opportunity to complete several sections of road to OHV trail conversion with Knutson-Vanderburg Act or stewardship funding. This would improve the visual quality objective of the OHV trails which currently look like roads. With the No Action Alternative, no timber sale funds would be generated and this work would be less likely to occur.

Portions of the landscape within Scenic Viewshed (B2) management area are not meeting their desired visual condition. With the No Action, these areas would continue to be a visible detraction from the scenic integrity of the landscape for decades to come. In the very long term (50+ years), these stands would eventually begin to take on the desired VQOs.

With the No Action Alternative fuels treatments would not occur and there would be greater risk of wildfire which would reduce the scenic attractiveness of the landscape due to the use of heavy equipment for suppression efforts which can result in long-lasting visual effects to the landscape.

Proposed Action Alternative

The Proposed Action includes mitigations to address the visual effects of actions associated with commercial thinning, sapling treatments, and fuels treatments. These mitigations would reduce the magnitude of effects to VQOs and ensure that the proposed actions do not result in areas dropping below its existing condition VQO. Mitigations are included in the full Scenery Analysis Report which is incorporated by reference for additional information.

The Proposed Action would apply variable density thinning (VDT), which allows flexible local density levels to achieve overall treatment objectives, and allows emphasis to be placed on leaving vigorous trees of all sizes without concern for spacing. Thinning below a 50 ft² basal area for stands visible from Highway 26 or OR-216 would not align with the prescribed retention VQO (Ribe 2009). Mitigations keeping these stands above 50 ft² basal area would ensure that their VQO is not lowered as a result of this element of the Proposed Alternative. The proposed range of thinning for the remainder of the planning area is (40-200 ft² basal area). It is likely that most stands would remain above a 50 ft² basal in the broader project area. Any areas which dropped below would be small in scale and would result in natural appearing openings. In this regard, the Proposed Action would be consistent with prescribed VQOs for the broader planning area.

Commercial thinning in stand 422 may open partial views of Mount Hood from the highway which would be a positive visual effect. The magnitude of this effect would be minor.

Variable density thinning would also involve other associated actions with the potential to directly affect scenic resources. Specific actions which would result in visible evidence of human modifications to the landscape include:

- Cutting trees which leave visible stumps

- Tree marking paint, flagging and boundary tags are visible human modifications which can detract from scenic integrity.
- Construction of temporary roads and skid trails, and temporary landings,
- Thinning, as it is likely to produce slash or other debris, which may be removed or scattered. Evidence of thinning may also subsequently be treated by piling and burning. If left on the landscape in large quantities, it would detract from VQOs.

In the short term, the Proposed Action would not change the VQO of these stands, however in the long term, the Proposed Action would be likely to improve VQOs. The overall intent for these treatments would be to move the stands toward better forest health and reduced wildfire risk. This would result in conditions with scenic benefits as well. Older stands are more likely to contain a mosaic of species and age classes distributed in natural-appearing patterns. A diversity of tree and shrub species of various sizes and ages which adds color contrast and texture. These stands would be more likely to contain target tree diameters for mature trees as prescribed in the Forest Plan. With mitigations to the direct effects of the Proposed Action (i.e. temp roads, landings, stumps) the result is likely to be a natural-appearing forest landscape with little evidence of human alteration.

Sapling stands within the project area generally meet a modification or partial retention VQO. Primarily due to the very high densities of young trees that contrast with the form and pattern of the characteristic natural landscape. The proposed sapling thinning would have the following visual effects:

- Thinning saplings would allow viewers to see further into stands which would allow for greater ability to see any objects of visual interest which might be present (e.g. rock outcroppings, remaining large trees, etc.). Thinning in stand 423 may open partial views of Mount Hood from the highway. This is generally a positive effect to VQO's.
- Saplings are typically thinned to a relatively even spacing. This would continue to contrast to the typical pattern of the characteristic natural landscape in the short term, but would not result in a change from existing conditions.
- Effects from past management activities, such as stumps, would continue to be visible on the landscape. Additional stumps from small diameter saplings cut as a part of these treatments would also be visible, although these typically decompose relatively quickly.
- Tree marking paint, flagging and boundary tags are visible human modifications which can detract from scenic integrity.
- Sapling thinning is likely to produce slash or other debris, which may be removed or scattered. It may also subsequently be treated by piling and burning. If left on the landscape in large quantities it would detract from VQOs.

Post treatment, these stands would continue to exhibit a visible human modification to the landscape in the short and midterm. This modification would still be visually subordinate within the natural setting of the landscape, and these stands would retain their current VQO. For stands within the project area, the current condition is either a partial retention or modification VQO, depending on the mitigations that were implemented with the past treatment. In the long term (10+ years), these stands would have lower risk of wildfire and improved stand health. In the long term, the remaining saplings would be quicker to develop into larger trees, and spacing would allow for the establishment of greater diversity of species and tree age class. This would better align with the natural line, form and pattern of the characteristic landscape and meet a retention or partial retention VQO.

An element of the purpose and need for the project is the reduction of the fuel loadings within the project area. This would be accomplished by treating residual fuels after treatments. Research has shown that high levels of down wood and debris are visually unappealing (Ryan 2005). Treating residual debris

would be a positive effect to the scenery of the project area. However, the methods used to accomplish this can have their own visual effects. These methods and their effects include:

- Debris may be piled by hand or by machine and subsequently burned. There is a short-term visual effect due to the presence of the piles on the landscape while fuels cure. These piles are typically burned in the late fall when conditions prevent the spread of wildfire. Consumption of materials is based on weather and fuel moisture and is challenging to predict. Any machine piles which fail to burn completely could leave a ring of unburned fuels, which could have a long-lasting visual effect. The magnitude of this effect would depend on the frequency and number of piles which did not completely burn.
- Low intensity underburning and jackpot burning typically results in a natural-appearing effect. This occasionally necessitates the creation of handline to prevent the spread of fire. Handline would be a minor negative effect to VQOs if not rehabilitated.
- Lopping and scattering is a method used when fuel concentrations are low, and is typically not a noticeable effect beyond one year.
- Biomass collection removes the fuels and has a natural-appearing result. The collection itself can have visual effects, typically as a result of equipment operation (e.g. landings, skid trails and temp roads).
- Mastication (and/or chipping) involves reducing the size of forest vegetation and downed material by grinding, shredding, chunking or chopping material. The visual effects of this depend on the size and quantity of the remaining debris. Smaller debris tends to be less visually apparent and tends to decompose quickly. The tons per acre of desired fuel loading (i.e. debris from mastication) in the prescribed action would necessitate small-sized residual debris at low densities. The visual effect from this would be a low magnitude. The Proposed Action includes mitigations to address the visual effects of actions associated with particularly visually-sensitive stands along Highway 26 and OR-216.

Fire is a natural feature of the characteristic landscape and can have a mixed affect to scenery. Large, high-intensity, stand-replacing fires have the potential to reduce scenic attractiveness (USDA 1995). Low-intensity, small-scale fires can open up views to the broader landscape and reveal interesting topography and geology. Many vegetative species require disturbance, thus, fire can result in greater vegetative diversity. Fire can also obscure some of the visible evidence of past human effects on the landscape (e.g. cut logs or stumps). The Proposed Action would reduce the risk of catastrophic wildfire with negative affects to scenery, and the small-scale, managed fire in the Proposed Action would facilitate some of the scenic benefits which can result from fire.

The Proposed Action would utilize approximately 17.5 miles of existing or planned OHV trail. The desired visual qualities associated with trails would be impacted in cases where trail was used for temporary roads, timber haul, and equipment transport. To mitigate this the trail tread would be re-established upon completion of project activities, or in other locations, trails might be realigned to avoid future conflicts. This work would be accomplished using Knutson-Vanderburg Act or stewardship funding as a result of implementation of the Proposed Action.

Many of the OHV trails within the project area were never actively converted to trail and still have all of the physical and visual characteristics of a road. Project implementation would not result in any significant change to the existing visual condition of these trails. Post project mitigations would provide an opportunity to actively complete many of these roads to trails conversions. This would result in these trails having the visual characteristics of a trail, and may improve the VQO for the trail.

Cumulative Effects

Portions of the project area are part of the background distance zone for other scenic viewsheds, and areas outside of the project area also form the background for views within the project area. In many locations inside and outside of the planning area, views would be screened by mountain topography and forest vegetation. The spatial context of the cumulative effects analysis considered the potential for visual effects to travel commensurate to their distance zone. Reduction of canopy cover is the only element of the Proposed Action which is likely to be seen from a background distance zone, however it would retain a natural color, texture, and form.

The Proposed Action Alternative would include immediate effects as a result of implementation, however many of the indirect effects would occur in the long term (10+ years). For example, vegetative growth, forest health, and naturally-occurring events such as wildfire, are natural processes which influence scenic resources in the long term. For the remainder of the proposed actions, the potential for cumulative effects was limited to the project area.

Table 54. Cumulative effects for visuals

Project	Potential Effects	Overlap in		Measurable Cumulative Effect?	Extent, Detectable?
		Time	Space		
Ongoing road and trail maintenance.	FS System Trails VQO	No	Yes	No	No measurable cumulative effects would occur.
	Land Allocation VQO	No	Yes	No	
Road decommissioning and road closures	Land Allocation VQO	No	Yes	Yes	This project would bring the project area into better alignment with the 2010 OHV Decision. It would likely reduce the number of non-system roads and be a positive effect to VQOs.
Future Hazard Tree Harvest Along Roads and Trails	Land Allocation VQO	No	Yes	No	Over time, potential hazard tree harvest along roads and trails could open up scenic views within the project area. This could improve views of Mount Hood as well as other unique natural features within the planning area. This is unlikely to be a measurable effect.
Past vegetation treatments.	Land Allocation VQO	No	Yes	Yes	As mentioned in the existing condition section, clearcutting which occurred prior to the mid-1990s altered both the project area and the surrounding landscape. Proposed vegetative treatments would have a lower magnitude effect to scenic resources than past practices. In the long term, the visible effects from past clearcutting should continue to diminish.

3.13.4 Consistency Determination

The Proposed Action Alternative would be consistent with Forest Plan direction. The relationship between the Proposed Action Alternative and Forest Plan consistency is outlined in Table 55 below.

Table 55. Forest Plan consistency

Standards & Guidelines	Consistency of the Proposed Action with the Forest Plan
FW-552/553 The VQOs prescribed in management direction represent the minimum level that shall be achieved in long term visual resource management.	This effects analysis addresses this Standard and Guideline
FW-554 VQOs for designated viewsheds shall be prescribed as listed in Table 4-23 of the Forest Plan.	This effects analysis considered VQOs as prescribed in the Forest Plan.
FW-555 A higher VQO than the minimum prescribed may be achieved where consistent with management area direction.	This effects analysis considered direct, indirect and cumulative effects to VQOs in both the short term and the long term.
FW-556/557: The prescribed VQO should be achieved within one year after completion of any project activities. Short-term deviations from prescribed visual quality objectives may occur due to catastrophic events, e.g. fire, windstorm, earthquake, and insect damage.	The Proposed Action would be consistent with the Forest Plan provided mitigations which address residual fuels treatments (pile burning) and project impacts (i.e. equipment disturbance, skids trail, etc.) rehabilitation were implemented.
FW-560: Timber harvest units (within all distance zones) should not dominate over natural landscape character (i.e. form, line, color and texture) in areas where VQOs of Retention and Partial Retention are prescribed.	The Proposed Action would be consistent with the Forest Plan provided mitigations were implemented. Specifically: <ul style="list-style-type: none"> • Mitigations which address residual fuels treatments (pile burning). • Mitigations which address project impacts (i.e. limitations on treatment, minimizing equipment disturbance, locations of temp roads and landing, low cut stumps, etc.)
FW-561 Harvest units should blend with the natural landscape character where VQOs of modification are prescribed.	The Proposed Action would be consistent with the modification VQO. Proposed actions and recommended mitigations would potentially improve the VQO near trails with a modification VQO in the long term.
FW-562/563: As a measure to achieve prescribed VQOs, only a limited portion of the “seen area” within viewsheds should be in a visually disturbed condition at any given time. Seen areas should be identified from selected viewer positions during project implementation planning.	The Forest Plan defines visual disturbance for this standard as not having trees above 20 feet in height. The Proposed Action would retain vegetation above 20 feet in height and would be consistent with this Forest Plan standard.
FW-564: Within landscapes where Retention VQOs are prescribed, the maximum percent of the seen area visually disturbed should not exceed 8 percent at any one time or 4 percent per decade.	Approximately 19% of the area under this VQO is composed of sapling stands. The trees are on average 40 feet tall in these stands which means that these stands are not classified as visually disturbed. The Proposed Action would retain many of these tall trees and continue to meet Forest Plan Standards.
FW-565 Within landscapes where partial retention VQOs are prescribed, the maximum percent of the seen area visually disturbed should not exceed 16 percent at any one time or 8 percent per decade.	Approximately 9% of the area under this VQO is composed of sapling stands. The trees are on average 40 feet tall in these stands which means that these stands are not classified as visually disturbed. The Proposed Action would retain many of these tall trees and continue to meet Forest Plan Standards.
FW-566 Within landscapes where modification VQOs are prescribed, the maximum percent of the seen area visually disturbed should not exceed 25 percent at any one time.	Approximately 17% of the area under this VQO is composed of sapling stands. The trees are on average 40 feet tall in these stands which means that these stands are not classified as visually disturbed. The Proposed Action would retain many of these tall trees and continue to meet Forest Plan Standards.

Standards & Guidelines	Consistency of the Proposed Action with the Forest Plan
FW-567 Natural diversity of plant species (and/or age classes) should be maintained or increased in landscapes where retention (foreground or middleground) and partial retention (foreground) VQOs are prescribed.	The Proposed Action would maintain or improve species diversity in the long term and be consistent with the Forest Plan.
FW-568/569/570: Landings shall be hidden from viewer positions in landscapes where Retention VQOs are prescribed. Landings should not dominate over landscape character where Partial Retention VQOs are prescribed. Mitigation measures may be necessary within the first year following an activity to achieve these Standards and Guidelines.	The Proposed Action would be consistent with the Forest Plan provided mitigations for landings were implemented.
FW-571: Tree stumps shall be cut so as to not dominate over natural form, line, color, and texture in foreground zones of landscapes where Retention and Partial Retention VQOs are prescribed.	The Proposed Action would be consistent with the Forest Plan provided mitigations related to stump height were implemented.
FW-576: New roads should not dominate natural landscape character (i.e. form, line, color, and texture) where Retention and Partial Retention VQOs are prescribed.	The Proposed Action does not include new roads, but it does include temporary roads which would be rehabilitated as a part of project completion. The Proposed Action be consistent with the Forest Plan provided the following mitigations relating to temporary roads were implemented.
FW-581 Wood residue treatment, and other fire and fuel management activities shall be designed to achieve prescribed VQOs.	The Proposed Action be consistent with the Forest Plan provided that mitigations relating to machine and hand piles were implemented.
FW-582 Exceptions to organic matter (e.g. down woody debris) management direction (see Forestwide wildlife, forest diversity, and soil productivity Standard and Guidelines) may occur within retention and partial retention near foreground areas (i.e. 200') of designated viewsheds as necessary to achieve VQOs.	The Proposed Action be consistent with the Forest Plan provided that mitigations relating to machine and hand piles were implemented.
FW-583 Maintenance of natural-appearing quantities and character of down woody debris shall be emphasized.	The Proposed Action would reduce fuel loads, but would leave some down fuels. A wildlife mitigation would encourage remaining fuels to include large diameter dead wood, which would provide scenic character.
FW-584 Trail VQOs shall be prescribed for near foreground (i.e. the first 600 feet on each side of the trail unless screened by topography) far foreground (i.e. the second 600 feet) and middleground based on sensitivity level. Prescribed trail VQOs apply to both existing trails and planned trails.	The Proposed Action be consistent with the Forest Plan provided that mitigations relating to visual conditions along sensitivity level II trails were implemented.
FW-586: Sensitivity Level II trails shall have prescribed VQOs or Partial Retention, Modification, and Modification in near foreground, far foreground and middleground distance zones, respectively.	The Proposed Action be consistent with the Forest Plan provided that mitigations relating to visual conditions along sensitivity level II trails were implemented.
FW-587 Sensitivity Level III trails shall have prescribed VQOs of Modification for all distance zones.	The Proposed Action would be consistent with the Forest Plan provided that mitigations relating to trails were implemented. These mitigations cover temporary roads, equipment crossings, skid trails, and landing locations. They also cover rehabilitation upon sale completion.
FW-588/589 Temporary trail VQO deviations may occur within near foreground areas within C1 Timber Emphasis Management Areas. VQO deviations shall not exceed 20	The Proposed Action would be consistent with the Forest Plan provided that mitigations relating to temporary roads, equipment crossings, and skid trails were implemented.

Standards & Guidelines	Consistency of the Proposed Action with the Forest Plan
percent of the trail length within a C1 Management Area.	Another mitigation would prescribe rehabilitation upon sale completion.
FW-590/591 Road crossings of trails may occur, but should be limited in quantity.	The Proposed Action would be consistent with the Forest Plan provided that mitigations relating to temporary roads, equipment crossings, and skid trails were implemented. Another mitigation would prescribe rehabilitation upon sale completion.
FW-594/595 Permanent Road crossings exceeding 1 per mile should not occur. One additional temporary road crossing per mile may occur if obliterated after project implementation.	The Proposed Action would not change the density of road crossings. The Proposed Action also includes mitigations relating to temporary roads, equipment crossings, and skid trails, as well as a mitigation for rehabilitation upon sale completion.
FW-596/597 Road crossings exceeding 2 per mile should not occur. Temporary roads may also occur if obliterated after project implementation.	The Proposed Action would not change the density of road crossings. The Proposed Action also includes mitigations relating to temporary roads, equipment crossings, and skid trails, as well as a mitigation for rehabilitation upon sale completion.
B2-012 Management activities shall achieve prescribed VQOs from identified view positions (designated viewsheds).	This effects analysis considered VQOs as view positions as prescribed in the Forest Plan.
B2-13 Opportunities for viewing unusual landscape features, (e.g. peaks, rock forms, water forms) may be designed into development projects.	Treatments in Stands 422 and 423 may open views to Mount Hood.
B2-014 Landscapes inconsistent with prescribed VQOs shall be planned and scheduled for rehabilitation.	Some sapling stands are not meeting prescribed VQOs. The Proposed Action would bring these stands closer to the desired condition in the long term.
B2-015 Unacceptable changes in form, line, color and/or texture resultant from management activities should be corrected within the first year after the activity occurs.	If all recommended visual mitigations were implemented the Proposed Action would not result in unacceptable changes to form, line, color, or texture as prescribed
B2-034/035 Regulated timber harvest should occur. All vegetation management activities shall be directed towards creating or maintaining the desired landscape character through time and space.	The Proposed Action includes timber harvest. If all recommended visual mitigations were implemented the proposed action would not result in unacceptable changes to form, line, color, or texture as prescribed
B2-038 A mix of naturally-occurring species (i.e. conifer and deciduous trees and shrubs) should be maintained in harvest areas.	The Proposed Action would maintain or improve species diversity in the long term and be consistent with the Forest Plan.
B2-064/065 Exceptions to down wood debris Standards and Guidelines may occur within near-foreground (i.e. 200 feet) areas with Retention and Partial Retention VQOs prescribed. Maintenance of natural appearing quantities and character of down woody debris shall be emphasized.	The Proposed Action would reduce fuel loads, but would leave some down fuels. A wildlife mitigation would encourage remaining fuels to include large diameter dead wood, which would provide scenic character.
B2-066/067/068 Prescribed fire may be permitted. Use of hand-pile fuel prescriptions should be emphasized in near foreground areas; exceptions may occur for eastside pine communities.	The Proposed Action includes low intensity prescribed fire, as well as mitigations that address residual fuels treatments (pile burning).

3.14 Cultural Resources

Summary – While some cultural resources exist within the project area, the project would have no effect on cultural resources because protective measures have been prescribed for certain sites. Other sites have

no protective measures either because it has been determined that the project would not have an effect to the site due to site proximity to proposed treatments, because the site has been determined to be ineligible for inclusion on the National Register of Historic Places (NRHP), or because the non-cultural objects cannot be relocated.

This section summarizes the Heritage Report which is incorporated by reference.

3.14.1 Analysis Assumptions and Methodology

Heritage resources include structures, sites, and objects that reflect the prehistory, protohistory, and history of people. The analysis area for heritage resources is the area of ground disturbance as described in the Proposed Action Alternative. Ground disturbance includes treatments using heavy machinery associated with logging, piling and burning, mastication of woody materials, temporary road construction, and road closures and decommissioning.

3.14.2 Existing Condition

Based on proximity, the pre-contact history of the general project area is undoubtedly linked to that of the lower Deschutes River basin, including adjacent portions of the Warm Springs Indian Reservation. The distribution of archaeological resources suggests relatively-low-intensity transient use of the general area throughout the pre-contact period. Artifacts recovered within the general project area provide evidence of use during the Early Archaic period (10,000 to 8,000 years ago). Early Archaic artifacts have also been noted at Clear Lake.

Heritage resources within the project area include peeled cedar trees, irrigation ditches, historic sawmills, lithic scatters, multi-component historic and protohistoric sites, ranger stations and guard stations, historic homesteads, the remains of a ditchwalker's cabin, the remains of a historic bridge, historic work camps, historic can and bottle dumps, the remains of historic lookouts, the remains of an abandoned vehicle, historic roads, historic telephone lines, historic benchmarks, and a water collection site.

3.14.3 Effects Analysis

No Action Alternative

Under the No Action Alternative, Heritage Resources would only be affected by decay and other natural and physical forces that are already occurring. With no action there would be no effect on heritage resources.

Proposed Action Alternative

Heritage resource surveys have been conducted for those ground-disturbing activities requiring inspection. The surveys are documented in the Heritage Resource Report 2017/060601/0001 (Dryden 2017) for the Proposed Action.

There are fourteen sites that are located within the project area that have no requirement for buffers or other protective measures because of the site proximity to proposed treatments, because the site is ineligible for inclusion on the National Register of Historic Places, or because the site contains non-cultural objects that cannot be relocated.

Protective measures that include flagging a 100-foot buffer zone for the exclusion of heavy machinery around the site, directionally felling trees away from the buffer zone, and excluding prescribed fire from the buffer zone are required for the following sites: Chinese Ovens site, 1932 Clear Lake Butte Lookout,

Clear Lake Lookout Tree, the Blast Camp, and the Pipeland site. These protective measures can allow the project to proceed with no effect to the sites.

The Hawke Eye site would have the same protective measures as listed above but with the exception to allow prescribed burning. These protective measures can allow the project to proceed with no effect to the Hawke Eye site.

The Highway 216 Telephone Line site consists of tree-mounted ceramic insulators, wire, and the remains of a telephone box in areas proposed for thinning and prescribed burning. Each tree containing an insulator, wire, mounting rod, or telephone box would be flagged or marked for avoidance during timber treatments. Prescribed burning may occur, but surface duff would be raked or scraped away from the base of each tree. With these protective measures, the project can proceed with no effect to the site.

The Highway 216 Benchmarks site consists of four surveying benchmarks in areas proposed for thinning and prescribed burning. Each benchmark would be flagged or marked for avoidance during timber treatments. With these protective measures, the project can proceed with no effect to the site.

Other cultural materials observed, but not formally documented, include logging cable, automobile parts, milled lumber, and miscellaneous cans and bottles. Most of the cans and bottles were situated along roadsides. All of these artifacts were determined to be of modern derivation and are not considered eligible for inclusion on the National Register of Historic Places.

The PDC for the Proposed Action resulted in no direct or indirect effects to heritage resources.

Cumulative Effects

This project would have no effect on heritage resources eligible for the NRHP and none of the projects considered for potential cumulative effects overlap the affected area, there would be no cumulative effects to heritage resources as a result of implementing the action alternatives. For heritage resources, any effects would be limited to site-specific locations. Any cumulative effects would also be limited to heritage resources situated within proposed areas of ground disturbance. For cumulative effects, all projects shown in Table 11 were considered; however, none of the proposed projects involve heritage resources situated within the proposed project areas. Also, heritage resources are generally avoided for all federal undertakings with no cumulative effects.

The consultation for the Heritage Resource Survey results and recommendations for the project have been completed in accordance with the 2004 PA and submitted to the Oregon SHPO for review. A letter of concurrence from SHPO was received on October 24, 2017.

3.14.4 Consistency Determination

The National Historic Preservation Act (NHPA) and the National Environmental Protection Act (NEPA) both require consideration be given to the potential effect of federal undertakings on heritage resources. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered into a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

The project would not impact any significant heritage resources. Based on the proposed protective measures, the project meets the criteria in the PA for “No Historic Properties Affected” determination (Stipulation III (B) 5).

The Proposed Action Alternative is consistent with Forest Plan goals to protect important heritage resources. Heritage resource inventories were conducted in compliance with the 2004 PA during the project planning stage (FW-598, FW-600, FW-610, FW-602 and FW-606), the field survey results were fully documented (FS-608), and the potential effects to heritage resources from the proposed projects were assessed (FW-609, FW-610). Heritage resources potentially affected by project activities were evaluated as ineligible for inclusion on the NRHP (FW-612).

The consultation for the Heritage Resource Survey results and recommendations for the project have been completed in accordance with the 2004 PA and submitted to the Oregon SHPO for review; SHPO has concurred that there would be no adverse effect to historic properties.

3.15 Climate Change

This Proposed Action Alternative would affect approximately 12,700 acres of forest by commercially thinning smaller trees from the stand, retaining a residual stand of about 40-120 ft² basal area in dry mixed-conifer forests and 80-200ft² basal area in moist mixed-conifer forests. This scope and degree of change would be minor relative to the approximately 1,000,000 acres that make up the Forest.

Climate change is a global phenomenon because major greenhouse gases (GHG) mix well throughout the planet's lower atmosphere (IPCC 2013). Considering emissions of GHG in 2010 was estimated at 49 ± 4.5 gigatonnes²⁰ globally (IPCC 2014) and 6.9 gigatonnes nationally (US EPA, 2015), a project of this magnitude makes an infinitesimal contribution to overall emissions. Therefore, at the global and national scales, this proposed action's direct and indirect contribution to greenhouse gases 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 global greenhouse gases and climate change would also be negligible.

The Intergovernmental Panel on Climate Change has summarized the contributions to climate change of global human activity sectors in its Fifth Assessment Report (IPCC 2014). In 2010, anthropogenic (human-caused) contributors to greenhouse gas emissions came from several sectors:

- Industry, transportation, and building – 41%
- Energy production – 35%
- Agriculture – 12%.
- Forestry and other land uses – 12%

There is agreement that the forestry sector contribution has declined over the last decade (IPCC, 2014; Smith et al., 2014; FAOSTAT, 2013). The main activity in this sector associated with GHG emissions is deforestation, which is defined as removal of all trees, most notably the conversion of forest and grassland 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 not be converted into a developed or agricultural condition. In fact, forest stands are being retained and thinned to maintain a vigorous condition that supports trees, and sequesters carbon long term. US forests sequestered 757.1 megatonnes²¹ of carbon dioxide after accounting for emissions from fires and soils in 2010 (US EPA, 2015).

²⁰ A gigatonne is one billion metric tons of CO₂; equal to about 2.2 trillion pounds.

²¹ A megatonne is one million metric tons of CO₂; equal to about 2.2 billion pounds.

However, there is growing concern over the impacts of climate change on US forests and their current status as a carbon sink. There is strong evidence of a relationship between increasing temperatures and large tree mortality events in forests of the western US. There is widespread recognition that climate change is increasing the size and frequency of droughts, fires, and insect/disease outbreaks, which would have major effect on these forests' role in the carbon cycle (Joyce et al. 2014).

The project is in line with the suggested practice of reducing forest disturbance effects found in the National Climate Assessment for public and private forests (Joyce et al. 2014). Here specifically, the project proposes to conduct thinning and follow-up with prescribed fire where appropriate to reduce the fuel loading and restore forest resiliency that is adapted to climate change. The release of carbon associated with this project is justified given the overall change in condition increases forest resistance to release of much greater quantities of carbon from wildfire, drought, insects/disease, or a combination of these disturbance types (Millar et al. 2007).

This project falls within the types of options presented by the IPCC for minimizing the impacts of climate change on forest carbon, and represents a potential synergy between adaptation measures and mitigation. Actions aimed at enhancing forest resilience to climate change by reducing the potential for large-scale, catastrophic disturbances such as wildfire also prevents release of GHG, and enhances carbon stocks (Smith et al. 2014). The Proposed Action reflects the rationale behind these recommendations because there exists the threat of a large-scale disturbance outside of the range that historically occurred on the landscape that could threaten both NFS land and adjacent privately-owned lands. There is a need to reduce the fire hazard in order to protect life and property and to restore forest to conditions that are more resilient to wildfire on NFS lands. This project contains the Juniper Flats WUI and is adjacent to the Warm Springs WUI.

Timber management projects can influence carbon dioxide sequestration in four main ways: (1) by increasing new forests (afforestation), (2) by avoiding their damage or destruction (avoided deforestation), (3) by manipulating existing forest cover (managed forests), and (4) through transferring carbon from the live biomass to the harvested wood product carbon pool. 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 dioxide, respectively (IPCC, Intergovernmental Panel on Climate Change, 2000). Projects like the Proposed Action that create forests or improve forest conditions and capacity to grow trees are positive factors in carbon sequestration.

3.16 Environmental Justice and Civil Rights

On February 11, 1994, President Clinton issued the Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898). This order directs agencies to identify and address disproportionately high and adverse human health or environmental effects of projects on certain populations. In accordance with this order, the proposed activities have been reviewed to determine if they would result in disproportionately high and adverse human and environmental effects on minorities and low-income populations.

The communities of Mt. Hood/Parkdale, Odell and Hood River are less than 40 miles north of the planning area. The communities of Dufur and The Dalles are less than 30-40 miles to the east / northeast of the planning area. Pine Grove is approximately 5 miles to the east of the project, and is included in the WUI that overlaps the eastern portion of the planning area. Tygh Valley, Wamic, Wapinitia and Maupin are other communities that are 5-15 miles east of the planning area. Other communities that may have an interest in the proposal would include Sandy, Gresham and Portland to the West.

The planning area is located on usual and accustomed land for the Confederated Tribes of Warm Springs (as is all of the Forest). The Treaty of 1855 granted the Confederated Tribes of the Warm Springs (CTWS) the right of “usual and accustomed” gathering of traditional native plants and “special interest” use. Based on proximity, the pre-contact history of the general project area is undoubtedly linked to that of the lower Deschutes River basin, including adjacent portions of the Confederated Tribes of Warm Springs Reservation. The distribution of archaeological resources suggests relatively low intensity transient use of the general area throughout the pre-contact period. Based on consultation and communication with the CTWS, the proposal to implement this project would not have any adverse effect on members of the CTWS.

Although there is no formal tracking system, based on observations, it is suspected that many of the foliage/greenery permits are sold to low-income individuals and minorities. It is likely that this project would generate more special forest products as the area is treated and new understory vegetation grows (e.g., huckleberry and bear grass). Therefore, the proposal to implement this project is not expected to have any negative effect on special forest product gatherers.

3.17 Congressionally Designated Areas

This section discusses Congressionally Designated areas, including Wild and Scenic Rivers and Wilderness areas. It does not discuss future designations, proposed designations or other proposals for changes in management direction.

3.17.1 Existing Condition

Wild and Scenic Rivers

When the Forest Plan was approved there were five rivers on the Forest, which comprised the Wild and Scenic Rivers System: Clackamas, Roaring, Salmon, Sandy and White Rivers. The White River Wild and Scenic River is adjacent to the treatment activities. The 1968 Wild and Scenic Rivers Act calls for maintaining the free-flowing character of the designated rivers and protecting their “outstandingly remarkable values” (ORVs). ORVs are values or opportunities in a river corridor that are directly related to the river which are rare, unique, or exemplary from a regional or national perspective.

The White River Wild and Scenic River Management Plan defines the river’s ORV for geology, fish habitat, wildlife, recreation, and scenic resources. These ORVs should be protected and/or enhanced.

Wilderness

There are seven wilderness areas that are entirely within the Forest (Badger Creek, Bull of the Woods, Clackamas, Mark O. Hatfield, Mt. Hood, Roaring River, and Salmon-Huckleberry) and portions of two other wilderness areas within the administrative boundary of the Forest (Lower White River and Mt. Jefferson).

Similarly, to the Wild and Scenic Rivers, there is a portion of the planning area’s north-east boundary that is adjacent to the Lower White Wilderness area. The project however does not contain any wilderness areas and there are no proposed activities within wilderness areas.

Inventoried Roadless Areas

Inventoried roadless areas (IRAs) possess social and ecological values and characteristics that are becoming scarce in our nation's increasingly developed landscape. Protecting air and water quality,

biodiversity and opportunities for personal renewal are highly valued qualities of roadless areas. Conserving IRAs leaves a legacy of natural areas for future generations.

The Forest Plan directs the Forest to maintain the roadless character of the Bull of the Woods, Lake, Mt. Hood Additions, Olallie, Roaring River, Salmon-Huckleberry, Twin Lakes, and Wind Creek IRA's. None of these IRAs are located within or adjacent to the project area.

3.17.2 Effects Analysis

Wild and Scenic Rivers

The project area, while near the White River Wild and Scenic River designation, is not within the designation. Since the project area and Proposed Action activities are not proposed to take place within the White River Wild and Scenic River corridor, there would be no adverse effect to the protection or enhancement to the ORVs that attributed to the river being added to the National Wild and Scenic River System.

Wilderness

No activities of any kind are proposed within the wilderness itself. Adjacent to this wilderness area there are strategic fuel and forest health activities proposed. While these areas are adjacent, activities up to the wilderness boundary are permissible under the Oregon Wilderness Act of 1984. Section 6 of the 1984 Act states:

“Congress does not intend that designation of wilderness areas in the State of Oregon lead to the creation of protective perimeters or buffer zones around each wilderness area. The fact that non-wilderness activities or uses can be seen or heard from the areas within the wilderness shall not, of itself, preclude such activities or uses up to the boundary of the wilderness area.”

Because none of the activities would take place within a wilderness area, it is unlikely that the Proposed Action would impact the wilderness area's apparent naturalness, opportunity for solitude, primitive recreation, or the area's unique features or values. A full analysis of the effects to the wilderness area is included in Section 3.12, Effects Analysis from the Proposed Action Alternative.

Any additional land that is not currently a designated or potential wilderness area was not included in an analysis for impacts to wilderness characteristics. The process for identifying and evaluating lands that may be suitable for inclusion in the National Wilderness Preservation System, and determining whether to recommend any such lands for wilderness designation is completed during the completion or revision of the Forest Plan. As such, any identification, inventory, evaluation, analysis and decision on these areas are not conducted at the project scale (36 CFR 219.7 (c) (2) (v)).

Inventoried Roadless Areas

Because there are no IRAs within or adjacent to the planning area, there would be no effects to any IRAs through implementation of the Proposed Action.

3.18 Other Required Disclosures

3.18.1 Conflicts with Plans, Policies or Other Jurisdictions

This project would not conflict with any plans or policies of other jurisdictions, including the Tribes. This project would not conflict with any other policies, regulations, or laws, including the Clean Water Act (see Section 3.6), Endangered Species Act (see Sections 3.8, 3.9, and 3.10), National Historic Preservation Act (see Section 3.14) and Clean Air Act (see Section 3.2). Other potential conflicts with plans, policies, or other jurisdictions are discussed below.

3.18.2 Floodplains (E.O. 11988) and Wetlands (E.O. 11990)

None of the proposed vegetation treatments are located within wetlands or floodplains. Frog Creek, Camas Creek and Clear Creek consist predominately of stream types that possess floodplains. These floodplains, however, are encompassed by areas designated for this project as wetlands (e.g. Camas Prairie) or as Riparian Reserves and therefore would be protected. The only activities associated with the project include use of existing system roads and temporary roads located within Riparian Reserves; however, with implementation of PDC, no measurable effect to existing wetlands or floodplains is expected.

3.18.3 Air Quality

Section 3.2, Fuels Management and section 3.3, Air Quality describe the impacts associated with pile burning on air quality. Fuel treatments would have a minimal impact on local airshed/air quality. All burning would be burned under conditions that minimize impacts to protected and sensitive areas, and would move smoke away from populated areas in the least amount of time. Currently, and in the future, all planned ignitions are and would be conducted according to the Operational Guidance for the Oregon Smoke Management Program (OSMP). The Operational Guidance contains the direction for meeting the terms of the OSMP. The Environmental Protection Agency has approved the OSMP as meeting the requirements of the Clean Air Act, as amended.

3.18.4 Consumers, Civil Rights, Minority Groups, Women, and Environmental Justice

Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, directs federal agencies to address effects accruing in a disproportionate way to minority and low income populations. No disproportionate impacts to consumers, civil rights, minority groups, and women are expected from this project. Commercial thinning work would be implemented by contracts with private businesses. Project contracting for the project's activities would use approved management direction to protect the rights of these private companies. Section 3.16 contains more information on Environmental Justice.

3.18.5 Treaty Resources and Reserved Indian Rights

No impacts on American Indian social, economic, or subsistence rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. The Confederated Tribe of Warm Springs was contacted in reference to this Proposed Action. More information on consultation with the tribes is available in Section 4.

3.18.6 Inventoried Roadless Areas and Potential Wilderness Areas

There would be no impacts to Inventoried Roadless Areas (IRA) as no treatments are proposed in any IRAs. The planning area contains a potential wilderness area within the bounds of the planning area,

however no proposed activities are proposed in this area, and none of the proposed activities would impact that area's ability to become wilderness in the future. There is an existing wilderness area adjacent to the planning area, but none of the proposed activities are within wilderness nor would they impact any wilderness characteristics. See section 3.18, Congressionally Designated Areas for more information about wilderness and other congressionally designated areas.

3.18.7 Prime Farmlands, Rangelands, and Forestlands

None of the alternatives would have an adverse impact to the productivity of farmland, rangeland, or forestland because none were identified in the project area.

3.18.8 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 planning area, use power equipment, and to utilize the logging systems. Jet fuel use for helicopter operations would also occur. Overall, the Proposed Action would not result in any unusual expenditure of fuel.

3.18.9 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.

3.18.10 Conflicts with Plans, Policies, or Other Jurisdictions

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with . . . other environmental review lands and executive orders.”

Based on information received during scoping, informal consultation meetings, and analysis in the EA, none of the alternatives under consideration would conflict with the plans or policies of other jurisdictions, including the Confederated Tribes of Warm Springs. This project would not conflict with any other policies and regulations or laws, including the Clean Water Act, Endangered Species Act, National Historic Preservation Act, and Clean Air Act. Refer to the following sections for discussions regarding these laws:

- Section 3.2 Fuels Management and Air Quality – Clean Air Act;
- Section 3.6 Water Quality – Clean Water Acts;
- Section 3.8 Fisheries and Aquatic Fauna, 3.9 Wildlife and 3.10 Botany – Endangered Species Act; and,
- Section 3.14 Cultural Resources– National Historic Preservation Act

4. Consultation and Coordination

The Forest Service consulted with the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment.

4.1 Federal, State and Local Agencies

In addition to the Forest's public mailing list of interested parties, several Federal, state and local agencies were notified of this project through the Wasco County Forest Collaborative and the Hood River Stewardship Crew. These agencies included: Natural Resources Conservation Service, Hood River Soil and Water Conservation District, Wasco County Soil and Water Conservation District, Oregon Department of Fish & Wildlife, Oregon Department of Forestry, and Hood River and Wasco Counties. The public field trip held on November 17, 2016 was coordinated with both the Wasco County Forest Collaborative and the Hood River Stew Crew. However, no representatives from government agencies attended the field trip. In addition, the Barlow District Ranger, regularly met with the Wasco County Commissioner throughout 2016 and 2017.

4.1.1 Consultation with the US Fish and Wildlife Service (USFWS)

Early involvement with U.S. Fish and Wildlife Service (USFWS) was conducted in regard to northern spotted owls, gray wolves, and Oregon spotted frogs, as well as the critical habitat for the northern spotted owl and the Oregon spotted frog. Throughout 2015-2017, Forest staff had several field trips and meetings with USFWS about the Proposed Action. The effects of this project to spotted owls, gray wolves, and spotted frogs is included in the Biological Assessment. A Biological Opinion was received from USFWS on January 19 2018. The terms and conditions and/or conservation measures are required actions for this project and have been incorporated into the Environmental Assessment and Decision Notice.

4.1.2 Consultation with the Oregon State Historic Preservation Office (SHPO)

The National Historic Preservation Act requires consideration be given to the potential effect of federal undertakings on historic resources, including historic and protohistoric cultural resource sites. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered a Programmatic Agreement (PA) with the SHPO and the Advisory Council on Historic Preservation (ACHP).

In accordance with the 2004 PA, the proposed activities of the project, including road decommissioning, temporary road construction, commercial thinning, pile burning, mastication, and non-commercial thinning, involve heavy machinery and ground disturbance and required heritage resource inventory surveys. A modified survey strategy was designed and implemented which excluded most of the intensively-treated plantations. The results, findings, and recommendations of the survey are documented in the Heritage Resources Report, which concluded there would be no adverse effects to historic and protohistoric cultural resource sites. The recommended protective measures would adequately protect the known heritage resources. The site protection measures were developed on the Forest to be consistent with the National Historic Preservation Act and adapted for use across the Forest. A letter of concurrence from the SHPO was received on October 24, 2017.

4.2 Tribes

This project is located on usual and accustomed land for the Confederated Tribes of Warm Springs (CTWS). The project is also immediately adjacent to the CTWS Reservation. The Treaty of 1855 granted the CTWS the right of “usual and accustomed” gathering of traditional native plants and “special interest” use. Based on proximity, the pre-contact history of the general project area is undoubtedly linked to that of the lower Deschutes River basin, including adjacent portions of the CTWS Reservation. The distribution of archaeological resources suggests relatively low intensity transient use of the general area throughout the pre-contact period.

The CTWS was contacted prior to scoping and throughout the planning process. A field trip to the project area with a representative from the CTWS’s cultural resources staff was held on October 23, 2017. Additionally, the Barlow District Ranger met with CTWS’s fuels staff discussing this project. To date, the CTWS or its representatives have not raised any issues with the proposed project.

4.3 List of Preparers

The following is a list of Interdisciplinary Team (IDT) members who assisted in the development of the Environmental Assessment.

Role	IDT Member
IDT Leader / NEPA	Casey Gatz
Silviculturist	Whitney Olsker
Logging Systems	Andrew Tierney
Roads Engineer	Lucas Jimenez
Soil Scientist	John Dodd
Hydrologist	Diane Hopster
Fish Biologist	Chris Rossel
Wildlife Biologist	Patty Walcott
Botanist / Invasive Species	Christina Mead
Fuels Specialist/Air Quality	Justin Sharpe/Scott MacDonald
Recreation / Visual Quality	Claire Fernandes
Heritage Resource Specialist	Mike Dryden

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