



United States  
Department of  
Agriculture

Forest  
Service

Mt. Hood National Forest

Barlow & Hood River  
Ranger District



# Crystal Clear Restoration

## Environmental Assessment

USDA Forest Service  
Barlow Ranger District &  
Hood River Ranger District  
Mt. Hood National Forest  
Wasco County, Oregon

T. 4 S., R. 8.5 E., sec. 36; T. 4 S., R. 9 E., sec. 25-29, 31-36;  
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T. 5 S., R.11 E., sec. 8, 17-20, 30; Willamette Meridian.



Crystal Clear Planning Area (Olsker, 2016)



for the greatest good

United States  
Department of  
Agriculture

Forest  
Service



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## Environmental Assessment

### Barlow & Hood River Ranger District Mt. Hood National Forest

Wasco County, Oregon

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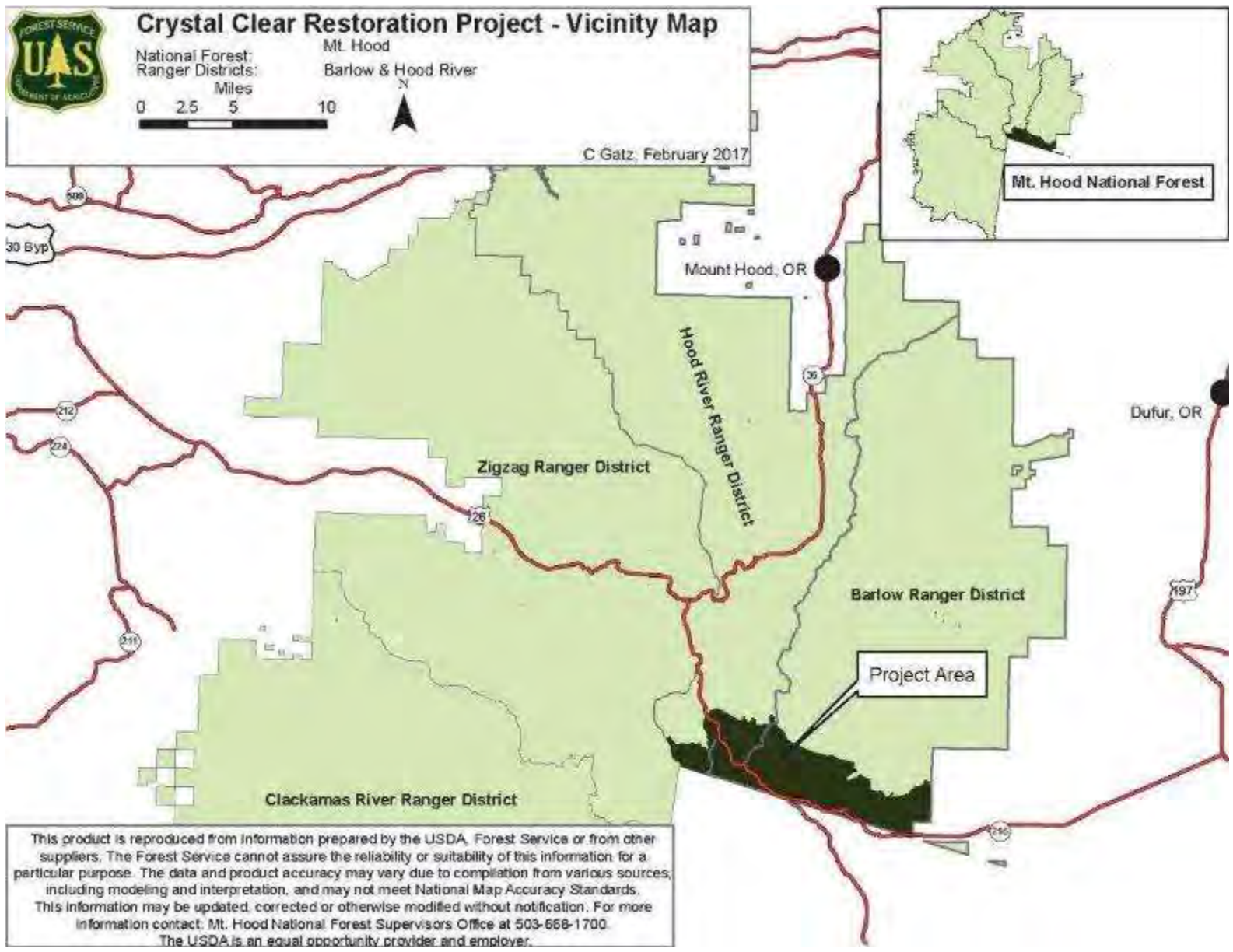


Figure 1. Vicinity Map of the Crystal Clear Restoration Planning area

# Chapter 1 – Introduction

The Crystal Clear Restoration (CCR) planning area is located on the Barlow and Hood River Ranger Districts of the Mt. Hood National Forest. The large majority of the roughly 24,000 acre planning area includes parts of the White River, White Horse Rapids-Deschutes River and Beaver Creek watersheds within the Lower Deschutes River sub-basin.

The Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. The need for action for the CCR planning area was determined by comparing the existing conditions in the project area with the desired conditions for the project area.

## 1.1 Document Structure

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

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

Additional documentation, including more detailed analyses of planning area resources, may be found in the project record located at the Barlow Ranger District Office in Dufur, Oregon.

## 1.2 Background

Land management activities since 1855 have altered the frequency, severity, and intensity of natural disturbance events and changed the probable outcomes of these events on public and private land. Over the past 100 years on the Mt. Hood National Forest, historical management activities, fire suppression efforts and favorable climatic conditions have altered vegetation growth resulting in the accumulation of dead fuel, highly dense and homogenous stand conditions throughout much of the planning area.

The high density of the stands contributes to mortality of trees because of competition for nutrients, water and sunlight. Densely stocked non-fire resistant trees, diseased trees, large scale tree mortality areas, and down fuel are creating continuous fuel ladders from the ground to the tree crowns. This has increased the risk of epidemic insect and disease-related mortality as well as the risk of uncharacteristic wildfire behavior.

The planning area is in close proximity to several landowners, including the Confederated Tribes of the Warm Springs Reservation to the south and major vehicle routes. The Warm Springs Wildland Urban Interface (WUI) shares the boundary between the Mt. Hood National Forest and the Warm Springs Reservation. This WUI was segmented into several compartments in the Wasco County Community Wildfire Protection Plan (CWPP), two of which are adjacent to the CCR planning area: Compartment 1 and Compartment 6.

Compartment 1 is located in the northwest part of the Reservation and adjacent to the westernmost portion of the CCR planning area. It is adjacent to most of the moist mixed conifer treatments. There are no communities in the compartment, but power lines cross it from east to west. Also, the compartment has year-round logging activity, hunting use, and wilderness trails that are used eight months of the year. There are traditional food areas and cultural sites. Compartment 1 was assigned an overall wildfire risk rating of “moderate” in the CWPP primarily because no people live there and it has a low fuel hazard level.

Compartment 6 is the largest compartment in the Reservation and is directly east of Compartment 1 and is adjacent to most of the dry mixed conifer treatments proposed in CCR. This compartment contains communities, individual homes, logging, high traffic volumes, campgrounds, wood cutting areas, hunting areas, and power lines. Four of the eight communities identified at risk by the Confederated Tribes of Warm Springs are partially, or completely, within the compartment. The CWPP has assigned this compartment a “high” overall wildfire risk rating based on fuel load hazards, ignition risk, and past fire history.

The Juniper Flats WUI, which is included in the eastern portion of the planning area, is made up of a rural area with scattered farms, ranches, and subdivision development. Light, flashy fuel and frequent down canyon winds often result in fast moving wildland fires. The Pine Grove community is one of the biggest concern for this WUI. This community has a high risk rating based on fire occurrence and a high density of homes. It has the second highest hazard rating of the communities in the Wasco County CWPP. This high score is justified from the type of fuel involved and the crown fire potential. Additionally, limited road access presents a unique risk for home-owners and fire fighters. The community is situated in, and adjacent to, a highly hazardous fuel situation on private and public lands.

US Highway 26 runs through the planning area, serving as a major cross-state highway. Through 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 high volume of vehicle traffic, fire risk from increased human presence and potential risk to public safety from a wildfire support the need for action adjacent to this travel corridor.

In addition to the Wasco County CWPP, in 2012 the Mt. Hood National Forest developed a Strategic Fuel Treatment Placement Plan. This was established to help guide the purpose and need for interdisciplinary projects and to create a forest landscape with a network of fuel breaks and natural openings that would promote the following:

- Increased public and firefighter safety;
- Decreased management costs;
- Increased suppression effectiveness in protecting private and federal improvements, timber and sensitive natural resources; and,
- Disturbances in unit sizes representing the natural disturbance regime.

The Strategic Fuel Treatment Plan spatially identifies areas of the forest where buffers and fuelbreaks would help meet the Plan's objectives. In order to help meet these objectives, the Plan recommends the need for a reduction in horizontal continuity of surface fuel and canopy fuel and a reduction to vertical continuity associated with ladder fuel.



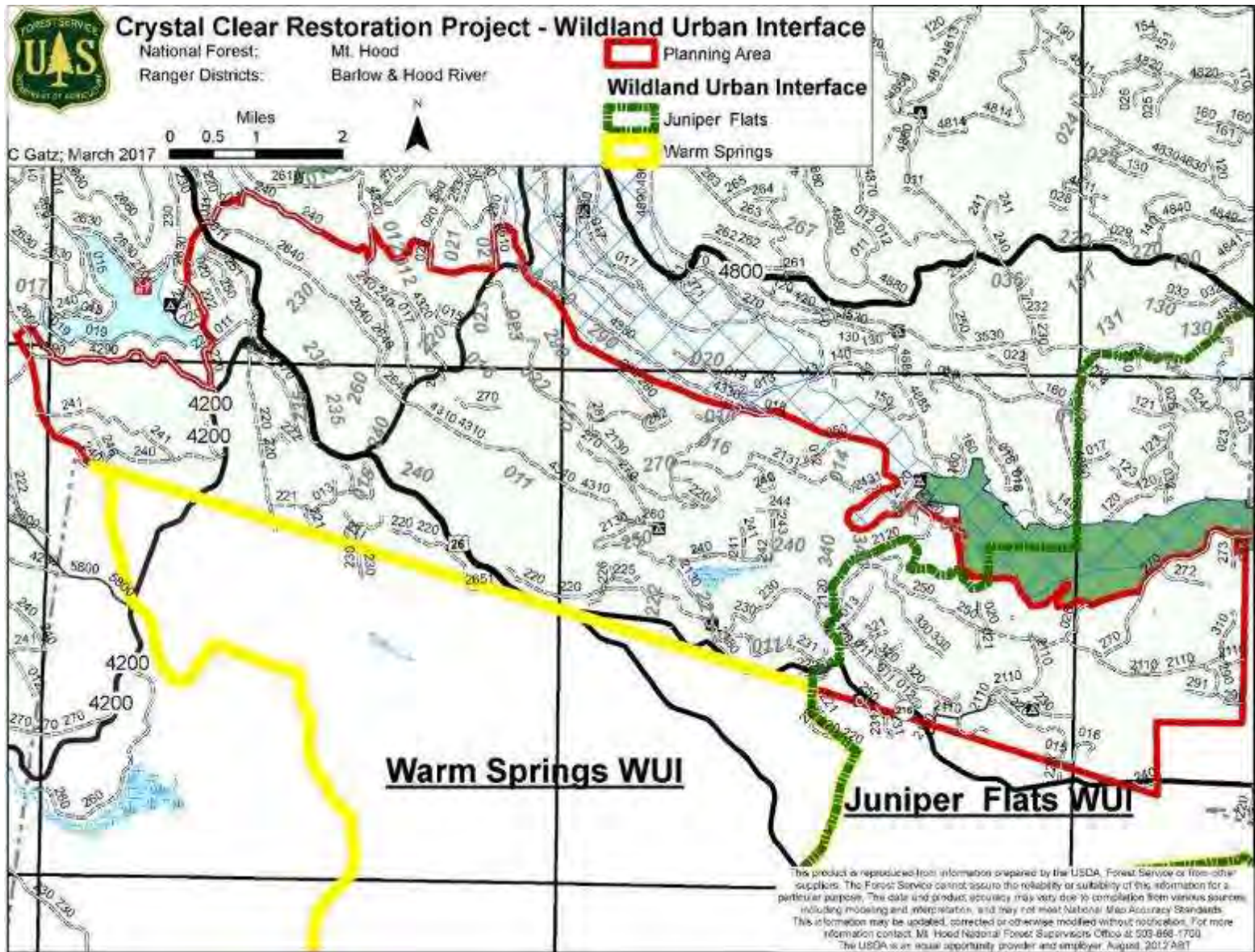


Figure 2: Map of CCR Planning Area and adjacent Wildland Urban Interfaces (WUIs)

The majority of National Forest System (NFS) lands have been mapped as Fire Regime Condition Class 2 or 3, thereby indicating they have missed one or more natural fire events and now contain unnaturally high fuel conditions and are at risk for uncharacteristic wildfires. Fire regimes are a national classification of the historic conditions for fire severity and frequency for a particular environment. Throughout the planning area, these regimes range from fire historically occurring every 0-35 years with low severity in the eastern portions of the planning area, to stand replacing wildfires occurring every 100-200 years in the higher elevation areas in the western portions of the planning area. However, over 85% of the planning area would have historically seen low to mixed severity wildfires.

### **1.3 Purpose and Need for Action**

The purpose of the Crystal Clear Restoration Project is to provide forest products where there is an opportunity to restore resiliency to forested areas and reduce the risk of uncharacteristic wildfire behavior.

The need for action for the Crystal Clear Restoration Project area was determined by comparing the existing conditions in the project area with the desired conditions for the project area as identified in the Mt. Hood National Forest Land and Resource Management Plan (Forest Plan), Strategic Fuel Treatment Plan, Wasco County Community Wildfire Protection Plan, White River Late Successional Reserve Assessment, and the White River Watershed Assessment.

The need for action in this project area, consistent with Forest Plan direction, is to promote the overall sustainability of vegetative systems. Sustainability would be enhanced by increasing the resiliency of the area to withstand severe, uncharacteristic fires, or widespread occurrence of mortality from insects and disease.

Existing plantations do not have the mix of tree species that were present historically and they are relatively uniform in terms of tree size and spacing. Sustainability also includes enhancing diversity within plantations, which would be designed to address species diversity and high density issues that are leading to forest health concerns.

Successful long-term development of a sustainable forest depends on facilitating the eventual return of characteristic fire to areas that were historically fire-dependent, and on maintaining stand conditions and fuel conditions that do not contribute to future fires with large-scale stand replacement mortality. This includes providing locations for fire suppression personnel to actively engage a fire safely in areas of high consequence infrastructure areas and the WUI, as well as reducing the impacts of human caused fires spreading to or from public access areas and adjacent landowners.

There is also a need to provide forest products consistent with the Northwest Forest Plan purpose of maintain a sustainable supply of timber and other forest products that would help maintain the stability of local and regional economies on a predictable and long-term basis.

#### **1.3.1 Management Direction**

The Crystal Clear Restoration Project is proposed to respond to goals and objectives of the Mt. Hood Land and Resource Management Plan, as amended (US Forest Service, 1990a) and the recommendations in the White River Watershed Analysis. This Environmental Assessment has been completed in accordance with direction contained in the National Forest Management Act, the National Environmental Policy Act, the Council on Environmental Quality regulations, Clean Water Act, the Endangered Species Act and other applicable laws, policies and regulations.

This Environmental Assessment is tiered to the *Mt. Hood National Forest Land and Resource Management Plan Final Environmental Impact Statement* (US Forest Service, 1990b) and Record of Decision (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. Goals, objectives and desired future conditions of the management areas within the planning area are discussed below in the description of land allocations. In addition, management direction for the area is provided in three major Forest Plan amendments:

- The Northwest Forest Plan (NWFP) - *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (1994);
- Survey and Manage – *Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines* (2001); and,
- Invasive Plants– *Pacific Northwest Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision* (2005).

Additionally, this Environmental Assessment considers and incorporates, as appropriate, the recommendations of the Strategic Fuel Treatment Plan, Wasco County Community Wildfire Protection Plan, White River Late Successional Reserve Assessment, and the White River Watershed Assessment. The NWFP Record of Decision (ROD) requires a watershed analysis for all Key Watersheds prior to resource management (page C-3). Watershed analysis is a systematic procedure to characterize the aquatic, riparian, and terrestrial features within a watershed. The information is used to refine riparian reserves boundaries, prescribe land management activities, including watershed restoration and develop monitoring programs (NWFP ROD page 10).

The Mt. Hood Strategic Fuel Treatment Plan spatially identified areas where fuel treatments could be most effective, and were the foundation for the Strategic Fuel Treatments in both dry and moist mixed conifer stands in the planning area. This plan identified areas that would protect high value resources and create fuelbreaks on roads and ridges to:

- Create opportunities for safe and effective fire suppression;
- Add depth to private land boundaries;
- Compartmentalize the landscape into blocks that are spatially representative of natural disturbances;
- Facilitate indirect fire suppression and reduce wildfire costs; and,
- Facilitate landscape restoration that adds depth to fuelbreaks by using fire and other vegetative treatments.

The White River Watershed Assessment provided recommendations in Chapter 6 of that assessment which is included in the project record and located on the CCR project website. These recommendations include a suite of desired conditions for multiple resource objectives. The areas where the purpose and need for the planning area and the recommendations aligned include items such as:

- Size, quantity and potential for downed wood after treatments;
- Protect old growth in the Crest Zone from a stand-replacing wildfire;
- Manage for ponderosa pine/Douglas-fir dominated in the Transition zone (dry mixed conifer) areas of the White River Late Successional Reserve; and
- A regular program of underburning should occur in... Transition zones;

### **1.3.2 Desired Future Conditions**

The desired future conditions for the stands would be to move them towards a more properly functioning plant community as defined by watershed assessment plan, forest plant association guides, and white river late successional reserve plan. By moving stands towards the desired future condition, they would become or maintain a multi-storied uneven-aged stands in the moist mixed conifer communities. Within the dry mix conifer stands would be moved towards a more open two-storied stands. Achieving this desired future condition would enable meeting the overall goals of the land allocations within the planning area.

After treatment, the planning area would become more resilient to perturbations such as insect attack and large scale fire occurrence; this means reductions in total stand density. In the dry mix conifer stands a stand structure that allows the efficient reintroduction of natural fire is desired and that in the long term natural fire starts can resume their normal processes and be easily managed. Within areas in the WUI and areas identified by the strategic fuel treatment placement plan, the desired future condition is to develop uneven-aged stands with canopy closure that would allow fire behavior to change from crown fire to surface fire, and to have stand species composition reflecting a Condition Class 1, low departure from the central tendency of the natural (historical) regime. Achieving this desired future condition would assist in meeting the overall goals of the LUAs and the CWPP within the planning area

The desired future condition of the project areas is a multi-layer canopy with large diameter trees, well-developed understory, more than one age class, and snags and down woody debris, as well as canopy closure and stand species composition reflecting Condition Class 1. Figure 3 and Figure 4 below illustrate the existing conditions and desired future conditions for the vegetation treatments throughout the planning area



Existing Dry Mixed Conifer Condition



Desired Dry Mixed Conifer Condition







Figure 3: Example existing vs desired future conditions for dry mixed conifer sites in the CCR planning area



**Existing Moist Mixed Conifer Condition**



**Desired Moist Mixed Conifer Condition**





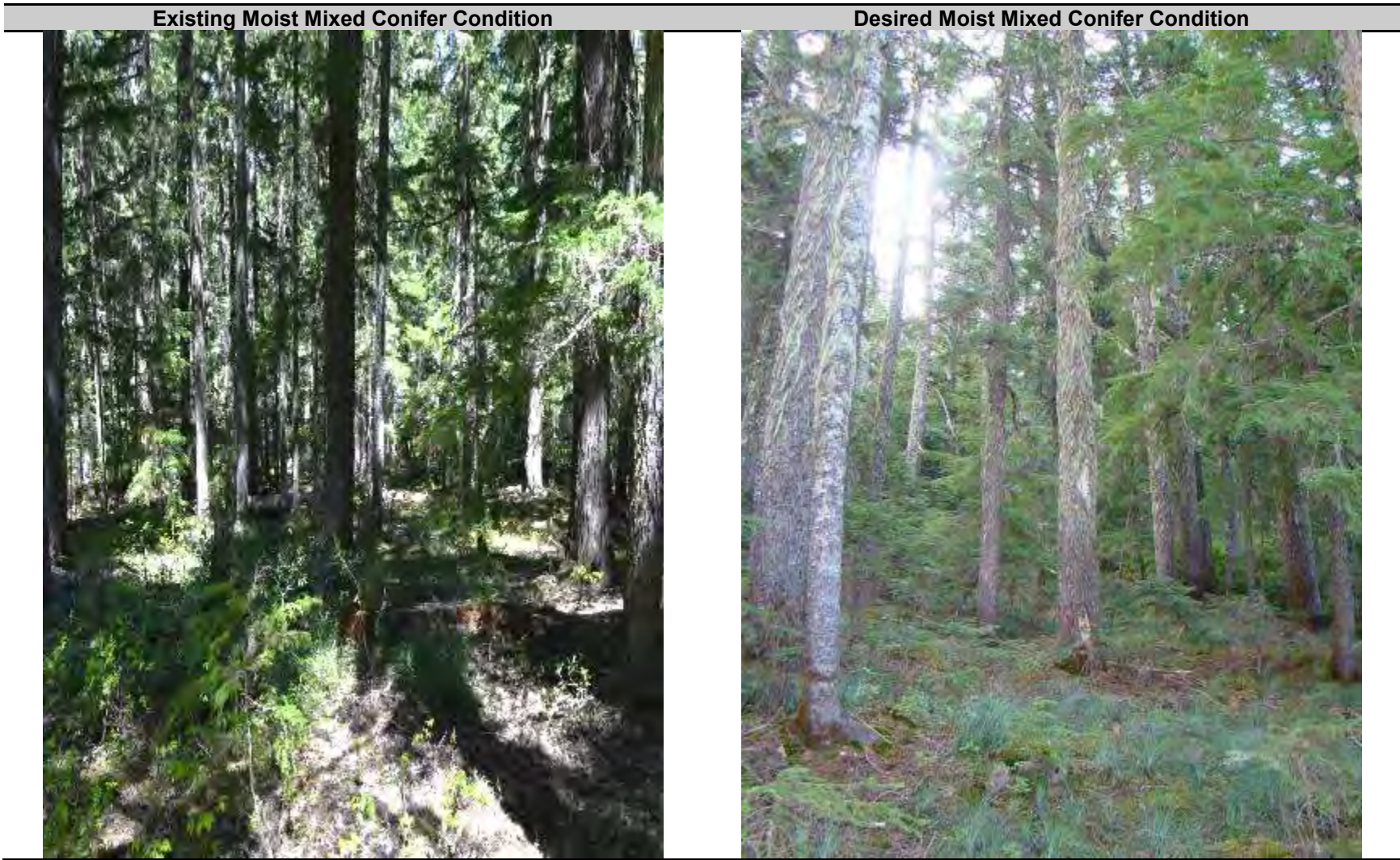


Figure 4: Example existing vs desired future conditions for moist mixed conifer sites in the CCR planning area



### 1.3.3 Planning Framework

#### Northwest Forest Plan

In addition to management direction found in the LRMP, the project area is managed under the Northwest Forest Plan (NWFP). The NWFP amended the LRMP in 1994. The planning area includes Riparian Reserve (11%), Late Successional Reserve (12%), and the majority of the area (77%) is Matrix (see Table 1 below). Most of the treatments would be located in Matrix (96%) and 4% of the treatments are proposed in the Late Successional Reserve. The Late Successional Reserve (LSR), in combination with other allocations and standards and guidelines, are to maintain a functional, interactive, late-successional and old-growth forest ecosystem.

**Table 1. Northwest Forest Plan Land Use Allocations in the CCR Planning Area**

<b>Land Use Allocation</b>	<b>Acres of Planning Area (Percent)</b>	<b>Acres of Treatment Area (Percent)</b>
Matrix	18,386 (77%)	12,271 (96%)
Late Successional Reserve	2,837 (12%)	453 (4%)
Riparian Reserves	2,769 (11%)	0 (0%)
Administratively Withdrawn	18 (0.07%)	0 (0%)

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).

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).

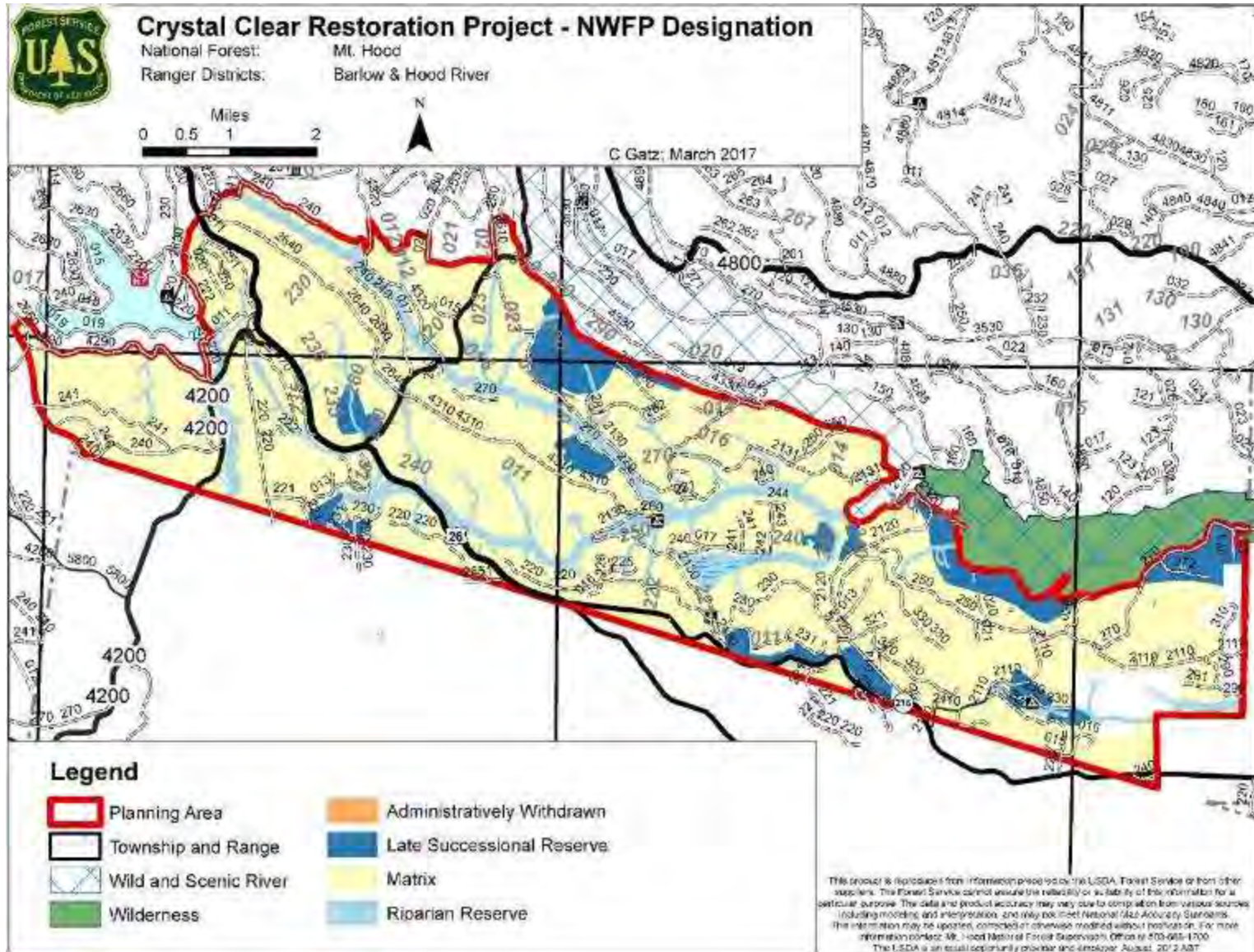


Figure 5. NWFP Land Designations within the Crystal Clear Restoration Planning area

## Mt. Hood National Forest Land and Resource Management Plan

This environmental assessment is tiered to the Final Environmental Impact Statement (FEIS) for the Mt. Hood National Forest Land and Resource Management Plan (LRMP). The Record of Decision (ROD) was signed in 1990. The LRMP was amended by the Northwest Forest Plan in 1994.

The LRMP, as amended, guides all natural resource management activities and provides standards and guidelines for the Mt. Hood National Forest. The goals for each land allocation are given below

Several land allocations for NFS lands as designated by the LRMP are found within the planning area (see Table 2 below). The four primary Forest Plan land allocations in the planning area are Key Site Riparian Area (A9), Scenic Viewshed (B2), Deer Winter Range (B10), and Timber Emphasis (C1). An overlapping secondary land use allocation in the planning area, Pileated Woodpecker/Pine Marten Habitat Area (B5), occurs on approximately 341 (3%) of the acres proposed for treatment. Where applicable, the more stringent standards and guidelines would be applied where land use allocations overlap.

**Table 2. Forest Plan Land Use Allocations in the CCR Planning Area**

Land Use Allocation	Acres of Planning Area (Percent)	Acres of Treatment Area (Percent)
A7-Special Old Growth	22 (0.09%)	0 (0%)
A9-Key Site Riparian Area	414 (2%)	0 (0%)
B1-Wild & Scenic River Corridor	65 (0.2%)	0 (0%)
B2-Scenic Viewshed	9,388 (39%)	4,814 (38%)
B10-Deer Winter Range	3,307 (14%)	2,161 (16%)
C1-Timber Emphasis	10,814 (45%)	5,749 (45%)
B5-Pileated Woodpecker/Pine Marten*	1,568 (6%)	341 (3%)

*\*The B5 areas are inclusions within other land use allocations. Management Area prescriptions for A9 predominate over the B5 prescription, A7 prescriptions are applied jointly with B5, and with the exception of visual quality objectives, B5 prescriptions predominate over B1, B2, B10 and C1.*

The main land use allocation of the planning area (approximately 45% of the planning area and treatment area) is within Timber Emphasis (C1) 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. 4-289 to 4-290).

Approximately 39% of the planning area and 38% of the treatment area is within the Scenic Viewshed (B2) land use allocation, as described by the Forest Plan on pages 4-218 to 4-220. 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.

The Deer Winter Range (B10) land use allocation accounts for approximately 14% of the planning area and 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.

Pileated Woodpecker/Pine Marten Habitat Area (B5) is a secondary land use allocation that overlaps the three primary land use allocations. For the proposed treatment areas, approximately 187 acres of B5

overlap with the Scenic Viewshed land use allocation, and approximately 154 acres of B5 overlap with Timber Emphasis land use allocation. The Goal of this land use allocation it to provide mature or old growth habitat blocks of sufficient quality, quantity and distribution to sustain viable populations of pileated woodpecker. A secondary goal is to maintain a healthy forest condition through a variety of timber management practices.



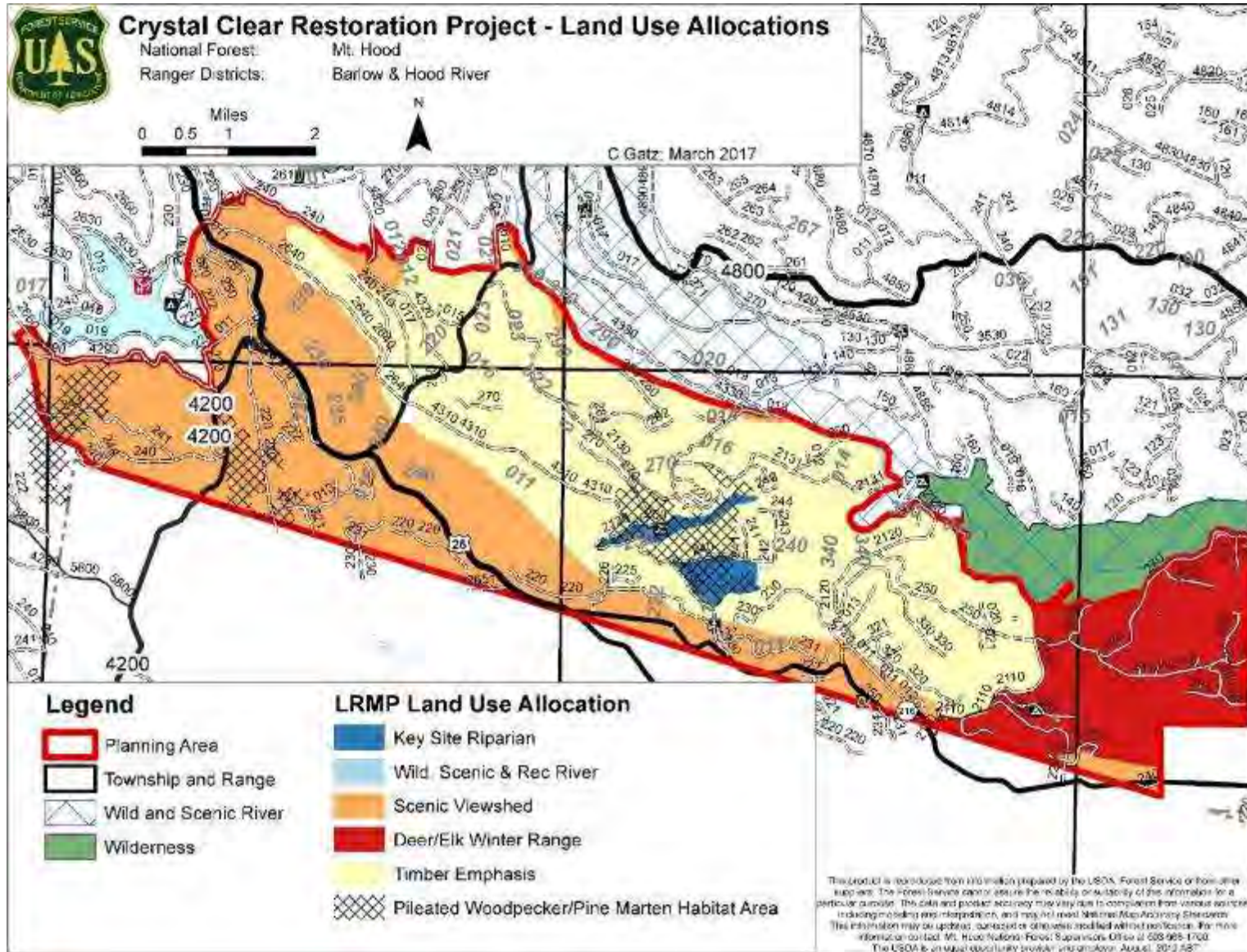


Figure 6: LRMP Land Use Allocations within the Crystal Clear Restoration Planning area

## 1.4 Proposed Action

In order to restore resilience and reduce the risk of uncharacteristic wildfire within the planning area, the proposed action would include thinning unmanaged stands and plantations of varying ages. All thinning activities proposed in this project would apply variable density thinning (VDT), which allows for flexible local density levels to achieve overall treatment objectives. Also, variable density thinning allows for an emphasis to be placed on leaving vigorous trees of all sizes without concern for spacing. Proposed treatment types would occur in either dry or moist mix 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 Plan.

The project includes utilizing system and temporary roads to facilitate implementation. In many cases, temporary roads are located on roads that were closed or decommissioned through a previous planning effort, but never effectively physically closed.

The Mt. Hood Strategic Fuel Treatment Plan spatially identified areas where fuel treatments could be most effective, and were the foundation for the Strategic Fuel Treatments in both dry and moist mixed conifer stands in the planning area. This plan identified areas that would protect high value resources and create fuelbreaks on roads and ridges to:

- Create opportunities for safe and effective fire suppression;
- Add depth to private land boundaries;
- Compartmentalize the landscape into blocks that are spatially representative of natural disturbances;
- Facilitate indirect fire suppression and reduce wildfire costs; and,
- Facilitate landscape restoration that adds depth to fuelbreaks by using fire and other vegetative treatments.

The proposed action also includes various fuel treatments that would be applied when all thinning activities have been completed. This is expected to occur within five years of mechanized treatments. Post-activity assessments would be completed to determine specifically when and where prescribed fire would be applied.

Utilizing the recommendations of the Strategic Fuel Treatment Plan, the proposed action includes four different treatment types:

- 1) Strategic Fuel Treatment in Dry Mixed Conifer
- 2) Forest Health Treatment in Dry Mixed Conifer
- 3) Strategic Fuel Treatment in Moist Mixed Conifer
- 4) Forest Health Treatment in Moist Mixed Conifer

The proposed fuel treatments are further described in Chapter 2 and outline both the vegetative treatments proposed in these areas and the corresponding follow-up fuel treatments that would accompany and help accomplish the overall goals of the proposed action. A map of the proposed action is also included in this letter.

## 1.5 Decision Framework

Based on the interdisciplinary analysis presented in the final Environmental Assessment and the project record, the Forest Supervisor will decide whether or not to authorize the implementation of vegetation treatments and fuel reduction activities to provide forest products where there is an opportunity to restore resiliency to forested areas and reduce the risk of uncharacteristic wildfire behavior on National Forest System (NFS) lands; and what project design criteria/mitigation measures are needed. The responsible

official can decide on several courses of action ranging from no action, to one of the action alternatives or a combination of treatments. The responsible official will also determine whether Forest Plan amendments are necessary and will identify which mitigation measures will apply to project implementation.

The responsible official will consider the following factors in making his decision:

1. How well the alternative meets the project purpose and need for action
2. How well does the alternative respond to the key issue(s); and have public comments been considered in the analysis?
3. What are the likely environmental effects of the proposed actions, and in particular, the short and long-term effects to habitat of federally-listed threatened and endangered species?

## **1.6 Public Involvement**

### **1.6.1 Scoping/Public Involvement**

Crystal Clear Restoration was listed in the Mt. Hood National Forest quarterly planning newsletter (Schedule of Proposed Action [SOPA]) beginning in January 2017. The project also listed on the Mt. Hood National Forest website beginning in October 2016:

<http://www.fs.usda.gov/projects/mthood/landmanagement/projects>

On September 1, 2016 Barlow District Ranger Kameron Sam made a presentation to the Wasco County Forest Collaborative with general project information for the CCR Planning 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 was mailed to provide the public an opportunity to visit the planning area before there was snow on the ground when the scoping letter was planned to be mailed during the winter of 2017. In addition to this pre-scoping letter, a public field trip was scheduled on November 17, 2016 and coordinated with both the Wasco County Forest Collaborative group and the Hood River Stew Crew, a collaborative group on the Hood River Ranger District. Zero members of the public attended the field trip. From the pre-scoping efforts, approximately 4 comments were received. These 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.

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 projects website.

In addition to these scoping efforts, the Forest Service participated in government-to-government consultation as detailed in Chapter 4.

### **1.6.2 Project Record**

This environmental assessment hereby incorporates by reference the Project Record (40 CFR 1502.21). The project record contains the Specialists Reports and other technical documentation used to support the analysis and conclusions in this environmental assessment. A summary of the Specialists reports in adequate detail to support the decision rationale and appendices provide supporting documentation for the effects analysis are contained in this environmental assessment.

Incorporating these Specialists Reports and the project record implement the Council on Environmental Quality (CEQ) Regulations that agencies should reduce NEPA paperwork (40 CFR 1500.4), that the document shall be “analytic rather than encyclopedic,” and that the document “shall be kept concise and no longer than absolutely necessary” (40 CFR 1502.0). The objective is to furnish adequate site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated without repeating detailed analysis and background information available elsewhere. The Project Record is available for review at the Barlow District office, 780 NE Court Street, Dufur, Oregon, Monday through Friday 8:30 a.m. to 4:30 p.m.

### **1.6.3 Objection Process (218 Objection Regulations)**

Section 428 of The Consolidated Appropriations Act of 2012 included a provision establishing a pre-decisional objection process (36 CFR 218) for projects and activities implementing land management plans in lieu of the post-decisional appeal process (36 CFR 215) used by the agency since 1993. Since this project is a non-fuels reduction act project it is subject to the Project-Level Pre-decisional Administrative Review Process (Objection process) as identified in 36 CFR 218, Subparts A and B.

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

Individuals and entities (non-governmental organizations, businesses, partnerships, state and local governments, Alaska Native Corporations, and Indian Tribes) who submit timely, specific written comments regarding a proposed project or activity during any designated opportunity for public comment may file an objection. Opportunity for public comment on this project included scoping and the 30 day public review period.

Written comments are those submitted to the Responsible Official or designee during a designated opportunity for public participation provided for a proposed project. Specific written comments should be within the scope of the Proposed Action, have a direct relationship to the Proposed Action, and must include supporting reasons for the responsible official to consider.

## **1.7 Issues**

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. See Section 2.5, Alternatives Considered, but Eliminated from Detailed Study for further information.



Several concerns and specific recommendations were raised during the scoping which were specifically addressed in modifications to the Proposed Action, changes to the project design criteria/mitigation measures (PDC) and environmental analysis. Some of the issues and concerns related to this project include but are not limited to the following discussions:

### **1.7.1 Use of Temporary Roads**

Some comments received stated concerns about using temporary roads or reopening old road alignments where vegetation had begun to reestablish for access to the treatment areas. The concern is that temporary road construction would introduce sediment to streams, impairing water quality and aquatic resources.

*The Proposed Action would re-open approximately 19 miles of existing temporary or decommissioned roads, utilize 14.5 miles of previously open roads that were designated as OHV trails, and would construct approximately 5.5 miles of new temporary roads. Where feasible, proposed temporary roads would re-trace the alignment of older overgrown or decommissioned roads. Under the Proposed Action temporary roads could be reopened with minimal earth movement, without side casting material and would be rehabilitated after project completion. Implementation of the CCR Proposed Action, should overall improve drainage and reduce sediment delivery on these temporary roads on converted trails relative to the existing condition. Of the approximately 20 miles of old existing temporary roads that would be reopened and 14 miles of converted trails, approximately 1.9 miles are located within Riparian Reserves. None of the new temporary road construction would be within Riparian Reserves.*

*The 1.9 miles of temporary road proposed to be reopened represents 16 different incursions into Riparian Reserves, six of which are on existing disturbance and 10 of which are previous roads converted to trail. Field surveys could not identify the wetland identified by the National Wetland Inventory System for two of the converted trail temporary road incursions into Riparian Reserves; however, a Riparian Reserve was still generated. No new stream crossings would need to be constructed for this project. For a full analysis of the effects to water quality from temporary road construction, please see Section 3.6.3.*

*To minimize sediment delivery to streams, PDCs include scheduling soil disturbing road maintenance activities to occur during the dry season (#27). Most road maintenance-related sediment would be trapped and stored in the ditches or on the forest floor below cross drains. 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. Any sediment delivered to streams during these activities would be minimal, short-term duration, and undetectable at a sub-watershed (6th field) or watershed (5th field) scale. The probability of any degradation to water quality or fisheries resources caused by sedimentation due to road construction, reconstruction and maintenance is extremely low.*

### **1.7.2 Open Road System**

Several commenters were concerned about the road system within the planning area and proposed several roads to close as a part of the planning effort to meet Forest Plan standards and reduce the potential impact to wildlife. Some of the suggestions included: FSR 2610-020; 4310-260; 4310-261; 2120-013; 2120-330; 2120-017; 2120-370; 2110-280; 2110-021; 2110-020; and the end of FSR 2110, 2110-270; 2110-272; 2110-220; 2130-281; 4885-150; and 4885-155.

*During the development of the Proposed Action, the Interdisciplinary Team reviewed the NFS Road System within the planning area, as well as the Travel Analysis Report (TAR) completed in 2015. Each road was reviewed for its current on-the-ground status, the NEPA status of the road (if there is a previous decision to close a road), the needs for the road related to CCR, and the potential need for the road into the future. All but two of the roads (2130281, 2110220) that were identified by members of the public for closure were outside of the planning area, or have previous NEPA decisions to close or be converted to a trail, however the implementation of many of these actions has not been completed.*

*As a part of the implementation of the Proposed Action, any roads that have a previous decision to close (implemented or not) that may be used for CCR related activities are listed as temporary roads. Similar to all temporary roads, previous system roads that have decisions to close and will be used for CCR, will be effectively closed as a component of the Proposed Action. By implementing this project, roads that are not used for CCR related activities, but also have previous NEPA to close, may be able to use retained receipts and KV funds generated from CCR to effectively implement the road closures proposed in CCR or those from previous decisions. Because of this, it is anticipated that this planning effort will effectively close most, if not all, of the roads that have past decisions to close, were recommended as likely not needed in the TAR, and are proposed for closure as a part of this Proposed Action.*

*Because the Proposed Action for the Crystal Clear Restoration Project would close additional miles of road, and implement past road closure decisions, the effective open road density within the planning area will be further reduced from their current condition. The likelihood of additional impacts occurring to water quality would be further reduced as outlined in the effects analysis are included in Section 3.6 of this EA.*

### **1.7.3 Impacts to Northern Spotted Owl**

Comments were received expressing concern about the impacts of the project to Northern Spotted Owls and their Critical Habitat that is within and adjacent to the planning area.

*Spotted owl surveys are being conducted in the project area to determine if these sights are currently occupied. Surveys began in 2016 and will continue until 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*

*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 significant moisture stress and increased all trees' susceptibility to insect, disease, drought, and fire-related mortality. The only habitat that would have existed in the eastern portion historically would have been in the moist areas, typically north aspects along perennial streams, and in riparian zones of larger streams.*

*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 will further reduce habitat for owl pairs 4 (32 acres) and 7 (144) 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.*

*Some habitat would be treated but the function of that habitat would be maintained after treatments. Treatments that maintain habitat include 1,253 acres of dispersal and 236 acres of suitable habitat. Treatments that maintain suitable and dispersal habitat impact these stands by reducing the canopy cover, and by reducing shrubs and other components that provide habitat for prey species. Although habitat within these units would be reduced in quality, it would still function as the same habitat as before treatment.*

*Treatment activities that remove dispersal habitat on 895 acres are **not likely to adversely affect** spotted owl. The analysis area currently has approximately 8,930 acres of dispersal only habitat. When combined with the amount of suitable that will also provide for dispersal (19,072 acres), 55 percent of the analysis area is currently providing dispersal habitat. This amount will 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.*

*Fuels reduction is expected to have both negative and beneficial effects to spotted owl prey species. Some small mammals may be directly impacted due to smoke or the inability to escape. Other small mammals may not be affected if they are mobile, protected within large downed coarse wood, or able to move away from the fire or mastication activities. However, there may be long-term benefits from a low intensity burn or mastication that is expected to increase plant vigor and prey species forage production. 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 will not change the overall function of the habitat after treatment.*

*The proposed project would create 4.0 miles (7.3 acres) of new temporary roads in suitable habitat. 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.*

*Within Critical Habitat, the proposed thinning treatments would impact the physical and biological features (PBFs) at the stand scale. 895 acres of dispersal only habitat (PBF 4) would be removed in treatment units. These 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 (901 acres) would be downgraded to dispersal. These treatments would reduce the PDCs 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.*

*Some habitat would be treated but the function of that habitat would be maintained. This includes 236 acres of PBF 2 and PBF 3, and 1,253 acres of PBF 4. Although the habitat within these units would be temporarily reduced in quality, these treatments would accelerate the development of the PBFs in these stands by reduced competition and an increase in the growth of trees and shrubs.*

*Treatments on 969 acres of non-habitat are within plantations where tree growth has slowed. Thinning these stands would increase the rate at which larger trees would be recruited, and in turn, increasing the rate that PBFs 2 through 4 would be attained.*

*Because PBF 4 would be removed on 895 acres, and PBFs 2 and 3 would be downgraded on 901 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 foraging habitat (PBF 3). Treatments may impact vegetation structure and prey species distributions by reducing prey hiding cover in treatment units and/or moving prey into adjacent stands where the density may be higher than normal. However, there may be long-term benefits from a low intensity burn or mastication that is expected to increase plant vigor and prey species forage production.*

*The proposed project would create 4.0 miles (7.3 acres) of new temporary roads, all of which are 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 PBF 2 could be removed, temporary road construction **may affect, and is likely to adversely affect** spotted owl critical habitat.*

#### **1.7.4 Impacts to Pine Marten**

Several comments were received requesting protection measures for pine marten. 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 Pine Marten areas.

*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.*

*Of the 1,568 acres of B5-Pine Marten Habitat Area in the CCR planning area, only approximately 3.7 acres are proposed to have canopy cover below the 40% suggested by Oregon Department of Fish and Wildlife. Additionally, only 341 acres within B5 are proposed for treatment. Of these, the required Forest Plan Standard of at least 160 acres of mature or old growth forest within each 320 acre management unit would be maintained and treatments in 233 acres within B5 would maintain a canopy cover of 50 percent within 10 years after treatments.*

*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. Snags would only be felled for safety reasons. Fuels treatments that target small diameter down wood are not anticipated to remove a substantial amount of large down wood.*

## Chapter 2– Alternatives

This chapter describes the alternatives and how they were formulated for the Crystal Clear Restoration Project. This chapter 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 fuel or forest health treatments, follow-up underburning, or other associated actions would be implemented to accomplish project goals.

Stands would continue to have accumulation of dead fuel, highly dense and homogenous stand conditions throughout much of the planning area. Defensible space adjacent to private lands would remain overstocked and would not meet the objectives and goals of the CWPP or the Strategic Fuels Treatment Placement Plan.

The No Action Alternative would not maintain, implement past decisions, repair or close any NFS 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. No action would mean that current minimal road maintenance would occur, and no road reconstruction would occur. Lack of road maintenance 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, 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

In order to restore resilience and reduce the risk of uncharacteristic wildfire within the planning area, the proposed action would include thinning unmanaged stands and plantations of varying ages on approximately 12,725 acres. All thinning activities proposed in this project would apply variable density thinning (VDT) from below, which allows for flexible local density levels to achieve overall treatment objectives. Also, variable density thinning allows for an emphasis to be placed on leaving vigorous trees of all sizes without concern for spacing. Proposed treatment types would occur in either dry or moist mix 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 Plan.

The project includes utilizing system and temporary roads to facilitate implementation. In many cases, temporary roads are located on roads that were closed or decommissioned through a previous planning effort, but never effectively physically closed. In addition to effectively closing many previously closed roads, this alternative proposes to close additional existing open system roads.

#### 2.2.1 Vegetation Treatments

All thinning activities proposed in this project would apply variable density thinning, which allows for flexible local density levels to achieve overall treatment objectives. Also, variable density thinning allows for an emphasis to be placed on leaving vigorous trees of all sizes without concern for spacing. Proposed

treatment types would occur in either dry or moist mix 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 Plan. Existing stand conditions for the planning area include three different types, sapling units, plantations, and non-plantations.

The proposed action also includes various fuel treatments that would be applied when all thinning activities have been completed. This is expected to occur within five years of mechanized treatments.

Utilizing the recommendations of the Strategic Fuel Treatment Plan, the proposed action includes four different treatment types:

- 1) Strategic Fuel Treatment in Dry Mixed Conifer
- 2) Forest Health Treatment in Dry Mixed Conifer
- 3) Strategic Fuel Treatment in Moist Mixed Conifer
- 4) Forest Health Treatment in Moist Mixed Conifer

The Strategic Fuel Plan spatially identified areas where fuel treatments could be most effective, and were the foundation for the Strategic Fuel Treatments in both dry and moist mixed conifer stands in the planning area. This plan identified areas that would protect high value resources and create fuelbreaks on roads and ridges to:

- Create opportunities for safe and effective fire suppression;
- Add depth to private land boundaries;
- Compartmentalize the landscape into blocks that are spatially representative of natural disturbances;
- Facilitate indirect fire suppression and reduce wildfire costs; and,
- Facilitate landscape restoration that adds depth to fuelbreaks by using fire and other vegetative treatments.

Within each of the four vegetative treatments, there are three existing vegetative stand conditions grounded in past activities that help drive the variability within the four proposed action treatment types summarized above and explained in detail below. These were identified and included to provide a clearer example of the existing conditions on the ground and the changes from the existing condition to the desired future condition that would be achieved through implementation of the proposed action.

### ***Variable Density Thinning***

Thinning activities proposed in this project would apply variable density thinning in both plantations and non-plantations, which allows flexible local densities levels to achieve overall treatment objectives. This allows emphasis to be placed on leaving vigorous trees of all sizes without concern for 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 treatments in dry mixed conifer stands, the historical conditions and fuel types dictate a delay the time at which the stand reaches the stem exclusion stage, a heavy VDT would be prescribed (wide leave tree spacing). In other areas, the objective would be to have stands reach the stem exclusion stage sooner and they would have moderate or light VDT. Leave trees would include minor species and would include trees with the elements of wood decay. Minor tree species are those species which would be expected to be present within a stand but which make up a relatively small number of the total trees. The minor tree species vary within each unit based on plant associations. See Section 3.1, Vegetation Resources 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, and

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 dry mixed conifer forest types, skips and gaps would be included only in the existing plantations and would not exceed two acres and would maintain a minimum of 30% canopy cover. In moist mixed conifer forest types, no gaps would be placed in plantations under 20 years old. Plantations over 20 years old gap sizes would not exceed two acres and would maintain a minimum of 30% canopy cover. Gaps in non-plantations, would be no more than 2 acres and would also maintain a minimum of 30% canopy cover.

### ***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. Treatments 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 to promote and develop more resilient stand conditions. 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 be a variable density thin from below treatment in existing even-aged managed units 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 towards a more late seral like structure with a large tree component that is currently absent in the majority of these stands. Late seral stands have their main canopy dominated by older, large trees; canopy closure variable; 2-3 canopy layers distinguishable; mortality both scattered and clumped and in higher proportion of stand than other stages. 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 are areas are those units that are not sapling areas or existing plantations. These 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, 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 in the vicinity, their condition has been altered from its natural state. This could include fuel loading above what historical conditions may have been, larger scale insect and disease outbreaks, higher densities of trees per acre, etc.

While these stands may have been treated recently, the current conditions do not meet the purpose and need of CCR and would need additional treatments to move them towards the desired conditions described in CCR.



These areas may have also had past vegetation manipulation, but are no longer actively managed 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 (5,133 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 ft<sup>2</sup> basal area. The desired basal area would be accomplished throughout the stand, providing for opportunities to have VDT across the stand, achieving multiple resource goals across the project area. The overall desire for these treatments would be to move the stands towards a properly functioning late-successional system, with fire as the primary disturbance with 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 3. Existing and Desired Future Conditions for Strategic Fuel Treatments in Dry Mixed Conifer Stands**

Existing Stand Condition	Acres	Existing Basal Area (ft <sup>2</sup> /ac)	Desired Average Basal Area (ft <sup>2</sup> /ac)	Existing Canopy Cover (%)	Desired Average Canopy Cover (%)	Existing Trees Per Acre	Desired Average Trees Per Acre
Sapling Thinning	1,519	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	2,400	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 goal for the area is to reduce the fuel loadings and modify the fuel profiles of the planning area 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 an initial thinning 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, underburning, jackpot burning, lop and scattering (where fuel loading was below the 10 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 (1,664 acres)

### Vegetation Thinning

Forest health treatments for sapling/commercial thinning and fuel reduction activities would be similar to the strategic fuel treatment areas. However, in these areas the desired densities range from 60-120 ft<sup>2</sup> basal area, higher average canopy cover, more frequent areas with little to no treatment, and treatments to meet other resource concerns.

**Table 4. Existing and Desired Future Conditions for Forest Treatments in Dry Mixed Conifer Stands**

Existing Stand Condition	Acres	Existing Basal Area (ft <sup>2</sup> /ac)	Desired Average Basal Area (ft <sup>2</sup> /ac)	Existing Canopy Cover (%)	Desired Average Canopy Cover (%)	Existing Trees Per Acre	Desired Average Trees Per Acre
Sapling Thinning	748	NA	NA	NA	40	200-450	60-120
Plantation Thinning	413	47-284	60-120	20-70	40	353-1261	NA
Non-Plantation Thinning	503	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

Fuel treatments would still occur in these stands to help forest vegetation remain resilient to uncharacteristic insect, disease and wildfire outbreaks. 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 (3,720 acres)

### Vegetation Thinning

Within moist mixed conifer areas that were identified as needed for strategic fuel treatment in the Strategic Fuel Treatment Plan, the desired densities would range from 80-150 ft<sup>2</sup> basal area. The desired basal area would be accomplished throughout the stand, providing for opportunities to have VDT across the stand, thereby achieving goals throughout the project area. The overall desire for these treatments would be to move the stands towards a properly functioning late-successional 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 and meet the purpose and need of the planning area.

**Table 5. Existing and Desired Future Conditions for Strategic Fuel Treatments in Moist Mixed Conifer Stands**

Existing Stand Condition	Acres	Existing Basal Area (ft <sup>2</sup> /ac)	Desired Average Basal Area (ft <sup>2</sup> /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	1,014	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 of the planning area. 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 of the planning.

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 (2,207 acres)

#### Vegetation Thinning

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 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 ft<sup>2</sup> basal area. The desired basal area would be accomplished throughout the stand, providing for opportunities to have VDT across the stand, thereby achieving goals across the project area. The overall desire for these treatments would be to move the stands towards a properly functioning late-successional that would be more resilient to large scale disturbance.

Sapling thinning would occur to promote and develop more resilient stands conditions.

**Table 6. Existing and Desired Future Conditions for Forest Health Treatments in Moist Mixed Conifer Stands**

Existing Stand Condition	Acres	Existing Basal Area (ft <sup>2</sup> /ac)	Desired Average Basal Area (ft <sup>2</sup> /ac)	Existing Canopy Cover (%)	Desired Average Canopy Cover (%)	Existing Trees Per Acre	Desired Average Trees Per Acre
Sapling Thinning	729	NA	NA	NA	NA	250-450	120-250
Plantation Thinning	974	54-283	100-200	30-70	60	250-4,371	NA
Non-Plantation Thinning	505	107-312	100-200	40-90	60	451-2459	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 would be similar to those in the strategic fuel treatment areas, but would allow for higher average densities of surface fuel to remain, averaging 25-30 tons per acre.

A copy of the unit by unit

## 2.2.2 Fuel Treatments

A variety of fuel treatment methods would be used throughout the approximately 12,700 acres within the planning area. Mechanical fuels reduction treatment is a non-commercial thinning and mechanical brush treatment to promote and develop more resilient stand conditions. The goal for the area is to reduce the fuel loadings and modify the fuel profiles of the planning area. 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 of the planning area and from 45-60 tons per acre to 20-25 tons per acre in the moist plant communities within the planning area.

In both Dry and Moist Mixed Conifer units, a suite of activities could be utilized to bring fuel loading within the ranges described in the Proposed Action 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 Dry Mixed Conifer units, underburning could also be used to treat any residual fuel left within units. However underburning would not occur within Moist Mixed Conifer units.

Across the planning area, this 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.

An example would be a dry mixed conifer unit that is first treated with a vegetation treatment, and the slash materials are piled. Burning of the piles may occur the following year, and would then be followed by a series of underburning several years after the initial treatment.

### Hand Piling

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

### ***Machine Piling***

Machine piling is the use of mechanical devices to pile activity and residual fuel. Bulldozers are generally more efficient in collecting and piling vegetative debris and creating compact piles. Typical mechanical use on the Mt. Hood National 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 would 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 planning area would require thinning and/or mowing before underburning could be done safely and effectively. Underburning unit boundaries would be coordinated with individuals from archaeology, silviculture, and fire management. 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 Road system into line with current agency policy, rectify inconsistencies, reduce impacts to natural resources, or reduce maintenance liabilities, all of the National Forest System



roads within the planning area were analyzed to determine if road closures were appropriate following the completion of the proposed vegetation treatments to support fuel reduction efforts. In addition to the roads proposed for closure below, many roads in the planning area have decisions to close from previous planning efforts, but have not been implemented, leaving the roads administratively closed, but physically open.

The criteria used to determine if the road would be closed included:

- Risk of fire start, accessibility for fire suppression or search and rescue operations;
- Public and administrative access/existing special use permits;
- Likelihood and timing of future timber/fuel treatment;
- Level of aquatic risk;
- Current road conditions;
- Future road maintenance needs.

As defined by the 2003 Roads Analysis Report, an aquatic risk rating was assigned to each road segment based on combining the values of individual aquatic risk factors. The individual risk factors are: riparian areas/floodplains; fish passage; landslide hazard; surface erosion hazard; hydrologic hazard; high risk stream crossings; stream crossing density; and, wetlands.

This project would decommission approximately 0.3 miles of NFS road, close approximately 5.2 miles of NFS road, and convert 1.6 miles to motorized mixed use as displayed in table 10. The three roads proposed for closure would help reduce the open road densities in the planning area, reduce impacts to streams and aquatic systems from sediment from high-risk roads, reducing the risk of human caused wildfires. The roads are currently classified as maintenance level (M2); 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 7. Roads proposed for a change in maintenance level**

Road Number	Length (Miles)	Existing NEPA status	Existing Physical Status	Post CCR Implementation NEPA/Physical Status
2131260	<.1	Open Road	Open Road	Closed Road
2630250	.8	Open Road	Open Road	Closed Road
2630251	.5	Open Road	Open Road	Closed Road
2130223	<.1	Open Road	Open Road	Closed Road
2110035	.1	Open Road	Open Road	Closed Road
4200011	.7	Open Road	Open Road	Closed Road
2630011	1.5	Open Road	Open Road	Closed Road
2110240	<.1	Converted to Trail/ Decommissioned	Open Road	Closed Road
2130270	.9	Converted to Trail/ Decommissioned	Open Road	Closed Road
2110230	.3	Converted to Trail/ Decommissioned	Open Road	Closed Road
4310011	.2	Converted to Trail/ Decommissioned	Open Road	Closed Road
2110240	1.6	Converted to Trail/ Decommissioned	Trail	Motorized Mixed Use Trail
2130017	.3	Open Road	Closed Road	Decommission Road

## **Decommission**

Decommission (0.3 miles) treatments includes blocking vehicles from entering the decommissioned road through the use of rocks, earth berms, large logs, etc. 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. A decommissioned road is removed from the Forest's transportation system and no longer receives any maintenance.

### **2130017 Road**

The 2130017 road proposed for decommissioning exists as a spur off of a road that was previously converted to a non-motorized trail. This previous trail conversion has restricted motorized use to the road proposed for decommissioning. There is currently no motorized access permitted to this road.

## **Closure**

Year Round Road Closure (5.2 miles) treatments would block vehicles from entering the closed road the entire year through the use of gates, rocks, earth berms, large logs etc., and moved to a Maintenance Level 1 (ML1). This level is 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 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.

If hydrologic and ecological processes are adversely impacted by the road, a closed road would also 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 7, eleven roads or portions of roads are proposed to move to ML1. While the existing physical condition of all eleven these roads are open, four of the roads had their maintenance level changed in the Off-Highway Vehicle (OHV) Management Plan decision to either decommissioned or 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.

### **2130270 Road**

The 2130270 road has been utilized multiple times in the past 10 years for administrative use, is being proposed to be used to implement this project, and provides access to existing plantations. A purpose-built OHV trail also leads to these areas. However, converting this trail to accommodate administrative use would degrade the OHV user's experience. Because the 2130270 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 2130270 road proposed for closure**

***2110230 Road***

In the OHV Management Plan, the 2110230 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 2110230 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 2110230 road proposed for closure**

### ***4310011 Road***

In the OHV Management Plan, the 4310011 road was closed to all traffic and was proposed to be decommissioned. This road remains physically open on the ground and provides access to both plantations that have been managed in the past and are proposed for management in Section 2.2.1. Additionally, there are two special use permits for fiber optic cables that utilize that segment of road for maintenance. These permits to Cascade Utilities and FTV Communications utilize this segment of the road for maintenance. By moving this to a closed road, it will restrict public use of the road, repair any damage, and put the road into storage for administrative or permit use only.





**Figure 9. Pictures of the Fiber Optic Cable and 4310011 road proposed for closure**

### ***2110240 Road***

In the OHV Management Plan, the 2110240 road had the entrance proposed to be decommissioned, and the remainder of the road proposed to be converted to a trail. Currently the entrance of this trail is steep off of the 2110 and is being used by OHV users as an access point to the remainder of the remainder of the converted 2110240 road. This creates multiple safety and resource concerns for this short segment of road. This proposal 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. It is proposed to move this to a closed road, ML1 because the 2110240 road has been used twice in the past ten years for management activities, is proposed for use in this planning effort, and would likely be utilized again to implement future activities. Through closing this road, it remains on the system for administrative use in the future, but blocks vehicles from using the road the remainder of the year.





**Figure 10. Picture of the 2110240 road proposed for closure**

## **Motorized Mixed-Use Road**

### ***2110240 Road***

This proposal is to move the 2110240 road to a Motorized Mixed-Use Road. As described above, the entrance of the 2110240 road would have an effective road closure implemented, restricting vehicle access from its current location. After the entrance closure, the remainder of the existing road would be moved to a Motorized Mixed-Use Roads (1.6 miles) Treatments would allow National Forest System (NFS) road designated for use by both highway-legal and specific classes of OHV vehicles. This would continue to allow off-highway vehicles to utilize the mixed-use road, but because the entrance would be closed, would restrict vehicles from utilizing the mixed-use road. The goal is to provide access for administrative uses while limiting the impacts to the natural resources from constructing additional miles of new or temporary roads where existing facilities exist.

## **Road Reconstruction/Maintenance**

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. The proposed roads activities include actions on National Forest System roads that would be used for timber hauling.

Determination of road reconstruction needed to safely conduct operations associated with the proposed action was made utilizing the standards and guidelines set forth in the following documents with authority under 36 CFR Parts 212, 251, 261, and 295:

- \* Roads Analysis: Mt. Hood National Forest
- \* Forest Service Manual (FSM) 7700 – Travel Management
- \* FSM 7710 – Travel Planning
- \* FSM 7730 – Transportation System Road Operation and Maintenance
- \* Highway Safety Act of 1966 (P.L. 89-564) in compliance with applicable Highway Safety Program Guidelines, as specified in the Memorandum of Understanding found in FSM 1535.11
- \* Forest Service Handbook (FSH) 7709.55 – Travel Analysis Handbook
- \* FSH 7709.56 – Road Preconstruction Handbook
- \* FSH 7709.58 – Transportation System Maintenance Handbook
- \* FSH 7709.59 – Transportation System Operations Handbook

Road maintenance will 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 that will occur on roads designated for haul are as follows:

Brushing – Cutting of 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 6 inches.

Blading – Grading of 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 washboarding 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 – Also known as 'Spot-Rocking', this 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 – Removal of soils that have collected in ditch lines over time due to deposit of sands & silts from the road surface or sloughing of cut-slope soils, rock, and organics. Cleaning of ditches is needed to facilitate proper flow of water away from roads to avoid subgrade saturation. Cleaning of ditches 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 conveyance of water away from roadways become blocked by soils and vegetative debris and need to be cleaned out in order to ensure proper flow of water, both at ditch drainage crossings and at road-stream crossings. Cleaning of culverts may produce temporary minor disturbance of soils at culvert inlets and outlets. Erosion control measures may be used to prevent downstream sedimentation as-needed and the need for erosion control measures will be evaluated on a case-by-case basis using Clean Water 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), involves reshaping of existing or installation of new drainage dips and/or waterbars in the roadway. These drainage features, as opposed to culverts, are features that are constructed into the roadbed itself and are comprised of the existing road’s rock and earthen material 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, will be smoothed out prior to heavy haul during the dry season. Replacement of these features or construction of new features will 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’ will 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 & grubbing, culvert replacement, and road resurfacing (aggregate, bituminous material, or a combination).
- 2) Road Repairs. 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 will involve 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/Terrestrial Organism Passages (including bridges), hardened low-water fords, earth retaining structures, roadside guardrails, rock-fall arresters, road paving, and road daylighting.

The preliminary recommendations displayed in the “Description” column of Table 8 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. 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, including 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 local 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. The itemized

repairs listed below and their costs are estimated based on the preliminary judgement of transportation engineers. Final design requires further intensive field measurements & calculations and may vary. Some road work may be accomplished by alternate funding sources and some road failures may not even be evident yet. 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 timeline of implementation, 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 additional NEPA review in the future as needed.

**Table 8. Road Maintenance Needed for Haul**

Road	Length	Description
2110000	.14	Road Reconstruction: Replace Cattleguard
2110000	2.2	Road Reconstruction: Replace 18"x40' corrugated metal pipe
2110013	1	Road Reconstruction: Riprap at each of 2 low water crossings
2110250	2.4	Road Reconstruction: Replace 18"x40' corrugated metal pipe
2110270	2.6	Road Reconstruction: Gate Repair, Replace 18"x40' corrugated metal pipe with 24" squash Pipe
2110290	.8	Road Reconstruction: Build Riprap Mat around existing 18" corrugated metal pipe
2120320	2.3	Road Reconstruction: Replace 18"x40' corrugated metal pipe
2130000	4.5	Road Reconstruction: Recondition 1 Pipe Inlet, Replace Four 18"x40' corrugated metal pipes
2131220	.8	Road Reconstruction: Replace corrugated metal pipe
2131221	.3	Road Reconstruction: Replace corrugated metal pipe
4200011	.5	Road Reconstruction: Excavate Ditch & Fill with Riprap at Entrance, Install Drivable Dip
4310000	1.5	Road Reconstruction: Pavement Pulverization
4330000	1	Road Reconstruction: Ditch Reconditioning

### 2.2.4 Landings & 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 60-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.

Every effort would be made to minimize the acres of disturbance associated with landings during lay-out and logging implementation. 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 design criteria within the PDCs.

Proposed logging systems for the Proposed Action are outlined in Table 9 and Figure 11 below. Logging systems are identified based on several factors, including slope, proximity to existing roads,

**Table 9. Logging System by Acres in the Proposed Action**

<b>Logging System</b>	<b>Acres (Percentage)</b>
Ground Based	12379 (98%)
Skyline	185 (1%)
Helicopter	60 (<1%)
Not Applicable	100 (<1%)



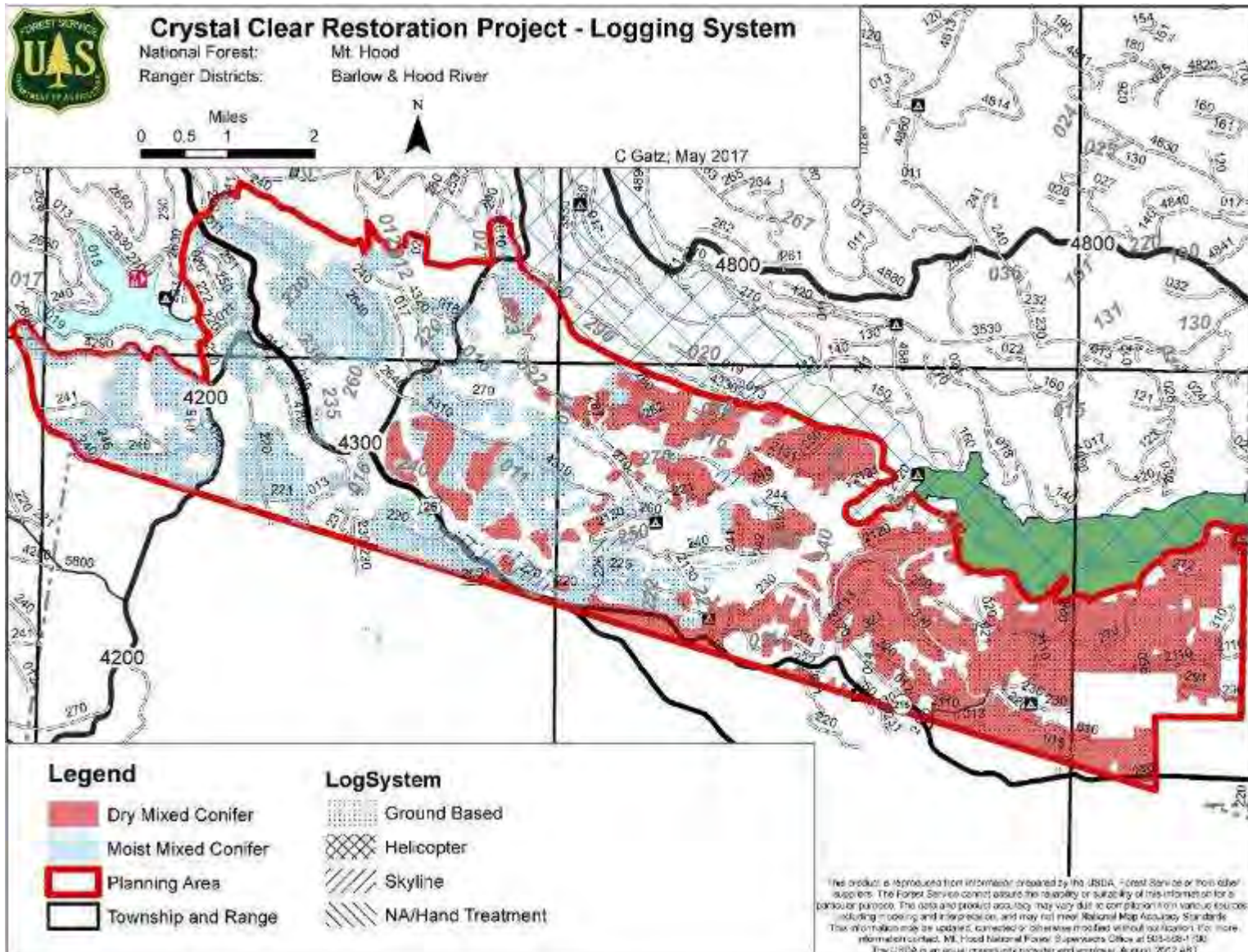


Figure 11. Logging Systems for the Proposed Action

## 2.2.5 Temporary Roads

In addition, the project includes proposed temporary roads that were identified to facilitate conventional logging systems (ground-based and skyline yarding). Temporary roads are roads that are built or reconstructed to access landings and are rehabilitated upon completion of all harvest activities. After use, temporary roads are water barred, culverts removed, decompacted, and roughened as needed with the jaws of a loader or excavator. Also, debris, such as rootwads, slash, logs or boulders, are 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 will be conducted to re-contour and redevelop the trail system.

To minimize impacts to the environment and natural resources, temporary roads are placed on existing road alignments of unauthorized routes and alignments of previously decommissioned system roads are utilized wherever practical. There are cases where it is not feasible or undesirable to use the same alignments or landings. In some places, in order to protect residual trees, soil, and water, new temporary roads are proposed to access landings where existing system roads and old alignments are not adequate for accessing strategic locations on the ground. Stream crossings were minimized as much as possible when identifying the location of temporary roads. No new temporary roads will be constructed within riparian reserves. However, in certain instances, previously constructed roadbeds that cross riparian reserves will be used where the effects can be mitigated through the use of PDCs. 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.

The temporary roads located on previously decommissioned roads minimize environmental impacts by utilizing old road prisms and previously disturbed grounds. Proposed temporary roads were only located on decommissioned roads that had an aquatic risk rating of low to moderate. None of the new temporary road construction would be within Riparian Reserves.

As defined by the 2003 Roads Analysis Report, an aquatic risk rating was assigned to each road segment based on combining the values of individual aquatic risk factors. The individual risk factors are: riparian areas/floodplains; fish passage; landslide hazard; surface erosion hazard; hydrologic hazard; high risk stream crossings; stream crossing density; and, wetlands. The reuse of existing alignments is consistent with Forest Service policy as described in Forest Service Manual 7703.22. The manual direction states: “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).”

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 the approximately 39 miles. Of the proposed temporary roads, 5.5 miles are new temporary roads, approximately 19 miles are existing alignments or decommissioned roads that would be reconstructed for this project. As mentioned above in Section 2.2.3, in many instances roads that have been decommissioned during the 2009 OHV Plan have not been decommissioned on the ground, and little to no maintenance or reconstruction would be required to utilize these roads. The remaining 14.5 miles of temporary roads are previous road alignments that had a decision to convert these to OHV trail in the 2009 OHV Plan. Similarly, in many cases, these trails had signs placed designating them as trails, but no work has been completed to change the characteristics of the roadbed from a road to an OHV trail.

The intent is to have the temporary roads located as depicted in the map; however, they may need to be adjusted during the layout phase. Any changes would have to meet the design criteria stated in this section and all Project Design Criteria (Section 2.3). Any change to the Proposed Action following a signed Decision Notice would have to follow the change condition requirements in NEPA and be approved by the Responsible Official.



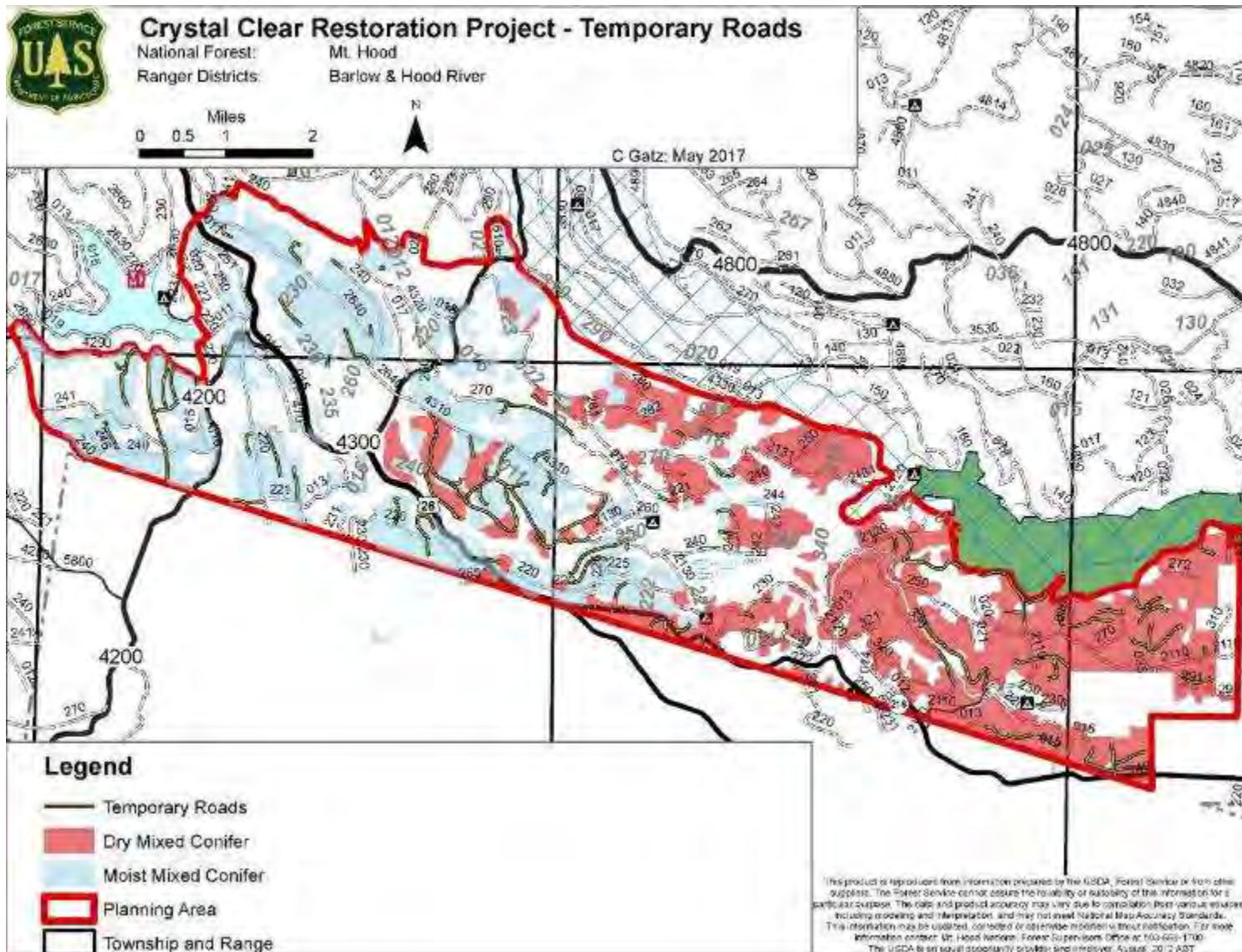


Figure 12. Map of Proposed Temporary Roads in the Planning Area

## 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 Chapter 3 is based on these project design criteria 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 the moist plant communities of the planning area no gaps would be placed in young plantations (<20 years). Plantations over 20 years gap sizes would not exceed 2 acres and would maintain a minimum of 30% canopy cover in resistant species when available. In recently unmanaged stands gaps should be no more than 2 acres. Gaps should be focused around current openings or areas with forest health concerns
- 2) Tree planting would occur in gaps larger than 2 acres and interplanting would occur only where canopy cover is open enough to support the establishment of shade intolerant and/or fire resistant species (ponderosa pine, western larch, western white pine).
- 3) Openings would be created in root disease pockets. Openings would 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 need to be 6-feet wide at base, 6-feet high as a minimum<sup>1</sup>. 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 will 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 2 years from contract completion (ie pile burning, complete pile burning, incineration, 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 minimum<sup>1</sup>. 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

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<sup>1</sup> The Forest Service would meet an average width and length of 8-feet and height of 6-feet for mechanical and hand piles. From past experience with implementation, it is virtually impossible to maintain an exact dimension of fuel piles, so allowance for a small deviation would be made as long as this deviation does not jeopardize meeting the above stated goals.

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 burns<sup>2</sup> should constitute the dominant type of controlled burn within Riparian Reserves, resulting in a mosaic pattern of burned and unburned landscape.
- 12) Moderate severity burns<sup>3</sup> 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 within Riparian Reserve during prescribe fire activities.
- 15) Where fire line is constructed, implement BMP's to reduce erosion and sedimentation risks, including constructing waterbars 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 Mt. Hood National 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 National Forest System roads which are designated for 'project use only' would be closed to public use. The purchaser 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 purchaser uses approved matting materials (such as wood chip or crushed rock) to protect the road surface. Purchaser is responsible for restoring roads to existing condition.
- 19) Temporary roads and landings located on or intersecting National Forest System 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 purchaser 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 purchaser, prior to commencing operations, with temporary culverts, french drains, drivable dips, or measures that provide effective drainage and prevent erosion.

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<sup>2</sup> 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."

<sup>3</sup> 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."



- 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 purchaser 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 shall be installed as needed. Disturbed ground shall 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; 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 shall 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 Forest System 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 are similar to those found during the dry season, 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 inches of precipitation or greater within any given 24-hour period as measured at the lowest elevation along the haul route. To measure precipitation, the purchaser would install a temporary rain gauge on National Forest 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 Forest System Roads shall be prohibited when the temperature of the road surface, as measured at the lowest elevation along the haul route on National Forest System lands, is above 28 degrees Fahrenheit and when the temperature as measured at the highest elevation on the active haul route is between 28 and 38 degrees Fahrenheit or at any time when the designated Timber Sale Administrator determines that freeze-thaw conditions along the haul route 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 Springbox and watertank 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 Northwest Forest Plan direction.
- 39) Any discovered Fish bearing streams in CCR would be provided a site index protection buffer determined by Northwest Forest Plan direction.
- 40) Vegetation treatment units will 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 will 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, track mounted shears, etc., 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)
  - 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) Any found northern spotted owl nest sites would be protected through the implementation of seasonal operation restrictions. In the event that a new activity center is located during the period of the contract, seasonal operating restrictions (March 1 thru July 15) would be implemented to units that are within the 65 yard disruption distance.
- 48) No burning or helicopter activities may take place within 0.25 miles of any newly found spotted owl nest site between March 1 and July 15.
- 49) No activities may take place within 0.25 miles of a bald eagle nest site between December 1 - July 15. The following units are within 0.25 of the historical bald eagle nest area (LUA A-13) around Clear Lake.
- 50) Within suitable spotted owl habitat and moist sites, an average of 6 logs per acre in decomposition classes 1, 2 and 3 should be retained in northern spotted owl suitable habitat. Logs should be relatively solid, retention of additional hollow and substantially fractured logs should be encouraged, 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.
- 51) Survey and Manage species needing protection would be designated on-the-ground prior to ground disturbing activities occurring.
- 52) All activities associated with the proposed action including noise and smoke-generating activities will be restricted within one mile of a den or known rendezvous site from April 1 through July 15.
- 53) All Firewood activity in LUA B-10 would be restricted from December 1 – April 1.
- 54) If raptor nesting areas are found would be protected according to forest plan standards by minimizing habitat management activities during the nesting season March 1 – May 30.
- 55) Maintain Forest Plan standards for snag retention
- 56) No activities would take place in B10 Deer/Elk Winter Range between December 1 and April 1. A seasonal restriction for hauling would be in place for roads in this land use allocation.
- 57) No fuelwood collection or reduction in B-5 LUA
- 58) In B-5 LUA snag creation may occur when the following conditions are met:
  - Not near an open road
  - Snag size is 18' dbh and greater
  - Needs to 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 National Forest System lands. This practice would not apply to service vehicles traveling frequently in and out of the project area that would remain on the roadway.
- 62) If the need for restoration/revegetation of skid trails and landings is identified, the use of native plant materials are the first choice for meeting this objective where timely natural regeneration of the native plant community is not likely to occur. Non-native, non-invasive plant species may be used in any of the following situations: 1) when needed in emergency

conditions to protect basic resource values (e.g., soil stability, water quality and to help prevent the establishment of invasive species), 2) as an interim, non-persistent measure designed to aid in the re-establishment of native plants, 3) if native plant materials are not available, or 4) in permanently altered plant communities.

- 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 outside of the road prism in B5 LUA

### **2.3.9 Botany**

- 68) Buffer populations of mountain ladyslipper (*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 will be provided to sale administration and fire crews. Preference 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 will 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 will 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 will 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 will 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 will 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 system trail for more than 100 feet, unless approved by timber sale administrator.
- 83) All trails that intersect units will be flagged prior to thinning operations. Include trails as protected feature in sale map.
- 84) Stumps within 5 feet of trails would be cut less than 3” to reduce potential hazard to recreationists.
- 85) Whenever possible, any trees felled within 1 tree length of the trail will 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 (temp roads, skid trails, fireline, landings, etc.) will 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 shall 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 6 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**

*(Includes Scenic Viewshed (B1) 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, 504)*

*(Includes portions of stands visible, and not screened by topography, within 660 ft. 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, 474)*

- 100) VD Treatment should be equal to or above 50 ft<sup>2</sup>
- 101) Sapling stands should not be thinned below 162 trees per acre (TPA).
- 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 shall 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, temp roads, fire line and skid trails.
- 109) Tree stumps should be cut at heights of 6 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 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 (BMP) and terms and conditions from consultation, are incorporated into the timber/stewardship contract. For each required component of the NEPA decision, the crosswalk identifies how and what stage in the process the component 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 Purchaser Representative. The inspection reports would also document any resolutions that have been identified. As needed during the implementation process, the sale administration team may request a resource specialist or Line Officer to come for a field visit to discuss a resource issue that has been identified. Also, a resource specialist may visit a sale without a formal request to conduct monitoring and to make sure that the project is being implemented as directed by the NEPA decision.

Also, resource specialists may visit the site to conduct a post-harvest review before completing any secondary activities, such as slash clean up, 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 BMP. The monitoring of noxious weeds and invasive plants would be conducted where appropriate to track changes in populations over time and corrective action would be prescribed where needed. Monitoring reports including these findings as they are available can be found on the Forest’s web site at <http://www.fs.usda.gov/main/mthood/landmanagement/planning>

BMP monitoring may be conducted on projects after treatment is complete. According to The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012), monitoring is one of four steps outlined in the BMP process. Monitoring is used to inform and improve management activities and share with other appropriate Federal, State and local agencies. The Technical Guide states “The Forest Service Nonpoint Source Strategy uses “programmatically monitoring” to evaluate BMP implementation and effectiveness; that is, aside from project administration described above, BMPs are not monitored on every project or activity that occurs on National Forest System lands. Projects to monitor or specific monitoring sites are selected in a manner that results in objective and representative data on BMP implementation and effectiveness. Often, a random or systematic random selection procedure is used to choose monitoring locations across a forest or grassland where specific activities or BMPs are targeted.” This project would go into a pool of similar projects to be selected for project level BMPs implementation and effectiveness monitoring as per the National BMP Monitoring Protocol. If selected an Interdisciplinary Team (IDT) would evaluate whether the site-specific BMPs were implemented and the effectiveness of the BMPs. Monitoring for each BMP is outlined in Appendix 2: Best Management Practices for Water Quality Protection.

## **2.5 Mt. Hood Land and Resource Management Plan Consistency**

### **2.5.1 Forest Plan Standards and Guidelines**

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

- Organic Matter for Soil Productivity (FW-32/33): 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 and 25 tons per acre in west side communities should be maintained and evenly distributed across managed sites.
- Snags and Down Log Associated Species (FW-215): Where new timber harvest blocks occur (e.g., regeneration harvest and commercial thinning), wildlife trees (i.e., snags and green reserve trees) should be maintained in sufficient quantity and quality to support over time at least 60 percent of the maximum biological potential of primary cavity nesting species, e.g., woodpeckers.
- Snags and Down Log Associated Species (FW-219): An average total of at least 6 logs per acre in decomposition classes 1, 2 and 3 (USDA Forest Service 1985, Brown editor) should be retained in all project activity areas, e.g., clearcut, commercial thin, salvage, or overwood removal.

- 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, these standards cannot be met because of the purpose and need for the project (FW-32/33, B10-014) and the on-the-ground conditions present within the stands (FW-215/219).

The purpose and need for the project includes fuel reduction efforts associated with areas identified in the Mt. Hood National Forest Strategic Fuel Treatment Plan. Particularly in dry mixed conifer areas, the best available science tells us that 15 tons per acre of dead and down woody material in east side vegetation communities is above what was historically present and serves as increased fuel during wildfires. With a goal of the Treatment Plan being increased suppression effectiveness and having disturbances in unit sizes representing the natural disturbance regime, reducing the tons per acre of down and woody material below the Forest Plan guidelines better help us achieve this goal. The Proposed Action proposes that 10-15 tons per acre of woody material remains in dry mixed conifer areas and 20-30 tons in moist mixed conifer areas. 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 this goal of effective fuel reduction treatments and would only apply to those areas within the dry mixed conifer communities of the planning area. This reduction of canopy closure is additionally consistent with the best available science related to dry mixed conifer forest management.

Implementation of the Proposed Action would reduce the amount of small snag recruitment that would have occurred through the process of stress and mortality in the next 20 to 30 years. Some of the snags and downed logs that might have formed from the death of the intermediate and suppressed trees would be removed by thinning activities. As a result the attainment of moderate-sized snags and down wood would be delayed because of the reduction in density of the stands which would reduce the levels of suppression mortality. For more information see Section 3.8, Wildlife.

## **2.5.2 National Forest Management Act Findings for Vegetation Manipulation**

### **Suitability for even-aged management**

Forest Plan guidelines advise against uneven aged management in stands with dwarf mistletoe and/or root disease. Even-aged management is the effective way to manage dwarf mistletoe and root disease, based on Forest Plan direction found in Forestwide Standards (FW) 316 and 317, C1-019 through C1-021, and C1-024. Project design criteria/mitigation measures, such as patch openings are written into the design of the Proposed Action in order to meet Forest Plan direction.

### **Suitability for reforestation**

Forest plan guidelines advise timber harvesting would be completed in a fashion that reasonably assures each harvest area can be adequately restocked within 5 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 for reforestation

## **2.5.3 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. BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving



waters” (EPA Water Quality Standards, Regulation, 40 CFR 130.2). Appendix H of the Forest Plan provides management direction on the BMP implementation process. Appendix H states: “The general BMP’s described herein are action initiating mechanisms which are for the development of detailed, site-specific BMP prescriptions to protect beneficial uses and meet water quality objectives. They are developed as part of the NEPA process, with interdisciplinary involvement by a team of individuals that represent several areas of professional knowledge, learning and/or skill appropriate for the issues and concerns identified. BMP’s also include such requirements as Forest Service Manual direction, contract provisions, environmental documents, and Forest Plan Standards and Guidelines. Inherent in prescribing project-level management requirements is recognition of specific water quality objectives which BMP’s are designed to achieve.” Appendix H of the Forest Plan continues on to describe the implementation process and format for project specific BMP requirements.

According to the Northwest Forest Plan, BMP would be incorporated into the implementation of the project. BMP are drawn from General Water Quality Best Management Practices, Pacific Northwest Region (November 1988); Draft Environmental Protection Agency Region 10 Source Water Protection Best Management Practices for USFS, BLM (April 2005); Mt. Hood National Forest Standards and Guidelines, Northwest Forest Plan Standards and Guidelines and The National Best Management Practices for Water Quality Management on National Forest System Lands - Volume 1: National Core BMP Technical Guide (April 2012) and professional judgment. The BMP have been adjusted and refined to fit local conditions and then incorporated in the project design criteria/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 BMPs, regional Forest Service guidance, land management plan standards and guidelines, monitoring results, and professional judgment are all used to develop site-specific BMP prescriptions.”

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

## Chapter 3

This chapter 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. Each resource area discloses the direct, indirect and cumulative effects for that resource area. The National Environmental Policy Act defines these as:

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

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

Each of the specialist reports and biological evaluations conduct an analysis of cumulative effects resulting from this project. Table 10. List of Projects Considered in the Cumulative Effects Analysis lists the projects that the IDT considered in their analysis.

**Table 10. List of Projects Considered in the Cumulative Effects Analysis**

<b>Past Activities</b>
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
<b>Ongoing Activities</b>
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

## **3.1 Vegetation Resources**

### **3.1.1 Analysis Assumptions and Methodology**

The intent of this report is to analyze how the vegetation resources would be affected by the management actions proposed by the U.S. Forest Service. Professional judgment and stand level data was utilized in determining the project's potential effects. Effects analyses were based on several components outlined in the following sections.

#### **Landscape Scale**

Information regarding the vegetative conditions of the larger landscape within the CCR Area is largely provided by White River Watershed Analysis (WRWA), which was conducted in the recent past by the Mt. Hood National Forest (Forest).

The WRWA characterizes resource conditions at their respective scales, identifies issues, discusses trends and changes in conditions over time, defines desired conditions, and identifies possible management opportunities to be pursued at both the landscape and at the project planning level. Only the elements from these analyses most pertinent to the proposal are discussed in this section. The Existing Conditions of this report provides an additional summary of this landscape information as related to the project.

#### **Site-Specific Scale**

The analysis area boundary for disclosing effects at the site-specific level is comprised of the several subwatershed (including the Clear Creek, Middle Beaver Creek, Wapinitia Creek, and Middle White River) within the White River Watershed. This analysis area totals 24,011 acres and represents the area where stands were evaluated for possible treatment actions as part of the CCR. The project record provides detailed documentation on individual stand conditions and the selection process. Additional information sources including stand records and field surveys conducted in the 1970's, 1980's, 1990's, 2000's as well as field reviews conducted in 2016 are also available in the project record, located at the Barlow Ranger District in Dufur, Oregon.

#### **Common Stand Exams**

As part of the initial data gathering for this project, Common stand exams (CSE) were conducted within the project area. CSE provides one set of national data collection protocols, data codes, portable data recorder software, forms, reports, and export programs. All stand examination data is stored in a common database structure, Field Sampled Vegetation (FSVeg). Data from multiple Districts, Forests, Regions, and participating Agencies can be analyzed with ease. The CSE protocols are used to collect stand, plot, tree, surface cover, vegetation, and down woody data. This data is stored in FSVeg along with strategic grid data, insect and disease study data, Forest Inventory and Analysis (FIA), and re-measured growth plot data.

#### **Forest Service Vegetation (FSVeg) Module**

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

#### **Forest Vegetation Simulator both East and West Cascade Variant**

The Forest Vegetation Simulator (FVS) is a distance-independent, individual-tree forest growth model. Stands are the basic projection unit, but the spatial scope can be many thousands of stands. The temporal scope is several hundred years at a resolution of 5–10 years (Crookston, 2005). FVS was used to interpret data collected utilizing the CSE. FVS is a growth and yield model used for predicting forest stand dynamics that is used extensively in the United States. FVS is the standard model used by various government agencies, including the U.S. Forest Service. Forest managers have used FVS extensively to summarize current stand conditions, predict future stand conditions under various management alternatives, and update inventory statistics (USDA, 2008).

Do to known limitations with FVS other analysis tools are used in determining the project’s potential effects. Some of these limitations are but not limited to the model is not directly sensitive to environmental changes such as increasing temperatures, changes in rainfall, and changes in atmospheric CO<sub>2</sub>, FVS is insensitive to climatic changes that can influence tree geography, and for fuels management actions in reducing fire hazard is that it is a stand-level model, not sensitive to spatially dependent fire behavior (Crookston, 2005).

**Plant Associations**

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

**Stand Structure Types**

Stand structure types as described by Larsen and Oliver (1996) were used to describe landscape and stand conditions. Table 11 describes the potential stand types. Stand patterns is the spatial and temporal distribution of trees and other plants within a given stand. Both distributions can be described by species present, vertical or horizontal spatial patterns, size of plants (or their parts), age, or by any combination of the above. Stand development is the part of stand dynamics concerned with change in stand structure over time (Larson, 1996). Stand exam, stand photos, aerial photos and Gradient Nearest Neighbor were used to determine planning and proposed action area stand structure types.

**Table 11. Stand type and descriptions**

<b>Stand Type</b>	<b>Description</b>
<b>Sparse</b>	Less than 10% Tree Cover
<b>Stand Initiation</b>	Young, single cohort stands whose canopy has not yet closed; seedlings and small saplings; remnant of previous stand may be present.
<b>Stem Exclusion</b>	Relatively young, single cohort stand whose canopy has closed and thinning has begun; saplings and poles; remnants of previous stand may be present
<b>Understory Reinitiation</b>	Middle-aged, medium sized trees with variable canopy closure; second cohort of young trees present in the understory; scattered mortality in all size classes; remnant of previous stand may still be visible
<b>Mature Stem Exclusion</b>	Middle-aged medium sized to large trees with closed canopy; crowns of second cohort intermingled with crowns of first cohort such that a second



Stand Type	Description
Late Seral Multistory	canopy layer is not readily distinguished' scattered mortality; some small clumps of snags may be present Main canopy dominated by older, large trees; canopy closure variable; 2-3 canopy layers distinguishable; mortality both scattered and clumped and in higher proportion of stand than other stages

### 3.1.2 Existing Condition

The desired future conditions for the stands would be to move them towards a more properly functioning plant community as defined by watershed assessment plan, forest plant association guides, and white river late successional reserve plan. By moving stands towards the desired future conditions would become or maintain a multi-storied uneven-aged stands in the moist mixed conifer communities. Within the dry mix 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 fire occurrence; this means reductions in total stand density. In the dry mix conifer stands a stand structure that allows the efficient reintroduction of natural fire is desired and that in the long term natural fire starts can resume their normal processes and be easily managed. Stands should be monitored over the next 50 years to evaluate the response to the thinning and determine if a re-entry thinning and/or burning is needed maintain or create the desired future conditions.

#### **Landscape Scale**

The WRWA describes the landscape on the southeast side of Mt. Hood and along the Cascade crest. The watershed analysis is subdivided into three climatic zones (Crest, Transition, and Eastside). The majority of CCR area falls in the Transition subdivision with small portions in the Eastside subdivision. Sixty percent of these watersheds are National Forest System lands with non-federal ownership as the other principal landowners. The Transition subdivision of the watershed is dominated by several vegetative zones including but not limited to Ponderosa pine (*Pinus Ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*) western white pine (*Pinus monticola*) with the climax species of grand fir, (*Abies grandis*), and western hemlock (*Tsuga heterophylla*). The Eastside subdivision has similar vegetative zone to the transition subdivision with different climax species of Douglas-fir, ponderosa pine, and Oregon white oak (*Quercus garryana*).

The analyses completed at the larger landscape scale (refer to WRWA) noted that there have been some marked changes in the nature and condition of the vegetation across the landscape from historical conditions (the period prior to Euro-American occupation defined as 1855 in WRWA). Most of these changes reflect the consequences of European settlement of the area, large wildfires and salvage activities, and other timber harvest activities beginning in the earliest years of the 20th century. The lumber industry began its development in the area in the 1850s, although the Hudson Bay Company constructed the first sawmill on Mill Creek in the 1820s. By the end of the 1800's, much of the timber was being cut from public lands at what was perceived as an alarming rate. This led to the establishment in 1893 of the Cascade Forest Reserve as part of a regional plan to preserve the forests of the western United States. The Mt. Hood National Forest contains the northern portion of the original reserve.

Before 1900, very large patches of similar type stands as mentioned above dominated the uplands. The species mix is similar today in both the understory and overstory. Due to the disturbance regimes on the uplands, five different structure types (see WRWA) tended to dominant the watershed at any one point in time. Stand replacing disturbance were rare. Some diversity did exist as the result of smaller scale disturbances, creating scattered smaller patches of a different stand structure within the larger landscape.

The current vegetation differs from the typical pre-1900 vegetation 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 watersheds are dominant by a forests structure of small diameter trees within the stem exclusion stage or early seral. The watersheds do have small pockets of Understory Reinitiation and Mature Stem Exclusion but they are not a dominate stand condition on the landscape like they would have been prior to 1900.

**Site-Specific Scale**

The project area occurs within the White river watersheds. The proposed treatment area are in two different moisture regimes in six dominate plant associations, Grand fir/vine maple (*Acer Circinatum*)/vanilla leaf(*Achlys triphylla*) (A1), Grand fir/oceanspray (*Holodiscus discolor*) (A2), Douglas-fir/common snowberry(*Symphoricarpos albus*) (A3), Ponderosa pine/bluebunch wheatgrass(*Agropyron spicatum*) (A4), Western hemlock/vine maple/vanilla leaf (A5), Pacific silver fir (*Abies amabilis*)/ vine maple/ vanilla leaf (A6), and the last two are a mix of plant associations in both moist mix conifer and dry mix conifer (A7 and A8). A7 make 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 mix conifer plant associations (A1, A2, A3, A4, and A7) 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 Oregongrape (*Berberis nervosa*), serviceberry (*Amelanchier alnifolia*), oceanspray, vine maple, greenleaf manzanita (*Arctostaphylos patula*). Currently ponderosa pine is representing 40% of the overstory component with a high shrub component present in the stands that were a part of past harvesting activities. In stands with limited entry actviites over the last century as very little to no understory component. Common to the moist plant associations (A5, A6, and A8) 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 productive 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. They are usually found on moderate slopes with an average elevation between 3,400 to 4,400 feet within moist mix conifer and 2,800 to 3,400 feet within the dry mix 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**

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

A1 should have an overstory dominated by Douglas-fir and ponderosa pine with minor components of grand fir throughout the stand. Regeneration should be found throughout the stand and dominated by Douglas-fir and grand fir. Understory should be sparse and dominated by vine maple and snowberry

(*Symphoricarpos albus*). These areas also tend to be very productive sites for timber with soils that tend to be rocky with good moisture –holding capacity (see soils Report for me details).

A2 should have an overstory dominated by and ponderosa pine with minor components of grand fir throughout the stand. Regeneration should be found throughout the stand and dominated by Douglas-fir and grand fir. Understory should be sparse and dominated by oceanspray, and snowberry. These areas tend to be moderately productive sites for timber with fine sandy soils (see soils Report for me details).

A3 should have an overstory dominated by Douglas-fir and Ponderosa pine with minor components of Oregon white oak. Regeneration should be found throughout the stand and dominated by oak and pine. The understory should be dominated by snowberry, Oregongrape, and bitterbrush (*Purshia tridentata*). These areas tend to be low to moderately productive sites for timber with moderately deep soils (see soils Report for me details).

A4 should have an overstory dominated by Ponderosa pine and Oregon white oak. Regeneration should be found throughout the stand and dominated by ponderosa pine. There should be a diverse understory dominated by snowberry, Oregongrape, and Greenleaf manzanita. These areas tend to be moderately productive sites for timber with moderately deep soils (see soils Report for me details).

A5 should have an overstory dominated by Douglas-fir and western hemlock with a minor component of grand fir. Regeneration should be found throughout the stand and dominated by western hemlock and Douglas-fir. There should be a diverse understory dominated by big leaf huckleberry, prince pine, vine maple, Oregongrape. These areas tend to be very productive sites for timber with moderately deep soils (see soils Report for me details).

A6 should have an overstory dominated by Douglas-fir, Pacific silver fir and western hemlock. Regeneration should be found throughout the stand and dominated by Pacific silver fir and western hemlock. There should be a diverse understory dominated by vanilla leaf, prince's pine, Oregongrape, and big leaf huckleberry. These areas tend to be low to moderately productive sites for timber with moderately deep soils (see soils Report for me details).

Currently, the project area contains several stand types and conditions with varying age ranges. 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 with a quadratic mean diameter (QMD) ranging from 2.0 to 3.5 inches and an average height of 40 feet. 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 with a QMD ranging from 4.0 to 10.0 inches and an average height of 70 feet.

In the stands that have had past thinning or no harvest actives stand conditions vary depending on plant community. Within the moist mix conifer the majority stands are in understory reinitiation stage and are dominated by medium to large size material with a QMD ranging from 4.0 to 10.0 inches and an average height of 95 feet. These stands also range in age from 50-250 years old and average 200 square feet of basal area (BA) with an average stand density index (SDI) 500. Regeneration in these stands is dominated by shade tolerant species like grand fir, Pacific silver fir, and western hemlock and is averaging around 600 trees per acre (TPA). Within the dry mix conifer the majority stands are in range of stem exclusion and understory reinitiation stage and are dominated by medium to large size material with a QMD ranging from 6.0 to 20.0 inches and an average height of 95 feet. These stands also range in age from 30-200 years old and average 200 square feet of BA with an average SDI 400. 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 (Figure 15) (Refer to Fire and Fuels Report)

On average the proposed treatment units are below Mt. Hood Land and Resource Management Plan (Forest Plan), FW-215 and 216) standards for snags. Currently, there are roughly 1 snags per acre in the

moist mix conifer and snags per acre in the dry mix conifer 20 inches DBH and larger. On average the proposed treatment areas averages an estimated 2 snags per acre in the moist mix conifer and 2 snags per acre in the dry mix conifer 11 inch DBH trees and larger.



**Figure 13. Young Stand in the Stand Initiation Stage Photos**



**Figure 14. Previously Thin Moist Stand in the Stem Exclusion Stage**





**Figure 15. Previously Thin Dry Stand in the Stem Exclusion Stage**



**Figure 16. Dry Stand in the Understory Reinitiation Stage**



**Table 13. Current percent of age class within the moist and dry mix conifer areas of the project area**

Age Class	Percent of the Project Area within Moist Mixed Conifer Stands	Percent of the Project Area within Dry Mixed Conifer Stands
< 20 Years	6%	4%
21-40 Years	26%	32%
41-60 Years	11%	10%
61-80 Years	10%	12%
81-100 Years	21%	35%
101-120 Years	8%	5%
121-140 Years	2%	2%
141-160 Years	4%	>1%
161-180 Years	1%	>1%
181-200 Years	1%	>1%
201 + Years	10%	>1%

**Table 14. Current percent of stand structure within moist mix conifer areas of the project area**

Stand Structure	Percent of the Project Area within Moist Mixed Conifer Stands	Percent of the Project Area within Dry Mixed Conifer Stands
1: Sparse <10% Tree Cover	18%	23%
2: Stand initiation	15%	16%
3: Stem Exclusion	51%	50%
4: Stand Reinitiation	13%	8%
5: Mature Stem Exclusion	4%	3%
6: Late Seral Multistory	<1%	0%
Unknown	3%	<1%

### ***Ecological Processes and Disturbances***

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).

Over the last century, there have been broad changes in vegetative conditions in the Cascade Range, as summarized in the landscape analysis referenced earlier. The disturbances or factors of change, influencing vegetation in the project area include diseases, insects, timber harvest, and fire both associated with timber harvest activities and wildfire events. These replacement forests also tend to be overstocked with vertical structure (Carlson et al. 1995). A brief discussion of insects, diseases, and timber harvesting follows below.

Insects and diseases can be natural elements of the ecosystem that can exert equal, if not greater, influence on forest development and conditions as 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. In the past, with regular small scale disturbances like floods or avalanches, they probably existed most commonly at endemic levels (i.e., present in an area but causing low or moderate levels of mortality). Population fluctuations were normal with epidemic conditions of some insects or diseases developing periodically and causing high levels of tree mortality over short periods (Harvey et al. 1995). Over time management past management practices and lack of small scale or low intensity disturbances has created densely stocked stands. Stand density has been found to exert a

strong influence on forest susceptibility to insect 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*) species, which has the potential to slowly eliminate true fir species from the ecosystem.

### **Balsam Woolly Adelgid**

The balsam woolly adelgid (*Adelges piceae*) is a tiny sucking insect that was introduced into North America from Europe. In North America, it has caused significant damage and mortality to true firs in both eastern and western forest. Primarily in the West, it occurs in subalpine, Pacific silver and grand fir stands. Symptoms of the adelgid attack appears as stunting of terminal growth, swelling around buds and branch nodes, dying foliage resulting in the foliage turning yellow then red or brown in color. All sizes of trees can be attacked, although trees that are pole-sized or larger seem most susceptible. Due to the fact that it is a non-native species, there are few natural predators or parasites to the adelgid. Climate and environmental factors are important influences allowing for the insect survival. Cold winters and high elevation rarely allow enough heat accumulation for the insect to complete a second generation. Site conditions and stand age can also play a role in affecting the insect survival, depending on the susceptibility of the host species at a given site.

### **Douglas-fir beetle**

Douglas-fir beetles (*Dendroctonus pseudotsugae Hopkins*) are a bark beetle that as adults tunnel through the bark to construct galleries in the cambial area in which they feed and lay their eggs. When abundant favorable breeding habitat (weakened trees, moist conditions, etc.) becomes available, usually as windthrow, or overstocked stands Douglas-fir bark beetle populations can rise to epidemic levels creating mortality in live trees. Over the last decade there have been small mortality pockets associated with Douglas-fir beetle in the proposed treatment areas, and with the existing conditions of highly stocked Douglas-fir plantations, the project area is at a higher risk for Douglas-fir beetle outbreak.

### **Mountain pine beetle**

Mountain pine beetles (*Dendroctonus ponderosae*) are a bark beetle that spend the majority of their life cycle is spent beneath the bark of host trees, except when adults emerge from brood trees and fly in search of new host trees. All native and introduced species of pine can be host trees for the beetle. When abundant favorable breeding habitat (weakened trees, moist conditions, etc.) becomes available, usually as density related competition or drought, mountain pine beetle populations can rise to epidemic levels creating mortality in apparently vigorous host trees over large areas. Outbreaks are most commonly associated with overcrowded stands. Over the last decade there have been small mortality pockets associated with mountain pine beetle in the proposed treatment areas, and with the existing conditions of highly stocked mix conifer stands with large remnant ponderosa pine present, the project area is at a higher risk for western pine beetle outbreak.

### **Western pine beetle**

Western pine beetles (*Dendroctonus brevicomis*) are a bark beetle that as adults tunnel through the bark to construct galleries in the cambial area in which they feed and lay their eggs. When abundant favorable breeding habitat (weakened trees, moist conditions, etc.) becomes available, usually as density related competition or drought, western pine beetle populations can rise to epidemic levels creating mortality in apparently vigorous host trees over large areas. Outbreaks are most commonly associated with large old growth and overcrowded second growth stands. There have been no known recent large scale insect outbreaks in the proposed treatment areas, but with the existing conditions of highly stocked mix conifer stands with large remnant ponderosa pine present, the project area is at a higher risk for western pine beetle outbreak.

### **Dwarf Mistletoe**

Dwarf mistletoe is small, leafless, parasitic plant, which extracts water and nutrients from live conifer trees. Mistletoe is generally host specific, occurring only on one principal species. Mistletoe causes decreased height and diameter growth, reduction in seed and cone crops and direct tree mortality or a predisposition to other pathogens or insects. Once the dwarf mistletoe has spread throughout the crown, it usually takes ten or more years for tree mortality to occur. There is increasing evidence that important interactions exist between dwarf mistletoe and animals (Hawksworth and Wiens 1996). Birds, porcupines, squirrels, and other animals eat seeds, shoots and other parts of the plant. The dense branch masses (witches brooms) caused by dwarf mistletoe provide cover and nesting sites for some birds and mammals.

Presently, throughout the project area there are minor occurrences of western hemlock dwarf mistletoe (*Arceuthobium campylopodum tsugense*) and western larch (*Larix occidentalis*)(*Arceuthobium laricis*) in the overstory. The potential for mistletoe spread to younger western hemlock and western larch regeneration would increase as the understory begins to differentiate and become established as a second and third layers.

### **Root disease**

The dense, single-canopied Douglas-fir dominated forests in the project area are perfect conditions for the proliferation of root disease. Most of the stands in the watershed have some level of root disease present as laminated and/or Armillaria root rot (*Phellinus weirri*) and (*Armillaria ostoyae*). Highly susceptible species include Douglas-fir, grand fir and mountain hemlock, with moderately susceptible species including noble fir, pacific silver fir, and western hemlock. Species that are tolerant or resistant to laminated root rot include lodgepole pine, western white pine and western red cedar (Goheen and Willhite 2006). Root disease organisms can cause increased stress, severe reduction in tree growth, and direct or indirect mortality to trees. Trees infected with *P. weirri* are sometimes killed by bark beetles in combination with other root diseases. The Douglas-fir beetle and fir engraver are commonly associated with laminated root rot (Schowalter and Filip 1993 *in* Rippey et al. 2005). It is recognized that root decay and stem decay are natural processes, which contribute downed wood thus creating a variety of structural components in the forest. Though these organisms themselves are a natural and integral part of the ecosystem, the condition of the vegetation across the landscape and within individual stands is in many cases not natural. When there is an abundance of a susceptible species in a stand, root disease centers continue to grow. When there is a wide variety of species in a stand, including some less susceptible species, it may be slowed. Current stand conditions have provided an abundance of susceptible species and available habitat for these organisms (dense, single-canopied Douglas-fir and grand fir stands) and therefore may cause more severe effects to the forests than has typically occurred in the past. Stands previously entered for selection harvest had the larger trees removed, mostly Douglas-fir and western hemlock.

### **Timber Harvest**

Timber harvesting has been a major contributor to the change in vegetative conditions that have occurred across the project area as well as the rest of the white river watershed. This has altered the normal functioning of ecosystem processes. Past practices of regeneration harvest have impacted stand structure and species diversity within the project area.

In the project area, records show about 11,096 acres that have previously been treated during the period from 1950 to 2010 (see

Table 15 below) on federal lands. The Forest does not have records of historical harvest for private or federal lands between 1880 and 1960, only information from field observations.

**Table 15. Acres by Harvest Type in CCR Project Area**

<b>Decade</b>	<b>Regeneration Activities</b>	<b>Thinning</b>
<b>1950-1959</b>	1,188	0
<b>1960-1969</b>	1,176	0
<b>1970-1979</b>	650	365
<b>1980-1989</b>	2,449	1,505
<b>1990-1999</b>	502	585
<b>2000-2010</b>	472	1,870
<b>2011-2016</b>	0	334
<b>Total</b>	<b>6,437</b>	<b>4,659</b>

### 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 project design criteria 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 – Direct and Indirect Effects**

No acres are treated under this alternative, and thus there are 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.

Due to the limited size of the project area (13% of the WRWS) there would be little to no effect at the landscape scale to stand structure and composition, residual trees, and insect and disease processes. The landscape would still have under-represented or lack necessary stand types vital to maintaining and sustaining properly functioning plant communities and disturbance regimes.

In the long-term, the stand structure and composition within the dry mix conifer would be dominated by grand fir in the overstory, and the understory would remain under-developed with low occurrences of ecologically important tree and shrub species. The stand structure would remain in a two-story dominant stem exclusion type stand. Young stands would continue to grow in densely stocked conditions with little regeneration. What regeneration does occur will be dominated by shade tolerant less fire resistance tree and shrub species. Densely stocked stands would continue to have large amounts of small patches with increasing crown closure with little shade intolerant species and minimal structural diversity. In the moist mix conifer stand structure and composition would be dominated by western hemlock and Douglas-fir in the overstory, with small patches of understory development of ecologically important tree and shrub species. In unmanaged or lightly managed stand natural disturbance regime would continue to occur creating small patches of structural diversity within the stands. Stand structure would remain in a multi-story dominant stem exclusion moving towards a mature stem exclusion type stand. The majority of the plantation within the moist mix conifer area would continue to grow in densely stocked conditions with little to no regeneration of ecologically important tree species and minimal structural diversity.

Ultimately, with no vegetation treatments, the stand would remain in dense overstocked conditions no mosaic reinitiation of understory; risk of insect and disease levels and vulnerability of the stands to infestations would remain high; and stand density would continue to increase (Refer to



Table 16 and

Table 17 for treatment area densities). By maintaining high tree competition, stems would continue to grow in height but diameter growth would continually slow. These trees would become more dependent on neighboring trees for support. When trees develop in this manner they are more likely to blow down in large groups or if drought conditions persist. By maintaining a high blowdown risk, the risk of bark beetle infestation remains high.

Quadratic mean diameter (QMD) is the diameter corresponding to the tree of arithmetic mean basal area, or average diameter by basal area (BA). The QMD slowly increases over time with little fluctuation. This is indicative of stands that had little regeneration occurring through time. Stands QMD should fluctuate over time to reflect the ingrowth of smaller diameter trees that contribute to the BA. The stand heights also continue to grow, but level out over time due to lack of growing space and site growing capacity.

The stands currently occupied by densely stocked grand fir and Douglas-fir would experience the continuing spread of root disease and resultant mortality over the long-term. Also, over the long term stand density indexes (SDI) would continue to rise above the upper management zone into the self-thinning zone. SDI is an index based on the relationship between tree size and the number of trees per acre. An advantage to SDI is their independence from site quality and stand age. This means that stands with the same QMD and number of trees per acre are more alike in every way than stands of the same site and age (Powell, 1999). When managing densities using SDI there are three thresholds, understocked, management zones, self-thinning zone. Once above the upper management zone and in the self-thinning zone trees aggressively compete with each other for moisture, sunlight, and nutrients. Stand outside the management zone experience density-related, competition-induced mortality, particularly for trees in the suppressed and intermediate crown classes (Powell, 1999). Without the reinitiation of the understory to a more typical species composition characteristic of the plant association, the spread of dwarf mistletoe would be limited due largely to the lack of ponderosa pine and western larch regenerating, but would remain high in with the Douglas-fir dwarf mistletoe. The risk of balsam wooly adelgid would remain moderate to low in stands dominated by Douglas-fir in the moist mix conifer but moderate to high in the dry mix conifer stands due to the availability of the highly susceptible grand fir. Any susceptible species that the adelgid does attack in the moist mix conifer stands would be at high risk due to poor growing conditions and stress from competing neighboring trees.

Table 16 and

Table 17 provide modeled density measurements for the proposed treatment areas if no action was taken. The density measurement indicators used below can be used in determining stand health, and productivity. The density measurements mentioned below can also be used to evaluate the stands vulnerability to large scale insect disturbances and processes. These measurements are used to determine the stands response to thinning in both the long- and short-term. The amount of trees present, the species composition and the size of the trees present in the stand indicate the overall health and vigor of the stand. Stands that maintain higher than normal tree densities for their specific plant association have less growth and less species composition. With less growth the health and vigor of the trees decline, making them more vulnerable to insect and disease.

**Table 16. Resulting density levels from FVS modeling of the no action alternative within the moist mix conifer plant communities**

<b>Time After Treatment</b>	<b><sup>1</sup>Basal Area (BA)</b>	<b><sup>2</sup>Stand Density Index (SDI)</b>	<b><sup>3</sup>Trees per Acre (TPA)</b>	<b><sup>4</sup>Quadratic Mean Diameter</b>	<b><sup>5</sup>Average Stand Height (feet)</b>
<b>2016</b>	192	424	1228	6.6	96
<b>2066</b>	288	582	1034	8.0	126
<b>2116</b>	298	544	630	10.6	127

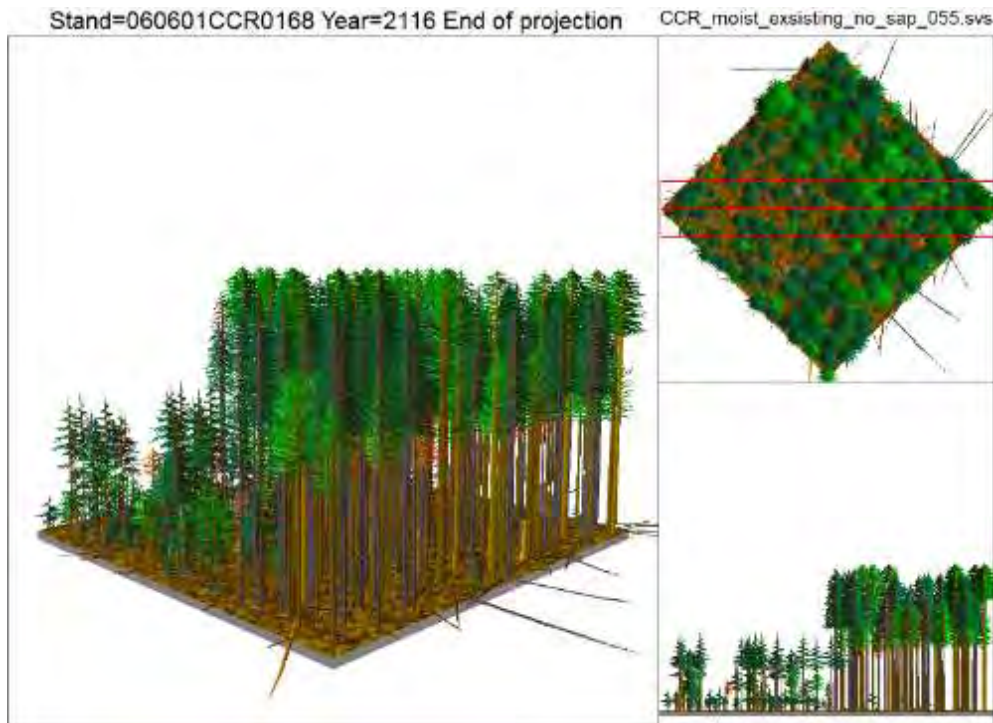
<sup>1</sup>Basal Area is the cross-sectional area of all stems of a species or all stems measured at breast height and expressed per unit of land area.

<sup>2</sup>Stand Density Index is an expression of relative stand density in terms of the relationship of a number of trees to stand quadratic mean diameter

<sup>3</sup>Trees per acre is the average number of stems within an acre.

<sup>4</sup>Quadratic mean diameter is the diameter corresponding to the tree of arithmetic mean basal area, or average diameter by basal area. The use of the quadratic mean gives greater weight to larger trees and is equal to or greater than the arithmetic mean.

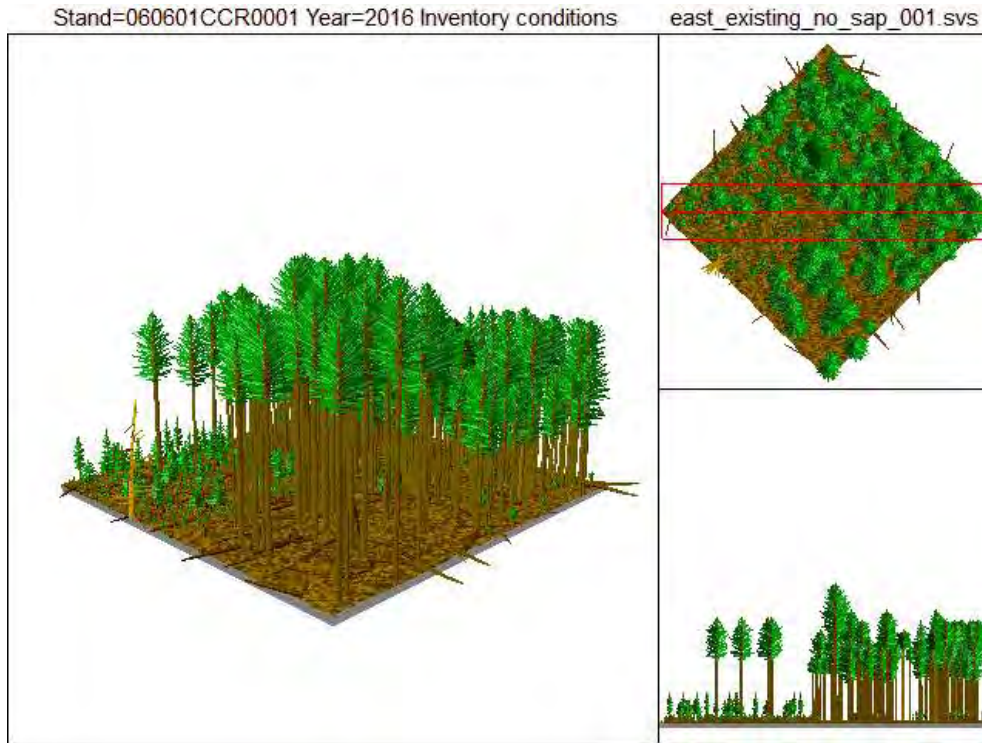
<sup>5</sup>Average stand height is the height of the dominant and co-dominant trees within the stand.



**Figure 17. Projected stand structure 100 years after no treatment is applied with in the moist mix conifer plant communities**

**Table 17. Resulting density levels from FVS modeling of the no action alternative within the dry mix conifer plant communities**

Time After Treatment	Basal Area (BA)	Stand Density Index (SDI)	Trees per Acre (TPA)	Quadratic Mean Diameter	Average Stand Height (feet)
2016	200	396	755	8.4	104
2066	260	479	555	10.2	115
2116	280	497	460	11.3	112



**Figure 18. Projected stand structure 100 years after no treatment is applied with in the dry mix conifer plant communities**

## Proposed Action – Direct and Indirect Effects

### ***Landscape Scale***

The total effects for this project would be minimal. The total acreage treated by thinning in the Proposed Action is approximately 13,262 acres. This is around 55% of the proposed project area and represents 7% of the white river watershed. Because the Proposed Action alternative treats a large portion of the dense dry mix 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. Insect and disease intensity 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.



### **Site-Specific Scale**

The Proposed Action would thin from below with a variable density thinning on 13,262 acres. 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 a more open less dense conditions stand reinitiation or open mature stages within both moist mix conifer and dry mix conifer. These conditions would have moderate to low canopy cover with large enough openings to stimulate natural regeneration of shade intolerant tree and shrub species within both plant community types. Species diversity in the overstory, seedlings and saplings and shrub layer is essential to the six dominate plant associations mainly present in the treatment areas. In the short-term, overstory species diversity would remain limited. Over time as a diversity of species regenerates and gets established the overstory diversity would increase. With the use of larger (1 to 5 acre) openings, more shade-intolerant trees and shrubs species can become establish.

In variable density thinning, selected trees of all sizes down to saplings (i.e., 3-inches or less in diameter) would be removed. The focus would be on leaving the most vigorous, healthiest trees and favoring shade intolerant 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 (both thinning and burning activities) the stand structure would be moved towards a multistory late seral stage with vegetation treatments the stand would be mosaic of understory reinitiation and mature open and closed stand structures. Over time stand density will move back into current conditions with stand structure and composition having more diversity of overstory and understory of tree and shrub species. Modeling shows that to maintain the defensible space within the moist mix conifer plant communities a re-entry thin would be needed every 20-30 years dependent on site conditions. Re-entry thin would also be need in the dry mix conifer communities every 50-60 years depending on site conditions and/or high frequency of low intensity fire occurrences.

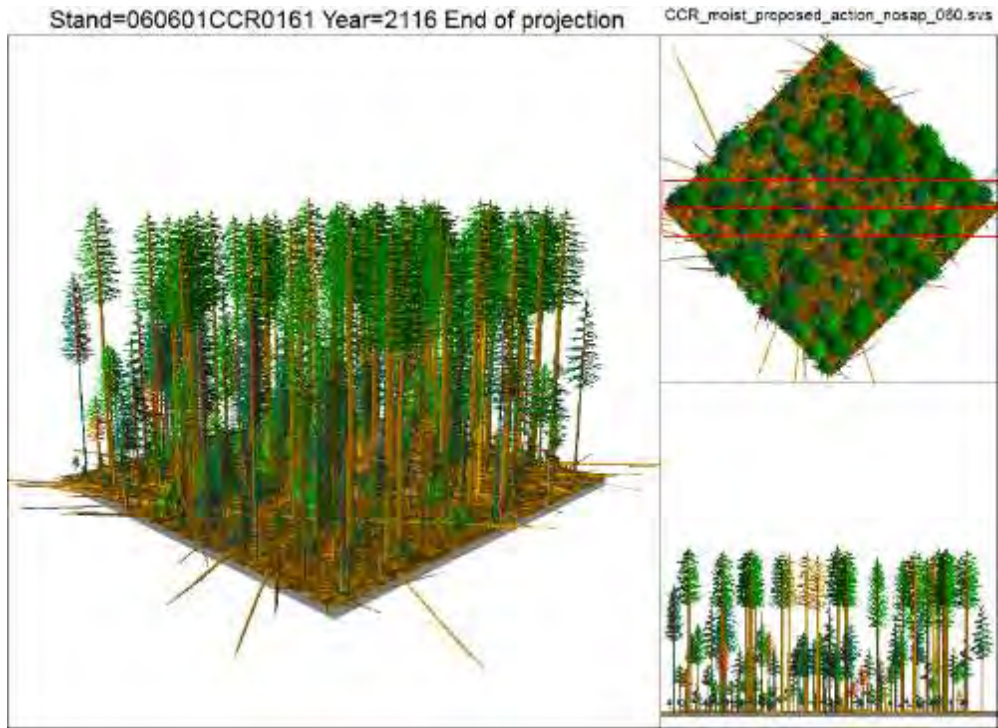
With vegetation treatments, the QMD would increase over time from 6.6 to 11.4 inches DBH in moist mix conifer and 8.4 to 12.8 in dry mix conifer. This is indicative of stands that have regeneration occurring through time. Stands QMD is fluctuating to reflect the ingrowth of smaller diameter trees that begin to contribute to the stand BA. The stand heights continue to grow through time from an average of 72 feet to 134 feet in moist mix conifer and 80 to 105 feet in dry mix conifer. The stands TPA and BA also continue to increase indicative of stands with multiple regenerations. Also fluctuating over time are the SDI from immediately after treatment of 193 moist mix conifer and 173 in the dry mix conifer. (Refer to Table 18 and Figure 19 and Figure 20. Projected stand structure immediately and 100 years after treatment is applied within the moist mix conifer plant communities and Table 18 and Figure 21 and Figure 22. Projected stand structure immediately and 100 years after treatment for treatment area densities within dry mix conifer). What these density measurement indicators are used for is evaluating the stand health and productivity over time. The density measurements mentioned below can be used to evaluate the stands vulnerability to large scale insect disturbances and processes. These measurements are used to determine the stands response to the thinning in both the long- and short-term. The amount of trees present, the species composition, and the size of the trees present in the stand indicate the overall health and vigor of the stand. Stands that maintain higher than normal tree densities, for their specific plant association, have less growth, and less species composition. With less growth the health and vigor of the trees decline, making them more vulnerable to insect and disease. In the short term stand densities and species composition in both the moist mix conifer and dry mix conifer create defensible and move the stands towards more historic species composition and structure.

**Table 18. Resulting density levels from FVS modeling of the Proposed Action within moist mix conifer plant communities**

Time After Treatment	Basal Area (BA)	Stand Density Index (SDI)	Trees per Acre (TPA)	Quadratic Mean Diameter	Average Stand Height (feet)
2016	106	193	200	10.2	72
2066	280	595	1023	7.3	117
2116	300	526	476	11.4	134



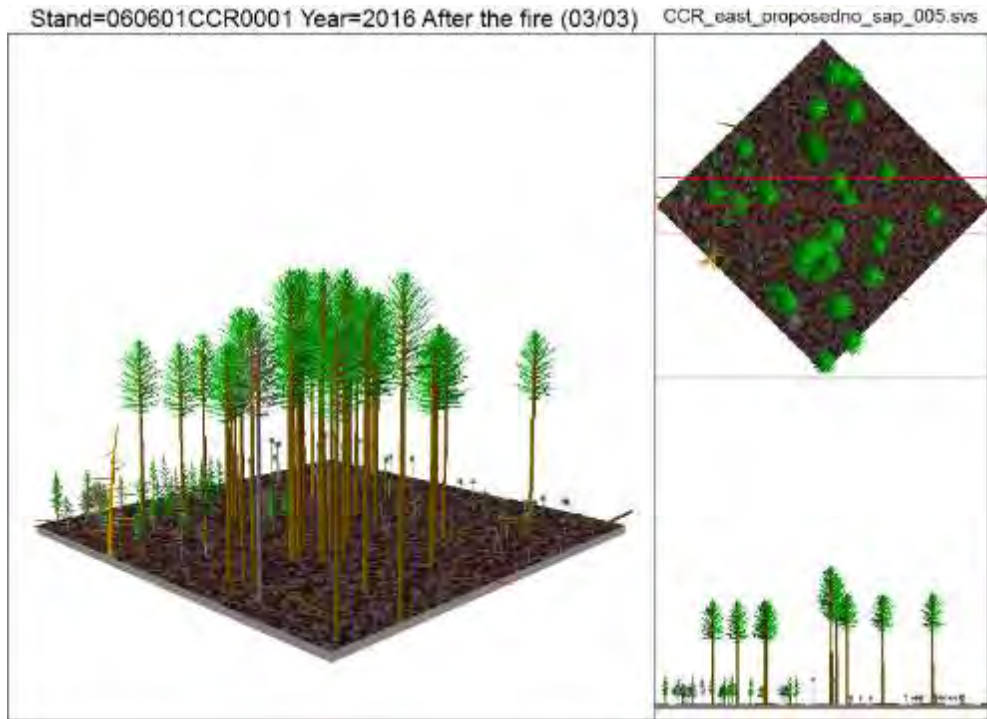
**Figure 19. Projected stand structure after treatment is applied within moist mix conifer plant communities.**



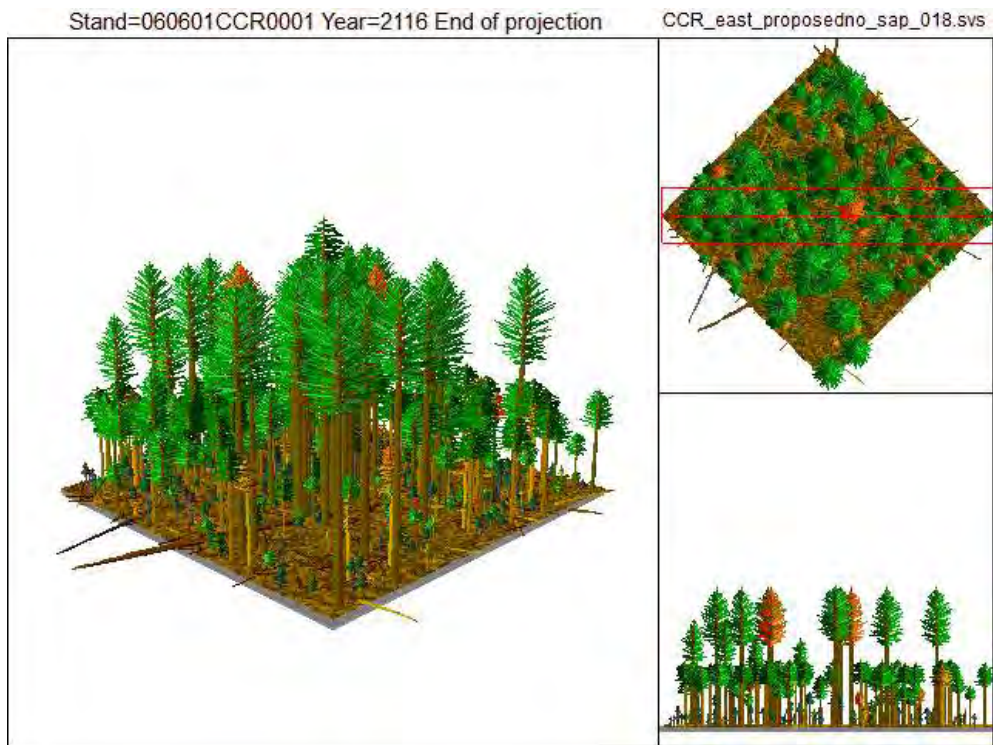
**Figure 20. Projected stand structure 100 years after treatment is applied within the moist mix conifer plant communities**

**Table 19. Resulting density levels from FVS modeling of the Proposed Action within dry mix conifer plant communities**

Time After Treatment	Basal Area (BA)	Stand Density Index (SDI)	Trees per Acre (TPA)	Quadratic Mean Diameter	Average Stand Height (feet)
2016	100	173	150	11.6	80
2066	249	473	562	9.0	95
2116	280	466	330	12.8	105



**Figure 21. Projected stand structure after treatment is applied within dry mix conifer plant communities**



**Figure 22. Projected stand structure 100 years after treatment is applied within dry mix conifer plant communities**

### **Residual Stand Conditions**

There is a short-term increased risk of bending and breakage of the residual trees from snow loading or windthrow. Trees that have grown for many decades in densely stocked conditions and are relatively small in diameter as a result (i.e. <9-inches diameter at breast height) are often more vulnerable to these effects if a thinning occurs and the surrounding “supporting” trees are removed. However, it is not expected that these effects would be significant in this area. Tree diameters would vary, but many, if not most, trees would be of large enough diameter and strength to withstand the effects of winds and snow. In locations of higher blowdown potential (i.e. ridge tops) treatments may vary to reflect the need to provide support trees around our desired leave trees.

In utilizing mechanized equipment there is some risk of damage to residual trees from equipment strikes. However, residual tree spacing would be sufficient to allowing machinery adequate room to maneuver; and therefore, should be able to avoid any appreciable damage to residual trees.

Within thinning units there would be little 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 runs).

### ***Ecological Processes and Disturbances***

Within the proposed treatment areas the canopy closure would be reduced from 70% to 50% in the moist mix conifer and 65% to 40% in the dry mix conifer on average (FVS runs). By creating less dense stands with less tree competition, residual trees would benefit from the increased availability of sunlight, nutrients and water. With the increase of available nutrients, trees should be more vigorous and less susceptible to large scale insect outbreaks. Small scale insect outbreaks would continue still including the balsam wooly adelgid do to availability of noble fir in plantations. Treatments would favor removal of susceptible species to the adelgid, root rot, and other less fire resistant species to create stands that would help moderate the outbreaks. Also, with healthier more vigorous trees, mortality would be more endemic to small scale disturbances. With lower SDI most stands would be moved into the targeted lower management zone which slow the stands from reaching the upper management and overstocked zone. The delay in the stands moving into the overstocked zone would lower the risk of density related mortality and insect and disease activity.

A direct reduction in dwarf mistletoe populations would occur within treatments areas under this alternative. This would occur mostly because many of the trees parasitized by dwarf mistletoe would be removed from the site in the thinning treatment. Dwarf mistletoe would not be eradicated from the project area due to the minimal acres being treated.

Thinning and small patch openings would reduce root to root contact and promote the growth of species in the stands that are resistant or have an increased tolerance to root disease. 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 small patches of forest would be restored to include a component of historical species with natural resistance (Carlson et al. 1995). Treating the 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 associated with the plant association while improving the stand resilience and forest health.

### **Summary of Effects by Alternatives**

Table 20 and Table 21 compare the action and no action alternatives for both the moist and dry mix conifer plant communities. Compared to the No Action alternative, the Proposed Action would in the short term reduce the trees per acre, basal area, and SDI while still increasing stand QMD. Lower TPA

and BA result in stands that mimic more natural conditions for these plant associations and create defensible space around the WUI and strategic roads and ridge tops in defense during a large scale disturbance. Increased diameters and tree heights would move the stands towards late successional characteristics. The stands would also be less vulnerable to large insect and disease outbreaks. With the use of variable density thinning, the stands would be moved towards a more sustainable vegetative condition in regards to species composition and stand structure. Larger openings would increase the regeneration of shade intolerant tree and shrub species. Within the openings, new age classes would be established moving the stand towards a multi-aged stand. Over time lower densities and larger tree heights are maintained in the Proposed Action versus No Action alternative within the first fifty years of treatment. The QMD of the Proposed Action would lower, due to the variety of size classes thinned and because created openings would contribute to an increase in small tree establishment. These small trees would contribute to the stand BA thus lowering the overall QMD. Again, the use of the quadratic mean gives greater weight to larger trees.

**Table 20. Differences between the action and no action alternatives from FVS modeling within the moist mix conifer plant communities**

Time After Treatment	BA		SDI		TPA		QMD		Average Height	
	No Action	Action	No Action	Action	No Action	Action	No Action	Action	No Action	Action
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

**Table 21. Differences between the action and no action alternatives from FVS modeling within the dry mix conifer plant communities**

Time After Treatment	BA		SDI		TPA		QMD		Average Height	
	No Action	Action	No Action	Action	No Action	Action	No Action	Action	No Action	Action
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

### 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 10 at the beginning of Chapter 3 in the CCR Project EA for a summary of all possible activities that were considered in this cumulative effects analysis for vegetative conditions. Only the vegetation related proposed projects in the CCR project that have direct or indirect effects are included in the cumulative effects analysis. The spatial context for the following cumulative effects analysis is the landscape and site-specific area as described previously in the existing conditions. The temporal context depends on the past, existing or future project/activity and if there is an overlap in time from an effects perspective.

There are no direct or indirect effects that would cumulate from other projects due to the minimal amount of area being treated. The total acreage treated by thinning in the Proposed Action is approximately 13,262 acres. This is around 7% of the White River watershed and represents with past and foreseeable future activities. Therefore, the total cumulative effects at the landscape scale for this project would be very nominal, and no cumulative effects are expected as a result the proposed projects to the vegetation



resource. At the project scale approximately 55% of the proposed project area is proposed for treatment. There is approximately 12,000 acres of dry mix 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 mix conifer plant communities we are moving more than half of the available dry mix conifer acres towards historical conditions from which fire could play a vital role in maintaining stand health, composition and structure.

### **3.1.4 Consistency Determination**

#### **NFMA Findings for Vegetation Manipulation**

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

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 Best Management Practices, these methods would be sufficient to protect soil and water resource values.

Finding: As described above within this report, 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 (USDA Forest Service 1990), as amended.

#### **Mt. Hood Forest Plan**

##### ***Suitability for even-aged management***

Even-aged management is the effective way to manage dwarf mistletoe and root disease, based on Forest Plan direction found in Forestwide Standards (FW) 316 and 317, C1-019 through C1-021, and C1-024. Project design criteria/mitigation measures, such as patch openings and risk of windthrow, are written into the design of the Proposed Action in order to meet Forest Plan direction.

##### ***Suitability for reforestation***

Forest plan guidelines advise timber harvesting shall be completed in a fashion that reasonably assures each harvest area can be adequately restocked within 5 years after final harvest (FW-358). Interplanting would be used to maintain genetic quality and desired species composition (FW-332).

Finding: The proposed treatments would be consistent with all of the above mentioned standards and there is no mandatory reforestation.

## 3.2 Fuels Management

### 3.2.1 Analysis Assumptions and Methodology

The intent of this report is to analyze how the fuels resources would be affected by the Proposed Action. Professional judgment and stand level data was utilized in determining the project's potential effects. Effects analyses were based on several components outlined in the following sections. Fire behavior for the existing condition of CCR Planning area has been predicted by using a number of state of the art tools.

#### ***Common Stand Exams***

As part of the initial data gathering for this project, Common stand exams (CSE) were conducted within the project area. CSE provides one set of national data collection protocols, data codes, portable data recorder software, forms, reports, and export programs. All stand examination data is stored in a common database structure, Field Sampled Vegetation (FSVeg). Data from multiple Districts, Forests, Regions, and participating Agencies can be analyzed with ease. The CSE protocols are used to collect stand, plot, tree, surface cover, vegetation, and down woody data. This data is stored in FSVeg along with strategic grid data, insect and disease study data, Forest Inventory and Analysis (FIA), and re-measured growth plot data.

#### ***Forest Service Vegetation (FSVeg) Module***

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

#### ***Forest Vegetation Simulator (FVS) East Cascade Variant***

The Forest Vegetation Simulator (FVS) is a distance-independent, individual-tree forest growth model. Stands are the basic projection unit, but the spatial scope can be many thousands of stands. The temporal scope is several hundred years at a resolution of 5–10 years (Crookston, 2005). FVS was used to interpret data collected utilizing the CSE. FVS is a growth and yield model used for predicting forest stand dynamics that is used extensively in the United States. FVS is the standard model used by various government agencies, including the U.S. Forest Service. Forest managers have used FVS extensively to summarize current stand conditions, predict future stand conditions under various management alternatives, and update inventory statistics (USDA, 2008). Do to known limitations with FVS other analysis tools are used in determining the project's potential effects. Some of these limitations are but not limited to the model not modeling natural regeneration outside of sprouting tree species. Due to this limitation regeneration is artificially simulated using trends from the local area to predict how the stands regeneration will react to proposed treatment vegetation treatments. The use of artificial regeneration may change depending on modeled fire activities to better simulate current stand conditions and predicted stand conditions once fire fuels treatments are completed Also the model is not directly sensitive to environmental changes such as increasing temperatures, changes in rainfall, and changes in atmospheric CO<sub>2</sub>, FVS is insensitive to climatic changes that can influence tree geography, and for fuels management actions in reducing fire hazard is that it is a stand-level model, not sensitive to spatially dependent fire behavior (Crookston, 2005).

**FVS Fire and Fuels Extension**

The Fire and Fuels Extension is an extension for FVS (FFE-FVS) which simulates fuel dynamics and potential over time (Rebain 2015). The model was used to assist with fuel model selections and determine canopy characteristics for modification of the landscape file used by FlamMap. Post treatment changes in canopy characteristics were expressed as a proportion based on treatment type then applied to the landscape file. Emissions outputs of particulate matter from prescribed burning and pile burning are utilized in the Air Quality section of this report.

Discontinuous behavior of FVS also presents challenges for fuel analysis. This results in sudden shifts in some fire behavior indicators as sudden waves of regeneration occur within a stand. In the instance of regeneration, sudden canopy base heights may be reduced, leading to a decrease in the crown index (Rebain 2015). Although intentional within the model, the outputs are exaggerated as regeneration and natural mortality occur on the cycle boundaries (Rebain 2015). When regeneration and fuels treatments are placed within the same cycle, the effects of the fuels treatments may be masked by a sudden burst of regeneration at the cycle boundary. To mitigate for this burst, regeneration was curtailed during the fuels treatment cycle and next cycle within FVS model runs for fuels analysis. However, the method of all treatments being applied simultaneously does lend itself to the quantification of effects of actions across the treated stands.

**Fire Family Plus**

Fire Family Plus is a suite of models that process weather data in order to determine fire danger and climatological break points. Fire Family Plus was used to determine a low and moderate fuel moisture scenario with regards to fuel moistures and wind speeds for use in FlamMap. Weather data was obtained from the Wamic Mill remote automated weather station which is located 8.5 miles to the north of the project area. The following analysis period was used for determining fuel moistures: June 15-October 15, 1997-2016. Two fuel moisture scenarios (FMS) were developed for 1, 10, and 100 hour fuels. The low fuel moisture scenario is based on 10th percentile fuel moistures and 95th percentile wind speeds. The moderate fuel moisture scenario is based on 45th percentile fuel moistures and mean wind speeds. Current mid-flame wind adjustment factors are lacking (Massman et al. 2017) and methods by which wind speed is measured are insufficient for wildfire modeling and prediction. Therefore, ten minute average wind speeds and gusts speeds were averaged to achieve a reasonable mid-flame wind. Table 22 displays the fuel moistures and wind speeds used as inputs for fire behavior prediction. Mid-flame wind speed is calculated in FlamMap and reflects adjustments based on canopy cover. Important note: figures in this section will show scenarios with high fire danger and moderate fire danger, these should be taken to mean low fuel moisture and moderate fuel moisture respectively. Both for the purposes of this fuels analysis and this section. Fire danger is somewhat ambiguous term without proper context of the index used to determine said fire danger and should be used primarily in the context of the National Fire Danger Rating System.

**Table 22. Fuel moisture scenarios for fire behavior modeling**

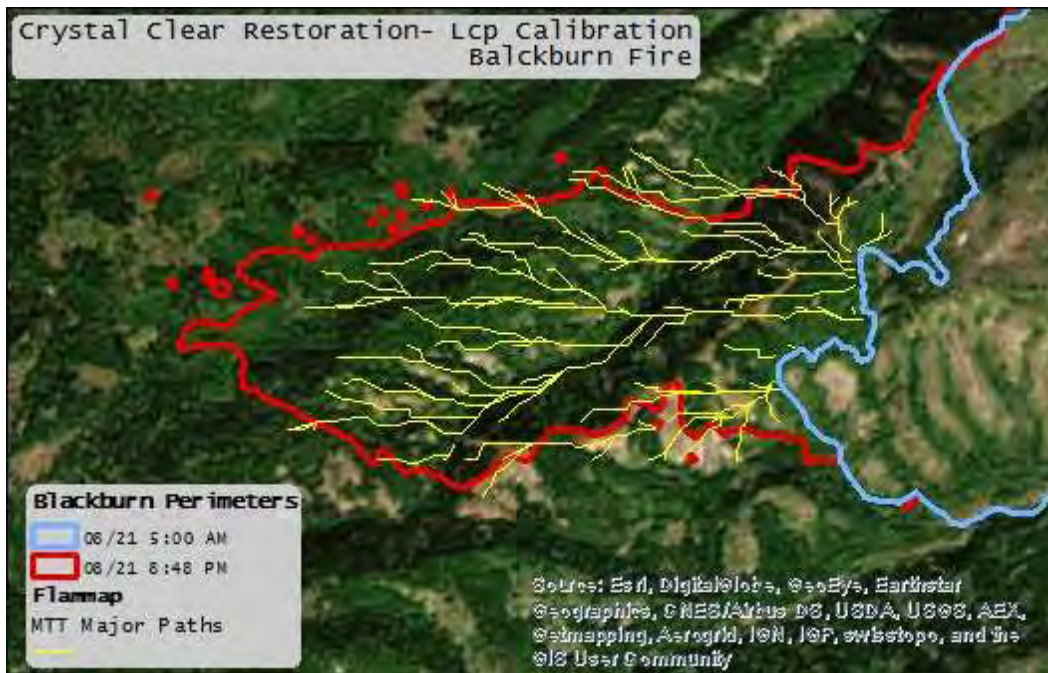
<b>Fuel Moisture Scenario</b>	<b>1 Hour</b>	<b>10 Hour</b>	<b>100 Hour</b>	<b>Wind Speed (mph)</b>	<b>Mid-Flame Wind Speed (mph)</b>
<b>Low</b>	3	4	6	15.5	1.5
<b>Moderate</b>	5	6	8	7	.07

## FlamMap

FlamMap is a spatial fire behavior and analysis program used to describe fire behavior potential using a landscape (LCP) file, fuel moisture, and weather data (Stratton 2009). The LCP is a series of spatial raster datasets that include data for elevation, slope, aspect, fuel model, canopy cover (CC), canopy height (CH), canopy base height (CBH), and canopy bulk density (CBD). This data can be created or obtained via LandFire at [www.landfire.gov](http://www.landfire.gov). Weather and fuel moisture are held constant for the duration of the simulation (Stratton 2006). FlamMap basic outputs do not determine spread across a landscape, but rather calculate potential fire behavior for each pixel across the landscape. This allows for even comparison of pre and post treatment results.

FlamMap is limited in spatial and temporal context. All treatments are applied evenly through the stand and they occur simultaneously. This results an instantaneous and simultaneous shift in fire behavior potential across all treatment units; similar to the discontinuous behavior of FVS. While burning landscape in the analysis area is beneficial for comparison and quantification of treatment effects, it lacks the ability describe potential fire behavior changes from adjacent treatment areas or sequential treatment (Finney 2003).

The Minimum Travel Time (MTT) module within FlamMap is a two-dimensional model of fire behavior and growth model (Seli et. al 2015). With MTT FlamMap can be used to predict fire spread and project boundaries of large fires (Ager et Al. 2010). MTT lends itself well to calibration of fire growth against short term events. There are limitations to calibration via this method. Primarily the sample is relatively small and short in duration, in most cases and as in this case, a single event. However, calibration of even short events is preferred to no calibration and increases confidence in outputs (Stratton 2009).



**Figure 23. Calibration of LCP using Blackburn Fire**

For this analysis the Blackburn fire (part of Government Flat Complex) of 2013 which burned into similar fuel types as it reached National Forest lands was used for calibration (Figure 23). Fuel moistures during the Blackburn fire were similar to those identified in FireFamily Plus weather analysis for the low fuel moisture scenario, which were used in calibration. This limited the calibration scope to just the LCP, primarily, CBD. Adjusting CBD, CBH, and CC are frequently needed when modeling wildfires using

LandFire data. A known section of unchecked fire edge from the 8/21/2013 0500 perimeter was used as an ignition point. The resulting major pathways fit well with the known perimeter of that evening. Overall the model outputs were found to be acceptable based on known fire behavior characteristics, burning period, and burning conditions. The LCP file used for this run was then used as the existing condition LCP for all subsequent runs with modifications being determined by FVS outputs to CBD, CBH, and CC. Fuel models changes are based upon observations from previous treated areas in similar fuel types (see Scott and Burgan 2005). For this report, images (maps) and tables displaying CBD, CBH, CC, and fuel models originated as LandFire and were modified as previously stated.

### ***Additional Models and Tools***

ArcFuels was used to process raster outputs from FlamMap and as a workflow (see Vaillant et al. 2013). The Landscape Editor in the Wildfire Decision Support System was used to make edits to the LCP for existing and post treatment conditions (see WFDSS 2017). In conjunction with FireFamily Plus, Real Statistics Resource Pack was used for descriptive statistics and percentile determination during weather and fuel moisture analysis (see Zaiantz 2015).

## **3.2.2 Existing Conditions**

Historically, dominate disturbance regimes in mixed-conifer forests took the form of wildfires, insect, disease, and weather (Stine et al. 2014). With Euro-American settlement a new disturbance regime arrived in the form of timber harvest, development of transportation infrastructure, fire suppression and grazing. The combination of timber harvest and fire suppression has led to denser mixed conifer forests with a greater number of small, fire-intolerant tree species with fewer large, fire-tolerant trees species than were historically present (Hessburg and Agee 2003, Hessburg et al. 2005).

### ***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 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.

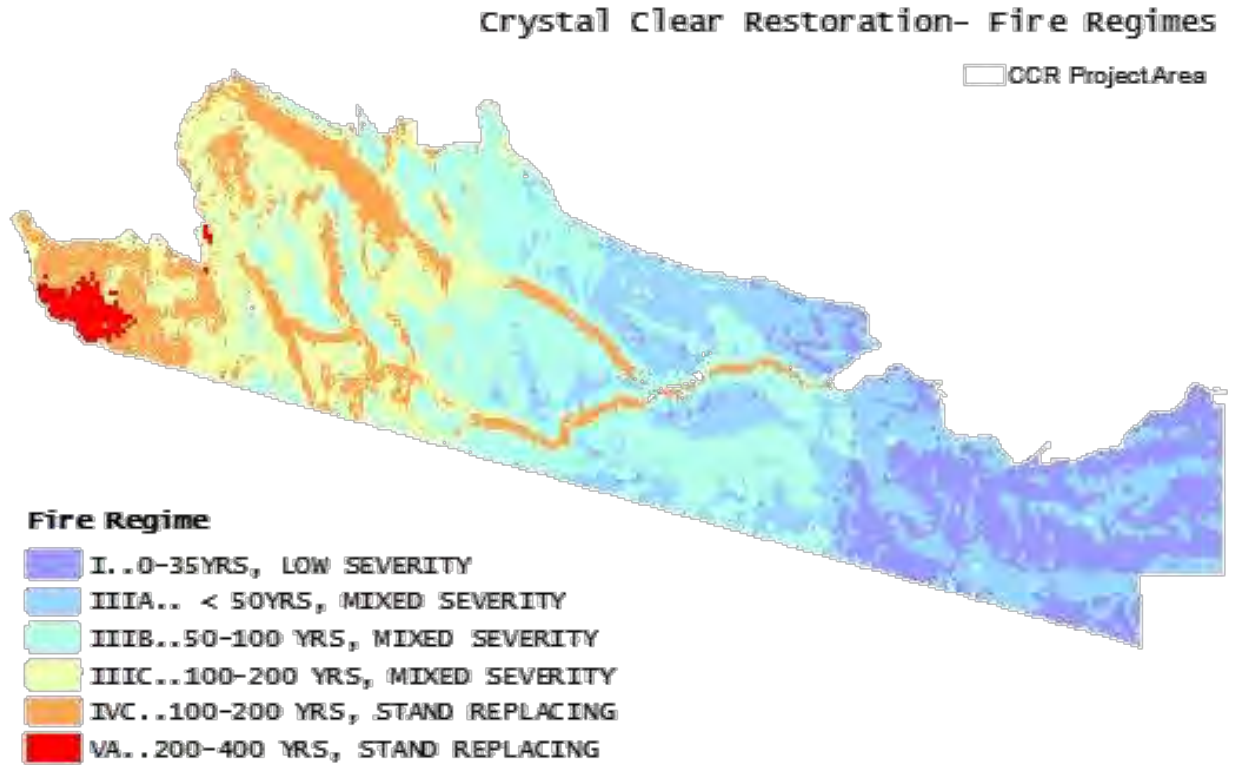


Figure 24. Fire Regime within CCR Project area

Table 23. Fire Regimes within CCR 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%
IIIC	100-200	Mixed	17%
IVC	100-200	Stand Replacing	13%
VA	200-400	Stand Replacing	1%

Fire regime condition class is a measure of departure from reference conditions expressed as a percentage. These percentages are binned to show FRCC as numerical value between 1 and 3 with 1 being least departed and 3 being most. Specifically FRCC 1 is less than 33% departed from reference conditions, FRCC 3 is greater than 66% departed from reference conditions, and FRCC 2 representing values between 33% and 66% (Hann et al. 2008). The departure can be a wide array of ecosystem, vegetation, or fuels characteristics including fire frequency, severity, and pattern (Hann et al. 2008). It is important to note the cause of departure is not limited to natural processes, e.g. disease infestation, may change the departure, so too could timber harvest, grazing, etc. Figure 25 and Table 24 show and summarize the FRCC for the CCR project area as determined by Rice and others 2006). Displayed is Stratum FRCC Departure which represents the percent departure from reference conditions within a Biophysical Setting (BpS). This allows for finer interpretation of results, and reduces the “blocky” nature of only three classes.

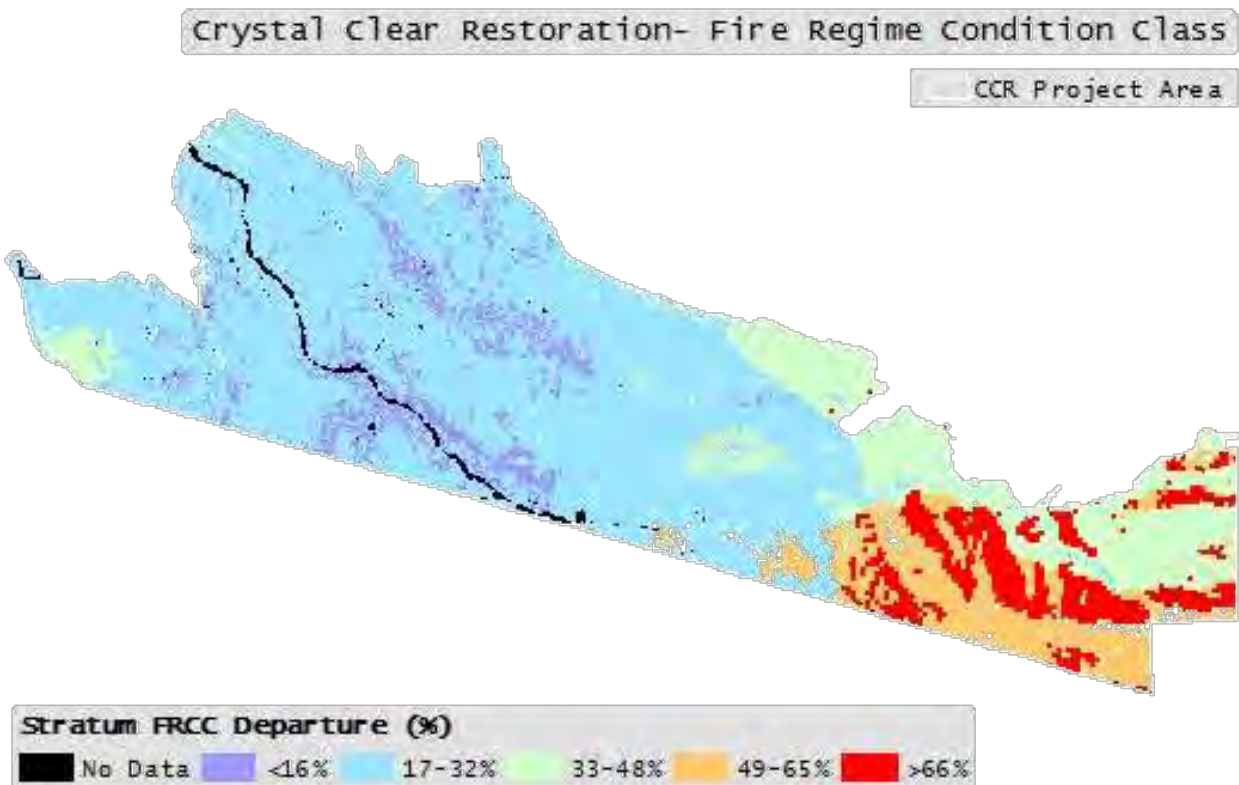


**Table 24. Stratum FRCC Departure (%) as proportion of area by treatment and all (Fuels Treatment Forest Health)**

Treatment	<=16%	17-32%	33-48%	49-65%	>=66%
Dry Fuel Treatment	2%	26%	33%	4%	35%
Dry Forest Health	4%	47%	29%	6%	15%
Moist Fuel Treatment	10%	85%	5%	0%	0%
Moist Forest Health	12%	85%	3%	0%	0%
Project Area	8%	61%	16%	2%	13%

During a phone interview conducted on 03 April 2017 Jane Kurtis stated the FRCC for sites at mid and higher elevations is likely higher due to changing conditions since the analysis has taken place. She also stated that changes in FRCC are unlikely at this scale as the analysis is based upon 5<sup>th</sup> field HUC. Finally, data for BpS was not available south of the project area at the time.

This FRCC analysis is likely more useful for the designation of fire regimes, rather than condition class at this time.



**Figure 25. Stratum FRCC Departure (%) within CCR Project area**

### Fuel Models

Fuel models for this analysis were selected from Scott and Burgan (2005). While the original 13 fuel models are still valid, their intended use is for the most severe portions of the wildfire season when fires are the most resistant to control (Anderson 1982). The *new 40* are better suited to use for fuels treatment

and potential fire behavior (Scott et al. 2005). Fuel model selection is less about images and loadings, though these are important, than it is about matching expected and observed fire behavior. TU5, described below, tends to fit well with fire behavior on Mt Hood based on modeling for several wildfires across the forest. Fuel models were left untouched during calibration of FlamMap, favoring instead manipulation of canopy characteristics. Fuel models outside of the project area were not evaluated for accuracy except for those used in calibration on the Blackburn fire. The primary fuel models within the CCR project area are summarized in Table 25 by project area and treatment units.

**Table 25. Existing primary fuel models as a proportion of project area and all treatment areas.**

	<b>GS2</b>	<b>TU1</b>	<b>TU2</b>	<b>TU5</b>	<b>TL4</b>	<b>TL5</b>
<b>Project Area</b>	2%	7%	3%	81%	2%	2%
<b>All Treatments</b>	2%	4%	3%	81%	3%	2%

Below are descriptions for the fuel models within the CCR project area. Those that are described as dynamic are fuel models where a live component plays an appreciable role in fire behavior.

GS2- is a dynamic moderate load, dry climate grass-shrub model. The primary carrier of fire is grass and shrubs. Rate of spread (ROS) can be high, intensity is low, and flame lengths tend to be moderate.

TU1- is a dynamic low load, dry climate timber, grass, and shrub model. The primary carrier of fire is grass or shrubs and litter. ROS is low, as are flame lengths.

TU2- is moderate load, humid climate timber and shrub model. The primary carrier of fire is litter and shrubs. ROS is moderate and flame lengths are low.

TU5- is high load, dry climate timber and shrub. The primary carrier of fire is litter, shrubs and understory trees. ROS is moderate as are flame lengths.

TL4- is generally comprised of small downed woody material. The primary carriers of fire are litter and downed woody material. ROS is low as are flame lengths.

TL5- is high load conifer litter. The primary carriers of fire are conifer litter, light slash or downed woody material. ROS is low as are flame lengths. Similar to TL4 but with higher loads of fine fuels.

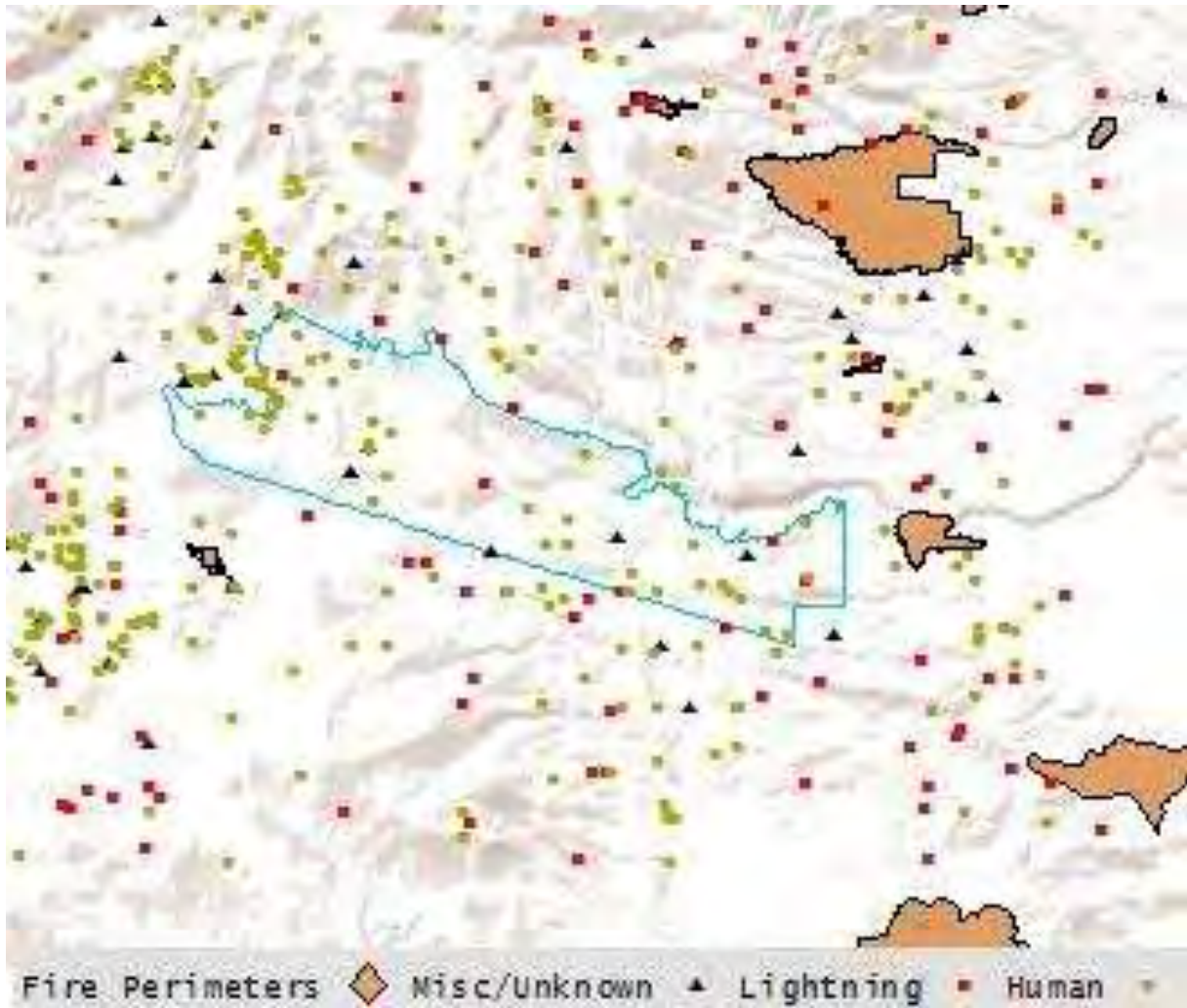


Figure 26. Existing conditions Scott and Burgan (2005) fuel models within the vicinity of CCR

### ***Fire History***

Fire origin data (point date) for the fire history in the vicinity of CCR were obtained from Short (2015) (Figure 27). These data are obtained from numerous federal, state and local fire organizations. The data is updated every other year, as such it does not represent the most current data available; it is the most comprehensive and quality controlled data available for multiple agency fire history on a large scale.





**Figure 27. Fire ignitions (1992-2013) within CCR vicinity as points. Polygons of large fires in greater vicinity**

Fire history perimeters (polygons) were obtained from the Northwest Coordination Center and USFS fire history. Perimeter dates ranges from 1994-2015, with the exception being the Rocky fire in 1973 (Figure 27, Table 26). Note, not all large fires have perimeter data as perimeter data standards vary amongst agencies.

**Table 26. Large fires within vicinity of CCR. Agencies- MHF- Mt Hood National Forest, ORST- State of Oregon, WSA- Confederated Tribes of Warm Springs**

Unit	Disc Date	Cause	Fire Name	Acres
MHF	8/15/1973	Human	Rocky	5097
MHF	7/28/1994	Lightning	Grasshopper	143
MHF	7/4/1997	Human	Highland	130
MHF	5/19/1997	Human	Hazel	56
MHF	7/12/2007	Lightning	Ball Point	1270
WSA	8/17/2010	Unknown	Laughlin	1947

Unit	Disc Date	Cause	Fire Name	Acres
ORST	7/12/2014	Human	White River	651
WSA	7/13/2014	Lightning	Skyline	116

Fires regularly burn in the vicinity of and within the CRR project area. In the vicinity of the CCR planning area over the past 22 years there has been an estimated 345 recorded human caused fires impacting an estimated 3,595 acres. Additionally there have been an estimated 118 fires caused by lightning impacting an estimated 294 acres (Table 27). The human causes of ignition included: smoking, equipment, abandoned campfires, and arson.

The mean fire size is 7.6 acres with a median size of .1 acres. While mean fire sizes can be susceptible to outlying data, they should not be dismissed. Growth of large wildfires tends to occur during few burning periods over the duration of the fire (Ager et al. 2010). Suppression is generally successful as most fires occur near campgrounds, roads or other visible and/or populated places.

**Table 27. CCR fires within vicinity by cause 1992-2013**

	Human		Lightning		Misc./Unknown		Totals	
	Fires	Acres	Fires	Acres	Fires	Acres	Fires	Acres
	345	3595	118	294	51	37	514	3927
<b>Median Fire Size</b>		.1		.1		.1		.1
<b>Mean Fire Size</b>		10.4		2.5		.7		7.6

### Canopy Structure/Crown Fire Potential

Stand structure plays a significant 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): canopy bulk density (CBD), canopy base height (CBH) and canopy cover (cover). Canopy cover can reduce horizontal continuity of canopy fuels, thereby reducing potential for active crown fire. However, reducing canopy cover can also have the effect of increasing ROS through by allowing solar radiation to dry surface fuels, allowing finer fuels to grow on the forest the forest floor, and reducing the impact of sheltering from wind the canopy provides. CBH is the average height from the ground to the bottom of forested stand’s canopy (LandFire 2017). Reduced CBH provides vertical continuity to stand and allows fire to reach the canopy. This can result in passive crown fire or the initiation of active crown fire (Agee et al. 2005). Agee and others (2005) identified flame lengths approximately half the CBH may induce passive crown fire or torching. CBD primarily acts as a carrier once a fire has entered the crown. While a wind or slope must be present to sustain the active canopy fire, sufficient fuels must also be available. CBD is the measure of those available fuels as a mass of foliage in a given volume of crown ( $\text{kg/m}^3$ ) (Agee et al. 2005). There is no definitive threshold at which CBD will be sufficient to propagate active crown fire. Agee (1996) found a CBD of  $.10 \text{ kg m}^{-3}$  to be a possible threshold in some instances. See Table 28 for existing CBD, CBH, and CC, and Figure 28 for visual of the densities in the dry stands.

**Table 28. Existing mean canopy bulk density (CBD) a  $\text{kg/m}^3$ , canopy base height (CBH) and canopy cover (CC) as % by treatment type or area**

Treatment Type/Area	Existing Mean CBD ( $\text{kg/m}^3$ )	Existing Mean CBH (feet)	Existing Mean CC
All Treatments	0.34	3.5	56%
Project Area	0.37	3.7	60%

Treatment Type/Area	Existing Mean CBD (kg/m3)	Existing Mean CBH (feet)	Existing Mean CC
Dry FH	0.32	3.9	55%
Dry FT	0.31	3.4	52%
Moist FH	0.36	3.1	58%
Moist FT	0.37	3.2	57%



**Figure 28. Dry Stand in the Understory Reinitiation Stage**

### **Fire Behavior**

As stated in the methodology portion of this report, calibration was performed using the Blackburn fire and known existing weather and fuel moisture scenarios. Being able to calibrate to these known weather and fuel moistures allows a more focused analysis of existing conditions and effects of fuels treatments with regard to wildfire behavior. FlamMap provides numerous fire behavior outputs that model fire behavior characteristics; this analysis focuses on canopy fire, flame length, fireline intensity, and rate of spread (ROS). Active crown fire is generally underestimated and transition from passive to active crown fire is a limitation of the model (Stratton 2004).

Two weather/fuel moistures scenarios were utilized, the low fuel moisture and moderate fuel moisture scenarios (Table 22). The low fuel moisture results in more intense fire effects and moderate fuel moist which results in less intense fire behavior.

### **Crown Fire**

**FlamMap crown fire activity results are categorized in three categories, surface, passive crown, crown. Surface fire describes fire that remains on the surface burning litter and surface fuels, it is crown fire. Passive crown fire describes fire that is torching, meaning individual trees or small**



trees burn along with surface fuels. Active crown fire describes a situation in which fire actively spreading through the canopy and along the surface. Independent crown fire, where crown fire is without direct involvement of surface fire is not modeled in FlamMap. It is therefore a poor model heavily lichen draped canopies. Independent crown fire was directly observed on the Dollar Lake Cold Springs fire (Gifford Pinchot National Forest). Table 29 summarizes FlamMap results for both fuel moisture scenarios, by treatment type or area, fire type, total acres and percentage of treatment type or area, and with passive and active crown fire combined as Crown Fire.

Figure 29 and Figure 30 display this information spatially.

**Table 29. Existing fire characteristics acres for both fuel moisture scenarios (FMS) by treatment type or area as (%). \*Crown Fire Acres represents both passive and active crown fire combined**

<b>FMS</b>	<b>Treatment Type/Area</b>	<b>Surface</b>	<b>Passive</b>	<b>Active</b>	<b>*Crown Fire Acres (%)</b>
<b>Low</b>	All Treatments	2252 (17%)	9240 (70%)	1775 (13%)	11015 (83%)
<b>Low</b>	Project Area	4237 (18%)	16631 (69%)	3137 (13%)	19768 (82%)
<b>Low</b>	Dry Forest Health	206 (12%)	1231 (74%)	228 (14%)	1459 (88%)
<b>Low</b>	Dry Fuels Treatment	744 (14%)	4198 (79%)	383 (7%)	4582 (86%)
<b>Low</b>	Moist Forest Health	530 (24%)	1284 (58%)	413 (19%)	1697 (76%)
<b>Low</b>	Moist Fuels Treatment	772 (19%)	2526 (62%)	751 (19%)	3277 (81%)
<b>Moderate</b>	All Treatments	3618 (27%)	9635 (73%)	13 (0%)	9649 (73%)
<b>Moderate</b>	Project Area	7558 (31%)	16415 (68%)	32 (0%)	16447 (68%)
<b>Moderate</b>	Dry Forest Health	292 (18%)	1372 (82%)	0 (0%)	1372 (82%)
<b>Moderate</b>	Dry Fuels Treatment	1300 (24%)	4025 (76%)	0 (0%)	4025 (76%)
<b>Moderate</b>	Moist Forest Health	801 (36%)	1420 (64%)	6 (0%)	1426 (64%)
<b>Moderate</b>	Moist Fuels Treatment	1225 (30%)	2818 (69%)	7 (0%)	2825 (70%)

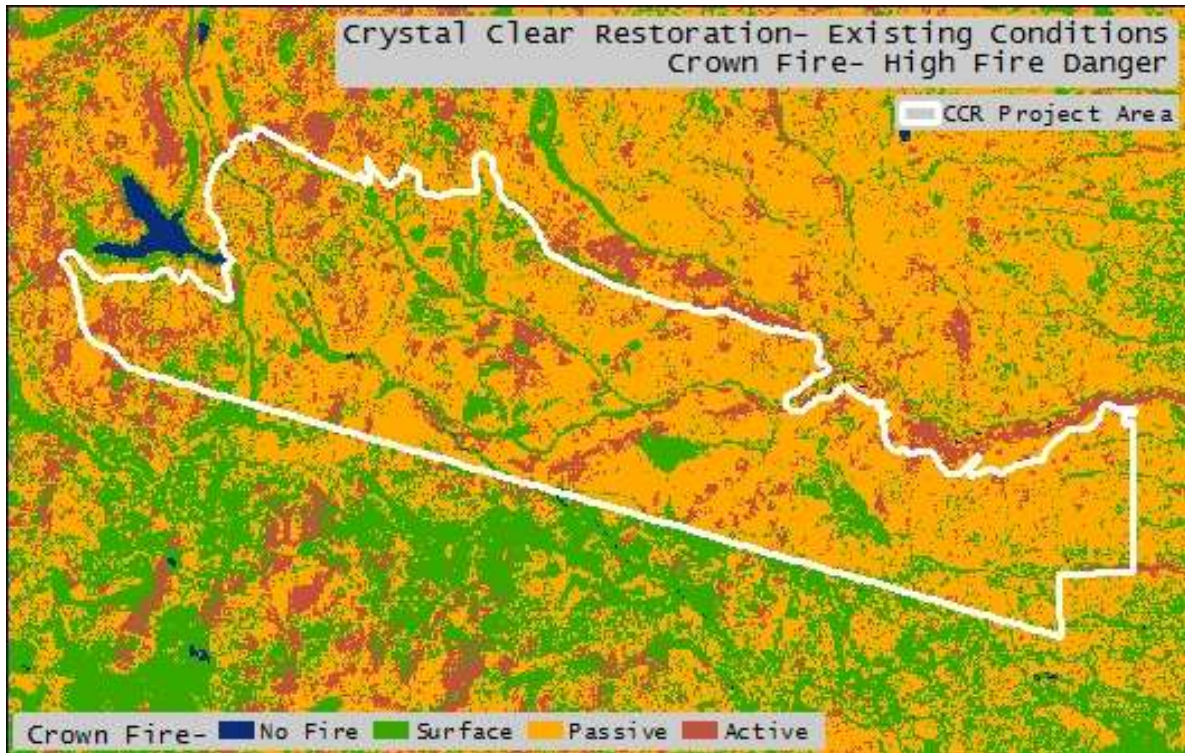


Figure 29. Existing conditions crown fire for low fuel moisture

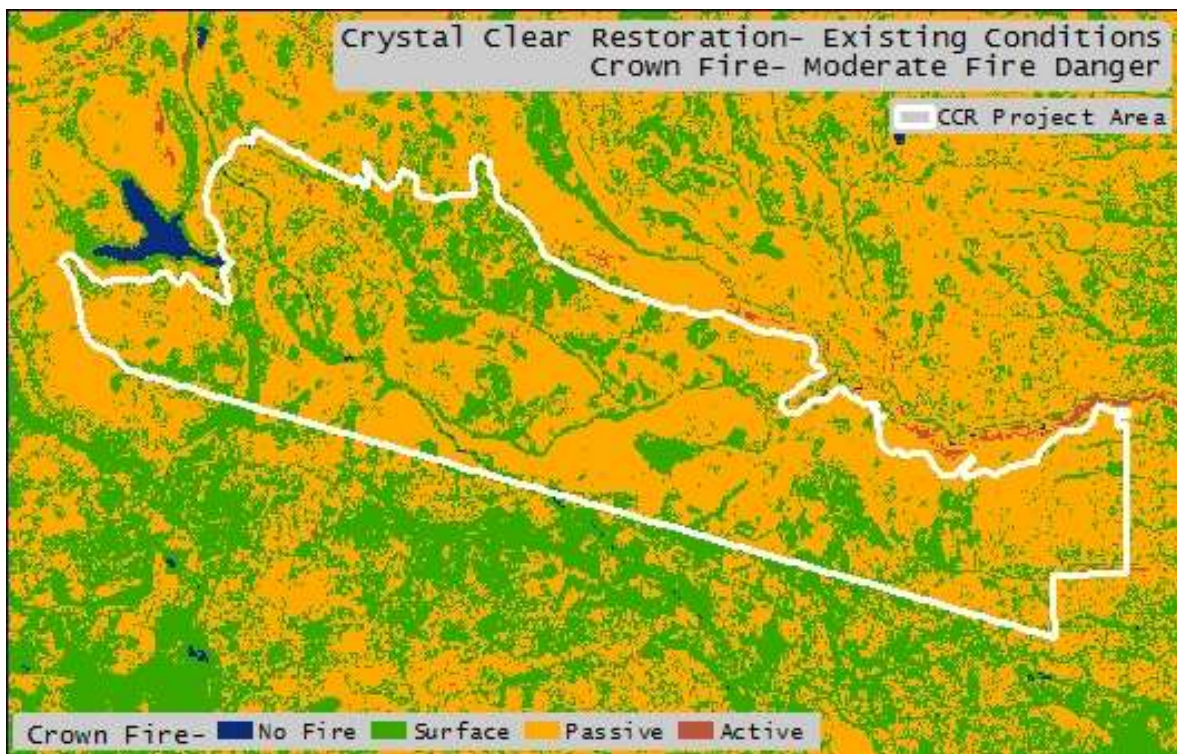


Figure 30. Existing conditions crown fire for moderate fuel moisture

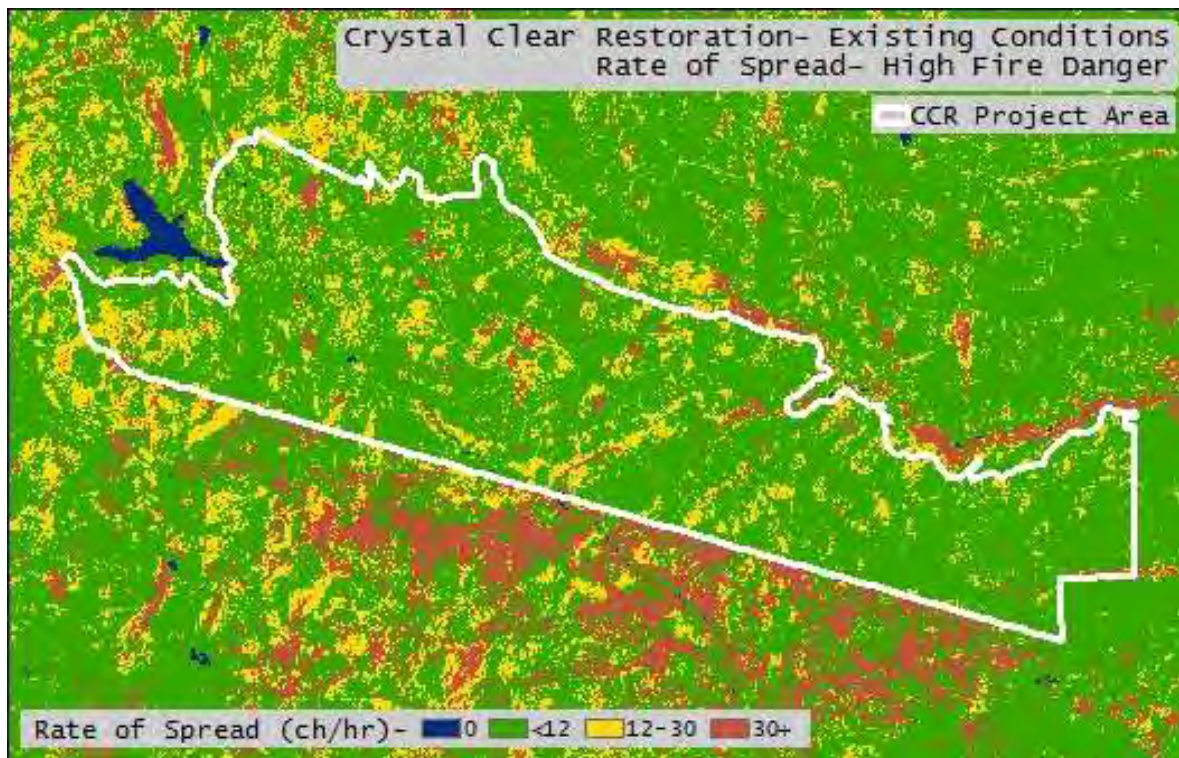


**Rate of Spread**

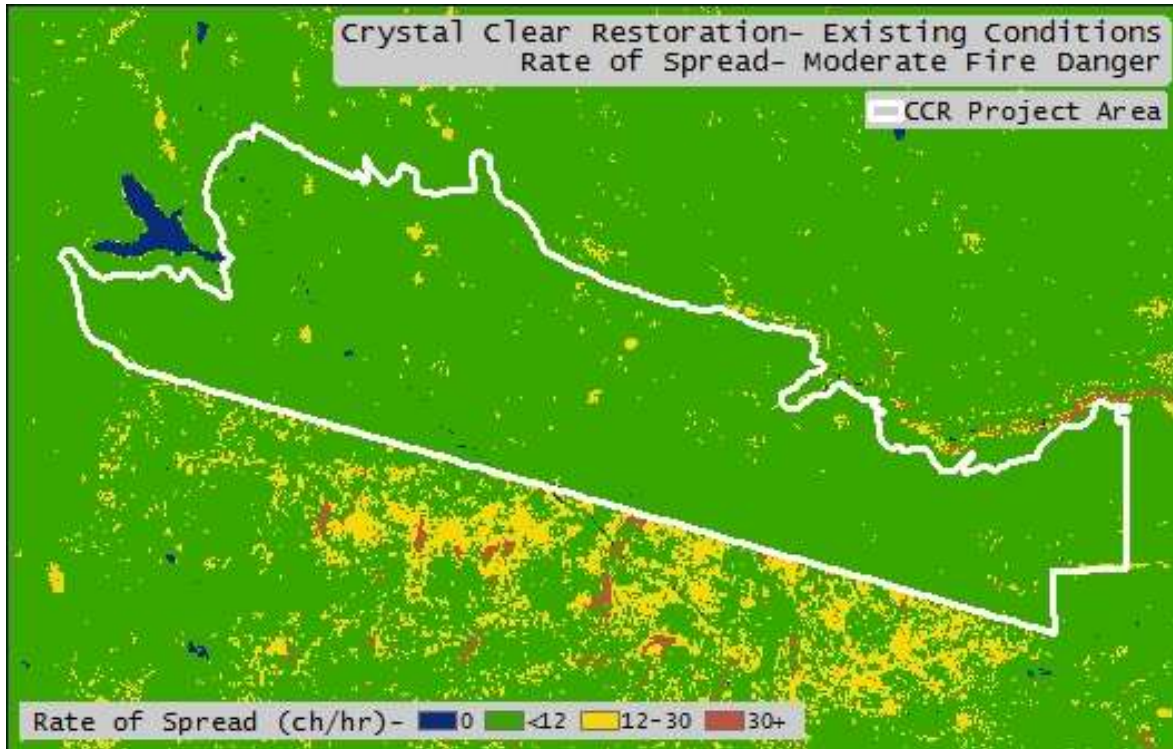
The Rate of Spread (ROS) is defined as the distance in Chains (66') per Hour that a fire under specific weather, fuel, and topographic conditions, will move in a direction out from a fire perimeter. While existing condition ROS is not overly fast (a single engine module or 5 person hand crew can exceed the line production rate) at an average of 8 ch/hr. (or about 528' per hour), the fireline intensity far exceeds any safe threshold for direct attack by either hand or mechanized attack.

**Table 30. Existing conditions mean ROS in chains per hour for both fuel moisture scenarios (FMS) by treatment type or area**

Treatment Type/Area	Mean ROS (ch/hr.) Low FMS	Mean ROS (ch/hr.) High FMS
All Treatments	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



**Figure 31. Existing conditions ROS for low fuel moisture**



**Figure 32. Existing conditions ROS for moderate fuel moisture**

***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 (FL). Table 32 below describes the break points used based on Fire line Intensity and Flame Length, to determine safe engagement fire tactics by suppression resources. The existing conditions in the project area, exceeds the upper end of Table 31 for any direct control effort for a wildfire event in the low fuel moisture scenario, based on the current modeling outputs (see Table 32 and Figure 33 for FLI outputs)

**Table 31. Fire Line Intensity**

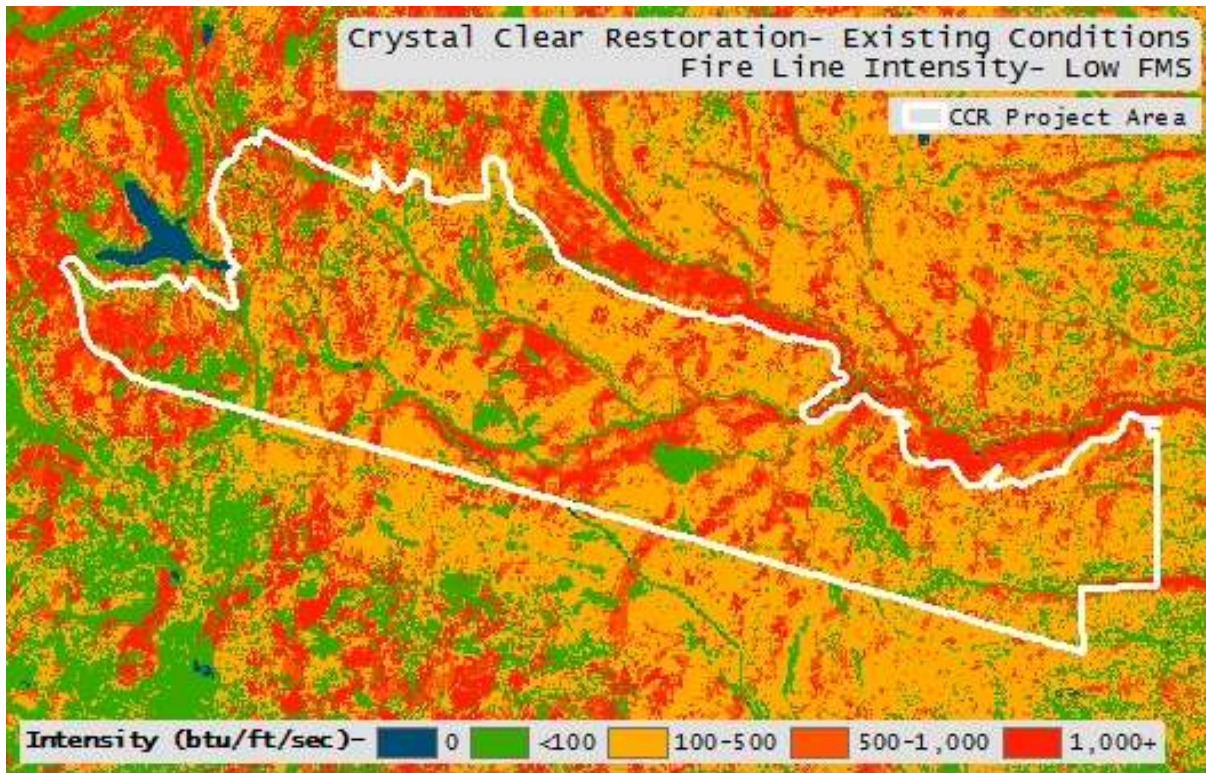
Flame Length (feet)	Fireline Intensity (Btu/ft./s)	Interpretation
<4	<100	Fires can generally be attacked at the head of flanks by persons using hand tools. Hand line should hold the fire.
4-8	100-500	Fires are too intense for direct attack on the head by per-sons using hand tools. Hand line cannot be relied on to hold the fire. Equipment such as dozers, pumpers, and retardant aircraft can be effective.
8-11	500-1000	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the fire head will probably be ineffective.



Flame Length (feet)	Fireline Intensity (Btu/ft./s)	Interpretation
>11	>1000	Crowning, spotting, and major fire runs are probable. Control efforts at head of fire are ineffective.

**Table 32. Existing conditions mean FLI in btu/ft./sec for both fuel moisture scenarios (FMS) by treatment type or area**

Treatment Type/Area	Mean FLI (btu/ft./sec) Low FMS	Mean FLI (btu/ft./sec) High FMS
All Treatments	1033	131
Project Area	1071	139
Dry Forest Health	1015	132
Dry Fuels Treatment	662	112
Moist Forest Health	1328	137
Moist Fuels Treatment	1365	152



**Figure 33. Existing conditions FLI (btu/ft./sec) for low fuel moisture**

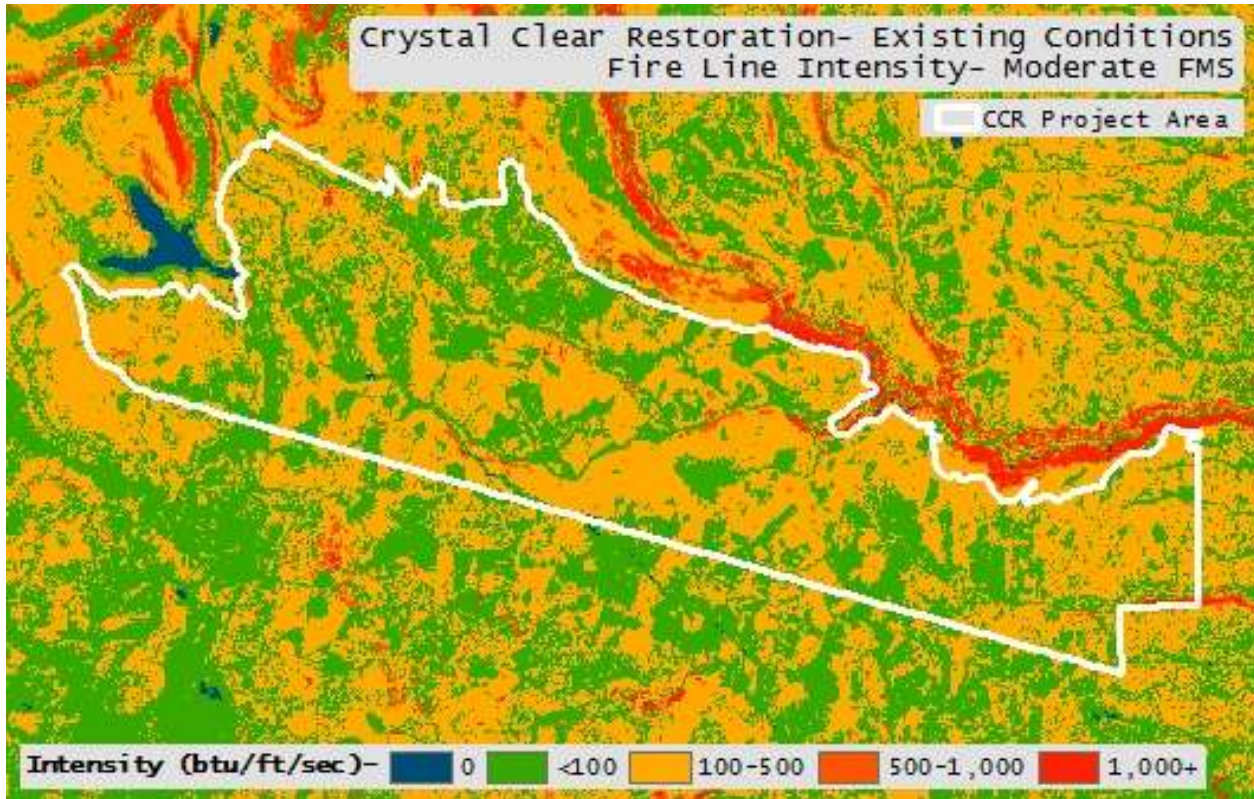


Figure 34. Existing conditions FLI (btu/ft./sec) for moderate fuel moisture

### Flame Length

Flame length is measured at 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. Even under the moderate fuel moisture scenario, the flame length is at the limits of hand attack, and likely would need an indirect approach, without mechanized support. The likelihood of a crown fire (passive or active) initiated under the low fuel moisture scenario is highly probable given the FL is averaging 16 feet and the crown base height (Table 28) is less than 4 feet; the surface is likely to transition to the canopy fuels in a majority of the stands (see Table 33), mostly as a passive crown fire, but with an active crown fire component as well.

Table 33. Existing mean flame length in feet for both fuel moisture scenarios (FMS) by treatment type or area.

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



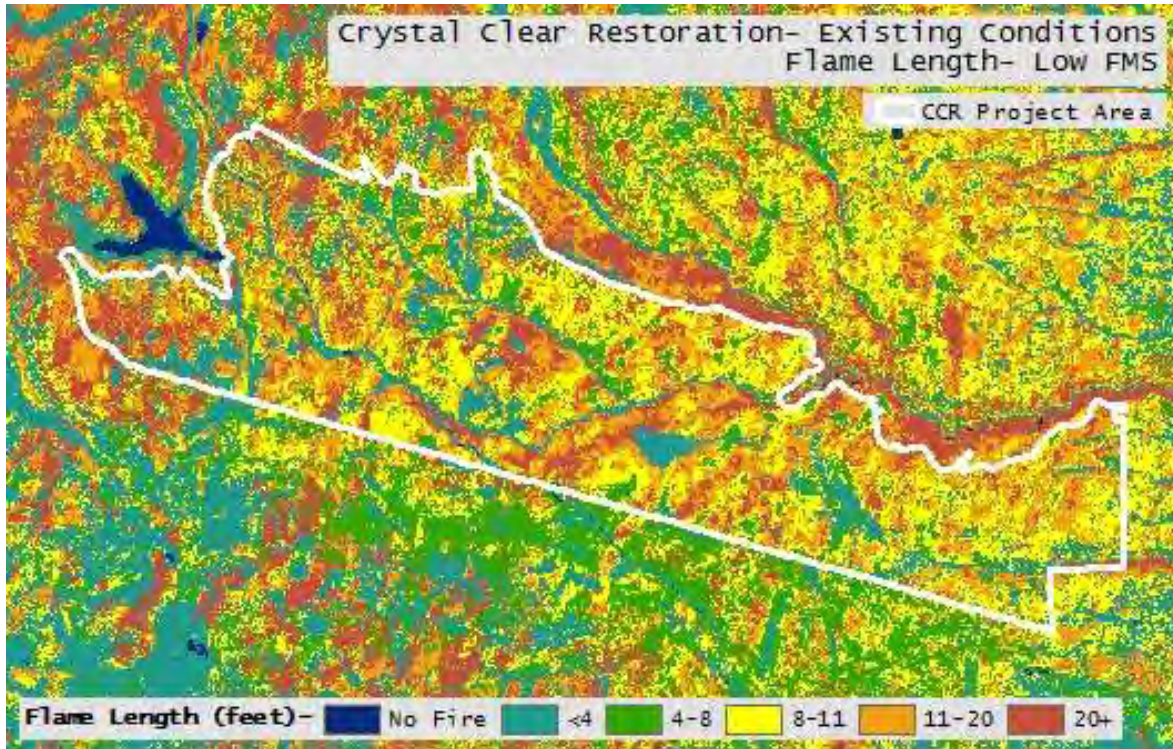


Figure 35. Existing conditions flame length (FL) for low fuel moisture

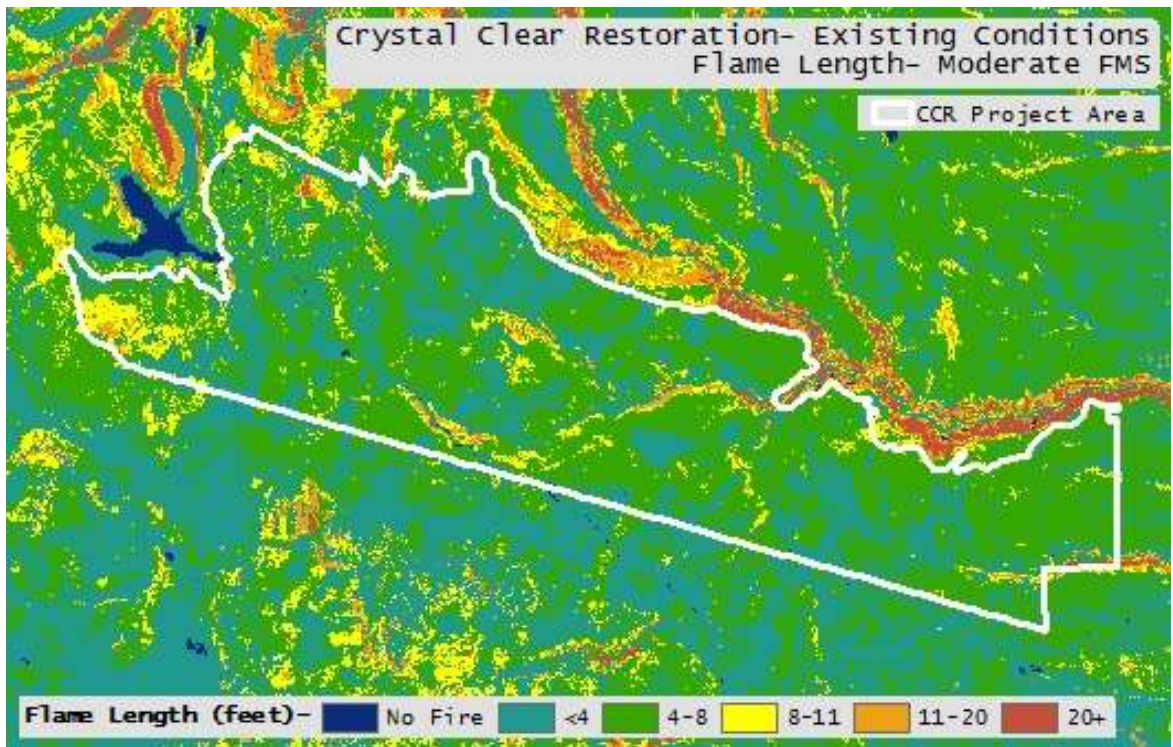


Figure 36. Existing conditions flame length (FL) for moderate fuel moisture

### **3.2.3 Effects Analysis**

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

1. Fire Behavior/Severity;
2. Canopy Structure;
3. Fuel model

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

#### **No Action Alternative- Direct and Indirect Effects**

The No Action Alternative proposes no projects and fire suppression would continue to occur. In the short term (one to five years), the fire hazard would remain constant, at a high risk. In the future, dead or dying trees would fall down increasing the fire hazard. Natural fuels (pine needles and other dead vegetation) would continue to accumulate. Natural processes of decay are not likely to remove the down and dead woody debris before the next fire cycle. As the available fuel increases (live and dead), so would the potential for a large stand replacing wildfire event, as under the existing conditions low and moderate fuel moisture scenarios.

The risk of injury to the public and firefighters would increase as the fuel loadings and fire hazards increase. Larger, fast moving, higher intensity fires would put the public and firefighters at an increased risk to injury or death. Suppression costs would increase due to larger fires and the increased need for mechanized equipment and aircraft. Resource damage caused by fire suppression efforts would increase.

When large amounts of dead and down debris increase and there is an increase in ladder fuels, a fire would burn very hot and exhibit extreme fire behavior. Such fire behavior could result in loss of productivity and biodiversity in the stands, surface soils could be severely damaged, and it could take many years to restore the ecosystem.

#### ***Canopy Structure***

The no action alternative, does not alter the current stand structure (see Table 28), and over time, a decrease in Canopy Base Height (CBH) is likely as more ladder fuels (brush and reproduction) increase in stands. As the CBH drops, the conditions become more conducive to a surface fire initiating a crown fire event (passive and active), with a likely shift from passive crown fire to an active crown fire event, reducing existing canopy structure significantly.

#### ***Fuel Models***

The no action alternative does not change the current fuel models as used. While some fuel models may change slightly over time, without a major disturbance event (fire, insect & disease, windthrow, etc.) they would remain in a similar state.

#### ***Fire Behavior/Severity***

There is no change in the fire behavior (ROS, FL, FLI) from the existing condition, with the no action alternative. Fires will continue to exceed direct suppression actions based on the Flame Lengths and Fireline Intensity (see Tables 12, 13, and 14)

#### ***Crown Fire Potential***

The No action alternative does not change the existing conditions for Crown Fire initiation or impacts (acres involved in crown fire, passive or active), and likely increases over time as more understory (ladders fuels) increase. (See Table 29).

### ***Rate of Spread, Flame Lengths, and Fire Line Intensity***

The No Action alternative would have the same concerns as the existing conditions stated above. The Rate of Spread for most of the project area is low to moderate in scale, generally within a one or two Initial Attack (IA) modules ability to construct and hold fireline (Table 30), except the flame lengths for these same areas (and corresponding Fire Line Intensity (FLI)), exceed any direct attack method even by mechanical methods (see Table 31), and there is a greater chance of a initiating a crown fire event as well, complicating ROS and FL for suppression. Under existing conditions, while fire spread would be slow, the ability for resources to directly engage a wildfire would be limited until weather conditions moderated the fire behavior (under the moderate fuel moisture scenario, a fire would still be at the upper limit of direct attack by hand tools, requiring an indirect strategy or use of a mechanized option – engines, dozers, etc.).

### **Proposed Action**

The Proposed Action would thin from below with a variable density thinning on 13,262 acres. 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 a more open less dense conditions stand reinitiation or open mature stages within both moist mix conifer and dry mix conifer. These conditions would have moderate to low canopy cover with large enough openings to stimulate natural regeneration of shade intolerant tree and shrub species within both plant community types. Species diversity in the overstory, seedlings and saplings and shrub layer is essential to the six dominate plant associations mainly present in the treatment areas. In the short-term, overstory species diversity would remain limited. Over time as a diversity of species regenerates and gets established the overstory diversity would increase. With the use of larger (1 to 5 acre) openings, more shade-intolerant trees and shrubs species can become establish.

In variable density thinning, selected trees of all sizes down to saplings (i.e., 3-inches or less in diameter) would be removed. The focus would be on leaving the most vigorous, healthiest trees and favoring shade intolerant 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).

### ***Canopy Structure***

Under the proposed action, the completed fuels treatments in the dry and moist plant communities, reduce the average Crown bulk density (CBD), dropping by about 29%, which reduces the available aerial fuels in the overall treatment area. The effect is similar for all treatment types, with the greater reduction in the dry plant community about 55% reduced CBD, and only a 6% drop in the moist plant community. The difference is the higher canopy closure (CC) in the moist plant communities as well as the greater CBD overall (almost twice the dry plant community), due to the differing trees species and the amount of material available in the canopies.

The opening of the canopy and the change from the existing mean Canopy Base Height (CBH) of 3' to 4', to a mean CBH of 5' to 6', reduces the potential for a large active crown fire event (an increase in CBH needs a higher FLI threshold to initiate a crown fire, and then needs the surface fire FLI to sustain the heating into the canopy to promote an active crown fire).

Table 34 displays the post treatment changes; overall the Canopy Cover (CC), including all areas not being treated would still retain almost a 50% CC, which is only a drop of 10% in CC from the existing conditions.

**Table 34. Post treatment mean canopy bulk density (CBD) a kg/m<sup>3</sup>, canopy base height (CBH) and canopy cover (CC) as % by treatment type or area**

Treatment Type/Area	Post Treatment Mean CBD (kg/m <sup>3</sup> )	Post Treatment Mean CBH (feet)	Post Treatment Mean CC (%)
All Treatments	0.24	5.9	35%
Project Area	0.31	5.2	48%
Dry FH	0.14	8.3	32%
Dry FT	0.15	6.7	33%
Moist FH	0.34	3.5	38%
Moist FT	0.35	3.7	39%

**Fuel Models**

Most of the modeled exiting condition fuel models remained, with some changing by the treatments applied to the area to a lower ROS and FL representative model. The TU5 is the fuel model showing the greatest impacts from treatments moving from a moderate ROS and FL over 81% of the project and treatment area, to just 33% and 2% of the project and treatment areas respectively. The project area number being higher is due to the untreated areas contributing to the overall fuel model values not changing, while the treated areas show a dramatic drop from the 81% to 2%, likely converting into a TL1, TL4, and TL7 (lowered ROS and FL) depending on the dry or moist plant communities in the treated areas, with the primary carrier of any ignitions being the timber litter, rather than the shrubs, small down woody debris, and understory trees contributing to the fire behavior.

Most of the timber litter fuel models, based on the outputs from FlamMap and FVS (and calibration of the models, show a reduction in ROS and FL. While the models did not show much change to the TU1 (timber understory), there is potential this fuel model would be somewhat representative to the future in the dry plant communities on the eastern edge of the project area; this model includes a grass or shrub component, but the ROS and FL are still low, thus meeting treatment objectives.

**Table 35. Fuel models post treatment by proportion of area. \* Denotes the models were changed for post treatment analysis in the FlamMap LCP based on loadings from FVS, Scott and Reinhardt (2005), and observation of previous treatments**

		TU1	TU5	TL1*	TL4*	TL5	TL7*
Post Treatment	Project Area	4%	33%	31%	11%	1%	18%
	All Treatments	0%	2%	52%	17%	0%	28%

Below are descriptions for the fuel models within the CCR project area post treatment. Those that are described as dynamic are fuel models where a live component plays an appreciable role in fire behavior.

TU1- is a dynamic low load, dry climate timber, grass, and shrub model. The primary carrier of fire is grass or shrubs and litter. ROS is low, as are flame lengths.



TU5- is high load, dry climate timber and shrub. The primary carrier of fire is litter, shrubs and understory trees. ROS is moderate as are flame lengths.

TL1 – is a light to moderate load, fuels 1-2 inches deep; primary carrier of fire is compact forest litter; spread rate very low; flame length very low

TL4- is generally comprised of small downed woody material. The primary carriers of fire are litter and downed woody material. ROS is low as are flame lengths.

TL5- is high load conifer litter. The primary carriers of fire are conifer litter, light slash or downed woody material. ROS is low as are flame lengths. Similar to TL4 but with higher loads of fine fuels.

TL7- is a heavy load, primary carrier of fire is heavy load forest litter; includes larger diameter downed logs, spread rate low; flame length low.

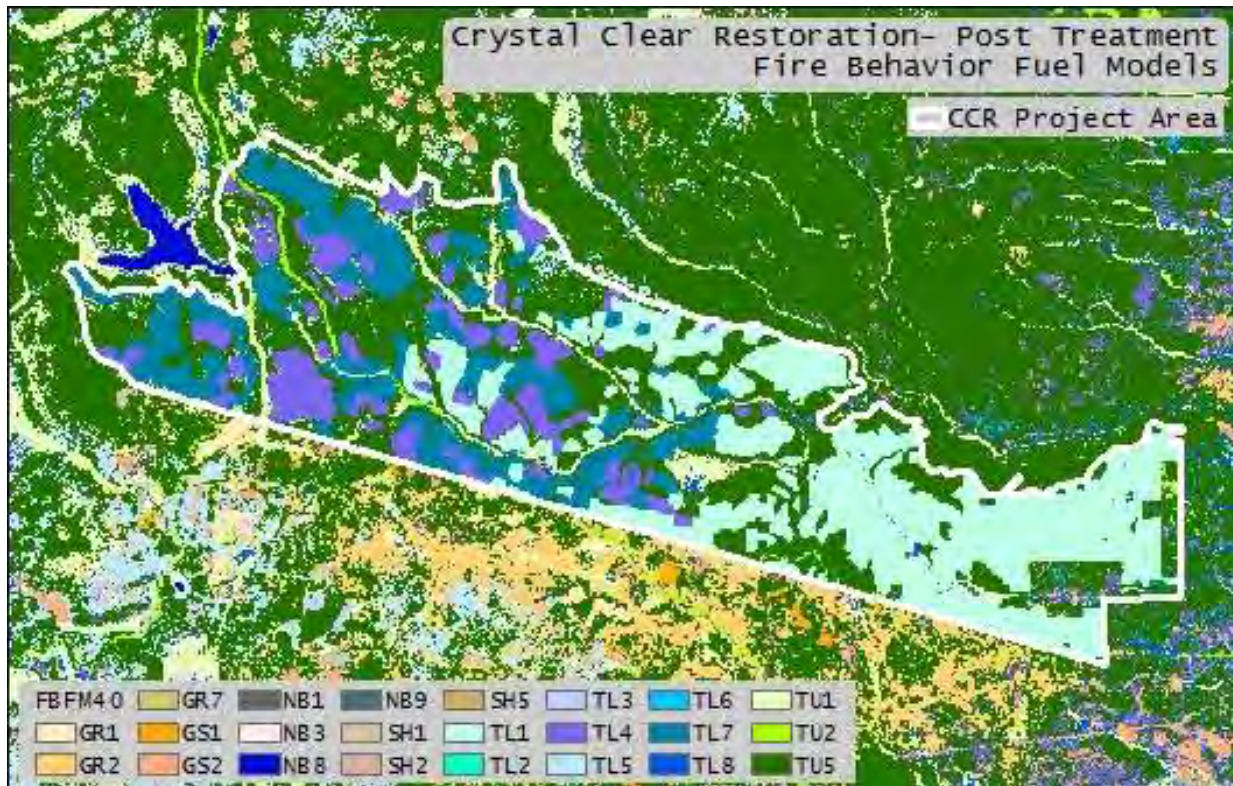


Figure 37. Post treatment fuel model

### Fire Behavior/Severity

Under the proposed action, fire behavior is reduced from a Fire Line Intensity (FLI)/Flame Length (FL), rather than altering the Rate of Spread (ROS). By reducing the surface fuel loadings in the dry and moist plant communities (see Table 35 for fuel model change percentages of project area), the surface fire intensity is reduced, lowering the flame lengths. By reducing the FLI/FL, suppression options are available for fire managers and incident commanders, to provide for fire personnel and public safety, while allowing fire to function in a more natural state.

More than one treatment may be necessary to reduce fuels and restore ecosystems for many areas, as initial treatments cause mortality after silvicultural and prescribed burning actions, allowing surface fuels to accumulate as killed overstory increases fuel loadings (Reinhardt, et al, 2008, 3.4). Fire behavior and



severity would likely only last 10 – 20 years, at which time fire behavior would return to existing conditions without follow up or maintenance fuels treatments.

**Crown Fire Potential**

Under the proposed action, Crown Fire potential would drop as Crown Bulk Density (CBD), Canopy Base Height (CBH), and Canopy Cover (CC) are reduced. By lowering the CBD, the available aerial fuels that may be involved in a crown fire are reduced (similar to surface fuel reductions), almost a 90% reduction in crown fire acres involved in any given wildfire event post treatment for the Low fuel moisture scenario (tables 17 and 18) within treated areas, and almost a 100% reduction of crown fire in a moderate fuel moisture scenario (tables 19 and 20) within treated areas. Most of the acres involved in a potential crown fire (passive or active) under the low fuel moisture scenario occurs in the areas that are not planned for treatment under the proposed action within the project area (see Figure 38 and Figure 39).

**Table 36. Low FMS existing conditions and post treatment surface and total crown fire by acres and percentage of change**

Treatment Type/Area	Post Treatment Surface Acres	Post Treatment Surface Change Acres	Post Treatment Crown Acres	Post Treatment Crown Change Acres
All Treatments	12336	10085 (448%)	943	-10072 (-91%)
Project Area	15291	11054 (261%)	8728	-11040 (-56%)
Dry- FH	1628	1422 (691%)	37	-1421 (-97%)
Dry- FT	5254	4510 (606%)	73	-4508 (-98%)
Moist- FH	2110	1580 (298%)	117	-1580 (-93%)
Moist- FT	3345	2572 (333%)	716	-2562 (-78%)

**Table 37. Low FMS existing conditions and post treatment passive and active crown fire by acres and percentage of change**

Treatment Type/Area	Post Treatment Passive Acres	Post Treatment Passive Change Acres	Post Treatment Active Acres	Post Treatment Active Change Acres
All Treatments	883	-8357 (-90%)	60	-1714 (-97%)
Project Area	7458	-9173 (-55%)	1270	-1867 (-60%)
Dry- FH	35	-1196 (-97%)	2	-225 (-99%)
Dry- FT	67	-4131 (-98%)	6	-377 (-98%)
Moist- FH	111	-1173 (-91%)	6	-407 (-99%)
Moist- FT	670	-1857 (-73%)	46	-705 (-94%)

**Table 38. Moderate FMS existing conditions and post treatment surface and total crown fire by acres and percentage of change**

<b>Treatment Type/Area</b>	<b>Post Treatment Surface Acres</b>	<b>Post Treatment Surface Change Acres</b>	<b>Post Treatment Crown Acres</b>	<b>Post Treatment Crown Change Acres</b>
<b>All Treatments</b>	12799	9181 (254%)	481	-9168 (-95%)
<b>Project Area</b>	17602	10045 (133%)	6417	-10031 (-61%)
<b>Dry FH</b>	1634	1342 (459%)	31	-1341 (-98%)
<b>Dry FT</b>	5262	3962 (305%)	65	-3960 (-98%)
<b>Moist FH</b>	2182	1381 (173%)	45	-1381 (-97%)
<b>Moist FT</b>	3720	2496 (204%)	340	-2485 (-88%)

**Table 39. Moderate FMS existing conditions and post treatment passive and active crown fire by acres and percentage of change**

<b>Treatment Type/Area</b>	<b>Post Treatment Passive Acres</b>	<b>Post Treatment Passive Change Acres</b>	<b>Post Treatment Active Acres</b>	<b>Post Treatment Active Change Acres</b>
<b>All Treatments</b>	481	-9154 (-95%)	0	-13 (-100%)
<b>Project Area</b>	6397	-10017 (-61%)	19	-13 (-41%)
<b>Dry FH</b>	31	-1341 (-98%)	0	0 (0%)
<b>Dry FT</b>	65	-3960 (-98%)	0	0 (0%)
<b>Moist FH</b>	45	-1375 (-97%)	0	-6 (-100%)
<b>Moist FT</b>	340	-2478 (-88%)	0	-7 (-100%)

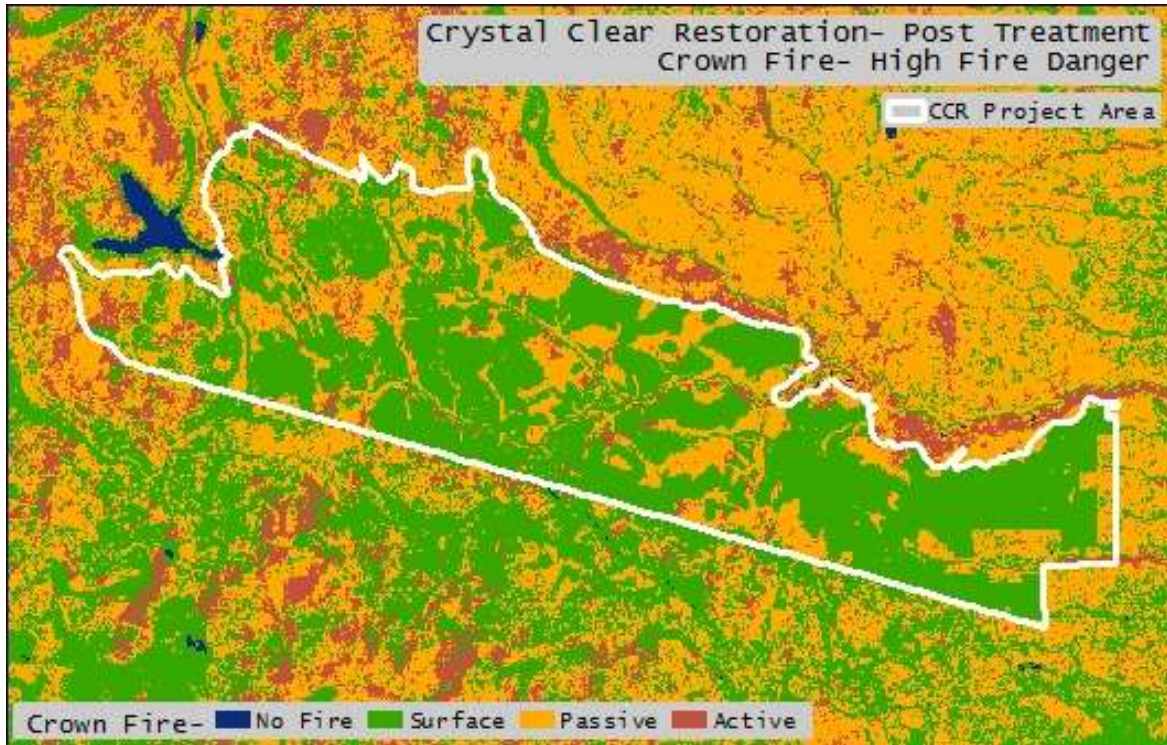


Figure 38. Post treatment low FMS Crown Fire

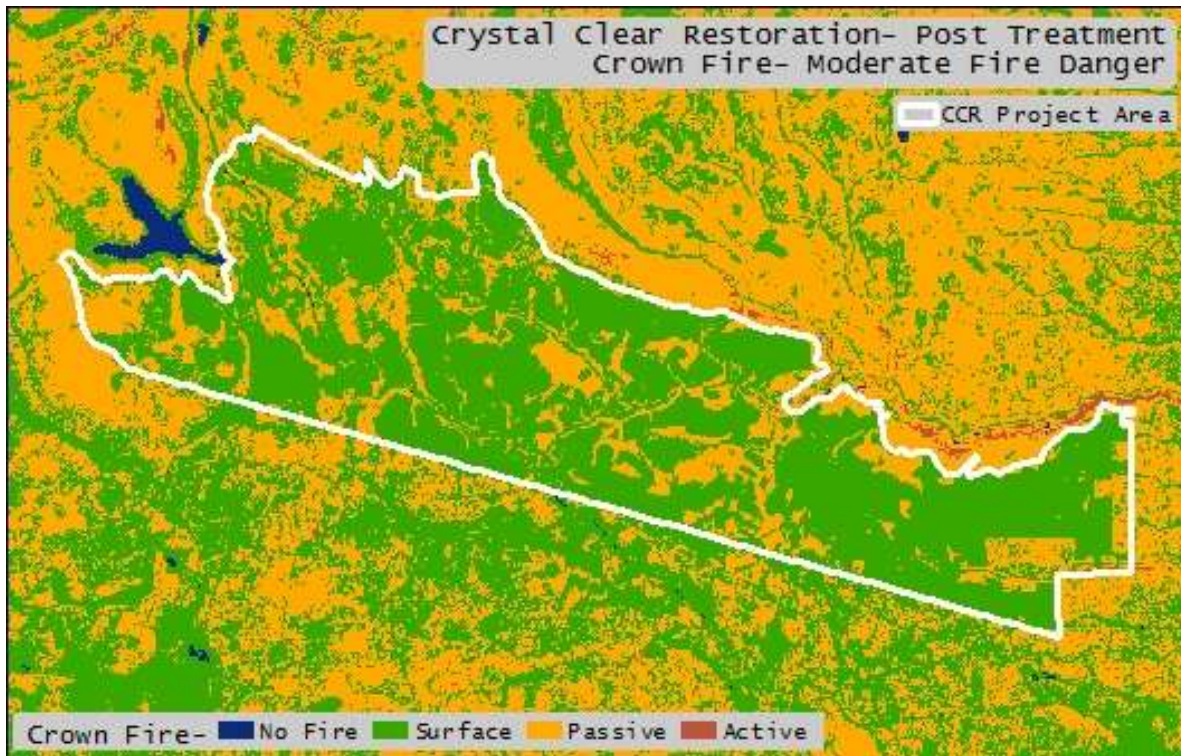


Figure 39. Post treatment moderate FMS Crown Fire

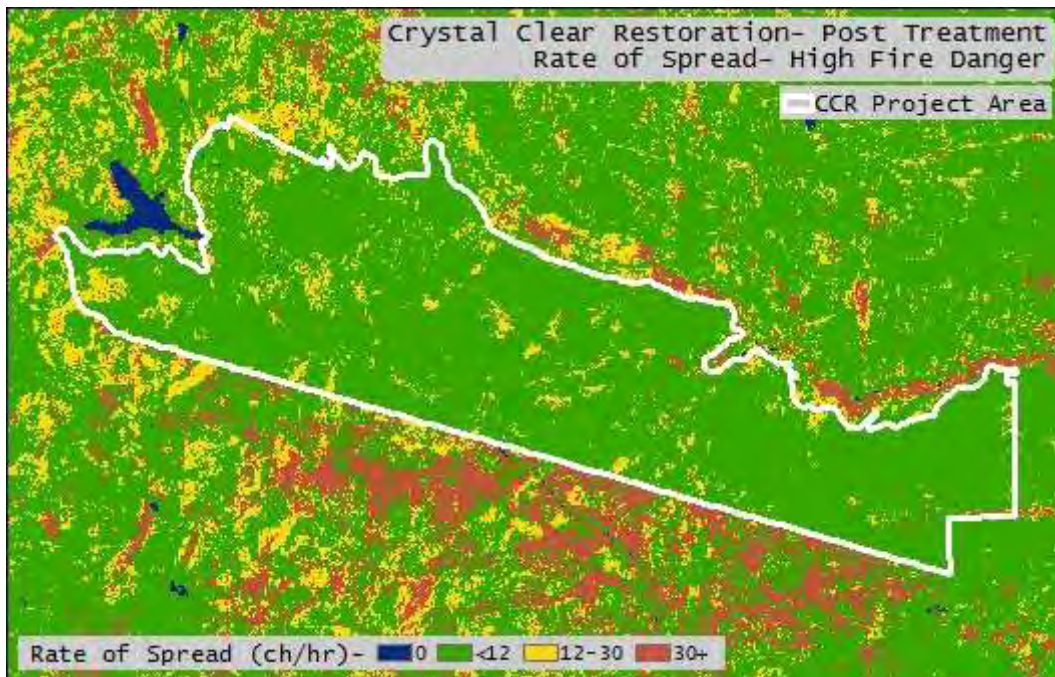


**Rate of Spread**

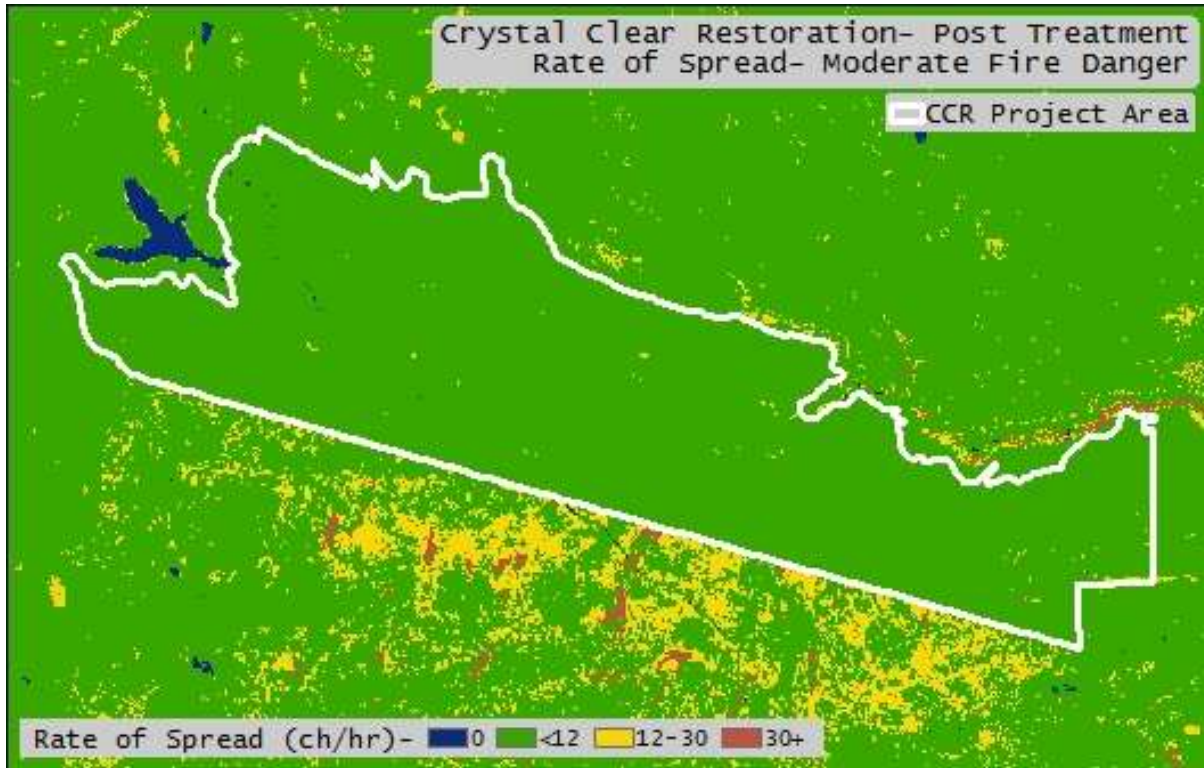
The Rate of Spread (ROS) post treatment is reduced overall from the existing conditions from a project area average of 7 ch/hr. to 3.2 ch/hr., an over 50% reduction in ROS; the overall project area includes the area treated and the areas untreated. While the untreated areas are likely to have higher ROS, the treated areas reduce the ROS significantly in the planning and treatment areas overall. In the drier plant communities the ROS drop is almost a 90% reduction in ROS, and even the wet plant communities see an overall reduction of 80%. The rate of spread reduction is due to the reduced surface fuel loading, as well as the lower fuel bed depth of the remaining fuels. 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 .1 acres in final size, with Flame Lengths under 1’, and ROS of less than 1 ch/hr. From a landscape perspective, the goals of a fuels treatment should not be to reduce spread rate, but reduce burn severity (Reinhardt, et al, 2008, 2.4), as spotting can negate the effects of reduced ROS.

**Table 40. Post treatment mean ROS in chains per hour for both fuel moisture scenarios (FMS) by treatment type or area**

Treatment Type/Area	Mean ROS (ch/hr.) Low FMS	Mean ROS (ch/hr.) Moderate FMS
All Treatments	1.1	0.5
Project Area	3.2	1.0
Dry Forest Health	0.7	0.3
Dry Fuels Treatment	0.6	0.3
Moist Forest Health	1.4	0.6
Moist Fuels Treatment	1.9	0.8



**Figure 40. Post treatment ROS for low fuel moisture**



**Figure 41. Post treatment ROS for moderate fuel moisture**

### ***Fire Line Intensity***

Fire Line Intensity (FLI) is an area that has the greatest impact on fire suppression options, tactics, and success and also direct fire effects on the plant communities in the treatment area. Flame Length (FL) is directly related to FLI, and the various fire behavior models use this intensity number to determine if a surface fires FLI will initiate a crown fire (passive or active) based on the canopy characteristics above (Table 34). As intensity decreases, so is there a corresponding decrease in FL (see below). The change in areas being treated in FLI, is a drop from 1033 Btu/ft./sec. to 32 Btu/Ft./sec. (96%) drop, which corresponds to a fire event with Flame Lengths well below 4', allowing direct attack with handtools (Table 31) or other options for fire suppression managers and incident commanders. The overall project area would also see a reduction from 1071 Btu/ft./sec. to 465 Btu/ft./sec. (56% drop), a similar FL reduction that is just over the threshold for successful direct attack with handtools, but well within the direct attack using mechanized equipment (engines, dozers, etc.).

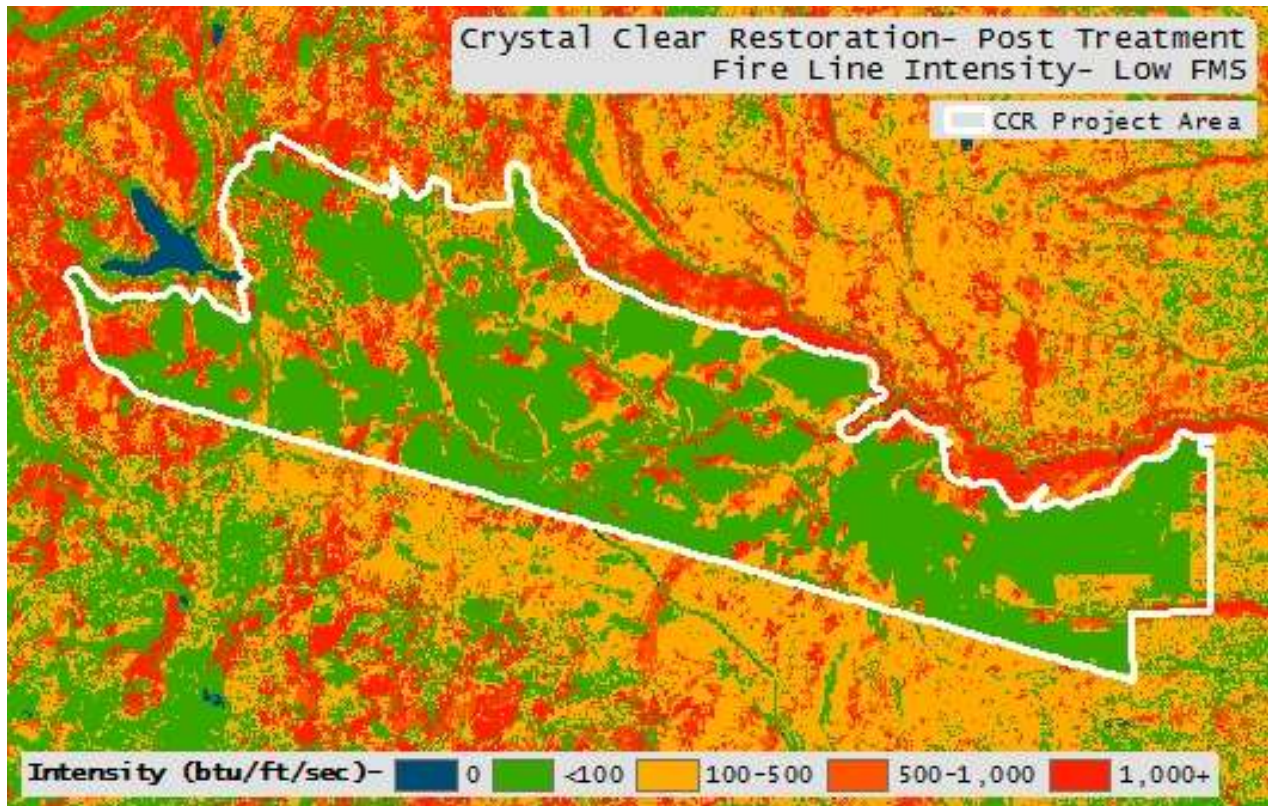
This slightly higher value is likely due to the untreated acres being included in the overall averages for the FLI as seen in figures 20 and 21 below. While there is more area in the green (less than 100 Btu/ft./sec.) versus the existing condition (Figure 33) modeling runs, the areas still showing greater than 1000 Btu/ft./sec., are in areas that are not being treated; areas outside these higher FLI zones help moderate overall fire intensity within the project area. These areas of higher FLI, would likely see increase passive and active crown fires, with spotting; the larger treatment areas can help mitigate the spotting issue by their lower FLI, and ability for resources to engage the resulting surface fire.

There is some variance between the dry and moist plant communities, but the overall effect is a lowering of FLI, which brings a fire event back into a direct attack, or other suppression objectives that a low intensity fire may provide.



**Table 41. Post treatment mean FLI in btu/ft./sec for both fuel moisture scenarios (FMS) by treatment type or area.**

Treatment Type/Area	Mean FLI (btu/ft./sec) Low FMS	Mean FLI (btu/ft./sec) Moderate FMS
All Treatments	32	6
Project Area	465	63
Dry Forest Health	18	4
Dry Fuels Treatment	12	2
Moist Forest Health	30	6
Moist Fuels Treatment	67	11



**Figure 42. Post treatment FLI (btu/ft./sec) for low fuel moisture**

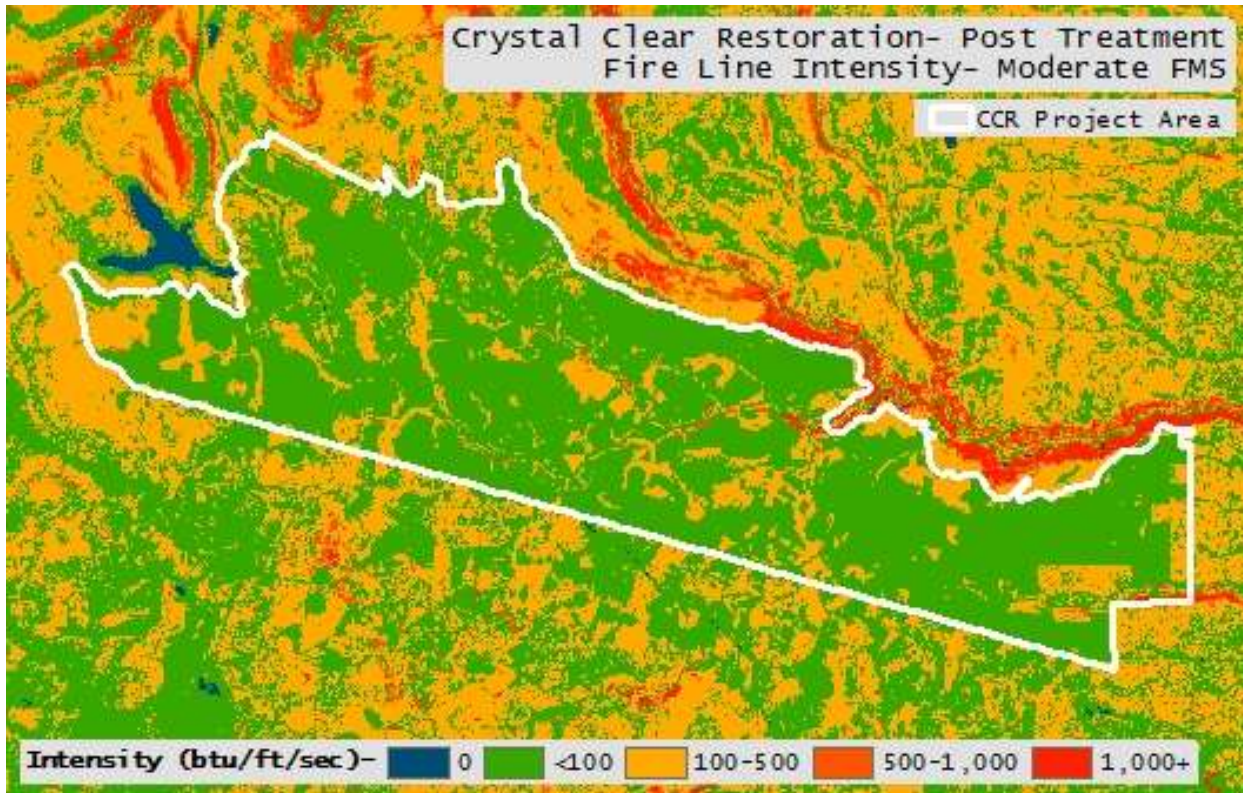


Figure 43. Post treatment FLI (btu/ft./sec) for moderate fuel moisture

### Flame Lengths

The post treatment flame lengths (FL), tied to FLI, are also reduced. In the Low Fuel Moisture Scenario (FMS), the Flame Lengths went from 16' to 1.3' (90+% reduction) for all treatments, and the project area dropped from 17' to 7.6' (see Table 42). Again, the greater FL is tied to the FLI for the overall project area, and the mean is influenced by the areas untreated. These untreated areas would see a higher FL, similar to the existing condition, allowing for at least passive crown fire initiation, and possibly short duration active crown fire, with spotting. At the FL of 16 feet, there is no direct capability for resources to engage a fire safely or have much chance of success, until weather conditions moderate the fire behavior or the fire event enters an area with reduced FLI/FL due to a change in surface fuel loading and canopy characteristics that support crown fire. At FL of 1' to 3', hand crews are able to safely engage a fire event.

Table 42. Post treatment mean flame length in feet for both fuel moisture scenarios (FMS) by treatment type or area

Treatment Type/Area	Mean Flame Length (FL) Low FMS	Mean Flame Length (FL) Moderate FMS
All Treatments	1.3	0.7
Project Area	7.6	2.4
Dry Forest Health	0.8	0.4
Dry Fuels Treatment	0.7	0.4
Moist Forest Health	1.4	0.8
Moist Fuels Treatment	2.4	1.2



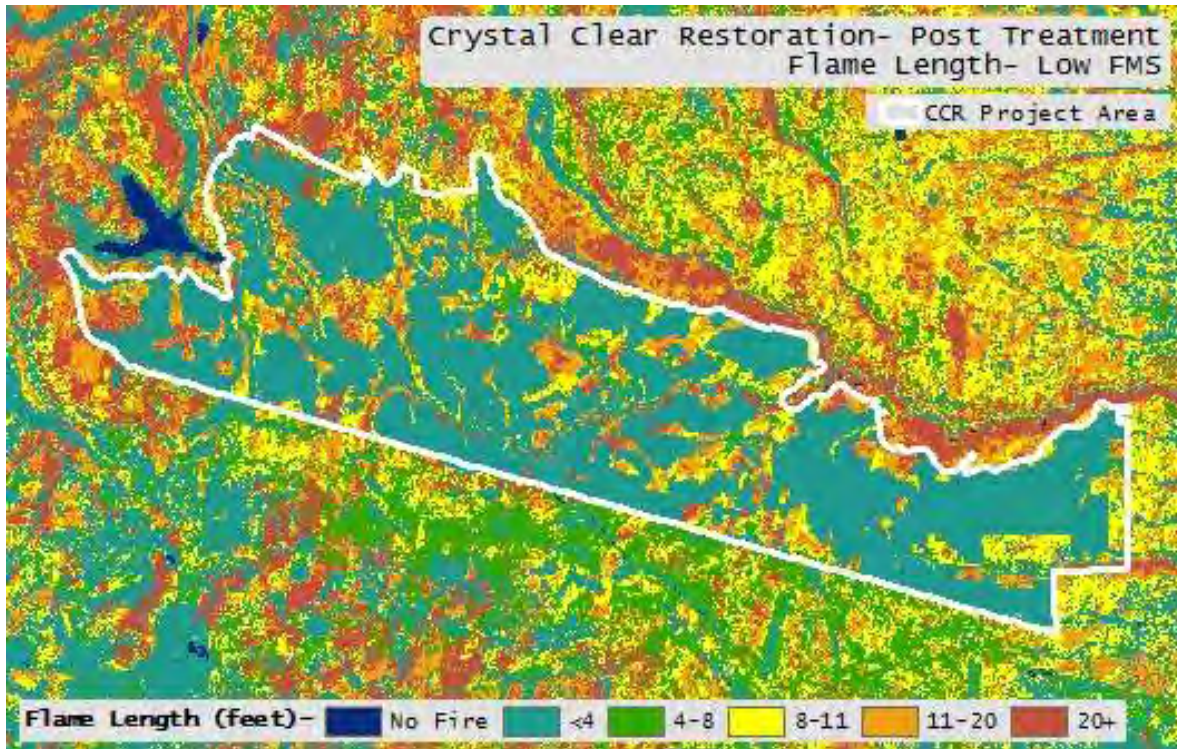


Figure 44. Post treatment flame length (FL) for low fuel moisture

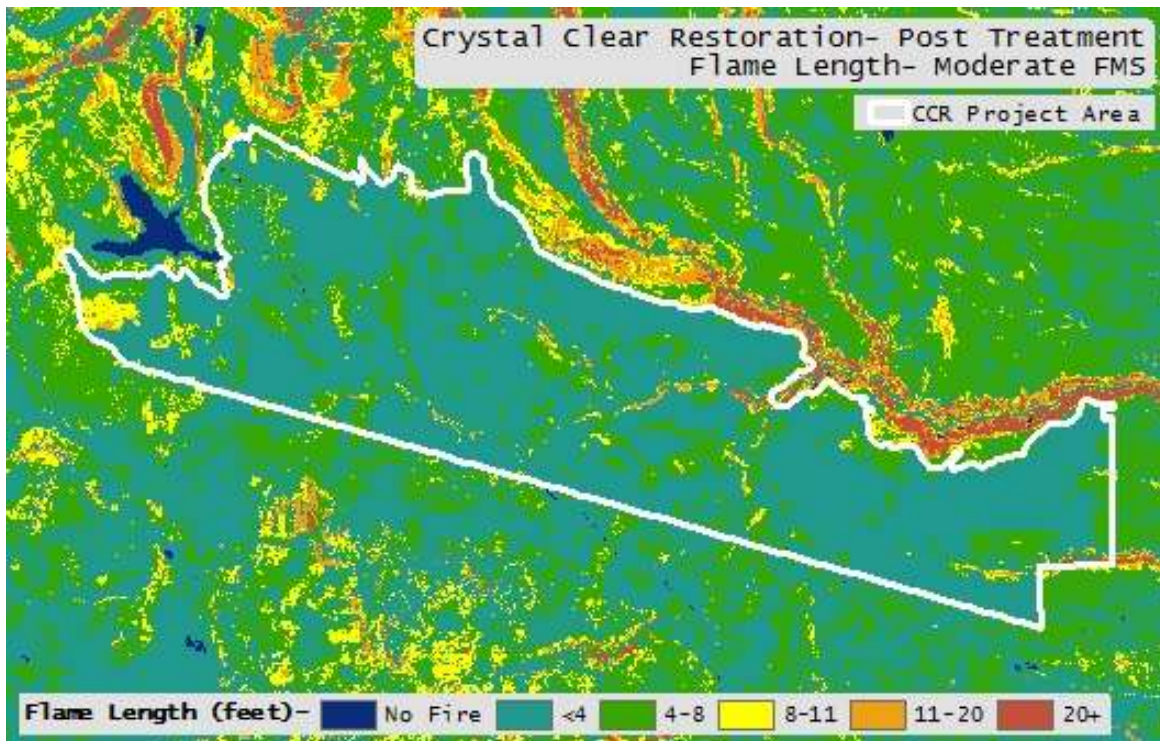


Figure 45. Post treatment flame length (FL) for moderate fuel moisture

## **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 10 at the beginning of Chapter 3 in the CCR Project EA for a summary of all possible activities that were considered in this cumulative effects analysis for vegetative conditions. The spatial context for the following cumulative effects analysis is the landscape and site-specific area as described previously in the existing conditions. The temporal context depends on the past, existing or future project/activity and if there is an overlap in time from an effects perspective.

There are no direct or indirect effects that would cumulate from other projects due to the minimal amount of area being treated. The total acreage treated by thinning in the Proposed Action is approximately 13,262 acres. This is around 7% of the White River watershed and represents with past and foreseeable future activities. Therefore, the total cumulative effects at the landscape scale for this project would be very nominal, and no cumulative effects are expected as a result the proposed projects to the vegetation resource. At the project scale approximately 55% of the proposed project area is proposed for treatment. There is approximately 12,000 acres of dry mix 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 mix conifer plant communities we are moving more than half of the available dry mix conifer acres towards historical conditions from which fire could play a vital role in maintaining stand health, composition and structure.

### **3.2.4 Consistency Determination**

The Proposed Action alternative is consistent with the Mt. Hood Forest Plan as amended, as well as the Wasco County Community Wildfire Protection Plan, including all applicable standards and guidelines.

## 3.3 Air Quality/Smoke Management

### 3.3.1 Analysis Assumptions and Methodology

Air quality is of particular concern on the Mt. Hood National Forest Airsheds. Airshed is defined as a geographical area that, because of topography, meteorology, and climate, share the same air (Boutcher 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 9 miles northwest of the CCR Planning area. The Badger Creek Wilderness, a Class II Airshed is approximately 8 miles north of the CCR planning area. Management activities shall comply with all applicable air quality laws and regulations, including the Clean Air Act and the Oregon State Implementation Plan (SIP) (MHFP, 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 are described below and the procedures and guidelines followed when utilizing prescribed fire as a management tool. All Forest-wide Standards and Guidelines for Air Quality FW-039 thru FW-053 (LRMP-MTF, 4:51-52) would be followed to minimize problems of Forest burns affecting air quality in local communities. All prescribed burning activities would comply with Forest Service Manual direction (FSM 5100, Chapter 5140). 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.

There is currently only one designated Smoke Sensitive Receptor Area (SSRA) near the CCR planning area which is the Columbia River Gorge National Scenic Area (CRG-NSA), which is over 30 miles north of the planning area. Communities near the project area that could be impacted include: Pine Grove (5 miles E), Tygh Valley (14 miles NE), Wamic (11 miles NE), Maupin (21 miles E), Simnasho (CTWS, 9



miles SE) and Dufur (26 miles NE). Burning would only be conducted when predicted and actual atmospheric conditions would minimize the possibility of smoke affecting these areas.

### 3.3.2 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 wild fire 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 condition to implement, 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 north east.

### 3.3.3 Consistency Determination

The Proposed Action alternative is consistent with the Mt. Hood Forest Plan as amended, as well as the Wasco County Community Wildfire Protection Plan, including all applicable standards and guidelines.

**Clean Air Act and National Ambient Air Quality Standards (NAAQS):** 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 43) 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.

**Table 43. National Ambient Air Quality Standards for PM<sub>10</sub> and PM<sub>2.5</sub>**

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

## 3.4 Transportation Resources

### 3.4.1 Analysis Assumptions and Methodology

In 2015, the Mt. Hood National Forest completed a transportation system analysis at the Forest scale (Mt. Hood National Forest, 2015) titled 2015 Travel Analysis Process (TAP), which sought to outline a sustainable Forest Transportation System for the future. The TAP for the Mt. Hood National Forest is the culmination of a series of travel management analyses dating back two decades, including the 1999 Access and Travel Management analysis (ATM), the Roads Analysis: Mt. Hood National Forest (2003), and The Legacy Roads Strategy of 2010.

The TAP analysis produced a report known as the 2015 Travel Analysis Report (TAR) which categorized all system roads on the Forest as either “Likely Needed” or “Likely Not Needed” as part of the desired future transportation system. While not in and of itself a decision document, the TAR set the stage for project-level decisions about whether to retain roads and maintain for public access use, close roads to public access but maintain for administrative use, place roads into storage for later use, or to decommission roads. This project-level analysis for the Crystal Clear Planning Restoration Project takes the general information from the TAR and looks at the local roads with proposals that may differ from what was listed in the TAR based on more detailed and site-specific information.

In addition to the TAP and past Forest transportation analyses, this project takes into consideration the effects and recommendations documented in the White River Watershed Analysis (Mt. Hood National Forest, 1995) and is further focused by project specific information obtained by observations and measurements taken in the field during the 2016 summer and autumn field season. This report is a project level analysis intended to document the effects of and on National Forest Transportation System within the project boundary, and helps ensure that the future road system can be one that, from a transportation perspective, is safe, environmentally sound, efficient, and cost effective.

Determination of road reconstruction needed to safely conduct operations associated with the proposed action was made utilizing the standards and guidelines set forth in the following documents with authority under 36 CFR Parts 212, 251, 261, and 295 and applicable Forest Service Manuals and Handbook direction.

Measurements and quantities shown in this report were compiled using data from the Region 6, Mt. Hood National Forest, 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.

### 3.4.2 Existing Condition

#### Existing Road and Trail Use Designations (Motorized Traffic):

The following table presents data concerning acres open to motorized cross-country travel, miles of roads and trails, miles of roads and trails within Riparian Areas, and total number of stream crossings as it exists in the field within the Crystal Clear Restoration Project Boundary. Miles by designated use within the project boundary were determined using the Transportation GIS Database and the “Motor Vehicle Use Map: Mt. Hood National Forest”.

**Table 44: Existing Motorized Route Designations**

<b>Route Miles, Stream Crossings, and Routes in RHCAs</b>	<b>Existing Condition</b>
Project Action Area - (Acres)	24,000
Action Area Open to Motorized Cross-country Travel (Acres)	0
Grand Total Motorized Route: System Miles	206.48
<b>1. Total Miles of Roads</b>	<b>165.20</b>
Miles designated as open yearlong	117.05
Miles designated as open seasonally	23.04
Miles designated as closed yearlong (ML1)	25.11
<b>2. Total Miles of Motorized Trails</b>	<b>44.49</b>
Miles of designated roads open year round for use of OHV's	3.21
Miles of designated road open seasonally for use of OHV's	21.79
Miles of trail available for use by OHVs < 50 in wide	44.49
Miles of trail available for use by OHVs > 50 in wide	0
Miles of trail designated for motorcycle use	44.49
<b>3. Total Miles of Routes in Riparian Reserves</b>	<b>16.40</b>
Total miles of designated open OHV trails in Riparian	3.21
Total miles of designated open roads in Riparian	11.22
Total miles of designated closed OHV trails in Riparian	0
Total miles of designated closed roads in Riparian (ML 1)	1.97
<b>4. Total Stream Crossings by Designated Route</b>	<b>110</b>
Total number of open OHV trail stream crossings	20
Total number of open road stream crossings	75
Total number of closed OHV trail stream crossings	0
Total number of closed road (ML1) stream crossings	15
<b>5. Total Miles of Designated Routes Available to OHVs</b>	<b>69.49</b>

This section focuses on the miles of System Roads that comprise the Forest Transportation Resource. Miles of Motorized Trails is considered a Recreation Resource and a detailed discussion and analysis of this feature of the analysis area can be found in the Recreation section of this report.

### Existing Road Conditions

The Forest's transportation system provides multi-use access for trans-forest travelers, the recreating public, commercial users, and administrative users. System roads within the Forest range from Maintenance Level 5 (commonly paved or continuously dust controlled for travel at speeds of nominally 35 mph) to Maintenance Level 1 (storage roads closed to 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 – Assigned to roads that provide a high degree of user comfort and convenience. 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 – Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. 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 – Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. 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 (1) discourage or prohibit passenger cars or (2) 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 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. 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.

The majority of roads within the analysis area have been in existence for better than 40 years. While a few of the primary roads within and adjacent to the analysis area have existed as travel routes to and through the Forest since early in the 20th Century, most of the secondary and tertiary road system has been constructed to provide access for vegetative management purposes. The roads within the analysis area generally have a pattern of use common to low-standard roads in the Mt. Hood National Forest. The use is moderate in the spring, after snow melt, with various recreational users and wood cutters clearing trees that fell onto roads over the winter. With the exception of roads that access areas of recreational interest and historic arterial through-routes such as US Highway 26, State Highway 216, and Forest Roads 42 & 43, most roads see low to moderate public and administrative use through the course of the spring. Peak use occurs in the summer with the influx of administrative, commercial, and recreational traffic. Summer recreational traffic in this area consists of OHV use, camping at established campgrounds and dispersed camp sites, boating & fishing at Frog Lake and Clear Lake, and use of roads for access to Timothy Lake and Olallie Lake National Scenic Area. Summer commercial traffic consists primarily of log haul and other timber purchaser traffic necessary for operations including commuting of workers into the Forest and transport of heavy equipment. Elevated use occurs in the late summer and fall with the commencement of the deer and elk hunting seasons. Winter brings lowered usage of the roads with arterial through-routes being used mostly by recreators seeking access to winter recreation areas such as ski resorts and snow parks, and the secondary and tertiary road systems receiving recreational traffic by OHV users on designated snowmobile routes. Grazing allotments are located within the analysis area that also create a small usage component provided by special use permitting which results in isolated short term increases during spring and fall for movement of livestock on and off of the Forest.



The anticipated future use patterns will most likely continue these trends, with the majority of road use being comprised of recreational traffic and timber haul. Across the Forest the historic needs for and uses of the system have shifted as timber harvest on national forests 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. Recent trends show that appropriated funds that are distributed to the Mt. Hood National Forest provide only enough to maintain or make repairs to about 15 percent of the road system annually. In April of 1981 the “Reduced Road Reconstruction Policy” was implemented on the Mt. Hood National Forest with stated objective of reducing the total cost of developing, maintaining, and operating the transportation system. The policy statement from FSM 7730 - Transportation System Road Operation and Maintenance:

7730.3 (b) Existing Road Reconstruction

- (1) Existing roads not meeting Forest Service Manual (FSM) requirements now or for future critical elements may be operated without reconstruction when the Forest Engineer determines the inadequacies can be mitigated (made less severe) by (a) user scheduling (sale or public), (b) maintenance, and (c) adequate traffic devices that identify the hazards.

And in turn, the 2003 Roads Analysis identified, for approximately half of the road system existing at that time, the need to change maintenance levels to lower standards, to store roads in a maintenance level one category, or to decommission roads.

In consideration of this policy, past transportation system analyses and decisions, detrimental environmental effects of unmaintained roads, and the need to reduce the operational transportation system to one that could be affordably maintained, the 2015 TAP strives to define a sustainable road system that balances the goals of providing for the access needs of our benefactors, provides them with options, continues to diminish unwanted environmental effects, and lessens the cost of our transportation network. TAP defined the transportation system’s Desired Future Condition as, “A minimum Forest transportation system that safely and efficiently serves current and anticipated management objectives and public uses; ... A balance of routine and deferred maintenance funding maintains this system, which meets public uses and resource protection objectives; ... (A system where) Available funding is primarily allocated to the ML 4-5 roads. Roads that are ML 2 and 3 primarily are maintained by project-associated funds commensurate with project use.” So the need to maintain the current operational transportation system, when pitted against continually declining funds from primary funding sources, can constrain and challenge how the priorities of annual maintenance funds are rotated around the transportation network. Consequently roads with lower level maintenance designations have been largely neglected in spite of the volume of traffic that they receive.

Overall, the condition of roads within this planning area are in fair, moderate, or poor shape. Some system roads have begun to deteriorate to a point where passage by passenger vehicles and commercial heavy haul vehicles is hazardous under current conditions. Vegetative growth along roadsides has begun to encroach upon the road prism, limiting sight distances around horizontal curves. Many of the stream crossing and drainage culverts on this road system, while originally sized for hydrologic capacity, are undersized for passage of runoff associated debris and become plugged on a frequent basis. Compounding this problem, ditch lines and drainage structures along the roadway are filled with slough and slide material or are blocked by trees which have grown in excess of 4” in diameter, causing these drainage features to operate inadequately or fail. Standing water in ditches then either flows over the roadway, causing surface erosion, or begins to percolate through the road base and subgrade causing potholes, sinkholes, and road slumps.

The paved and bituminous treated roads that are part of the Forest transportation system (i.e. not including State Highways) in this area suffer from severe cracking, potholing, or surfaces which are beginning to

break apart entirely. Generally, the aggregate surfaced and improved (pit-run) roads in this area hold together very well in areas where the terrain is relatively flat and erosion is less of an issue, whereas in a few locations where steeper terrain prevails these roads exhibit severe erosion characterized by loss of surface materials and delivery of sediment to streams. Native surface roads in this area are characterized by moderate rutting caused by heavy haul during wet conditions or even by passenger vehicle use at times when the soils in the roadbed are entirely saturated.

## **Temporary Roads**

Some of the primary effects of note accruing from the construction, use, and rehabilitation of temporary roads are related to surface and groundwater hydrology and sediment production. The relatively moderate topography that makes up the analysis area has led to a tradition of employing ground-based yarding systems to remove logs to landings. Temporary roads have customarily been constructed to provide access to those landings that were within the interior of units or otherwise not immediately adjacent to existing portions of the transportation system. With the advent of 1976's National Forest Management Act which requires that temporary roads be revegetated within 10 years, more attention has been paid to improving circumstances for revegetation on compacted temporary road surfaces, and within the last decade they have been more aggressively treated by surface decompaction techniques and intensive erosion control measures such as placement of logging slash or seeding & mulching to cover the decompacted roadbed.

## **Material Sources**

Construction, reconstruction, and maintenance of Forest System Roads requires mineral rock resources. During the construction of the original road system multiple rock pits and quarries were developed in the area to serve as government sources of material that could be utilized to avoid the costly expense of purchasing and importing large quantities of materials from greater distances away. These material sources were developed not only to provide materials for construction, but were planned out to continue providing this valuable resource for reconstruction and maintenance needs into the future. 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 now and into the future, with additional concerns for protection of other natural resources being considered and addressed in the development and operation of these pits and quarries.

Jackey Quarry is accessed from the west by Forest Road 2640-221 and from the north by Forest Road 2610-241, which crosses over Frog Creek to gain quarry access. Jackey Quarry has material that is easily obtained by use of heavy equipment without the need for ripping or blasting and therefore has traditionally been a popular source for mining of pit-run. Rock has also been crushed successfully in the past to produce roadway base and surface course aggregates, making Jackey Quarry a valuable resource for the quality and flexibility of its material. However, because a portion of the quarry exists within the riparian zone of Frog Creek special consideration and attention must be given to erosion control and protection of water quality at this site. The quarry was analyzed last under the Little Knoll Resource Management Projects EA (See DN and FONSI Little Knoll Resource Management Projects, 1987). Via the Little Knoll EA they analyzed alternatives for either retiring and reclaiming the quarry, maintaining active use of the quarry under its then-current development plan, or maintaining active use of the quarry while mitigating land management and water quality concerns. The Decision delivered by the Responsible Official at the time was to implement the latter alternative by: 1) constructing an AOP culvert at the NFSR 2610-241 crossing with Frog Creek, 2) constructing a settling basin to reduce sediment delivery to Frog Creek, 3) deciding to preserve organic overburden to utilize during rehabilitation of the quarry (which would be completed in stages as areas of the pit are exhausted and closed out), 4) limiting stockpile areas to defined locations away from the creek, and 5) creating a new quarry development plan to ensure that future excavation takes place directionally away from Frog Creek (not parallel to it) and would limit expansion into productive forest lands. This direction has been implemented in the field and Jackey Quarry continues to serve as an active source of quality material.

Rimrock Quarry is located on Forest Road 2131 at mile post 0.43. Rimrock Quarry also has material that is easily obtained by use of heavy equipment without the need for ripping or blasting and has been used for successfully crushing rock in the past to produce roadway base and surface course aggregates, making Rimrock Quarry another valuable resource for the quality and flexibility of its material. However, since there is no current Quarry Development Plan in place for this source the geologic extents of this material and quantity available for use in maintenance and reconstruction work is unclear.

Alkali Quarry is located on Forest Road 2651-230 at mile post 1.10 (end of road) on Forest Land, but which has to be accessed via roads that run over land owned by The Confederated Tribes of the Warm Springs with road jurisdictions under the Bureau of Indian Affairs, and thus any heavy haul of materials or equipment requires permitting through that entity. However, the supply of mineral materials at Alkali Quarry has been exhausted and the site has been retired as a production source circa 1995, having since been utilized for disposal of unsuitable or waste soils.

### **3.4.3 Effects Analysis**

#### **No Action Alternative**

##### ***Commercial Haul of Materials***

The No Action Alternative 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 less traffic generated wear and tear on the roads within the project boundary. Wear and tear that would come from recreation and administrative use would continue to occur; normally in passenger vehicles. This would be considered detrimental to the transportation resource in this area due to the inability to address current maintenance and reconstruction needs on this portion of the Forest.

##### ***Road Maintenance & Reconstruction Activities***

Due to budget prioritizations, no action would mean that none of the planned road maintenance associated with this project would occur in the near future. Road reconstruction issues such as current road failures, drainage failures, and erosion control problems that have been identified within this road system would not be addressed.

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, 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 (U.S. Forest Service Engineering Staff, 1994).

Failed or poorly functioning drainage systems increase sedimentation in streams and waterways due to their failure to properly mitigate erosion. They also increase the likelihood of waterway contamination from vehicular fluids due to water being forced onto roadways prior to draining into natural stream courses. Unbrushed roadways also present an additional safety hazard to road users due to decreased sight/stopping distance (American Association of State Highway and Transportation Officials, 2004).

##### ***Temporary Roads***

Since this alternative would not include any action, there would be no need for temporary roads. Since there would be no need for access to proposed units, the absence of temporary roads would have no direct impact to the transportation resource.

##### ***Material Sources and Material Disposal Locations***

As road maintenance and reconstruction would become deferred over the near term, quarry operations would consequently also be deferred for the same period of time. This alternative would not prevent the government from obtaining commercial source materials to conduct such road maintenance or reconstruction work now or in the future, but the cost of completing the work could increase and the Forest Service would have less control over the prevention and eradication of noxious weeds and invasive species of concern on the Forest.

### ***Changes to the National Forest Road System***

This alternative would not include system road status changes such as road closure 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 will 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 both remain unchanged with no action.

### **Proposed Action Alternative**

#### ***Commercial Haul of Materials***

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 will be accompanied by increased quantities and frequency of road maintenance. The roads within the project area were designed for hauling timber during the dry season and the Proposed Action Alternative was analyzed for dry season haul.

#### ***Road Maintenance Activities***

Road maintenance will 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 that will occur on roads designated for haul as identified in the Proposed Action.

#### ***Road Reconstruction Activities***

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, including 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 local 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. The itemized repairs listed in the Proposed Action and their costs as identified in the Transportation Specialist Report are estimated based on the preliminary judgement of transportation engineers. Final design requires further intensive field measurements & calculations and may vary. Some road work may be accomplished

by alternate funding sources and some road failures may not even be evident yet. Any adjustments to this listed work would be developed consistent with the Project Design Criteria.

### ***Temporary Roads***

To minimize impacts to the environment and natural resources, pre-existing alignments that were used as a temporary road in the past and alignments of previously decommissioned system roads are utilized wherever feasible. Even though many of the units were logged in the past, there are cases where it is not feasible or desirable to use the same alignments, landings, or logging methods used before at certain sites. In some places, in order to protect residual trees, soil, and water, new temporary roads are proposed to access landings where existing system roads and old alignments are not adequate for accessing strategic locations on the ground. 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 as described in the PDCs.

Within this planning area there exists an extensive system of Off-Highway-Vehicle (OHV) recreation trails. In many cases these OHV trails existed as system roads in the past and have been converted to be incorporated into the system of recreation trails. While that conversion has been officially completed in terms of designated use, in many cases little work has been completed on the ground to restrict or discourage use by highway legal vehicles and the physical condition of these alignments on the ground is no different than some of the open system roads that have received less recent maintenance, and in a few cases the condition of these trails would better accommodate vehicular traffic than open system roads that have received no maintenance in a long period of time.

This alternative proposes to utilize some of the recreational OHV Trail System 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 PDCs have been developed to govern the use of these alignments as part of this project, including a limitation on the percentage of trail system that can be closed and used for project operations at any one time. 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.

For more detailed information on all temporary roads and their impacts to the trail system, see the analysis sections on Logging Systems and Recreation.

### ***Material Sources and Material Disposal Locations***

Commercial sources of rock products in the local area would be the preferred method of supply for crushed surface or base aggregates used in road maintenance and reconstruction work in the area due to the high cost of excavating, crushing, sampling, and testing materials from government sources. In order for this commercial product to be utilized on the Forest, local commercial sources will need to coordinate with the Forest Service to have their quarries or pits inspected by qualified Forest Service personnel and accepted as meeting the standard for being reasonably free of organic material or seeds from noxious weeds or invasive botanical species of concern. Three known commercial sources that may be considered for utilization are Dodge Pit/Quarry, Tygh Valley Sand & Gravel, and Badger Creek Rock Inc.

Jackey Quarry is a government source known to have an abundance of quality material within the bounds of the current Quarry Development Plan that can be easily excavated for use as suitable borrow and structural fill, screened for use as pit-run material, or even crushed for production of surface and base course aggregates. The current Quarry Operating Plan shows that this site also has adequate room for crushing operations to occur if the need arises in the case that material from commercial sources is shown to be unsuitable due to botanical infestations. If operations take place in Jackey Quarry, such operations would be conducted in collaboration with soils, geotechnical, hydrologic, and aquatic wildlife specialists



and in compliance with all National and State Clean Water Best Management Practices as well as all PDCs associated with this analysis.

Rimrock Quarry is a government source known to have quality material that can be easily excavated for use as suitable borrow and structural fill, screened for use as pit-run material, or even crushed for production of surface and base course aggregates. However, the quantity of material at this site is unknown and space available at the site is limited and may not accommodate both stockpile areas and the equipment that would be needed for crushing operations should the need arise. Due to this quarry's strategic location within the planning area together with lack of outstanding concerns for water quality and aquatic wildlife, Rimrock Quarry is the preferred location for mining pit-run material to use in road maintenance and reconstruction work in the area.

Alkali Quarry exists on government land and has been retired with respect to production of mineral materials, but because of its available space with a quarry floor that is lower than the elevation of the nearby creek, this site would be the preferred location for disposal of unsuitable and waste soils produced from road reconstruction activities. Disposal operations in Alkali Quarry would be conducted in collaboration with soils, geotechnical, hydrologic, and aquatic wildlife specialists and in compliance with all National and State Clean Water Best Management Practices as well as all PDCs associated with this analysis.

### ***Changes to the National Forest Road System***

In order to bring the Forest Road system into line with current agency policy, rectify inconsistencies, reduce impacts to natural resources, or reduce maintenance liabilities, this project proposes to add miles to one system road, prohibit traffic on certain roads, or decommission roads. Site-specific treatments would be tailored to site-specific conditions using one or more of the following treatments:

- Road Closure with a Gate (remains a system road).
- Road Closure with a Berm and Stormproofing (remains a system road) - stormproofing usually involves water-bars or other structures to provide drainage & hydrologic stability and reduce erosion. Culverts would be retained unless specified. Where appropriate, the depth of fill material over culverts may be reduced.
- Road Closure with Entrance Management (remains a system road) - installing one or more earth berms or trenches and decompacting approximately the first 1/8 mile of road. Culverts would be retained unless specified.
- Active Decommissioning - removing culverts, reestablishing former drainage patterns or natural contours at stream channels, installing water bars, removing gravel surfacing, decompacting road surfaces, pulling back unstable fill slopes or road shoulders, scattering slash on the roadbed, applying erosion control mulch and seed on disturbed areas, and blocking and disguising the former road entrance to prevent motorized vehicle traffic.
- Passive Decommissioning - removes a road from the transportation system but involves no physical treatments on the ground because the road is overgrown in a naturally recovering state and a determination is made that creating a disturbance would create more detriment than benefit.

The Proposed Action would add one 1.60 miles to one road (NFSR 2110-240). This existing alignment was a segment of open system road in the past, which was converted to a recreational OHV trail via the 2009 OHV decision document. When looking at the use history and long term future need for this particular road, it was discovered that the road has been used as a haul route for land management access twice within the last decade, is being planned for use as a haul route under this Proposed Action, and is seen as being needed as a haul route for land management access in the near and distant future. To continue to use it repeatedly as a temporary road while claiming that it is not part of the Forest Transportation System would be disingenuous and contrary to agency policy. Therefore, it is proposed that this segment be returned to the system as a road intended for intermittent administrative and

commercial use, while allowing the continuation of use by OHVs as part of the trail system. Because placing a road into storage (ML1 status) would, by definition, prohibit all motorized vehicular traffic, this would not be the appropriate status for the road to allow continued use by OHV traffic. So adding this mileage to the system at ML 2 with an administrative closure under Title 36 of the Code of Federal Regulations (36 CFR) that prohibits public highway legal traffic, except by special use permit, was deemed the appropriate course of action.

The first 0.03 miles of this road was never converted to trail and is still an open road with ML 2 status. Mixed use should not be a problem on this road since it will be closed to OHV use whenever a commercial use is permitted and public notice will be posted in that event. As administrative traffic is expected to be extremely low volume, low speed, and intermittent use, this route does not warrant a full engineering analysis of mixed use traffic.

The Proposed Action in Chapter 2 presents the full list of road status changes scheduled to occur under this Proposed Action and summarizes the treatment that each road will receive.

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 Off-Highway Vehicle (OHV) use, low levels of dispersed camping, and use by seasonal hunters. Hunters and campers in the area will still be permitted access to their traditional recreational grounds, but will 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**

### ***No Action Alternative***

Since the No Action alternative for this project would have no heavy haul of materials, no road reconstruction or maintenance, no construction of temporary roads, no quarry operations, and no road closures or road decommissioning, all effects being considered in this analysis under the No Action alternative are either direct or indirect effects.

### ***Proposed Action Alternative***

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 will 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 Project Design Criteria included with this proposed action.

## **3.4.4 Consistency Determination**

The proposed action plan, with respect to the transportation resource, has been reviewed for consistency with the “Land and Resource Management Plan, Mt. Hood Nation Forest”, also known as the Mt. Hood Forest Plan. All proposed actions related to the Forest Transportation System are consistent with the Forestwide Transportation Standards and Guidelines and any additional standards and guidelines under the Mt. Hood Forest Plan are specifically addressed and enforced through contract provisions included with each individual timber sale, stewardship project, or public works contract and/or the stated Project Design Criteria.



## 3.5 Soil Productivity

### 3.5.1 Analysis Assumptions and Methodology

Regional soil productivity protection standards were originally implemented in 1976, and have been revised several times since then, including incorporation into the Mt. Hood Land and Resource Management Plan (Forest Plan) as part of the soil productivity chapter of the Forest Plan.

#### Methodology

Each type of soil has been given a soil map unit (number) to show where they occur on the soil map and how they lay across the landscape. Each map unit was then assessed for many risks and hazards and assigned management ratings (e.g. erosion risk, compaction hazard), which are located in the Mt. Hood National Forest Soil Resource Inventory (SRI, Howes, 1979). The scale at which the mapping was produced in the SRI is one inch to the mile, which makes it useful as an initial broad-scale planning tool to identify and display maps of possible soil concerns or sensitive areas. The SRI map and overlay of proposed treatment areas was taken to the field and validated, and no changes were needed to reflect what was observed on the ground.

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. Personal 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 possible. In addition, several older planning efforts on the west side of CCR (Hilynix, Bear Knoll, Juncrock, and Osprey) were planned and reported on by this author.

#### Analysis Approach

The analysis area for soil resources in this Environmental Assessment (EA) are the proposed treatment units. A comparison of alternatives will be 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 project design criteria?
- What are the consequences of taking no action?

For this analysis and project type, the following three criteria will be used to assess impacts and answer these questions.

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 amount 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 will also consider restorative actions as well as the Project Design Criteria/Mitigation Measures (PDC) and best management practices 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.

## Assumptions

The analysis within this report is based on the following assumptions:

- It is assumed damage on skid trails would average 12 feet in width;
- The conceptual layout of logging system patterns have 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;
- 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, 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. Figure 46 and Figure 47 below show the overlays of soil type and proposed treatment areas by these two vegetation ecotypes.



### CCR Soil Types and Proposed Units by Dry Mix Conifer



**Legend**

-  Dry Mix Conifer Boundary
-  Soil Resource Inventory
-  Proposed Units
-  Riparian Reserve
-  Streams

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Figure 46. Soil types and proposed units within the Dry Mixed Conifer Ecotype on the east part of the planning area.

### CCR Soil Types and Proposed Units by Moist Mix Conifer

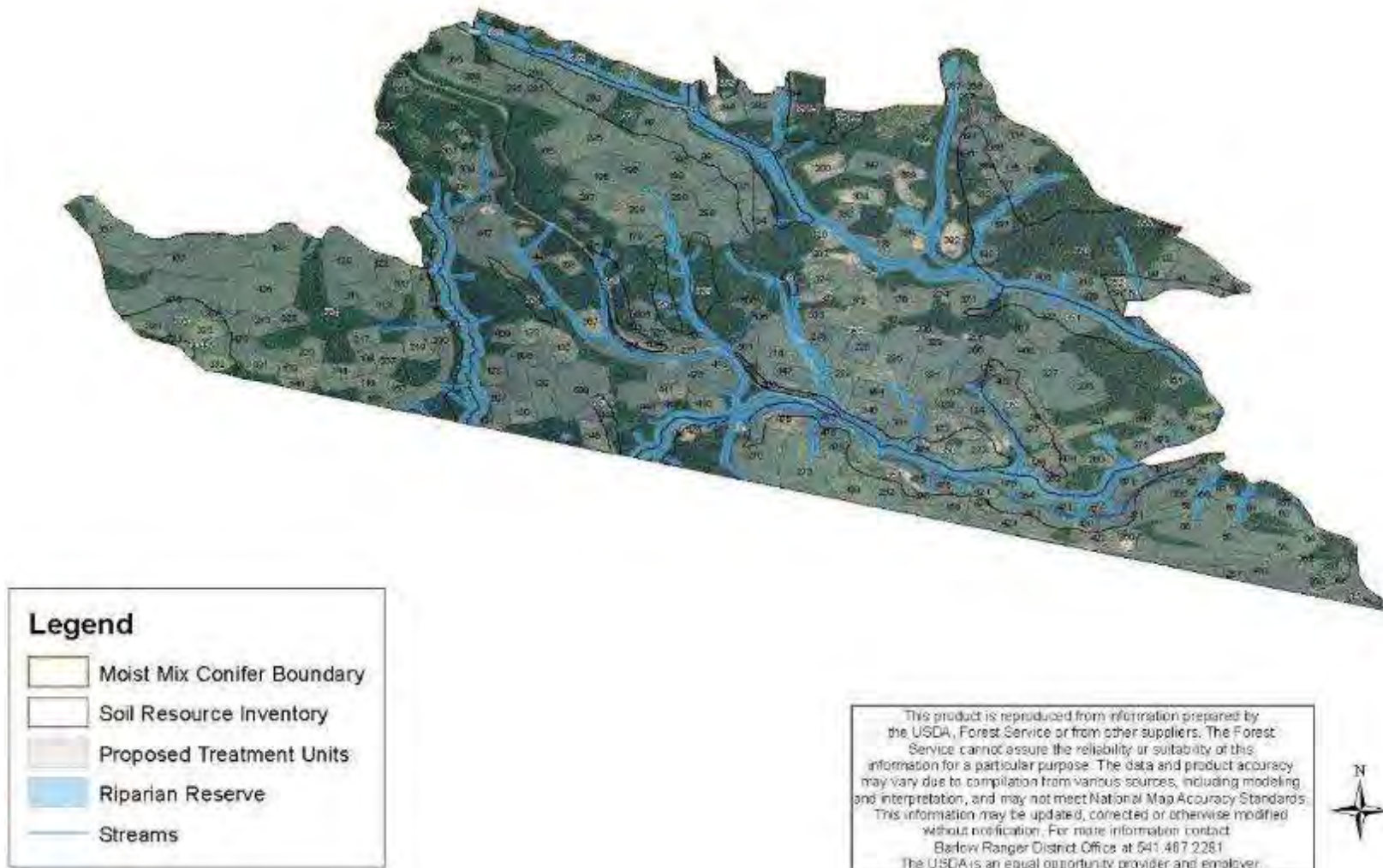


Figure 47. Soil types and proposed units within the Moist Mixed Conifer Ecotype on the west part of the planning area

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. In Table 45 below, a summary of ecosystem components is presented to illustrate the differences that occur from west to east.

**Table 45. Summary of soil distribution with associated landscape factors across the planning area.**

Soil Characteristics	Soil Distribution	
	West	East
SRI map unit	305/304 → 350/351/352 MMC*	350/351/352 DMC* → 154/155 → 156
Soils forming in:	Widespread Thick Glacial Deposits → Thinning Glacial → Older Remnant Landforms	
Soil characteristics	Sandy/gravelly/low clay content → Higher fine sand/silt/increasing clayey subsoil	
Upland Veg.	Mt. Hemlock → Silver fir → W.Hemlock → Doug fir/Grand fir → Pond. Pine/White Oak	
Climate	Cooler, wetter	→ Warmer, dryer
Organic matter	Average appx 25 tons and six logs per acre	→ Average 10 tons and one log per acre**
Fire frequency/type	Less frequent/stand replacing	→ More frequent/underburn

\* MMC refers to Moist Mixed Conifer Ecotype and DMC refers to Dry Mixed Conifer Ecotype  
 \*\* From: Managing Coarse Woody Debris in Forests of the Rocky Mountains (Graham, et.al., 1994)

A summary of soil mapping units and their associated management interpretations is located in Table 46 below. Key observations from the table include:

- All potentially impacted soils have a low to moderate compaction hazard;
- Erosion risk for soils on less than a 30% slope run generally from slight to moderate for undisturbed, bare soil; and,
- Erosion risk for bare soils on greater than a 30% slope are all rated no higher than moderate.
- Virtually all of the proposed activities are situated on very broadly occurring soil types marked with an X.

**Table 46. Summary of soil types in the analysis area and associated management interpretations from Mt Hood Soil Resource Inventory**

Proposed Action Occurring within Soil Unit	SRI Soil Map Units	Compaction Hazard	Erosion Potential ( <i>bare soil</i> )
	154*	Low	Moderate
	155*	Low	Moderate
	156	Low-Mod	Slight-Mod
	157*	Low-Mod	Moderate
X	304	Low-Mod	Slight
X	305*	Low	Slight-Mod
X	350	Low-Mod	Moderate
X	351	Low-Mod	Moderate
X	352	Moderate	Slight

\* Greater than 30% slope

### 3.5.3 Effects Analysis

#### No Action Alternative – Direct and Indirect Effects

##### Soil Erosion Risk:

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 (therefore nutrients and water) for all normally expected soil biological, chemical, and physical functions to occur.

##### 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, and 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 – Direct and Indirect Effects

##### Soil erosion risk:

No active erosion from previous vegetation management was observed during the field reconnaissance for this project. All areas proposed for treatments are expected to meet the effective groundcover standard following ground disturbing activities.

##### Detrimental soil conditions:

The results of soil quality field surveys performed over several years are shown in Table 47 below. Monitoring occurred on glacial soil types that exist within the planning area, or on soil types expected to respond in a similar fashion. All areas listed as proposed were either been clearcut many years ago, or have had some kind of on-the-ground impacts from scattered tree removal. All areas monitored post logging were within the 15 percent detrimental soil condition standard. The Forest has seen a steady trend of improvement in meeting this standard, which was commonly exceeded from the 1980's through the mid-1990's (Mt. Hood Forest Plan Monitoring Report, 2006). Reduced impacts may be attributed primarily to the following: major changes in practices, such as the elimination of machine (dozer) piling of logging slash; lower ground pressure machinery that reduce compactive forces; and an awareness that soil damage was exceeding acceptable levels with a conscious effort to reduce damage. The one major change in operations that led to the greatest decrease in soil damage was moving away from dozer piling to more grapple piling of slash.

**Table 47. Summary of stands monitored with shovel probe transects. MP = Fuel concentrations were machine piled with small excavator**

Sale Name and Unit Number or Planning Unit Number	Year Monitored	Silviculture Treatment	Logging System	Fuel Treatment	Percentage Monitored Detrimental Soil Impacts
BS Thin 43	2009	Proposed Thinning	N/A	N/A	Less than 2
BS Thin 58	2009	Proposed Thinning	N/A	N/A	Less than 2
BS Thin 59	2009	Proposed Thinning	N/A	N/A	Less than 3
BS Thin 64	2009	Proposed Thinning	N/A	N/A	Less than 2
BS Thin 70	2009	Proposed Thinning	N/A	N/A	Less than 3
BS Thin 76	2009	Proposed Thinning	N/A	N/A	Less than 3
Bear Knoll 145	1999	Proposed Thinning	N/A	N/A	1
Bear Knoll 169	1999	Proposed Thinning	N/A	N/A	1
Juncrock 8	1999	Proposed Thinning	N/A	N/A	3
Hi-Thin 1	2009	Thinned	Processor	MP	3
Hi-Thin 2	2009	Thinned	Processor	MP	Less than 3
Chee 18	2003	Thinned	Feller Buncher,Rub ber tired skidder	MP	13
Yaka 21	2000	Thinned	Feller Buncher,Rub ber tired skidder	MP	6

In addition to the traditional monitoring methods and summary above, 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 on out to the east almost to the forest boundary. The supplemental monitoring report is attached and explains in full the findings on a proposed unit by unit basis. None of the 30 monitored proposed units exceeded 7% detrimental soil condition. The summary provided by the field crew is attached at the end of this report.

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 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.

**Organic matter levels:**

Given the amount of material left standing on site, as well as expected slash loading, it is likely an increased level of organic matter (tonnage) would be left on the ground verses up in the canopy for site productivity purposes.

***Effects Resulting From Changing Conditions***

**Soil Erosion Risk:**

Soil erosion risk would increase with the Proposed Action 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 'Best Management Practices', or BMP's, is discussed by Rashin et.al. (2006) in an applicable publication of the Journal of the American Water Resources Association. Comparing the Proposed Action to their application of studied BMP's 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's 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's and PDC's, the risk of erosion and subsequent sediment delivery caused by the Proposed Action is extremely small.

**Detrimental Soil Conditions:**

Impacts caused by heavy equipment would increase the amount of detrimental soil damage within the treatment areas. This increase is not expected to exceed Forest Plan standards. Therefore, there would be no accompanying measurable decrease in site productivity in the units. The Changed Condition section above explains how logging systems are expected to impact the ground based treatment areas.

**Organic Matter Levels:**

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 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 is consistent with all applicable laws, regulations, and Forest Plan guidance with the exception of the Soil Organic Matter standard in the Dry Mixed Conifer Ecotypes.

## 3.6 Water Quality

### 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 Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) standard FW-064 dealing with Watershed Impact Areas. 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 48.

The following assumptions are utilized in the Water Quality Analysis:

- All Best Management Practices (BMP) and Project Design Criteria (PDC) listed in Environmental Assessment (EA), Chapter 2 Section 2.3 would be implemented and effective as described in the BMP Table in Appendix 2.
- The areas of impact outlined in EA, Chapter 2 are actual 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 48. Strengths and Weaknesses of the Water Quality Analysis Approach**

<b>Analysis Method</b>	<b>Strength</b>	<b>Weakness</b>
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 Best Management Practices	Effectiveness of various erosion control measures in reducing erosion is well documented. General effectiveness of buffers in reducing	Effectiveness of various buffer widths on reduction of effects to surface water is not extensively

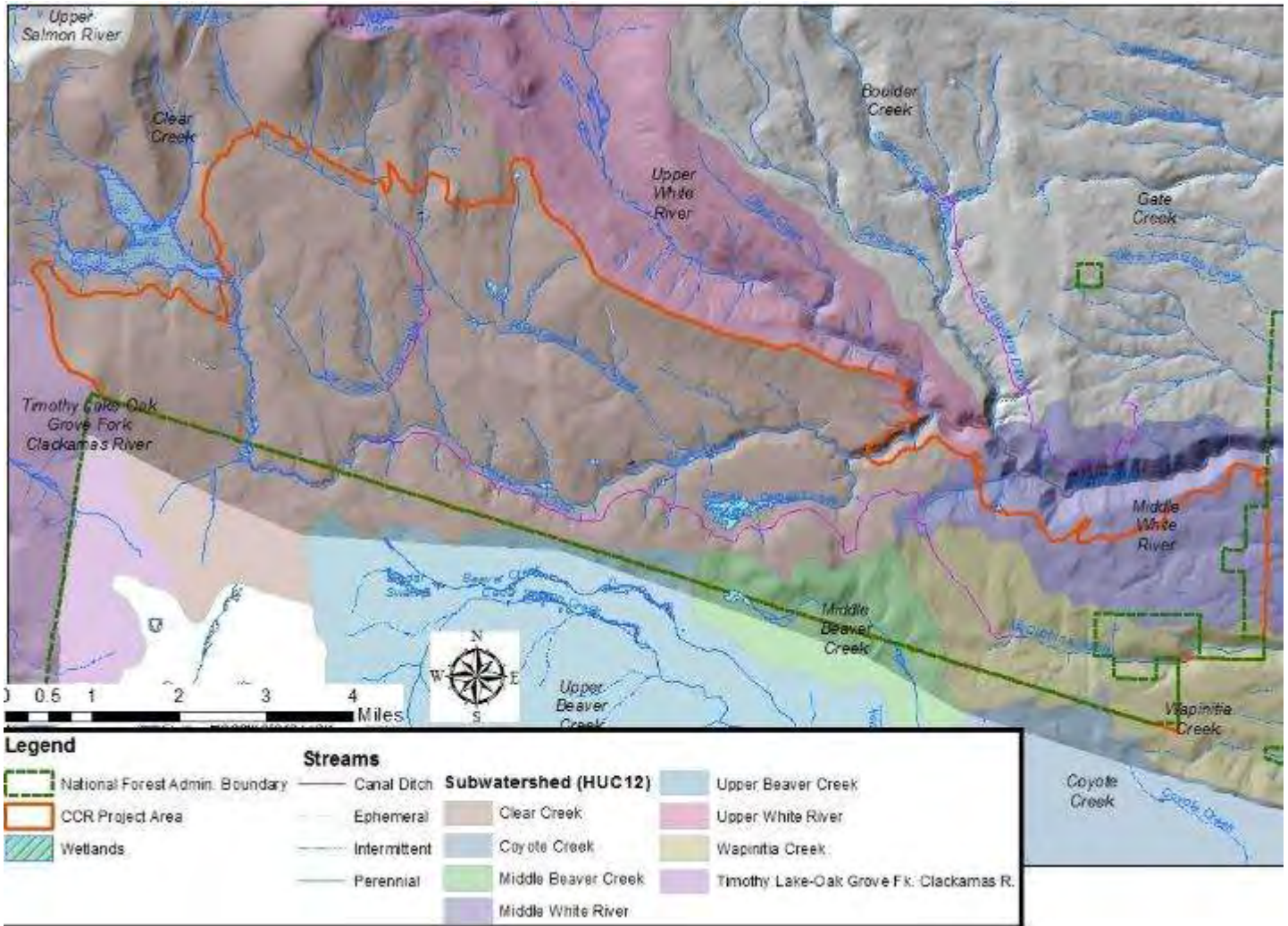
<b>Analysis Method</b>	<b>Strength</b>	<b>Weakness</b>
(BMP) and Project Design Criteria (PDC)	sediment and other impacts is well documented.	documented in a wide variety of physical settings.
WEPP Model	Some of the model input parameters can be adjusted to reflect site conditions. This resulted in more accurate representations of potential erosion and sediment delivery	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 give an actual value for erosion and sediment delivery.	Model results have been documented to underestimate actual amounts of erosion and sediment delivery (Welsh, 2008). The model documentation states that results can be up to + or – 50% of actual amounts.
Stream Inventories	Provide more site-specific data for effects analysis. This data has been collected in a Nationally standardized protocol by trained resource professionals.	Some of the inventories are older and some conditions may have changed between the time the data was collected and the present time.

### 3.6.2 Existing Condition

The CCR Project is located primarily within portions of four subwatersheds: Clear Creek, Wapinitia Creek, Middle Beaver Creek and the Middle White River (Figure 48). Approximately 1.5% of the CCR 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 approximately 0.75 acres at the head of two intermittent tributaries to White River; however, the upstream extent of these stream appears to be extended further than the actual channels based on LiDAR data for the area. Effects are expected to be limited due to the small amount of disturbance and will not be included in the analysis for this document. For the purposes of this analysis, only the four primary subwatersheds will be used for the analysis area and in the remainder of this Water Quality Report. Hydrologic Unit Codes (HUC), which break drainage systems into progressively smaller areas, and subwatershed names that intersect the project area are listed in Table 49. These 6<sup>th</sup> field watersheds (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.

There are many streams and wetlands located within these watersheds. Clear Lake is located just outside of the western boundary of the project area. In addition, irrigation ditches are located within the project area that divert flow from one natural stream channel into another within the project area include Clear Creek Ditch and Frog Creek Ditch.

There are approximately 107 miles of stream and 13 miles of irrigation canals in the National Forest portion of these 6<sup>th</sup> field watersheds in the following categories: 45 miles of perennial streams (i.e. flow year around), 62 miles of intermittent streams (i.e. streams that dry up for part of the year) and less than one mile of ephemeral streams (i.e. streams that typically only flow during storm events).



**Figure 48. Map of the 6th field Watersheds intersecting the CCR Project Area**

The primary streams include Camas Creek, Clear Creek, Elk Creek, and Frog Creek. Irrigation ditches include Clear Creek and Frog Creek Irrigation Ditches, which are ultimately used off the National Forest for agricultural irrigation uses. A substantial portion of Frog Creek is diverted into the Frog Creek Ditch, which then flows into Elk Creek where Elk Creek has been ditched, likely as a result of construction of State Highway 26. Elk Creek then flows into Clear Creek at a holding pond, which is then mostly diverted into the Clear Creek Ditch. The Clear Creek Ditch then flows into McCubbins Gulch within and approximately one mile upstream of the Forest Boundary.

**Table 49. Hydrologic Unit Codes for the Crystal Clear Restoration Project Area**

Field	Area	Name	Hydrologic Unit Code
1st	Region	Pacific Northwest	<b>17</b>
2nd	Sub-Region	Middle Columbia River	<b>1707</b>
3rd	River Basin	Deschutes River	<b>170703</b>
4th	Subbasin	Lower Deschutes River	<b>17070306</b>
5th	Watershed	White River	<b>1707030609</b>
5th	Watershed	White Horse Rapids – Deschutes River	<b>1707030611</b>



Field	Area	Name	Hydrologic Unit Code
5 <sup>th</sup>	Watershed	Beaver Creek	1707030605
6 <sup>th</sup>	Subwatershed	Clear Creek	170703060901
6 <sup>th</sup>	Subwatershed	Middle Beaver Creek	170703060503
6 <sup>th</sup>	Subwatershed	Wapinitia Creek	170703061106
6 <sup>th</sup>	Subwatershed	Middle White River	170703060906

A total of 46 springs were identified within the project area. The majority occur in the western 2/3rds of the project area and their sizes range from approximately 0.1 acres to 66 acres. Of the 46 wetlands, 34 were identified by the U.S. Fish and Wildlife Service National Wetlands Inventory, an additional 12 wetlands were identified during field surveys in 2016. Most, if not all, of these wetlands 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 the CCR project were given the appropriate Riparian Reserves per the Northwest Forest Plan and will be protected and excluded from treatment occurring during this project.

### **Water Quality**

Rivers, streams, and lakes within and downstream of the treatment areas are used for boating, fishing, swimming, and other recreation. Additionally, these streams provide habitat and clean water for fish and other aquatic biota, each with specific water quality requirements. The CWA protects water quality for each of these uses.

The CWA requires states to set water quality standards to ensure beneficial uses of water resources. The Act also requires States to identify the status of all waters and prioritize water bodies whose water quality is limited or impaired. In Oregon, the Department of Environmental Quality (DEQ) develops water quality standards and lists water quality limited waters. In addition, Region 6 of the Forest Service has a Memorandum of Agreement (MOA) with the Oregon DEQ to acknowledge the Forest Service as the Designated Management Agency for implementation of the CWA on National Forest System (NFS) lands. In an effort to support the CWA, the Mt. Hood National Forest conducts monitoring and inventory programs to determine status of meeting state water quality standards as well as other regulatory and agency requirements. In an average year, approximately 30 sites are monitored for water temperature throughout the Forest. In addition, other water quality monitoring occurs at various locations depending projects on planned for the year. Monitoring activities may include temperature, turbidity or instream sediment sampling, flow, water chemical sampling, or surveys of physical stream conditions.

Approximately 25 miles of stream habitats are surveyed every year on the Forest and approximately 1300 miles of stream have been surveyed to date. Some reaches may be re-surveyed to monitor for changes over time. Information collected during these physical habitat surveys includes the number of pools and riffles, their length and depth, the quantity, size class and stability of large woody debris, the type, condition, and shade provided by the riparian area and numbers of fish and other aquatic organisms.

By direction of the Clean Water Act, where water quality is limited, Oregon DEQ develops Total Maximum Daily Load (TMDL) plans to improve water quality to support the beneficial uses of water. For water quality limited streams on NFS lands, the US Forest Service provides information, analysis, and site-specific planning to support state processes to protect and restore water quality. No TMDL has been initiated for the project streams as of 2016. 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). Summer stream temperature standards for Salmonid fish rearing uses are 17.8 °C.

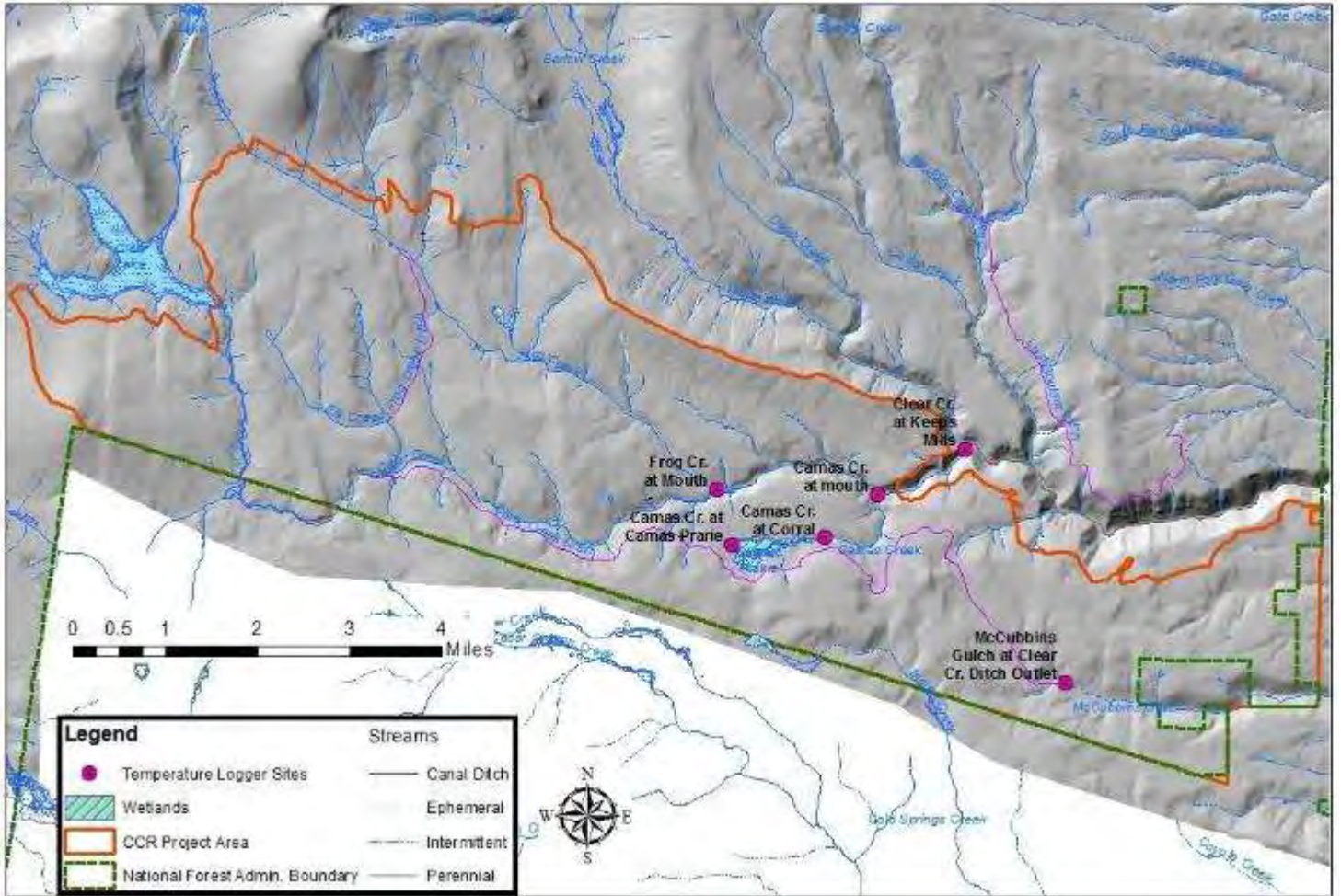
### Stream Temperature

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 will not be downloaded until the spring of 2017. Data has been collected on continuous temperature recording dataloggers in six locations within or directly adjacent to the project area (Figure 49). Table 50 shows the highest 7-day average maximum stream temperatures for the years temperature dataloggers were deployed. Table 50 indicates that 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.

**Table 50. Highest 7-Day Average Maximum Stream Temperatures in the Analysis Area (Celsius)**

<b>Stream</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2006</b>	<b>2007</b>	<b>2009</b>
<b>Clear Creek at Keeps Mill</b>	<b>18.6</b>	13.9	13.3	14.4	13.7	ND	14.8	14.7	15.1	14.8	16.4	14.7
<b>Camas Creek at Camas Prairie (3120' elev.)</b>	ND	ND	<b>27.2</b>	<b>31.0</b>	<b>29.3</b>	<b>31.4</b>	<b>29.1</b>	ND	ND	ND	ND	ND
<b>Camas Creek at Camas Prairie Corral (3050' elev.)</b>	ND	ND	ND	<b>18.4</b>	<b>28.4</b>	<b>29.6</b>	<b>28.8</b>	ND	ND	ND	ND	ND
<b>Camas Creek at Clear Creek confluence</b>	16.0	ND	14.3	11.9	11.9	15.2	14.8	ND	ND	ND	ND	ND
<b>McCubbins Gulch Creek at Clear Creek Ditch outlet</b>	ND	ND	ND	ND	ND	ND	<b>18.6</b>	ND	ND	ND	ND	<b>18.9</b>
<b>Frog Creek at Clear Creek confluence</b>	ND	ND	12.0	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND indicates no 7-day average maximum stream temperature data available for that year.



**Figure 49. US Forest Service Water Temperature Monitoring Sites**

### ***Stream Channel Condition and Sediment***

Varying stream forms and systems react differently to disturbance and recover at differing rates. Depending upon the geomorphic variables, such as entrenchment and bankfull width and depth, one stream may be more resilient and may recover more quickly than another when exposed to disturbance. Stream channels with similar geomorphic variables react similarly to disturbances. In order to assess the existing condition and the potential effects on the stream channels in the CCR 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.

The entrenchment ratio is defined by Rosgen (1996) as the flood-prone area width divided by the bankfull width. Flood-prone area width is the width of the stream at twice maximum bankfull depth. Entrenched

streams are typically vertically confined (within cutbanks) due to vertical channel erosion and have entrenchment ratios that are less than 1.4; higher entrenchment ratios indicate that channels are not confined and have access to floodplain.

Channel disturbances such as increased sediment supply, excessive bank erosion or increased flows can result in stream channel instability by upsetting the balance between sediment inputs and outputs. Increased sediment supply may result in channel aggradation, whereas excessive bank erosion typically results in channel widening. Both aggradation and channel widening change the ability of a stream channel to transport sediment downstream and may lead to a change in stream channel type.

A stream channel’s sensitivity to disturbance is related to the channel type and the dominant channel material (Rosgen 2009). In general, finer grained channel material results in a more sensitive stream channel, with the exception of clay, which can in some circumstances increase channel stability somewhat (Rosgen 2009). Finer grained (gravels and smaller) A, C, D, E, F, and G channels range from high to extreme sensitivity to disturbance (Table 51). Finer grained B and DA channel types, however, are expected to have moderate sensitivity to disturbance. Rosgen channel types include both a letter and a number, the letter represents the major morphological stream type and the number represents the dominant channel material (i.e. substrate). Generally, 1 equates to bedrock, 2 equates to boulders, 3 equates to cobble, 4 equates to gravel, 5 equates to sand and 6 equates to silt/clay.

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).

B channels are moderately entrenched, moderate gradient, riffle dominated channels with infrequently spaced pools that tend to have very stable plan and profile forms, as well as stable banks (Rosgen 1996). C channels are low gradient, meandering, point-bar, riffle/pool, alluvial channels with broad, well defined floodplains. E channels are low gradient, meandering, riffle/pool streams with low width/depth ratios and little deposition that are generally very efficient and stable. Table 51 shows broad-level, generalized management interpretations by stream type within the CCR project area.

**Table 51. Generalized management interpretations by stream types within CCR 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). Frog Creek was identified in 2016 as predominately an E4 channel type, gravel dominated substrate, with a steeper sand dominated headwater channel type of B5c (Rosgen 1996). In 2009, Clear Creek was characterized as a C4 throughout its length, from the lake to just upstream of the mouth, with the mouth characterized as a slighter higher gradient and with substrate dominated by boulders, C2b channel type. Both reaches of McCubbins Gulch, above and below the private land inholding, were characterized as B5 channel types in 2009 as well. Finally, in 2007, Camas Creek was identified as an E5 channel type within and just downstream of Camas Prairie, transitioning to a C4 channel type as the valley becomes more confined downstream of the prairie and finally with a slightly higher gradient and course grained channel type of C2b at the mouth.

Stream surveys indicate perennial streams in the project area are stable with approximately 0-1.5% of all stream lengths indicated as unstable, except for the upper reach of McCubbins Gulch, which has approximately 75% of its length identified as unstable, which equates to only approximately 25% stable banks. Mt. Hood Forest Plan standards FW-102 and FW-103 state that “Streambank and/or shoreline stability of the riparian management areas shall be maintained in its natural condition. If the existing streambank condition is degraded due to past management activities, the natural condition should be restored.” Generally, desirable characteristics for banks stability is for greater than 80% bank stability (LRMP 1990). The bank instability in the upper reach of McCubbins Gulch was identified during the stream survey as resulting from cattle and Off-Road Vehicle (ORV) activity, as well as campground usage. However, a major contributor to bank instability in McCubbins Gulch is likely the substantial flow modifications from increased flows diverted from Frog Creek and Clear Creek for which the McCubbins Gulch stream channel did not evolve. A lot of fine sediment deposition was also noted in the stream during this survey as well as is indicated by the percent fines from the Wolman Pebble Count Surveys conducted during the stream survey (Table 52).

**Table 52. Percent fines (<2 mm) from Stream Survey Pebble Counts**

Table 52 summarizes the percent fine from pebble counts conducted as part of the Level II stream surveys. The Mt. Hood Land Resource Management 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.” Stream surveys do not differentiate between <1 mm and <2 mm diameter particles as part of their Wolman Pebble Counts; however, fines <1 mm are likely a similar percentage as the <2 mm particles. The purpose of this standard is to protect spawning habitat and scientific literature directed at impacts of fine

<b>Stream Reach</b>	<b>Survey Year</b>	<b>% fines (&lt; 2 mm)</b>
Camas Creek R1	2007	0%
Camas Creek R2	2007	6%
Camas Creek R3	2007	67%
Clear Creek R1	2009	0%
Clear Creek R2	2009	10%
Clear Creek R3	2009	33%
Clear Creek R4	2009	20%
Frog Creek R1	2016	20%
Frog Creek R2	2016	20%
McCubbins Gulch R1	2009	36%
McCubbins Gulch R2	2009	80%

sediment to spawning habitat use a standard based on a definition of fines as <6 mm (see Fisheries Report for more detail). Stream surveys indicate that Camas Creek Reach 3, Clear Creek Reach 3, McCubbins Gulch Reaches 1 and 2 all 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, a potential source of coarse and fine sediment to surface water in the area include nearby roads and Off-Highway Vehicle (OHV) trails. Sediment can wash off road and trail surfaces into adjacent streams. The potential for erosion is highest on native surface (dirt) roads and trails and lowest on paved or asphalt roads and trails, especially if used during wet weather (Reid and Dunne 1984; Ziegler et al. 2001). 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 three 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). Generally, the higher the road density, the lower the proportion of subwatersheds that support strong populations of key salmonids, see the Fisheries Report for a more in-depth discussion (USFS 1996). Table 53 displays total specified road densities, including closed roads, for 6th field watersheds within the project area and within the National Forest Boundary.

**Table 53. Watershed Road and Motorized Trail Density**

<b>Watershed</b>	<b>Road Density (mi/mi<sup>2</sup>)</b>	<b>OHV Trail Density (mi/mi<sup>2</sup>)</b>	<b>Total Road + Trail Density (mi/mi<sup>2</sup>)</b>
Clear Creek	3.8	0.4	4.2
Middle Beaver Creek	6.2	2.4	8.5
Middle White River	1.7	1.5	3.2
Wapinitia Creek	2.7	2.4	5.1

Middle White River and Wapinitia Subwatersheds within the National Forest Boundary are below three mi/mi<sup>2</sup> (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/mi<sup>2</sup>. When motorized trails are added to overall road densities, all four of the analysis subwatersheds have densities that exceed 3 mi/mi<sup>2</sup>. No stream surveys were conducted in Middle Beaver Creek, only approximately four percent of the subwatershed is located on National Forest land. 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 National Forest Boundary. Trail and road densities within the Wapinitia Subwatershed exceed 5 mi/mi<sup>2</sup>.

Three grazing allotments intersect the project area, one of which that has active cattle grazing allotment, the White River Allotment. The White River Allotment overlaps 83% of the project area. Streambank alteration by hoof shear, trampling, and/or post-holing (cumulatively referred to as hoof action in the remainder of this report) has the potential to result in a cutbank or alter channel morphology. Streambanks with hoof action alteration are more susceptible to the transport of fine soil particles from unvegetated banks to stream channels (i.e. higher sediment yield) than streams with vegetated banks (Skovlin 1984). Buckhouse et al. (1981) could find no particular relationship between streambank erosion and various grazing treatments in northeastern Oregon, however Buckhouse and Bohn (1987) found streambank retreat (erosion) to be statistically different between ungrazed and grazed treatments. Kauffman et al. (1983) measured significantly greater streambank losses in grazed areas compared to ungrazed areas in northeastern Oregon. Field surveys conducted in 2016 found numerous unfenced wetlands and streams that exhibited post-holing and streambank alteration 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 to address them (Table 54). Each of these recommended projects were proposed in order to address existing or potential erosion and sediment delivery to streams within the CCR Project Area. The only one of these projects that has been confirmed to have been completed thus far is enclosure 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. This decision included the following mitigations: constructing an Aquatic Organism Passage (AOP) structure at the NSFR 2610-241 crossing location on Frog Creek, constructing a settling basin to reduce sediment delivery to Frog Creek, preserving overburden to utilize during rehabilitation of the quarry, limiting stockpile areas to defined locations from the creek, and creating a new quarry development plan to ensure that future excavation takes place directionally away from Frog Creek. Other than updating the Quarry Development Plan, it is unclear to what extent these on-the-ground mitigations were implemented; however, prior to use of this quarry for the CCR Project any remaining mitigations from the Little Knoll Decision would be implemented. Two additional quarries are located within the CCR 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.

**Table 54. Water Quality Improvement Projects identified in the White River Watershed Analysis**

<b>Project Name</b>	<b>Type</b>	<b>Description</b>	<b>Implemented (Date)</b>
Monitoring Program	Grazing	Develop and implement monitoring to assess livestock physical damage (i.e. streambank alteration) in Riparian Areas	No
Camas Prairie Enclosure	Grazing	Camas Prairie Enclosure and Restoration work to protect the spotted frog	Yes (2007/2008)
Clear Creek Riparian Enclosure	Grazing	Fence degraded portions of Clear Creek to exclude cattle	No
Jackey Quarry (referred to as Jakey Pit) Restoration	Mining	Restore or stabilize to reduce sediment, stabilize streambanks, and encourage regrowth of riparian vegetation on Frog Creek.	No
Reduce Sanding Impacts	Roads	Work with ODOT to reduce impacts to creeks from sanding (US 26)	No
McCubbins Gulch Campground Restoration	Recreation	Redesign to handle and control use levels, reduce erosion, rehabilitation of streambank damage, and restoration of riparian and screening vegetation	No
McCubbins Gulch Industrial Camp Site at 2110	Recreation	Install dry hydrants, remove existing water retaining structures, scarify soil and close unimproved roads, move dispersed campsites away from stream, restore riparian vegetation, and place large downed logs for fish cover as needed	No
Clear Creek Trail Reconstruction	Recreation	Relocate trail below Clear Creek Campground away from wet soils along Clear Creek	No

Project Name	Type	Description	Implemented (Date)
Clear Lake Recreation Management Plan	Recreation	Develop and implement plan to reduce sediment delivery into lake from high levels of dispersed and developed recreation use	No
Road 42 Dispersed Site Restoration	Recreation	Redesign dispersed site at water source on Clear Creek at Road 42 to move campsite away from streambank, control use area, reduce erosion, and restore ground vegetation	No
Irrigation Ditch Stabilization	Irrigation	Assist irrigation companies in acquiring sufficient funding to pipe irrigation ditches on sideslopes to reduce risk of blowouts and to line irrigation ditches across uplands to reduce leakage	No

**Peak Flows**

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.

Another component of the peak flow analysis is the extension of the stream channel network by roads ditch lines in roads. Roads have the potential to increase the drainage density of a stream network by intercepting runoff at stream crossings or by channelizing flow that would otherwise be sheet flow or groundwater flow (Wemple et al. 1996; Jones et al. 2000; Takken et al. 2008). By increasing the drainage density and providing a more direct route to stream channels, roads in effect can decrease the time it takes for the precipitation, in the form of runoff, to enter the stream channel and potentially resulting in increased peak flows (La March and Lettenmaier 2001; Storck et al. 1998; Woldie et al. 2009; Harr et al. 1975). In addition, since erosion risk from ATV trails has been shown to potentially equal that of a forest road network, it can be expected that trails have the potential to increase drainage densities and peak flows similar to forest roads (Meadows et al. 2008). Areas with high road densities, high drainage densities, and a high density of stream crossings typically result in higher connectivity of the road and stream network. The effects of roads (or trails) on increased peak flows is expected to be greatest downstream of areas with a high density of stream crossings due to increased efficiency in routing flow to adjacent channels (Jones et al. 2000). The road surface also collects rainfall due to surface compaction, and routes this water to adjacent channels. See

Table 55 for the extension of the stream channel network.

**Table 55. Percent increase of stream channel miles by roads and OHV trails for the Analysis Area. Values are based on 200 foot and 500 foot spacing of relief culverts**

<b>Watershed</b>	<b>Current Increase in the miles of stream channel due to roads (percent)</b>
Clear Creek	14-34
Middle Beaver Creek	5-13
Middle White River	12-31
Wapinitia Creek	12-29

### 3.6.3 Effects Analysis

#### No Action Alternative

In general, conditions described above in the existing conditions section would be maintained.

#### *Stream Temperature*

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 as a result of long-term fire exclusion. In the event a wildfire burned in this watershed, riparian areas have the potential to burn hot in areas that have high fuel loading. Research by Tollefson and others (2004) on 33 burned watersheds in the central, western Cascades of Oregon indicates that fire severity in intense events may be similar between intermittent stream channels and adjacent upland areas. It had been thought that the riparian areas may burn with a lower severity due to the presence water and other fire resistant features. Rhoades and others (2011) found that stream temperatures in burned areas increased by an average of 4 degrees C compared to unburned areas in the Hayman Fire Complex in Colorado. Research on the effects of wildfire on stream temperature is limited, but there is quite a bit of research on burning after clear-cut logging. In the central Oregon Cascades, clear-cut harvesting along a stream increased summertime maximum stream temperatures by 4° F. This same area was burned the following year and stream temperatures increased 14° F when compared to an undisturbed forest watershed (Levno and Rothacher 1969). In the central Oregon Coast Range, clear-cut harvesting along a stream increased maximum stream temperatures by 17° F; after a hot slash burn, an additional increase of 10° F was measured the following summer (Brown 1972). The above mentioned studies indicate that riparian vegetation can experience a high severity burn that has the potential to increase water temperature.

#### *Sediment*

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 will 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 will 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, increased stream channel and bank erosion from increased runoff and sediment bulking from ash deposits could be expected. Sediment yields for the Wilson River watershed in Oregon were 252



tons per square mile per year or 5.7 times higher than for a comparable unburned watershed, after the 1933 Tillamook Fire. The number of days that the river experienced very high turbidity (sediment concentrations greater than 27 mg. per liter) increased from 18 to 102 days per year (Anderson 1976). It is not known to what extent salvage operations in the burned area contributed to this sediment increase. Increased sediment yields were found after a wildfire burned three relatively steep watersheds (average slopes of 50%) in the central Washington Cascades (Helvey 1980; Helvey et. al. 1985). An increased susceptibility to debris torrents was noted following the fire and was an important factor in causing increased sediment yields.

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

## **Proposed Action Alternative**

### ***Stream Temperature***

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

The concept of the sufficiency analysis is to maintain a primary shade zone of vegetation next to the stream and identify a secondary shade zone and other areas within the Riparian Reserves further away from the stream that can be treated to reach Riparian Reserve objectives while maintaining stream temperatures. In order to maintain sufficient shade next to the stream, the primary shade zone is untreated. The size of this zone is dependent on the height of the trees that would be removed and the hill slope adjacent the stream (

Table 56). The zones were developed by calculating the width of the riparian area adjacent to perennial stream channels that provides stream shade for the period of greatest solar loading (between 1000 and 1400 hours), known as the primary shade zone, and the width of the riparian area that provides shade in the morning and afternoon (0600-1000 hours; 1400-1800 hours), considered the secondary shade zone. In dense riparian stands, optimum shade can be provided by the primary shade zone alone, and the secondary shade zone may contribute little to no shade since trees in the primary shade zone are already blocking the sun's solar radiation.

**Table 56. Width of Primary Shade Zone**

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

As an example, if the heights of trees in the riparian area are predominately greater than 20 feet tall, the primary shade zone would be 14 feet wide for an area that had 30 percent to 60 percent hill slopes next to the stream. Based on field observations in proposed treatment blocks, most of the hill slopes are between 30 percent and 60 percent and the majority of existing tree heights range from greater than 60 feet to 100 feet. Trees within sapling thinning blocks are generally less than 20 feet tall. The proposed prescription for riparian area treatments would thin vegetation that would, for the most part be greater than 60 feet and less than 100 feet tall, which translates into a maximum primary shade zone of 60 feet for the project area. Some blocks would treat vegetation less than 60 feet tall but would still retain a primary shade zone of 60 feet according to the treatment prescription. This area would be left untreated next to perennial streams to maintain current stream shading and water temperatures.

A literature review for the State of Oregon by Czarnomski and Hale (2013) examined the ability of seven different riparian vegetation treatments to meet Oregon State Water Temperature Standards. The major review question was “For small and medium streams in the western Pacific Northwest, in or adjacent to forest harvest operations, what are the effects of near-stream forest management on stream temperature and/or riparian shade?” They defined small and medium streams as having average annual flows that are 10 cubic feet per second (CFS) or less. The review also evaluated the relevance of the publications to each riparian management scenario and the confidence in each study to provide reliable information.

Of the seven treatment alternatives evaluated in the report, the alternative identified as Derived No-Cut Buffer is most similar to the riparian prescription for the CCR Project. No-cut buffer widths in the publications reviewed by this study ranged from 7 to 115 feet per side, while the CCR Project employs no-cut buffers ranging from 100 to 300 feet per side. The CCR project riparian prescription either meets or exceeds the widths for the riparian management zone in the FMP prescription. The publications reviewed showed that while no-cut buffers have the potential to protect against exceeding the Protecting Cold Water (PCW) criterion, the generally implied notion that wider buffer widths provide better protection is not fully supported by all studies.

The CCR Proposed Action does not include any treatments, including prescribed fire, within the Riparian Reserves. The fire may, however, back down into the very outer portions of the Riparian Reserves, but lighting is not allowed within the Riparian Reserve itself. No tree mortality is 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 will not be treated, Riparian Reserves will 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 Analysis, treatments associated with the CCR Project are not expected to have a measureable effect on existing stream temperatures (USDA and BLM 2012).

### **Sediment**

Some ground disturbing activities in this alternative 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. A detailed discussion of soil erosion and sedimentation is contained in the soils section of the EA. 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 Best Management Practices (BMP) or Project Design Criteria (PDC) as they are referred to in the EA.

The Proposed Action would re-open 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. The reopened temporary roads re-trace the alignment of older overgrown road beds. Some of roads converted OHV trails still have aggregate surfacing. These temporary roads can be reopened with minimal earth movement, without side casting material, and would be rehabilitated after project completion. Two of the temporary roads on existing disturbance and nine of the converted temporary roads cross streams. 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 approximately 20 miles of old existing temporary roads that would be reopened and 14 miles of converted trails, approximately 1.9 miles are located within Riparian Reserves. None of the new temporary road construction would be within Riparian Reserves.

The 1.9 miles of temporary road proposed to be reopened represents 16 different incursions into Riparian Reserves, six of which are on existing disturbance and 10 of which are previous roads converted to trail. Field surveys could not identify the wetland identified by the National Wetland Inventory System for two of the converted trail temporary road incursions into Riparian Reserves; however, a Riparian Reserve was still generated. No new stream crossings would need to be constructed for this project.

An example of some of the drainage and sediment delivery issues currently existing along temporary roads on converted trails is shown below in Figure 50 and Figure 51 (previous to conversion this was the FS 4310-011 Road). This converted



**Figure 50. Sediment delivery to a perennial stream channel on a converted trail, temporary road**

trail exhibits various water quality related concerns, including a comprised closures allowing access to all vehicles, sediment delivery to two perennial stream crossings, seeps in the road, rutting, lack of surfacing and a failed culvert. Some of these closure and drainage issues would be



**Figure 51. Seep on temporary road on a converted trail surface**

addressed either during implementation through temporary drainage improvements or through rehabilitation post-implementation. Therefore, implementation of the CCR Proposed Action, should overall improve drainage and reduce sediment delivery on these temporary roads on converted trails relative to the existing condition. Not all drainage improvements that will ultimately be needed for a sustainable trail network; however, will be implemented with CCR. Some of these improvements will need to take place after implementation as part of the McCubbins Gulch OHV Project implementation.

Additional road work that is included in the CCR Proposed Action includes approximately 3.6 miles of open roads to be closed, 1.5 miles of currently open roads to change from a plan to be decommissioned to being closed, 0.3 miles to decommission and changing 1.6 miles of converted OHV trails to mixed use trail. Of these road actions, 0.2 miles of high clearance vehicle roads (Level II) located within Riparian Reserves (4200-011 and 2630-011) are proposed for closure and 0.6 miles of roads planned to be decommissioned within the Riparian Reserves are proposed to be closed instead (2130-270, 2110-230 and 4310-011). Currently, the 2130-270 and 2110-230 roads are open to vehicles; however, after implementation of the Proposed Action, these roads will be blocked with either a gate or other material to block vehicular access. The 2110-230 road parallels McCubbins Gulch past the campground for approximately 0.3 miles ranging a distance from the stream of approximately 50 to 100 feet from the stream. This section of road access private land and therefore is needed for administrative purposes and therefore is proposed for closure as opposed to decommissioning (Figure 52). An attempt was made by the Forest Service to block the 4310-011 road from vehicular access other than OHVs; however, the boulders were moved and are no longer blocking vehicular access. The 4310-011 road is needed for administrative use to access a fiber-optic cable underlying the road. This segment of road crosses a perennial stream that has a plugged culvert. As part of the implementation of the CCR Proposed Action, drainage at this stream crossing will be addressed in some form. The section of the 2130-270 road that is located within the Riparian Reserves parallels Frog Creek and is located at least 150 feet away from the stream, which should far enough away to prevent it from delivering sediment to Frog Creek.



**Figure 52. Photo of the 2110-230 road that parallels McCubbins Gulch**

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 per Road Project Design Criteria (#22). Table 57 displays the short-term change in road density.

**Table 57. Watershed Road and Motorized Trail Density**

<b>Watershed</b>	<b>Existing Road/Trail Density (mi/mi<sup>2</sup>)</b>	<b>Proposed Action Road Density During Operations (mi/mi<sup>2</sup>)</b>	<b>Proposed Action Road Density After Operations (mi/mi<sup>2</sup>)</b>
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 will need either temporary drainage fixes or will 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. In addition, erosion control measures described in the Project Design Criteria (PDC) section would be employed to reduce and/or eliminate erosion and potential sedimentation. The new temporary roads and re-opened temporary roads on existing disturbance would be rehabilitated and re-vegetated immediately following completion of vegetation treatment operations to help reduce compaction, increase infiltration rates, minimize surface erosion, and re-establish natural drainage patterns. Temporary roads on converted trails will be rehabilitated for drainage; however, will likely not be decommissioned to the level of the new and existing temporary roads.



Road maintenance prior to log haul would help maintain the design drainage of the road surface which reduces the potential for larger sediment inputs that eventually may enter stream courses. This includes the placement of new aggregate surfacing where necessary, blading, removing debris, brushing out encroaching vegetation, removing berms, stabilizing failing road shoulders and cleaning out ditch and culvert inlets where needed. 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 58. 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.

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

Some road maintenance activities have the potential to increase short-term road related erosion and sediment during rainfall events. This increase is associated primarily with blading, ditch cleaning and culvert cleaning on aggregate and native surface roads although ditch cleaning and culvert cleaning associated with paved roads is a potential sediment source as well. In order to prevent or reduce sediment delivery to streams, Road PDC (#26) protects existing vegetation in ditch lines hydrologically connected to streams or requires adequate erosion control measures. Most of the road maintenance work would be brushing out existing vegetation, hazard tree removal, cleaning culvert inlets and minor blading and spot rocking of the road surface. Any fine sediment created by road maintenance activities would most likely be washed from the road surface in the first few precipitation events immediately after work has been completed for most of the maintenance activities. Multiple roads will require culvert replacements, some of which are on sections of road that are hydrologically connected to streams in the project area. The roads that require culvert replacements are: 2110, 2110-250, 2110-270, 2120-320, 2130 (4 culvert replacements), 2131-220 and the 2131-221 roads. Culvert replacements on hydrologically connected sections of road could contribute short-term sediment delivery to streams until vegetation is re-established. To minimize sediment delivery to streams, PDCs include scheduling soil disturbing road maintenance activities to occur during the dry season (#27). Most road maintenance-related sediment would be trapped and stored in the ditches or on the forest floor below cross drains. 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. Any sediment delivered to streams during these activities would be minimal, short-term duration, and undetectable at a sub-watershed (6th field) or watershed (5th field) scale. 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. Sections of road identified for maintenance are currently rutted and forcing runoff from precipitation to flow down the road surface causing long term erosion and sedimentation from the road. Maintenance would correct these problems.

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, 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 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 Chapter 2, PDC for more details).

Fuel treatment activities that utilize fire are not expected to introduce additional sediment into surface water. A literature review by Beschta (1990) states that “Management practices that prevent the occurrence of hot slash burns and encourage rapid re-vegetation would help minimize potential increases in fire-related sedimentation from upslope source. Relatively “cool” burns” (such as the swamper or jackpot burn blocks in this project) “should have little impact on erosion and sedimentation, regardless of general watershed slope.” The fire may back down into the very outer portions of the protection buffer but lighting is not allowed within the protection buffer itself (PDC #14). Additional PDC that limit burn severity in Riparian Reserves to primarily low severity with some moderate severity and 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 PDC such as ground based logging restrictions on ground over 30 percent side-slope, ripping and water barring disturbed areas and seeding disturbed areas. It is unlikely that any material would reach the aquatic system due to buffering by the Riparian Reserves and the other required PDC such as ripping and water barring skidtrails and keeping mechanized equipment away from streams.

An additional activity associated with the CCR Proposed Action includes use of quarries within the project area as landings, disposal sites or as a material source for project-related road improvement activities. Three quarries area located within the project area that may be used for project-related activities: Jackey Quarry, Alkali Quarry and Rimrock Quarry. Rimrock Quarry is located more than 500 feet upslope from Frog Creek, outside of the Riparian Reserves; therefore, use of this quarry will have no effect to water quality. Alkali Quarry has been exhausted of usable material and has been retired as a production source, it would potentially be used as a disposal site for unsuitable and waste materials. By implementing PDC, work done in the Alkali Quarry would be done in a manner to ensure that runoff from the area used for disposal of CCR Project waste material infiltrated into the ground prior to flowing off-site towards any stream. My infiltrating prior to entering a stream, sediment would be filtered out and no sediment delivery to streams should result. Jackey Quarry is located within the Riparian Reserves along Frog Creek, a perennial fish-bearing stream in the CCR Project Area. Prior projects have implemented some mitigations at the Jackey Quarry in the past, in addition CCR Project PDC require erosion control between project activities and the stream, as well as maintaining project activities within the quarry away from the stream channel (approximately 100 feet away or more). With implementation of the PDC, sediment delivery from quarry use will be minimized in the short-term and not measurable in the long-term.

**Peak Flow Analysis**

Pre- and post- project implementation watershed impact areas (WIAs) for The CCR Project are displayed in Table 59.

**Table 59. Pre and Post Watershed Impact Areas for the Analysis Area. Any value greater than 35 percent is exceeding Forest Plan Standard FW-064.**

<b>6<sup>th</sup> Field Watershed</b>	<b>Current Watershed Impact Area (percent)</b>	<b>Post-Project Watershed Impact Area (percent)</b>
Clear Creek	5	10
Middle Beaver Creek	9	16
Middle White River	3	13
Wapinitia Creek	10	23

WIAs in all four analysis subwatersheds are well below the maximum Watershed Impact Area percentage of 35 percent after implementation. Based on implementation of the Proposed Action, WIAs for the White River Major Drainage are calculated to be approximately six percent, approximately two percent higher than the existing condition. Additional, more site specific investigation, was conducted using ARP model to assess potential changes to peak flows from the proposed action to flows entering Camas Prairie (see Wildlife Report for more details). The ARP model results for Camas Prairie indicate that the current WIA of the area draining to the meadow are at approximately 5.6% and are estimated to increase to 6.1% with the implementation of the proposed action, well below any threshold of concern. Since no WIAs exceed 35 percent, the CCR Proposed Action 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 CCR 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 crossing 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.

**Best Management Practices and Project Design Criteria**

A complete list of BMPs and PDC are included in Chapter 2 of the EA. BMPs and PDC were developed for the CCR EA using the National Core BMP Technical Guide (USDA Forest Service 2012), monitoring, field verification, professional judgment, and the best available science. An additional resource for BMP was utilized for this project due to the presence of the Crystal Springs DWPA. This resource is the draft “EPA Region 10 Source Water Protection Best Management Practices for USFS, BLM” (EPA, 2005). BMPs and PDC are discussed throughout the effects analysis of this report and are the primary mechanism to mitigate potential effects to water quality and quantity from the project.

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

At the national scale, a consistent program to monitor BMP implementation and effectiveness has been in development for several years. A publication outlining potential BMP was published April 2012 and monitoring protocols as well as a database with an associated scoring system is now fully in place. Monitoring of BMP implementation and effectiveness using the national BMP protocols has taken place on the Mt. Hood National Forest (MHNH) since 2012. A Forest wide monitoring report was produced in

2014, summarizing BMP monitoring results from 2013 (U.S. Forest Service 2014). “Of the 36 Core BMPs monitored for implementation on all projects, 89 percent were implemented fully as prescribed.” Twenty one Core BMPs specifically pertaining to ground based vegetation management were monitored and found to have 95 percent of the measures fully implemented. “Of the 38 Core BMPs monitored for effectiveness, 87 percent were fully effective at preventing or minimizing the effects of activities to aquatic and water resources as prescribed.” Twenty one Core BMPs specifically pertaining to ground based vegetation management were monitored and found to have 95 percent of the measures fully effective. The one measure that was not implemented (temporary road rehabilitation) “resulted in some observable surface erosion, but transport of sediment off-site to a water body had not occurred and because of its location there was no potential for it to do so.” An executive summary detailing the results of the 2014 BMP monitoring on the Mt. Hood National Forest (U.S. Forest Service 2015) indicate that two vegetation treatment projects were monitored and all BMP were fully implemented and fully effective. Additional project-level BMP monitoring by hydrologists and soil scientists has occurred as part of project implementation on the MHNH and is incorporated in professional judgment.

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

Other studies also support the effectiveness of mitigating sediment delivery by maintaining a buffered area adjacent to surface water. Burroughs and King (1989) found that 80 percent of sediment reaching streams from roads in the first year after construction came from the fill slope of the road. They also found that transport distances and obstructions between the fill slopes and streams influenced the amount and likelihood of eroded material reaching these streams. Burroughs and King found that windrowed fill slopes, which would act very similar to unharvested Riparian Reserves in that there would be obstructions to flow, had an average travel distance of 3.8 feet for eroded material, and a maximum travel distance of 33 feet. Similar results were documented by Packer (1967). He found that “the most important factors that affect the distance that sediment moves are the spacing between down slope obstructions and an interaction between this spacing and the kind of obstruction”. He found that logs, rocks, and trees or stumps were the second, third, and fourth most effective materials in reducing sediment movement distances below roads. Travel distances were similar to those reported by Burroughs and King.

PDC that include no treatment within the Riparian Reserve that encompass the primary shade zone, keeping large mechanized equipment away from surface water, use of erosion control (e.g., ditchline sediment traps, straw wattles, waterbars) where necessary, controlling burn severity near surface water and lower impact road maintenance techniques (leaving vegetated buffer strips in ditchlines near streams) would substantially reduce the amount of sediment reaching the streams from this work. Burroughs and King (1989) reported that measures, such as erosion control blankets, could reduce sediment production by 80 to 90 percent. This in conjunction with other measures, such as minimizing the amount of ground disturbance and seeding these areas, would further decrease the chance of short-term direct and indirect

sediment production. 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.

### ***Summary of Indirect/Direct Effects***

Detrimental effects to water quality and quantity would be reduced or eliminated through implementation of PDC and BMP in the Proposed Action and following Standards and Guidelines. These PDC and BMP are listed in Chapter 2 and Appendix 2 of the EA and pertinent ones are described in this analysis. Based on the ARP analysis, WIAs will not exceed the Mt. Hood LRMP standard and therefore increased peak flows are not expected from implementation of the CCR Proposed Action. Sediment delivery effects to water quality from the CCR Project are expected to be minimal in the short-term until vegetation is reestablished at the culvert replacement sites and quarries (<2 years) and immeasurable in the long-term.

### ***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 CCR Proposed Action, no cumulative effects to water quality and quantity are therefore anticipated.

The Hydrology Specialist Report in the Project Record provides a qualitative summary of potential cumulative watershed effects; however since the CCR Project is anticipated to have no measurable direct or indirect effects, none of the overlapping projects could be considered to have cumulative effects. It shows existing and potential projects, effects from those projects that have the potential to result in cumulative effects, whether these projects overlap in time and space and an assessment if a measureable cumulative effect is expected. Only projects that overlap in either time or space with the CCR Project are included in this table. Findings in this summary are supported by the analysis above which utilizes pertinent research, PDC and applicable management standards and guidelines. Water Quantity is included in this section, as potential increased peak flow from vegetation removal is primarily a cumulative effect at the sub-watershed and larger scale.

### ***Stream Temperature***

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

### ***Sediment***

Detrimental cumulative effects are not expected as a result of sediment introduction from activities associated with the CCR project. Sediment from road maintenance activities and the culvert replacements may mix with sediment originating from grazing in the White River Allotment and OHV trail use within riparian areas, including unauthorized OHV use. This risk would be greatest the year following the road maintenance and culvert replacement or removal work associated with the CCR Project. The cumulative effect is not expected to be measurable and would be localized due to the small amount of sediment expected from the CCR Project.

### ***Water Quantity***

A peak flow analysis was completed for this project and is displayed in the Effects Section above. This project along with other projects on and off National Forest lands were included in the Watershed Impact Area calculation (Forest Plan Standard FW-067, pg. Four-55) and the analysis area was found to be in



compliance with Forest Plan Standard FW-064 so 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 (S&G) and recommended Best Management Practices (BMP). These documents include the Mt. Hood National Forest Land and Resource Plan (Forest Plan), the Northwest Forest Plan (NWFP) and associated supporting documents and the Middle Columbia-Hood (Western Hood Subbasin) TMDL.

The inclusion of Best Management Practices (BMP) and the establishment of Riparian Reserves and protection buffers adjacent to all streams helps the project to meet water quality standards and the Clean Water Act. These BMPs reduce or eliminate potential degradation from increased water temperature and sedimentation. This project is consistent with all applicable Forest Plan and Northwest Forest Plan Standards and Guidelines. Compliance with the Clean Water Act by National Forests in Oregon is achieved under State Law.

In addition to the plans discussed above other documents such as the “Forest Service National Core Best Management Practices” (USFS 2012) and the draft “EPA Region 10 Source Water Protection Best Management Practices for US Forest Service, BLM” provide guidance about potential BMP’s for this project and would be incorporated where appropriate.

#### ***Executive Order 11990 – Protection of wetlands***

As documented above, none of the proposed activities are located in wetlands nor the associated Riparian Reserves.

#### ***Executive Order 11988 – Protection of Floodplains***

As documented above, none of the proposed vegetation treatments are located within wetlands or Riparian Reserves. 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 will be protected. The only activities associated with the CCR Project include use of existing system roads and temporary roads located within Riparian Reserves; however, with implementation of PDC, no measurable effect to existing floodplains is expected.

### 3.7 Aquatic Conservation Strategy

In order for a project to proceed, “a decision maker must find that the proposed management activity is consistent with the Aquatic Conservation Strategy objectives” (ROD B-10) from the Northwest Forest Plan Record of Decision. The nine objectives are listed on page B-11 of the ROD. Portions of the effects analysis in this document focus on key parameters or indicators that make up elements of the nine Aquatic Conservation Strategy objectives, to determine if the project would restore, maintain, or degrade these indicators. Once this determination is made, the indicators are examined together with the Range of Natural Variability to ascertain whether the project is consistent with the objectives. A description of the range of natural variability of the “important physical and biological components” (ROD B-10) is necessary for determining whether a project “meets” or “does not prevent attainment” of the Aquatic Conservation Strategy objectives (ROD B-10). Relevant portions of the range of natural variability are included in the Existing Conditions section of this report. In general, the sensitivity of streams in the CCR 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 CCR Project Area existing condition is affected by a combination of many historic and current landuses, including grazing, OHV use, irrigation diversions and vegetation management.

Table 60 displays specific indicators that comprise the Aquatic Conservation Strategy (ACS) objectives and the effects section that covers this indicator in the Environmental Assessment. Also, refer to the Fisheries and Aquatic Fauna Specialist Report for additional effects descriptions.

**Table 60. ACS Objective Indicators in the EA**

<b>Indicators</b>	<b>Analysis Found in the Effects Section of the EA</b>
Water Temperature	Water Quality, Fisheries
Sediment	Soil Productivity, Water Quality, Fisheries
Chem. Contaminants	Water Quality
Physical Barriers	Fisheries
Substrate	Water Quality, Fisheries
Large Woody Debris	Fisheries
Pool Frequency	Fisheries
Pool Quality	Fisheries
Off-Channel Habitat	Fisheries
Refugia	Fisheries
Width/Depth Ratio	Water Quality
Streambank Condition	Water Quality, Fisheries
Floodplain Connectivity	Water Quality
Peak/base Flows	Water Quality
Drainage Network Increase	Water Quality
Riparian Reserves	Water Quality, Fisheries

Table 61 displays the individual indicators and the effect the alternatives have on those indicators at the 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> field watershed scale. Fifth field watersheds are generally large in size (40,000 acres to 250,000 acres), while 6<sup>th</sup> and 7<sup>th</sup> field watersheds are smaller (5,000 acres to 40,000 acres and 2,000 acres to 5,000 acres respectively). As indicated in

Table 61, ACS Objectives indicators would be maintained.

**Table 61. ACS Objective Indicators for each Alternative.**

Indicators	Effects of the Actions by Alternative	
	No Action	Proposed Action
Water Quality: Temperature	M	M
Sediment	M	M
Chemical Contamination	M	M
Habitat Access: Physical Barriers	M	M
Habitat Elements: Substrate	M	M
Large Woody Debris	M	M
Pool Frequency	M	M
Pool Quality	M	M
Off-channel Habitat	M	M
Refugia	M	M
Channel Conditions and Dynamics: Width/Depth Ratio	M	M
Streambank Condition	M	M
Floodplain Connectivity	M	M
Flow/Hydrology: Peak/Base Flows	M	M
Drainage Network Increase	M	M
Watershed Conditions: 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 is a summary the Aquatic Conservation Strategy objectives (ROD B-10) and how the CCR Project action alternative would influence them. All changes described below would be evident at the 6<sup>th</sup> field watershed or smaller (site scale) scale:

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

100 percent of the Riparian Reserves in the 6<sup>th</sup> field sub-watersheds comprising this project would be left untreated so their current condition would be maintained. Stream shade and therefore stream temperature will not be affected since no treatment will occur within the primary shade zones. By not treating the Riparian Reserves, they will continue to be susceptible to wildfire; however, the surrounding uplands will have fuel reductions lowering wildfire severity in the uplands and reducing the likelihood of spread to the riparian areas. Equipment will not be 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. Approximately ten failed culverts are anticipated to be replaced on system roads; however, drainage on existing roads and trails will improve over the long-term.

**2. Maintain Spatial and Temporal Connectivity Within and Between Watersheds:**

100 percent 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 project design criteria aimed at reducing soil compaction and erosion, restricting near-stream ground disturbance and not treating vegetation within Riparian Reserves next to perennial, intermittent and ephemeral streams which would maintain current levels of snags and wood input. By not treating within the Riparian Reserves and the lack of any new road crossings on perennial, intermittent or ephemerals streams would greatly reduce risks of sedimentation, increased peak flow, and resulting bank erosion and channel bed scour. By not treating the Riparian Reserves; however, they will continue to be susceptible to wildfire though the surrounding uplands will have fuel reductions lowering wildfire severity in the uplands and reducing the likelihood of spread to the riparian areas. Approximately ten failed culverts are anticipated to be replaced on system roads, which with implementation of PDC will result in minimal sediment delivery to streams in the short-term until vegetation is reestablished; however, drainage on existing roads and trails will improve over the long-term, resulting in reduced sediment delivery overall. These culvert replacements will not affect the physical integrity of the overall aquatic system.

**4. Maintain Water Quality Necessary to Support Healthy Ecosystems:**

This project would meet this objective through project design criteria 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 project design criteria aimed at reducing erosion would maintain the sediment levels in the long-term. Approximately ten failed culverts are anticipated to be replaced on system roads, which with implementation of PDC will result in minimal sediment delivery to streams in the short-term until vegetation is reestablished; however, drainage on existing roads and trails will improve over the long-term, resulting in reduced sediment delivery overall. These measures are discussed in detail in the Soil Productivity, Water Quality, and Fisheries sections in Chapter 3.

**5. Maintain Sediment Regimes:**

Project design criteria 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:**

As described in the watershed section of the EA, 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 project design criteria 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 6<sup>th</sup> field sub-watersheds comprising this project would be left untreated so their current condition would be maintained. By not treating the Riparian Reserves, they will continue to be susceptible to wildfire; however, the surrounding uplands will 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 6<sup>th</sup> field sub-watersheds comprising this project would be left untreated so their current condition would be maintained. By not treating the Riparian Reserves, they will continue to be susceptible to wildfire; however, the surrounding uplands will 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.

## 3.8 Fisheries and Aquatic Fauna

### 3.8.1 Analysis Assumptions and Methodology

The CCR project is located primarily within portions of four subwatersheds: Clear Creek, Wapinitia Creek, Middle Beaver Creek and the Middle White River Table 62. About 1.5% of the CCR 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%) as shown in Figure 53. 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. Effects are expected to be limited due to the small amount of disturbance and will not be included in the analysis for this document (Table 62). For the purposes of this analysis, only the four primary subwatersheds will be used for the analysis area and in the remainder of this BE (Table 62).

The Action Area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action [50 CFR §402.02]. The Action Area for the purposes of this BE, is defined as the 5<sup>th</sup> field watersheds and 6<sup>th</sup> field subwatersheds identified in Table 62. The subwatersheds are displayed in Figure 53 which identifying the planning area, watershed boundaries, historic temperature sites, and fish distribution.

**Table 62. Summary of The Four 5<sup>th</sup> Field and Eight 6<sup>th</sup> Field Subwatersheds with Proposed Activities Covered Under CCR EA.**

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



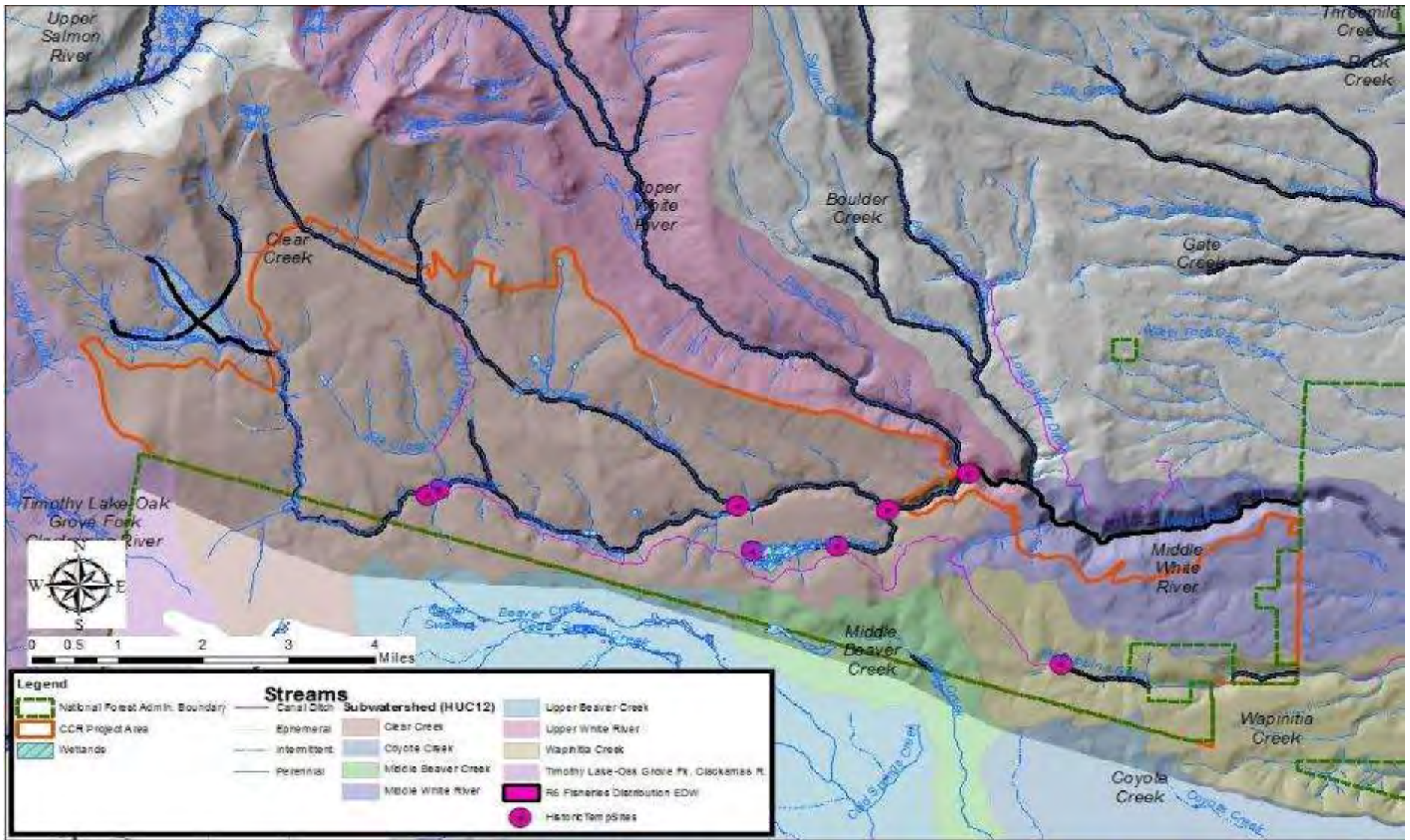


Figure 53. Map identifying Planning Area, Watershed Boundaries, Historic Temperature Sites, and Fish Distribution

### 3.8.2 Existing Condition

About 300 stream crossings from fords, culverts, or bridges are identified in the proposed action areas. See Figure 53 for proposed action areas. The primary aquatic feature in the project area is Clear Creek drainage downstream of Clear Lake.

The environmental baseline or its “existing condition” includes the past and present impacts of all Federal, state, or private actions and other human activities in the Action Area, the anticipated impacts of all proposed Federal projects in the Action Area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process (50 CFR 402.02). This BE describes the existing condition in terms of the biological requirements for habitat features and processes necessary to support all life stages of PETS and aquatic special status species within the Action Area. There are four major stream channel elements which do have an impact to all life stages of PETS and aquatic special status species within the Action Area, and will be analyzed in this BE, and they are as follows: water temperature, stream channel fine sediment, in channel large woody debris (LWD), and pools.

The main stream drainages in the action area located in the Clear Creek 6<sup>th</sup> field subwatershed are Clear Creek and its two main tributaries; Camas Creek and Frog Creek. Indian Creek is the main stream drainage in the Action Area of the Middle Beaver Creek 6<sup>th</sup> field subwatershed, and McCubbins Gulch Creek is the main stream drainage in the Action Area of Wapinitia Creek 6<sup>th</sup> field subwatershed. See Figure 53 for a visual map of the Action Area.

#### Water Temperature

Interior redband trout (*Oncorhynchus mykiss gairdneri*) throughout the Oregon interior basins, which originally derived from the Columbia River system are well known to be hereditary resilient to high water temperatures, and interior redband trout have been found in water temperatures over 28°C (Behnke R., 1992). Interior redband trout are located in Clear, Camas, and Frog Creeks, and possibly in McCubbins Gulch Creek. Indian Creek has unknown rainbow type trout species present on Forest. Spawning occurs for redband and rainbow trout (*O. mykiss*) during the latter half of April. Fry are believed to leave the gravel in late June, depending on water temperatures. Non-native eastern brook trout (*Salvelinus fontinalis*) spawn during the fall, and the fry leave the gravel in the spring. Brook trout are found in Clear, Frog, and McCubbins Gulch Creeks.

Brazier and Brown (1973) state that, “Direct solar radiation can be transmitted, absorbed, or reflected.” Ice (2000) concluded, “Only direct solar radiation (not diffused) can possibly affect stream temperatures.” Historic water temperature data has been sporadically collected for their highest 7-day average maximum stream temperatures (unpublished survey data from Barlow Ranger District, Mt. Hood National Forest 1995-2009). See Table 63 for the highest 7-day average maximum stream temperatures from 1995 to 2009. In 2016 water temperature data loggers were installed in Clear Creek, Camas Creek, and McCubbins Gulch Creek, however, data will not be downloaded until late spring of 2017. No water temperature records are available for analysis from Indian Creek.

#### Clear Creek

No stream temperatures in Clear Creek exceeded the 17.8°C summer temperature standard for Salmonid rearing from 1996 to 2009; however, ODEQ records indicated that in 1995 a USFS site located at FS road 42 crossing had a 7-day average maximum stream temperature of 18.6°C. This data point was not recorded in the USFS AqS database of stream temperatures. The ODEQ 2012 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)

for summer salmonid fish rearing. See Table 63 for the highest 7-day average maximum stream temperatures in the analysis area.

**Camas Creek**

Camas Creek was listed in the ODEQ 2012 Integrated Report as *Category 2 (Attaining – Specific water quality standards are met)*, and is meeting water temperature standards for summer salmonid fish rearing. Camas Creek headwaters is located in Camas Prairie, which is an open wet meadow and has naturally warm water at its source due to believed geothermal activity interacting with the Camas Creek ground water in Camas Prairie. Water temperatures in Camas Prairie between 1997 and 2001 had a high 7-day average maximum stream temperature between 27.2°C and 31.4°C, and just two river miles downstream at Camas Creek confluence with Clear Creek the water temperature during the same timeline had a 7-day average maximum stream temperature between 11.9°C and 15.2°C (Table 63). The decrease in water temperature is believe to be from multiple prominent springs located between Camas Prairie and its confluence.

**Frog Creek**

Frog Creek is the largest tributary to Clear Creek and was listed in the ODEQ 2012 Integrated Report as Category 2, and is meeting water temperature standards for summer salmonid fish rearing (Table 63). Both Clear Creek and Frog Creek irrigation ditches are only managed to meet Oregon state water quality standards for water temperature. Water temperature data taken in Frog Creek ditch upstream of the confluence to Clear Creek was recorded only in 2003 with the highest 7-day average maximum being 10.5 degrees C. A Hobotemp temperature monitor was not deployed during the 2016 Level II Stream Survey. Temperatures were recorded in degrees Celsius at each measured unit and in the mouth of each tributary encountered using a hand held thermometer. The handheld water temperatures ranged from 5°C to 11°C with an average of 8.2°C

**McCubbins Gulch Creek**

McCubbins Gulch, which is not listed by ODEQ 2012 Integrated Report for stream temperatures, did exceed the summer stream temperature for Salmonid rearing during the two years of recorded temperatures with a high 7-day average maximum stream temperature of 18.6°C in 2001 and in 2009 it was 18.9°C (Table 63).

**Indian Creek**

The ODEQ did not have Indian Creek listed in its 2012 integrated Report for the Lower Deschutes subbasin. The MHNf has no records of temperature monitoring being conducted on Indian Creek. The approximate 1.5 RM’s that are located on MHNf does have well stocked mature conifers and hardwood trees along its riparian reserve.

**Table 63. Highest 7-Day Average Maximum Stream Temperatures in the Analysis Area (Celsius)**

Stream	1995	1996	1997	1998	1999	2000	2001	2002	2003	2006	2007	2009
Clear Creek (Confluence at Keeps Mill at ~2900 ft. elev.)	18.6	13.9	13.3	14.4	13.7	ND	14.8	14.7	15.1	14.8	16.4	14.7
Camas Creek (Camas Prairie at 3120 ft. elev.)			27.2	31.0	29.3	31.4	29.1					

Stream	1995	1996	1997	1998	1999	2000	2001	2002	2003	2006	2007	2009
<b>Camas Creek</b> (Camas Prairie Corral at 3050 ft. elev.)				18.4	28.4	29.6	28.8					
<b>Camas Creek</b> (Confluence at 2900 ft. elev.)	16.0		14.3	11.9	11.9	15.2	14.8					
<b>McCubbins Gulch Creek</b> (at Clear Creek Ditch Outlet at 3200 ft. elev.)		ND	ND	ND	ND	ND	18.6	ND	ND	ND	ND	18.9
<b>Frog Creek</b> (Confluence at ~ 3000 ft. elev.)			11.98									

In 2001 the MHNH experienced a summer drought, and an extreme low snow pack was experienced in 2003, while 2002 was considered to have a normal water year. Water temperature met ODEQ standards in 2001 and 2002 by exceeding 17.8°C for only 6 consecutive days in 2001 and 0 days in 2002. In 2003, water temperature did exceed ODEQ standards for 14 consecutive days. Review Table 64 for additional information. See the Water Quality Specialist Report for additional water temperature information.

**Table 64. Stream Temperature Summary**

Stream	Location	Days over Max 7 Day Average >17.8 °C in multiple years from 1996 through 2003
Clear Creek	Above confluence of Camas Creek	0 (1998), 0 (1999)
Clear Creek	At Keeps Mills Campground	0 (1996, 1997, 1998, 1999, 2001, 2002, and 2003)
Frog Creek	At confluence of Frog Creek	0 (1997), 0 (2003)
Frog Creek	Frog Creek Ditch before diversion of clear Creek ditch	0 (2003)
McCubbins Gulch	About 1.75 miles upstream of McCubbins Gulch Campground	6 (2001), 0 (2002), 14 (2003)
Clear Creek Ditch	In Clear Creek Ditch just below the headgate diversion	0 (2001), 0 (2002), 0 (2003)

### Sedimentation

Trout prefer stream channel spawning habitat, to be dominated with clean gravels (green pea to baseball size). There have been many studies, which analyzed sediment particle sizes in relation to survivability of salmonids from egg to fry life stages (e.g. Bjornn and Reiser, 1991; Jensen et al., 2009; and Waters, 1995). When a particle size of <0.85mm is more than 10% of the substrate composition the survival of salmonids from egg to fry steeply reduces before leveling out at less than 10% survival when fines were >25% of the substrate composition. There was a similar relationship for when fine sediment was <4.8 or 6.4mm, but the threshold occurred at a higher level of fines (>50% for each). The emergence of a salmonid sac fry from their redd maybe obstructed by sediment of 2-6.4mm in percentages above about

10%. Particle sizes <1mm Mt. Hood Land Resource Management Plan (LRMP) standards FW-097 states, “Spawning habitat (e.g. pool tailouts and glides) shall maintain less than 20 percent fine sediments (i.e. particles < 1.0mm in diameter) and FW-099 states, Riffle areas shall be maintain less than 25 percent embeddedness on an area –weighted average.” See the Soil and Water Quality Specialist Reports for additional erosion risk and sediment information.

## **Spawning Gravels and Pebble Counts**

### **Clear Creek**

The ODEQ 2012 integrated Report has listed Clear Creek as *Category 3 (Insufficient data to determine whether a standard is met)* for sediment and flow modification. Clear Creek did meet sediment LRMP standards FW-097 and FW-099 in reaches 1 and 2, but not in reach 3 or 4.

- Reach 1 was dominated by substrate in the small cobbles size class (64 – 128 mm) accounting for 20% of the total pebble count. Large cobbles (128 – 256 mm) also accounted for 18%. Substrate in the fines (<2 mm) size class accounted for 0%.
- Coarse gravels (16 -32 mm) accounted for 29% of the pebble count in Reach 2, followed by very coarse gravels (32 -64 mm) accounting for 22%. Substrate in the fines (<2 mm) size class accounted for 10%.
- Reach 3 was dominated by substrate in the fines (< 2 mm) size class accounting for 33% of the total pebble count. Coarse gravels (16 - 32 mm) also accounted for 20%.
- Reach 4 was dominated by substrate in the coarse gravels (16 – 32) size class accounting for 25% of the total pebble count. Medium gravels (8 – 16 mm) also accounted for 21%. Substrate in the fines (<2 mm) size class accounted for 19%.

### **Camas Creek**

The ODEQ 2012 integrated Report has listed Camas Creek as Category 3 for sediment. Camas Creek did meet sediment LRMP standards FW-097 and FW-099 in reaches 1 and 2, but not in reach 3. Although, reach 3 is located in Camas Prairie and is expected to have a naturally high fine sediment load with a stream gradient of about 0.2%.

- Medium and small boulders both accounted for 28 % of the total count in Reach 1. Substrate in the fines (<2 mm) size class accounted for 0%.
- Coarse gravels accounted for 28% of the total count in Reach 2, followed by very coarse gravels with 21% of the total count. Substrate in the fines (<2 mm) size class accounted for 6%.
- Reach 3 was dominated by fines (<2 mm) with 67% of the total count followed by fine gravels accounting for 15% of the total pebble count.

### **Frog Creek**

The ODEQ 2012 integrated Report did not list Frog Creek for having sedimentation issues, therefore it is considered to be a Category 3 for flow modification.

### **McCubbins Gulch Creek**

The ODEQ 2012 integrated Report has listed McCubbins Gulch Creek as Category 3 for sediment and habitat modification. McCubbins Gulch Creek did not meet sediment LRMP standards FW-097 or FW-099.

- Reach 1 was dominated by substrate in the fines (less than 2 mm) size class accounting for 37% of the total pebble count. Coarse gravels (16 - 32 mm) and very coarse gravels (32 -64 mm) also each accounted for 18%.

- Reach 2 was dominated by substrate in the fines (less than 2 mm) size class accounting for 80% of the total pebble count. Medium gravels (8 - 16 mm) also accounted for 9%.

**Indian Creek**

The ODEQ did not have Indian Creek listed in its 2012 integrated Report for the Lower Deschutes subbasin. The MHNH has not conducted a formal Level II stream survey for the approximate 1.5 RM section of the stream located on MHNH, nor has the MHNH conducted any Wolman pebble count surveys.

**Large Woody Debris**

Large wood plays a critical role on rivers and streams of forested ecosystems throughout the world (Boyer et al. 2003). Wood provides streams with structure and organic matter that create and enhance habitat diversity and food sources for both riparian dependent wildlife and aquatic organisms (Gregory et al. 2003). Wood plays an important role in forming and maintaining stream channel function and providing spawning, rearing, and refugia habitat for the aquatic species present in the Action Area. There is a wide range of large woody debris (LWD) loading in the Action Area riparian reserves, due to both natural loading of fallen conifer and hardwood trees into their adjacent stream channel and floodplains, and past instream and floodplain restoration projects. No Level II stream survey data is present from Indian Creek.

Definitions of LWD size categories can be found below in Table 65. Comparisons of the existing in-channel woody debris densities per mile to LRMP Guidelines, Region 6 desired future conditions from the project implementation guide (PIG), and National Marine Fisheries Service (NOAA) Fisheries standards can be found below in Table 65 and are discussed further in this section.

**Table 65. Definition of Wood Size Classes East of the High Cascades**

Size	Diameter	Length
Small	>6 inches at 20 feet from large end	>20 feet or 2X the bankfull width
Medium	>12 inches at 35 feet from large end	>35 feet or 2X the bankfull width
Large	>20 inches at 35 feet from large end	>35 feet or 2X the bankfull width

**Clear Creek**

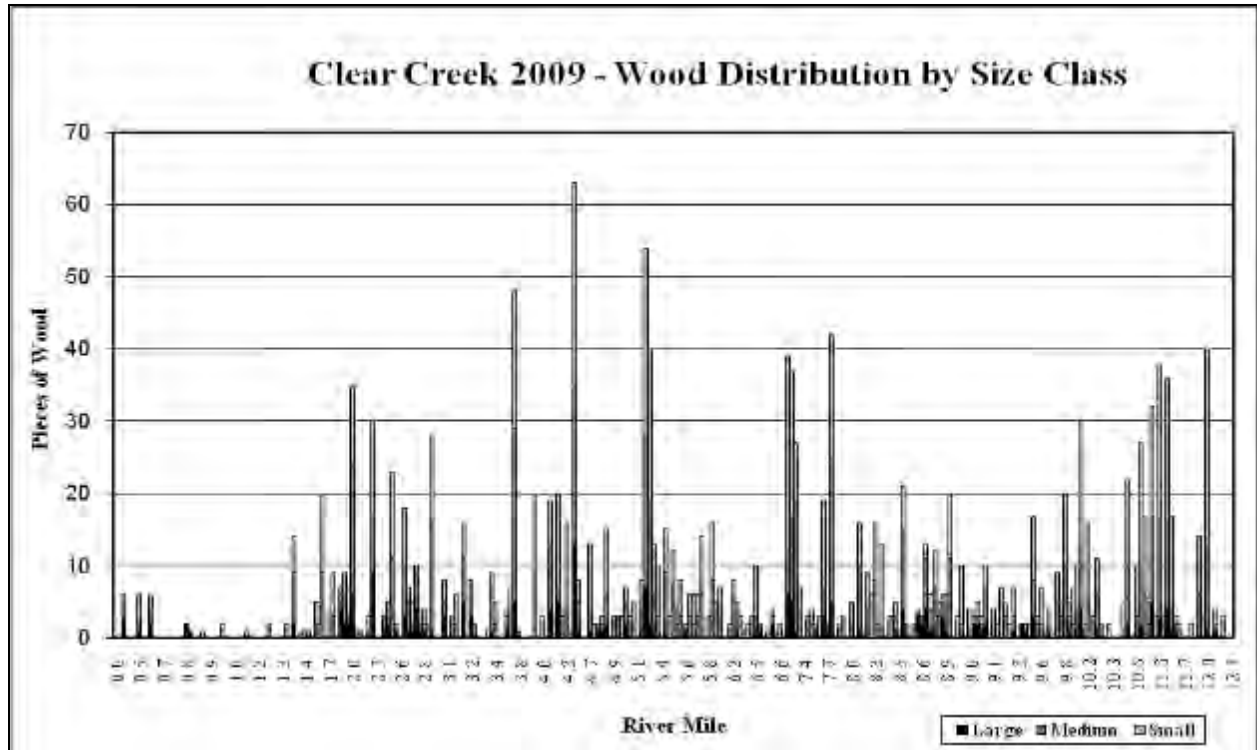
**Woody Debris Density and Desired Future Conditions (DFC)**

Table 66 shows the existing number of in channel woody debris within the reaches of Clear Creek. Figure 54 displays wood distribution by size class and river mile.

**Table 66. Existing Number of In-channel Woody Debris and Woody Debris Density vs. the LRMP, PIG, and NMFS Standards (total of both medium and large size classes)**

Reach	Corrected Length	Number of Pieces In-Channel				Density per Mile			Standard Density per Mile	
		Small	Medium	Large	Total	Medium	Large	Total	LRMP	PIG/NOAA
1	1.6	29	31	11	71	19.2	6.8	26	106	20
2	4.5	356	328	101	785	72.7	22.4	95.1	106	20
3	2.3	154	118	28	300	50.3	11.9	62.2	106	20
4	3.7	336	224	62	622	61.4	17	78.4	106	20





**Figure 54. Wood Distribution by Size Class**

**DFC Discussion**

Clear Creek met PIG and NOAA wood density standards in all reaches LRMP wood density guidelines were not met in any reach.

**Small Sized Wood**

The majority of the LWD was identified in this category. Small sized wood was abundant in Clear Creek. Reach 1 had 29 pieces, Reach 2 had 356 pieces, Reach 3 had 154 pieces, and Reach had 336 pieces of small sized wood in the bankfull channel.

**Role as Fish Cover**

Woody debris was abundant in Reach 2 with a density of 174 pieces per mile. Woody debris was less abundant in Reaches 1, 3, and 4 with 44 pieces per mile, 127.9 pieces per mile, and 170.5 pieces per mile.

**Debris Jams**

A total of 58 debris jams were identified in Clear Creek. Debris jams were numerous in Reach 2 with 40 debris jams. Debris jams were less abundant in reaches 1, 3, and 4 with 6 debris jams, 9 debris jams, and 3 debris jams, respectively. Seventeen percent of the total countable wood in Clear Creek was found in debris jams. Of the wood counted in debris jams, 50.7 percent was in the small size class, 35 percent was in the medium size class and 14.3 percent was in the large size class. For distribution of debris jams and debris jam characteristics by river mile see Figure 55 and Table 67.

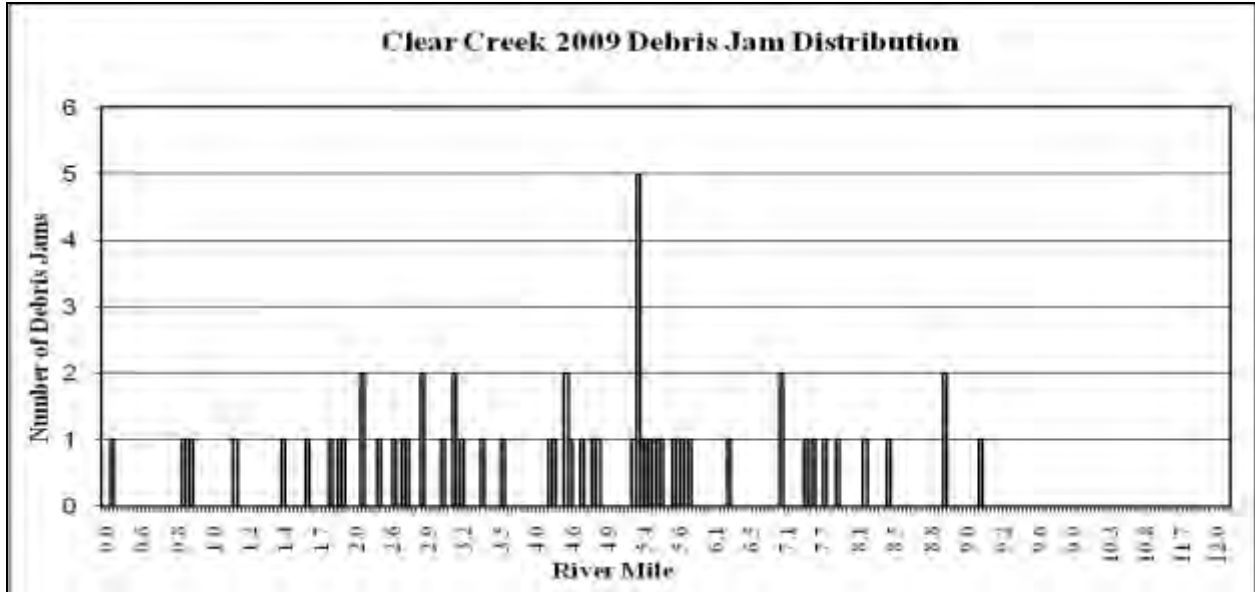


Figure 55. Debris Jam Distribution and the Number of Debris Jams Found in Each Location by River Mile.

Table 67. Debris Jam Information – Existing Number of In-channel Woody Debris and Where it was Located Either as Isolated Pieces (single) or in Debris Jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	6	23	6	24	7	8	3
2	40	254	102	255	73	71	30
3	9	131	23	102	16	24	4
4	3	315	21	215	9	56	6

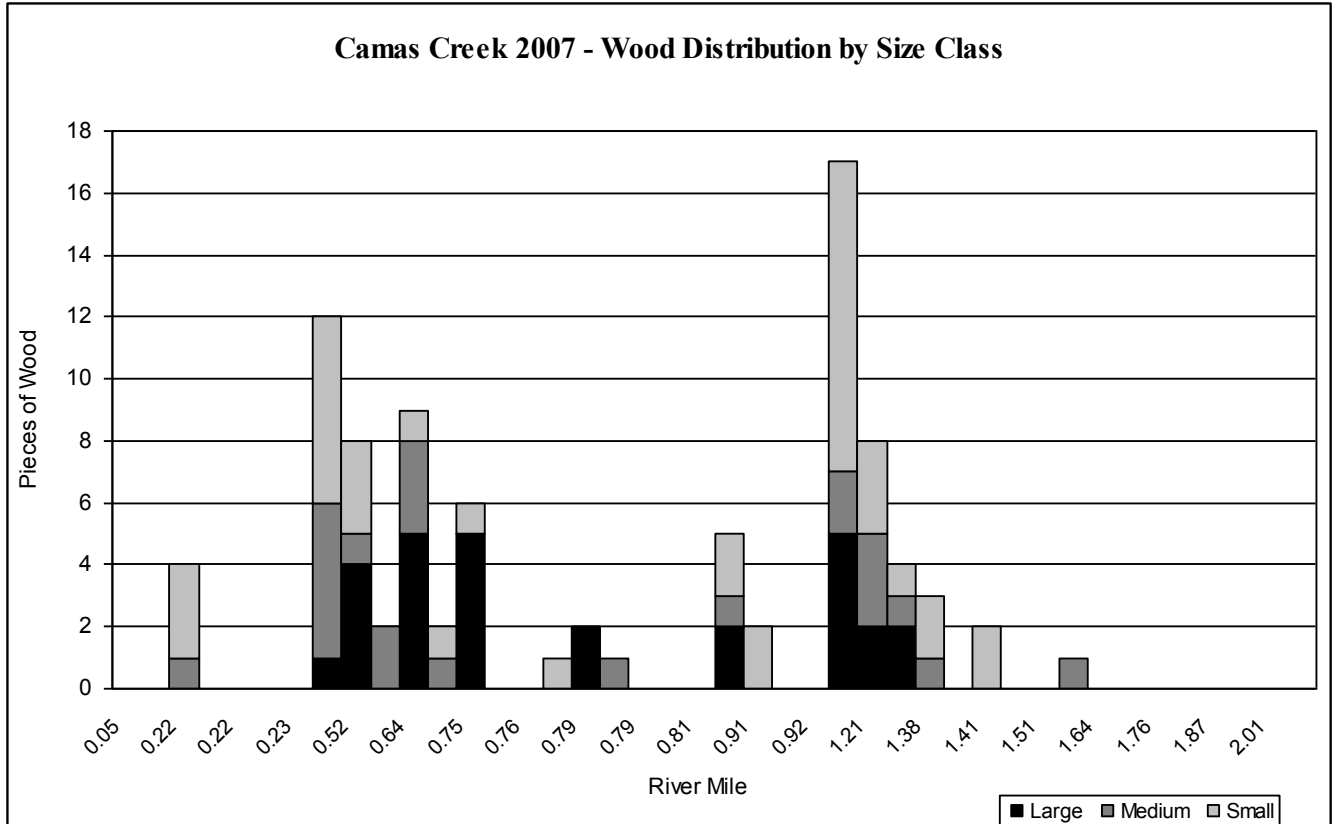
**Camas Creek**

**Woody Debris Density**

Figure 56 displays wood distribution by size class and river mile.

Table 68. Existing Number of In-channel Woody Debris and Woody Debris Density vs. the LRMP, PIG, and NMFS Standards (total of both medium and large size classes).

Reach	Corrected Length	Number of Pieces In-Channel			Density per Mile			Standard Density per Mile		
		Small	Medium	Large	Total	Medium	Large	Total	LRMP	PIG/NOAA
1	0.23	3	1	0	4	4.35	0.00	4.35	106	20
2	1.19	33	21	29	83	17.65	23.53	41.18	106	20
3	1.08	0	1	0	1	0.93	0.00	0.63	106	20



**Figure 56. Wood Distribution by Size Class and River Mile**

**DFC Discussion**

Camas Creek did not meet LRMP, PIG, or NOAA wood density standards (Table 68).

**Small Sized Wood**

The majority of the wood was identified in this category (Figure 56).

**Role as Fish Cover**

Wood was a major cover for fish especially where it was associated with debris jams. Woody debris was abundant in Reach 2 with a density of 70.59 pieces per mile. Woody debris was less abundant in Reaches 1 and 3, with 17.39 pieces per mile and 0.93 pieces per mile respectively. Reach 3 was an open meadow so wood numbers would be expected to be low.

A total of 25 debris jams were identified in Camas Creek. Debris jams were numerous in Reach 2 with 21 debris jams. Thirty-three percent of the total countable wood in Camas Creek was found in debris jams. Of the wood counted in debris jams, 38 percent was in the small size class, 31 percent was in the medium size class, and 31 percent was in the large size class (Table 69). See Figure 57 for distribution of debris jams by river mile.

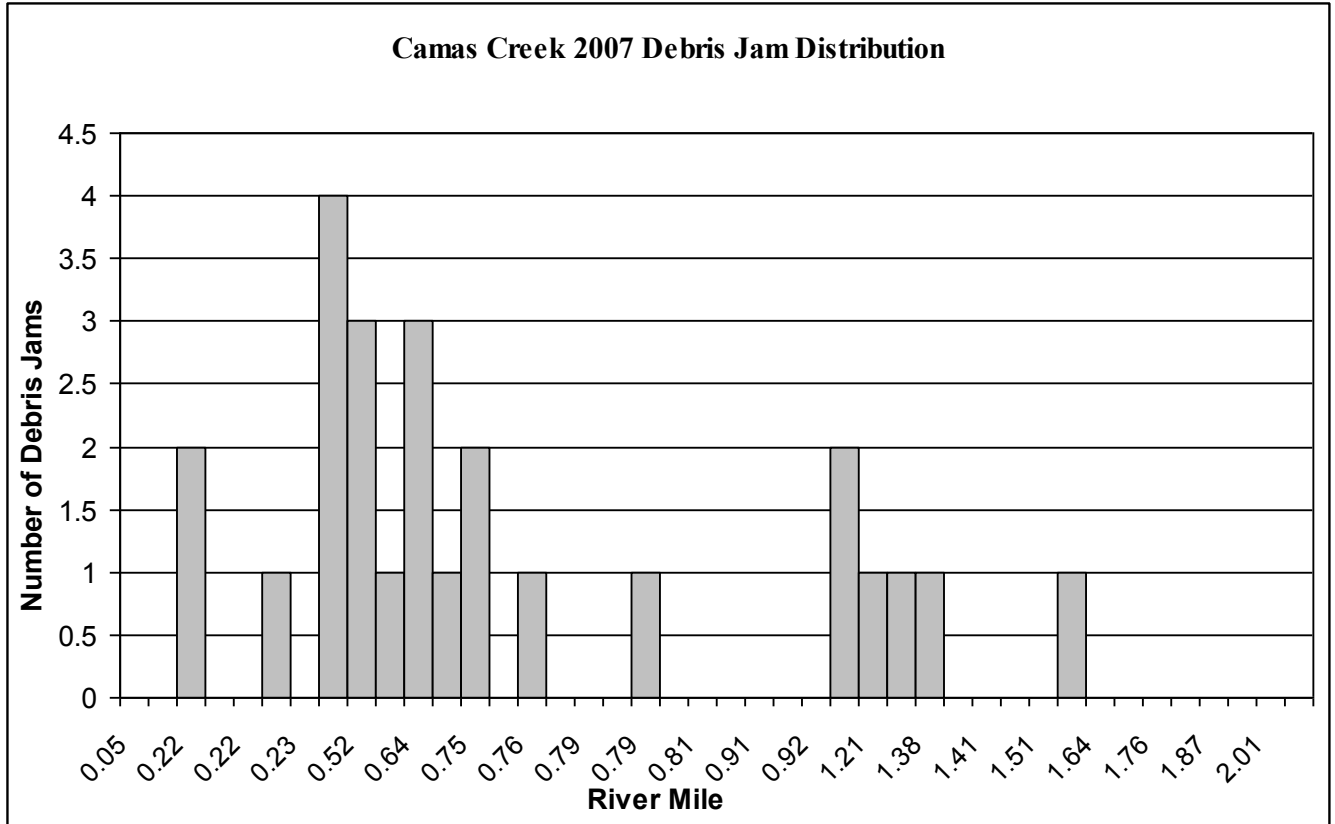


Figure 57. Debris Jam Distribution and the Number of Debris Jams Found in Each Location by River Mile.

Table 69. Debris Jam Information – Existing number of In-channel Woody Debris and Where it was Located Either as Isolated Pieces (single) or in Debris Jams.

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small		Medium		Large	
		Single	Debris Jam	Single	Debris Jam	Single	Debris Jam
1	3	1	2	1	0	0	0
2	21	24	9	13	8	20	9
3	1	0	0	0	1	0	0

**Frog Creek**

**Woody Debris Density**

Table 70 discusses large woody debris within Frog creek, and are discussed further in this section.

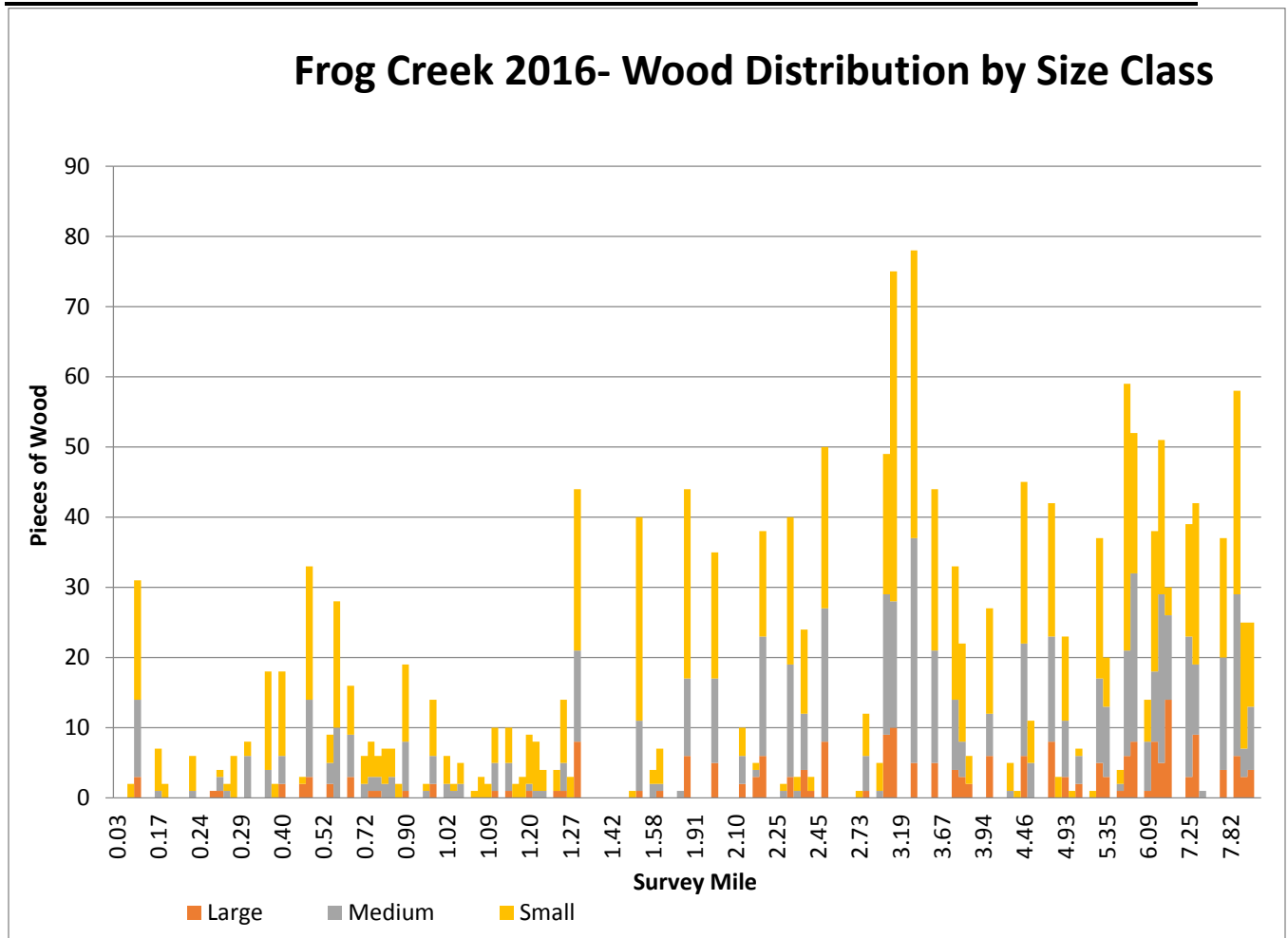


Figure 58. Wood distribution by survey mile.

Table 70. Existing number of in-channel woody debris and woody debris density vs. the LRMP, PIG, and NOAA standards (total of both medium and large size classes)

Reach	Reach Length (miles)	Number of Pieces In-Channel			Total (M+L)	Density per Mile			Standard Density per Mile	
		Small	Medium	Large		Medium	Large	Total	LRMP	PIG/NOAA
1	5.35	702	414	153	567	77.4	28.6	106	106	20
2	3.3	234	170	72	242	51.1	21.6	72.7	106	20

**DFC Discussion:**

Frog Creek met LRMP and NOAA standards for woody debris density in Reach 1. Reach 2 met only the NOAA standards.

**Small Sized Wood:**

Small wood was very prominent in Frog Creek. Much of this wood was associated with small debris jams.

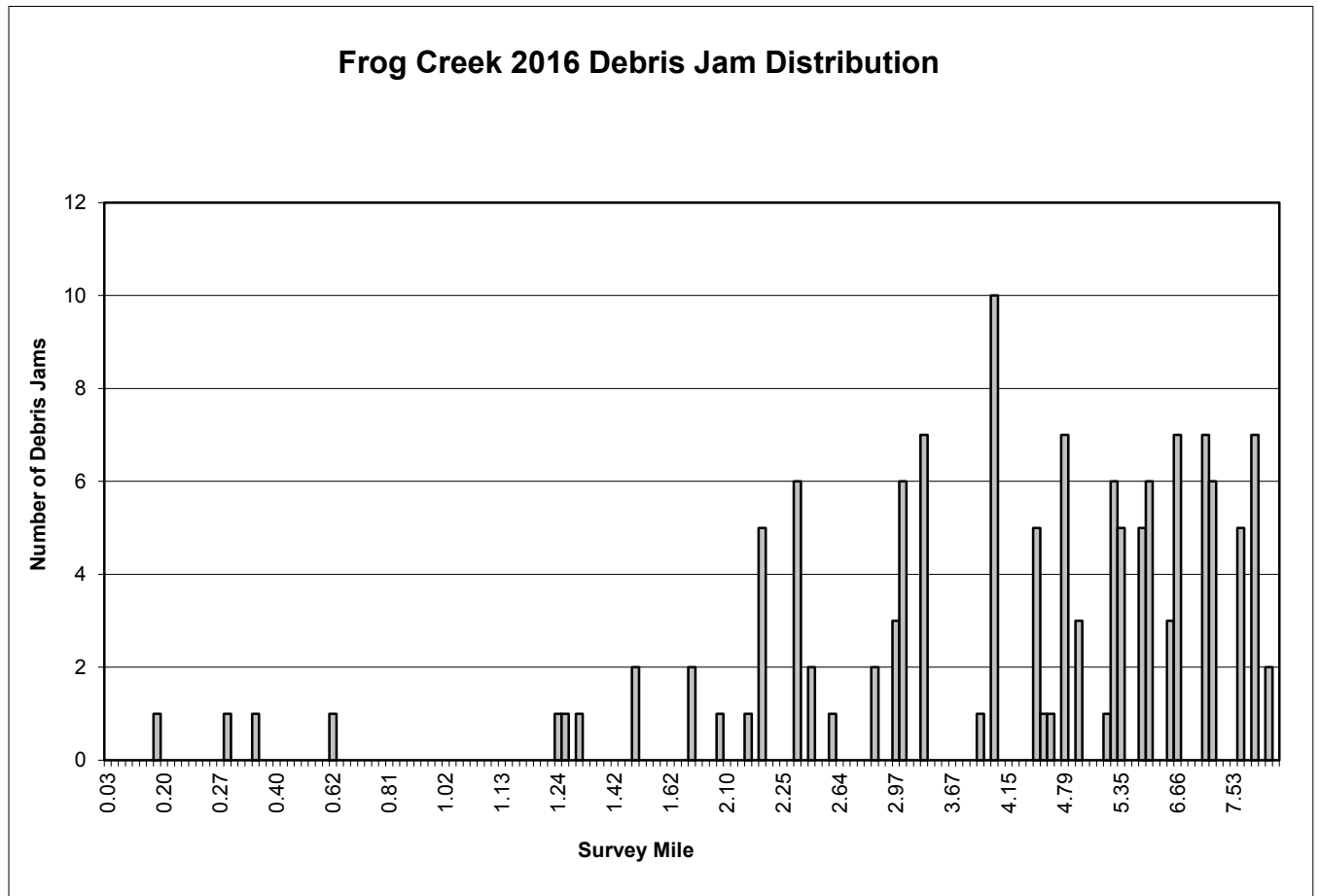
**Role as Fish Cover:**

Wood played a major role in fish cover as well as helping to create pool habitat.

**Debris Jams:**

A total of 133 debris jams were identified in Frog Creek with 85 jams in Reach 1 and 48 debris jams in Reach 2. The debris jams also contained a large amount of brushy material that did not meet woody debris size criteria. The majority of the debris jams were located in the upper 5 miles of the survey. Of the countable wood in Reach 1, 18 percent was located in debris jams. Of this wood 48 percent was in the small wood category, 36 percent medium, and 16 percent large. Of the countable wood in Reach 2, 26 percent was located in debris jams. Of this wood 47 percent was in the small wood category, 38 percent medium, and 15 percent large.

For distribution of debris jams and debris jam characteristics by river mile, see Figure 59 and Table 71, respectively.



**Figure 59. Debris jam distribution and the number of debris jams found in each location by river mile**

**Table 71. Debris Jam Information – Existing number of in-channel woody debris and where it was located either as isolated pieces (single) or in debris jams**



Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small Single	Debris Jam	Medium Single	Debris Jam	Large Single	Debris Jam
1	85	593	109	333	81	117	36
2	48	177	57	123	47	54	18

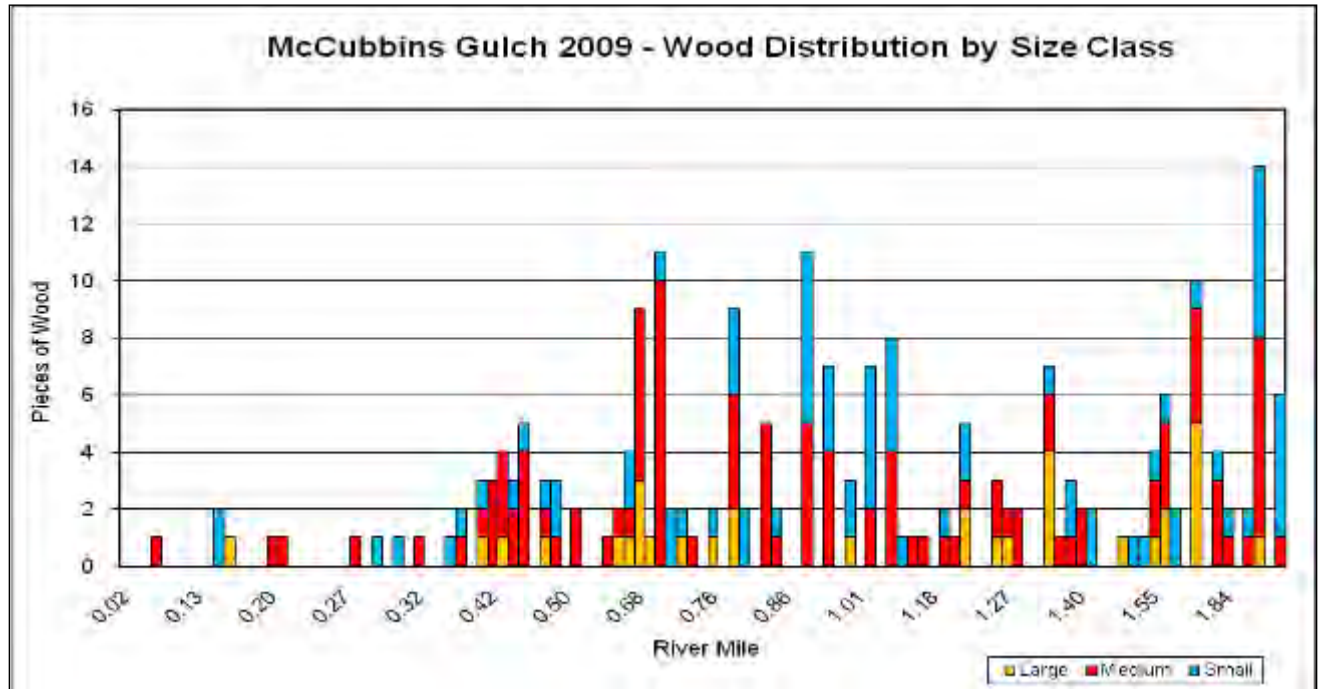
**McCubbins Gulch Creek**

**Woody Debris Density**

Figure 60 displays wood distribution by size class and river mile.

**Table 72. Existing Number of In-channel Woody Debris and Woody Debris Density vs. the LRMP, PIG, and NMFS Standards (total of both medium and large size classes).**

Reach	Corrected Length	Number of Pieces In-Channel				Density per Mile			Standard Density per Mile	
		Small	Medium	Large	Total	Medium	Large	Total	LRMP	PIG/NOAA
1	0.8	24	54	14	92	71	18.4	89.4	106	20
2	1.2	52	54	22	128	46.2	18.8	65	106	20



**Figure 60. Wood Distribution by Size Class.**

**DFC Discussion**

McCubbins Gulch met PIG and NOAA wood density standards in all reaches. LRMP wood density standards were not met in any reach.

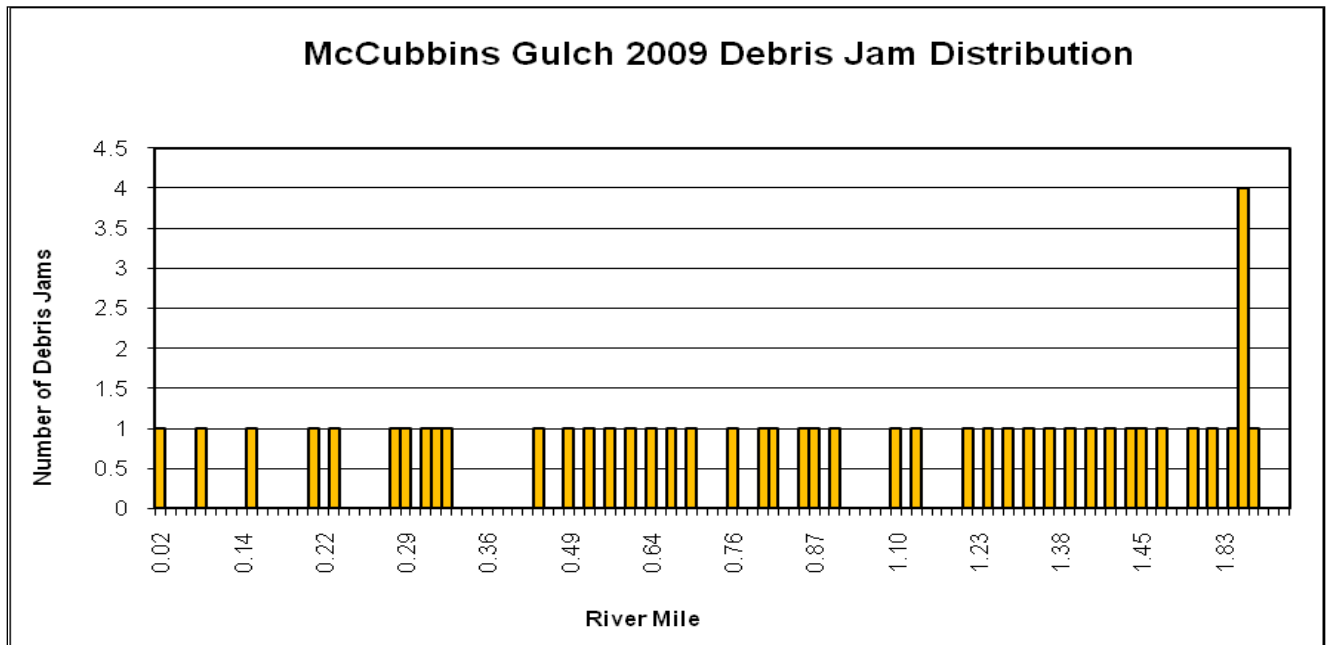
**Small Sized Wood**

Small sized wood was not abundant in McCubbins Gulch. Reach 1 had 24 pieces and Reach 2 had 52 pieces of small sized wood within the bankfull channel.

**Role as Fish Cover**

Woody debris was a major source of cover for fish. Woody debris was most abundant in Reach 1 with a density of 121 pieces per mile. Woody debris was less abundant in Reach 2 with 109.4 pieces per mile.

A total of 41 debris jams were identified in McCubbins Gulch. Debris jams were numerous in Reach 1 with 21 debris jams. Debris jams were less abundant in Reach 2 with 20 debris jams. None of the total countable wood in McCubbins Gulch was found in debris jams. For distribution of debris jams and debris jam characteristics by river mile, see Figure 61 and Table 73, respectively.



**Figure 61. Debris Jam Distribution and the Number of Debris Jams Found in Each Location by River Mile**

**Table 73. Debris Jam Information – Existing Number of In-channel Woody Debris and Where it was Located Either as Isolated Pieces (single) or in Debris Jams.**

Reach	# of Debris Jams	Total Pieces of Woody Debris					
		Small Single	Debris Jam	Medium Single	Debris Jam	Large Single	Debris Jam
1	21	24	0	54	0	13	0
2	20	52	0	54	0	22	0

**Indian Creek**

Indian Creek, has not been formally surveyed for LWD densities on the approximate 1.5 RM's located on MHNH. The small reach of Indian Creek located from the Forest Boundary upstream through Bear Springs Work Center and just downstream of Bear Springs Campground is mostly composed of a broad wet meadow with multiple relic side channels assumed to be formed by historic beaver dams in the meadow. Down wood is found throughout the wet meadow. From Bear Springs Campground upstream to the headwaters wetland the stream channel is located in a narrow to broad floodplain, with a high density of mixed species and size classes of conifer trees and small stands of aspen groves. Down LWD 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 MHNH.

## Pools

Salmonids require high quality and quantity pool habitat in streams in order to maintain a healthy population. Quality pools (residual depth > 3 feet deep) create import spawning and rearing habitat for salmonids, including refugia from predators. High quantities of pool habitat (any depth) help create stream channel complexity, which increases micro habitats for all aquatic life in the stream channel. Pools are created and maintained from the geomorphology of the stream channel, such as valley and stream gradient, channel roughness (substrates and LWD), channel sinuosity (channel confinement i.e. no floodplain vs. board floodplain). Different stream channel types will naturally have different amounts of pools.

## Clear Creek

The total number of pools per mile was greatest in Reach 1. Pools were identified at a frequency of 16.8 per mile with an average residual depth of 2.2 ft. Pools were less frequent in reaches 2, 3, and 4 with 9.3 pools per mile, 7.3 pools per mile, and 11.8 pools per mile, respectively. Average residual pool depths in Reaches 2, 3, and 4 were 1.8 feet, 1.7 feet, and 2.1 feet, respectively. See below for more detailed information.

The number of pools per reach, pool frequency, pool to riffle ratio, and comparisons of the existing pool frequencies per mile to LRMP, PIG, and NOAA Fisheries standards appear below in Table 74 and are discussed further in this section.

**Table 74. Clear Creek - Existing number of pools; primary pools (pools >=3' depth) frequency vs. The LRMP standard; and frequency of pools of all depths vs. the PIG and NMFS standards (shaded columns)**

Reach	Correct. Length	Avg. Bankfull Width	Avg. Width Wetted	Pool to Riffle Ratio	Total Number Primary	All Depths	Primary Pools per Mile	LRMP Standard per Mile	Pools all Depths per Mile	NOAA Standard per Mile	PIG Standard per Mile
1	1.61	27	22.2	1:8.8	22	27	13.7	28	16.8	47	47
2	4.51	33.5	21.1	1:11.9	12	42	2.7	22.5	9.3	47	47
3	2.34	23	17.3	1:23.4	1	17	0.4	32.8	7.3	56	56
4	3.65	22.75	26.3	1:4.0	13	43	3.6	33.2	11.8	26	26

## DFC Discussion

Clear Creek did not met LRMP, PIG, and NOAA pool standards in any reach.

## Pool Quality

Average residual pool depths in Reaches 1, 2, 3, and 4, were 2.2 feet, 1.8 feet, 1.7 feet, and 2.1 feet, respectively.

## Pool Quantity

The stream reaches of Clear Creek were identified as a Rosgen (1996) C2b in reach 1, C4 in reaches 2 and 4, and C6 in reach 3. The average pool-to-pool spacing in reach 1 was not numerically defined by Rosgen, but spacing of pools is related to the nature and resistance of the dominate boulder placement, and the backwater pools are created by LWD being irregularly placed. For Reaches 2, 3, and 4, the expected riffle/pool sequence for both C4 and C6 stream type averages are 5-7 bankfull channel widths in length.

**Step-pool Sequences**

A step pool sequence is a step-like series of riffle and pool units in a high gradient segment of stream. If pool habitat dominates a step pool sequence it means that there are a number of pools in sequence with a short riffle in between. The riffle is added to the upstream habitat length. If riffle habitat is dominant it means that pocket pools are located in the habitat unit but are not channel spanning and can't be broken out into separate units.

**Pool Control Structure**

The major structural elements that appeared to be forming pools in Clear Creek were identified in each pool unit. Wood created the most pool units (62 percent). Boulder (23.3 percent), stream bend (9.3 percent), bedrock (3.8 percent), dam (0.8 percent), and other (0.8 percent), created the remaining pools. Wood was particularly prominent in Reach 4, forming 83.7 percent of the pools.

**Camas Creek**

The total number of pools per mile was greatest in Reach 1. Pools were identified at a frequency of 13.04 per mile and average residual depth for these pools was 1.37 feet. Pools were less frequent in Reach 2 with 8.04 pools per mile and an average residual depth of 1.11. Reach 3 consisted of fast water units only. See below for more detailed information.

The number of pools per reach, pool frequency, pool to riffle ratio, and comparisons of the existing pool frequencies per mile to LRMP, PIG, and NOAA Fisheries standards appear below in Table 75 and are discussed further in this section.

**Table 75. Camas Creek - Existing number of pools; primary pools (pools >=3' depth) frequency vs. The LRMP standard; and frequency of pools of all depths vs. the PIG and NMFS standards (shaded columns)**

Reach	Correct. Length	Avg. Bankfull Width	Avg. Width Wetted	Pool to Riffle Ratio	Total Number Primary	All Depths	Primary Pools per Mile	LRMP Standard per Mile	Pools all Depths per Mile	NOAA Standard per Mile	PIG Standard per Mile
1	0.23	12.00	8.67	1:35.1	0	3	0	146.70	13.04	96	96
2	1.19	17.70	8.63	1:77.6	0	10	0	99.44	8.04	96	96
3	1.08	21.80	8.70	NA	0	0	0	34.60	0.00	96	96

**DFC Discussion**

Camas Creek did not meet LRMP, PIG, or NOAA pool standards in any Reach.

**Pool Quality**

The average residual pool depth was 1.37 feet and 1.11 feet for Reaches 1 and 2. No pools were identified in Reach 3 although the habitat was slow moving and the reach gradient was low.

**Pool Quantity**

The stream reaches of Camas Creek were identified as a Rosgen (1996) C2b in reach 1, C4 in reach 2, and an E5 in reach 3. The average pool-to-pool spacing in reach 1 was not numerically defined by Rosgen, but

spacing of pools is related to the nature and resistance of the dominate boulder placement, and the backwater pools are created by LWD being irregularly placed. For Reach 2, the expected riffle/pool sequence for a C4 stream type average is 5-7 bankfull channel widths in length. Reach 3 was not numerically defined by Rosgen, but states, that the E5 stream type has a riffle/pool type system with channel slopes <2%.

**Pool Control Structure**

The major structural elements that appeared to be forming pools in Camas Creek were identified in each pool unit. Wood created the most pool units (53.8 percent). Boulder (30.8 percent), stream bend (7.7 percent), and culvert (7.7 percent) created the remaining pools. Wood was particularly prominent in Reach 2, forming 70 percent of the pools.

**Frog Creek**

The total number of pools per mile was greatest in Reach 1. Pools were identified at a frequency of 7.3 per mile with an average residual depth of 1.7 ft. Pools were infrequent in Reach 2 with only 1.2 pools per mile with an average residual depth of 2.3 ft. Fish were observed throughout the survey on Frog Creek. Redband trout and brook trout were observed during a snorkel survey.

**Desired Future Conditions**

The number of pools per reach, pool frequency, pool to riffle ratio, and comparisons of the existing pool frequencies per mile to LRMP, PIG, and NOAA Fisheries standards appear below in Table 76 and are discussed further in this section.

**Table 76. Frog Creek - Existing number of pools; primary pools (pools >=3' depth) frequency vs. The LRMP standard; and frequency of pools of all depths vs. the PIG and NMFS standards (shaded columns).**

Reach	Measure d length (ft)	Avg. Bankfull Width	Avg. Width Wetted	Pool to Riffle Ratio	Total Number Primary	All Depths	Primary Pools per Mile	LRMP Standard per Mile	Pools all Depths per Mile	NOAA Standard per Mile	PIG Standard per Mile
1	28270	13*	17.1	1:15.9	1	39	<b>0.2</b>	<b>135.4</b>	7.3	56	56
2	17565	30.5	17.5	1:24.4	1	4	<b>0.3</b>	<b>57</b>	1.2	56	56

\* The average wetted width at the locations of the bankfull readings was 9.7 feet. They were taken at the beginning of the reach where the stream was narrower

**DFC Discussion**

No reaches in Frog Creek met the LRMP, NOAA, or PIG pool standards.

**Pool Quality**

Pools in Frog Creek were identified using a residual depth (maximum water depth minus the depth at the pool tail crest) of 1.0 feet. The average residual depth in Reaches 1 and 2 of Frog Creek were 1.7 and 2.3 respectively. Even though pool numbers are especially low in Reach 2 pool habitat did exist that did not meet the criteria of the protocol (length longer than wetted width and also not meeting minimum residual depths).

**Pool Quantity**

Reach 1 of Frog Creek was identified as a Rosgen (1996) E4 stream type, which is typically a riffle/pool stream. Reach 2 was identified as a B5c (<2% gradient) where pool to pool spacing is usually one pool every 4-5 bankfull channel widths apart.

**Pool Control Structure**

The major structural elements forming pools in Frog Creek were identified in each pool unit. Wood created the majority of the pools (63 percent) Stream bend (28 percent), culverts (7 percent), and a dam (2 percent) created the remaining pools.

**McCubbins Gulch Creek**

The total number of pools per mile was greatest in Reach 1. Pools were identified at a frequency of 40.8 per mile with an average residual depth of 1.2 ft. Pools were less frequent in Reach 2 with 19.7 pools per mile with an average residual depth of 1.4 ft. No fish were observed during this survey. McCubbins Gulch was very turbid and visibility was very low.

The number of pools per reach, pool frequency, pool to riffle ratio, and comparisons of the existing pool frequencies per mile to LRMP, PIG, and NOAA Fisheries standards appear below in Table 77 and are discussed further in this section.

**Table 77. McCubbins Gulch Creek - Existing number of pools; primary pools (pools >=3' depth) frequency vs. The LRMP standard; and frequency of pools of all depths vs. the PIG and NMFS standards (shaded columns).**

Reach	Correct. Length	Avg. Bankfull Width	Avg. Width Wetted	Pool to Riffle Ratio	Total Number		Primary Pools per Mile	LRMP Standard per Mile	Pools all Depths per Mile	NOAA Standard per Mile	PIG Standard per Mile
					Primary	All Depths					
1	0.76	17.4	17.1	1:3.4	2	31	2.6	43.4	40.8	56	56
2	1.17	20	18.6	1:6.7	7	23	6.0	37.7	19.7	56	56

**DFC Discussion**

Clear Creek did not met LRMP, PIG, and NOAA pool standards in any reach.

**Pool Quality**

Average residual pool depths in Reaches 1 and 2, were 1.2 feet and 1.4 feet, respectively.

**Pool Quantity**

Both reaches of McCubbins Gulch Creek were identified as a Rosgen (1996) B5 stream type, where the average pool-to-pool spacing is expected to be 3-4 bankfull channel widths.

**Pool Control Structure**

The major structural elements that appeared to be forming pools in McCubbins Gulch were identified in each pool unit. Wood created the most pool units (80 percent). Stream bend (11.1 percent), bedrock (7 percent) and boulder (1.9 percent), created the remaining pools. Wood was particularly prominent in Reach 2, forming 91.3 percent of the pools.

**Indian Creek**

Indian Creek, has not been formally surveyed for pool frequency or quality on the approximate 1.5 RM's located on MHNF. The Barlow district fish biologist has walked about 0.5 RM and driven along the remainder 1.0 RM of Indian Creek and has taken ocular accounts over the last 16 years of Indian Creek stream channel conditions. The short stream reach (~0.25 RM) of Indian Creek located from the Forest Boundary upstream through Bear Springs Work Center and just downstream of Bear Springs Campground is mostly composed of a broad wet meadow with multiple relic side channels assumed to be formed by historic beaver dams in the meadow. This section of the stream has braided stream channels with a few prominent primary pools (>3 feet deep) from what appears to be relic beaver dam structures.



This stream reach provides high quality rearing and refugia habitat for the unknown salmonid species found in Indian Creek on MHNH lands. From Bear Springs Campground upstream to the headwaters wetland the stream channel is located in a narrow to broad floodplain, with a high density of mixed species and size class of conifer trees and small stands of aspen groves. Down LWD is the primary developing structure for pool creation and maintenance in Indian Creek located on MHNH.

**Presence of PETS Fish and/or Aquatic Species in or Downstream of Action Area**

**Regional Forester’s Special Status Species List - Federally Threatened Date: July 13, 2015**

The following Federally listed as threatened species are found on the MHNH, but individuals or their critical habitat are not present in the Action Area or its area of influence, therefore, will not be discussed any further in this section: Lower and Middle Columbia River (LCR and MCR) steelhead trout, LCR and MCR chinook and coho salmon or their critical habitat, CR Bull trout or their critical habitat, as well as Upper Willamette River Chinook salmon or their critical habitat.

**Regional Forester’s Special Status Species List - Sensitive Vertebrates and Invertebrates July 2015**

Special Status Species are those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by:

- Significant current or predicted downward trends in population numbers or density.
- Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.” (FSM 2670.5)

The following Federally listed as Sensitive species are found on the MHNH, but individuals or their habitat are not present in the Action Area or its area of influence, therefore, will not be discussed any further in this section: coastal cutthroat trout (*O. clarkii clarkii*), Pacific lamprey (*Entosphenus tridentatus*), and Scott’s apatanian caddisfly (*Allomyia scotti*).

Special Status aquatic species that reside, or potentially reside, within the Action Area are identified in Table 78.

**Table 78. Special status (threatened, endangered, or R6 sensitive) aquatic species found or suspected in watershed streams in the Action Area or its area of influence**

Species	DPS/ESU	Status	Major River Systems Where Found
Interior Redband Trout ( <i>Oncorhynchus mykiss gairdneri</i> )	Not Applicable (N/A)	Sensitive 7/04	White River, Clear Creek, Camas Creek, Frog Creek, McCubbins Gulch Creek, and suspected in Indian Creek
Rocky Mountain duskysnail ( <i>Colligyrus greggi</i> ) Formally believed to be Columbia duskysnail ( <i>Colligyrus</i> sp. nov.1)	N/A	Sensitive - 7/04, and Special Status Species – 1/08	Throughout Forest
A rhyacophilan caddisfly ( <i>Rhyacophila viquaea</i> )	N/A	Proposed to be Listed in July 2017	Salmon River, with potential habitat Throughout Forest

The date after the listing status is the date of listing

### **Rainbow/Interior Redband Trout**

Interior redband trout (redband trout) are present in the Action Area and its area of influence. Native resident redband trout are present in White River, Clear Creek (including some unnamed tributaries), Camas Creek, Frog Creek (including unnamed tributaries), and McCubbins Gulch Creek. Redband trout populations within the White River and Tygh Creek watersheds (adjacent watershed to White River) are genetically distinct from those in the Deschutes River and are unique among other redband trout populations east of the Cascades (Currans et. al., 1990). Rainbow trout within the other watersheds (i.e. Beaver Creek and White Horse Rapids-Deschutes River) may be the redband subspecies (Behnke, 1992), but definitive genetic analysis has not been conducted. The unknown resident salmonid trout present off Forest in Indian Creek has not been determined to be redband trout (Personal Communication, Mike Weldon, CTWS Fish Biologist, August 2002). Both Clear Creek irrigation ditch and Frog Creek irrigation ditch both have redband trout present. See Figure 53 for fish distribution within CCR.

Spawning of redband trout occurs in the spring, fry emergence from the gravel normally occurs by the middle of July, but depends on water temperature and exact time of spawning. Redband trout prefer water temperatures from 50 to 57 °F, but have been found actively feeding at temperatures up to 77 °F in high desert streams of Oregon and have survived in waters up to 82 °F.

### **2001 ROD Survey and Manage Species Covered Under Pechman Order 2006**

There are two species on the MHNF, Columbia dusksnail and Basalt Juga, which were covered under the 2001 ROD and are mandated to survey for under the 2006 Pechman Order. Both Columbia dusksnail and Basalt Juga have been documented on the MHNF. However it was not found to be present in the Action Area or its area of influence during a multi-year survey effort from the late 1990's, 2010, and 2015, therefore it is not believed to present in the Action Area.

### **Rhyacophilan caddisfly**

The Rhyacophilan caddisfly is being proposed by Rob Huff Conservation Planning Coordinator Interagency Sensitive and Special Status Species Program (ISSSSP) Forest Service Region 6 and BLM Oregon/Washington to be listed in July of 2017 as a sensitive species. *Rhyacophila* is a large genus of primitive, free-living caddisflies that live in cool, lotic freshwater habitats throughout the northern hemisphere (Ross 1956, Wiggins 2004, Merritt et al. 2008).

The type locality for this species is locally found in the Salmon River in Clackamas County, Oregon (Milne 1936). This species is currently known from over 60 records and about 43 sites in Oregon and Washington (Wisseman 2017, unpublished *R. viquaea* report). This species has not been found in the Action Area or its area of influence, but there is potential habitat for this species throughout the Action Area and area of influence for this species.

## **3.8.3 Effects Analysis**

### **Direct and Indirect Effects - No Action Alternative**

Short-term direct and indirect effects are those that could occur during project implementation and in five years after projects are completed. Long-term direct and indirect effects are those that could occur between 5 and 50 years after the projects are completed.

There should be no short-term direct or indirect effects to aquatic habitat or individuals by implementing this alternative. 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 should stay the same until the next high flow event occurs. Stream temperature, fine sediment, LWD, and pool and refugia habitat throughout the Action 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 improve over the long-term as stream side vegetation continues to grow. Fine sediment inputs to the stream channel in the Action Area and its area of influence would be maintained at existing conditions. Natural tree mortality would increase LWD and move the area towards meeting standards and guidelines for LWD. 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 Action Area.

### **Cumulative Effects**

There should be no cumulative effects by implementing this alternative.

### **Irreversible and Irretrievable Effects**

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

### **Direct and Indirect Effects - Proposed Action Alternative**

#### ***Water Temperature***

No short or long-term indirect effects to water temperature would occur in the Action Area or its area of influence, from commercial logging activities in the Action Area. This is due to the proposed action is not proposing to enter riparian reserves with commercial logging activities.

Underburning would occur in some riparian reserves located in the dry mix conifer stands. The proposed action would limit over story tree mortality to no more than 10% across the dry mix conifer underburning action areas (includes both in and out of riparian reserves). Due to the PDC's and BMP's in place the probability would be negligible for mortality of over story trees, which presently provide shade to stream channels in the dry mix conifer stands. Any stream channel shade loss from over story tree mortality by underburning is expected to be isolated. The loss of isolated temporary (0 to 5 years) shade to the stream channel from underburning activities in riparian reserves should not cause an indirect increase in water temperature for the short or long-term at the site level, Action Area level, or subwatershed level.

Road maintenance actions would also occur as part of the proposed action, including activities such as culvert replacement. Stream side vegetation located in the road prism at the road crossings would be removed in order to safely remove and replace those culverts. None of the proposed culvert replacements are located on any known fish bearing streams. They are however located on 1<sup>st</sup> or 2<sup>nd</sup> order perennial stream channels and are within 0.5 RM's from fish bearing streams. The loss of isolated temporary (0 to 5 years) shade to the stream channel from the replacement of road culverts in the Action Area should not cause an indirect increase in water temperature for the short or long-term at the site level (culvert replacement site), Action Area level, or subwatershed level.

Post treatment, water temperature is expected to be maintained or decrease over the long-term at the site level, Action Area level, and Clear Creek, Middle White River, Middle Beaver Creek and Wapinitia Creek 6<sup>th</sup> field subwatershed level.

## ***Sediment***

Waters (1995), identified 4 effects to fish located in streams from anthropogenic sediments, which are: 1) direct effect of suspended sediment, which includes turbidity; 2) effects on success of fry emergence from salmonid redds; 3) effects on success of fry emergence from nonsalmonid redds; and 4) effects of deposited sediment on the all life stages of fish habitat.

No short or long-term indirect effects to sediment would occur in the Action Area or its area of influence, from commercial logging activities in the Action Area. This is due to the proposed action is not proposing to enter riparian reserves with commercial logging activities.

Underburning would occur in some riparian reserves located in the dry mix conifer stands, and only pile and jack pot burning would be limited out of all riparian serves located in the wet mix conifer stands. The proposed action in dry mix conifer stands is to not actively put fire in riparian reserves, but to allow the fire to creep into the riparian reserves, resulting in a low severity burn. This dominate type of burn 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. Moderate severity burns are permitted in no more than 20% of Riparian Reserves to invigorate desirable deciduous species. Moderate severity burns are expected to have the potential for fine sediment delivery in isolated locations to the stream channel. Any fine sediment delivery to a stream channel post underburn would be expected to be short-term in time (first year) and quantity (during runoff storm events).

The soil erosion and delivery potential is detailed in the Soils and Water Quality Specialist Reports. 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 Action Area, or the 6<sup>th</sup> field subwatershed level. However, individuals and habitat of aquatic populations, including sensitive redband trout, Rocky Mountain dusksnail, and rhyacophilan caddisfly may be affected by sedimentation. Because none of the sediment input are expected to be on-going, little time should elapse before stream conditions return to pre-project conditions.

Road activities in the proposed action could lead to limited mobilization of sediment particles which could be at risk of entering streams and aquatic habitats. Those road activities that could yield sediments include use of native and gravel roads and landings, road maintenance including culvert replacement, and the temporary conversion of roads from OHV trail construction would occur in about 1.45 miles of trails located in riparian reverses, and the use of about 0.42 road miles presently located in riparian reserves. The soil erosion and delivery potential is detailed in the Soils and Water Quality Specialist Reports. Erosion and sediment delivery are expected to be limited due to design criteria associated with the road activities. 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 Action Area, or the 6<sup>th</sup> field subwatershed level. However, individuals and habitat of aquatic populations, including sensitive redband trout, Rocky Mountain dusksnail, and rhyacophilan caddisfly may be affected by short-term increases of sedimentation.

Post treatment, 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, Action Area level, and Clear Creek, Middle White River, Middle Beaver Creek and Wapinitia Creek 6<sup>th</sup> field subwatershed level.

## ***Large Woody Debris***

No short or long-term direct or indirect effects to large woody debris levels would occur in the Action Area or its area of influence, from commercial logging activities in the Action Area. This is due to the proposed action is not proposing to enter riparian reserves with commercial logging activities. Large

woody debris levels are expected to increase over the long-term as future stream side trees fall into the stream channel in the Action Area and 6<sup>th</sup> field subwatershed level.

### ***Pools***

No short or long-term direct or indirect effects to pools quantity levels would occur in the Action Area or its area of influence, from commercial logging activities in the Action Area. This is due to the proposed action is not proposing to enter riparian reserves with commercial logging activities. 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 Action Area are expected to be negligible to pool quality and aquatic refugia. Over the long-term pool quantities and quality could increase as LWD falls into the stream channels and creates and maintains new pools in the Action Area.

### ***Species Specific Findings of Proposed Action***

#### **Threatened Species (NMFS)**

##### ***Mid-Columbia River Steelhead Trout***

A “No Effect” (NE) determination is warranted to Mid-Columbia River steelhead trout. Mid-Columbia steelhead trout upper limits are at White River Falls, which is a long-standing natural fish barrier.

#### **Threatened Species (USF&WS)**

##### **Columbia River Bull Trout**

A “No Effect” (NE) determination is warranted to Columbia River bull trout. Bull trout upper limits are at the White River Falls.

#### **R6 Sensitive Aquatic Species**

##### ***Interior Redband Trout***

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. Following design layout and adhering to PDC’ and BMP’s 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 Action Area or its area of influence.

##### ***Rocky Mountain Dusksnail Aquatic Mollusks (Formally known as Columbia Dusksnail)***

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 Rocky Mountain dusksnails (formally known as Columbia dusksnails) for the proposed action. Following design layout and adhering to PDC’ and BMP’s in the proposed action there would be potential for short-term impacts to individuals or their habitat, due to the expected short-term (0 to 1 year) pulses of fine sediment from underburning and road maintenance including culvert replacements in streams and ditch line cleaning activities with springs in the Action Area or its area of influence.

### ***Rhyacophilan caddisfly***

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 Rhyacophilan caddisfly for the proposed action. Following design layout and adhering to PDC’ and BMP’s in the proposed action there would be potential for short-term impacts to individuals or their habitat, due to the expected short-term (0 to 1 year) pulses of fine sediment from underburning and road maintenance including culvert replacements in streams and ditch line cleaning activities with springs in the Action Area or its area of influence.

### **Essential Fish Habitat**

#### ***Chinook and Coho Salmon***

A “**No Effect**” (**No Effect**) determination is warranted to chinook and coho essential habitat. Chinook and coho essential habitat stops at White River Falls.

### **Cumulative Effects**

The 6<sup>th</sup> and 5<sup>th</sup> 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 off highway vehicles (OHV), 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 5<sup>th</sup> 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, Rocky Mountain dusksnail populations that are present in the two-three watersheds, and potential rhyacophilan caddisfly, which habitat is present in the three watersheds. The proposed action would maintain the overall riparian conditions at the 5<sup>th</sup> and 6<sup>th</sup> field watershed scale, while maintaining or improving other resource uses in the watershed.

See the Water Quality Specialist Report for information on the Aggregate Recovery Percentage (ARP) model used by the Mt. Hood National Forest to model the possible cumulative effects, from a base and peak flow standpoint, for a given watershed from proposed activities.

See the Water Quality Specialist Report for information on nine Aquatic Conservation Strategy Objectives at the Action Area level, and both 6<sup>th</sup> and 5<sup>th</sup> field watershed levels.

### **Irreversible and Irretrievable Effects**

There would be no irreversible or irretrievable commitment of aquatic resources as a result of selecting the proposed action. Potential changes in habitat conditions described above would recover over time. Fish, aquatic mollusk, and insect populations fluctuate naturally, but any fluctuations caused by selecting the proposed action would not result in local extinctions.



## 3.9 Wildlife

### 3.9.1 Species in the Planning Area

Six species of wildlife including critical habitat that are classified as threatened, endangered or proposed may be found on or adjacent to the Hood River and Barlow Ranger Districts. There are sixteen U.S. Forest Service Region 6 Sensitive species (2011), seven Survey and Manage species (2001), and five Management Indicator species that may also be found on the District. The status of species in the project area is listed in Table 79. Species that are not present or do not have habitat within the project area will not be discussed further in this biological evaluation.

**Table 79. Status of Species in the Project Area**

<b>Federally Threatened, Endangered or Proposed Species</b>	<b>Habitat</b>	<b>Presence</b>
Northern spotted owl ( <i>Strix occidentalis caurina</i> )	yes	unknown
Northern spotted owl critical habitat	yes	yes
North American wolverine ( <i>Gulo gulo luscus</i> )	no	-
Canada lynx ( <i>Lynx canadensis</i> )	no	-
Gray wolf ( <i>Canis lupus</i> )	yes	Unknown
Oregon spotted frog ( <i>Rana pretiosa</i> )	yes	yes
Oregon spotted frog critical habitat	yes	yes
<b>R6 Sensitive Species</b>		
Bald eagle ( <i>Haliaetus leucocephalus</i> )	yes	unknown
Peregrine falcon ( <i>Falco peregrinus anatum</i> )	no	-
Bufflehead ( <i>Bucephala albeola</i> )	no	-
Harlequin duck ( <i>Histrionicus histrionicus</i> )	no	-
White-headed woodpecker ( <i>Picoides albolarvatus</i> )	yes	unknown
Lewis' woodpecker ( <i>Melanerpes lewis</i> )	no	-
Cope's giant salamander ( <i>Dicomptodon copei</i> )	no	-
Cascade torrent salamander ( <i>Rhyocotriton cascadae</i> )	no	-
Townsend's big-eared bat ( <i>Corynorhinus townsendii</i> )	no	-
Fringed myotis ( <i>Myotis thysanodes</i> )	yes	unknown
Pacific fisher ( <i>Martes pennanti</i> )	no	-
Western bumblebee ( <i>Bombus occidentalis</i> )	yes	unknown
Beller's ground beetle ( <i>Agonum belleri</i> )	no	-
California Shield-backed bug ( <i>Vanduzeenia borealis californica</i> )	no	-
Johnson's hairstreak ( <i>Callophrys johnsoni</i> )	yes	unknown
Mardon skipper ( <i>Polites mardon</i> )	no	-
<b>Survey and Manage Species</b>		
Great gray owl ( <i>Strix nebulosa</i> )	no	-
Larch Mountain salamander ( <i>Plethodon larselii</i> )	no	-
Dalles sideband ( <i>Monadenia fidelis minor</i> )	yes	yes
Crater Lake tightcoil ( <i>Pristiloma arcticum crateris</i> )	yes	unknown
Evening fieldslug ( <i>Deroceras hesperium</i> )	yes	unknown
Puget Oregonian ( <i>Cryptomastix devia</i> )	yes	unknown
Columbia Oregonian ( <i>Cryptomastix hendersoni</i> )	yes	unknown
<b>Management Indicator Species</b>		

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
<b>Other Speices of Interest</b>		
Snag and Down Log Associated Species	yes	yes
Neotropical Migratory Birds	yes	yes

### 3.9.2 Federally Threatened, Endangered or Proposed Species

#### Northern Spotted Owl

##### *Analysis Assumptions and Methodology*

##### **Disturbance**

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

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

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

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

##### **Home Range and Core Area**

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

for purposes of assessing the effects of a proposed project on spotted owls. These potential sites are based on factors known to influence the carrying capacity of a given area for spotted owls.

For the Willamette Province, the home range is a 1.2 mile radius circle (2,985 acres) centered on a nest site. Incidental take would be presumed to occur when suitable habitat is removed from a home range and if suitable habitat is less than 40 percent of the home range. A core area has been defined as the area within a home range that receives disproportionately high use (503 acres or 0.5 mile radius circle from the historic nest). Incidental take would be presumed to occur when suitable habitat is removed from a core area and if suitable habitat is less than 50 percent of the core area. While it is usually the alteration or removal of suitable habitat (nesting, roosting, and foraging) that may result in adverse impacts to a territorial pair of spotted owls, the loss or degradation of dispersal habitat may also result in short-term impacts. The FWS has guidelines for how much removal of suitable habitat would result in take, but there are no such guidelines for dispersal habitat.

## ***Existing Condition***

### **Habitat**

Spotted owls generally rely on older forested habitats that contain the structures and characteristics required for nesting, roosting, foraging, and dispersal. These characteristics of older forests include a multi-layered, multi-species canopy dominated by large overstory trees; moderate to high canopy closure; a high incidence of trees with large cavities and other types of deformities; numerous large snags; an abundance of large, dead wood on the ground; and open space within and below the upper canopy for spotted owls to fly (Thomas et al. 1990). Forested stands with high canopy closure also provide thermal cover, as well as protection from predation.

Generally, suitable habitat is 80 years of age or older, canopy cover exceeds 60 percent, is multi-storied and has sufficient snags and down wood to provide opportunities for nesting, roosting and foraging. Dispersal habitat for spotted owls usually consists of mid-seral stage stands between 40 and 80 years of age with a canopy closure of 40 percent or greater and an average diameter of 11-inches. Spotted owls use dispersal habitat to move between blocks of suitable habitat and juveniles use it to disperse from natal territories. Dispersal habitat may have roosting and foraging components, enabling spotted owls to survive, but lack structure suitable for nesting. Recent landscape-level analyses suggest that a mosaic of late-successional habitat interspersed with other vegetation types may benefit spotted owls more than large, homogeneous expanses of older forests (Zabel et al. 2003).

Spotted owls are mostly nocturnal, but they may forage opportunistically during the day. Composition of prey in the spotted owl's diet varies regionally, seasonally, annually, and locally, which is likely in response to prey availability (Forsman et al. 2001). Northern flying squirrels and woodrats are usually the predominant prey species. Other prey species include red tree vole, red backed voles, mice, rabbits and hares, birds, and insects.

### **Management and Population Trends**

The Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) has developed a habitat modeling tool to aid in the development of future land management plans by Federal land managers, and the consideration of management options by State, Tribal or private land owners.

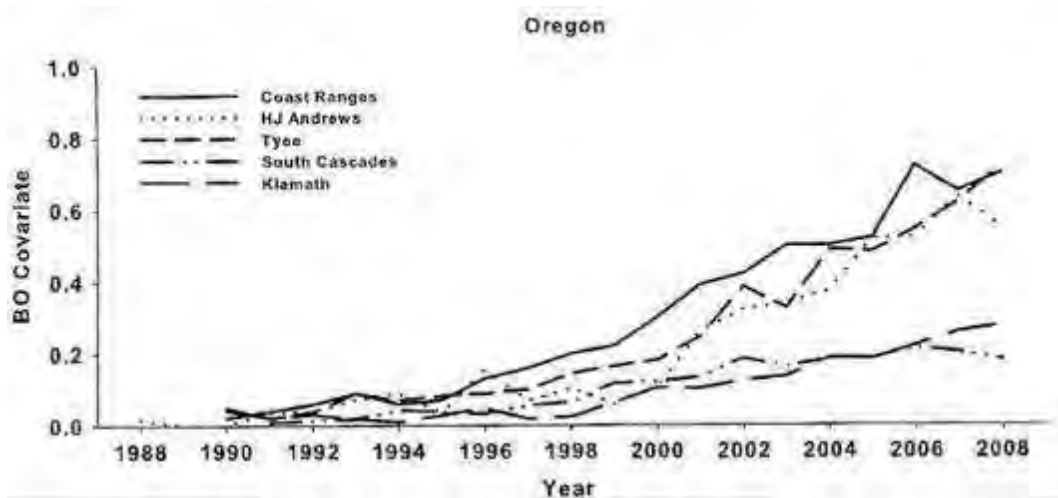
Given the continued decline of the species, the apparent increase in severity of the threat from barred owls, and information indicating a recent loss of genetic diversity for the species, the Revised Recovery Plan recommends retaining more occupied spotted owl sites and unoccupied, high value spotted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

reduce future losses of spotted owl habitat and improve overall forest ecosystem resilience to climate change, which should result in more habitat retained on the landscape for longer periods of time.

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

Recovery units are intended to assist land managers in re-establishing or maintaining: (1) historical or current genetic flow between spotted owl populations; (2) current and historic spotted owl population and habitat distribution; and (3) spotted owl meta-population dynamics. To accomplish this, the recovery plan recommends continued application of the reserve network established under the NWFP, and the restoration of more occupied and high-value spotted owl habitat, including increased conservation of habitat on some Federal “Matrix” lands (USFWS 2011, p. III-41). Under the Recovery Plan, the conservation of occupied and high value spotted owl habitat is expected to be accomplished through implementation of Recovery Actions 10 and 32 on all lands containing such habitat (USFWS 2011, p. III-41).

The Revised Recovery Plan also identifies competition from the barred owl as an important threat to the spotted owl. Since barred owls are more aggressive and also use the same habitats and prey as spotted owls they are believed to be out competing spotted owls for habitat and food (USFWS 2011, Wiens 2012). Within the Oregon demographic study areas, there has been a steady increase in the number of barred owls as measured by the proportion of spotted owl sites with barred owls detected, with as many as 60 percent of the spotted owl sites having barred owls detected, see Figure 62 (Forsman et al. 2011).



**Figure 62. Annual Proportion of Spotted Owl Territories with Barred Owl Detections**

Dugger et al. (2011) modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study area where barred owls were detected on some home ranges. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was 2-3 times greater when barred owls were detected. They found that colonization rates for spotted owls decreased as the distance between patches of old-growth forest increased (i.e. increased habitat loss and fragmentation) and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs. They concluded that conserving large blocks of contiguous old-forest habitat was important for reducing interference competition between the two owl species. They mapped old-forest habitat as generally >100 years of age with trees diameter at breast height (dbh) >35 cm. Wiens (2012)

also found that the relative probability of a location being selected by spotted owls was reduced if the location was in close proximity to the core-use area of a barred owl.

**Nest Sites in the Project Area**

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 significant moisture stress and increased all trees’ susceptibility to insect, disease, drought, and fire-related mortality. The only habitat that would have existed in the eastern portion historically would have been in the moist areas, typically north aspects along perennial streams, and in riparian zones of larger streams.

Spotted owl surveys are being conducted in the project area to determine if these sights are currently occupied. Surveys began in 2016 and will continue until 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 (Figure 63). 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 80).

**Table 80. Percent of Habitat in Potential Owl Territories**

	Dispersal Only		Suitable	
	Acres	Percent	Acres	Percent
Nest #1	Acres	Percent	Acres	Percent
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	588	20	1,562	54
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
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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

### ***Effects Analysis***

#### **Analysis Area**

The analysis area for spotted owl includes the project boundary and the eight potential spotted owl territories that overlap and extend beyond the boundary (Figure 63).



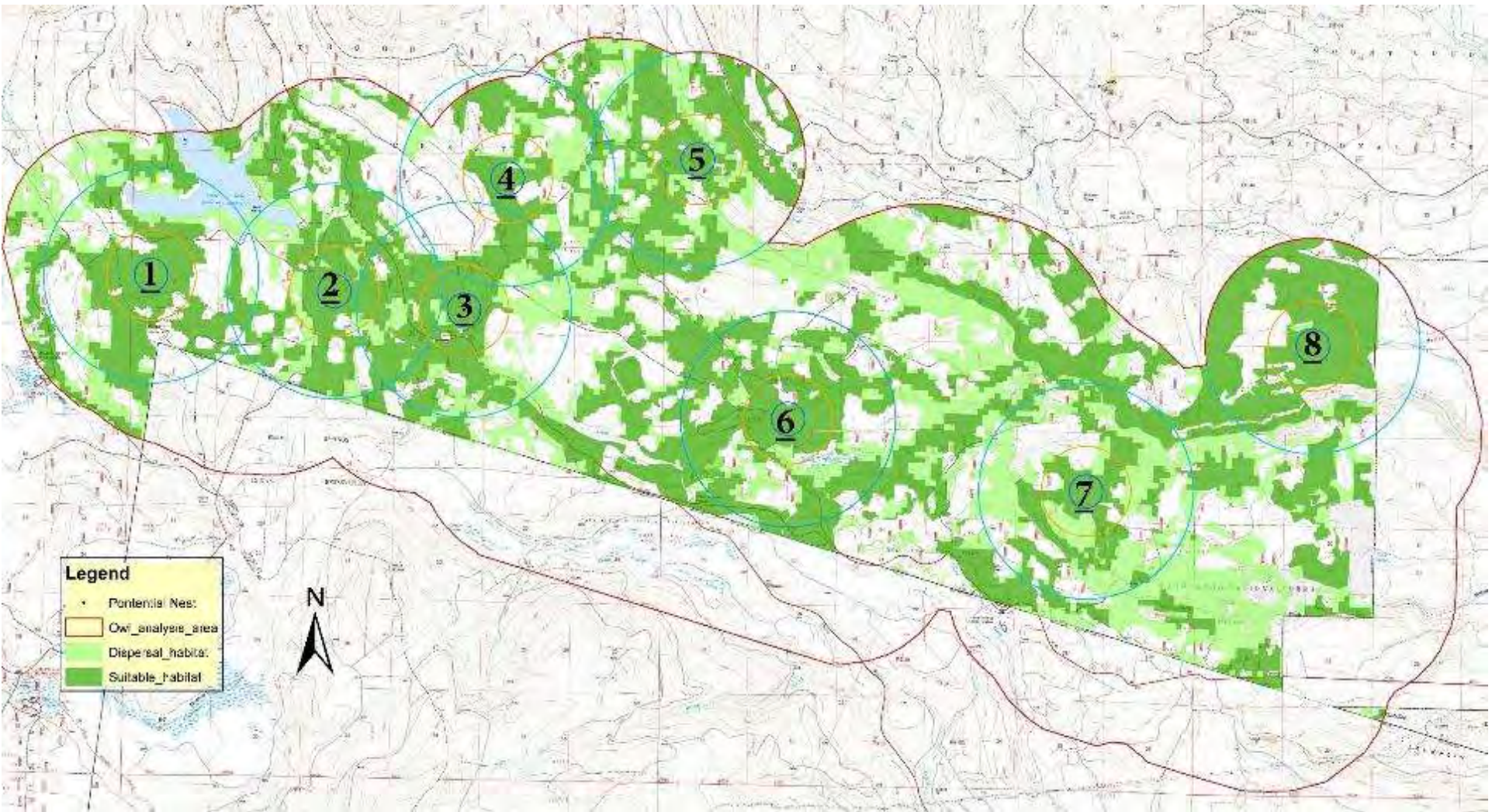


Figure 63. Spotted Owl Analysis Area with Potential Home Ranges

### **No Action Alternative**

There would be no short-term effects to spotted owls under this alternative. In the short-term, the units that are providing dispersal habitat 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. The quality of dispersal habitat would improve only slightly in some stands while improving more in others depending on site conditions. Stands that are functioning as suitable habitat 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. Some of the stands may eventually develop nesting habitat characteristics and become suitable spotted owl habitat. However, with no action, it could take as much as 60 to 150 years for these stands to develop into suitable habitat. Refer to the Silviculture Specialist Report for further discussion of tree response under the No Action Alternative. The potential impacts to 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. Refer to the Fuels Specialist Report for further discussion of wildfire impacts under the No Action Alternative.

### **Proposed Action**

#### ***Effects from Disturbance***

The FWS has concluded that sound, smoke, and human presence can result in a significant disruption of breeding, feeding, or sheltering behavior of the spotted owl such that it creates the potential for injury to individuals (i.e., incidental take in the form of harass). For a significant disruption of spotted owl behavior to occur as a result of disturbance caused by a Proposed Action, the disturbance and the spotted owl(s) must be in close proximity to one another. Human presence on the ground is not expected to cause a significant disruption of behavior because spotted owls do not seem to be startled by those situations (USFWS 2002).

Spotted owl reactions to smoke and excessive noise levels in the immediate vicinity are expected to include the following: flushing from the nest site, which would leave eggs or young exposed to predation; causing a juvenile to prematurely fledge, which would increase the young's risk of predation; interrupting foraging activities, which would result in the reduced fitness or even mortality of an individual; or disrupting roosting activities which would cause a spotted owl to relocate. A spotted owl that may be disturbed at a roost site is presumably capable of moving away from disturbance without a significant disruption of its behavior. Spotted owls forage primarily at night. Therefore, projects that occur during the day are not likely to disrupt an owl's foraging behavior. The potential for effects is mainly associated with breeding behavior at an active nest site.

In the late breeding period, the potential effects from disturbance declines because juvenile spotted owls are increasingly more capable of moving as the nesting season progresses. Once capable of sustained flight, young owls are presumably able to distance themselves from disturbance and minimize their risk of predation. To ensure that most juvenile spotted owls are able to move away from disturbances without increasing their risk of predation or harm, the critical nesting period is considered to be March 1 through July 15 for the proposed project. This is based on fledge data (Forsman et al. 1984) and includes an additional two weeks to allow for development of flight skills. After July 15, it is estimated that most fledgling spotted owls are capable of sustained flight and can move away from the most harmful disturbances. However, disturbances associated with the use of Type I helicopters<sup>1</sup> and blasting are considered to have a greater impact than other activities, due to the intensity of the sound. Thus, these activities would require fledglings to move over greater distances, potentially increasing their risk of predation or harm. Therefore, these disturbance types may still adversely affect spotted owls during the entire nesting breeding period (March 1 – September 30) (Table 81).

**Table 81. Disturbance and Disruption Distances for Northern Spotted Owls**

Disturbance Source	No Effect March 1 – September 30.	Disturbance Distance	Disruption Distances <sup>1</sup>	
			Entire Breeding Period (March 1 – September 30). NLAA	Critical Breeding Period (March 1 – July 15). LAA
Use of chainsaws	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards	No Disruption Anticipated
Use of heavy equipment	> 0.25 mile	66 yards to 0.25 mile	≤ 65 yards	No Disruption Anticipated
Hauling on open roads	> 0.25 mile	≤ 0.25 mile	No Disruption Anticipated	No Disruption Anticipated
Blasting	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile	≤ 100 yards (injury)
Helicopter – Type I <sup>2</sup>	> 0.5 mile	266 yards to 0.5 mile	≤ 265 yards	≤ 100 yards (hovering only)
Helicopter – other <sup>3</sup>	> 0.25 mile	111 yards to 0.25 mi	151 yards to 0.25 mile	≤ 50 yards (hovering only)
Rock crushing		440 yards (0.25 mile)	180 yards	No Disruption Anticipated
Burning	> 1 mile	0.25 mile to 1 mile	≤ 0.25 mile	No Disruption Anticipated

<sup>1</sup> Noise distances were developed from a threshold of 92 dB (USFWS 2003). Smoke disturbance distances are based on a FWS white paper (USFWS 2008b). Distances are measured from occupied spotted owl nest tree or fledgling location. If these are not identified, distances are from the edge of nest patch (for both known and potential spotted owl sites).

<sup>2</sup> Type I helicopters seat at least 16 people and have a minimum capacity of 5,000 lbs. Both a CH-47 (Chinook) and UH-60 (Blackhawk) are Type I helicopters. Kmax helicopters are considered “other” for the purposes of disturbance. Sound readings from Kmax helicopter logging on the Olympic NF registered 86 dB at 150 yards (Piper 2006).

<sup>3</sup> All other helicopters (including Kmax)

Although the FWS has assumed disruption distances based on interpretation of the best available information, the exact distances where different disturbances disrupt breeding are difficult to predict and can be influenced by a multitude of factors. Site-specific information (e.g., topographic features, project length/duration or frequency of disturbance to an area) would also influence the degree of the effects to spotted owls. The potential for noise producing activities creating the likelihood of injury to spotted owls is also dependent on the background or baseline levels in the environment. In areas that are continually exposed to higher ambient noise levels (e.g. areas near well-traveled roads, campgrounds), spotted owls are probably less susceptible to small increases in disturbances because they are accustomed to such activities. Some spotted owls occur in areas near human activities and may habituate to certain levels of noise.

The proposed project is expected to have disturbance from vegetative treatments, fuel treatments and from closing roads and construction of temporary roads. Specifically the disruption will be from chainsaws and other heavy equipment, smoke, and helicopter usage. No spotted owls have been found during surveys. If the potential nest sites are unoccupied, then there would be no effect from disturbance to spotted owls from the proposed activities. Since there is a possibility of owls being present but undetected, the following affects determinations are based on assumed occupancy.

The project design criteria for timber harvest in the Proposed Action, including tree falling and ground based-logging, includes a timing restriction from March 1 to July 15 within the disturbance distance of a

known spotted owl nest patch. All treatments that are between 65 yards and 0.25 miles from an owl nest patch between March 1 and July 15 **may affect, but are not likely to adversely affect** spotted owl from disturbance. Small helicopter yarding has a disturbance distance of 0.5 miles (Table 81) and a disruption distance of 150 yards to 0.25 miles for the entire breeding period (March 1 to September 30). The project design criteria for helicopter use in the Proposed Action includes a timing restriction for no helicopter use within 150 yards of a spotted owl nest patch between March 1 and September 30, therefore, the use of helicopters **may affect, but is not likely to adversely affect** spotted owls due to disturbance.

Log hauling along roads regularly used by the public is not expected to increase noise above ambient levels and should have no effect on spotted owls. The risk of disturbances and disruptions to owl nest sites is similar to that of heavy equipment (Table 81). Since there is no disruption distance for the latter part of the breeding season when this activity would occur, noise associated with log hauling will have **no effect** on spotted owls.

#### *Fuel Treatments*

The disturbance distance for burning is 0.25 miles during the critical and late breeding periods (Table 81). In addition, fuels treatment will involve limited chainsaw work to clear brush and woody debris. All units that will implement burning post-treatment will be greater than 0.25 miles from a spotted owl nest patch or will have a timing restriction of March 1 to September 30. Therefore, the effects from prescribed fire, pile burning, and underburning are **not likely to adversely affect** spotted owl.

#### *Closed and Temporary Roads*

The disturbance distance for heavy equipment is 65 yards during the critical breeding period. The proposed temporary roads and road closures are all located further than 65 yards from a nest patch and therefore activities associated temporary road construction and road closures are **not likely to adversely affect** spotted owl.

### **Effects from Habitat Modification**

#### *Vegetative Treatments*

The removal of suitable habitat has an indirect effect on spotted owls by reducing the amount of potential nesting, roosting or foraging habitat. These effects on local owl populations are greater when the amount of suitable habitat remaining post-harvest is limited in the area. The loss of nesting structure may reduce the number of breeding pairs if other nesting habitat is limited. The loss of roosting habitat reduces the number of stands that provide thermal protection, plus these stands usually also function as foraging habitat. The loss of foraging habitat could reduce the amount of food available to nearby adult and juvenile owls, which could affect their survival if other foraging options are limited. The removal of unoccupied suitable habitat could preclude future spotted owl occupancy for a period of time. It is estimated that these units would again provide quality suitable habitat in 75 to 100 years after treatments, depending on the site conditions.

Vegetative treatments that impact suitable and dispersal habitat could impede or shift spotted owl movements during dispersal. Dispersal can be described as having two phases: transience and colonization (Courtney et al 2004, p. 5-13). Fragmented forest landscapes are more likely to be used by owls in the transience phase as a means to move rapidly between denser forest areas (Courtney et al 2004, USFWS 2012). Movements through mature and old growth forests occur during the colonization phase when birds are looking to become established in an area (Miller et al 1997, Courtney et al 2004). Transient dispersers use a wider variety of forest conditions for movements than colonizing dispersers, who require nesting/roosting/foraging habitats used by breeding birds (USFWS 2012). The removal of suitable and dispersal habitat could reduce the ability of owls to move across the landscape as dispersal

success is likely highest in mature and old growth forest stands where there is more adequate cover and food supply.

Sollmann et.al (2016) found that flying squirrel densities were reduced on the scale of a thinning treatment unit, and that these animals shifted their distribution into adjacent un-thinned areas without decline in overall density. While density-dependent effects didn't manifest in the untreated stands during the life of the study, it is possible that there may be delayed effects on flying squirrel populations as the untreated stands move toward the pre-treatment densities. For the short-term at least, prey for spotted owls may still be available at pre-treatment densities within the owl's home range but it is expected that in the long-term, until habitat returns to pre-treatment conditions, prey for spotted owl may be reduced.

The proposed thinning would remove 895 acres of dispersal habitat. These treatments would also downgrade 1,414 acres of suitable habitat to dispersal (Table 82).

**Table 82. Acres of Habitat Removed, Downgraded, or Maintained in the Project Area**

	Acres of Dispersal	% Treated	Acres of Suitable	% Treated
Total	8,930		19,072	
Maintained	8,035*	90	17,658**	93
Downgraded	N/A	N/A	1,414	7
Removed	895	10	0	0

\*1,253 acres of dispersal maintained through treatment

\*\*1,137 acres of suitable maintained through treatment

Some habitat would be treated but the function of that habitat would be maintained after treatments. Treatments that maintain habitat include 1,253 acres of dispersal and 1,137 acres of suitable habitat. Treatments that maintain suitable and dispersal habitat impact these stands by reducing the canopy cover, and by reducing shrubs and other components that provide habitat for prey species. Although habitat within these units would be reduced in quality, it would still function as the same habitat as before treatment.

There are currently eight potential owl sites that overlap some or all of the treatment units. The effect of habitat changes to these territories are evaluated at three scales: a) nest patch within 300 meters of the nest site; b) core area, within 0.5 miles of the nest; and c) home range, within 1.2 miles of the nest. A summary of suitable habitat for the core area and home range for these territories pre- and post-harvest is shown in Table 83.

**Table 83. Suitable Habitat in the Core Area and Home Range Pre- and Post-treatment**

Owl Site #	Core Area				Home Range			
	% Suitable Habitat Pre-Treatment	Total Acres Pre-Treatment	% Suitable Habitat in Post-Treatment	Total Acres Post-Treatment	% Suitable Habitat in Pre-Treatment	Total Acres Pre-Treatment	% Suitable Habitat Post-Treatment	Total Acres Post-Treatment
1	83	420	83	419	44	1,278	40	1,271
2	77	386	77	386	56	1,611	56	1,610
3	81	405	81	405	51	1,471	51	1,468
4	56	282	56	282	36	1,053	36	1,044
5	65	326	65	326	54	1,562	53	1,550
6	86	433	79	399	59	1,694	50	1,435



Owl Site #	Core Area				Home Range			
	% Suitable Habitat Pre-Treatment	Total Acres Pre-Treatment	% Suitable Habitat in Post-Treatment	Total Acres Post-Treatment	% Suitable Habitat in Pre-Treatment	Total Acres Pre-Treatment	% Suitable Habitat Post-Treatment	Total Acres Post-Treatment
7	55	275	55	275	34	971	28	824
8	84	422	84	422	58	1,676	57	1,638

All of the potential 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 will further reduce habitat for owl pairs 4 (32 acres) and 7 (144) 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.

The removal of habitat within potential spotted owl territories is not expected to prevent owls from occupying these sites or from successfully producing young. A number of nesting territories on the east side of the Forest are occupied and pairs have successfully reproduced in these sites with much less habitat in the home ranges, some as low as 10 percent. Owl site number 7 would have a 6 percent reduction from 34 percent to 28 percent. Site number 7 is in the far south eastern portion of the analysis area and is within dry mixed conifer and ponderosa pine. This site would not be capable of maintaining suitable habitat over the long term since the tree densities required for suitable habitat are not sustainable for this dry forest type. Treatments for site 7 would be located outside of the core area and between patches of habitat in the home range which will reduce the likelihood of losing the remaining habitat from wildfire, insects or disease.

Treatment activities that remove dispersal habitat on 895 acres are *not likely to adversely affect* spotted owl. The analysis area currently has approximately 8,930 acres of dispersal only habitat. When combined with the amount of suitable that will also provide for dispersal (19,072 acres), 55 percent of the analysis area is currently providing dispersal habitat. This amount will 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.

#### Fuel Treatments

Fuels reduction is expected to have both negative and beneficial effects to spotted owl prey species. Some small mammals may be directly impacted due to smoke or the inability to escape. Other small mammals may not be affected if they are mobile, protected within large downed coarse wood, or able to move away from the fire or mastication activities. However, there may be long-term benefits from a low intensity burn or mastication that is expected to increase plant vigor and prey species forage production.

Burning could also facilitate cavity creation and increase denning opportunities. Another expected benefit of fuels treatments is the decrease in potential for a stand replacement event in the drier forests within the eastern portion of the action area. All fuels treatments would be within vegetation treatment units.

Although fire may be allowed to back into untreated stands, the intent is to contain fuels treatments within previously treated areas and any habitat impacted by fire backing into adjacent stands would not change the function of the habitat. 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 will not change the overall function of the habitat after treatment.



### *New Temporary Roads*

The proposed project would create 4.0 miles of new temporary roads in suitable habitat. 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. The width of temporary roads would be approximately 15 feet, and when multiplied by the length of the proposed roads equals 7.3 acres of roads in suitable habitat. While these acres represent the footprint of impacts, the actual acres of habitat impacted would likely be much less since roads would be placed in areas requiring the least amount of tree removal which would be more cost effective. Therefore, the above numbers represent the worst case scenario. 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. These acres are in addition to the acres provided for habitat impacts from thinning and fuels reduction activities.

### *Combined Impacts to Potential Spotted Owl Territories*

Treatments were placed outside of most core areas and in locations that would provide a mix of suitable habitat adjacent to treatments units in order to reduce the likelihood of losing habitat from fire, insects and disease, or both. Corridors of dispersal and suitable habitat will provide for movement between blocks of suitable habitat within and outside of the planning area to support the transience and colonization phases of dispersing owls. Untreated stands would continue to provide habitat for prey species, possibly at higher densities in the short term. In the long term prey species may be reduced until stands again provide better quality nesting and foraging.

The proposed treatments will promote tree species such as ponderosa pine and Douglas fir that are more resilient to fire. Thinned stands that retain and promote fire resistant tree species will provide habitat that is more resilient to the effects of fire and would therefore benefit spotted owl in the long-term. Spotted owls would continue to persist in the analysis area because suitable habitat would be maintained within potential territories, and active management to reduce the risk of wildfire, insect outbreak, and disease is expected to offset the risks of habitat loss.

### **White River LSR**

The White River LSR Assessment provides the existing condition for the plant series in the planning area and the suggested management actions for each Landscape Unit (LU). The planning area falls within portions of the Mustang and Canyon LUs and were identified as a management priority.

There are 453 acres of treatments within these LUs; 98 acres in suitable, 102 acres in dispersal, and the remaining treatments are in non-habitat. In suitable habitat, 60 acres would be removed and 38 would be downgraded to dispersal. In dispersal habitat, 20 acres would be maintained as dispersal, and 82 would be removed and no longer function as dispersal habitat.

### **Barred Owls**

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). There is concern that timber harvest and other silvicultural activities may directly or indirectly affect the interaction between barred owls and spotted owls and increase the competitive advantage for barred owls. As indicated in the “Existing Condition” for spotted owl, timber harvest activities may expand the range of barred owls; and silviculture treatments that thin forests and create early seral habitat, or create edge habitat, may favor barred owls over spotted owls.

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

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

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

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

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

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: Timber harvest on federal, tribal, and private lands; McCubbins Gulch OHV trail construction and maintenance, Bear Springs Plantation Thinning; utility corridor operations and maintenance.

Timber harvest on federal, tribal, and private land, and utility corridor operations have reduced the amount of suitable habitat on the landscape and will 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. Timber harvest on federal and tribal lands would reduce the amount of habitat until these stands grow over time and become suitable habitat again.

The cumulative effects to dispersal habitat 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.

### **Consistency Determination**

#### **Recovery Actions 10 and 32**

The proposed project is consistent with the Northwest Forest Plan and with the Revised Northern Spotted Owl Recovery Plan (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 project 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 will 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 project 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.

### **Consultation**

A formal BA will be submitted to the FWS for the effects to federally listed species including northern spotted owls. A signed Biological Opinion would be received before a final decision is signed for this project.

### **Spotted Owl Critical Habitat**

#### ***Analysis Assumptions and Methodology***

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

PBF 1 is the forest types that support spotted owls. This criterion was used to identify CH affected by the Proposed Action. PBFs 2, 3, and 4 (nesting/roosting, foraging, and dispersal habitat) were specifically considered with respect to the Proposed Action to determine if they were removed, reduced, maintained or enhanced at a stand level. The analysis of impacts has both a temporal scale (would the actions delay or accelerate the development of the 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).

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

### **Existing Condition**

## Legal Status

On December 4, 2012, the revised final rule for spotted owl critical habitat (CH) was published (USFWS 2012), and became effective on January 3rd, 2013. The revised CH currently includes approximately 9,577,969 acres in 11 units and 60 subunits in California, Oregon, and Washington.

## Conservation Role of Critical Habitat

The role of spotted owl critical habitat is:

- To ensure sufficient habitat to support stable, healthy populations of spotted owls across the range and within each of the 11 recovery units,
- To ensure distribution of northern spotted owl habitat across the range of habitat conditions used by the species, and
- Incorporate uncertainty, including potential effects of barred owls, climate change and wildfire-disturbance risk.

Critical habitat protections are also meant to work in concert with other recovery actions such as barred owl management (USFWS 2012, p. 71879). Recovery actions include:

1. Conserve the older growth, high quality and occupied forest habitat as necessary to meet recovery goals. This includes conserving old growth trees and forests on Federal lands *wherever they are found* (emphasis added), and undertake appropriate restoration treatment in the threatened forest types.
2. 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. This includes managing Northwest Forest Plan (NWFP) forests as dynamic ecosystems that conserve all stages of forest development (e.g., old growth and early seral), and where tradeoffs between short-term and long-term risks are better balanced. The NWFP should be recognized as an integrated conservation strategy that contributes to all components of sustainability across Federal lands.
3. Encourage landscape-level planning and vegetation management that allow historical ecological processes, such as characteristic fire regimes and natural forest succession, to occur on these landscapes throughout the range of the spotted owl. This approach has the best chance of resulting in forests that are resilient to future changes that may arise due to climate change (USFWS 2012, p. 71881).

## Physical and Biological Features

Past designations of critical habitat have used the terms "primary constituent elements" (PCEs), "physical and biological features" (PBFs) or "essential features" to characterize the key components of critical habitat that provide for the conservation of the listed species. The new critical habitat regulations (USFWS and NMFS 2016) discontinue use of the terms "PCEs" or "essential features" and rely exclusively on use of the term PBFs for that purpose because that term is contained in the statute. To be consistent with that shift in terminology and in recognition that the terms PBFs, PCEs, and essential habitat features are synonymous in meaning, we are only referring 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 CH 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). The PBFs include:

1. Forest types that support the spotted owl across its geographic range. This PBF is essential to the conservation of the species because it provides the biotic communities that are known to be necessary for the spotted owl.
  - a. Includes - Sitka spruce, western hemlock, mixed conifer, mixed evergreen, grand fir, Pacific silver fir, Douglas-fir, white fir, Shasta red fir, redwood/Douglas-fir, and the moist end of ponderosa pine.
  - b. Coniferous zones at elevations up to 6000'.
  - c. This PBF must be in concert with at least one other PBF to be critical habitat.
2. Habitat for nesting and roosting. Nesting habitat is essential to provide structural features for nesting, protection from adverse weather conditions, and cover to reduce predation risks. Roosting habitat is essential to provide for thermoregulation, shelter, and cover to reduce predation risk while resting or foraging.
  - a. These habitats must provide:
    - i. Sufficient foraging habitat to meet home range needs of territorial pairs throughout the year.
    - ii. Nesting and roosting habitat (see definition above)
3. Foraging habitat is essential to provide a food supply for survival and reproduction.
  - a. Varies widely across the range in accordance with ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions
  - b. East Cascades foraging habitat
    - i. Stands of nesting or roosting habitat
    - ii. Stands of Douglas-fir or white fir/Douglas-fir mix
    - iii. Mean tree size >16.5" dbh
    - iv. Increased density of large trees (>26" dbh) and increased basal area
    - v. Large accumulations of fallen trees and other woody debris
    - vi. Sufficient space below canopy to fly
4. Habitat to support the transience and colonization phases of dispersal.
  - a. Would optimally be composed of nesting, roosting or foraging habitat but may also be composed of other forest types that occur between larger blocks of nesting, roosting, and foraging habitat
    - i. Where nesting, roosting, and foraging habitat is insufficient to support dispersal, dispersal habitat may be provided by:
      1. Habitat supporting the transience phase of dispersal
        - a. Stands with adequate tree size and canopy cover to provide protection from avian predators and minimal foraging opportunities
        - b. May include but is not limited to trees at least 11" dbh and a minimum of 40% canopy cover AND
        - c. Younger and less diverse forest stands than foraging habitat like even-aged, pole-sized stands if they contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the transience phase
      2. Habitat supporting the colonization phase of dispersal
        - a. Equivalent to nesting, roosting, and foraging habitat but may be smaller in area than that needed to support nesting pairs

### Critical Habitat in the Action Area

Of the 12,725 acres of critical habitat proposed for treatments, approximately 2,148 acres are providing only dispersal habitat (PBF 4) and 2,551 acres are providing suitable habitat for spotted owls (PBF 2, 3 and 4). The remaining 8,026 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.

### **Subunit ECN 7**

The Proposed Action is within the in 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 2,800 acres of critical habitat in treatment units.

There are approximately 57,861 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.

Special management considerations or protections are required in this subunit to address threats from current and past timber harvest, removal or modification of habitat by forest fires and the effects on vegetation from fire exclusion, and competition with barred owls. This subunit is expected to function primarily for demographic support to the overall population, as well as north-south and east-west connectivity between other subunits and critical habitat units.

### **Special Management Considerations**

Special management considerations for primary constituent elements are from the Final Critical Habitat Rule (USFWS 2012, p. 71909-71910). The following is a summary of the special management considerations for ECN 7. These management considerations will be addressed in the effects section of this document:

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.III43, III-67). On Federal lands this recommendation applies to all land use allocations;
2. Emphasize vegetation management treatments outside of northern spotted owl territories or highly suitable habitat;
3. Design and implement restoration treatments at the landscape level;
4. Retain and restore key structural components, including large and old trees, large snags, and downed logs;
5. Retain and restore heterogeneity within stands;
6. Retain and restore heterogeneity among stands;
7. Manage roads to address fire risk; and
8. Consider vegetation management objectives when managing wildfires, where appropriate.

## ***Effects Analysis***

### **Analysis Area**

The analysis area for spotted owl includes the Crystal Clear Restoration project boundary and a 1.2 mile buffer to include any territories that may overlap (Figure 63).

### **No Action Alternative**

There would be no short-term effects to spotted owl critical habitat under this alternative. In the short-term, the units that are providing dispersal habitat (PBF 4) 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.



The quality of dispersal habitat would improve only slightly in some stands while improving more in others depending on site conditions. 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. Refer to the Silviculture Specialist Report for further discussion of tree response under the No Action Alternative. 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. Refer to the Fuels Specialist Report for further discussion of wildfire impacts under the No Action Alternative.

### **Proposed Action**

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

PBF 1 is the forest types that support spotted owls. This criterion was used to identify CH affected by the Proposed Action. PBFs 2, 3, and 4 (nesting/roosting, foraging, and dispersal habitat) were specifically considered with respect to the Proposed Action to determine if they were removed, reduced, maintained or enhanced at a stand level. The analysis of impacts has both a temporal scale (would the actions delay or accelerate the development of the 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).

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

### *Effects from Vegetation Treatments*

The proposed thinning treatments would impact the PBFs at the stand scale. 895 acres of dispersal only habitat (PBF 4) would be removed in treatment units. These 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 (1,414 acres) would be downgraded to dispersal. These treatments would reduce the PDCs 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.

Some habitat would be treated but the function of that habitat would be maintained. This includes 1,127 acres of PBF 2 and PBF 3, and 1,253 acres of PBF 4. Although the habitat within these units would be temporarily reduced in quality, these treatments would accelerate the development of the PBFs in these stands by reduced competition and an increase in the growth of trees and shrubs.

Treatments on 8,026 acres of non-habitat are within plantations where tree growth has slowed. Thinning these stands would increase the rate at which larger trees would be recruited, and in turn, increasing the rate that PBFs 2 through 4 would be attained.

Because PBF 4 would be removed on 895 acres, and PBFs 2 and 3 would be downgraded on 1,414 acres, these treatment units would no longer provide or would reduce the quality of 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.

#### *Effects of Fuels Treatments*

Fuels reduction is expected to have both negative and beneficial effects to spotted owl foraging habitat (PBF 3). Treatments may impact vegetation structure and prey species distributions by reducing prey hiding cover in treatment units and/or moving prey into adjacent stands where the density may be higher than normal. However, there may be long-term benefits from a low intensity burn or mastication that is expected to increase plant vigor and prey species forage production.

Burning could also facilitate cavity creation and increase prey denning opportunities. Another expected benefit of fuels treatments is the decrease in potential for a stand replacement event in the drier forests within the eastern portion of the action area. While underburning and mastication may temporarily impact prey habitat, these treatments will not change the overall function of the habitat after treatment. Because fuel treatment activities have the potential to remove some components of PBF 3 in the short-term, these activities **may affect and are likely to adversely affect** spotted owl critical habitat.

#### *Effects from Temporary Road Construction*

The proposed project would create 4.0 miles of new temporary roads, all of which are 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. The width of temporary roads would be approximately 15 feet, and when multiplied by the length of the proposed roads equals 7.3 acres of roads in suitable habitat. While these acres represent the footprint of impacts, the actual number of acres of habitat impacts would likely be much less since roads would be placed in areas requiring the least amount of tree removal which would be more cost effective. Therefore, the above numbers represent the worst case scenario. Given that up to 7.3 acres of PBF 2 could be removed, temporary road construction **may affect, and is likely to adversely affect** spotted owl critical habitat.

#### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: Timber harvest on federal land; McCubbins Gulch OHV trail construction and maintenance, Bear Springs Plantation Thinning; utility corridor operations and maintenance. Private and Tribal lands are not CH and were therefore not considered in the cumulative effects analysis.

Timber harvest on federal land and utility corridor maintenance have reduced the amount of suitable habitat (PBF 2) on the landscape and will continue to do so into the future. Utility corridors are not expected to provide suitable habitat as they are not managed for spotted owl CH. Timber harvest on federal land have reduced the amount of all 4 PBF's 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.

#### **Consistency Determination**

The Proposed Action is consistent with the CH 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. This includes managing NWFP forests as dynamic ecosystems that conserve all stages of forest development (e.g., old growth and early seral), and where tradeoffs between short-term and long-term risks are better balanced. 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 will 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.

### ***Special Management Considerations for ECN-7***

Eight special management considerations or protections were identified for the East Cascades Critical Habitat Unit ECN-7 in the Final Critical Habitat 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 will be located between patches of this habitat which will 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 will be located between patches of this habitat which will 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 will be used to maintain these elements.

The proposed project will 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;

The proposed project will maintain a road system that will accommodate fire suppression activities and will 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.

## **Consultation**

A formal BA will be submitted to the FWS for the effects to federally listed species including northern spotted owl critical habitat. A signed Biological Opinion would be received before a final decision is signed for this project.

## **Gray Wolf**

### ***Analysis Assumptions and Methodology***

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 (Appendix A). 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).

The authors of this draft paper examined the best available information to evaluate the impacts of forest management on gray wolf range and population expansion on the Umatilla Forest. Because the management activities on both Forests are similar, it is assumed that this information would also apply to wolves that may occur on the Mt. Hood NF. This evaluation concluded that activities that took place outside of 1 mile from a den or rendezvous site would have no effect on gray wolf.

### ***Existing Condition***

Gray wolves (*Canis lupus*) were reintroduced in the mid-1990s in central Idaho and Yellowstone National Park and then dispersed naturally into Oregon. In 2008 the first wolf pack was confirmed in Oregon on the Umatilla National Forest by Oregon Department of Fish and Wildlife (ODFW) biologists. In May 2001, the FWS delisted wolves in Idaho, Montana, parts of Oregon, Washington, and Utah. In December 2015 the ODFW removed the gray wolf from its endangered species list because the wolf had met the state's population criteria for delisting. Wolves in Oregon west of Hwy 395 remain protected by the federal Endangered Species Act. The FWS is the lead management agency for wolves west of Hwy 395, including those that may be on the Forest.

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.

Status and Trend of Gray Wolves and Forest Management on the Umatilla National Forest). The authors of this draft paper examined the best available information to evaluate the impacts of forest management on gray wolf range and population expansion on the Umatilla Forest. Because the management activities on both Forests are similar, it is assumed that this information would also apply to wolves that may occur on the Mt. Hood NF.

## **Effects Analysis**

### **Analysis Area**

The analysis area for gray wolves includes the planning area boundary and a one mile buffer.

### **No Action Alternative**

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. The possibility of a wolf den or rendezvous site remaining undetected in the vicinity of the project area is extremely unlikely because of the vocal nature of wolf packs and the amount of human activity that takes place on this part of the Forest. , Project related activities would increase human presence during implementation and this may cause wolves to temporarily avoid the area. Thinning and fuels reduction activities would increase forage for deer and elk which are the primary prey species of gray wolves. 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.

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal lands, road decommissioning and road closures, pre-commercial thinning, and Bear Springs plantation thinning.

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.

### **Consistency Determination**

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

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

### **Consultation**

A formal BA will be submitted to the FWS for the effects to federally listed species including gray wolf. A signed Biological Opinion would be received before a final decision is signed for this project.

## Oregon Spotted Frog

### *Analysis Assumptions and Methodology*

#### *Existing Condition*

##### *Habitat*

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).

Oregon spotted frogs breed in shallow pools ( $\leq 14$  in deep) that are near flowing water, or which are connected to larger bodies of water during seasonally high water or at flood stage. After breeding, during the dry season, Oregon spotted frogs move to deeper, permanent pools or creeks (Watson *et al.* 2003). They are often observed near the water's surface basking and feeding in beds of floating and submerged vegetation (Watson *et al.* 2003, Pearl *et al.* 2005).

Known overwintering sites are associated with flowing systems, such as springs and creeks, that provide well oxygenated water (Hallock and Pearson 2001, Tattersall and Ultsch 2008) and sheltering locations protected from predators and freezing (Watson *et al.* 2003). Oregon spotted frogs apparently burrow in mud, silty substrate; clumps of emergent vegetation; woody accumulations within the creek; and holes in creek banks when inactive during periods of prolonged or severe cold (Watson *et al.* 2003, Hallock and Pearson 2001, McAllister and Leonard 1997). This species remains active during the winter and selects microhabitats that can support aerobic metabolism and minimize exposure to predators (Hallock and Pearson 2001, Hayes *et al.* 2001, Tattersall and Ultsch 2008).

##### *Range*

Historically, the Oregon spotted frog ranged from British Columbia to the Pit River basin in northeastern California (Hayes 1997, McAllister and Leonard 1997). Oregon spotted frogs have been documented at 61 historical localities in 48 watersheds (3 in British Columbia, 13 in Washington, 29 in Oregon, and 3 in California). Currently, the Oregon spotted frog is found from extreme southwestern British Columbia south through the Puget Trough and in the Cascades Range from south-central Washington at least to the Klamath Basin in southern Oregon. Oregon spotted frogs occur in lower elevations in British Columbia and Washington and are restricted to high elevations in Oregon (Pearl *et al.* 2009). In addition, Oregon spotted frogs currently have a very limited distribution west of the Cascade crest in Oregon, are considered to be extirpated from the Willamette Valley in Oregon (Cushman *et al.* 2007), and may be extirpated in the Klamath and Pit River basins of California (Hayes 1997). When viewed at the range-wide scale, the Oregon spotted frog has been extirpated from most of its historical range.

In Oregon, Oregon spotted frogs are known to occur only within eight subbasins: Lower Deschutes River, Upper Deschutes River, Little Deschutes River, McKenzie River, Middle Fork Willamette, Upper



Klamath, Upper Klamath Lake, and the Williamson River. The Oregon spotted frogs in most of these sub-basins are isolated from frogs in other sub-basins, although Oregon spotted frogs in the lower Little Deschutes River are aquatically connected with those below Wickiup Reservoir in the Upper Deschutes River sub-basin.

There is one small population of Oregon spotted frogs on the Forest at Camas Prairie, an 82-ac 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.

### **Threats**

Large historical losses of wetland habitat have occurred across the range of the Oregon spotted frog. Wetland losses are estimated from between 30 to 85 percent across the species' range with the greatest percentage lost having occurred in British Columbia. These wetland losses have directly influenced the current fragmentation and isolation of remaining Oregon spotted frog populations.

In several riparian zones and wetland complexes in British Columbia, Washington, and Oregon, livestock grazing occurs within Oregon spotted frog habitat, although its effects vary with the site conditions, livestock numbers, timing, and intensity. Livestock (primarily horses and cows) can cause direct mortality by trampling adult frogs (Ross *et al.* 1999) and egg masses when livestock are allowed in shallow water habitat when frogs are present. Livestock graze and trample emergent and riparian vegetation, compact soil in riparian and upland areas, and reduce bank stability, which results in increased sedimentation and water pollution through animal waste. (Hayes 1997, Hayes 1998, 61 FR 25813). The resulting increases in temperature and sediment production, alterations to stream morphology, effects on prey organisms, and changes in water quality negatively affect Oregon spotted frog habitat. Livestock trampling compacts affected soils and decreases soil porosity, which results in reduced water holding capacity (Kauffman and Krueger 1984). Livestock also act as vectors for the introduction of weed seeds that alter riparian vegetation characteristics (Belsky and Gelbard 2000), and they are a source of introduced parasites and pathogens.

### **Effects Analysis**

#### **Analysis Area**

The analysis area for Oregon spotted frogs includes Camas Prairie and a one mile buffer around the prairie which would include all upstream waters.

#### **No Action Alternative**

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.

Roads and roads converted to trails with impaired drainage will continue to contribute sediment to streams in the project area. Current high road and trail densities would continue for all of the analysis area, resulting in continued bank instability and fine sediment in streams. See the Water Quality Report for further discussion on impacts to water temperature and sediment delivery.

## **Proposed Action**

### ***Stream Temperature***

Vegetation removal near water bodies has the potential of increasing solar radiation to surface water which in turn may increase water temperature. The Proposed Action does not include any treatments, including prescribed fire, within the Riparian Reserves. The fire may; however, back down into the very outer portions of the Riparian Reserves, but lighting is not allowed within the Riparian Reserve itself. No tree mortality is 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 will not be treated, Riparian Reserves will continue to have substantial fuel loads in areas where they currently have substantial fuel loads, resulting in continued susceptibility to affects from wildfire. Because the primary shade width recommendations are being met or exceeded in the Sufficiency Analysis, treatments associated with the CCR Project are not expected to have a measureable effect on existing stream temperatures including those that feed into Camas Prairie.

### ***Sediment***

Some ground disturbing activities in this alternative 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. See the Soils Report for a detailed discussion of soil erosion and sedimentation. According to the soils analysis, the risk of erosion and potential sediment delivery are expected to be small due to maintaining protective groundcover along with implementation of Best Management Practices or Project Design Criteria. Fuel treatment activities that utilize fire are not expected to introduce additional sediment into surface water.

### ***Flow Analysis***

An analysis of potential changes in peak flow were conducted (see Water Quality Report.) Under the Proposed Action, the watershed impact area (WIA) percentages for the planning area would all be below the maximum of 35 percent. A more site specific analysis was conducted to assess potential changes to peak flows entering Camas Prairie. 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.

### ***ESA Determination***

There are no activities directly adjacent to Camas Prairie, and there are no proposed treatments that would remove vegetation and increase water temperature, or increase the amount of sediment reaching the meadow. The WIA percentage for flows entering Camas Prairie would increase slightly (0.5 percent). All treatment units except unit 473 are more than 0.25 miles from the meadow and are within drainages that flow away from Camas Prairie. Unit 473 is north of the meadow by 850 feet and 500 feet from the springs that feed into the meadow. This unit is in an unmanaged stand and currently has 80 percent canopy cover. The proposed prescription would reduce the canopy cover to 50 percent. All appropriate buffers and BMPs would be implemented. There are no treatments in any habitat that provides for cover, shelter, breeding, or rearing for Oregon spotted frogs. 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.

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: noxious weed treatments and the White River grazing allotment. Weed treatments could 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 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. Frogs may overwinter in the springs adjacent to the meadow but cattle are on present in the allotment during the winter months.

### **Consistency Determination**

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

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

## **Oregon Spotted Frog Critical Habitat**

### **Analysis Assumptions and Methodology**

The FWS published a final regulation with a new definition of destruction or adverse modification on February 11, 2016 (81 FR 7214), which became effective on March 14, 2016. 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 significantly delay development of such features.

### **Existing Condition**

#### **Legal Status**

On May 11, 2016, the Final Rule for spotted owl critical habitat (CH) was published (USFWS 2016), and became effective on June 10, 2016. The rule includes 365,038 acres and 20.3 river miles in 14 units within the boundaries of the CH designation.

Critical habitat is defined as the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features essential to the conservation of the species, and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

#### **Physical and Biological Features**

In determining which areas within the geographical area occupied by the species at the time of listing to designate as critical habitat, the FWS considers the physical or biological features essential to the

conservation of the species and which may require special management considerations or protection. These include, but are not limited to: (1) Space for individual and population growth and for normal behavior; (2) Food, water, air, light, minerals, or other nutritional or physiological requirements; (3) Cover or shelter; (4) Sites for breeding, reproduction, or rearing (or development) of offspring; and (5) Habitats that are protected from disturbance or are representative of the historical, geographical, and ecological distributions of a species.

#### ***Space for Individual and Population Growth***

Based on the habitat needs of the species, the physical or biological features needed by Oregon spotted frogs to provide space for their individual and population growth and for normal behavior: (1) Perennial bodies of water (such as, but not limited to springs, ponds, lakes, and sluggish streams) or other water bodies that retain water year round (such as irrigation canals or roadside ditches) with a continuum of vegetation densities along edges; (2) a gradual topographic gradient that enables movement out of shallow egg-laying sites into deeper, more permanent water; and, (3) barrier-free movement corridors.

#### ***Food, Water, Air, Light, Minerals***

The following physical or biological features are needed by Oregon spotted frogs to provide for their nutritional and physiological requirements: (1) Sufficient quality of water to support habitat used by Oregon spotted frogs (including providing for a sufficient prey base); (2) absence of competition from introduced fish and bullfrogs; and (3) shallow (warmer) water.

#### ***Cover and Shelter***

The following physical or biological features needed by Oregon spotted frogs to provide for their cover and shelter requirements: (1) Permanent fresh water bodies, including natural and manmade, that have greater than 50 percent surface water with floating and shallow subsurface vegetation during the summer, and that are hydrologically connected via surface water to breeding and rearing habitat; (2) permanent fresh water bodies, including natural and manmade, that hold water from October to March and are hydrologically connected via surface water to breeding and rearing habitat; (3) physical cover from avian and terrestrial predators, and lack of predation by introduced fish and bullfrogs; and (4) refuge from lethal overwintering conditions (freezing and anoxia).

#### ***Sites for Breeding, Reproduction, or Rearing of Offspring***

The following physical or biological features needed by Oregon spotted frogs to provide for sites for reproduction, or rearing (development) of offspring: (1) Standing bodies of fresh water, including natural and manmade ponds, slow-moving streams or pools within streams, and other ephemeral or permanent water bodies that typically become inundated during winter rains and hold water for a minimum of 4 months (from egg laying through metamorphosis); (2) shallow (less than or equal to 12 in) water areas (shallow water may also occur over vegetation that is in deeper water); (3) a hydrological connection to a permanent water body; (4) gradual topographic gradient; (5) emergent wetland vegetation (or vegetation that can mimic emergent vegetation via manipulation, for example reed canary grass that can be mowed); and (6) full solar exposure.

#### ***Habitats Protected From Disturbance***

The following physical or biological features are needed by Oregon spotted frogs to provide habitats protected from disturbance and representative of the historical, geographic, and ecological distribution: (1) Wetted corridors within 3.1 mi (5 km) of breeding habitat that are free of barriers to movement, and (2) a diversity of high-quality habitats across multiple sub-basins throughout the geographic extent of the species' range sufficiently representing the major genetic groups.

### **Primary Constituent Elements**

Under the Act and its implementing regulations, the FWS is required to identify the physical or biological features essential to the conservation of the Oregon spotted frog in areas occupied at the time of listing, focusing on the features' PCEs. PCEs are those specific elements of the physical or biological features that provide for a species' lifehistory processes and are essential to the conservation of the species.

Based on our current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, we determine that the PCEs specific to the Oregon spotted frog are:

(1) PCE 1—Nonbreeding (N), Breeding (B), Rearing (R), and Overwintering Habitat (O). Ephemeral or permanent bodies of fresh water, including but not limited to natural or manmade ponds, springs, lakes, slow-moving streams, or pools within or oxbows adjacent to streams, canals, and ditches, that have one or more of the following characteristics:

- Inundated for a minimum of 4 months per year (B, R) (timing varies by elevation but may begin as early as February and last as long as September);
- Inundated from October through March (O);
- If ephemeral, areas are hydrologically connected by surface water flow to a permanent water body (*e.g.*, pools, springs, ponds, lakes, streams, canals, or ditches) (B, R);
- Shallow-water areas (less than or equal to 30 centimeters (12 inches), or water of this depth over vegetation in deeper water (B, R);
- Total surface area with less than 50 percent vegetative cover (N);
- Gradual topographic gradient (less than 3 percent slope) from shallow water toward deeper, permanent water (B, R);
- Herbaceous wetland vegetation (*i.e.*, emergent, submergent, and floating leaved aquatic plants), or vegetation that can structurally mimic emergent wetland vegetation through manipulation (B, R);
- Shallow-water areas with high solar exposure or low (short) canopy cover (B, R);
- An absence or low density of nonnative predators (B, R, N)

(2) PCE 2—Aquatic movement corridors. Ephemeral or permanent bodies of fresh water that have one or more of the following characteristics:

- Less than or equal to 3.1 mi (5 km) linear distance from breeding areas;
- Impediment free (including, but not limited to, hard barriers such as dams, impassable culverts, lack of water, or biological barriers such as abundant predators, or lack of refugia from predators).

(3) PCE 3—Refugia habitat. Nonbreeding, breeding, rearing, or overwintering habitat or aquatic movement corridors with habitat characteristics (*e.g.*, dense vegetation and/or an abundance of woody debris) that provide refugia from predators (*e.g.*, nonnative fish or bullfrogs).

### **Critical Habitat in the Project Area**

There are 14 separate units designated as CH and the Lower Deschutes River unit (unit 7) is within the CCR planning area. The Lower Deschutes River unit consists of 90 acres and includes Camas Prairie and Camas Creek, a tributary to the White River, and occurs entirely on the Forest (Figure 64). 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 vegetation succession (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.

## ***Effects Analysis***

### **Analysis Area**

The analysis area for Oregon spotted frog critical habitat includes Camas Prairie and a one mile buffer around the prairie which would include all upstream waters.

### **No Action Alternative**

The PCE's and physical and biological features for Oregon spotted frog critical habitat would not be impacted under this alternative. 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 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 which could increase sediment and water temperature.

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 which would impact PCE's 1, 2, and 3. Roads and roads converted to trails with impaired drainage will continue to contribute sediment to streams in the project area (PCE's 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 (PCE's 1 and 2). See the Water Quality Report for further discussion on impacts to water temperature and sediment delivery.

### **Proposed Action**

#### ***Stream Temperature***

Vegetation removal near water bodies has the potential of increasing solar radiation to surface water which in turn may increase water temperature (PCE's 1, 2, and 3). The Proposed Action does not include any treatments, including prescribed fire, within the Riparian Reserves. The fire may, however, back into the very outer portions of the Riparian Reserves, but lighting is not allowed within the Riparian Reserve itself. No tree mortality is expected from implementation of the Proposed Action in the larger, shade producing vegetation adjacent to streams, so stream shading (PCE's 1, 2, and 3) would be maintained. Since Riparian Reserves will not be treated, Riparian Reserves will continue to have substantial fuel loads, resulting in continued susceptibility to effects from wildfire. Because the primary shade width recommendations are being met or exceeded in the Sufficiency Analysis, treatments associated with the CCR Project are not expected to have a measureable effect on existing stream temperatures including those that feed Camas Prairie.



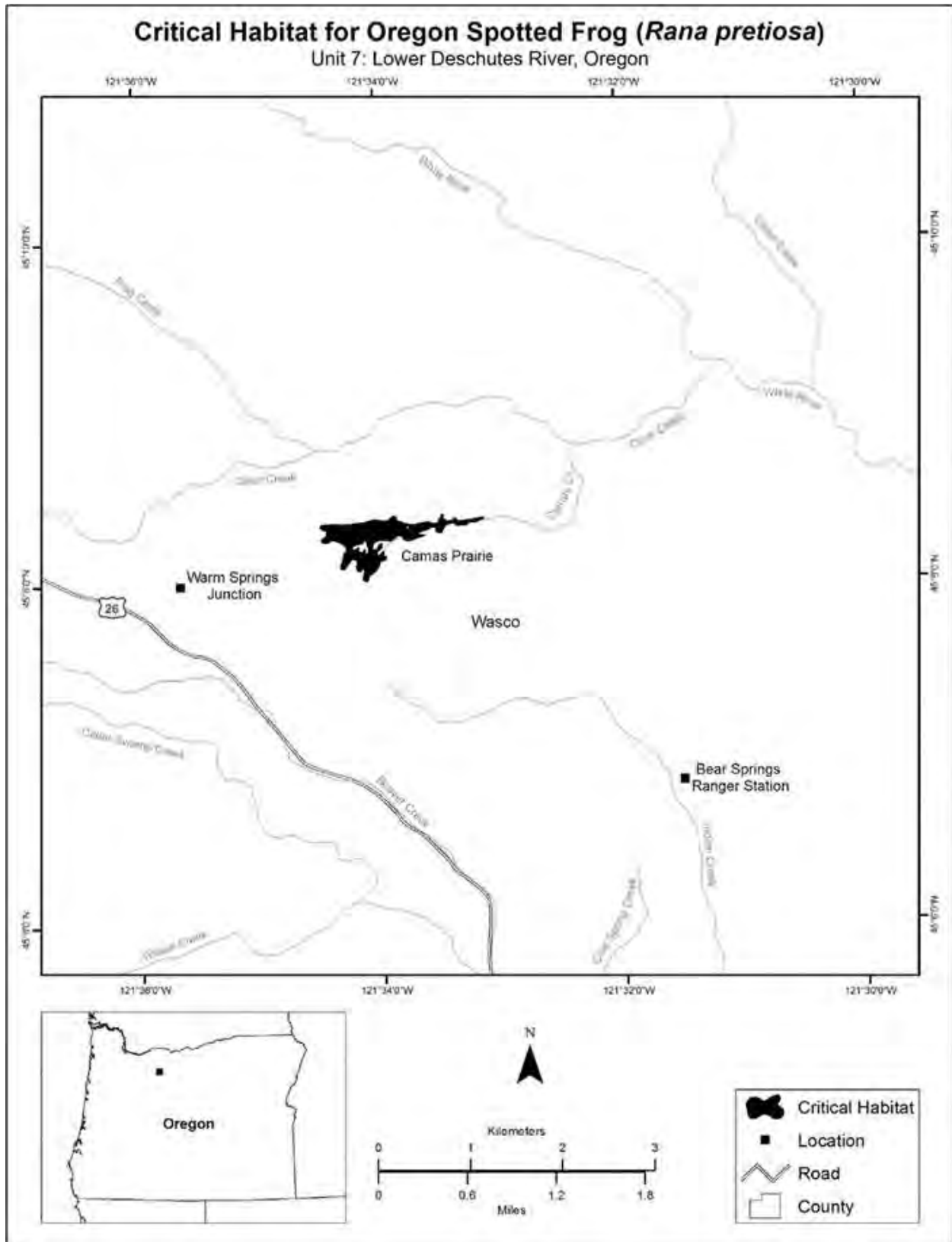


Figure 64. Location of Critical Habitat Unit 7

### **Sediment**

Some ground disturbing activities in this alternative 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. See the Soils Report for a detailed discussion of soil erosion and sedimentation. 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 Best Management Practices (BMP) or Project Design Criteria (PDC) as they are referred to in the EA. Fuel treatment activities that utilize fire are not expected to introduce additional sediment into surface water. There are no activities adjacent to Camas Prairie that would increase the amount of sediment reaching the meadow and therefore all PCE's would be maintained.

### **Flow Analysis**

An analysis of potential changes in peak flow was conducted (see Water Quality Report). Under the Proposed Action, the watershed impact area (WIA) percentages for the planning area would all be below the maximum of 35 percent. A more site specific analysis was conducted to assess potential changes to peak flows entering Camas Prairie. The model results for Camas Prairie indicate that under the Proposed Action, the current WIA 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.

### **ESA Determination**

There are no activities directly adjacent to Camas Prairie that would remove vegetation, and there are no proposed treatments upstream that would remove vegetation and increase water temperature, or increase the amount of sediment reaching the meadow. The WIA percentage for flows entering Camas Prairie would increase slightly (0.5 percent). All treatment units except unit 473 are more than 0.25 miles from the meadow and are within drainages that flow away from Camas Prairie. Unit 473 is north of the meadow by 850 feet and 500 feet from the springs that feed into the meadow. This unit is in an unmanaged stand and currently has 80 percent canopy cover. The proposed prescription would reduce the canopy cover to 50 percent. All appropriate buffers and BMPs would be implemented. 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.

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: noxious weed treatments and the White River grazing allotment. 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 this critical habitat unit until further studies can be conducted in order to determine the appropriate use of cattle as a management tool for this unit.

### **Consistency Determination**

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

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

- FW 177 & 178: Consultation with the USFWS shall occur on each program activity or project that the Forest Service determines may affect threatened or endangered species. Consultation shall be completed before any decision is made on the proposed project.

### 3.9.3 Region 6 Sensitive Species

#### Bald Eagle

##### *Analysis Assumptions and Methodology*

All Region 6 sensitive species within the project area must be analyzed in a Biological Evaluation, as required by the Forest Plan. Sensitive species with suitable habitat within the project area include bald eagle, white-headed woodpecker, fringed myotis, western bumblebee, and Johnson’s hair-streak. 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.

During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully in close proximity to human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in Table 84.

**Table 84. 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. Activities that

cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves.

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 MBTA and the Eagle Act protect bald eagles from a variety of harmful actions and impacts. The U.S. Fish and Wildlife Service developed National Bald Eagle Management Guidelines (USFWS 2007) to advise land managers when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. The Guidelines are intended to help minimize impacts to bald eagles, particularly where they may constitute disturbance, which is prohibited by the Eagle Act.

Disturbance as 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.”

In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles are not present, if upon the eagles return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

## ***Existing Condition***

### **Habitat and Nesting**

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags; cliffs; rarely on the ground; and with increasing frequency on human-made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nests typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags provide the visibility and accessibility needed to locate aquatic prey.

Breeding bald eagles occupy territories that average 1 to 2 square miles. They will typically defend these territories against intrusion by other eagles. In addition to the active nest, a territory may include one or more alternate nests that are built or maintained by the eagles but not used for nesting in a given year. Bald eagles exhibit high nest site fidelity and nesting territories are often used year after year.

Nesting building activities begin in December or January in the Pacific Northwest. Egg-laying dates may vary from February to early April and incubation typically lasts 33 to 35 days. Eaglets make their first flights about 10 to 12 weeks after hatching and leave their nests within a few days after that first flight. Young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later.

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.

## **Effects Analysis**

### **Analysis Area**

The analysis area for bald eagles includes a one mile buffer around Clear Lake which would include any potential nest site in the planning area.

### **No Action Alternative**

Under this alternative, 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**

The Proposed Action has the potential to impact bald eagles by disrupting nesting or foraging behavior. Chainsaw use and burning in close proximity to the nest could cause the eagles to abandon the nest or change their foraging behavior, depending on the time of year these activities take place. 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. This timing restriction would reduce the possibility of disrupting the nesting eagles which would in turn reduce the chance of nest abandonment or exposure of the eaglets to extreme weather or predation. Because the territory of the bald eagle is so large, foraging opportunities would still exist in other areas during project implementation. Therefore, this project would not impact the pair's ability to successfully forage and provide food for their young.

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. Some areas adjacent to the lake would remain untreated which would continue to provide for nesting opportunities.

The proposed project **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.

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: Timber harvest on federal and tribal lands; road decommissioning and road closures; developed and dispersed campsites operations and maintenance.

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.

### **Consistency Determination**

The proposed project is consistent with the Eagle Act, the MBTA, the Mt. Hood Forest Plan Standards and Guidelines 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.

### **White-headed Woodpecker**

#### **Analysis Assumptions and Methodology**

All Region 6 sensitive species within the project area must be analyzed in a Biological Evaluation, as required by the Forest Plan. Sensitive species with suitable habitat within the project area include bald eagle, white-headed woodpecker, fringed myotis, western bumblebee, and Johnson's hair-streak. 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.

#### **Existing Condition**

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

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

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

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

Nest trees of White-headed woodpeckers are typically large, moderately decayed, ponderosa pine snags. In Oregon and Washington, 6 separate studies indicate average nest tree dbh of 15 to 40 inches dbh. Wightman et al. (2010) found nest survival rates were higher in burned areas than nest success reported for unburned forests in central Oregon. Wightman et al. (2010) also found white-headed woodpeckers selected for nest snags >20 inches dbh from unburned or low severity burned areas that contained live trees.

Table 85 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 tolerance level and 30 percent tolerance level for large snags.



**Table 85. 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. For white-headed woodpeckers, 80 percent of this species uses habitat with  $\leq 3.8$  large snags per acre and  $\leq 4.3$  small snags per acre. In the planning area, 50 percent of the white headed woodpeckers would use the available small snags (2.0 per acre) and 30 percent would use the available large snags ( $< 1$  per acre). The current snags per acre are shown in Table 87 and Table 88 under the DecAID analysis.

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

The golden-mantled ground squirrel and yellow pine chipmunk are known nest predators. Golden-mantled ground squirrels are positively associated with down wood volume and yellow pine chipmunks are positively associated with shrub cover (Wightman et al. 2010).

Hollenbeck et al. (2011) developed a habitat suitability index model for unburned forests of central and southeastern Oregon. Based on this model, there are 2,887 acres of highly suitable habitat, 5,357 acres of marginally suitable habitat, and 1,010,461 acres of non-habitat for white-headed woodpecker on the Forest. 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.

### Threats

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

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

### Landbird Conservation Strategy

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

Management considerations should focus on white-headed woodpecker habitats on public lands which are primarily, low-elevation, dry forests with a component of large ponderosa pine. In Oregon and Washington, the vast majority of habitat for this species is on National Forest System lands. Private, State, and City lands are not managed for woodpecker habitat, therefore, it is assumed that any habitat currently present in those areas, would not be maintained for the long term. Management considerations should include spatial heterogeneity at the landscape scale that mimics historical conditions.

## **Effects Analysis**

### **Analysis Area**

The analysis area for white-headed woodpeckers includes the eastern portion of the planning area (from the 2130 rd.) that lies within the project boundary.

### **No Action Alternative**

Under the No Action alternative, open large ponderosa pine habitat would remain limited, which is important nesting habitat for this species. In the short-term, the analysis area would continue to provide snags at the 30 and 50 percent tolerance levels for large and small snags for white-headed woodpeckers. Snags would be recruited more quickly under this alternative as shown in Tables 11 and 12. The 80 percent tolerance level for large snags (3.5 snags per acre) would be achieved within 80 years under this alternative and within 10 years for small snag (4.3 snags per acre).

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. White-headed woodpeckers prefer to nest lower on large diameter trees and favor open conditions to be able to escape predators and defend their young, and this habitat would not be provided under current conditions. The number of white-headed woodpeckers in the analysis area would continue to be lower than historic levels.

### **Proposed Action**

Vegetative and fuel treatments on 6,797 acres under the Proposed Action 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. Areas of no treatment adjacent to treated stands would provide a mosaic of open habitat for nesting in close proximity to closed-canopy forests which provide foraging habitat for this species. Fuels treatments that reduce the amount of shrubs would also reduce habitat for golden-mantled ground squirrels and yellow pine chipmunk, which are known nest predators of white-headed woodpeckers.

In the short-term, the analysis area would continue to provide snags at the 30 and 50 percent tolerance levels for large and small snags for white-headed woodpeckers. Over the long-term, snags would be recruited more slowly under this alternative as shown in Tables 13 and 14. The 80 percent tolerance level for large snags (3.8 snags per acre) would not be achieved within 100 years under this alternative but would be achieved for small snags (4.3 snags per acre) within 50 years.

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. The analysis area currently provides marginal habitat for 6 to 7 pairs of white-headed woodpeckers. Under the Proposed Action, 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.** Large snags and large down wood would not be impacted by the Proposed Action. While snags within this habitat type are below historic levels at the watershed scale (see DecAID analysis), white-

headed woodpeckers do not appear to rely on these high density patches and may rely more on the presence of large ponderosa pine.

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal land, pre-commercial thinning, Bear Springs Plantation Thinning, and fire suppression. 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.

### **Consistency Determination**

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.

### **Fringed Myotis**

#### ***Analysis Assumptions and Methodology***

All Region 6 sensitive species within the project area must be analyzed in a Biological Evaluation, as required by the Forest Plan. Sensitive species with suitable habitat within the project area include bald eagle, white-headed woodpecker, fringed myotis, western bumblebee, and Johnson's hair-streak. 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.

#### ***Existing Condition***

##### **Distribution and Habitat**

The fringed myotis is predominantly found in western North America, occurring from southern British Columbia, Canada (where it is only known from a few animals), south through southern Mexico (O'Farrell and Studier 1980, Hall 1981, Rasheed et al. 1995). It occurs west to the Pacific coast and east to the Rocky Mountains.

Fringed myotis appear to use a fairly broad range of habitats (Cryan 1997). 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. This can take a variety of forms, where open areas are likely represented by short and mixed-grass prairie, sagebrush and other xeric shrublands and forests, including a variety of low and mid-elevation pine and mixed-conifer types. Ideal habitat includes nearby water sources and suitable cliff or snag roost habitat.

## Roost Sites

Suitable roosting sites are an important habitat component, the availability of which can determine population sizes and distributions (Humphrey 1975, Kunz 1982). Throughout their range, fringed myotis use caves, mines, and buildings as maternity colonies, solitary day and night roosts, and hibernacula (O'Farrell and Studier 1980, Perkins et al. 1990, Ellison et al. 2004). They also use bridges and rock crevices as solitary day and night roosts (Brown and Berry 1998, Herder 1998), and they may hibernate in crevices (Christy and West 1993). They regularly roost underneath bark and inside hollows of tree snags, particularly ponderosa pine and Douglas-fir in medium stages of decay (Chung-MacCoubrey 2001, as cited in Cryan 1997). This may represent the primary daytime roosting structure in some areas.

The best habitat model for predicting bat presence in an area contained only these variables (the number of snags  $\geq 30$  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). In such circumstances, fringed myotis have been known to switch roosts several times a week (e.g., every  $1.72 \pm 0.23$  days; Weller and Zabel 1999). Roost snags also tended to be taller relative to the surrounding canopy than random snags, had a higher diameter at breast height than random snags, and were nearer to stream channels than randomly selected points. Since *M. thysanodes* tended to roost under loose bark, most roost snags were in decay classes 2 to 4 (Thomas et al. 1979). Roost snags were Douglas-fir, ponderosa pine, and sugar pine used in approximate proportion to their availability, and the largest snags in the study area were predominantly Douglas-fir.

## Foraging

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). Early studies (Black 1974, Banfield 1975) speculate that fringed myotis hunt insects on the wing, usually over vegetative canopy from sunset until midnight. However, their wing morphology is indicative of dexterous, low-speed flight suggesting that these bats may glean insects from vegetation (O'Farrell and Studier 1980), probably near the top of the forest canopy (Miner et al. 1996). 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.

## Effects Analysis

### Analysis Area

The analysis area for the fringed myotis includes the eastern portion (from the 2130 rd.) that lies within the project boundary.

### No Action Alternative

Under the No Action alternative, fringed myotis roosting and foraging habitat would not be impacted. There is no hibernacula or mines in the analysis area. Canopy closures would remain unchanged. 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. Vegetative and fuel treatments on 6,797 acres under the Proposed Action 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. Areas of no treatment adjacent to treated stands would create a mosaic of open habitat that would also improve foraging habitat for this species. Thinning would reduce the number of large snags in the analysis area over the long-term from 5 snags over 25 inches DBH in 100 years to 3 snags over 25 inches DBH in the same time frame (see DecAID analysis). 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.**

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal land, pre-commercial thinning, Bear Springs Plantation Thinning, hazard tree removal, and campsite operations and maintenance. 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 will continue to remove large snags that provide important roosting habitat.

### **Consistency Determination**

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

### **Western Bumblebee**

#### ***Analysis Assumptions and Methodology***

See “Analysis Assumptions and Methodology” section under Bald Eagle.

#### ***Existing Condition***

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

## **Life History**

According to Goulsen (2003a), bumblebee colonies are annual. In the late winter or early spring, the queen emerges from hibernation and then selects a nest site, which is often a pre-existing hole, such as an abandoned rodent hole. She then supplies the nest with pollen as well as nectar, which she stores in a wax pot formed by wax secreted by specialized glands. The queen then starts her new colony by laying between 8 and 16 eggs in her first batch, which she then incubates until hatching. The young feed upon the food mass provided by the queen and subsequent feedings are provided by the queen regurgitating food from her crop. After feeding has been completed, the young pupate in cocoons spun from silk. The queen ceases to forage within a few days of the workers' emergence and then focuses upon increasing the colony's population. Male bumblebees develop from unfertilized eggs and females develop from fertilized eggs. According to Thorp et al. (1983), around the time that the number of workers equal or outnumber the brood to be fed, some unfertilized eggs have been laid, which would develop into males, while fertilized eggs become new queens. Young queens may assist with some household activities before leaving the hive to mate with the male drones. After mating, the queen then digs a hole in which she would hibernate through the winter. The rest of the colony including the old queen, workers and males die out.

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

## **Threats**

There are several threats which face bumblebees and are leading to their decline. The following threats and conservation considerations are from a status review, co-authored by Robbin Thorp, Elaine Evans, and Scott Hoffman (Thorp et al. 2008). Agriculture and urban development alter landscapes and habitat required by bumblebees while grazing livestock poses a threat since the animals remove flowering food sources, disturb nest sites and alter the vegetation community. Foraging bumble bees are directly threatened by insecticide applications when used in agricultural settings. Massive bumble bee kills have occurred as a result of insecticide application on Forest Service managed public lands intended for the control of spruce budworm. Bumble bees can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides. When exotic plants invade and dominate native grasslands, they may threaten bumble bees by competing with the native nectar and pollen plants relied upon by bumble bees.

## **Surveys on the Forest**

Surveys for Western bumblebees 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. No Western bumbles have been found in the project area but suitable habitat exists and detections were made adjacent to the project area at Little Crater Lake and Jackpot Meadow.

## **Effects Analysis**

### **Analysis Area**

The analysis area for Western bumblebee includes the Crystal Clear Project boundary.

### **No Action Alternative**



Under the No Action alternative, there would be no direct impacts to bumble bee nesting, foraging, and over-wintering habitat. There would be fewer flowering plants for foraging under this alternative in the long-term since canopies would remain closed and less sunlight would reach the forest floor which is required for the growth of most nectar plants.

### **Proposed Action**

The proposed project may temporarily impact flowering plants during road maintenance, road construction, fuels treatments, and timber harvest activities. Reducing this food source would reduce the ability of foraging bees to find nectar at these sites which is a required food source for young bees. It is expected that these shrubs would regenerate within a few years and that the bumblebees would have other nectar plants available within the untreated open portions of the project area.

The proposed project may temporarily impact nest sites if these nests are located within abandoned bird nests or other structures above ground. Tree harvest and temporary road construction activities could reduce the number of nests available in the short-term and therefore reduce the number of bumblebees that this area could support. Nest sites would increase within a few years after treatment. The temporary reduction in flowering shrubs and nesting sites **may impact individuals, but will not likely contribute to a trend towards federal listing or cause a loss of viability of the population or species.**

The approximate total number of acres impacted (including road maintenance and construction of temporary roads) would not exceed 525 acres since most of the treatment units are heavily timbered and do not provide foraging habitat or nest sites. This impact represents approximately 2.1 percent of the Forest Service owned lands within the analysis area. While the number of bees in the project area may be slightly reduced, this reduction would be temporary as flowering shrubs and nest sites increase within a few years after treatments.

Because bumblebees 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 watershed would also continue to provide for nesting and hibernating habitat. The adjacent untreated areas would allow for bumblebees to recolonize the impacted acres within the treatment area as foraging and nesting habitat return. Between 2 and 10 years after treatments, there would be an increase in flowering plants for foraging compared to the no action alternative since canopies would be more open and more sunlight would reach the forest floor which is required for the growth of most nectar plants.

### **Cumulative Effects**

The following list of past, present, and reasonably foreseeable future projects overlap the analysis area in time and space and were considered in the cumulative effects analysis: timber harvest on federal lands, road decommissioning and road closures, McCubbins Gulch OHV trail construction and maintenance, pre-commercial thinning, noxious weed treatments, Bear Springs plantation thinning, and the White River grazing allotment.

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 bumblebees by improving habitat for native flowering plants, bees 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 construction and maintenance and livestock grazing reduces the amount of foraging and nesting habitat. Livestock grazing poses a threat since the animals remove flowering food sources, disturb nest sites and alter the vegetation community.

Habitat alterations including those that could destroy, fragment, alter, degrade or reduce the food supply produced by flowers as well as destruction of nest sites and hibernation sites for overwintering queens,

such as abandoned rodent burrows and bird nests, adversely affect these bees. Large scale ground disturbing activities alter landscapes and habitat required by bumble bees by removing flowering food sources, disturbing nest sites and altering the vegetation community. The size of bumble bee populations diminish and inbreeding becomes more common as habitats become fragmented. This in turn, decreases the genetic diversity and increases the risk of population decline.

While the projects analyzed under cumulative effects may have impacts to individual bumble bees, the main threats to this species are agriculture and urban development, livestock grazing, and broad scale insecticide application (Thorp et al. 2008). These kinds of activities are not included in the 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.

### **Consistency Determination**

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

### **Johnson's Hairstreak**

#### **Analysis Assumptions and Methodology**

See "Analysis Assumptions and Methodology" section under Bald Eagle.

#### **Existing Condition**

##### **Habitat**

Johnson's hairstreak occurs within coniferous forests which contain the mistletoes of the genus *Arceuthobium*, commonly referred to as dwarf mistletoe. These plants are highly specialized and are known to occur on a number of different conifers (Schmitt and Spiegel 2008). 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. Ecoregions where this species occurs in Oregon, as determined by the Oregon Biodiversity Information Center include the Ochoco, Blue and Willowa Mountains, Coast Range, East Cascades, Klamath Mountains, West Cascades and the Willamette Valley.

##### **Life History**

Larvae can be found feeding on dwarf mistletoe (Opler and Wright 1999). Caterpillars feed on all exposed plant parts and secrete a sugary solution which is used by ants that in turn protect the caterpillar from predators. Caterpillars can be found on host leaves April-October (Allen et al. 2005). Nectar of flowers in several families from numerous genera including *Actostophylos*, *Ceanothus*, *Cornus*, dandelion, *Fragaria*, *Rorippa* and *Spraguea* is consumed by adult butterflies who obtain additional moisture by visiting mud puddles (Shields 1965). In California, males have been observed awaiting females by perching atop treetops or hilltops (Scott 1986). Adults fly from mid-May to early September with peaks occurring in May and August (Pyle 2002). In the northern part of the range, and at high altitudes, one flight occurs from late May- mid July (Scott 1986). The Johnson's hairstreak is considered to be the only obligate old-growth butterfly (Pyle 2002). Due to their habitat associations and tendency to reside in the forest canopy, these butterflies are not often encountered.

## Threats

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. The application of BTK (*Bacillus thuringiensis* Berliner var. *kurstaki*), used for spruce budworm suppression, is also hazardous to populations of the Johnson's hairstreak.

## Effects Analysis

### Analysis Area

The analysis area for Johnson's hair streak includes the Crystal Clear Restoration project boundary.

### No Action Alternative

Under the No Action alternative, there would be no direct impacts to Johnson's hair streak larval and foraging habitat. There would be fewer flowering plants for foraging under this alternative in the long-term since canopies would remain closed and less sunlight would reach the forest floor which is required for the growth of most nectar plants.

### Proposed Action

The Proposed Action could impact the larval stage of Johnson's hairstreak by removing large trees with mistletoe. Mistletoe brooms may also be removed where it is a ladder fuel component. Trees with mistletoe would not be directly targeted by this project and would continue to be present throughout the planning area. Mature forest structure would also remain within treated and adjacent untreated stands.

The proposed project may temporarily impact flowering plants during road maintenance, road construction, fuels treatments, and timber harvest activities. Reducing this food source would reduce the ability of foraging butterflies to find nectar at these sites which. It is expected that these flowers and shrubs would regenerate within a few years and that the butterflies would have other nectar plants available within the project area.

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.**

### Cumulative Effects

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal lands, road decommissioning and road closures, McCubbins Gulch OHV trail maintenance, pre-commercial thinning, noxious weed treatments, Bear Springs plantation thinning, and the White River grazing allotment.

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.

### ***Consistency Determination***

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

## **3.9.4 Survey and Manage Species**

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

#### ***Analysis Assumptions and Methodology***

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.

#### ***Existing Condition***

##### **Dalles Sideband**

This species has been found in moist talus habitat (especially around seeps and springs), and in forested areas in upland sites near, but outside of, riparian corridors. Mollusks which inhabit rocky habitats also utilize the surrounding forest areas during moist, cool conditions. In some forested sites, the species has been found associated with down wood where no rock substrates occur. Down wood may provide temporary refugia used during dispersal in the wet season, while rock substrates provide more stable refugia during summer and winter. Areas with frequent fire return intervals where rock crevice refugia are available may have historically favored this species over other, larger forms of *Monadenia*. This species has been found in the planning area during 2016 and 2017 surveys. A buffer will be placed around each site found for this species. The size of the buffer may vary depending on the site conditions and will 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 m. of open water in wetlands, springs, seeps and riparian areas, generally in areas which remain under snow for long periods in the winter. Riparian habitats in the Eastern Oregon Cascades may be limited to the extent of permanent surface moisture, which is often much less than 10 m. from open water. 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. Little is known about this species or its habitat. Surveys may be limited to moist surface vegetation and cover objects within 30 m. (98 ft.) of

perennial wetlands, springs, seeps and riparian areas. 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.

## **Effects Analysis**

### **Analysis Area**

The Analysis Area for Survey and Manage species is the planning area boundary. Surveys were conducted in 2013 and 2014 survey seasons. An individual Crater Lake tightcoil was found, while no other Survey and Manage species was observed within the units of the Proposed Action containing suitable habitat for species. The site location in Unit 19 that contained the snail will have a buffer around the location consistent with the 2001 ROD direction.

### **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. Refer to the Silviculture Specialist Report for further discussion of tree response under the No Action Alternative. 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**

Reduction of the canopy may cause desiccation of soil substrates and loss of the moss ground cover in some areas. Tree-felling and ground-based logging systems can disturb the substrate resulting in destabilization of talus and substrate compaction, which reduces substrate interstices used by some species. The areas underlying skid trails nearest to landings are most likely to incur damage because they receive the most trips with equipment. Refer to the Soils report for discussion of these impacts to soil conditions, organic matter levels, and erosion risks.

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 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.

Activities in the plantation thinning, and sapling thinning stands would not pose a threat to survey and manage species, as those areas are not expected to be providing habitat. The existing stand structure in these plantations is typically uniform, even aged, and lacks the suitable habitat features required for these species. Treatments would improve habitat for these species in the long-term by creating larger diameter trees (future down wood) and improving the overall health of the stand. Activities in recently unmanaged stands could potentially harm survey and manage species as habitat is present throughout most of these units. PDC's for stream buffers, wetland buffers, and buffers at each known mollusk site would minimize the amount of habitat impacted. Down wood standards would be met where it currently exists, providing for continued refugia and habitat for these species.

Very localized activity may impact a few individuals but would not affect populations. Fuels treatments are not expected to have direct adverse impacts. Some habitat components will be lost from fuels treatments, however Forest Plan Standards and Guides will be met where conditions currently exist. In addition, the ROD recommends 120 linear feet of down logs per acre greater than 16 inches in diameter within the matrix management areas in eastern Oregon. 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.

### **Cumulative Effects**

The list of projects in the past, present, and foreseeable future that overlap the analysis area in time and space and were considered and timber harvest on federal land was the only activity that meets the definition for consideration in this cumulative effects analysis. Timber harvest on federal lands within the analysis area have reduced the amount of habitat for mollusk species on the landscape and will 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.

### **Consistency Determination**

The Propose Action is consistent with the survey requirements and management provisions found in the Record of Decision and Standard and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines 2001.

## **3.9.5 Management Indicator Species**

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

#### ***Analysis Assumptions and Methodology***

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

project area include northern spotted owl (see analysis above), deer and elk, pileated woodpecker, American marten, wild turkey, and Western gray squirrel (Table 86).

**Table 86. Management Indicator Species for the Project Area**

<b>Management Indicator Species</b>	<b>Habitat Description</b>	<b>Habitat Present in Analysis Area</b>	<b>Species Present in the Analysis Area</b>
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		Yes	Documented
Gray Squirrel		Yes	Documented

With the selection of some of these species there was a special emphasis on mature, over mature, and old growth habitat. The selection was done at a time when timber harvest was planned to replace many older stands with younger more rapidly growing stands: it was suspected that the mature and over mature stands would decline and the species associated with this habitat could be lost. Several species were selected to represent all of the species that required this type of habitat.

**Existing Condition**

**Deer and Elk**

**Existing Condition**

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 Mt. Hood LRMP 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.

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

The Forest Plan Standards and Guidelines have minimum requirements for optimal and thermal cover habitat components, but no specific level for forage. During the 1980s and 1990s, wildlife managers considered thermal cover to be important to deer and elk survival and production. Over time, wildlife



managers have questioned if elk required thermal cover. Telemetry data presented at the Elk Modeling Workshop (April 2010) indicated that elk were negatively associated with cover and that openings are far more valuable for elk than cover. With the reduction in regeneration timber harvest, the Forest now has abundant optimal and thermal cover, but openings for forage are becoming scarce. There are approximately 69,226 acres of early-seral habitat on the Forest. This level is declining over time at mid and lower elevations since plantations have grown dense with trees that shade out forage. There are few dry meadows in the planning area, and forage habitat improvement for elk is limited.

High road densities lead to harassment of elk herds. Harassed elk move more often than elk left alone and use of habitat decreases as road density increases (Witmer 1985). It is also recognized that elk within or moving through areas of high open-road densities move longer distances; often several miles per day.

## **Effects Analysis**

### ***Analysis Area***

The analysis area for deer and elk is the Whit River Watershed. The treatment units are located within inventoried winter range, B10 winter range, and summer range.

### ***No Action Alternative***

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 at 2.59 miles of road per square mile overall; 2.78 in inventoried summer range; 1.20 in B10 and inventoried winter range.

### ***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. The loss of thermal cover and increase in forage in the proposed units could alter the distribution and use of habitat by deer and elk in the project area, however, the change would likely be positive for both species. During both the summer and winter, a potential increase in animals would be expected due to the availability of more forage opportunities being created with cover interspersed throughout. Canopy closure is expected to eventually increase over the long term to a point in which most forage benefits are lost and consequently forage levels would return to pre-treatment levels. Most of the lost thermal cover characteristics in the stands should be regained in about 20-40 years as canopy cover increases in both the dry and moist mix conifer stands.

Timber removal, road maintenance, sale area preparation activities could potentially disturb animals in the area at the time of implementation. Disturbance that occurs 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. Project activities would not all be occurring at the same time, but in a few places at any one time. The potential disturbance is predicted to be small in scale, temporary in nature and only impact a few individuals. The project is not expected to cause a measurable reduction or increase in the current local population size for either deer or elk.

New temporary road construction and old existing temporary roads would be reopened and reconstructed to access units. These roads would not be open to the public and the only disturbance occurring as a result of these roads being opened would be from activities required to open the road and to accomplish proposed treatments in the project area. The roads that would need to be opened would be closed after

treatments and open-road density would be back to the current level. There would be no increase in the long-term harassment of deer and elk with this alternative.

#### *Road Densities*

The overall open road density within the project area is currently 2.59 miles of road per square mile. The current open road density in summer range (lands not in B10 LUA or Inventoried winter range) is 2.78 which is above the 2.5 miles per square mile for the Forest Plan Standard in inventoried summer range. The open road density within inventoried deer and elk winter range is currently 1.20 miles of road per square mile, which is below the 2.0 miles per square mile standard for inventoried winter range under the Forest Plan. There are also 1.20 miles of open roads per square mile within B10 winter range which is below the Forest Plan Standard of 1.5 miles per square mile between December 1 and April 1.

The Proposed Action 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.

#### *Winter Range and B10*

The current Forest Plan Standards and guidelines for winter range thermal cover cannot be achieved through time. All of the winter range in the watershed, including the planning area, fall within the Eastside Zone and 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. The B10 Forest Plan Standard calls for 70 percent canopy cover after timber harvest treatments and for 50 percent thermal cover on inventoried winter range. The high 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 through time. The likelihood of maintaining thermal cover through time is highest on the north aspects of perennial streams and in riparian zones.

The 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 much, therefore conserving energy. The large boles provide radiation will 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 of 70 percent canopy cover after treatments in the B10 land use allocation. The watershed analysis recommends that the Forest develop new standards and guidelines for winter range in cooperation with Oregon Department of Fish and Wildlife. These standards should address thermal cover levels in terms of site capabilities to support dense stands over the long-term. All haul roads that go through the B10 land use allocation would have their use restricted between December 1 and April 1, as described in the Project Design Criteria.

#### **Cumulative Effects**

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

Warm Springs lands, road decommissioning and road closures, McCubbins Gulch OHV, Bear Springs plantation thinning, White River allotment, utility corridor operations and maintenance, recreation event permits, Warm Springs fuels reduction projects, and developed and dispersed campsites.

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. The optimum cover forage ratio is 60 percent forage and 40 percent cover (Thomas, 1979). 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

### **Consistency Determination**

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 this BE would be maintained at the Forest-scale.

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 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.

### ***Pileated Woodpecker***

#### **Existing Condition**

The pileated woodpecker was chosen as a management indicator species because of its need for large snags, large amounts of down woody material, and large defective trees for nesting, roosting and foraging. Pileated woodpeckers use mature and older, closed canopy stands (>60% canopy cover) for nesting and roosting, but may use younger (40 to 70 years), closed-canopy stands for foraging if large snags are available. Large snags and decadent trees are important habitat components for pileated woodpeckers (Hartwig et al. 2004, Mellen et al. 1992).

The 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 cavities average 8 inches in diameter and 22 inches in depth and are excavated at an average height of 50 feet above the ground, therefore nest trees must have a large diameter in order to contain nest cavities. Because ants are the main diet for pileated woodpeckers, large diameter snags and logs with some decay are selected for foraging because carpenter ants inhabit these sites. Nest excavation occurs from late March to early May, incubation from May to early June, and fledging in early July. Both birds excavate, incubate, and rear young.

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).

There are 405,092 acres of pileated woodpecker habitat on the Forest based on GIS data for habitat 80 years and older. By dividing the acres of pileated woodpecker habitat by the average home range with overlap of 970 acres there are 418 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.

## **Effects Analysis**

### ***Analysis Area***

The analysis area for the pileated woodpecker includes the area within the project boundary. The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas.

The White River watershed analysis looked at all individual B5 areas again to validate the results of the Forest level analysis and to make a recommendation on which areas to retain. The Forest did not find a need to retain any B5 areas set aside for pileated woodpeckers and did not retain any B5 in the Badger Wilderness and allocated LSRs.

### ***No Action Alternative***

There would be no short-term effects to pileated woodpecker habitat under this alternative. In the short-term, the units that are not providing habitat would continue to function as non-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 would continue to function as suitable habitat.

In the long-term, some of the stands may eventually develop nesting habitat characteristics and become suitable habitat. However, with no action, it could take as much as 60 to 150 years for these stands to develop into suitable habitat. Refer to the Silviculture Specialist Report for further discussion of tree response under the No Action Alternative. The potential impacts to 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. Refer to the Fuels Specialist Report for further discussion of wildfire impacts under the No Action Alternative.

### ***Proposed Action***

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 pileated woodpecker would be improved in these stands because larger trees would be recruited onto the landscape more quickly in thinned stands.

Timber harvest has the most significant effect on habitat for the pileated woodpecker. Removal of large-diameter live and dead trees, down woody material, and canopy reductions limits nest and roost sites,

foraging habitat, and protective cover. Forest fragmentation likely reduces population density and makes birds more vulnerable to predation as they fly between forest fragments. Activities on 901 acres that reduce the cover may reduce the ability of an area to support nesting, roosting, and foraging for this species (Marshall, D.B. et al. 2003).

Treatments in the unmanaged stands would impact habitat by reducing canopy cover below 50 percent. The treatment of 901 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 will again 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. Snags would only be felled for safety reasons. Fuels treatments that target small diameter down wood are not anticipated to remove a substantial amount of large down wood.

### ***Cumulative Effects***

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal lands and Bear Springs Plantation Thinning.

Timber harvest on federal land has reduced the amount of suitable habitat for pileated woodpecker on the landscape and will 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.

### **Consistency Determination**

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 this BE would be maintained at the Forest-scale.

### ***American Marten***

#### **Existing Condition**

In the western United States, the American marten’s distribution is fragmented. Home ranges vary from 1 to 4.5 square miles for males and from 0.4 to 3.6 square miles for females (Simon 1980, Zielinski et al. 1997). Martens prey on vertebrates smaller and larger than themselves, eat carrion, and forage for bird eggs, insects, and fruits (Martin 1994).

American martens are closely associated with forested habitats with complex physical structure near the ground. Structure can include the lower branches of living trees, tree boles in various stages of decomposition, coarse woody debris, shrubs, and rock fields. 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. Fragmented habitats attract habitat generalist predators like the great-horned owl, coyote, and bobcat which can all prey on marten. In addition, fragmentation eliminates the connectivity and creates isolated individuals and populations which are more susceptible to extirpation.

## **Effects Analysis**

### ***Analysis Area***

The analysis area for the American martin includes the area within the project boundary. The Northwest Forest Plan directs the B5 pileated woodpecker/American marten areas to return to their underlying land allocation in Matrix lands except where needed to assure habitat and dispersal for the guilds of species represented by the pileated woodpecker and marten. The Forest assessed the relative importance of individual B5 areas in contributing to late seral forest conditions at the watershed landscape level. Based on that assessment, the Forest recommended that certain B5 areas be returned to the underlying land allocation and that individual watershed analysis take a closer look at the remaining B5 areas.

The White River watershed analysis looked at all individual B5 areas again to validate the results of the Forest level analysis and to make a recommendation on which areas to retain. The Forest did not find a need to retain any B5 areas set aside for pileated woodpeckers and did not retain any B5 in the Badger Wilderness and allocated LSRs, and the analysis retained two B5 American marten habitat areas within the analysis area.

### ***No Action Alternative***

There would be no short-term effects to American marten under this alternative. In the short-term, habitat and snag levels would remain essentially unchanged. In 20 to 30 years, the plantation and sapling stands would start to differentiate to varying degrees and show an increase in the levels of small snags and small down wood. Some of the stands may eventually become suitable habitat. However, with no action, it could take as long as 60 to 150 years for these stands to develop into suitable marten habitat. Refer to the Silviculture Specialist Report for further discussion of tree response under the No Action Alternative.

### ***Proposed Action***

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. Treatments in the unmanaged stands in the western portion of the project area would impact habitat by reducing canopy cover below 50 percent. At least 160 acres of mature or old growth forest within each 320 acre management unit would be maintained and treatments in 233 acres within B5 would maintain a canopy cover of 50 percent within 10 years after treatments.

Treatments in the unmanaged stands outside of B5 would impact habitat by reducing canopy cover below 50 percent. The treatment of 901 acres would reduce the amount of habitat available for American marten. This impact would last for 60 to 80 years until the remaining trees grow and conditions will again 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. Snags would only be felled for safety reasons. Fuels treatments that target small diameter down wood are not anticipated to remove a substantial amount of large down wood.

### ***Cumulative Effects***

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal lands and Bear Springs Plantation Thinning.

Timber harvest on federal land has reduced the amount of suitable habitat for pileated woodpecker on the landscape and will 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.

### **Consistency Determination**

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 this BE would be maintained at the Forest-scale.

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). Snags are discussed below under “Snag and Down Log Associated Species.”

## ***Wild Turkey and Gray Squirrel***

### **Existing Condition**

#### ***Wild Turkey***

The wild turkey is a management indicator species for the ponderosa pine-Oregon white oak vegetation association of the Forest. Two subspecies of wild turkeys (Merriam’s and Rio Grande) are found on the Forest. Turkeys feed on acorns, conifer seed, insects, and grass/forbs and nest on the ground hidden by grass or shrubs. Turkeys roost on the ground and in large diameter (> 14 inch dbh) ponderosa pine and Douglas fir generally on slopes greater than 30 percent and within 0.5 miles of a food source.

Wild turkey generally prefer dense ground vegetation (14 to 16 inches in height) 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***

The western gray squirrel is also a management indicator species for the ponderosa pine-Oregon white oak association of the Forest. Western gray squirrels need a mix of mast-producing trees to provide food, cover, and nesting sites in their habitat. The ecological range of the western gray squirrel includes a variety of habitat types within mixed conifer and oak forests. High tree species diversity is a common component of western gray squirrel habitat and contributes to habitat quality (Linders, 2000). Gray squirrel have been documented in the planning area and there is both wintering and nesting habitat.

Gray squirrels require various age classes of oaks, including old live and dead trees, to provide both food and cover, and different age categories of conifers are important for year-round cover and seasonally important food (Patton, 1984). Generally, the squirrels require trees of a size sufficient to produce an interconnected canopy for movement between stands (Rodrick, 1986). Gray squirrels usually build winter and rearing nests in conifers and temporary or summer nests in deciduous trees, and frequently nest in trees larger than 16 inches DBH (Gregory, 2005).



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 and the spread of these fungi play an important role in the health of the forests in which they live. Coniferous trees depend on the fungi for the uptake of non-mobile minerals from the soil. 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.

## **Effects Analysis**

### ***Analysis Area***

The analysis area for white-headed woodpeckers includes the eastern portion of the planning area (from the 2130 rd.) that lies within the project boundary.

### ***No Action Alternative***

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. 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 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. Mast-producing trees such as oaks would not be removed during treatments. Fuels treatments including burning would promote new growth of shrub and forb species. Untreated stands would maintain patches of forested habitat that would serve as travel corridors.

Treatments under the Proposed Action would have both negative and beneficial impacts to western gray squirrels. Reduction of canopy cover and disturbance of the litter layer during harvest may reduce soil moisture resulting in lower mycorrhizal fungi production, which is an important food source for this species. At the same time, thinning activities would provide more open conditions that would increase acorn and pine seed production which is also a food source for gray squirrels. Western gray squirrels would forage in the thinned stands that provide seasonal or an occasional abundance of food, while nesting in adjacent conifer stands with higher canopy cover. 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.

### ***Cumulative Effects***

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal lands, White River grazing allotment, and Bear Springs Plantation Thinning. These projects would have a combination of beneficial and negative impacts to wild turkey and western 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 (Bethlenfalvai and Dakessian 1984) which are a food source for gray squirrels.

### **Consistency Determination**

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.

## **3.9.6 Other Species of Interest**

### **Snag and Down Log Associated Species**

#### ***Analysis Assumptions and Methodology***

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

#### **DecAID Advisor**

DecAID is a planning tool intended to help advise and guide managers as they conserve and manage snags, partially dead trees and down wood for biodiversity (Mellen et al. 2003). It also can help managers decide on snag and down wood sizes and levels needed to help meet wildlife management objectives. This tool is not a wildlife population simulator nor is it an analysis of wildlife population viability.

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

Modeling biological potential of wildlife species has been used in the past. DecAID was developed to avoid some pitfalls associated with that approach. There is not a direct relationship between the statistical summaries presented in DecAID and past calculations or models of biological potential.

Refer to the DecAID web site listed in the References section for more detail and for definition of terms. This advisory tool focuses on several key themes prevalent in recent literature:

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

### **Existing Condition**

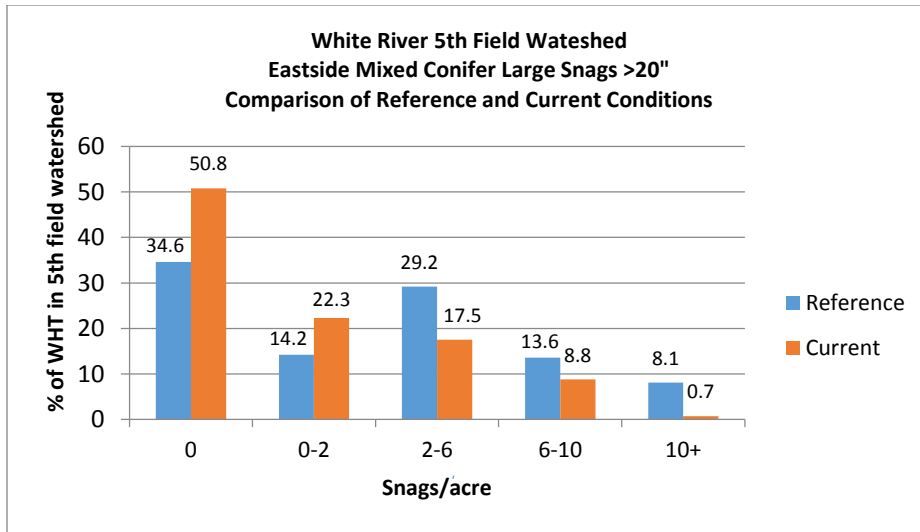
The project area contains stands of immature plantations less than 80 years old and recently unmanaged stands over 80 years old in the wildlife habitat type (WHT) of Eastside Mixed Conifer in the eastern portion of the planning area and Montane Mixed Conifer in the western portion as defined in DecAID. Many wildlife species evolved to use large snags and logs that were historically more abundant on the landscape. The loss of large snags and logs from managed stands affects biodiversity and these large snags and down wood are often missing from managed stands across the Forest. Currently, there are roughly 1 snags per acre in the moist mix conifer and <1 snags per acre in the dry mix conifer 24 inches DBH and larger and an average of 5 snags per acre in the moist mix conifer and 2 snags per acre in the dry mix conifer 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 DecAID.

For the small/medium trees in the Eastside Mixed Conifer, the DecAID advisor identifies the 30 percent tolerance level for snags as 6.7 snags per acre greater than 10 inches in diameter with 2.7 of those snags greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 6.5 percent cover of down wood (including all decay classes) with sizes of logs averaging 5 to 8 inches in diameter. For the large trees in this habitat type, the DecAID advisor identifies the 30 percent tolerance level for snags as 15 snags per acre greater than 10 inches in diameter, with 3.6 of those snags greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 2 percent cover of down wood (including all decay classes) with sizes of logs averaging 5 to 8 inches in diameter.

For the small/medium trees in Montane Mixed Conifer, the DecAID advisor identifies the 30 percent tolerance level for snags as 10 snags per acre greater than 10 inches in diameter, with 2.7 of those snags greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 2.5 percent cover of down wood (including all decay classes) with sizes of logs averaging greater than 5 inches in diameter. For the large trees in this habitat type, the DecAID advisor identifies the 30 percent tolerance level for snags as 11 snags per acre greater than 10 inches in diameter, with 6.5 snags per acre greater than 20 inches in diameter. It identifies the 30 percent tolerance level for down wood as up to 3.3 percent cover of down wood (including all decay classes) with sizes of logs averaging greater than 5 inches in diameter.

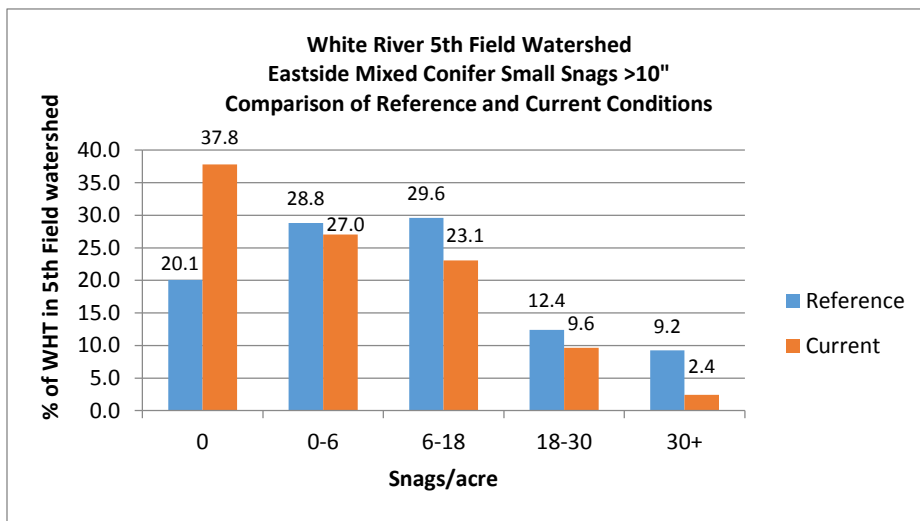
### **Snags**

Currently, 50.8 percent of the White River Watershed contains no large snags in eastside mixed conifer compared to the historic condition of 34.6 percent (Figure 65). The only category where current levels exceed historical conditions is in 0-2 large snags per acre. Currently, 22.3 percent of the watershed has between 0 and 2 snags per acre and historically that number was 14.2. This Watershed is deficient in high concentrations of snags with 8.1 percent of the area with 10 or more snags per acre historically and 0.7 percent currently.



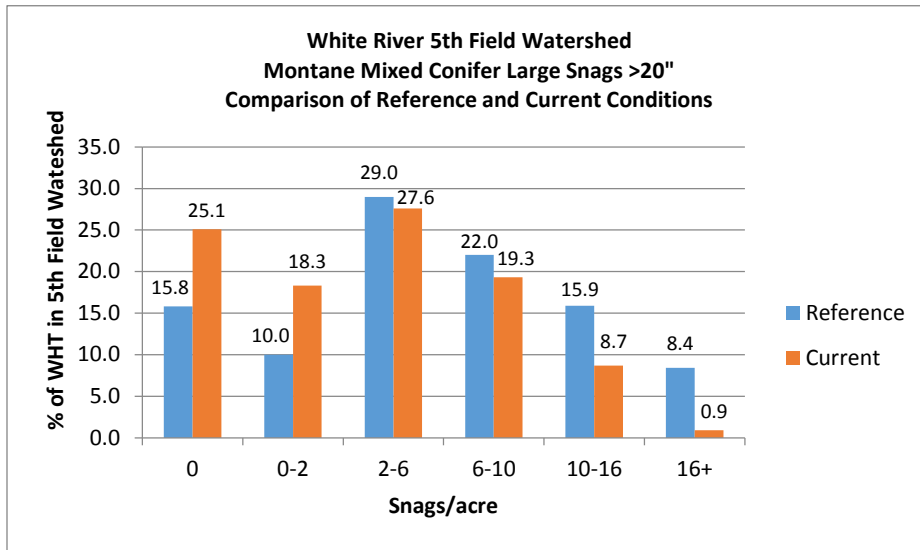
**Figure 65. Comparison of Current and Reference Conditions for Large Snags in Eastside Mixed Conifer**

For small snags in eastside mixed conifer, 37.8 percent of the White River Watershed contains no snags compared to the historic condition of 20.1 percent (Figure 66). There are no categories where current levels exceed historical conditions in small snags densities although levels are comparable. As is with the large snags, this watershed is deficient in high concentrations of small snags with 9.2 percent of the area with 30 or more snags per acre historically and 2.4 percent currently.



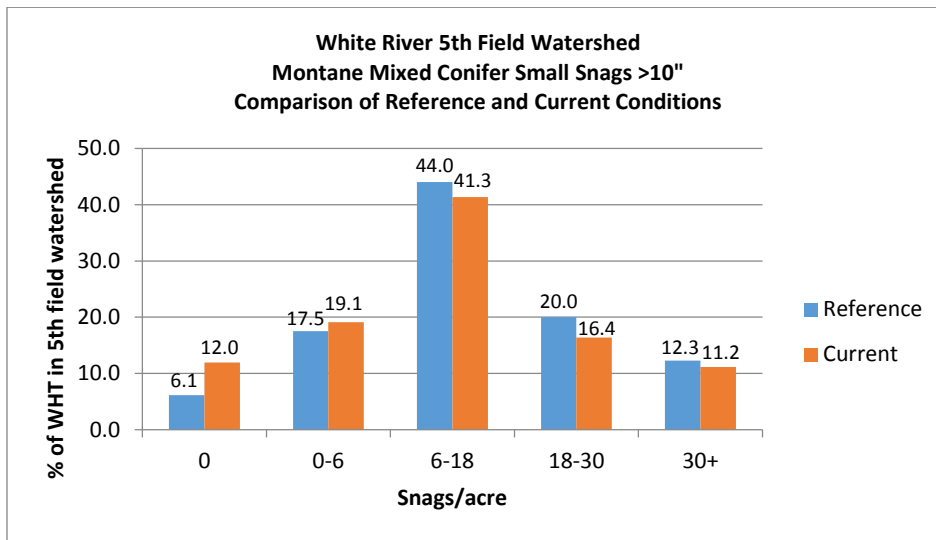
**Figure 66. Comparison of Current and Reference Conditions for Small Snags in Eastside Mixed Conifer**

Currently, 25.1 percent of the White River watershed contains no large snags in montane mixed conifer compared to the historic condition of 15.8 percent (Figure 67). The only category where current levels exceed historical conditions is in 0-2 large snags per acre. Currently, 18.3 percent of the watershed has between 0 and 2 snags per acre where historically 10.0 percent would have had 0-2 per acre. This watershed is deficient in high concentrations of snags with 8.4 percent of the area with 16 or more snags per acre historically and 0.9 percent under current conditions.



**Figure 67. Comparison of Current and Reference Conditions for Large Snags in Montane Mixed Conifer**

For small snags in montane mixed conifer, 12.0 percent of the White River watershed contains no snags compared to the historic levels of 6.1 percent (Figure 68). The remainder of the categories for small snag densities are comparable to historic conditions.



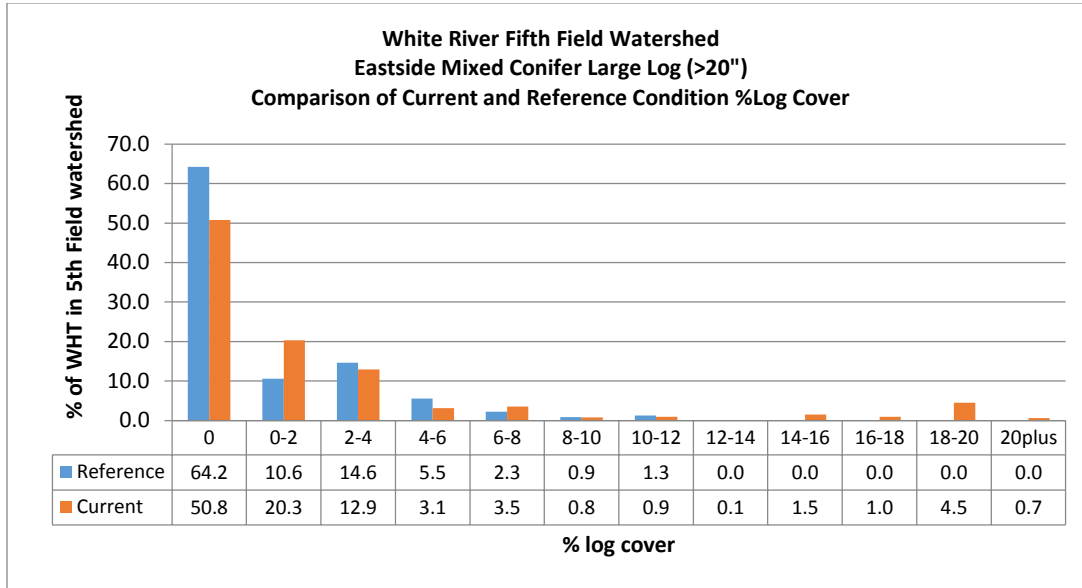
**Figure 68. Comparison of Current and Reference Conditions for Small Snags in Montane Mixed Conifer**

### Down Wood

Figures 4 thru 7 show the reference and current conditions for Eastside Mixed Conifer and Montane Mixed Conifer large and small logs in the White River watershed.

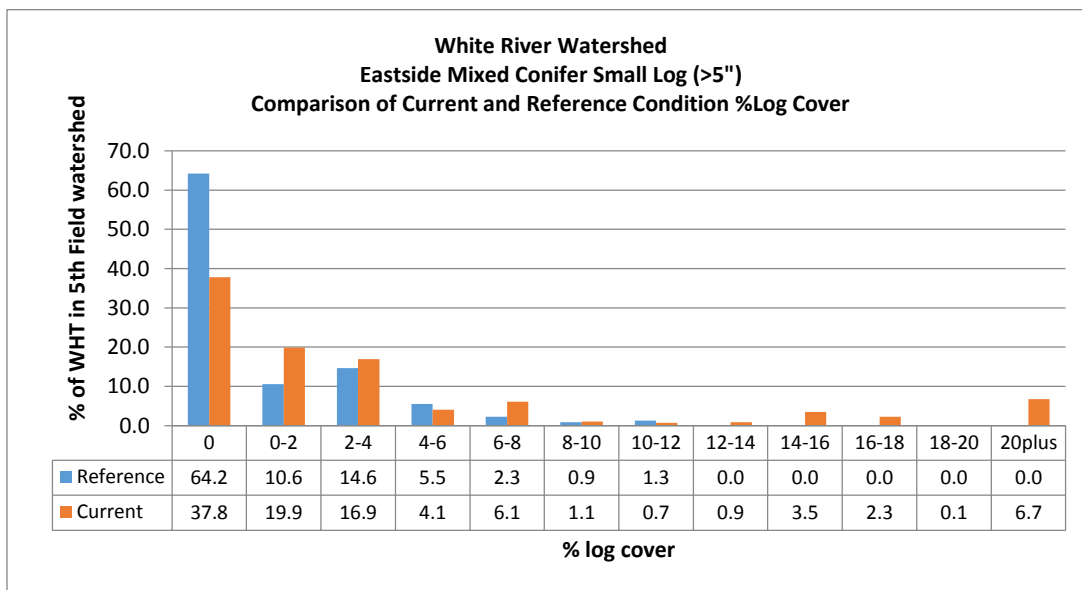
While current and reference conditions of large down logs in eastside mixed conifer are comparable, there are some differences. Historically, 64.2 percent of the White River Watershed had no cover of large down

logs and currently, 50.8 percent has no large log cover. Under historic conditions, 10.6 percent of the watershed had up to 2 percent cover and currently 20.3 percent of the watershed has up to 2 percent cover (Figure 69).



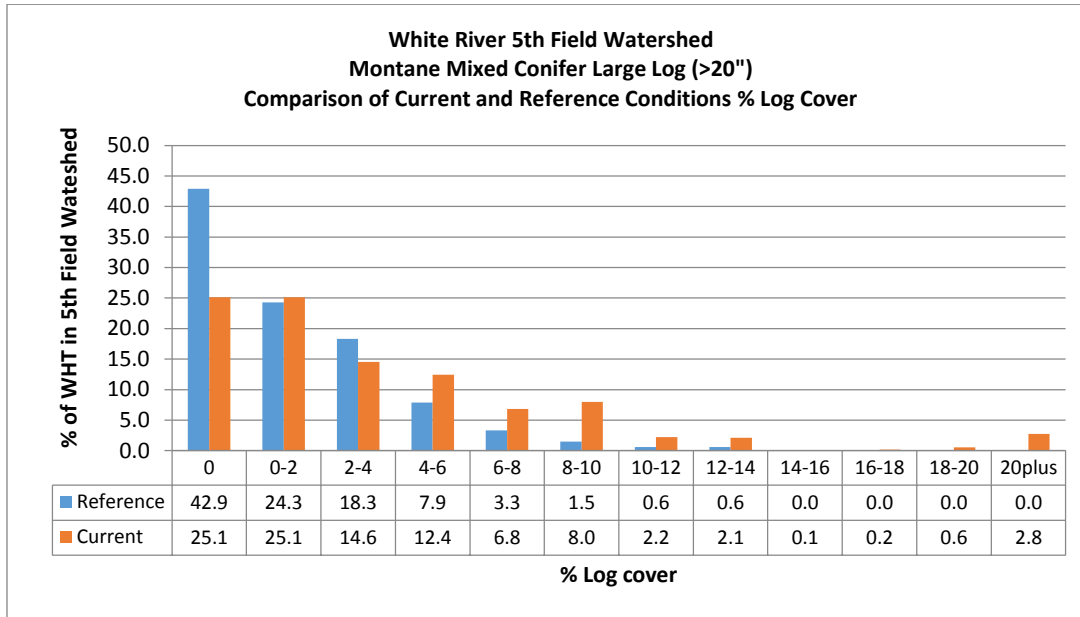
**Figure 69. Comparison of Current and Reference Conditions of Percent Large Log Cover in Eastside Mixed Conifer**

A similar comparison can be made for small logs in eastside mixed conifer. Historically, 64.2 percent of the White River watershed had no cover of small down logs and currently, 37.8 percent has no small log cover. Under historic conditions, 10.6 percent of the watershed had up to 2 percent cover and currently 19.9 percent of the watershed has up to 2 percent cover of small logs (Figure 70). 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.



**Figure 70. Comparison of Current and Reference Conditions of Percent Large Log Cover in Montane Mixed Conifer**

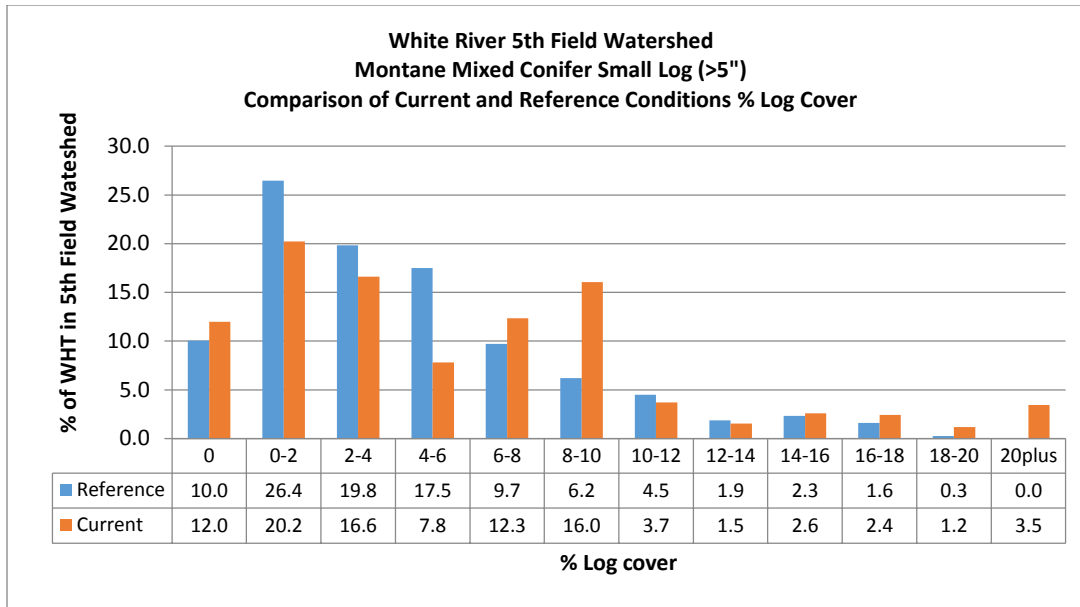
Historically, 42.9 percent of the White River watershed had no cover of large down logs in montane mixed conifer and currently, 25.1 percent has no large log cover. Under historic conditions there is more down wood than would have existed historically in the 4-6, 6-8, and 8-10 percent categories (Figure 71).



**Figure 71. Comparison of Current and Reference Conditions of Percent Large Log Cover in Montane Mixed Conifer**

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 a difference however in the 4-6 percent cover category with 17.5 percent cover historically and currently there is 7.8 percent cover. There is currently 16.0 percent of the watershed with 8-10 percent cover compared to 6.2 percent historically (Figure 72).





**Figure 72. Comparison of Current and Reference Conditions of Percent Small Log Cover in Montane Mixed Conifer**

**Effects Analysis**

**Analysis Area**

The analysis area includes the Whit River Watershed. While there are portions of the White Horse Rapids Watershed and the Beaver Creek Watershed within the planning area, the amount of these watersheds within the planning area represents less than one percent of the total respective watershed acres. Treatment units fall within the habitat types identified in DecAID as Eastside Mixed Conifer and Montane Mixed Conifer with vegetation condition types of small/medium trees and large trees.

**No Action Alternative**

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. However, some of the harvest units would likely have at least 3 percent of down wood comprised of classes 1 thru 4 and therefore would meet the 30 percent tolerance level for natural down wood conditions, as indicated by DecAID inventory data from unharvested plots.

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. These natural processes would recruit new snags and down logs, mainly from the smaller intermediate and suppressed trees. Trees would take more than 70 years to reach the 24-inch size class (USDA 2009). Tables 11 thru 14 show the number of snags per acre recruited over time for the No Action and Proposed Action alternatives.

**Table 87. Recruitment of Snags under the No Action Alternative Dry Mixed Conifer**

Years After Treatment	QMD	# of Trees per Acre	Snags per Acre $\geq 12''$ DBH	Snags per Acre $\geq 24''$ DBH
0	8.4	755	2.0	<1
10	9.3	663	7.0	1.0
20	10.2	585	10.0	1.0
30	11	519	13.0	2.0
40	11.8	472	14.0	2.0
50	10.2	555	14.0	2.0
60	10.9	496	15.0	3.0
70	10.3	539	15.0	3.0
80	11.1	478	16.0	4.0
90	10.5	517	15.0	5.0
100	11.3	460	15.0	5.0

**Table 88. Recruitment of Snags under the No Action Alternative Moist Mixed Conifer**

Years After Treatment	QMD	# of Trees per Acre	Snags per Acre $\geq 12''$ DBH	Snags per Acre $\geq 24''$ DBH
0	6.6	1228	5.0	1.0
10	7.5	1124	7.0	1.0
20	8.3	1008	9.0	1.0
30	9.2	892	14.0	1.0
40	10.1	798	17.0	1.0
50	8.0	1034	20.0	2.0
60	9.1	842	26.0	3.0
70	8.7	899	25.0	4.0
80	9.8	742	26.0	5.0
90	9.5	755	25.0	6.0
100	10.6	630	25.0	6.0

**Table 89. Recruitment of Snags under the Proposed Action Dry Mixed Conifer**

Years After Treatment	QMD	# of Trees per Acre	Snags per Acre $\geq 12''$ DBH	Snags per Acre $\geq 24''$ DBH
0	11.6	140	2.0	<1
10	4.9	1105	3.0	1.0
20	5.7	1008	5.0	1.0
30	7.5	604	4.0	1.0
40	8.5	557	4.0	1.0
50	9	563	5.0	1.0
60	10.1	480	9.0	2.0
70	10.4	470	13.0	2.0
80	11.5	397	18.0	3.0
90	11.7	390	21.0	3.0
100	12.8	331	21.0	3.0

**Table 90. Recruitment of Snags under the Proposed Action Moist Mixed Conifer**

Years After Treatment	QMD	# of Trees per Acre	Snags per Acre $\geq 12''$ DBH	Snags per Acre $\geq 24''$ DBH
0	10.2	200	5.0	1.0
10	6.3	696	4.0	1.0
20	8.3	1008	9.0	1.0
30	6.4	1013	5.0	1.0
40	7.6	832	10.0	1.0
50	7.3	1023	12.0	1.0
60	8.6	747	16.0	2.0
70	8.7	767	16.0	3.0
80	10.0	590	19.0	4.0
90	10.0	598	20.0	4.0
100	11.4	476	20.0	4.0

Based on the snag analysis, 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  $\geq 12$  inches DBH in the dry habitat type. This is due mainly to the creation of healthier stands under the proposed thinning which would become less susceptible to stress and disease-caused mortality.

### Proposed Action

Some live trees would be selected as leave trees that are defective or have the elements of decay as described in DecAID advisor. Hollow structures are created in living trees by heart rot decay organisms over many years. These hollow structures in living trees provide especially valuable habitat for a variety of wildlife, including cavity users. Trees that have heart rot decay present may include features such as, openings in the bole, broken boles with bayonet tops, large dead tops or branches, old wounds on the bole, crooks in the bole signifying previous breakage, and the presence of fruiting bodies. Defective trees with deformities such as forked tops, broken tops, damaged and loose bark or brooms caused by mistletoe or rust can also provide important habitat for a number of species.

Structural diversity is a combination of several stand characteristic which would include, but would not be limited to, number of canopy layers, down wood and snags. The stands under the Proposed Action are a mix of different stand structures. The young stands have lower tree diversity, are single-canopied even-aged stands, and/or have trees that are insufficient in size to provide quality snags or downed wood. In recently unmanaged stands structure is more diverse in tree species with a regeneration component of shade tolerant species and no shrub components. Thinning can have both immediate effects on forest diversity and long-term effects restoring native plant communities as understory species are released and provide a seed source for future snag and down wood recruitment. 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 trees. These retention trees would later become large diameter snags and downed wood.

### Snags

Implementation of this project could result in the loss of some snags cut for safety concerns. However, no snags are proposed to be cut as part of the Proposed Action and large snags that need to be cut would remain nearby. 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. Skips and streamside protection buffers would provide short and mid-term recruitment of snags similar to the level described under the No Action Alternative.

Snags that are left standing after thinning would be more prone to wind damage and snow breakage than they would have been without thinning. There would likely be some loss of the remaining snags within 10 years after harvest which would become down wood. Over the next 50 years, an increased number of snags would be recruited under the Proposed Action as the stands age and current snag levels would be again be achieved and then exceeded in both habitat types.

Based on the snag analysis in Tables 13 and 14, the Proposed Action would recruit fewer snags over time compared to the No Action alternative, with the exception of small snags  $\geq 12$  inches dbh in the dry habitat type. This is due mainly to the creation of healthier stands that become less susceptible to stress and disease caused mortality. Over the next 100 years, the numbers of snags in these stands would be slightly reduced as existing snags fall and become down wood. Snags would then eventually be recruited as the stands age and current snag levels would be again be achieved or exceeded.

Some snags may be created during underburning activities. Tree mortality would be limited to 10 percent of the burned units which would increase the number of snags in these units. See the Fuels report for more information on tree mortality after fuels treatments.

### ***Down Wood***

Large logs (> 20 inches) existing on the forest floor would be retained and few that size are expected to be consumed during underburning activities. Prior to harvest, sale administrators would approve skid trail and skyline locations in areas that would avoid disturbing key concentrations of down logs or large individual down logs when possible. Snags or green trees that fall after thinning and fuels treatments would contribute to down wood.

Figures 8-11 show that the planning area and watershed have more of the area without down wood but some pockets with higher concentrations of down wood than would have existed historically. Under the Proposed Action, the current conditions at the watershed level would remain unchanged. While some snags may be more prone to fall after thinning and then become down wood, and some down wood may be consumed during underburning, the amount of down logs recruited would not be measurable at the watershed scale. Skips and streamside protection buffers would provide short and mid-term recruitment of down wood similar to the level described under the No Action Alternative.

### ***Cumulative Effects***

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: past timber harvest on federal, tribal, and private lands and conversion to agricultural lands which have the potential to reduce and remove snags and down wood on the landscape. 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.

### ***Consistency Determination***

Thinning may have short-term impacts on downed wood 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 leaf trees retained would be representative of the largest size class present in the stand.

## Neotropical Migratory Birds

### ***Analysis Assumptions and Methodology***

The Forest Service has implemented management guidelines that direct migratory birds to be addressed in the NEPA process when actions have the potential to impact migratory bird species of concern. The methodology for this analysis follows “Incorporating Migratory& Resident Bird Concerns into the National Environmental Policy Act Process Region Six Forest Service & OR/WA Bureau of Land Management” (Bresson 2016).

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

The 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.

### ***Existing Condition***

Table 91 displays the focal species potentially (positively or negatively affected) by changes in habitat in the Cascade Mountains Physiographic Province, and the forest conditions and habitat attributes they represent.

**Table 91. Focal Migratory Bird Species**

<b>Forest Conditions</b>	<b>Habitat Attribute</b>	<b>Focal Species</b>
<b>Ponderosa Pine</b>	Old forest, large patches	<b>White-headed woodpecker</b>
<b>Ponderosa Pine</b>	Large trees	<b>Pygmy nuthatch</b>
<b>Ponderosa Pine</b>	Open understory, regeneration	<b>Chipping sparrow</b>
<b>Ponderosa Pine</b>	Burned old-forest	<b>Lewis’ woodpecker</b>
<b>Mixed Conifer</b>	Large trees	<b>Brown Creeper*</b>
<b>Mixed Conifer</b>	Open understory, regeneration	<b>Williamson’s sapsucker</b>
<b>Mixed Conifer</b>	Grassy openings, dense thickets	<b>Flammulated owl</b>
<b>Mixed Conifer</b>	Multi-layered, structural diverse	<b>Hermit thrush</b>
<b>Mixed Conifer</b>	Fire edges and openings	<b>Olive-sided flycatcher*</b>
<b>Oak-Pine Woodland</b>	Early-seral, dense understory	<b>Nashville warbler</b>

<b>Forest Conditions</b>	<b>Habitat Attribute</b>	<b>Focal Species</b>
<b>Oak-Pine Woodland</b>	Large oaks with cavities	<b>Ash-throated flycatcher</b>
<b>Oak-Pine Woodland</b>	Large pine trees/snags	<b>Lewis' woodpecker</b>
<b>Lodgepole Pine</b>	Mature/old-growth	<b>Black-backed woodpecker</b>
<b>Whitebark Pine</b>	Mature/old-growth	<b>Clark's nutcracker</b>
<b>Montane Meadows</b>	Wet and dry	<b>Sandhill crane</b>
<b>Aspen</b>	Large trees/snags, regeneration	<b>Red-naped sapsucker</b>
<b>Subalpine fir</b>	Patchy presence	<b>Blue grouse*</b>

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

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.

## **Effects Analysis**

### **Analysis Area**

The analysis area for migratory birds includes area within the boundary of the Proposed Action.

### **No Action Alternative**

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**

Research has demonstrated that thinning enhances habitat for a number of migratory species and provides habitat for some species that are rare or absent in un-thinned stands (Hagar and Friesen 2009). However, some species of migratory birds have been shown to decline following thinning. 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.

Some species of birds may redistribute area after thinning. These effects would be short-term since more structurally diverse conditions are expected to return as the stands develop over the next 20 to 40 years. The stands in the eastern portion of the planning area include ponderosa pine. Thinning around pines would enhance habitat for those species that rely on large ponderosa pine dominated forests like the white-headed woodpecker and pygmy nuthatch. Harvest operations would take place throughout the breeding season and would have a negative impact on reproduction for at least one breeding season in a given area, depending on how long it takes to implement the proposed treatments.

### **Cumulative Effects**

The following list of projects in the past, present, and foreseeable future overlap the analysis area in time and space and were considered in this cumulative effects analysis: timber harvest on federal lands, road decommissioning and road closures, pre-commercial thinning, and Bear Springs plantation thinning.

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.

### ***Consistency Determination***

The Proposed Action is consistent with Executive Order 13186 (66 Fed. Reg. 3853, January 17, 2001) "Responsibilities of Federal Agencies to Protect Migratory Birds." This Executive Order directs federal agencies to avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat. This Executive Order also requires federal agencies to develop Memorandum of Understandings (MOU) with the 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

### 3.10.1 Analysis Assumptions and Methodology

The purpose of this Biological Evaluation (BE) is to document Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered or sensitive (TES) species and their habitats (FSM 2670.5). The species considered in this report 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 Amendments to the Survey and Manage 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. Part of the BE is completed to determine whether a proposed action or any of the alternatives would result in a trend toward the sensitive species becoming federally listed.

The goals of a BE are:

- To ensure that Forest Service actions do not contribute to the loss of viability of any native or desired non-native plant or animal species;
- To ensure that Forest Service actions do not hasten the federal listing of any species; and
- To provide a process and standard through which TES species receive full consideration throughout the planning process, thereby reducing negative impacts to species and enhancing opportunities for mitigation.

This report includes all the necessary components of a biological evaluation. It discusses the existing condition and analyzes the effects of the proposed action and alternatives on sensitive plants within the Crystal Clear Restoration project area. This report analyzes sensitive species that are documented or suspected to occur within the general biophysical area where the project will occur. Only those species which may be directly, indirectly, or cumulatively affected by the proposed actions are considered. Species that are not suspected to occur within the analysis area, or are eliminated from consideration due to other factors, are not described and are not considered in the detailed effects analysis. However, information on these species is available at the district offices of the Mt. Hood National Forest, upon request.

### Biological Evaluation Process

Under the suggested procedure for conducting a biological evaluation as described in a memo issued August 17, 1995 by the Regional Foresters of Regions 1, 4, and 6, the Biological Evaluation is a seven step process to evaluate possible effects to TES species. The seven steps are as follows:

1. Review of existing documented information
2. Field reconnaissance of the project area.
3. Determination of effects of proposed project on TES species.
4. Determination of irreversible or irretrievable commitment of resources (required for listed and proposed species only)
5. Determination of conclusions on effects.
6. Recommendations for removing, avoiding, or compensating adverse effects.
7. Documentation of consultation with other agencies, references, and contributors.

## Pre-field Analysis

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. Information from the pre-field review, in conjunction with the project description, is used to determine the need and intensity of field surveys and, in part, fulfills the standards and procedures for conducting a biological evaluation (FSM 2672.42).

A complete list of previous and historical surveys for sensitive and rare plants in the project area was determined by querying the Forest Service's Natural Resource Manager's Threatened, Endangered, and Sensitive Plant Species database (NRM TESP-IS 2016) and by examining historical survey forms, maps, NEPA records and electronic botanical databases.

The following sources were consulted for the pre-field review:

- Regional Forester's Sensitive Species List (July 2015).
- Rare threatened and endangered species of Oregon (Oregon Biodiversity Information Center (ORBIC) August 2016).
- The Forest Service's Geographic Information System (GIS) corporate database: NRM TESP-IS.
- Species Fact Sheets provided by the Interagency Special Status Sensitive Species Program website [<http://www.fs.fed.us/r6/sfpnw/issssp/>] of the Pacific Northwest Region.
- USFS personnel and District botany records.
- Literature, reports, conservation plans, conservation assessments, and species descriptions on file at the Barlow Ranger District Office.

There are no known occurrences of federally listed endangered or threatened plants on the Mt. Hood National Forest and the forest has no habitat recognized as essential for listed plant species recovery under the Endangered Species Act. There are currently 335 sensitive species on the Regional Forester's Sensitive Species List and/or on the 2001 ROD that are known or suspected to occur or have habitat on the Mt. Hood National Forest. Of these, 108 plant, bryophyte, lichen and fungi species were determined to have historic known sites or suitable habitat within the project area and adjacent watersheds. See Appendix 1 of the Botany Specialist Report for the full list of species considered during the pre-field review and the summary of findings.

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 will 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 and Manage standards and guidelines (USDA/USDI, 2001) require equivalent-effort surveys for Category B fungal species (rare, pre-disturbance surveys not practical) when National Environmental Policy Act (NEPA) decisions or decision documents are to be signed for habitat-disturbing activities in old-growth forest if strategic surveys are not considered completed. While previous surveys have been conducted within this project area, it is not clear if strategic surveys were conducted in all units. All the stands for which this condition applied within the project area were surveyed in spring and fall 2016 and in spring 2017. For forests east of the Cascades, one round of spring surveys and one round of fall surveys are needed. It is recommended that surveys consist of two visits, approximately two weeks apart (VanNorman and Huff 2012). Many of these units were determined during summer 2016, and spring surveys were completed during spring 2017. Survey timing and completion is weather dependent.

### 3.10.2 Existing Condition

The Crystal Clear Restoration project area includes several plant association types, and a variety of habitats, from dry ponderosa pine/Oregon white oak stands to moist, mid-elevation hemlock stands. The geographical boundary analyzed during this project was within the Clear Creek, Middle Beaver Creek, Middle White River and Wapinitia Creek 6<sup>th</sup> field subwatersheds and surveys were limited to the project area. There are many habitat types within this area, but much of the proposed project units had relatively low species diversity, due to dense canopy closure and heavy 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 were not controlled by the grazing of deer or cattle. Well-established populations of these species reduced the understory diversity. For more information on invasive species, please reference the invasive species report.

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 only species which were found in great quantity were tall, dense shrubs such as snowbrush (*Ceanothus velutinus*) or chinquapin (*Chrysolepis chrysophylla*) and hardy smaller shrubs such as tall snowberry (*Symphoricarpus albus*) and wild rose (*Rosa gymnocarpa*). Forb species were sporadic, and there were few graminoids present. Those that were, such as Idaho fescue (*Festuca idahoensis*) and elk sedge (*Carex geyerii*) were heavily grazed. The units also included large legacy trees over 180 years, but these were leave trees from previous shelterwood thinning treatments 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, legacy Douglas-fir and ponderosa pine. While these stands were often heavily shaded and grazed as well, with a sparse understory, they also included the greatest amount of species diversity and abundance. The stands included 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.

The project area includes habitat or known sites for several species of sensitive bryophytes, lichens, fungi and vascular plants. For additional information on any of the species considered, please reference Appendix 1 of the Botany Specialist Report.

#### ***Cypripedium montanum* and *Cypripedium fasciculatum***

*Cypripedium montanum* (mountain lady's-slipper, Figure 73) and *Cypripedium fasciculatum* (clustered lady's slipper) are orchid species endemic to western North America and located within the planning area. It has a global ranking of G4 (Apparently Secure) from NatureServe, and a state ranking of S3S4 (Apparently Secure or Vulnerable) in Oregon. It is on the Oregon Biodiversity information Center's watch list, which suggests continued monitoring of species which are not threatened or endangered but require continued monitoring (ORBIC 2016). Both of these orchid species are included in the December



**Figure 73. Flowering mountain lady's-slipper. Photo by C. Mead**

2003 Survey and Manage ROD as Category C species. The guidelines for these species suggest that they are uncommon and pre-disturbance surveys are practical.

Mountain lady's-slipper is a long-lived perennial orchid which grows in open, mixed conifer and conifer/oak plant communities in the montane west. The clustered lady's-slipper grows in similar habitats and is found both west and east of the Cascades. These plants may remain vegetative for many years before flowering (Harper and White 1974; Wells 1981), and a single individual may not produce above-ground vegetative growth in a given year (Peck 1961, Latham and Hibbs 2001). *Cypripedium* species rely upon mycorrhizal associations for several months or years before producing above ground vegetative growth (Harper and White 1974). Each fall the plants will die back completely and will over winter within underground rhizomes. Spring growth is particularly sensitive in this genus. If new spring growth is destroyed by frost, foraging animals or management practices, the orchid will not replace the growth until the following year or may not survive (Barbour et al. 1998, Sheviak 1990). If the plant is damaged before midsummer, they may produce vegetative growth the following year but may not bloom for two or more seasons (Whitlow 1983; Case 1987). The major threats to these species are the direct loss of populations due to ground disturbing activities such as timber harvest and road construction, or harvesting activities that disturb litter and soil, or fire. The species' extremely slow growth rate, complex symbiotic relationships with other organisms, and exposure to possibly frequent wildfires, suggest that recolonization of lady's-slipper throughout their historic range is unlikely (USDA Forest Service and USDI Bureau of Land Management 1994a).

There are no known sites for clustered lady's-slipper in this project area. Three historic populations of mountain lady's-slipper are known within this area. Of those, only two appear to have persisted.

Surveys were conducted during spring and summer of 2016, within known population areas and adjacent habitat for both species. The known populations did not appear to be vigorous, nor were they at the numbers described from earlier reports of those sites. Most of the sites have relatively closed canopies and open understories with few shrubs. Grazing pressure appears to be high in these sites. No new sites were discovered within the project area.

### **Bryophytes and Lichens**

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.

Target terrestrial bryophytes and lichens are typically associated with large, decaying downed wood or the bases of large conifer trees, or are found with other mosses in moist sites. These species are found in old-growth forests both east and west of the Cascades. Species considered during this analysis are: *Blepharostoma arachnoideum*, *Brotherella roellii*, *Tetraphis geniculata*, *Cladonia norvegica*, *Lobaria linita*, and *Peltigera pacifica*.

The target epiphytic species are all lichens. Epiphytic lichens grow in the furrowed bark of large conifer or hardwood trees, or hang loosely from the bark or branches. The species considered are: *Calicium abietinum*, *Cetrelia cetrarioides*, *Chaenotheca chrysocephala*, *Chaenotheca ferruginea*, *Chaenotheca furfuracea*, *Chaenotheca subroscida*, *Chaenothecopsis pusilla*, *Dendrisocaulon intricatulum*, *Hypogymnia vittata*, *Leptogium cyanescens*, *Leptogium teretiusculum*, *Microcalicium arenarium*, *Nephroma bellum*, *Nephroma isidiosum*, *Nephroma occultum*, *Pannaria rubiginosa*, *Stenocybe clavata*.

Of these species, only *Nephroma occultum* has a historic known site within the project area. There are also a number of sites for *Hypogymnia oceanica*, an epiphytic lichen 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.

## Fungi

There are known sites for *Albatrellus flettii*, *Clavariadelphus ligula*, *Cortinarius olympianus*, *Hygrophorus californicus*, *Ramaria maculatipes*, and *Ramaria rubripermanens* within the Crystal Clear Restoration area. In addition, 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* (Figure 76), *Polyozellus multiplex*, *Sparassis crispa*, and *Spathularia flavida* (Figure 74).

Litter and wood saprobes feed on dead and decaying organic material. This plays a crucial role of decomposition in ecosystems. These fungi require downed woody material of varying size and decay classes or leaf/needle and twig litter to grow and sustain themselves. Wood saprobes may be limited in distribution to the particular source of decaying wood, but litter saprobes may extend over a larger area via mycelial networks. The species listed here 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*, *Spathularia flavida*,



**Figure 74. *Spathularia flavida*, the fairy fan mushroom, on litter. Photo by C. Mead**

Mycorrhizal fungal species form mutually beneficial symbiotic associations with the roots of plants and trees. This connection allows fungi to absorb carbohydrates from the host plant, while the host receives minerals from the fungi. The increased surface area formed around the plant's roots by the fine fungal network also allows for increased water absorption. Many plants rely upon these fungi for nutrient and water uptake. The species listed here are known to be associated with members of the pine family such as ponderosa pine or Douglas-fir, and are known or suspected to occur east of the Cascades: *Albatrellus ellisii*, *Albatrellus flettii*, *Arcangeliella crassa*, *Arcangeliella lactarioides*, *Boletus pulcherrimus*, *Chalciporus piperatus*, *Chamonixia caespitosa*, *Choiromyces alveolatus*, *Clavariadelphus ligula* (Figure 75), *Clavariadelphus occidentalis*, *Clavariadelphus sachalinensis*, *Clavariadelphus subfastigiatus*, *Clavariadelphus truncatus*, *Cortinarius magnivelatus*, *Cortinarius olympianus*, *Cortinarius speciosissimus*, *Cortinarius umidicola*, *Cortinarius verrucisporus*, *Cortinarius wiebeae*, *Cystangium lymanensis* (*Macowanites lymanensis*), *Elaphomyces anthracinus*, *Elaphomyces subviscidus*, *Fevansia aurantiaca*, *Gastroboletus subalpinus*, *Gastroboletus turbinatus*, *Gastroboletus vividus*, *Gastrosuillus amaranthii*, *Gastrosuillus umbrinus*, *Gautieria magnicellaris*, *Gautieria othii*, *Gymnomyces abietis*, *Helvella crassitunicata*, *Hydnотrya inordinata*, *Hygrophorus caeruleus*, *Leucogaster citrinus*, *Polyozellus multiplex*, *Ramaria abietina*, *Ramaria amyloidea*, *Ramaria araiospora*, *Ramaria aurantiisiccescens*, *Ramaria botrytis* var. *aurantiiramosa*, *Ramaria celerivirescens*, *Ramaria conjunctipes* var. *sparsiramosa*, *Ramaria coulterae*, *Ramaria cyaneigranosa*, *Ramaria gelatiniauriantia*, *Ramaria gracilis*. *Ramaria*



*hilaris* var. *olympiana*, *Ramaria largentii*, *Ramaria maculatipes*, *Ramaria rubrievanescens*, *Ramaria rubripermanens*, *Ramaria stuntzii*, *Ramaria suecica*, *Ramaria thiersii*, *Rhizopogon abietis*, *Rhizopogon alexsmithii* (*Alpova alexsmithii*), *Rhizopogon atroviolaceus*, *Rhizopogon brunneifibrillosus*, *Rhizopogon truncatus*, *Sarcodon fuscoindicus*, *Turbinellus floccosus* (*Gomphus bonarii*), and *Turbinellus kauffmanii* (*Gomphus kauffmanii*).

### 3.10.3 Effects Analysis

#### No Action Alternative

The No Action alternative would have no direct effects to any of the target species. Under this alternative, none of the thinning or fuels reduction treatments and connected actions (such as temporary roads) would take place. 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 report 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

The actions proposed have direct, ground-disturbing effects to all the target species discussed above. Project design criteria and mitigations would be employed to reduce the direct effects of these actions to acceptable and potentially beneficial results.

#### *Cypripedium montanum* and *Cypripedium fasciculatum*

Two of the historic populations of mountain lady's-slipper were monitored following timber sales in the early 1980s. These sales involved harvest and underburning as well as clearcutting and broadcast burning. Most of the plants in these populations were protected from harvest activities, while some were left in treatment areas to monitor the response. Monitoring of these populations showed that the most successful populations of mountain lady's-slipper appeared in areas with protection by shrub cover, and also with overstory openings. Areas with closed canopies had reduced vigor over subsequent years. This suggests that an effective means of preserving this species involves leaving residual patches of vegetation while opening up the tree canopy to between 35 and 50 percent (Helliwell 1990, 1991). This is supported by other findings where plant survival and spread was higher in shelterwood cuts rather than clear-cut or uncut forests (Huber 2002, Kaye 1999).

Research is not clear on the role that fire plays with these species. It is certain that fire suppression has resulted in dense stand conditions which do not favor lady's-slipper and may be an important factor in



**Figure 75. *Clavariadelphus ligula*, a mycorrhizal club-fungi. Photo by C. Mead.**

their decline. While some studies found that mountain lady's-slipper emerged immediately following fire (Pappalardo 1997), others found it to be fire-intolerant (Harrod et al 1997). Post-fire survival depends on the survival of the root crown and also on the recovery of shrubs and other understory plants which provide necessary shade and protection (Knorr and Martin 2003). Timber harvest activities would directly impact these plants through the removal of individuals and the disturbance of soil and litter. Prescribed fire has the potential to also remove individuals if the fire burns hot enough to destroy the root crown and underground rhizomes. Prescribed fire would also disturb soil and litter, and may damage the mycorrhizal soil fungi the mountain lady's-slipper is associated with if it burns at a high intensity.

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 and landing or slash pile placements. Fire crews would be provided maps of these site locations, 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. 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.

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 this 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 the plants appears important in maintaining these populations.

### ***Bryophytes and Lichens***

For terrestrial species, the removal or destruction of dead and decaying logs and large conifers by timber harvest, road or trail construction, or fire are all direct effects and would remove both individuals and habitat. For epiphytic species, the removal of standing snags or large, living conifers has the same effect.

A diversity of downed woody materials would be maintained on-site to meet the standards for soil protection and sensitive mollusk 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. All 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.

### ***Fungi***

Threats to fungi occur at many levels, from direct impacts to the substrates on which fungi grow to larger-scale, indirect impacts such as global climate change or pollution. The requirements for fungal habitat are not well understood. In addition to providing a food source for saprobic fungi, down woody debris and litter may function to retain moisture and provide refugia for fungal species, especially in dry sites. In addition, the size of this down woody material is important. Having a wide size range of material, from large, logs to small twigs, and a variety of decay classes would decrease the homogeneity of the site and increase the fungal diversity. Management actions which threaten fungi include intense removal of hosts, woody material and litter, or management of a site which changes the microclimate. The fungal organism can be directly destroyed when machinery churns and breaks up the soil where these species reside. The mushroom is only a fruiting body. Each fungi persists as a thread-like network of fungal mycelia within the soil. Regional effects to fungi, and mitigation measures to minimize these effects were considered during the 2000 Final Supplemental Environmental Impact Statement for Amendment to the Survey &



Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (USDA/USDI, 2000) and are discussed below.

The Mt. Hood National Forest Plan was amended by the 2001 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 (USDA/USDI, 2001). The 2001 Survey and Manage ROD is based upon the 2000 Final SEIS. The 2000 Final SEIS analyzed the effects of applying Survey & Manage mitigation measures during habitat disturbing activities.

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 will still result in a moderate level of uncertainty that there will 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. As described below, 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.”

That analysis is incorporated here by reference.

As described below, there is no new information or changed circumstances that would substantially change the effects anticipated in the 2000 Final SEIS.

1. The proposed action applies all mitigation measures for this type of project as expected in the 2000 Final SEIS and adopted in the 2001 ROD.
  - Equivalent-effort surveys for 82 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. New sites were discovered for *Clavariadelphus ligula*, *Clavariadelphus truncatus*, *Polyozellus multiplex*, *Sparassis crispa*, and *Spathularia flavida*.
  - *The known sites of Albatrellus flettii*, *Clavariadelphus ligula*, *Cortinarius olympianus*, *Hygrophorus californicus*, *Ramaria maculatipes*, and *Ramaria rubripermanens*, which are located within the project boundaries would be managed according to the Management Recommendation and Conservation assessment for Fungi. These sites and the newly discovered sites would be incorporated into patch retention areas and would be buffered from ground disturbing activity, including skid trails, landings, and fire lines. These areas may still be impacted by prescribed fire (see further analysis).
2. The predicted rate of habitat disturbance on federal lands in the Northwest Forest Plan area is within that analyzed in the 2000 Final SEIS. The predicted rate of habitat loss (i.e. late-successional forest) due to management activities is described on Pages 180-181 in the 2000 Final SEIS: “...the likelihood that an activity modifying late-successional forest will occur within the range of a truly rare of localized species population must be viewed in light of the relatively conservative degree of modification of late-successional forest projected to occur with in the northwest Forest Plan Area. For example, management activities (timber harvest and prescribed fire) are projected to modify approximately 3 percent of the late-successional forest within the area over the next decade.”

The Northwest Forest Plan 15-year Monitoring Report on Status and Trends of Late-Successional and Old-Growth Forests (Moeur et al. 2011) concluded that LSOG areas decreased on federal lands by an estimated 1.9 percent plan-wide over the monitoring period (1994 – 2008). This loss of habitat was from all sources, mostly wildfire. Actual losses from management activities were <0.5%. This is substantially less than the 3% predicted in the 2000 Final SEIS. The effects to these species are well within what was anticipated in the 2000 FSEIS, even with the impacts from this project. Since the objective of the Survey and Manage mitigation is related to the Forest Service viability provision to provide for viable populations across the planning area, management consistent with the Survey and Manage Standards and Guidelines would also meet Forest Service Sensitive species policies to not result in a trend towards listing or a loss of species viability.



**Figure 76. Clavariadelphus truncatus, a mycorrhizal club fungi. Photo by C. Mead**

As discussed above, 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 is also limited by the forest plan standards for soil protection. This disturbance remains a risk for species. 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). If mastication or chipping methods are applied in these areas, it would still maintain the large down woody material, and would be scattered so as to avoid excessive deposition. If pile burning is 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.

### Cumulative Effects

The area analyzed for cumulative effects was within the Clear Creek, Middle Beaver Creek, Middle White River and Wapinitia Creek 6<sup>th</sup> field subwatersheds. This serves to include the appropriate habitats for target sensitive species as well as the habitats targeted for improvement during these proposed actions. 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 future 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 range 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, however, it is affecting <10 percent of the combined acreages of the four watersheds (103,277 acres).

### **3.10.4 Consistency Determination**

#### **Forest Service Policy**

The No Action and the Proposed Action Alternatives are consistent with all applicable Forest Service Standards:

#### **Mt. Hood National Forest Land and Resource Management Plan (Forest Plan) Direction**

The No Action and the Proposed Action Alternatives are consistent with all applicable Forestwide Standards.

#### **2001 Survey and Manage Record of Decision**

The No Action and the Proposed Action Alternatives are consistent with the survey protocols 2001 Survey and Manage Record of Decision. All botany surveys included consideration of botanical species in table C-3 of the 2001 Survey and Manage Record of Decision.

#### **NFMA Implementing Regulations**

The No Action and the Proposed Action Alternatives are consistent with all applicable NFMA regulations.

## 3.11 Invasive Plant Species

### 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.

Invasive plants can inhabit and negatively alter native plant communities and ecosystems. Aggressive invasions may cause long-lasting management problems. These species can displace native vegetation, increase fire hazards, reduce the quality of recreational experiences, poison livestock, alter nutrient dynamics, increase soil erosion and replace both wildlife and livestock forage. By simplifying complex plant communities, weeds reduce biological diversity and threaten rare habitats. Most invasive non-native plants in the Pacific Northwest originate from Europe and Asia. The predators and diseases that control these plant species in their native habitats are not present in the habitats where they have been introduced. Unchecked by predators or disease, such plants may become invasive and dominate a site, displacing native plants and altering a site’s biological and ecological integrity.

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 Mt. Hood National Forest and Columbia River Gorge National Scenic Area (March 2008). Both of these documents amended the Mt. Hood National 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.

The Oregon State Weed Board maintains a list of target invasive species that are considered a high priority for the state. These species are termed “noxious weeds” and are defined as “exotic, non-indigenous, species that are injurious to public health, agriculture, recreation, wildlife or any public or private property.” The noxious weeds listed in

Table 92 below are identified by the Oregon Department of Agriculture (ODA) and are known to occur within or adjacent to the project area. For a complete list of Oregon noxious weeds see Appendix 1 of the Invasive Species Specialist Report.

**Table 92. Noxious weeds as determined by Oregon State Weed Board**

Common name	Scientific name	Designation*
Armenian (Himalayan) blackberry	<i>Rubus armeniacus</i> ( <i>R. procerus</i> , <i>R. discolor</i> )	B
Broom, Scotch	<i>Cytisus scoparius</i>	B
Houndstongue	<i>Cynoglossum officinale</i>	B
Knapweed		
Diffuse	<i>Centaurea diffusa</i>	B
Meadow	<i>Centaurea pratensis</i>	B
Spotted	<i>Centaurea stoebe</i> ( <i>C. maculosa</i> )	B, T
Medusahead rye	<i>Taeniatherum caput-medusae</i>	B
Perennial peavine	<i>Lathyrus latifolius</i>	B
St. Johnswort	<i>Hypericum perforatum</i>	B
Tansy ragwort	<i>Senecio jacobaea</i>	B, T
Thistle		
Bull	<i>Cirsium vulgare</i>	B
Canada	<i>Cirsium arvense</i>	B

Noxious weeds are designated as “A”, “B” and/or “T” according to the 2017 ODA Noxious Weed Rating System:

“A” Designated weed – a weed of known economic importance that occurs in the state in small enough infestations to make eradication /containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent. Recommended action: Infestations are subject to intensive control when and where found.

“B” designated weed - a weed of economic importance that is regionally abundant but may have limited distribution in some counties. Where implementation of a fully integrated statewide management plan is infeasible, biological control shall be the main control approach.

“T” designated weed – a priority noxious weed designated by the State Weed Board as a target weed species for which ODA will implement a statewide management plan.

In addition to noxious weeds, which are designated by the State, there are other non-native plants of concern in this area that are not officially termed "noxious" (Table 93). Efforts to proactively remove these plants where found will reduce the risk of infestation, and eventual noxious weed listing. These and other species of concern populate areas throughout the forest (Appendix 2 of the Botany Specialist Report), and will be discussed where deemed appropriate.

**Table 93. Additional non-native plant species of concern known on the Mt. Hood National Forest**

Common Name	Scientific Name
birdsfoot trefoil	<i>Lotus corniculatus</i>
bulbous bluegrass	<i>Poa bulbosa</i>
cheat grass	<i>Bromus tectorum</i>
Foxglove	<i>Digitalis purpurea</i>
reed canarygrass	<i>Phalaris aquatica</i>
North African grass, voodoo grass	<i>Ventenata dubia</i>

The sites of known infestations for these species are recorded in the Natural Resource Manager Threatened, Endangered and Sensitive Species – Invasive Species Database (NRM TESP-IS 2016). This database is used to record sites and treatment information. This information was used to determine known populations of invasive species within this project area. In addition, extensive ground surveys using intuitive-control transect methods were conducted throughout this project area during the 2016 and 2017

field seasons to determine current conditions and high risk areas. Surveys were conducted along all travel ways and within project units to determine which species were present, the level of infestation and the vectors for weed dispersal. This information was then used to determine the likely risk associated with the proposed activities.

### 3.11.2 Existing Condition

The Crystal Clear Restoration project area includes several plant association types, and a variety of habitats, from dry ponderosa pine/Oregon white oak stands to moist, mid-elevation hemlock stands. 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.

There are many habitat types within this area, but much of the proposed project units had relatively low native species diversity, due to dense canopy closure and heavy 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.

These species will be discussed in further detail below. 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. See Appendix 3 of the invasive species specialist report for a map of the known invasive species infestations within this area.

#### ***Cynoglossum officinale* - houndstongue**

Houndstongue, also known as beggar's lice (Scoggan 1976) dog's tongue (Greatorex 1966), dog bur or sheep lice (Muenscher 1980), among other names, is a biennial or short-lived perennial weed which reproduces by seed. It has been introduced to North America from Eurasia. Although it is usually not a weed of cultivated fields, houndstongue may become a serious rangeland weed. As the common names suggest, this weed is characterized by large, densely-haired leaves and seed coats which are covered in hooked, Velcro-like spines. The flower of houndstongue matures into four nutlet-like seeds, wrapped in this spiny seed coat. These seeds readily cling to hair, wool and fur (Gains and Swan 1972), which reduces the value of sheep, and causes irritation and behavioral problems in cattle.

In this project area, the heavy grazing has resulted in reduced diversity of competitive, understory plant species. The open-grown areas (either natural, or created through past management activities) which would typically support forage species (grasses, etc) are now often dominated by houndstongue.

The viability of fresh houndstongue seeds exceeds 90% (Boorman and Fuller 1984). In the Netherlands, viable seeds were found to occur almost entirely within the first 1 centimeter of soil; and viable seeds did not occur deeper than 5 centimeters (Van Breemen 1984). Lhotska (1982) reported that, in Czechoslovakia, houndstongue seeds may remain viable for 2-3 years. Houndstongue does not produce a large, persistent seed bank, since buried seeds do not survive burial past 1 year (Van Leeuwen and Van Breemen 1930, 1980; Boorman and Fuller 1984; Van Breemen 1984). However, seeds may overwinter on the inflorescences or the on the soil surface (Van Breemen and Van Leeuwen 1983).

Houndstongue was introduced to this area via seed, which was likely carried on equipment during a past utility installation and maintenance project. Following this introduction, timber management practices opened up the forest stands and created additional habitat. This area is also an active grazing allotment. The continued use of this area for grazing and for wildlife forage means that a vector will always be in



place for the spread of these weed seeds on animal fur. There is also heavy use within this area for recreational Off-Highway Vehicles (OHVs) within the designated McCubbins Gulch OHV Area. Houndstongue seeds do not stick to vehicles, but can be carried in the soil which is caught in the tires or rims of these machines, and can also be caught on the clothing of OHV operators. Houndstongue infestations are documented on almost 600 acres within the eastern half of this project area. During surveys, houndstongue was found within most of the heavily managed units, which increases this acreage substantially.

### ***Senecio jacobea – tansy ragwort***

Tansy ragwort is a biennial or short-lived perennial native to Europe, Siberia and Asia. It grows in variety of conditions, but is most common in pastures, sparse forests, rangeland, roadsides, burned areas and other disturbed locations (Bain 1991). It prefers climates with cool, wet weather. It can successfully overwinter under snowpack, but dry summer weather will limit its growth. In the Crystal Clear Restoration project area, it is known from most of the road systems on the west half of the project area, primarily within the Hood River Ranger district. This species will not persist under closed canopy, so it is primarily found on roadsides, or within old timber sales that have not developed canopy closure. It is common to find it in frost pockets, where vegetation is limited.

This weed disperses numerous, small seeds short distances by wind (typically <5 meters) (McEvoy and Cox 1987). The seeds have a barbed pappus structure to aid in this dispersal which can also be caught on fur, clothing or machinery and be carried further. These seeds germinate rapidly, and may also persist in the soil for up to 8 years (McEvoy 1984).

Tansy is also a poisonous species for livestock, and can cause irreversible liver damage. Unlike houndstongue, however, there is a biological control in place for this weed species. The cinnabar moth was approved for release as a biocontrol of tansy ragwort in 1959, and has helped to control populations across the west (Coombs et al 2004).

## **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 will experience a catastrophic, stand-replacing wildfire within the next several years. The dense canopies and heavy fuel loading will result in severely burned conditions on the ground. This would create favorable conditions for invasive species colonization and spread.

### **Proposed Action**

The Proposed Action would involve cutting trees, temporary road building, and landing construction, which would cause a reduction in canopy and stems. This would provide favorable light conditions for invasive species establishment. Harvest activities (yarding material) 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. This is an inevitable conclusion. The project area already includes a large populations of houndstongue and tansy ragwort, and minor populations of other species. There are no mitigations to completely remove these populations prior to project implementation, and no direction to limit the ongoing use of this area for grazing and recreation.

Conceivably, all the treatment acres would 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.

Project Design Criteria 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. This prevention would occur through the 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, treatment units would be implemented in clean units before moving to infested units, so as to minimize the spread of weeds. Wash stations would be set up within the project area. 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. Seeds could be transported not just to other sites on forest but to homes or other work sites off forest. Haul routes, landings and certain known infestations within treatment units would be treated prior to implementation. Use of slash or masticated wood material to cover open ground and prevent weed infestation would be utilized.

This is the first large scale effort for weed prevention within this infestation area, and would provide opportunity to begin addressing this issue rather than allowing it to continue spreading without management in place. 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 Mt. Hood National Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16.

### **Cumulative Effects**

The area analyzed for cumulative effects was within the Clear Creek, Middle Beaver Creek, Middle White River and Wapinitia Creek 6<sup>th</sup> field subwatersheds. This serves to include the appropriate habitats for target sensitive species as well as the habitats targeted for improvement during these proposed actions. 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 future thinning and fuels reduction proposed as part of this analysis.

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. Project Design Criteria, as discussed above, would mitigate for the introduction and spread of invasive species. Under the 2008 Site-Specific Invasive Plant Treatment EIS, roadside populations would be treated regularly depending on the need and level of infestation. These combined actions would lower the risk of invasive species 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 Mt. Hood National Forest and Columbia River National Scenic Area in Oregon including Forest Plan Amendment #16.

### **3.11.4 Consistency Determination**

Forest Service Manual (FSM) 2900 Invasive Species Management direction requires the determination of “the risk of invasive species introduction or spread as part of the project planning and analysis process for proposed actions, especially for ground disturbing and site altering activities, and public use activities” (FSM 2904.08, #8)

FSM 2900 also states, “Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas” (FSM 2903).

The identification of management and prevention is also consistent with the Site-Specific Invasive Plant Treatments for Mt. Hood National Forest and Columbia River Gorge National Scenic Area in Oregon FEIS/ROD (2008).

The project is consistent with LRMP standards and guides and Northwest Forest Plan Direction relating to invasive species.

## 3.12 Recreation

### 3.12.1 Analysis Assumptions and Methodology

This section will examine several different types of recreation resources, including: developed recreation facilities, dispersed recreation, trails, and special use permits. This report will also consider 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* section of this report. 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 be examined in the context of the prescribed management allocations and standards and guidelines under the Forest Plan (USDA 1990). This report will also discuss 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.

#### Recreation Opportunity Spectrum (ROS)

The desired condition for this area is one where “opportunities for dispersed recreation in roaded setting are plentiful” (Forest Plan 1990). The planning area falls within two ROS settings: Roaded Natural, and Roaded Modified. These ROS settings provide for the following recreation experiences:

##### Roaded Natural

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. This ROS is characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. These evidences usually harmonize with the natural environment. 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. Conventional motorized use is provided for in construction standards and the design of facilities.

### **Roaded Modified**

This 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.

### **Developed Recreation Facilities**

There are several developed recreation sites within the planning area. These include:

- **McCubbins Gulch Campground.** This site is a rustic campground with many shady sites near Camas Creek. This campground is within the McCubbins Gulch OHV area's designated trail system, and these sites are designed to accommodate larger space needs. This site includes an upper and lower OHV staging area. Campers are likely to hear and see OHV enthusiasts during their stay.
- **Bear Springs Campground.** This is a campground built to accommodate larger groups. It also includes a day use area and shelter.
- **Clear Creek Crossing Campground.** This is a relatively quiet and shady spot near Clear Creek
- **Staging area on Forest Road 2130.** This is used as a trailhead for the McCubbins Gulch OHV Trail System and includes a toilet and asphalt parking spaces.

### **Dispersed Recreation Use**

Dispersed recreation occurs throughout the project area, and common activities include: driving for pleasure, hunting, special forest products collection, and camping.

Driving for pleasure can occur on any open road within the planning area, but is most heavily concentrated along Highway 26 and OR-216. Highway 26 is one of the most popular scenic routes on the Mount Hood National 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. This type of camping is allowed in many locations, however the Forest Service does not actively manage or promote these campsites. There are no toilets, picnic tables, etc., but there may be visitor created developments such as vehicle pullouts and fire rings. Visitors occupy dispersed campsites on a first come first serve basis and across the Forest there are large numbers of existing or potential dispersed campsites. The Forest Service does not have a complete inventory of dispersed campsites within the project area, but local manager experience suggest 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.

### **Trails**

There are a variety of system trails within the planning area, as shown in Table 94 and on the maps found in Appendix A of the Recreation Specialist Report. These trails are maintained by District trail crews, and in partnership with multiple volunteer groups.

**Table 94. Trails within the planning area**

<b>Trail Name and Number</b>	<b>Permitted Uses</b>	<b>Mileage within Planning Area</b>
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
Snowmobile Trails	Snowmobile, XC Ski, Snowshoe	36.6

**Camas Trail #490/#490A.** This non-motorized trail follows Camas Creek and Clear Creek to Keeps Mill Campground in the White River Canyon. From the Camas Prairie trailhead, the trail leaves a meadow and heads east into thick ponderosa pine. The trail tread is well establish and the trail offers a primitive experience appropriate to its trail class. Use levels along this trail are low to moderate, and it is used for recreation events.

**Clear Creek Trail # 487.** This trail originates at Clear Creek Campground and travels through forest along the creek eventually reaching Camas Prairie. This trail is popular for mountain biking and short day hikes, often by visitors staying at the campground. This trail is fairly primitive and has a well-established tread. Use levels along this trail are low to moderate, and it is used for recreation events.

**McCubbins Gulch OHV Trail System.** There is a designated Off Highway Vehicle (OHV) trail system in the project area that is open to vehicles wheeled vehicles 50 inches or less (quads and dirt bikes). This system was established under a Forest OHV Management Plan (USDA 2010). This management plan was completed to comply with the national travel management direction and regulations, and it adopted many existing trails, some with a history of use dating back to the 1960s. This management plan authorized creation of several new trails, conversion of some forest roads to trails, and trail realignments. Much of this authorized work has been completed working in partnership with the Mt. Scott Motorcycle Club and Hurricane Racing, however some of the trails authorized under the OHV Management Plan have yet to be implemented on the ground. The McCubbins Gulch OHV trail system closes between December 1 to April 1 to protect deer and elk winter range. It is also not uncommon for the trails to be closed during peak fire season.

**Non-system trails.** There are some non-system trails within the planning area, however there has not been a complete survey of the planning area for these types of trails. Some of these trails may have been created by Forest Visitors without the knowledge or consent of the Forest Service. Others may be remnants of historic trails or sections of trails which are no longer part of the official trail system. All motorized use of any unauthorized and undesignated routes is prohibited.

**Winter Snowmobile Trails.** There are several groomed snowmobile routes located within the planning area. These routes are roads in the summer, but become part of a system of snowmobile trails during the winter. Orange diamonds on trees along the side of the road are used to mark these trails. Snowmobiles are permitted for cross-country travel on National Forest Lands, except where they are specifically prohibited (i.e. wilderness areas).

### **Special Use Permits**

There are several recreation-related special use permits issued within the planning area. 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:

- Mt. Scott Dual Sport Ride
- Black Dog Duall Sport Ride
- Bear Springs Trap Mountain Bike Race

- McCubbins Gulch Scramble
- Cascade Pacific Council Boy Scout Horse Trek

### **Wild and Scenic Rivers**

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. These acres are classified as scenic and have a B1 management area allocation under the Forest Plan. The proposed action does not include and actions within these 65 acres.

### **Wilderness**

A section of the congressionally designated Lower White Wilderness adjoins the project area to the north. The intent of this designation is to preserve and protect the wilderness area in its undeveloped and natural condition; to allow natural processes to operate freely; and to provide opportunities for solitude and primitive recreation.

## **3.12.3 Effects Analysis**

### **No Action Alternative**

#### ***Direct Effects***

There would be no direct effects as a result of selecting the no action alternative.

#### ***Indirect and Cumulative Effects***

The 2010 OHV Management Plan authorized creation of several new trails, conversion of some forest roads to trails, and trail realignments, however much of the work authorized under the OHV Management Plan has yet to be implemented on the ground. An indirect effect of not 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. Timber sales typically generate Knutson-Vanderburg Act or stewardship 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 existing trails which were recently converted from roads would continue to naturalize and provide a more desirable trail experience.

### **Proposed Action**

#### ***Developed Recreation***

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.

#### ***Dispersed Recreation***

The proposed activities could affect dispersed campsites 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. This would reduce the number of dispersed campsites available within the planning area. In the longer term the proposed action is unlikely to have more than a nominal effect on the availability of dispersed campsites within the project area.



Implementation of the proposed action may also create new locations which could be desirable for use as dispersed campsites. Temporary roads and landing decks are examples of the types of features which visitors occasionally convert to dispersed campsites after conclusion of timber harvest activities. There are occasionally resource concerns associated with the development of dispersed campsites as they are not planned, created, or maintained by the agency. A mitigation to address this concern would be to close and obliterate any temporary roads that were created as a result of implementing the proposed alternative. This would limit the potential for creation of new dispersed sites and reduce potential for driving of closed roads.

Overall, there could be localized effects to dispersed campsites as a result of the proposed action, but the overall 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 recreationist seeking this type of opportunity both inside and outside the project area.

Dispersed recreation activities that occur within the project area also have the potential to be affected by the proposed action. These types of recreation are not closely monitored by the forest service which makes it challenging to definitively know exactly which activities are taking place and exactly where these activities are taking place. Effects to dispersed recreation activities are also challenging to quantify because of the wide range of activities that might utilize the same area. For example, the proposed actions might improve hunting opportunities within a specific stand while conversely diminishing opportunities for harvesting special forest products such as mushrooms. Any effects would likely be localized in nature and not significant because many opportunities would continue to be available within the wider Forest for dispersed recreation activities. A likely short-term effect is that dispersed recreationists would avoid using areas where logging is occurring due to noise and equipment. Some recreationist do not prefer landscapes with visible effects of management and might subsequently choose to avoid the area in the short term. 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.

### **Trails**

Wherever possible the proposed alternative would avoid the reuse of roads converted to trail. In some locations this would not possible due to soil conditions, streams, or other resource concerns. 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. Landing piles would also be created in some locations along these trails. After implementation of project activities trail tread would be re-established, 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. As mentioned in the existing condition section, several portions of affected trail are roads to trails conversions which have yet to be implemented or were never fully implemented. In these cases 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.

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 the effects 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 reset the clock on 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 are a likely mitigation. If closures were to occur, it would impact recreationist who desired to utilize the trail. Professional experience also suggests that the magnitude of this impact is greater if recreationist discover that only discover that a trail is closed upon arrival at the trailhead. 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 effectively 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 over 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 recreationist could be significant if trail closures were not coordinated. The proposed alternative includes a mitigation requiring coordinate of activities to minimize the effect to recreationist to the degree practicable. This mitigation 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 request for winter operations during implementation. Any winter operations which required use of the network of groomed winter trails, access roads, or parking areas would have the potential to affect winter recreation and trail use. There would be the potential for conflicts between treatment operations and winter recreationist in regards to safety, road use and parking. 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.

The 2010 OHV Management Plan authorized creation of several new trails, conversion of some forest roads to trails, and trail realignments, however many of the trails authorized under the OHV Management Plan have yet to be implemented on the ground. 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 do 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.

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 alternative includes a mitigation 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.

### ***Special Uses***

The proposed alternative would have the potential to disrupt or effect recreation events or races within the planning area. Trail closures have the potential to significantly alter routes or make some events entirely unfeasible. The planning and logistics for these types of events typically begins well in advance of the event itself, and it could create significant hardship for event planners if they were asked to adjust at the last minute. Providing timely information well in advance of the event regarding trail closures, timing and reroutes would help mitigate the potential for these effects.

### ***Wilderness***

The proposed activities would not directly impact wilderness as long as the activities do not cross the wilderness boundary. Given that units 1, 2, 5, 6, 7, 15, 41, 42, 454L, 455, 457, 458, 464, 466L are near the boundary of the Wilderness, there is reason to be concerned that proposed activities could inadvertently cross the Wilderness Boundary. It would be a significant impact to wilderness if any of the proposed activities inadvertently occurred within the congressionally designated Lower White Wilderness. Of particular concern is the potential for motorized equipment to cross the boundary, or if

trees fell across the boundary and were subsequently yarded out. This concern could be mitigated by clearly marking the Wilderness boundary and providing clear direction in sale contracts.

In general, the proposed action would include vegetative disturbance and also reduce canopy cover. The proposed actions also include equipment operations which has the potential to transport seeds from other locations. This increases the likelihood of the establishment or growth of non-native invasive plants. Proposed actions in units 1, 2, 5, 6, 7, 15, 41, 42, 454L, 455, 457, 458, 464, 466L which are immediately adjacent to the Lower White Wilderness could create a vector which would allow additional invasive plants to become established in Wilderness. Establishment of non-native and invasive species would reduce the natural Wilderness Character of the area. Subsequent treatments might improve the natural character of Wilderness, but would result in an impact to its untrammeled character. Preventing the establishment of non-native and invasive species is the most desirable method of preserving wilderness character. A mitigation to treat equipment prior to operation would reduce the risk of introducing invasive weeds. As would treatment of any invasive species in stands nearby wilderness prior to, and after, implementing proposed actions.

### 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. This boundary was determined based on the interconnected access to recreational resources such as trailheads, road networks and campgrounds. Table 10 in the Environmental Assessment lists recent, current, and future projects or activities that have been tracked in the analysis, including activities on private lands. Cumulative effects are outlined in Table 95 below for projects and activities that have the potential for cumulative effects to recreation.

**Table 95. 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 2009 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 2009 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 mid-term.
Ongoing Developed Recreation Site Operations	Developed Recreation Facilities	Yes	Yes	No	

### **3.12.4 Consistency Determination**

#### ***Forest Plan***

Both alternatives 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.

#### ***2009 OHV Management Plan***

Both alternatives would be consistent with the direction set for OHV trails within the planning area under the 2009 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 activities proposed in Alternative 2 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 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 is undeveloped Wilderness character was preserved. Under alternative 2 mitigations would be taken outside of Wilderness to prevent the spread of noxious weeds into the Lower White Wilderness and preserve its natural character.

## 3.13 Visual Quality

### 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;
- 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

#### Scenic Context for Planning Area

The terrain within the project area is predominately built upon intrusive and extrusive volcanic rocks which have been sculpted over time by glaciers and other erosive forces. Mount Hood is the dominant topographic feature in the area, and its massif is a visual focal point when it is not screened by vegetation

or terrain. The White River originates on Mount Hood and flows through canyons scoured by water erosion and debris flows. Most of the waterways within the project area flow into the White River just to the north of the project boundary.

The majority of the project area is blanketed by a mixed conifer forest (fir, hemlock, larch, and pine). Precipitation within the project area varies, which leads to moister and denser stand conditions to the west that transition to drier and more open stand conditions to the east (USDA 1996). Common understory species include: vine maple, ninebark, oceanspray, Oregon grape, beargrass, snowberry, vanilla leaf, and bluebunch wheatgrass (USDA 1989). Historically the typical old-growth structure in the project area was a multi-story 'cathedral like forest' usually dominated by large ponderosa pine and Douglas fir (USDA 1995). Old growth stands typically possess a high degree of visual interest in the foreground due to the presence of large trees, diversity of species, and diversity of age and size classes. Due to logging and fire exclusion these scenic characteristics are much less common than they were historically (USDA 1995).



**Figure 77. Multi-story cathedral like forest**

Natural disturbance, such as fire, historically created larger openings in the canopy of several tens to several hundred acres. These openings contrasted with the mostly forested landscape and created opportunities to view the underlying topography as well as views towards Mount Hood. These disturbances also created conditions which allowed a greater diversity of species to persist within the project area. Current frequencies and intensities of disturbance have departed from their historic range due to fire suppression and timber management activities (Macdonald 2017).

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 detraction 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, 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.

### Visual Management Areas

There are several additional management areas within the project area, including: Special Old Growth (A7), Key Site Riparian Reserve (A9), and the White River Wild and Scenic River (B1). As none of the proposed actions would occur within these areas, they are not covered in detail in this report. The planning area also includes Pileated Woodpecker/Pine Martin Habitat (B5) management areas. This designation overlays with the designations in Table 96 and adopts their prescribed VQOs.

**Table 96. Visual Quality Objectives by Management Area**

Management Areas	Distance Zone from Viewer Position		
	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

### Deer Winter Range and Wood Product Emphasis (B10 & C1)

While managed for different purposes, lands under these two management areas share a modification VQO for all distance zones. There has been a significant amount of past timber harvest activity 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.

Other human modifications to the landscape include an extensive network of designated Off Highway Vehicle (OHV) trails. McCubbins Gulch is an established campground within this area. There are also unofficial dispersed campsites and non-system trails and roads within these management areas. While human modifications are present within these management areas they remain visually subordinate to the natural landscape, and these areas currently meet the prescribed modification VQO.



**Scenic Viewshed (B2)**

**Table 97. Designated Viewsheds**

Designated Viewsheds	Viewer Position	Distance Zone from 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**

Stands potentially visible from Highway 26 or Highway 216 include: 47, 85, 134, 159, 208, 233, 260, 413, 422, 423, 470, 475, 476, 501, 502 and 504. More information regarding these stands is located in the project file.

Highway 26 tends to pass through moist mixed conifer forest whereas OR 216 also passes through dry mixed conifer forest as it approaches the eastern boundary of the project area. There are some visual differences between vegetative species associated with these two types of stands, however the remainder of the visual conditions present are similar between both highways.

In several locations these highways pass through previously harvested stands. There are still visible stumps and occasional temp roads and skid trails which intersect with the highway and detract from the visual quality objectives. In the years since these past treatments occurred, vegetative regrowth has also obscured much of the visual evidence of past harvest, and the magnitude of this effect is minor.

Particularly notable are some of the clearcut treatments that occurred in the Late 1980's and early 1990's. These areas were thickly replanted and are now thick sapling stands, and the average height of trees in these stands is 41 feet. According to the Forest Plan a created opening is generally no longer considered visually disturbed when the vegetation within it reaches an average of 20 feet in height. In comparison to the characteristic landscape the vegetative regrowth is often quite dense which limits views into the stand beyond the immediate foreground. The regrowth also lacks the visual diversity and interest that is a key component of the foreground retention VQO. The existing condition for these sapling stands aligns more closely with a partial retention VQO than the prescribed retention VQO.

Highway 26 and OR-216 are both significant state highways. 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 will focus on the natural setting, and at the normal rate of travel (55mph) the magnitude of these effects is minor.

Overall, the views from these two designated view sheds 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.

**White River Viewshed**

Affected Stands: 93, 121, 268, 315, 317, 318, 319, 386

This 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 desired condition is one where large diameter ponderosa pine stands on top of a deeply incised gorge allow visitors perceive the canyon as pristine and remote (USDA 1990). 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.

Stand 319 is within the foreground distance zone from the river and has a retention VQO. This stand is located at the top of the canyon, and is generally not visible from the river or other identified viewpoints. This stand was clear cut over 25 years ago and is currently composed of thickly stocked saplings with little diversity of size, age class, or species. At a distance, the shape and outline of the stand is still visible in contrast to surrounding stands which have not been cut recently. Due to the still visible effects of past regeneration harvest, this stand currently aligns more closely with a partial retention VQO than the prescribed retention VQO.

**Project Area Trails**

Multiple designated trails are located entirely within the planning area or intersect with the planning area. Table 98 below lists the trails that cross the planning area as well as their visual sensitivity levels as classified by the Mount Hood National Forest Plan. Within these sensitivity levels visual quality objectives are prescribed for foreground, far foreground, and middleground.

**Table 98. Designated trails within the planning area**

Trail Name and Number	Sensitivity Level	Distance Zone from Viewer Position		
		Foreground	Far Foreground	Middleground
All OHV Trails within the 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				

**Sensitivity Level II Trails**

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.

**Trail #490**

Potentially affected stands: 169

**Trail #490A**

Potentially affected stands: 73, 74, 174, 175, 242

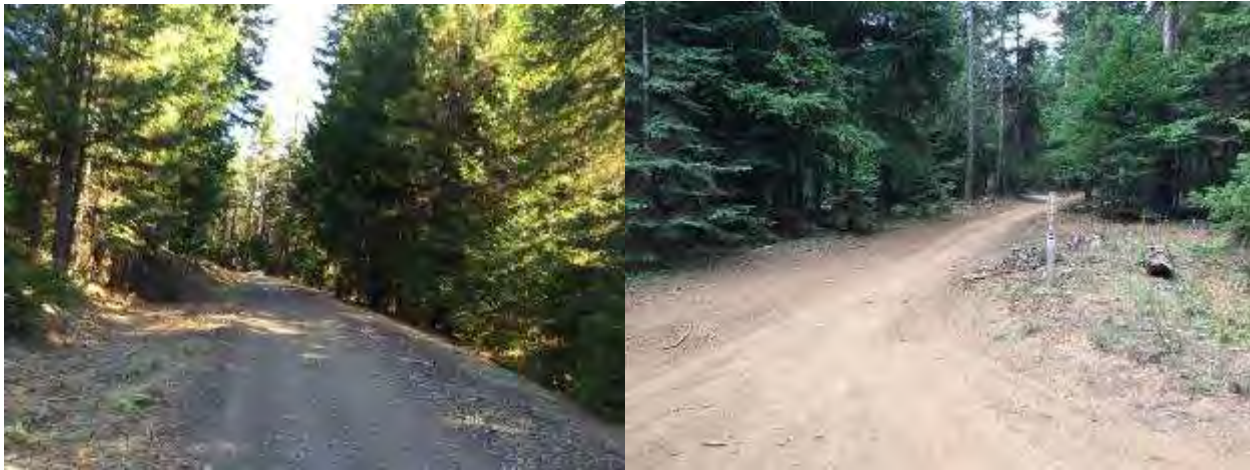
**Trail #487**

Potentially affected stands: 89, 90, 95, 96, 145, 232, 235, 269, 277, 347, 473, 474

**Sensitivity Level III Trails**

**OHV Trails**

Many of the trails within the project area were originally roads which were converted to trail (USDA 2009). Many of these trails 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.



**Figure 78. Images of trails in the McCubbins Gulch OHV System. The image on the left is the 576F Trail. The 576 is on the right. Large portions of these trails have not been actively converted to trail and have the visual characteristics of a road.**

**3.13.3 Effects Analysis**

**No Action Alternative**

***Direct Effects***

There would be no direct effects as a result of implementing the no action alternative.

***Indirect and Cumulative Effects***

An indirect effect of implementing the proposed action would be the 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. These portions of the landscape mostly consist of previously clear cut stands which have modified the scenic integrity (natural form, line, color, and texture) of the landscape. Specifically, these

sapling stands lack large trees, diversity of species, and diversity of age and size classes. Temporary roads, skid trails, landings and cut stumps are additional associated scenic effects which are a result of past timber harvest practices. With the no action alternative, these modifications to the natural setting and scenery 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.

Natural disturbance, such as fire, historically created larger openings in the canopy of several tens to several hundred acres. Wildfire generally reduces the scenic attractiveness of the landscape in the short term; however, wildfire has some positive effects in the longer term. It creates conditions which allowed a greater diversity of species to persist in the project area, and creates opportunities to view the underlying topography as well as views towards Mount Hood. Current frequencies and intensities of disturbance have departed from their historic range due to fire suppression and timber management activities (MacDonald 2017). With the no action alternative fuels treatments would not occur and there would be greater risk of catastrophic wildfire which would reduce the scenic attractiveness of the landscape. Large wildfires typically involve active suppression efforts which can result in long lasting visual effects to the landscape (dozer line, cut stumps, aerial retardant etc.).

## **Proposed Action**

### ***Direct Effects***

#### **Commercial Stands**

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 ft<sup>2</sup> 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 ft<sup>2</sup> 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 ft<sup>2</sup> basal area). It is likely that most stands will remain above a 50 ft<sup>2</sup> 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.



**Figure 79. Photo on left is representative of current conditions in dry mixed conifer forest. Photo on right is representative of desired future conditions for dry mixed conifer forest.**

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 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.

The proposed action includes mitigations to address the visual effects of actions associated with commercial thinning. These mitigations would reduce the magnitude of these effects and ensure that the proposed actions remain consistent with prescribed VQOs. Please refer to the PDCs in Chapter 2 for additional information.

### **Sapling Thinning**

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.

The proposed action includes mitigations to address the visual effects of actions associated with sapling treatments. These mitigations would reduce the magnitude of these effects and ensure that the proposed actions do not result in a stands VQO dropping below its existing condition. Please refer to the PDCs in Chapter 2 for additional information.

### **Fuels Treatments**

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.



**Figure 80. Photo on left is representative of conditions in previously managed stands prior to mastication. Photo on right is representative of desired future conditions in previously managed stands after mastication.**



**Figure 81. Photos on left and right depict conditions in previously unmanaged stands 3 years after mastication.**

The proposed action includes mitigations to address the visual effects of actions associated with fuels treatments. These mitigations would reduce the magnitude of these effects and ensure that the proposed actions remain consistent with prescribed VQOs. Please refer to the PDCs in Chapter 2 for additional information.

### **Trails**

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.

### ***Indirect Effects***

#### **Commercial Stands**

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 towards 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 road, landings, stumps) the result is likely to be a natural appearing forest landscape with little evidence of human alteration.

#### **Sapling Stands**

Post treatment, these stands would continue to exhibit a visible human modification to the landscape in the short and mid-term. 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.

**Fuels Treatments**

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.

**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 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 natural processes 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 99. Cumulative Effects for Visuals**

<b>Project</b>	<b>Potential Effects</b>	<b>Overlap in Time</b>	<b>Overlap in Space</b>	<b>Measurable Cumulative Effect?</b>	<b>Extent, Detectable?</b>
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 2009 OHV Decision. It would likely reduce the number of non-system roads and be a positive effect to VQOs.

<b>Project</b>	<b>Potential Effects</b>	<b>Overlap in Time Space</b>		<b>Measurable Cumulative Effect?</b>	<b>Extent, Detectable?</b>
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.
<b>Past vegetation treatments.</b>	<b>Land Allocation VQO</b>	<b>No</b>	<b>Yes</b>	<b>Yes</b>	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

All of the proposed alternatives described in this report would be in compliance with Mount Hood Forest Plan and the Forest Service Manual. The relationship between standards and guidelines, mitigations, and potential actions is detailed in the mitigations table in Appendix D of the Specialist Report.

## 3.14 Cultural Resources

### 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 in this EA is the area of ground disturbance as proposed for all alternatives. 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.

The National Historic Preservation Act and the National Environmental Protection Act both require consideration be given to the potential effect of federal undertakings on heritage resources. The guidelines for assessing effects and for consultation are provided in 36 CFR 800. To implement these guidelines, in 2004, Region 6 of the Forest Service entered into a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

The proposed activities of the Crystal Clear Restoration project include tree removal, mechanical slash piling and burning, mastication of woody materials, temporary road construction, and road closures and decommissioning involving heavy machinery and ground disturbance. In accordance with the 2004 agreement, heritage resource surveys have been conducted for those ground disturbing activities requiring inspection and documented in Heritage Resource Report 2017/060601/0001 (Dryden 2017) for the proposed action.

### 3.14.2 Existing Condition

The project area is large in scope, occupying a good percentage of the southern portions of both the Barlow and Hood River Ranger Districts, in an area formerly known as the Bear Springs Ranger District. The project area extends east from Clear Lake to McCubbins Gulch and the eastern forest boundary. The project area is bordered on the south by lands of the Confederated Tribes of Warm Springs, and on the north by the White River.

Major perennial drainages within the project area include Clear Creek, Frog Creek, McCubbins Gulch, and their tributaries. All of these perennial streams flow south east to the White River. Other significant landforms within the project area include Clear Lake, Clear Lake Butte, and Camas Prairie.

### Pre-Contact Land Use and Settlement Patterns

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 at site 662NA93 within the general project area provide evidence of use during the Early Archaic period. Early Archaic artifacts have also been noted at Clear Lake.

### Historic Period Traditional Use

At the time of Euroamerican contact the general area appears to have been jointly utilized by Northern Molala people, with villages west of the Cascades, and the tayxłáma, a Sahaptin-speaking group who had a winter village in Tygh Valley. Neighboring groups, such as the tıl̄xniłáma at Sherar's Bridge and the mliłáma at Simnasho may also have used the area. A trail from Tygh Valley passing through the McCubbins Gulch area provided access to huckleberry fields at the crest of the Cascades. Although there are no known Traditional Cultural Properties within the project area, a camp used by native people

enroute to the berry fields was located in the Camas Prairie vicinity (Musser 1984). Cranberries growing within the bogs of Camas Prairie may have also been utilized by native peoples. Although there is a lack of much camas observed within the large meadow, it is believed that Camas Prairie was named for the camas that once grew there and probably also utilized by native peoples. The bark of western red cedars was also obtained within the project area by native peoples.

A treaty signed by the Indian tribes of middle Oregon in 1855 reduced their ancestral lands to the area now known as the Warm Springs Reservation. At the time that the treaty was signed, the area had not been formally surveyed, but the Indians accepted a verbal description and sketch map by General Joel Palmer, superintendent of Indian Affairs for Oregon Territory (The McQuinn Strip Boundary Dispute: 1871-1972. Retrieved from <https://warmsprings-nsn.gov/treaty-documents/the-mcquinn-strip-boundary-dispute/>). A survey of the reservation was eventually conducted in 1871 but placed the northern boundary further south than the location understood by the Indians. A survey of the reservation in 1887 by John A. McQuinn found that the 1871 boundary was indeed erroneous; however, the dispute was not resolved until 1972 when 61,360 acres of federal lands and 17,251 acres of private lands were added to the adjusted reservation lands. The lands of dispute became known as the McQuinn strip, which borders the southern portion of the project area.

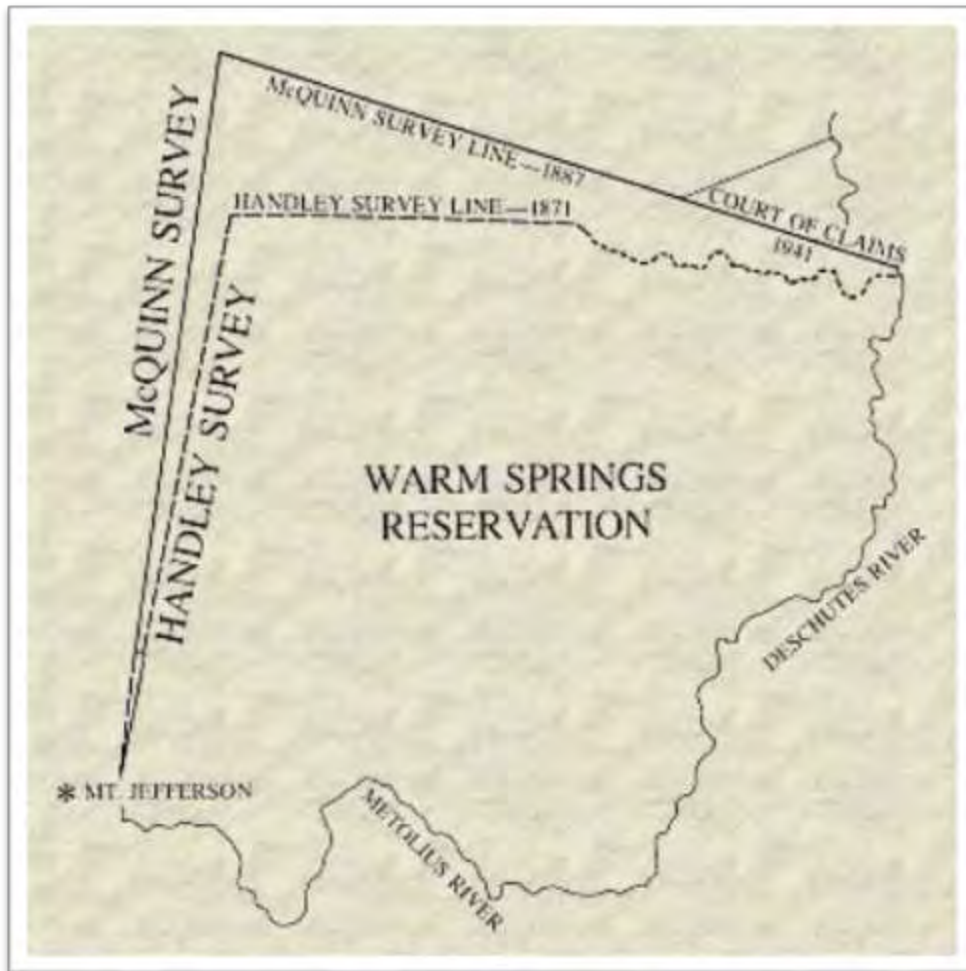


Figure 82. McQuinn Survey Line

## **Euroamerican History**

Situated outside of the project area, the Barlow Road was first traveled in 1845 as a way to bypass the treacherous rapids on the Columbia River along the Oregon Trail. The road was completed the following year, and tollgates were established to collect user fees. The eastern half of the Barlow Road became a drivable route with the advent of the automobile in the early 1900s. By 1919, the ownership of the road passed to the State of Oregon. The Mount Hood Loop Highway largely replaced the Barlow Road by 1925.

In 1855, U.S. Army Lt. Henry L. Abbot led a survey party on a reconnaissance trip from Tygh Valley across the Cascades to Oregon City, following an Indian trail through the project area. A cabin owned by O. Delars (Pete Delore?) was established near Camas Prairie by 1882. McCubbins Gulch is named after the McCubbins, who are believed to have been settled in the area prior to 1898 (McNeal 1953). Little is known about the McCubbins, other than they left the area very early to move to Wallowa, Washington.

By the 1860s non-native settlers had established ranches in the Tygh Valley area. Intensive use of the project area by non-native Euroamerican people began in the 1880s, when sheep ranchers from the eastern slope of the Cascades began using the high country along the crest as summer range for sheep herds. To improve access and transportation and bypass the tolls along the Barlow Road, the Oak Grove – Oregon City Wagon Road was opened in 1869 from Wapinitia to Oregon City. Portions of Forest Roads 2130, 2640, 4130, Oregon State Highway 26, and Oregon State Route 216 follow or occupy the historic route. A “Shingle Camp Road” shown on 1883 General Land Office plat maps for the area appears to follow the general alignment of Oregon State Route 216. Sometime prior to 1906 Dr. Hubert Miller constructed a trail extending south from the Oak Grove Wagon Road to his cabin at Clackamas Lake. By 1914 the forest service had widened the trail into a road. Portions of the road were relocated between 1931 and 1938, renamed the Skyline Road, and was completely reconstructed and paved by the Forest Service in 1962.

In 1902, Harold D. Langille described the lands in T4S, R9E as containing variable timber of poor quality with a large percentage of defect. The original forest was red fir, with few left and those are defective. There were approximately 3,015 burned acres at the time. For T5S, R9E, there were approximately 3,980 burned acres. For T5S, R10E, Langille described a small sawmill (Farr’s Mill) near Camas Prairie that had culled timber “in a trifling area around it.”

The Clear Lake Lumber and Irrigation Company was formed in 1881. Construction of the Clear Creek Ditch actually preceded the dam, with work on the ditch beginning around 1885 or 1887 by George McCoy, who reportedly established a small settlement on the edge of the forest for the ditch workers. Construction on the ditch continued through the 1920s. Construction on the initial Clear Lake Dam probably began in 1914 by Joseph R. Keep in an effort to obtain irrigation water for the relatively arid Juniper Flats area to the east. The dam was expanded in 1929, flooding a total of approximately 100 acres, including huckleberries important to the native peoples. The dam was expanded again 1959 which increased the lake size to 600 acres. Work on the Frog Lake Feeder ditch probably began ca. 1920 in an effort to feed additional water to the Clear Creek Ditch. Both ditches continue to be operated and maintained by the Juniper Flat District Improvement Corporation. Construction on the Lost Ditch began in 1899 to transport irrigation water to the Smock Prairie area in Wasco County. The original Boulder Ditch was constructed in 1907 to feed water to the Lost Ditch. The existing Lost and Boulder Ditches were relocated and constructed in 1959, and continue to be operated and maintained.

Charlie Farr (pronounced Freeier) operated a sawmill near Camas Prairie as early as 1882. The mill operated through 1903 (Grauer 2005), but it is believed that the closed soon after, as the Forest Service listed Keeps Mill as the only lumber source in 1912. Around 1912 Joseph Keep constructed a flume diverting water from the White River just below its junction with Clear Creek into a flume which transported water to eastern farmlands. Keep also established a sawmill expressly for the purpose of building the flume above the White River canyon; the sawmill was thought to be a failure and only

operated for about 16 – 20 years. However, the Forest Service purchased lumber from the mill in 1912 to build ranger stations. Frank Lynn established a portable sawmill near Camas Prairie in the 1940s, which was later moved to Pine Grove.

A “Shingle Camp Road” shown on 1883 General Land Office plat maps for the area appears to follow the general alignment of Oregon State Route 216. Sometime around 1908 Dr. Hubert Miller constructed a trail extending south from the Oak Grove Wagon Road to his cabin at Clackamas Lake. By 1914 the forest service had widened the trail into a road. Portions of the road were relocated between 1931 and 1938, renamed the Skyline Road, and was completely reconstructed and paved by the Forest Service in 1962.

Federal land management had its beginnings with the creation of the Cascade Range Forest Reserve in 1893. Initially managed by the Department of the Interior, the lands were transferred to the Department of Agriculture in 1905, and administered by the U.S. Forest Service as the Oregon National Forest by 1908. The bulk of the project area occupies the former Lakes Ranger District, established in 1911. The forest name was changed to the Mt. Hood National Forest in 1924. Forest Service management in the early years of the agency was oriented toward fire protection and grazing. In 1937, 600 head of cattle and 7,000 sheep were grazing on the area formerly designated as the Lakes Ranger District (Wheeler 1937). Livestock driveways were established and maintained across the area through the 1940s, including one between Wapinitia – White River – High Rock. The Lakes Ranger District was divided among the Clackamas River Ranger District, the Zig Zag Ranger District, and the Bear Springs Ranger District in 1949.

Fire detection became a Forest Service priority early in the 1900s. The remains of two lookout trees indicate that there was probably some type of formal fire watch atop Clear Lake Butte as early as the 1920s. A 110-foot timber lookout tower was constructed in 1932 by the Civilian Conservation Corps, along with a small dwelling and garage. The tower was rebuilt with a 40-foot lookout in 1962.

The Bear Creek Administrative site was designated in the current location of the Bear Springs compound in 1913. On site at the time was an unnamed spring, Bear Creek, old cow corral, and a sheep counting corral. In 1922 proposed improvements were designated at the “Bear Springs – Forest Boundary and Beaver Creek project” for fire protection. At least one cabin for forest service administration was constructed in the meadow at Bear Springs in 1924. A Civilian Conservation Corps camp was established at Bear Springs in 1933. According to oral histories, the camp enrollees were mostly young African American men from the Chicago area. Several additional administrative buildings were constructed at Bear Springs from 1933 to 1938. The garage from the Cedar Burn Guard Station was moved to Bear Springs when the guard station was dismantled ca.1940s.



**Figure 83. Bear Springs Surveying Crew, ca.1920s. Digital scan of USFS photograph.**

A ranger station with a substantial cabin and well was established at Camas Prairie by 1908 at what had formerly been named the Camas Prairie Forest Camp. The Cedar Burn Guard Station was established in 1933 along Forest Service Road 4300 with a small cabin and garage constructed by the Bear Springs Civilian Conservation Corps. The guard station was named for a wildfire in the area; the facility was also referred to on some archival sources as the Cedar Flat Guard Station. The cabin was moved to the Bear Springs complex in 1944 and used for officer's quarters.

The Bear Paw Campground was established along Forest Service Road 4300 by 1935. The campground eventually became the Hickeyville Industrial Camp during timber harvest efforts in the 1950s. Other forest camps at the time include those at Bear Springs and Clear Lake.

Off-Highway Vehicle (OHV) use of the McCubbins Gulch road network probably started in the late 1950s, and gradually increased through time. Campground were eventually established by the Forest Service in the area.

Prior to the 1950s, timber harvest was limited to the small-scale sawmills dotted throughout the area. From 1950 through the 1960s, approximately 2364 acres of timber were harvested (Silviculture Report). Treatments ramped up again in the 1980s when approximately 4,000 acres of timber were harvested. Many of the Forest Service Roads in the area were constructed for timber access in the 1950s through 1960s, and again in the 1980s. To date, approximately 11,096 acres of the total 13,272 project acres have experienced some level of timber treatment.

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, a



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. This alternative would have no effect on heritage resources.

#### **Proposed Action**

Several sites are situated within the general project area, but are located within riparian areas where there are no proposed actions, or they are located outside of proposed treatment areas. These sites include peeled cedar trees (662NA0056 and 661NA0258) irrigation ditches (662NA0035 and 662EA0059), a historic sawmill (662EA0031), historic sites with lithic components (662EA0030 and 662EA0005), ranger stations or guard stations (662EA0001 and 662EA0007), a lithic isolate (662IS0105), a ditchwalker's cabin (662EA0054), a stock driveway (666EA0242) and the remains of a historic bridge (662EA0012).

The Oak Grove – Oregon City Wagon Road (662EA0013) consists of a wagon road constructed ca.1880 to bypass the Barlow Road and provide a transportation route from the Juniper Flat – Wapinitia area to Oregon City. The entire route of the road covers approximately 31 miles, much of it through the current project area. Although there is no record of the actual construction of the road, it has been speculated that the road may have originally followed an Indian trail surveyed by Lt. Abbot in 1853. The road continued to be utilized by settlers in the Tygh Valley area, and was slowly expanded by these users. The road has been largely obliterated by the construction of Forest Service Roads 2600-230, 2600-013, 220, 2640, 4310, US Highway 26 and Oregon State Highway 216. Other portions of the road have been impacted by past logging activity and fiber optic line installation. In 1996, East Zone Archaeologist Grady Caulk determined that the road was largely obliterated, fragmented, lacked integrity and was not eligible for inclusion on the National Register of Historic Places. However, there is no indication that the eligibility determination was submitted to the Oregon State Historic Preservation Office for review. In 1996 a potentially intact portion of the road was located adjacent to Forest Service Road 4310, while other potential “ruts” have been documented adjacent to Forest Service Road 4310. These portions of the road are situated outside of any areas proposed for treatment for the current project. No additional intact portions of the road were observed or documented during the survey for the current project. The project can occur as proposed with no effect to 662EA0013.

The Miller Road (662EA0028) (later to be known as the Skyline Road) consists of a historic road that passes through areas scheduled for thinning and prescribed burning. The road was originally constructed as a trail by Dr. Hubert Miller in 1908 between the Oak Grove – Oregon City Wagon Road and Clackamas Lake. Much of the trail was later reconstructed and relocated, mostly by the Forest Service. The portion of the road within this project area was found to lack integrity and was determined to be ineligible for inclusion on the National Register of Historic Places. On March 18, 1980 the Oregon State Historic Preservation Office concurred with the eligibility determination. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 662EA0028.

The Chinese Ovens (662EA0046) consists of the remains of a possible ditch work camp situated in an area scheduled for thinning and prescribed burning. The site consists of two stone “ovens”, and up to 14 leveled or bermed areas supporting some sort of structures, and scattered artifacts. After the initial documentation of the site, it was determined that the stone ovens cannot necessarily be attributed to

people of the Chinese culture; other cultural groups such as the Greeks and Italians constructed similar ovens. The majority of the site is situated within a riparian area with no proposed activities; however, the site does extend to the south into a proposed treatment area. A 100-foot buffer zone for the exclusion of heavy machinery will be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Prescribed fire will also be excluded from the buffer zone. With these stipulations, the project can proceed with no effect to site 662EA0046.

The Clear Lake Butte Lookout (662EA0052) consists of the remains of a lookout tower constructed in 1932 situated in an area scheduled for thinning and prescribed burning. The site consists of a concrete block, a refuse/burn pit, concrete corner foundations, mooring cable, and stacked stone. The existing Clear Lake Butte Lookout constructed in 1962 is situated outside of a proposed treatment area. A 100-foot buffer zone for the exclusion of heavy machinery will be flagged around the 1932 site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Prescribed fire will also be excluded from the buffer zone. With these stipulations, the project can proceed with no effect to site 662EA0052.

The Clear Lake Lookout Tree (662EA0071) consists of the remains of a fire lookout tree situated in an area scheduled for thinning and prescribed burning. The tree is a snag that is partially standing; however, the top of the tree has fallen to the ground. Both sections of the tree exhibit large spikes that had been nailed to the tree for steps. A 100-foot buffer zone for the exclusion of heavy machinery will be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Prescribed fire will also be excluded from the buffer zone. With these stipulations, the project can proceed with no effect to site 662EA0071.

The Hawke Eye Site (35WS297; 662NA0093) consists of an open-air lithic scatter. The site has been investigated numerous times, with the most recent being subsurface testing in 2008 by Rick McClure. Tools recovered from the site include a fragment of ground stone, a core fragment, two biface fragments, a possible abrader, and a leaf-shaped projectile point similar in form and style to “Cascade” points associated with Early Archaic sites. McClure determined that the site is eligible for inclusion in the National Register of Historic Places. The site is situated within an area scheduled for thinning and prescribed burning. A 100-foot buffer zone for the exclusion of heavy machinery and tree harvest will be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer. Much of the site is devoid of ground cover; prescribed burning can occur within the buffer zone. With these stipulations, the project can proceed with no effect to site 35WS297 (662NA93).

The Biface Fragment (662IS0094) consists of a single biface fragment in an area scheduled for thinning and prescribed burning. The biface midsection consists of white crypto-crystalline silicate which was recovered from the exposed soils of Forest Service Road 2100-014. The road passing through the area provided excellent ground visibility and was intensively surveyed, as well as the surrounding area, with negative results for additional cultural materials. The area was again intensively inspected again in 2016 with negative results. The artifact was collected; the area offers no further research potential and requires no further archeological work. The find was determined to be an isolate; isolated finds are considered ineligible for inclusion on the National Register of Historic Places. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 662IS0094.

The Cowbell Lithic Site (662IS0102) consists of a partial projectile point in an area scheduled for thinning and prescribed burning. The artifact was recovered from the exposed soils within a livestock trail. Four shovel tests were excavated in each of the cardinal directions around the find with negative results. The livestock trail passing through the area provided excellent ground visibility and was intensively surveyed, as well as the surrounding area, with negative results for additional cultural materials. The artifact was collected; the area offers no further research potential and requires no further archeological work. The find was determined to be an isolate; isolated finds are considered ineligible for

inclusion on the National Register of Historic Places. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 662IS0102.

The Diablo Point (662IS0103) consists of a large, broken spear/knife point of opaque obsidian situated within an area scheduled for thinning and prescribed burning. The artifact was located in two fragments on two separate occasions on the surface of a road. Three shovel tests were excavated around the find with negative results. The road passing through the area provided excellent ground visibility and was intensively surveyed, as well as the surrounding area, with negative results for additional cultural materials. The area was again intensively inspected again in 2016 with negative results. The artifact was collected; the area offers no further research potential and requires no further archeological work. The find was determined to be an isolate; isolated finds are considered ineligible for inclusion on the National Register of Historic Places. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 662IS0103.

The Diablo Can Dump (662EA0104) consists of approximately 20 cans in an area scheduled for thinning and prescribed burning. The cans have a solder dot lid and crimped seams and have been opened by a narrow object, such as a knife. Two cans may be three pound coffee cans. One can is embossed with the words "PAT. OFF. 1802". The cans were described as badly rusted during their initial documentation in 1995. The site could not be relocated despite intensive inspection of the mapped site location; the cans have likely further deteriorated in the 20 years since their initial documentation. No protective measures are required or recommended for non-cultural objects that cannot be relocated. The project can occur as proposed with no effect to site 662EA0104.

The Obsidian Midsection Biface Isolate (666IS0189) consists of a single lithic artifact within an area scheduled for thinning and prescribed burning. The artifact was recovered from the exposed soils of Forest Service Road 2840-012 and consists of the midsection of an obsidian dart point or knife blade. Three shovel probes were excavated around the find with no additional cultural materials recovered. The road passing through the area provided excellent ground visibility and was intensively surveyed with no additional cultural materials observed. Cultural finds with 10 lithic artifacts or less are considered ineligible for inclusion in the National Register of Historic Places. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 666IS0189.

The Wolf/Elk Lithic Scatter (661IS0257) consists of several flakes situated within an area scheduled for thinning and prescribed burning. The flakes include one of red crypto-crystalline, one of grey crypto-crystalline, and two obsidian flakes recovered from the surface of an unnumbered spur road. A total of seven shovel probes were conducted around the flakes, with one additional grey crypto-crystalline flake and one additional red crypto-crystalline flake uncovered in one shovel probe. The remaining six shovel probes proved negative for additional cultural materials. Cultural finds with 10 lithic artifacts or less are considered ineligible for inclusion in the National Register of Historic Places. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 666IS0257.

The International (661IS0270) consists of the remains of an abandoned vehicle in an area scheduled for thinning and prescribed burning. The vehicle remains probably dated to the 1950s and consisted of the metal cab of a truck and the flat bed portion of the truck; both portions are separated by a few feet. The find has been previously determined to be ineligible for inclusion on the National Register of Historic Places (Dryden 2010). The Oregon State Historic Preservation Officer concurred with the recommendations and findings of that previous report. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 661IS0270.

The Rimrock Site (661IS0271) consists of a single flake situated within an area scheduled for thinning and prescribed burning. The large basalt flake was recovered from the exposed soils of Forest Service Road 2131 during the initial investigation of the find in 1998. The road and surrounding area were

intensively inspected with no additional cultural materials found. The site was revisited in 2001 and a total of 12 shovel probes were conducted around the area of the flake. Six basalt flakes, two angular fragments of crypto-crystalline silicate (non-cultural), and one piece of quartzite (non-cultural) were collected from five of the shovel probes; the remaining seven shovel probes were negative for additional cultural material. Cultural finds with 10 lithic artifacts or less are considered ineligible for inclusion in the National Register of Historic Places. No protective measures are recommended or required for ineligible cultural finds. The project can occur as proposed with no effect to 666IS0271.

The Traps in Trees (666IS0296) consists of two double-spring leg hold traps mounted in trees. One trap is situated within a riparian area where no treatment is proposed; however, one trap is situated in an area scheduled for thinning and prescribed burning. The isolated artifacts offer no research potential and are not considered eligible for inclusion on the National Register of Historic Places. No protective measures are required or recommended for ineligible sites. The project can proceed with no effect to 666IS0296.

The Historic Implement (666IS0299) consists of an isolated historic artifact situated in an area scheduled for thinning and prescribed burning. The artifact appears to be a home-made frame constructed from wood and steel. The isolated artifact offers no research potential and is not considered eligible for inclusion on the National Register of Historic Places. No protective measures are required or recommended for ineligible sites. The project can proceed with no effect to 666IS0299.

The Blast Camp (666EA0300) consists of the apparent remains of a work camp that used explosives in an area scheduled for thinning and prescribed burning. The camp includes two barrel stoves, 46 25lb Dupont blasting powder cans (empty), wire cable, and other scattered metal artifacts. A 100-foot buffer zone for the exclusion of heavy machinery will be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Prescribed fire will also be excluded from the buffer zone. With these stipulations, the project can proceed with no effect to site 661EA0300.

The Highway 216 Telephone Line (661EA0338) consists of tree-mounted ceramic insulators, wire, and the remains of a telephone box in areas scheduled for thinning and prescribed burning. A total of 44 insulators have been previously documented along about 3.14 miles of Oregon State Highway 216. The telephone line is shown on the 1930s Mt. Hood National Forest maps as traveling between the Bear Springs Ranger Station east to the Clackamas Lake Guard Station. The line was maintained and used through the 1970s (personal communication with former Barlow Ranger District Fire Management Officer Jim Wrightson and former Barlow Ranger District Facilities Manager John Pierce). Each tree containing an insulator, wire, mounting rod, or telephone box will be flagged or marked for avoidance during timber treatments. Prescribed burning may occur, but surface duff will be raked or scraped away from the base of each tree. The project can proceed with no effect to 661EA0338.

The Highway 216 Benchmarks (661EA0339) consists of four surveying benchmarks in areas schedule for thinning and prescribed burning. The markers are spaced along a total distance of about 1.54 miles of Oregon State Highway 216 and consist of inscribed brass discs set into small concrete cylinders. Each benchmark will be flagged or marked for avoidance during timber treatments. The project can proceed with no effect to 661EA0339.

The Oil and Lube site (661EA0380) consists of cans situated within an area scheduled for thinning and prescribed burning. The cans include two Shell motor oil cans, one Olympia beer can, and one sanitary can. All had been opened using a “church key”. The cans are probably associated with the last logging operations ca.1990s. The cans were determined to be of recent vintage and are not considered eligible for inclusion in the National Register of Historic Places. No protective measures are recommended or required for ineligible sites. The project can proceed with no effect to 661EA0380.

The Eli’s Bottles Site (661EA0381) consists of a vehicle air filter, a glass bottle, and bottle fragments situated in an area scheduled for thinning and prescribed burning. The bottles include one brown bottle and four brown glass bottle bases. Other brown bottle fragments are scattered about the area. Several

stumps are situated in the area, suggesting that the bottles are associated with the last logging operations ca 1990s. The bottles were determined to be of recent vintage and are not considered eligible for inclusion in the National Register of Historic Places. No protective measures are recommended or required for ineligible sites. The project can proceed with no effect to 661EA0381.

The Pipeland Site (661EA0382) consists of a possible water collection system comprised of a series of pipes, barrels, and a water tank. Additional artifacts include a rusted coffee can, a mesh screen, a possible paint can, and milled lumber. Other features at the site include two wooden structures, a horseshoe-shaped rock pile, and a second rock pile. The features and artifacts appear to be of modern derivation. The site is mostly within the Clear Creek Ditch riparian buffer where no proposed actions are planned, but may extend to the south partially into an area proposed for thinning and prescribed burning. A 100-foot buffer zone for the exclusion of heavy machinery will be flagged around the site. Any trees harvested near the buffer zone should be felled directionally away from the buffer zone. Prescribed fire will also be excluded from the buffer zone. With these stipulations, the project can proceed with no effect to site 661EA0382.

The Steady Old Sign (661IS0383) consists of a single metal sign nailed to a tree. No additional artifacts were observed in association with the isolate. The sign may be related to and part of the Wapinitia - White River - High Rock Stock Driveway (666EA0242). The tree will be flagged or marked for avoidance during timber treatments. Prescribed burning may occur, but surface duff will be raked or scraped away from the base of the tree. The project can proceed with no effect to 661IS0383.

The Bear Paw Campground (661EA0384) consists of the remains of an obliterated forest camp. The remains consist of native-surfaced trails and depressions situated within an area scheduled for thinning and prescribed burning. The site offers no research potential and is not considered eligible for inclusion on the National Register of Historic Places. No protective measures are required or recommended for ineligible sites. The project can proceed with no effect to 661EA0384.

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.

### **Cumulative Effects**

For heritage resources, any effects are limited to site specific locations. Any cumulative effects would also be limited to heritage resources situated within proposed areas of ground disturbance. The project design criteria for the Proposed Action resulted in no direct or indirect effects to heritage resources since there are no significant heritage resources affected by any alternatives. For cumulative effects, all projects shown in Table 10 were considered; however, none of the proposed projects involve heritage resources situated within the proposed project areas. Also, heritage resources are generally avoided for all federal undertakings with no cumulative effects. Because this project would have 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 any of the action alternatives.

The consultation for the Heritage Resource Survey results and recommendations for the project have been completed in accordance with the 2004 PA and submitted to the Oregon SHPO for review; the results of the SHPO review are pending.

### **3.14.4 Consistency Determination**

The project would not impact any significant heritage resources. Based on the proposed protective measures, the project meets the criteria in the Programmatic Agreement for “No Historic Properties Affected” determination (Stipulation III (B) 5).

This action 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). All records and documents concerning heritage resources for the project are kept on file at the Hood River Ranger District, Mt. Hood National Forest (FW-626).

### 3.15 Climate Change

This proposed action would affect approximately 12,700 acres of forest by commercially thinning smaller trees from the stand, retaining a residual stand of about 40-120 ft<sup>2</sup> basal area in dry mixed conifer forests and 80-200ft<sup>2</sup> basal area in moist mixed conifer forests. This scope and degree of change would be minor relative to the approximately 1,000,000 acre Mt. Hood National Forest.

Climate change is a global phenomenon because major greenhouse gasses (GHG) mix well throughout the planet's lower atmosphere (IPCC 2013). Considering emissions of GHG in 2010 was estimated at 49 ± 4.5 gigatonnes<sup>4</sup> 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 gasses and climate change would be negligible.

In addition, because the direct and indirect effects would be negligible, the proposed action's contribution to cumulative effects on global greenhouse gasses 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 megatonnes<sup>5</sup> of carbon dioxide after accounting for emissions from fires and soils in 2010 (US EPA, 2015).

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

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<sup>4</sup> A gigatonne is one billion metric tons of CO<sub>2</sub>; equal to about 2.2 trillion pounds.

<sup>5</sup> A megatonne is one million metric tons of CO<sub>2</sub>; equal to about 2.2 billion pounds.



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 National Forest System (NFS) lands. This planning area is the last untreated wildland urban interface (WUI) on the eastside of the Mt. Hood National Forest.

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 CCR planning area is located on usual and accustomed land for the Confederated Tribes of Warm Springs (as is all of the Mt. Hood National Forest). The Treaty of 1855 granted the Confederated Tribes of the Warm Springs (CTWS) the right of “usual and accustomed” gathering of traditional native plants and “special interest” use. 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. 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 the CCR 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 1968 Wild and Scenic Rivers Act calls for maintaining the free-flowing character of the designated rivers and protecting their "outstandingly remarkable values." Outstandingly remarkable values are values or opportunities in a river corridor that are directly related to the river and which are rare, unique or exemplary from a regional or national perspective.

The White River Wild and Scenic River is located outside of the planning area but directly adjacent to its northern boundary. No actions are proposed within the Wild and Scenic River.

#### 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).

The 1964 Wilderness Act established the National Wilderness Preservation System to ensure that parts of the United States would be preserved and protected in their natural condition. A wilderness area is defined, in part, as an area that generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable. The Wilderness Act places responsibility upon the administering agency for preserving the wilderness character of the area. The Act specifically prohibits motor vehicles, motorized equipment and mechanical transport in all wilderness areas (Public Law 88-577, Sec. 4 (c) Prohibitions of Certain Uses).

Similarly to the Wild and Scenic Rivers, there is a portion of the planning areas 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 CCR planning area.

The Planning area does not contain any inventoried roadless areas, nor is it bounded by any existing IRAs, as such, no treatments are proposed within any IRAs.

### **3.17.2 Effects Analysis**

#### **Wild and Scenic Rivers**

A full analysis of the effects to the Wild and Scenic Rivers is included in Section 3.12, Effects Analysis from the Proposed Action Alternative on Wild and Scenic Rivers.

As the ORV's for the East Fork Hood River Wild and Scenic River segment are associated with geologic landforms (lava flow and debris flows) that exist outside any proposed treatment areas there would be no adverse effect to the ORV's for which the river segment was 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 areas apparent naturalness, opportunity for solitude, primitive recreation, or the areas 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 determine 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 will be no effects to any IRAs though 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 and Wetlands**

There would be very limited impacts to floodplains or wetlands from this project. Due to the steepness of the topography, small stream size and confined nature of streams in this area, floodplain width is fairly limited. The impacts to wetland and floodplains are discussed in Section 3.6, Water Quality. Due to the PDCs and BMPs which are aimed at minimizing the impacts to wetlands and floodplains, there would be minimal direct and indirect effects.

### **3.18.3 Air Quality**

Section 3.2, Fuels Management and 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 Chapter 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 areas ability to become wilderness in the future. There are some existing wilderness areas adjacent to the planning area, and none of the proposed activities would impact that areas 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 CRF 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with . . . other environmental review lands and executive orders.”

Based on information received during scoping, informal consultation meetings, and analysis in the EA, none of the alternative under consideration would conflict with the plans or policies of other jurisdictions, including the Confederated Tribes of Warm Springs. This project would not conflict with any other policies and regulations or laws, including the Clean Water Act, Endangered Species Act, National Historic Preservation Act, and Clean Air Act. Refer to the following sections for discussions regarding these laws:

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;

Section 3.14 Cultural Resources– National Historic Preservation Act; and

Section 3.2 Fuels Management and Air Quality – Clean Air Act

## Chapter 4

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 formal government-to-government consultation description below, other state and local agencies were involved in the collaborative process through the Hood River Stewardship Crew. These agencies included: Hood River Soil and Water Conservation District, Oregon Department of Fish & Wildlife, Oregon Department of Forestry, and Hood River County. Each of these agencies also received the scoping information for this project.

#### 4.1.1 Consultation with the US Fish and Wildlife Service (FWS)

Early involvement with U.S. Fish and Wildlife Service (FWS) was conducted in regard to northern spotted owls and critical habitat within the action area. Throughout 2015-2017, several field trips and meetings about the Proposed Action occurred.

The effects to spotted owls and critical for this revised project will be included in Biological Assessment, which will be submitted to the U.S. Fish and Wildlife Service. Consultation will be completed prior to signing any decision for this project. All terms and conditions and/or conservation measures will be required actions for this project and incorporated into the final Environmental Assessment and Decision Notice.

#### 4.1.2 Consultation with the Oregon State Historic Preservation Officer (SHPO)

The National Historic Preservation Act and the National Environmental Protection Act both require 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 Oregon State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP).

In accordance with the 2004 agreement, 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 will be documented in Heritage Resource Report prior to the final decision.

The recommended protective measures would adequately protect the known heritage resources. The site protection measures were developed on the Mt. Hood National Forest to be consistent with the National Historic Preservation Act and adapted for use across the forest. A final decision will not be signed until a letter of concurrence from The Oregon State Historic Preservation Officer is received.



## 4.2 Tribes

The CCR planning area is located on usual and accustomed land for the Confederated Tribes of Warm Springs (as is all of the Mt. Hood National Forest). The Treaty of 1855 granted the Confederated Tribes of the Warm Springs (CTWS) the right of “usual and accustomed” gathering of traditional native plants and “special interest” use. 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.

CTWS was engaged prior to scoping and throughout the planning process to consult in the development and design of the CCR project and has not raise any issues with the proposed project.

## 4.3 List of Preparers

The following is a list of Interdisciplinary Team (IDT) members who assisted in the development of the Environmental Assessment.

<b>Role</b>	<b>IDT Member</b>
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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