Eagle Creek Project

Draft Environmental Assessment and Preliminary Finding of No Significant Impact

For more information, contact:

Erica Taecker
Wenatchee River Ranger District, Okanogan-Wenatchee National Forest
600 Sherbourne St
Leavenworth, WA 98826
Email: erica.taecker@usda.gov

The United States Department of Agriculture (USDA) is committed to making its digital content accessible. USDA customers, employees, job applicants, and members of the public with disabilities must have access to information and communication technology (ICT) comparable to the access available to those without disabilities. The U.S. Access Board ("Access Board") is responsible for developing accessibility standards. In 2017, the Access Board published a Final Rule that updated the accessibility requirements in Section 508 of the Rehabilitation Act of 1973 (Section 508), 29 U.S.C. 794d, and refreshed the guidelines in the law. The Final Rule went into effect on January 18, 2018. The standards are available at Information and Communication Technology: Revised 508 Standards and 255 Guidelines.

For more information, see the USDA Accessibility Statement.

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the State or local Agency that administers the program or contact USDA through the Telecommunications Relay Service at 711 (voice and TTY). Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at How to File a Program Discrimination Complaint and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Mail Stop 9410, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov.

USDA is an equal opportunity provider, employer, and lender.

Table of Contents

Tables

Figures

Purpose and Need

The purpose of the Eagle Creek Project is to improve timber stands by restoring forest structure and composition to more sustainable conditions; improve wildlife habitat by reducing the risk of large-scale habitat loss from severe wildfire and pathogens; and increase opportunities for effective fire suppression across the project area.

The project area is characteristic of much of the Wenatchee River Ranger District and lower Wenatchee Valley, where few of the stands can be described as natural. Changes in forest structure, such as increased stand densities, and shift in species composition away from shade intolerant tree species, increases in fuel associated with mortality and the increase in ladder fuels that facilitate crown fire, and infilling of trees into gaps that were historically maintained by wildfire.

Within the project area, conifer encroachment and lack of fire has suppressed natural regeneration of quaking aspen and associated understory plant communities, thus reducing plant diversity and wildlife habitat quality. The current conditions have made conifer forests susceptible to widespread insect and disease outbreaks that, in combination with excessive fuel loading, have set the stage for more large-scale, stand-replacing wildland fire.

There is a need to restore the forest structure and species composition to a condition resilient to wildfire and pathogens, and beneficial to wildlife, including the need to:

- Restore the mosaic patterns of individual trees, clumps, and openings commonly found in pine and mixed conifer forests (Larson and Churchill 2012), as well as other forest types (Larson and Churchill 2008);
- Reduce elevated risk of wildfire, while increasing opportunities for effective fire suppression by reducing fuels which have accumulated in the project area;
- Reduce inter-tree competition and risk of insect mortality.

The desired condition in the project area is forest structure and composition consistent with reference and predicted reference conditions with fuel loading at a level allowing fire to function as a natural process at intensities consistent with historic levels. A more open forest structure within the landscape is desired to reduce susceptibility to insects and disease and high severity fire and would be consistent with the historic and future ranges of variability in the project area. Sustaining what remains of the existing late-successional habitat is important, as it is the preferred habitat for the NSO.

Project Area Background

The Eagle Creek project area was originally part of the larger Chumstick to Lower Peshastin Project Environmental Assessment (EA), which was scoped to the public in September 2023. Due to wildfire impacts in that project area in 2025, the Chumstick to Lower Peshastin EA was put on hold and this project area, which was not impacted by wildfire, is moving forward as a standalone EA.

The Eagle Creek project area is 5,130 acres (Figure 9). Land use allocations as designated in the Wenatchee Forest Plan and Northwest Forest Plan are listed in Table 1 and Table 2, respectively, also see Figure 10 and Figure 11.

Table 1. Wenatchee Forest Plan land use allocations in the project area

Land Use Allocation	Acreage
General Forest	1,762
Key Wildlife Range	1,508
Scenic Travel – Partial Retention	1,276
Scenic Travel – Retention	585
Total	5,131*

*Slight differences in total acres exist between the project boundary, Wenatchee Forest Plan, and Northwest Forest Plan allocations due to rounding.

Table 2. Northwest Forest Plan land use allocations in the project area

Land Use Allocation	Acreage
Late Successional Reserve	207
Managed Late Successional Area	276
Not Determined	543
Matrix / Other	4,101
Total	5,127*

*Slight differences in total acres exist between the project boundary, Wenatchee Forest Plan, and Northwest Forest Plan allocations due to rounding.

Stand Condition Classes

Seven primary stand conditions were identified in the project area. Figure 1 illustrates six of the conditions that are represented in the project area, non-forest shrublands is not included in the depiction. Non-forest shrublands/herblands may receive prescribed burning treatments. Stand condition descriptions can be found in Appendix A. Table 3 shows the existing stand condition types in the project area.

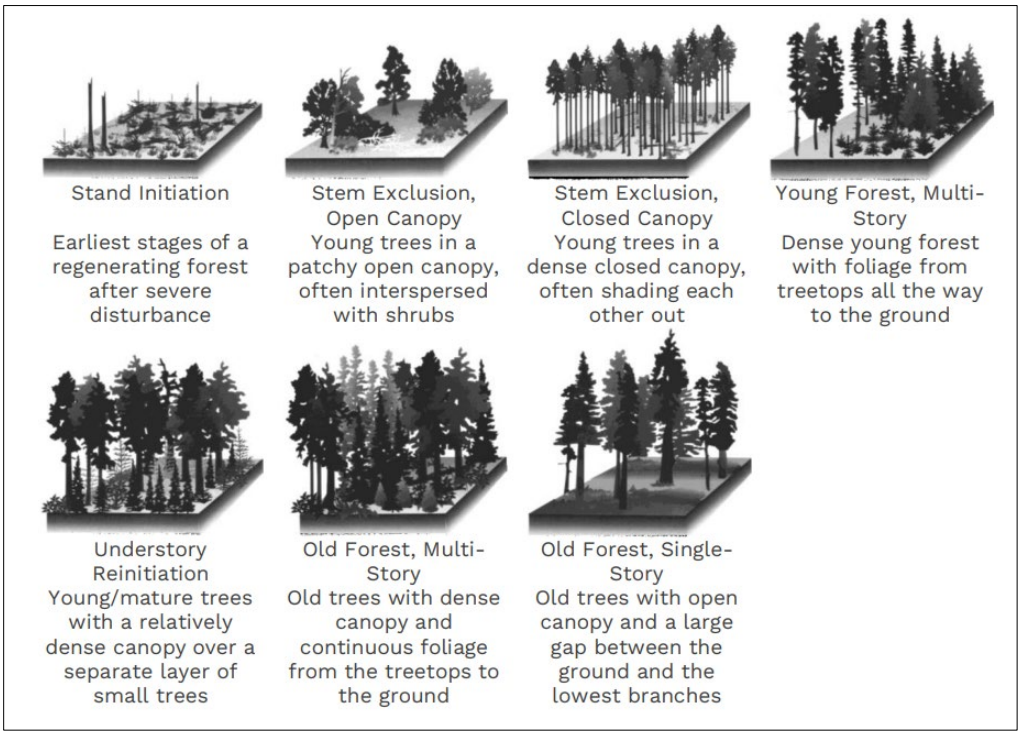

Figure 1. Stand Condition Depiction (Jeronimo 2022)

Table 3: Existing Stand Conditions within the project area

Stand Condition	Acres
Stand initiation (dry and moist forests)	237
Early seral stem exclusion closed canopy and understory reinitiation (dry and moist forests)	309
Dry forest – YFMS	3,618
Dry forest – stem exclusion open canopy	676
Moist forest – YFMS	62
Old-forest multistory	26
Non-forest shrublands, herblands	163
Total	**5,094**

Emergency Authority

This project received approval to use the following emergency authority: IIJA 40807 Forest Health and Fuels Emergency Situation Determination (ESD) on February 6, 2026.

Proposed Action

The proposed action is designed to reduce hazardous fuels, restore and maintain forest conditions within historical and future ranges of variability, and reduce the risks associated with wildfire on NFS lands in the project area. Commercial and non-commercial tree thinning, biomass removal, prescribed burning, and pile burning would be used as treatment methods to restore timber stand conditions, restore wildlife habitat, and reduce the risk of uncharacteristic wildfires by removing hazardous fuels. Increasing forest stand heterogeneity and successional pathways would create forest conditions that would improve resilience to large-scale natural disturbance. Treatments would aim to restore the structure and composition of the landscape, reduce stand density, and reduce ladder fuels to be in line with projected past and future reference conditions. Additional connected actions include road maintenance, use of roads for haul, and temporary road creation; Table 4 and Table 5 show the details of these proposed actions. Figure 10 shows the proposed activity units.

Table 4. Proposed action summary

Proposed Action	Amount
Commercial thinning	964 acres
Small Tree Thinning	4,167 acres
Broadcast burning	4,646 acres
Pile burning	5,130 acres
Haul routes	28.3 miles*
Road maintenance	4.3 miles
Road Reconstruction	18.2 miles
Temporary road building	4 miles

*Haul routes includes some miles that are outside the project area

Table 5. Proposed action breakdown for thinning

Activity	Type	Acres	Diameter Limits	Description
Thinning	Commercial	964	25” dbh	Forest/stand health and timber production
Small Tree Thinning	Non-commercial	2,994 acres	11” dbh	Fuel reduction
Small Tree Thinning	Non-commercial	484 acres	7” dbh	Fuel reduction – wildlife
Small Tree Thinning	Non-commercial (Stand Improvement)	689 acres	7” dbh	Pre-Commercial Thinning

The following design criteria would apply to all proposed vegetation treatments, informed by *Identifying Old Trees and Forest* by Robert Van Pelt (2008) and *The ICO Approach to Quantifying and Restoring Forest Spatial Pattern: Implementation Guide* (Churchill et al. 2016):

- Legacy trees would not be cut. Ponderosa pine and Douglas-fir with scores greater than 6 and 7, respectively, are highly valued for retention.
- Remove all conifers within a distance equal to average aspen tree height or 50 feet (whichever is greater) of an aspen clone. For the purposes of this analysis a clone is 5 Aspen trees that are a minimum 5 feet tall, within 15 feet of each other. Aspen treatments may occur within commercial and non-commercial units and would be subject to the diameter limits in Table 5 and all relevant project design criteria.
- Ladder fuels would be removed within 30 feet of overstory trees (greater than 25 inches in diameter at breast height [DBH]).
- Forest understories would contain small patches of seedlings and saplings along with patches of shrubs.
- Post-treatment species preferences would be ponderosa pine, western redcedar, Douglas-fir, western hemlock, western white pine, western larch, and whitebark pine. Where ponderosa pine does not have the desirable tree characteristics and greater than a 40 percent live canopy, vigor and growth would be given preference throughout the remaining species list.
- Douglas-fir with a dwarf mistletoe rating system greater than 3 would be prioritized for removal (USFS 1977).
- Openings in forest stands of up to 3 acres would be created in treatment areas.

Table 6 shows the proposed vegetation treatments by stand condition class. The Stand Condition Descriptions and Treatment Descriptions section below describes the prescriptions in more detail.

Table 6. Proposed Vegetation Treatments by Stand Condition (acres)

Stand Condition	Thin to 20–40% Canopy Cover and Prescribed Burn	Small Tree* Thinning and Prescribed Burn	Prescribed Burn Only
Condition 1—Stand initiation	0	237	1
Condition 2—Early seral stem exclusion closed canopy and understory reinitiation	35	275	0
Condition 3—Dry forest – YFMS	929	2715	0
Condition 4—Dry forest – stem exclusion open canopy	0	633	44
Condition 5—Moist forest – YFMS	0	62	1
Condition 6—Old-forest multistory	0	27	0
Condition 7—Non-forest shrublands, herblands	0	0	163

*Up to 7 inches DBH (USFS 2014)

Commercial Thinning

The proposed action involves the commercial harvest of 928 acres of Young Forest Multi-Story and 35 acres of Stem Exclusion Closed Canopy stands within the project area, trees to be cut are generally less than 25 inches DBH.

Logging methods and equipment

Subject to restrictions described in the design criteria, tree removal methods would include mechanized logging that utilize feller bunchers and log skidders and/or logging with a heel-boom log loader (commonly referred to as “shovel” logging). Except for minor inclusions of steeper areas, any proposed mechanized thinning on slopes greater than 35% would utilize purpose built tethered equipment for felling and yarding on steep slopes. In steeper areas cable logging would be used, where conventional timber falling occurs using chainsaws or tethered felling machines and cut material is yarded with skyline towers. Areas with no road access would utilize helicopters to yard cut material to landings.

Log landings and decking areas would generally employ one or more of the following: log loaders, tree processors, log trucks, and fuel trucks. Temporary roads and landings would be constructed after approval by Forest Service.

In addition to commercial thinning, the removal of dead and unstable live trees (hazard trees) of all sizes would occur along timber haul roads and landings to provide for safety of workers and the public throughout project implementation, except where restrictions for removal apply.

All excess fuels resulting from thinning would be disposed of after harvest operations have concluded. This includes felling small, damaged trees, broken tops, and any other logging residues.

Small Tree Thinning

The proposed action includes small tree thinning to achieve either silvicultural or fuels objectives by selectively felling and removing trees. Generally, diameter limits for fuels thinning would be 11 inches DBH, and 7 inches DBH for Pre Commercial Thinning (PCT). Subject to the restrictions in the design criteria, trees would be cut usings chainsaws or by equipment such as masticators or feller bunchers. Objectives of this action would be to reduce the risk of insect and disease outbreaks, to reduce fire

intensity during future prescribed fires and wildfires by increasing canopy height and decreasing ladder fuels and to promote growth in retention trees by reducing competition for soil and water resources.

The stands identified for PCT would cut trees less than 7” DBH that are: undesirable species, unhealthy (indicated by evidence of disease or physical damage), or contributing to overstocking of stands.

Where fuels objectives overlap timber harvest, small tree thinning may occur concurrently with logging operations. These fuels may be removed as biomass and shipped on trucks or chip vans to biomass manufacturing facilities when there is an opportunity to do so.

Fuels Activities

Pruning

The proposed action includes pruning to remove the live and dead limbs from the lower portion of retentions trees (<11 feet) to increase canopy base height. Decreasing these ladder fuels reduces the susceptibility of tree crowns to prescribed fire and wildfire. Pruning could be implemented in any areas within the project identified for commercial or small tree thinning.

Piling

Hand Piles

Slash generated by small tree thinning and pruning would be gathered and stacked into hand piles. This would occur concurrently with thinning and pruning. Standard pile size would be 6 to 8 feet by 6 to 8 feet by 6 to 8 feet. Piles would be arranged on the landscape to reduce direct flame impingement to the residual living trees, snags and other sensitive features. Hand piles would be burned after approximately 8 to 16 months of curing. In areas where thinning and pruning does not generate enough slash material to create piles within specification, material could be scattered. Fuel bed generated by scattering would not exceed 2 feet and material would not be distributed within 10 feet of residual trees.

Machine Piles

Machine piling would be done in areas where the residual slash bed from commercial thinning operations exceeds 12 inches in depth or the surface fuel loading exceeds 10 tons per acre. It could also be implemented in areas where the residual slash bed is more than 6 inches in depth within 12 to 24 feet (depending on slope) of residual trees or within 50 feet of prescribed fire control lines. Machine Piles would be burned after approximately 6 to 12 months of curing.

Prescribed Fire

Prescribed fire would be implemented both following treatments and as a stand-alone activity.. Prescribed fire treatments could include broadcast burning, biomass utilization, pile burning or a combination of prescribed burn treatments. In general, prescribed fire would be considered in all stand types in the project area.

Implementation would generally be done in the spring and fall to allow for a range of low to moderate intensity fire behavior, as retention of overstory and large trees is desired. Fire modeling based on weather and fuel moistures would be used to create a burn plan and prescription that would produce the desired fire effects. The application of prescribed fire may continue after initial treatment entry to maintain desired conditions and reduce fuel accumulations. The Forest will review the area for changed conditions

before implementation of follow-up maintenance activities and reinitiate planning and consultation processes, as appropriate, should conditions change on the ground.

Prescribed fire would be associated with natural fuels such as brush and grass, and activity fuels generated during mechanical thinning. Ignitions could be done utilizing both hand ignition and aerial ignition from a Unmanned Aircraft System or helicopter platform. Prescribed fire would be done throughout the project area but not in Late Successional Reserves (LSR) and Managed Late Successional Areas (MLSA).

Pile Burning

Pile burning includes ignition of both hand and machine piles. This would generally be done in the fall or winter to minimize fire spread outside of burning piles, although some creep may be permitted. Burning would generally be done 8 to 16 months after construction to allow the material to cure enough for complete consumption of the piles. Ignitions would be done on foot using various handheld firing devices. Pile burning would occur in all areas of the project planned for commercial and non-commercial thinning, including in LSR and MLSA.

Fire Lines

Fire lines in support of broadcast burning would be created as needed and may include up to 27 miles of handline construction and 20 miles of equipment line over the course of project implementation. Burn units would be as large as feasible to reduce exposure to firefighters, take advantage of longer periods with good ventilation conditions, and be cost-effective. There would be enough fire lines on the landscape to allow for ignition of various areas based on conditions. Larger units may also need to be broken into smaller sections to allow for focused burning during periods of good ventilation. Care would be taken not to get too far ahead of planned broadcast burns with line construction, to reduce the amount of line on the landscape at any given time. Lines would be repaired to standard as soon as possible following ignition of the unit they surround or dissect.

Containment lines created by hand crews and tools would generally be 18 to 24” in width to mineral soil. Hand line would be used in more sensitive areas or on slopes over 35%. Containment lines created by equipment would be 2 to -6 feet in width to mineral soil, with equipment disturbance of less than 10 feet. Equipment line would be used in areas where fire behavior is expected to be moderate to high or resistance to control is high and risk of values adjacent is high. Use of equipment to create fire lines would only occur in areas where slope is 35% or less.

Alternative Fuel Management

As an alternative to pile burning, excess fuels may be retained onsite, hauled to a landing, and disposed of using kilns, air curtain burners, portable biomass units, or other equipment.

Road Maintenance, Haul Routes, and Temporary Roads

Road maintenance could occur on all roads in the project area. These activities would include cleaning culverts, ditches, and drains; grading road surfaces; and reestablishing rolling dips or other drainage features of the roadbeds on haul routes in the project area. All road maintenance, including maintenance of haul routes, would occur within previously disturbed areas of the roadbed, consistent with current road maintenance levels and national best management practices (BMPs) (USFS 2021). No changes are proposed to the existing road system. For public safety, some roads may be temporarily closed during implementation.

Up to 4 miles of temporary road would be constructed to facilitate project implementation. Based on initial layout and Lidar imagery, all temporary roads have been located on existing, unauthorized road prisms. Design criteria for construction and rehabilitation are described in the project design criteria.

Table 7. Road maintenance, haul routes, and temporary road activities

Road Action	Mileage	Description
Road reconstruction	18.2	Activities may include surface blading, clearing vegetation, adding fill, and cleaning ditches and culverts of ML 1, ML 2, and ML 3 roads
Road maintenance	4.3	Activities may include surface blading, clearing vegetation, adding fill, and cleaning ditches and culverts of ML 1, ML 2, and ML 3 roads
Opening ML1 roads for implementation	8	Closed roads to be opened for use during implementation
Decommissioning temp roads and putting ML1 back in storage	12	Closed roads opened for use during implementation and temporary road to be decommissioned after implementation
Haul Routes	28.3*	Roads used for haul
Temporary Roads	4	Temporary roads constructed to facilitate project implementation

*Haul route mileage includes some miles outside the project area boundary

Treatments in Riparian Reserves

Some treatments may occur within Riparian Reserves with project design criteria relevant to all treatment activity types, as described in Table 8.

Table 8. Treatments within Riparian Reserves

Riparian Reserve Type	Prescribed Fire (acres)	Commercial Thinning (acres)	Non-commercial Thinning 11 DBH (acres)	Small Tree Thinning 7 DBH (acres)	Late Successional Reserve (acres)**
Intermittent Outer*	332.89	79.35	218.1	35.56	41.72
Intermittent Inner	330.21	0	234.88	30.22	42.94
Non-Fish Outer	50.38	0.06	33.31	17.02	6.41
Non-Fish Inner	51.7	0	44.86	6.83	8.19
Fish-bearing Outer	181.13	1.94	159.11	19.5	1.66
Fish-bearing Inner	175.37	0	165.55	9.8	0
Total by treatment	1121.68	81.4	855.81	118.93	100.92

*Outer and Inner refer to how treatments differ within the RR: no equipment from 0-150 feet (Inner), Equipment allowed from 150-300 feet (Outer).

**Treatment in Late Successional Reserve management area (small tree thinning, pile burning) that intersect Riparian Reserve management area.

Treatments in Late Successional Reserves and Managed Late Successional Areas

Within areas designated as LSR and MSLA, to remain consistent with NWFP standards and guidelines, only non-commercial thinning activities, limited to removal of material 7 inches DBH and smaller, and pile burning would occur. No larger tree thinning or broadcast burn activities are proposed within these management areas. The project is predominately designated as Matrix, which are lands outside of reserved allocations where most timber harvest and silvicultural activities were expected to occur.

Other Actions

Other connected actions include dust abatement, hazard tree removal, and water drafting. Details for these activities are addressed in the project design criteria.

Site potential tree height for Pine stands is 133 feet and for Doug Fir stand is 112 feet. Hazard tree removal may occur in commercial units, non-commercial units, prescribed fire units, pile burn units, within 150 feet of temporary, reconstructed, opened, or currently open roads.

Consideration of No Action

Taking no action would not respond to the purpose and need for action and movement toward desired conditions of restoring forest structure and composition, improving wildlife habitat, and reducing the risks of severe wildfire and pathogens would not occur. The no action alternative serves as a point of comparison between the existing condition and the potential effects of the proposed actions.

Environmental Impacts

Aquatics Species

Affected Environment

The project is being implemented in three HUC 12 sub-watersheds within the HUC 10 Wenatchee River watershed. Project actions barely edge into the Chumstick Creek sub-watershed and will not impact fish-bearing streams and so is not further considered in our analysis. Upper Columbia River steelhead (federally listed, Threatened) may use streams near the project for rearing and migration or holding habitat. No known steelhead spawning habitat occurs downstream of project actions in the Eagle Creek or Derby Canyon sub-watersheds. Spawning habitat is documented in the Wenatchee River but project effects will not extend that far downstream. The lower reaches of Eagle Creek and Grindstone Creek (Derby Canyon sub-watershed) have designated critical habitat (see the Eagle Creek Project Biological Analysis, Habitat Baseline and Species Baseline sections for details).

Overall, the Wenatchee River watershed has low ecological function. The Eagle Creek and Derby Canyon sub-watersheds have a relatively high level of residential and agricultural development. Streams in these sub-watersheds have been altered and habitat for aquatic species is degraded. It is highly likely that these streams will no longer support steelhead within the foreseeable future except perhaps as holding habitat during migration in the spring (Isaak et al., 2017). The Eagle Creek Project Biological Analysis (USFS 2026) updated baseline conditions within these sub-watersheds (Table 9).

Table 9. Environmental Baseline Conditions in the Wenatchee River HUC 10 Watershed (from USFS, 2026).

Indicators	Measure	Baseline Condition
Temperature	Water Quality	Functioning at risk
Sediment	Water Quality	Not properly functioning
Chemical Contaminants/Nutrients	Water Quality	Functioning at risk (Upper) Not properly functioning (Lower)
Physical Barriers	Habitat Access	Functioning at risk (Upper) Not properly functioning (Lower)
Substrate Embeddedness	Habitat Elements	Not properly functioning
Large Woody Debris	Habitat Elements	Not properly functioning
Pool Frequency/Quality	Habitat Elements	Not properly functioning
Off-Channel Habitat	Habitat Elements	Functioning at risk
Refugia	Habitat Elements	Functioning at risk
Width/Depth Ratio	Channel Condition and Dynamics	Functioning at risk
Streambank Condition	Channel Condition and Dynamics	Functioning at risk
Floodplain Connectivity	Channel Condition and Dynamics	Not properly functioning
Change in Peak/Base Flows	Flow/Hydrology	Functioning at risk
Drainage Network/Roads	Flow/Hydrology	Not properly functioning
Road Density and Location	Watershed Conditions	Not properly functioning
Disturbance History	Watershed Conditions	Not properly functioning
Riparian Reserves	Watershed Conditions	Not properly functioning
Disturbance Regime	Watershed Conditions	Functioning at risk
Integration of Species/Habitat Conditions	Watershed Conditions	Not properly functioning

Environmental Impacts

Summary of Effects to ESA Fish Species and Designated Critical Habitat

A complete analysis of the environmental consequences of this project is provided in the project's Biological Assessment (BA) (USFS, 2026) and should be referred to for details and citations as we will provide a plain-language summary here.

One species and its designated critical habitat was analyzed for aquatics: Upper Columbia River (UCR) steelhead (Threatened). Possible negative effects from this project are not likely to extend downstream of the project to the Wenatchee River which has two ESA-listed fish species: Bull Trout and Spring Chinook. The effects determination for Bull Trout, Spring Chinook, and their designated critical habitats is **Not likely to Adversely Affect** (see BA).

The BA identified one project action that may result in measurable negative effects on UCR steelhead and designated critical habitat: Road Management. The BA estimated measurable increased sediment delivery into Grindstone Creek in the Derby Canyon sub-watershed. Log hauling (about 975 trips) and maintenance actions are the cause. This is mostly because the log haul route is native surface (dirt), adjacent to the stream, and has at least 12 stream crossings. The haul route leaves the ridge dividing the Eagle Creek and Derby Canyon sub-watersheds and runs along an intermittent stream downslope to Grindstone Creek and steelhead critical habitat. The route then runs along Grindstone Creek for about 1.3 miles before hitting pavement.

Within that 1.3 mile section of the road, we do not expect elevated sediment delivery because the road is mostly disconnected from the stream network and road reconstruction should reduce existing baseline sediment delivery. However, the road along the intermittent tributary is not disconnected from the stream and road reconstruction is unlikely to offset the impact of log haul and road maintenance.

Increased sediment delivery would increase turbidity into critical habitat at the confluence of the intermittent tributary and Grindstone Creek. We expect short term measurable increases in turbidity at the confluence and immediately downstream or at the site scale. We do not expect effects to be measurable the sub-watershed (HUC 12) scale. We do not expect effects on other stream habitat variables such as substrate character (substrate is dominated by sand with some silt; fine gravel is less common) or embeddedness, even at the site scale. We estimated habitat recovery to baseline conditions within about 1 year after the 5-year contract is complete. Long term we expect that road reconstruction would tend to improve baseline levels of sediment input (the road is currently degraded).

Effects on steelhead would likely be limited to avoidance though there may be minor, insignificant effects on physiology. Impacts are unlikely to measurably impact feeding, growth, reproduction, dispersal, prey base, or survival for Redband Trout or steelhead. These effects were estimated to be significant under the Endangered Species Act (1973, as amended) during the process of Section 7 consultation (16 U.S.C. § 1536) with the National Marine Fisheries Service. However, expected effects are likely to be short term, limited to the site scale, and we expect long-term positive benefits to designated critical habitat and UCR steelhead. Effects do not rise to the threshold of significance as defined in NEPA.

We expect effects to be intermittent following precipitation and snow melt with highest flows and likely turbidity during spring run-off. Duration is expected to be 5 years during the commercial harvest contract and an additional year for recovery to baseline conditions.

The effects determination for UCR steelhead and its critical habitat is **May Affect, Likely to Adversely Affect** (see BA).

Summary of Effects to Region 6 Sensitive Species and Management Indicator Species

We expect no significant negative impacts from project actions on Columbia Basin Redband Trout (see section above) at the sub-watershed scale. There is likely to be short term and intermittent elevated turbidity at the site scale in one stream.

Summary of Effects to Essential Fish Habitat (EFH)

Impacts to Upper Columbia River steelhead and steelhead critical habitat (a surrogate for Spring Chinook, Coho, and Sockeye) are considered short-term and would not be significant at the sub-watershed (HUC 12) or watershed (HUC 10) scale, based on the project Biological Assessment. Some short term and minor negative impacts to EFH are expected at the site scale. Impacts would not occur over spatial scales that would lead to adverse, permanent modifications of habitat. Long term effects are expected to be beneficial at the sub-watershed scale.

Project Consistency with the Aquatic Conservation Strategy Objectives

The project proposes timber harvest, non-commercial thinning, and prescribed fire designed to increase forest/stand resiliency and indirectly benefit ESA critical habitat through reduction/avoidance of high severity wildfire effects and promoting resilience to drought. In addition, proposed closing and restoration of unauthorized roads would also occur which would tend to improve aquatic and riparian function. Some of these actions would cause minor, short-term degradation to ESA critical habitat. Road Management, in support of project actions, would likely cause short term, negative effects to ESA critical habitat at the site

scale in one stream. However, road reconstruction would likely lead to a long-term reduction in sediment delivery across the project which would benefit critical habitat. Project design criteria and other actions to prevent and minimize impacts would be required, including site stabilization, erosion control measures, and no-treatment setbacks for some vegetation treatments. Short-term effects could be measurable at the site scale, but not at larger sub-watershed or watershed scales. Therefore, the project would tend to improve and trend towards desired fine sediment levels in sub-watersheds where conditions are currently degraded and mostly not properly functioning.

Consistency with each ACS objective is discussed below with a description of relevant existing conditions, effects, and determination on whether the project would maintain the existing conditions or lead to improved conditions in the long term.

1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Individual Site Scale: In the short term, the proposed action would: (1) increase sedimentation due to ground disturbance, road-related actions (haul, maintenance, road reconstruction, etc.), vegetation treatments within RRs, and prescribed fire; (2) decrease risk of moderate to high intensity wildfire. In the long-term, the proposed action would maintain and restore the characteristics listed above by: (1) reducing potential for chronic and acute sedimentation of streams through road reconstruction and closing and restoration of non-system roads used as temporary roads for the project, (2) reducing the density of conifers towards reference conditions by thinning treatments, (3) restoring vegetative species composition towards reference condition by thinning and fuels treatments, (4) reducing fuel loading towards reference condition by thinning and fuel treatments, and (5) decrease the risk of adverse effects caused by wildfires such as temperature increases and fine sediment pulses. Short- and long-term effects on the characteristics listed above would occur primarily at the site and reach scales.

Project Scale (HUC 12): At the project scale (mostly one HUC 12 sub-watershed), impacts of the proposed action would be similar to those described for the individual site scale because project actions such as forest vegetation restoration treatments, fuel reduction actions, and road management actions are proposed at this scale.

Watershed Scale (HUC 10): Effects of the proposed action would be immeasurable and/or neutral at the watershed scale or beyond.

2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

All Scales - In the short-term, the proposed action would not create any physical or chemical barrier to migration routes for wildlife species or restrict access to refugia, spawning, or rearing areas for aquatic species. In the long-term, the proposed action would improve the characteristics listed above by (1) opening dense stands to restore the greater riparian connectivity which existed historically in these watersheds and (2) closing and restoring about 4 miles of non-system roads that likely impact aquatic and wildlife species beyond fish. Long-term effects on the characteristics listed above would be manifested at the site scale up to the HUC 8 scale and beyond.

3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

All Spatial Scales: At the site scale and beyond, proposed vegetation management actions would not directly impact physical integrity of aquatic systems since actions incorporate no-treatment setbacks from shorelines, streambanks, and streambeds. Though there may be increased delivery of sediment at the site scale from vegetation treatments and road management actions, effects would not reach the level of reducing the physical integrity of streams at any spatial scale. Though road reconstruction may include some stream crossings, effects would be limited to minor and short-term addition of sediment to streams at the site scale and would not permanently alter baseline condition for physical integrity. In the long-term, road reconstruction would tend to increase stability of the stream crossings, reduce sediment delivery, and prevent failures which could reduce the integrity of stream banks and channel geometry. In the short-term, there are not likely to be any measurable effects on the physical integrity of streams at any spatial scale from vegetation treatments or prescribed fire. Long-term beneficial impacts would greatly outweigh short-term minor and unmeasurable site-scale impacts. By reducing wildfire risk and reconstructing roads, it is likely that these actions would stabilize the physical integrity of streams within the project area and a neighboring HUC 12. From this, positive benefits would likely extend to other portions of the HUC 10 Wenatchee River watershed.

4. Maintain and restore water quality necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Individual Site Scale: There would likely be short-term negative effects to water quality from increased sediment delivery at the site scale in one stream caused by log haul and road maintenance. Site-specific project design criteria are designed to minimize impacts. However, road reconstruction would tend to reduce sediment delivery relative to baseline conditions over the long-term. Elsewhere in the project there may be short-term, minor and unmeasurable increases in sediment delivery from project actions. We do not expect any other impacts to water quality at any spatial scale. As stated, the road reconstruction action would tend to reduce sediment delivery relative to the degraded baseline condition over the long-term.

There would be no effect on water temperature at the any scale since shade-providing vegetation would be protected by project design criteria that prescribe no-treatment buffers along streams. Similarly, there would be no measurable change to water quality via chemical/nutrient impact since project design criteria would restrict the application of chemicals in riparian/stream locations and riparian buffers would limit sediment/nutrient inputs after prescribed fire.

Project Scale (HUC 12): Though we expect increased and measurable sediment delivery and turbidity at one site in one stream, we do not expect measurable increases at the project scale. There would not be measurable changes to water temperatures, or measurable inputs of chemicals/nutrients at the project scale.

Watershed Scale (HUC-5): Sediment, temperature, or chemical/nutrient impacts would not be measurable at the watershed scale.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

All Scales: Proposed actions would cause short-term, localized impacts via increased sediment inputs. As outlined earlier, these effects would be minor and at the site scale except for one site on one stream where we expect measurable but small increases in sediment delivery because of log haul and road maintenance. At this site we expect effects to be short term and spatially limited. Over the long term we expect road reconstruction and reductions in wildfire risk, as well as the closure and restoration of non-system roads, to result in improvement in baseline conditions related to sediment delivery across the project.

6. Maintain and restore instream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

All Scales: Maintenance of instream flow, sediment, nutrient, and wood delivery regimes are critical to maintaining aquatic habitat for imperiled species such as steelhead. The proposed action meets this objective. Because there would be no net change to the FS road network and a reduction in non-system roads which would be closed and restored, and because currently degraded system roads would be reconstructed, the baseline effects of the road network on hydrology should be improved across the project.

There may be immeasurable increases in flows at the project and HUC 12 scales because of vegetation thinning. These increases should better reflect historical and desired conditions and perhaps nudge water tables slightly higher benefiting wet meadows and wetlands

Project design criteria, specifically incorporation of no-treat buffers for commercial/overstory and non-commercial and fuels reduction treatments, would protect sediment, nutrient, and wood delivery regimes, ensuring this objective is maintained fully.

Long-term net reduction of road density, number of stream crossings, high-severity fire risk, and protection of existing and future large tree health/presence on the landscape, would all contribute to maintaining instream flows, and protecting sediment, nutrient, and long-term wood routing processes at the project and watershed scales.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Individual Site Scale: The proposed action would meet this objective. Peaks flows causing floodplain inundation would remain unchanged in the short- and long-terms, particularly at the project and watershed scales. Water table elevations in meadows and along smaller upland streams may respond with slightly higher water table elevations due to vegetation treatments. Efforts to reduce conifer encroachment after decades of fire suppression may result in slightly increased available water in localized reaches.

Project Scale (HUC 12) and Watershed Scale (HUC 10): Vegetation treatments would likely result in slightly higher if immeasurable changes to flows and water tables. Road reconstruction and closure and restoration of non-system roads should reduce negative effects of the road network on hydrology. Together, these actions would tend to move hydrological function toward desired, historical conditions which in turn would likely be beneficial for floodplain inundation and higher water tables that are beneficial for meadows and wetlands.

8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Individual Site Scale: The proposed action would meet this objective. The majority of stands proposed for treatments in the project area, particularly those along streams/in riparian reserves, had prior selective logging and ongoing fire exclusion over the last century. Forest stands are now more homogeneous, with little structural or understory species diversity. Riparian treatments, particularly, are designed to increase resilience of existing large and old conifers and also include treatments to promote native hardwoods (e.g. aspen) and understory diversity in riparian areas where fire exclusion has allowed encroachment by Douglas-fir and other conifers. These stands would experience greater species composition due to additional light reaching the forest floor and would have greater structural diversity as new seedlings create an understory and as residual trees increase in growth and vigor in response to thinning and underburning. Treatments including maintenance small-tree thinning and underburning that would be allowed to back into riparian reserves. Maintenance treatments, which would primarily involve prescribed fire, would help to nudge condition in the desired direction over time. Benefits would be realized in the short- and long term.

Due to implemented PDCs that include no-treatment buffers that increase in size with fish presence, background riparian processes (thermal regulation, nutrient/sediment filtering, erosional processes, and wood recruitment) would be maintained in the short-term during and following implementation. Long-term benefits (>3y) of increased stand resiliency would result from vegetation treatments and net reduction of riparian road density, allowing long-term vegetation growth in RRs where roads once occurred.

Project Scale (HUC 12) and Watershed Scale (HUC 10): Because treatments would occur across a substantial portion of one HUC 12, benefits would span this same spatial scale. Not every treated acre is suitable for hardwood growth and increased species diversity. But along riparian corridors, thinning treatments would increase resiliency of existing large/old confers, allowing measurable changes to species composition & structural diversity across the project. There would not likely be measurable changes at the HUC 10 watershed scale.

9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

All scales: The proposed action would meet this objective. Most historic riparian timber harvest included more aggressive tractor piling/burning, followed by planting Douglas-fir and/or pine. Native hardwoods and other conifer species may have naturally established, but are relatively scarce in areas where fire exclusion has promoted conifer encroachment and over-stocked conditions. Treatments would help accelerate the recovery of these altered RR stands at the site scale in the short- and long-term. Invertebrates in aggressively burned and tractor-piled plantations may have been destroyed especially in areas where extensive removal of woody debris from streams had taken place. In formerly treated stands, treatments would result in more water, nutrients, and sunlight being available for improving the growth, resilience, and vigor of residual trees within RRs and upland areas. Preserving wood recruitment has likely benefited invertebrate stream communities and treatments would enhance this positive benefit.

Fire and Fuels

Affected Environment

The project area is in a primarily dry portion of the Okanogan-Wenatchee National Forest where, historically, frequent wildfires occurred following a natural wildfire regime and where fire frequency at regular intervals resulted in light-intensity fires due to open stands of timber and limited accumulation of fuels, such as needles, branches, and downed logs. Due to successful fire suppression in the last century, stands in the area are now dense and overcrowded and fuel loading is high. Fires are expected to be difficult to control and uncharacteristically destructive to habitat and timber stands (Agee et al. 2009: Hessburg et al. 2003).

The desired condition within the project area is a forest structure and composition consistent with predicted conditions where fire can function as a natural process at intensities consistent with historical levels that do not severely impact habitat or timber stands (Harrod et al. 2009: Prichard et al. 2010: Stevens-Rumann et al. 2013).

The project area consists of mostly dry vegetation types with dry forests covering 84 percent (4,295 acres) of the project area and moist forests covering about 1 percent (63 acres); Table 6. Dense, young, multistory forest structures, particularly on dry sites, are primarily occupied by Douglas-fir and ponderosa pine and are especially vulnerable to insects (Fettig et al 2006) and fire (Fule et al. 2001: Hessburg et al. 2003: Prichard et al. 2010).

Figure 2 shows the crown fire potential in the project area based on existing conditions. Acres of predicted crown fire activity (surface, passive, and active) in the project area are shown in Table 10. Surface fires are fires that burn downed wood, litter, and plants that are at or near the surface of the ground. Passive crown fires occur when fire at the surface is intense enough to ignite tree crowns, but crown fuels are not sufficient to support fire traveling from tree to tree. Active crown fires spread readily between crowns of adjacent trees (NWCG n.d.). The majority (63 percent) of fire activity on USFS lands in the project area at modeled conditions is predicted to be passive and active crown fire. Both passive and active crown fire are expected to cause destruction of timber values and degradation of habitat (Agee et al. 2009: Hessburg et al. 2003).

Table 10. Predicted Crown Fire Activity for USFS Lands in the Project Area for Existing Conditions

Crown Fire Activity[1]	Acres[2]	Percentage of the Project Area[3]
Non-burnable	309	6
Surface fire	1,591	31
Passive crown fire	2,932	57
Active crown fire	294	6

Source: USFS 2023

[1] Predicted crown fire activity under the 93rd percentile of expected environmental conditions, using FlamMap fire behavior simulation.

[2] Values are rounded to the nearest acre.

[3] Values are rounded to the nearest percent.

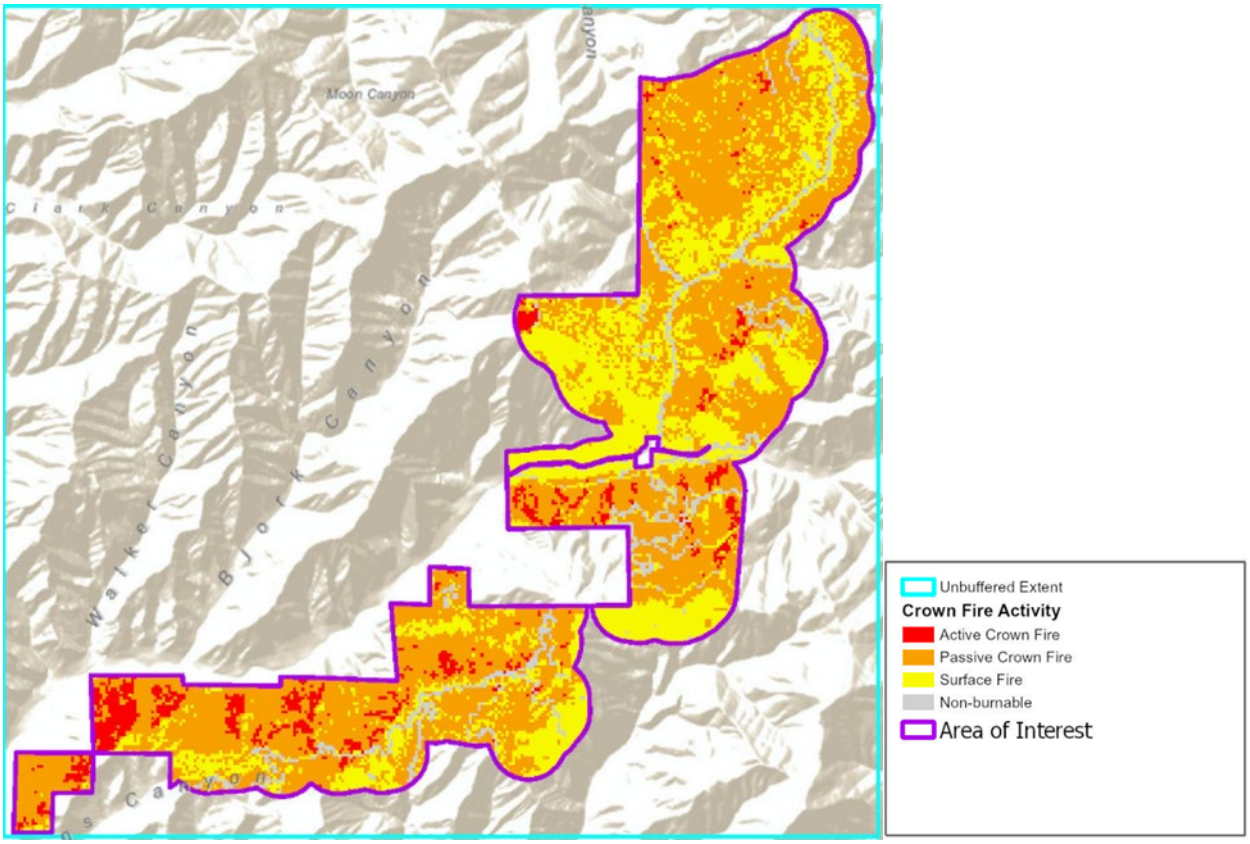

Figure 2. Predicted crown fire activity for the existing condition

Flame length is an indicator of fireline intensity and behavior. It is the distance measured from the average flame tip to the middle of the flaming zone at the base of the fire. Table 11 presents the acres of predicted flame length in the project area based on existing conditions. Flame lengths over 4 feet are expected to be moderately to highly difficult to control because they generally cannot be suppressed by firefighters with hand tools (Andrews et al. 1982). In the project area, 72 percent of acres have a predicted flame length over 4 feet at modeled conditions.

Table 11. Predicted Flame Length (Feet) for USFS Lands in the Project Area for Existing Conditions

Flame Length (feet)[1]	Acres[2]	Percentage of the Project Area[3]
Non-burnable	309	6
0–1	125	2
1–4	1,045	20
4–8	902	18
8–11	283	6
11–25	830	16
>25	1,631	32

Source: USFS 2023

[1] Predicted flame lengths under the 93rd percentile of expected environmental conditions, using FlamMap fire behavior simulation.

[2] Values are rounded to the nearest acre.

[3] Values are rounded to the nearest percent.

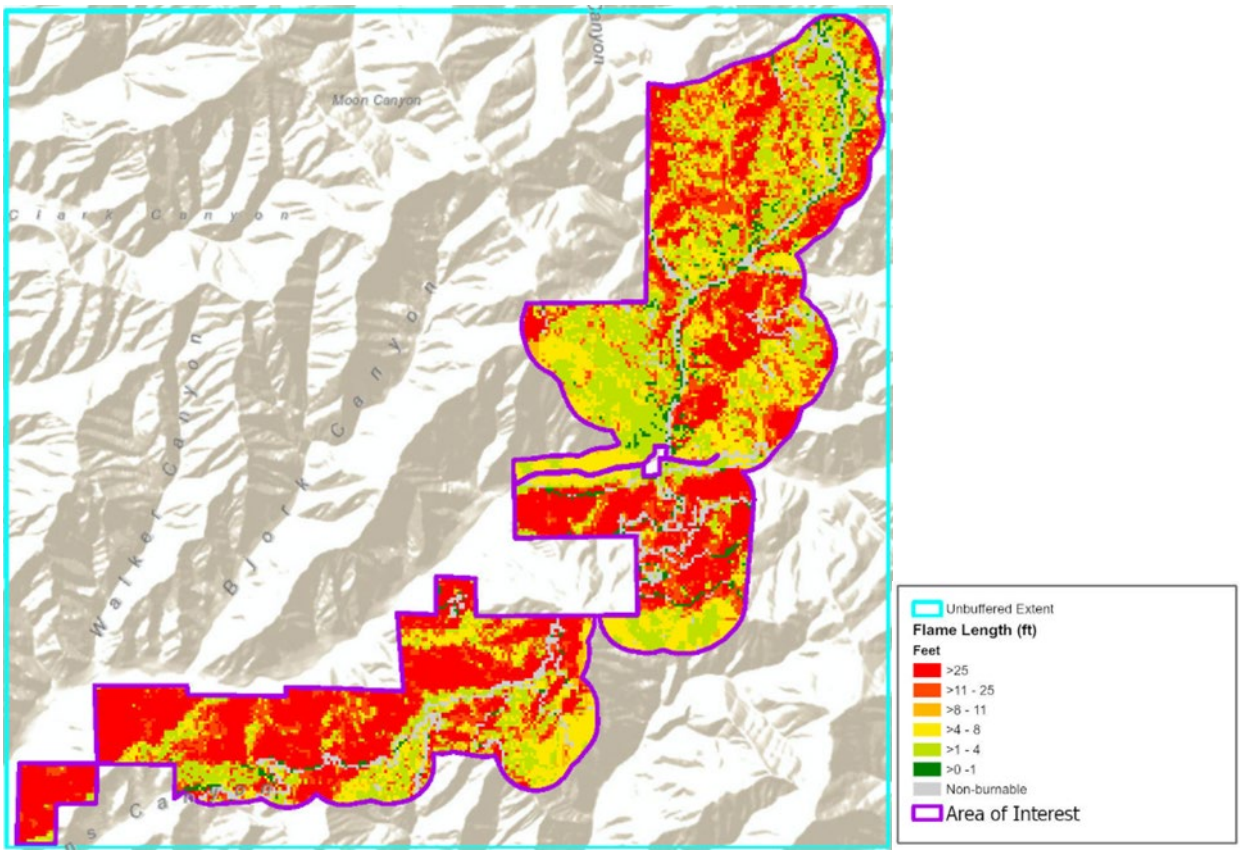

Figure 3. Predicted flame length for the existing condition

If no action is taken the existing conditions in the project area would continue; the majority of the fire activity on USFS lands would be expected to be passive and active crown fire and expected flame lengths would remain high. These conditions would continue to impact the effectiveness of firefighter suppression activities and the sustainability of wildlife habitat and timber stand health.

Environmental Impacts

Predicted fire behavior in the project area under both current conditions and post-treatment is analyzed quantitatively and qualitatively to assess the potential for reduction of fire behavior under the Proposed Action. Predicted crown fire potential and flame lengths in the project area with and without the implementation of fuels management actions under the Proposed Action are simulated using a fire behavior model from the Interagency Fuels Treatment Decision Support System (IFTDSS). Analysis of the best available data using scientifically credible modeling software provides a reliable estimate of the changes in fire behavior in the project area that would result from fuels management actions under the Proposed Action. The expected impacts of proposed fuels management strategies such as commercial and small tree thinning, biomass removal, prescribed burning, and mechanical treatments on fire behavior in the project area are also discussed qualitatively in reference to the best available science on the subject. See the Fire and Fuels Report for additional discussion on methodology.

Under the Proposed Action, the USFS would use commercial and small tree thinning, biomass removal, prescribed burning, and mechanical treatments as methods to reduce the risk of uncharacteristic wildfires, increase the effectiveness of fire suppression tactics, improve the health of timber stands, and enhance the quality of wildlife habitat. In areas identified for commercial thinning and <11” diameter at breast height

(DBH) small tree thinning crown fuels would be reduced by increasing canopy spacing and height. Prescribed burning and small tree thinning <7" DBH would decrease the density of stands and remove ladder fuels such as limbs, small trees, and surface vegetation.

Table 12 and Figure 4 display predicted flame length in the project area post-treatment and also provide a comparison of predicted flame length between the Existing Condition and Proposed Action in terms of the change of acreage. The quantity of lands within the project area that are predicted to experience flame lengths over 4 feet, where firefighters with hand tools would likely not be effective in suppressing wildfire (Andrews et al. 1982), would be reduced by a total of approximately 3,130 acres post-treatment. When a full suppression strategy for future ignitions is desired in the project area this would increase the probability of success for firefighters in protecting habitat, timber stands, and other values. This change also illustrates the potential reduction in fire intensity that would result from the application of the Proposed Action.

Table 12. Post-Treatment Predicted Flame Length (Feet) for USFS Lands in the Project Area (Proposed Action)

Flame Length (feet)[1]	Acres[2]	Change in Acres[2]
Non-burnable	309	0
0–1	1,480	+1,355
1–4	2,821	+1,776
4–8	454	-448
8–11	32	-251
11–25	28	-802
>25	2	-1,629

Source: USFS 2023

[1] Predicted flame lengths under the 93rd percentile of expected environmental conditions, using FlamMap fire behavior simulation.

[2] Values are rounded to the nearest acre.

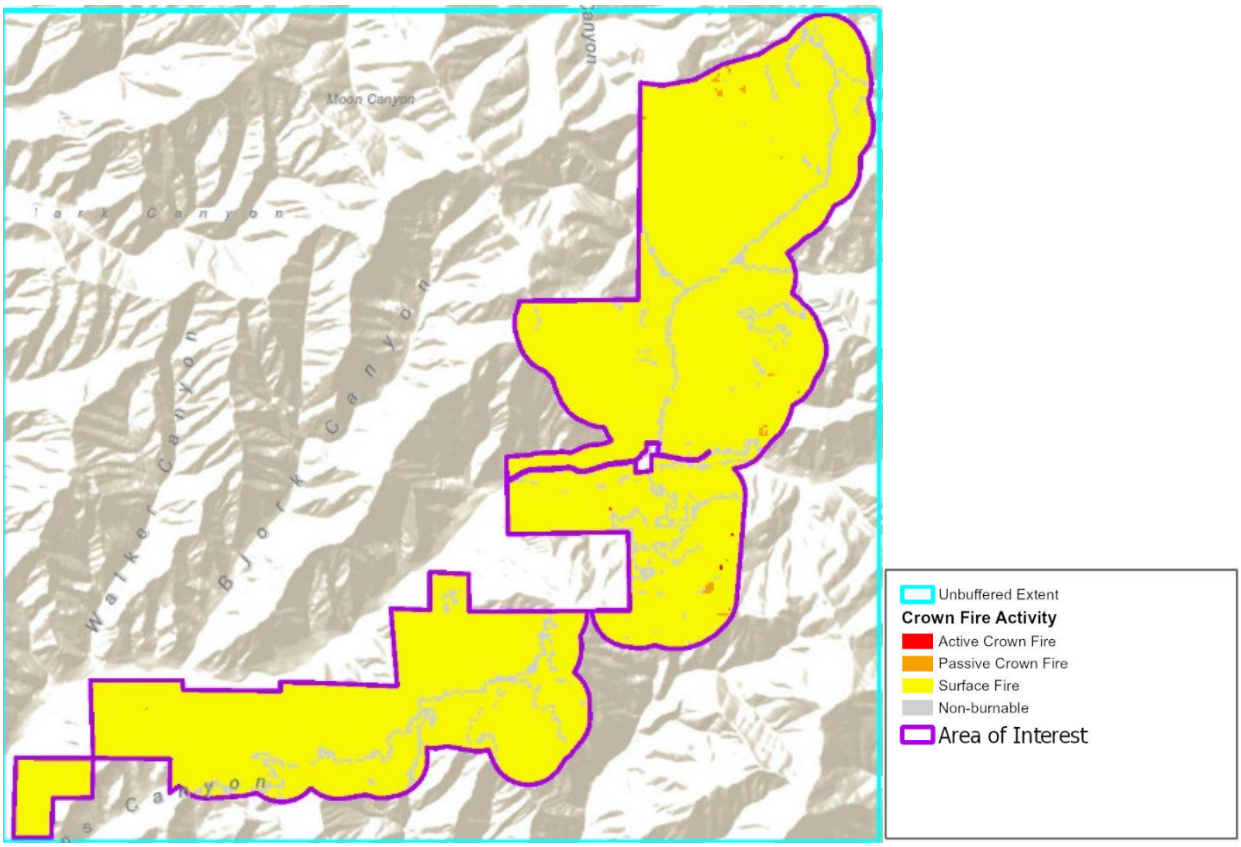

Figure 4. Predicated crown fire activity post implementation

The proposed action would result in a reduction in fire intensity and crown fires (Fule et al. 2001: Harrod et al. 2009: Prichard et al. 2010), and would improve wildlife habitat (Agee et al. 2009) and timber stand health (Looney 2024). The treated area would shift toward a more fire resilient landscape that is closer to historical fire regimes (Stevens-Rumann et al. 2013). Table 13 and Figure 5 display acreage post-treatment predicted crown fire activity in the project area and the difference in acres between the Existing Condition and Proposed Action. Fuels treatments under the Proposed Action would reduce the amount of lands within the project area that are predicted to exhibit passive and active crown fire activity by approximately 3,213 acres.

Table 13. Post-Treatment Predicted Crown Fire Activity for USFS Lands in the Project Area (Proposed Action)

Crown Fire Activity[1]	Acres[2]	Change in Acres[2]
Non-burnable	309	0
Surface fire	4,804	+3,213
Passive fire	12	-2,930
Active fire	1	-293

Source: USFS 2023

[1] Predicted crown fire activity under the 93rd percentile of expected environmental conditions, using FlamMap fire behavior simulation.

[2] Values are rounded to the nearest acre.

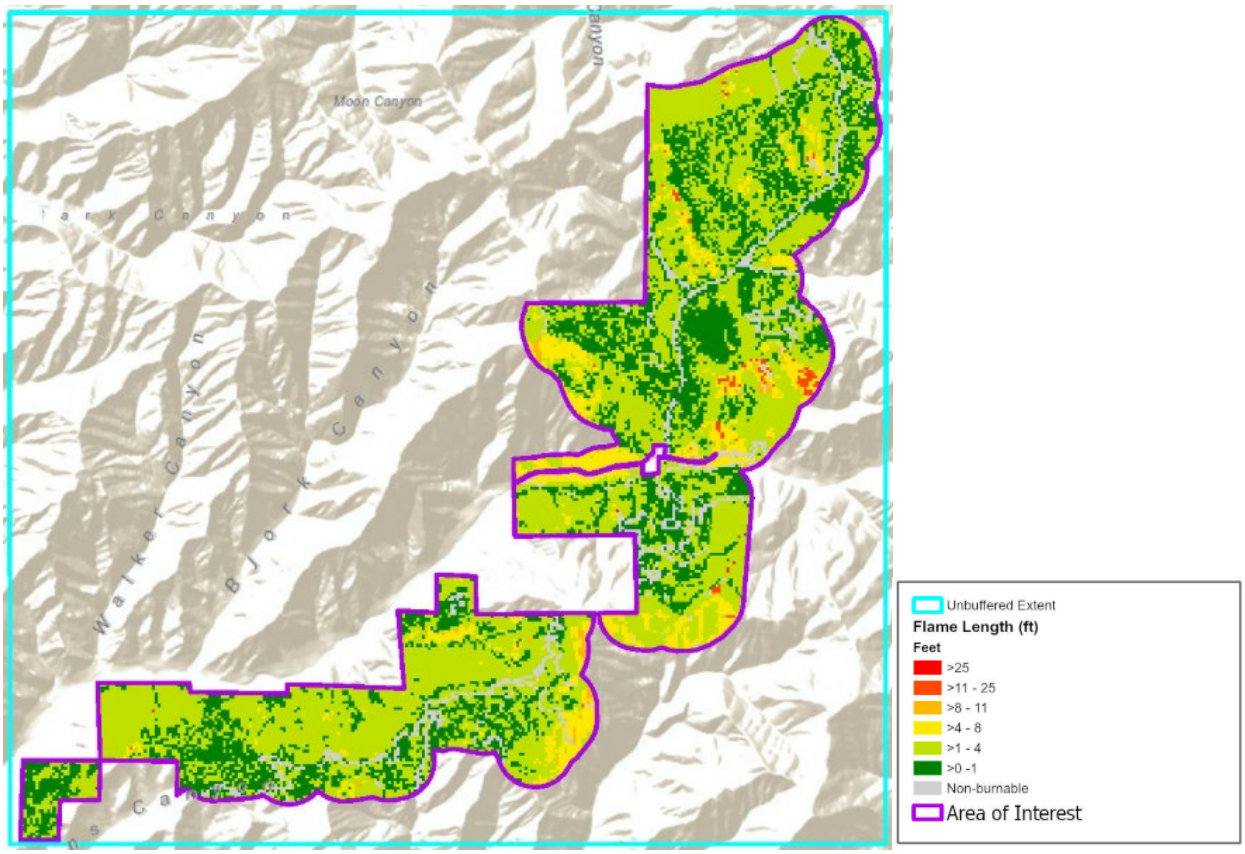

Figure 5. Predicted flame length post implementation

Hydrology

Affected Environment

The Wenatchee River Ranger District has developed the Eagle Creek Project. Most of the project is located within the wildfire urban interface and is mostly located in the Eagle Creek HUC 12 sub-watershed. There is a single haul route from Eagle Creek into the Derby Canyon HUC 12 sub-watershed to access state highway 2 along the Wenatchee River. We would use the term Derby Canyon to refer to the sub-watershed and the valley formed by Grindstone Creek. Most maps indicate that the name of the stream is Derby Canyon, but the USGS National Map indicates the name is Grindstone Creek.

There are about 5 miles of fish-bearing streams within Eagle Creek and one tributary, Van Creek.

Wetlands are few and are mostly located outside, but near, the project boundary and are Freshwater Forested/Shrub type along Eagle Creek. Three small beaver ponds are associated with the wetlands, one of which extends into the project boundary. Outside these wetlands, riparian habitat downstream of FS lands has been impacted by residential development. The stream is moderately incised and lacks wood and structure which has negatively impacted riparian habitat on FS lands. Stream barriers are mostly associated with private property access across streams. There are at least 15 partial barriers and 8 complete barriers in the sub-watershed. Recreation is not a significant factor in the project area though roads do see heavy use.

Watershed Conditions

HUC 12 watersheds are the main planning-level size of watershed used by the USFS. The USFS monitors the condition of the watersheds to evaluate the effects of its management decisions. The condition of HUC 12 watersheds were graded as good, fair, or poor based on 12 objective criteria to determine how near they are to a properly functioning condition. Watersheds were evaluated based on the condition of aquatic biota, riparian wetland vegetation, water quality, water quantity, aquatic habitat, roads and trails, soils, fire effects regime, forest cover, forest health, invasive species, and rangeland vegetation. The hydrology analysis will focus on water quality/quantity and sediment delivery. The project is not proposing any changes to in-stream conditions and there is a riparian reserve no-treatment buffer that would not alter streambank conditions or shade. The watershed condition rating system is meant to identify areas that need improvement at the individual watershed scale and to identify trends that could suggest management issues affecting multiple watersheds. Although no comprehensive nationwide survey of watershed condition has been undertaken since 2012, forest managers continually monitor watershed condition at the forest level and are aware of changes occurring at different scales. The results of the evaluation indicated that all HUC 12 watersheds in the project area are high-priority, function-at-risk watersheds

Water Quality

Water Temperature

Eagle Creek: State data indicate that lowermost reaches have been exceeding state standards since at least 2003 and more consistently since 2012 (https://apps.ecology.wa.gov/waterqualityatlas/). In 2003, between 6/23/2003 and 7/9/2003, the 7-day mean of daily maximum values (7DADmax) exceeded the criterion for this waterbody (16°C) on 9 of 17 days (53%); The maximum exceedance during this period was 16.64°C for the 7-day period centered on 7/6/2003. Dissolved Oxygen has also deviated from state standards at three sites within this sub-watershed. This indicator is **Functioning at Risk** for this sub-watershed.

Derby Canyon-Wenatchee River: No water temperature information is available for Grindstone Creek. However, aspect, road locations, rural development, and logging contribute to reduced riparian vegetation and increased stream exposure. Similar to Eagle Creek, Grindstone Creek has suffered from channel modifications, incisement, and erosion. However, whereas Eagle Creek has perennial flow through most if its length, Grindstone Creek is mostly intermittent upstream of steelhead designated critical habitat. This likely contributes to relatively higher modeled water temperature (NorWeST data, Isaak et al., 2017). This indicator is **Functioning at Risk** for this sub-watershed.

Sediment and Turbidity

Eagle Creek: We have no quantitative sediment data for Eagle Creek, however soils in Eagle Creek are derived from the same Swauk sandstone in Chumstick Creek and the disturbance histories are similar. Urban development and impervious surface likely contribute to elevated levels of turbidity after precipitation events. Based on the data from Chumstick Creek, Eagle Creek is likely **Functioning at Risk**.

Derby Canyon-Wenatchee River: Field observations of Grindstone Creek determined that sand/silt is the dominant substrate in the majority of riffle locations. Many segments of Grindstone Creek and its tributaries are highly constrained by existing native surfaced roads and old skid trails located in draws or intermittent stream bottoms. A minor short-term (four years or the life of the project) negative effect was expected primarily from log hauling on native surfaced roads adjacent to Grindstone Creek during the Fishcher Fire Recovery project. In 2010, the main Grindstone Creek road (7400) that parallels

Grindstone Creek for its length was surfaced with crushed aggragate for 9.0 miles and road drainage was improved with the installation of ditch relief culverts, re-establishment of ditches, and installation of rolling dips. These improvements are expected to reduce existing sediment delivery from the use and maintenance of this road. Despite this improvement, road systems, non-functioning culverts, and road prisms that traverse hill slopes continue to alter intermittent stream function, especially sediment routing in this subwatershed. For these reasons and because fine sediment in the mainstem Wenatchee River is moderately high as is road density and impervious surface (urban development), the Derby Canyon-Wenatchee River subwatershed is **Functioning at Risk.**

Road Density and Location

Table 14 shows the road density calculations for HUC 12 sub-watersheds in the Wenatchee River HUC 10 watershed**.** Riparian roads are defined as a segment of road within 300 ft of a stream channel

Table 14. Road density calculations for the HUC 12 watersheds in the Wenatchee River HUC 10 watershed

HUC 12*	HUC 12 ACRES	Road Miles Per HUC 12	Sum of Riparian Road Miles	Road Density Mi./ Sq. Mi. by HUC 12	Riparian Road Density Mi./ Sq. Mi. by HUC 12
Derby Canyon	18,366	129.85	19.73	4.53	0.69
Eagle	18,143	121.75	24.89	4.29	0.88

* mi/sq. mi = total miles of road in the subwatershed divided by total square miles in the subwatershed; Rip mi/sq mi = miles of riparian road in the subwatershed divided by total square miles in the subwatershed.

This indicator is **Not Properly Functioning** for these sub-watersheds. The riparian road density is substantially less and does alleviate some sediment transport issues within the sub-watersheds.

Environmental Consequences

Impacts Under All Alternatives

Under all alternatives, soil and water resources in the project area would be affected by future wildfires (Neary et al. 2005). During a fire event in the project area, extreme heat would sterilize soil, killing beneficial microorganisms and seeds. Loss of organic material during a fire would also reduce soil's ability to retain moisture and support plant growth. Fires would create hydrophobic (water-repellent) layers in the soil, which prevent water infiltration and increase runoff, exacerbating erosion and reducing water availability for plants within the project area. Other impacts include reduced vegetation cover, which could increase wind and water erosion and increase sediment delivery to streams, degrading water quality. Erosion susceptibility would be increased in areas with severe erosion hazard ratings and in areas with high compaction and high displacement ratings. However, post-fire erosion would depend on existing soil disturbance, ground cover, and soil hydrophobicity.

The impacts of burns would vary widely based on fire type, timing, extent, intensity, and location. To the extent practicable during a wildfire [1], Wenatchee Forest Plan standards and guidelines for soil and water resources would minimize impacts (USFS 1990a, 1998, 2012b, 2014).

[1] After wildfire, wildfire suppression rehabilitation could include a series of immediate post-fire actions to minimize soil erosion and impacts resulting from fire suppression activities.

No Action

Under Alternative 1 (No Action), the proposed fuel reduction treatments and fuel breaks would not be implemented in the project area. The absence of fire treatments would lead to an accumulation of fuels, such as dead leaves and organic debris, increasing the risk of high-intensity, stand-replacing fires. Intense wildfires would likely trend the landscape towards undesirable conditions, with increased fuel loading and more intense fires that are difficult to control.

With the highest potential for high-intensity wildfires, the no-action alternative also has the highest potential for wildfire suppression activities. Fire suppression activities, such as creating firelines, (Both mechanical and hand lines), and using fire retardants, could increase surface disturbance, soil compaction, soil erosion, and water quality degradation. For example, firelines can disturb soil, disrupt infiltration, and increase sediment transport to surface waters. On slopes, firelines could form incised channels that exacerbate erosion and gullying. To support fire suppression activities, existing roads would be cleared for access and dozer lines may be constructed, potentially increasing erosion hazards. Traffic from heavy equipment and trucks could also deteriorate existing roads, making them more susceptible to erosion. Soil compaction from the creation of firelines and roads would decrease infiltration rates and increase overland flow, encouraging the transport of pollutants and eroded sediment to surface water resources in the project area. This would impair water quality due to increased contamination and turbidity. Other impacts from fire suppression activities include direct damage to riparian areas and potential spills (such as petroleum products or fire retardants), which could also degrade water quality. To the extent practicable during wildfire, Wenatchee Forest Plan standards and guidelines for soil and water resources would minimize impacts from fire suppression activities, similar to *Impacts Under All Alternatives* (USFS 1990a, 1998, 2012b, 2014). Burn rehabilitation measures could be implemented after major wildfires to minimize adverse on-site and off-site impacts on soil and water resources.

Water Resources

The No Action would not directly affect water resources, as no changes to drainage networks or sediment delivery from additional ground-disturbing activities would occur, and road density would remain unchanged. The current erosion and landslide potential from roads and hillsides would remain the same.

Natural wildfire processes could have both positive and negative effects on water resources, depending on severity and proximity to streams. For example, high fire intensity could lead to the widespread loss of streamside forests and severely burned soils, negatively impacting water quality through increased stream temperatures (due to reduced shade and increased solar exposure) and elevated erosion and sedimentation. Recent fires in the project area and their corresponding soil burn severities show that larger fires typically have a combined moderate and high soil burn severity between 15-50 percent (see *Fire and Fuels Report* for additional details on fire history). On the other hand, natural wildfire processes can improve forest health and ecological resilience in areas affected by low-intensity fire, subsequently enhancing watershed functioning and water quality.

Under the No Action, current environmental conditions would persist. Without vegetation treatments and prescribed burning, forested stands would continue to decline due to insects, disease, and lack of regenerating disturbance. Consequently, the risk of large-scale fires would increase over time, leading to indirect impacts on water quality such as increased erosion and sedimentation, as large-scale fires and wildfire suppression activities could result in erosion and the delivery of sediment, nutrients, and metals to water resources (USGS 2023).

Proposed Action

Project Design Features and Mitigation Measures

Design features would comply with the Wenatchee Forest Plan (USFS 1990a), Region 6 Supplement (USFS 1998) to FSM Chapter 2500, and Northwest Forest Plan (USFS and BLM 1994) and would be used to reduce the short-term and long-term effects of thinning and other restoration activities on the water resources in the project area.

The project would protect water resources, including lakes, natural ponds, ephemeral draws, intermittent streams, wetlands, perennial fish-bearing streams, and perennial non-fish-bearing streams, through proposed riparian design features. The project would apply activity-dependent design criteria within riparian reserves, to meet Aquatic Conservation Strategy objectives. Riparian design features would protect water resources by minimizing impacts from surface disturbance, vegetation loss, and timber harvest that could result in increased sedimentation, altered drainage patterns, and degraded water quality. (see Table 28 and Table 29, Riparian Design Features, for additional information).

Project activities and their associated BMPs would avoid pollution and excess sediment runoff into waterbodies. Design features also provide practices to mitigate water pollution from temporary roads and guide restoration areas of impact to pre-work hydrologic conditions (see Table 30, Other Resource Project Design Features, for additional information).

The project would meet Aquatic Conservation Strategy objectives of maintaining and restoring species composition and structural diversity of plant communities in riparian reserves by improving stand conditions to encourage development of large tree structure.

See Appendix B - Project Design Features for detailed project design features and mitigation measures.

Water Quality

Decreased ground cover and increased soil disturbance because of proposed treatment activities could impact water quality due to increased sedimentation and soil erosion. For example, reduced ground cover would exacerbate the impact of raindrops on exposed soil, dislodging soil particles and breaking down soil aggregates, leading to heightened erosion. Finer particles can fill surface macropores, reducing infiltration and increasing runoff and soil erosion during heavy rainfall (Powers 2002). Compacted soils would inhibit water infiltration, causing increased runoff. Road reconstruction activities would lead to short-term impacts on water quality by increasing sediment delivery to streams during implementation and for 1 to 3 years afterward. Impacts on water quality due to project activities could impact habitat quality for fish and other aquatic species but this would be short-term and PDCs would minimize the impacts. After treatment and road maintenance, sediment delivery should be improved.

The Wenatchee Forest Plan's sediment yield guidelines are designed to reflect the sediment-carrying capacity of a stream system (USFS 1990a, 2014). Under the Proposed Action, all watersheds within the proposed treatment units are expected to remain below the sediment yield guidelines for fish bearing streams, which include maintaining sediment at less than 20 percent fines (grain size less than 1 inch) and to meet State water quality standards for turbidity (USFS 1990a).

Under the Proposed Action, the effects of sedimentation and erosion on water quality during and after thinning and other restoration activities would be minor and short-term. Although thinning the canopy, removing underbrush, and controlled burning reduce soil cover, the spread-out nature of these treatments over several years, coupled with the implementation of project design measures and BMPs such as riparian reserve buffers and reseeding and replanting, would limit impacts on water quality. Additionally,

the potential consequences of severe fires, which are more likely without intervention, would be considerably more damaging. For example, sediment input from hillsides is influenced by wildfires, with high-severity wildfires generating much more sediment than lower-severity prescribed fires. Although the frequency of treatments may exceed that of wildfires, erosion rates from treatments are generally lower, (Elliot et al. 2010). Consequently, without treatment, sediment erosion after wildfire would be substantially more severe compared to post-treatment scenarios. The Proposed Action (Table 2) thereby reduces the risk of high-severity, sediment-producing wildfires in those areas compared to the No Action.

Under the Proposed Action, additional temporary roads and haul roads represent new potential sediment sources and delivery vectors that may impact water quality. Road density by subwatershed for each alternative is summarized in Table 1. Road density serves as a useful surrogate for evaluating sediment delivery potential, as higher road densities generally correlate with greater risks of soil disturbance, hydrologic connectivity, and sediment transport. Under the Proposed Action, higher road density would increase the likelihood of sediment delivery to waterbodies, compared to the No Action Alternative, as additional roads would provide additional opportunities for soil disturbance and runoff. Roads on soils with severe erosion hazard are highly susceptible to losing material when disturbed, particularly by road construction or heavy traffic. As a result, the additional temporary roads and haul roads with severe erosion hazard could increase sedimentation and water quality degradation under the Proposed Action.

Under the Proposed Action, additional temporary roads would be constructed within subwatersheds that are currently classified as high-priority, functioning at risk. These additional temporary roads are expected to contribute to increased erosion and sediment detachment from the road prism. However, since none of the temporary roads would be located within 300 feet of a stream (see Table 28 and Table 29), the risk of direct sediment delivery to streams is low. As a result, although these subwatersheds would continue to be rated as not properly functioning and would experience elevated erosion due to the temporary roads, they are not expected to see a significant increase in sediment delivery to streams. Over time, erosion and sedimentation are anticipated to decline following treatment and road decommissioning, as decommissioned roads are stabilized and revegetate.

By implementing erosion control measures, protective design features, and BMPs in all treatment areas, impacts on water quality due to project activities are expected to remain within forest management guidelines and comply with Washington State water quality standards (see Table 28, Table 29, and Table 30 for additional information).

Water Quantity and Yield

The primary source of streamflow on the east side of the Cascade Range is the winter snowpack, which causes streamflow to peak in the spring and drop to low levels in the summer. Water management in these regions is closely tied to snowpack management. Timber harvests can temporarily increase both annual and summer streamflow, with more significant increases in wetter areas and less noticeable changes in drier ones. However, these increases are usually negligible and tend to diminish quickly as vegetation regrows.

Regarding peak flows, timber harvests may cause an initial increase, but this effect is usually attenuated downstream due to the mixing of flows from various tributaries. Despite some temporary increases in water yield and summer flow, these changes are often negligible compared to overall annual runoff and are influenced by various natural and management factors. The impact on larger watersheds and stream channels is generally minimal if harvests are spread out over time and space. Concerns include potential effects on water availability, stream channel stability, fish habitat, and irrigation. These are influenced by numerous interrelated factors such as precipitation, evapotranspiration, groundwater movement, stream

channel and riparian conditions, irrigation withdrawals, storage facilities, land use practices, and water conservation efforts.

An equivalent clearcut area of less than 20 percent at the HUC 12 scale is generally unlikely to cause significant changes in water yield that would lead to stream channel instability (Stednick 1996; Troendle et al. 2010). Under the Proposed Action, prescriptions are not expected to remove the 20 percent basal area at the HUC 12 subwatershed scale required to produce a detectable change in flow. As Bosch and Hewlett (1982) and subsequent data (Hornbeck et al. 1997) and modeling (Troendle et al. 2003, 2007) indicate, removing less than 20 percent of the basal area may result in a change in flow, but this change would likely be undetectable. Riparian design features would protect streams from changes in water yield by limiting vegetation removal from prescribed fire activities and maintaining greater than 50% canopy cover for commercial harvest activities. Buffers in Riparian Reserves would maintain and protect stream channel vegetation, which in turn would control erosion, absorb runoff, regulate stream temperature, and improve water quality, maintaining the stability and resilience of stream channels against the potential effects of increased peak flows (see Appendix B - Project Design Features).

Ongoing and Future Actions

Currently, multiple wildfire management projects at the Federal, state, and local levels in Chelan County focus on reducing fuel loads, protecting old-growth forests, and enhancing forest resilience to wildfire. Combined with the Proposed Action, these projects are expected to result in beneficial cumulative effects on soil and water resources in the project area.

Ongoing and future projects are anticipated to continue reducing forest fuel loads, supporting natural ecosystem processes, and promoting the natural fire regime. This, in turn, would increase protection for soil and water resources. While localized disturbances and cumulative impacts may occur, particularly if projects overlap in space, proper monitoring and adaptive management can help minimize any negative effects. The direct impacts of the project treatments are expected to be limited to the treatment areas, with minimal impact on soil and water resources outside these areas, aside from potential fire spread (see the Fires and Fuels Report).

Under the No Action, the risk of uncharacteristic wildfire and decreased ecosystem integrity would persist, potentially exacerbating the effects of future activities on soil and water resources. Future projects will continue to address climate change impacts and historical fire suppression issues.

Vegetation

The current forest condition was compared to reference conditions and is described in the *Chumstick to LP Landscape Evaluation and Prescription* (Resilient Forestry 2024). The evaluation concluded that the legacy of past land use activities in the early- to mid-twentieth century such as wildfire suppression, and a subsequent drop in logging pressure, have led to significant changes in forest structure in the project area. As a result, legacy old-growth forests have been largely removed by past logging, while new forests have been shielded from natural fire disturbance. This has led to the creation of dense, multi-layered, younger stands at high risk from fire, insect, and disease.

Common Stand Exams (collected in 2023) provided inventory data to assess existing conditions and model treatments for the project. To address data gaps, walk through exams were conducted to verify treatment needs in SECC stand (condition class 2, Figure 1., Eagle Creek Project EA). For commercial activities, inventory metrics are separated by the stand condition classes identified in the environmental analysis (Figure 1).

Aerial surveys conducted in 2025 by Forest Health Protection identified several insect pathogens within the project area.

Additionally, sawtimber volume estimates were established with variable point sampling during timber sale reconnaissance. Plot information was entered into the USFS National Cruise Program.

Affected Environment

Historical Analysis

Figure 6 shows structure class for the current conditions (Historic Range of Variability, HRV) and reference conditions (Future Range of Variability, FRV). ~Sixty percent of the eagle creek watershed is now covered in young forest, multi-story (YFMS) stands, which have grown in patch size and density over the past decades. Stem exclusion, open canopy (SEOC) stands are on the lower end of what would be expected historical or in the future. Moving YFMS to SEOC is a driving factor for focusing commercial treatments towards these stands.

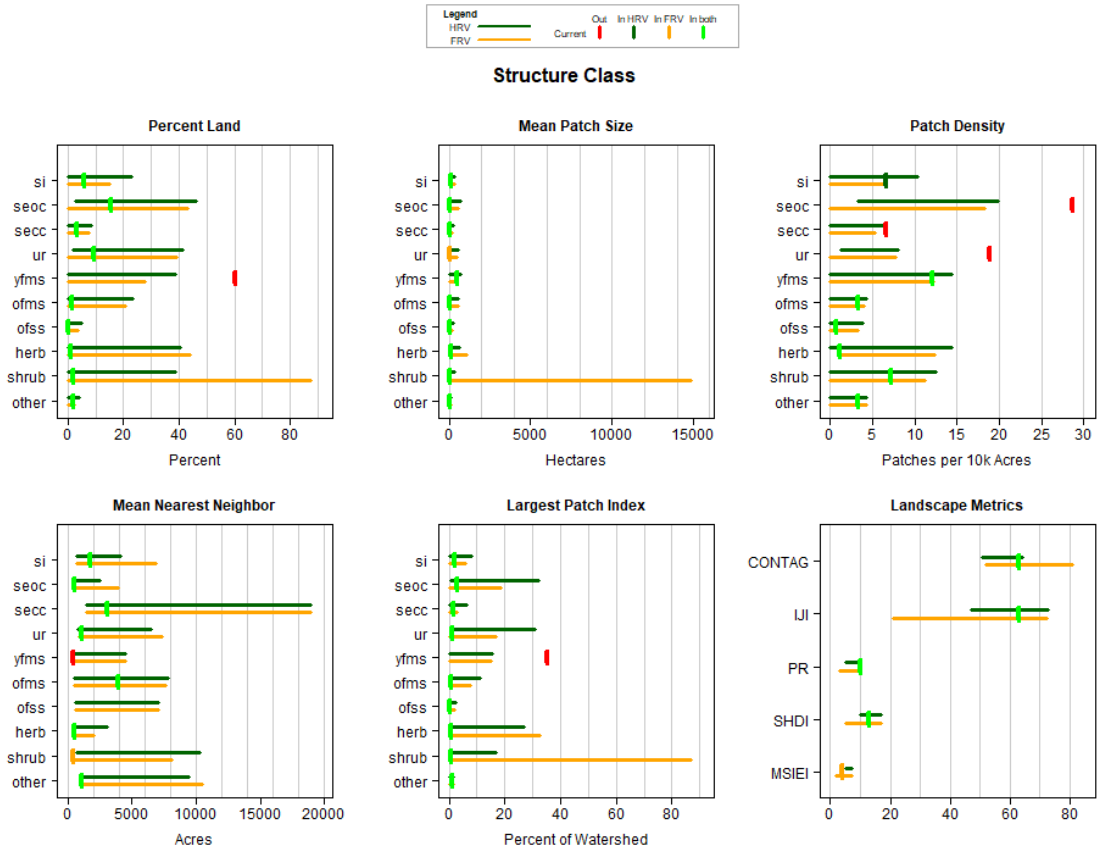

Figure 6. Structure class current conditions vs. reference conditions (HRV & FRV)

No Action

Figure 7 shows the composite stand metrics for the existing conditions and no action alternative for the YFMS condition class. At all times, the stands would remain at high risk to wildfire, insects, and disease. This indicates that taking no action poses high risk to the human environment. Canopy cover as modeled by FVS is known to underestimate canopy cover. It is assumed that the cover listed in Table 15 is somewhat higher than the model outputs.

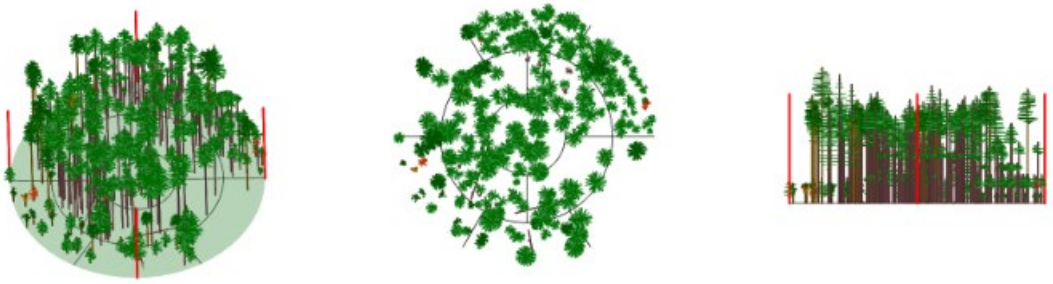

Figure 7 composite visualization of existing conditions in YFMS stands

Table 15 Composite stand metrics for existing conditions and no action alternative for the YFMS condition class.

Year	Canopy Cover %	Trees per acre	Basal Area	SDI	Height	QMD	CCF	MBF
2023	50.04	252.96	141.54	257.04	88.56	10.35	39.1031	17.59
2026	50.46	247.58	144.98	261.44	90.15	10.57	40.7658	18.34
2036	51.87	231.19	156.34	274.07	94.74	11.34	46.3789	20.86
2046	52.67	215.32	166.02	283.74	97.33	12.1	51.349	23.01

Insect and Disease Risk

Within the Project area, spruce budworm, Douglas-fir engraver, fir engraver, mountain pine beetle, western pine beetle, and others of less management concern were detected in 2025. There is at least a moderate risk for outbreak in all stands for the above insects in the project area (Richmond 2024).

All of the species mentioned above are known to increase tree mortality, especially when relative stand densities are above the zone of imminent density-induced mortality, which is about 60% of maximum stand density (Maximum SDI is assumed to be 425 in the Douglas-fir Forest type). All stands selected for commercial treatment are at least at a moderate risk of insect mortality, particularly beetles that attack Douglas-fir. Stands in the SECC condition class are assumed to be less resilient to insect outbreaks, due to high stand densities and low species diversity.

Quaking aspen

Quaking aspen is very shade intolerant and walkthrough observation indicate a decline in the presence of these trees; which provide forage and cover for numerous wildlife species, create unique habitat for many sensitive plants, and moderate fire behavior (Burns and Honkala 1990). All known aspen in the commercial thinning units occur within YFMS stand condition class. Canopy cover and conifer stem density remains relatively high with no action, further decline of Quaking aspen is expected to continue.

Environmental Consequences

The commercial treatments described in the final EA for the proposed action were developed to respond to the need to create a more resilient landscape by creating forest stand structure and species composition appropriate for the specific site and landscape conditions, while increasing domestic timber production.

This evaluation incorporates departure analysis data, identifying deviations from the historical range of variability and considering future scenarios, ecological indicators for forest composition and structure, risk of insect infestation, stand-level fire behavior, wildlife habitat distribution, and interactions between aquatic systems and road networks (Richmond 2024). This integrated approach ensures that thinning and

vegetation treatments are aligned with broader restoration and resilience objectives while addressing site-specific forest health concerns.

In general, the stands targeted for commercial thinning are dense with a wide range of diameter classes represented throughout. There are numerous large trees (greater than 25" DBH), particularly ponderosa pine. Canopies are generally closed with very little sunlight reaching the ground. Past disturbances, such as logging and insect mortality have created some openings and have reduced density in some stands.

The commercial thinning aims to transition stands towards more open conditions. Stands with suitable legacy pine trees would be managed to on a trajectory for understory reinitiation (condition 4 table 6. Eagle Creek EA).

Reduce insect and disease related mortality

Generally, the promotion of trees species that are less susceptible to fir engraver, Spruce budworm, Douglas-fir beetle, mountain pine beetle, and the species-specific dwarf mistletoe would provide for the most resilient stand conditions (Dickinson 2020). Grand fir and Douglas-fir are typically targeted for removal within most treatments although may be retained to meet stocking targets and very large tree retention in some instances. Generally, creating more open conditions, and retaining ponderosa pine, or other conifer species less susceptible to the above pathogens would provide increased resilience to these biotic disturbances.

Stand level prescriptions would be modified to ensure dwarf mistletoe infected suitable for Northern Spotted Owl use are protected.

Other factors such as prolonged drought, warm winters, moisture deficit etc. compound to increase the risk of insect mortality. Targeted residual stand densities are 20-50% (Richmond 2024), which is well below the zone of imminent mortality. This lower relative SDI would increase the likelihood that residual trees would grow well into the future before succumbing to mortality events from insects.

Restoration Treatments

Structural and compositional improvements would be achieved through variable-density thinning, following the individuals, clumps, and openings approach (Churchill et al. 2016). This would create a heterogeneous landscape of openings, tree clumps, and scattered individuals, enhancing habitat conditions, stand stability, and fire resistance. The Proposed Action would help reduce fire severity while maintaining structural complexity for wildlife. Over time, these treatments would transition young forest multistory stands into more sustainable structures, reducing fire risk, improving stand resilience, and fostering a healthier forest ecosystem. Churchill 2016 used historic stand conditions to develop the residual stocking parameters in these forest types. See Appendix A for more detail on initial prescriptions, the two used for commercial thinning are below:

YFMS: Thinning from below to residual densities of 20 to 60 trees per acre, removing ladder fuels within 30 to 40 feet of large trees, and maintaining 20 to 50 percent canopy cover where appropriate. By promoting uneven-aged stand development, ladder fuel reduction and prescribed burning would encourage low intensity wildfire behavior and promote the development of very large tree structures that are most resistant to negative wildfire impacts. Lowering stand densities has been shown to increase tree growth rates, reduce competition mortality and increase stand resiliency to disturbances and climate change (Zhang et al., 2019) as a result, resistance to drought and biotic disturbances can be expected (Tepley et al. 2020). Remove all conifers within a distance equal to average aspen tree height or 50 feet (whichever is greater) of an aspen clone.

SECC: break up stands of continuous Douglas-fir to increase gaps and promote herbs and shrubs within selected stands. Reduce stand density to 30 to 100 TPA depending on size class distribution. Basal area targets are generally 40 to 80 square feet per acre for dry and mesic forest. Use SDI as a guide to determine residual tree density at the stand level.

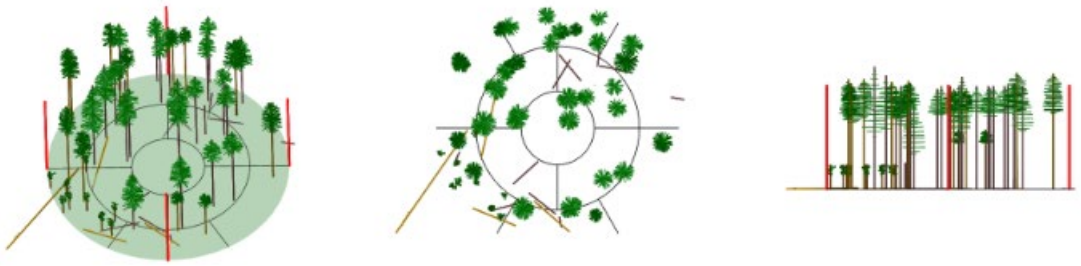

Figure 8. Composite visualization of YFMS post commercial thinning, stand structure is better described as SEOC after treatment.

Table 16 Composite stand metrics for commercial thinning for the YFMS condition class prescription.

Year	Canopy Cover %	Trees Per Acre	Basal Area	SDI	Height	QMD	CCF	MBF
2023	50.04	252.96	141.54	257.04	88.56	10.35	3910.31	17.59
2026	~20	43.75	59.7	91.33	83.3	15.84	1726.6	9.325
2036	23.25	42.8	65.9	98.22	87.48	16.83	1790.11	10.88
2046	24.25	41.56	71.51	104.22	90.67	17.8	1989.41	12.44

Timber Production

Based on initial timber cruise volume estimates, the proposed harvest of 964 acres is estimated to produce a total of 7,967.46 MBF. The merchantable sawtimber in this project is almost exclusively Douglas-fir, which is relatively valuable as dimensional lumber.

In addition to the sawtimber, there is potentially 1600 CCF of non-sawtimber material that would be generated from cutting non merchantable material and residue from manufacturing sawlogs. This material has numerous applications (firewood, pulp, biochar, etc.) but markets are not strong in the area at this time.

Due to steep terrain, stream courses, and land ownership; accessing and implementing much of these areas would be logistically difficult. The agency would employ state of the art logging equipment, and traditional logging systems used in the local forest products industry to recover merchantable sawtimber. Various contracting methods may be needed as certain units (helicopter in particular) may not be viable when included as a part of a commercial timber sale.

Wildlife

Affected Environment

The Eagle Creek Project landscape has been impacted by natural and human-caused disturbances over the last several decades, leading to departures from desired conditions needed to sustain healthy forest conditions. The Project Area is characteristic of much of the Wenatchee River Ranger District and lower Wenatchee Valley, where few of the stands can be described as natural. Changes in forest structure, such

as increased stand densities, and shift in species composition away from shade intolerant tree species, increases in fuel associated with mortality and the increase in ladder fuels that facilitate crown fire, and infilling of trees into gaps that were historically maintained by wildfire.

The habitat types in the project area vary in species composition and forested stand ages. The majority of the project area falls within the Douglas-fir or Ponderosa Pine forest cover type. This area has been significantly impacted by previous human and natural causes, including agriculture, timber harvesting, roads, private residences, and wildfire. Commercial harvest occurred primarily in the 80's and mid-2000s throughout the area in small units. Wildfire has also impacted the action area with the 2025 Lower Sugarloaf Fire being the most recent which burned 594 acres within the action area, in addition to Chumyon (2017), Eagle (2013), and Fischer (2004). These previous fires burned approximately 4,587 acres in the Action Area.

Environmental Impacts

The direct and indirect effects to wildlife species are dependent on the species and their associated habitat type.

In units where mature forest currently exists and we are thinning, thinning would result in impacts to wildlife through initial habitat modification by reducing canopy cover and understory vegetation. In addition, the presence and noise generated during vegetation treatments could result in a temporary disturbance of wildlife and potential disruption of individuals into adjacent habitats (with the disturbance/disruption lasting until the active treatment activities ceased).

Thinning in combination with the prescribed fires, would reduce the extent of undergrowth in affected areas, they would also reduce cover that may be used by various wildlife species. Wildlife may also be disturbed during prescribed burns and from associated smoke, and relocate to unaffected areas away from these controlled fires.

In areas where forest structure is currently in the stand initiation phase, thinning would modify habitat for early seral dependent species, along with the disturbance effects described above. The duration of effects from disturbance is equal to the time required for implementation. The duration of habitat modification is variable and dependent on stand type. Short term as regeneration of shrubs can occur within 1-3 years post implementation, and regeneration of trees would likely occur within 10 years, but could take 50-100 years to reach mature forest characteristics.

Long term beneficial impacts to wildlife habitat would result from vegetation management activities. The proposed thinning would promote the conservation of existing mature forest and accelerate the growth of young over-stocked forest. Medium and large-diameter trees would be retained across the landscape, including standing snags and large woody debris. This, in combination with prescribed burns, would reduce the potential for stand-replacing crown-fires and insect outbreaks in forested stands while increasing tree vigor and accelerating the attainment of large trees and old-growth characteristics.

Depending on the level of action required to effectively close or decommission a road segment post implementation, disturbance to individuals during implementation would be similar to as described above.

Threatened, Endangered, and Sensitive Species

This project complies with the Endangered Species Act.

The project May Affect, Likely to Adversely Affect the Gray Wolf, Northern Spotted Owl, and Northern Spotted Owl Critical Habitat.

The project would have No Effect on Canada lynx, Canada Lynx Critical Habitat, Wolverine, Mt. Rainer White-tailed Ptarmigan, or Yellow-billed Cuckoo. These species, nor their critical habitat or suitable habitat exist in the project area and if discovered would be protected via project design criteria. They will not be discussed further in this analysis.

Refer to the Eagle Creek Wildlife Biological Assessment for a complete effects analysis related to the above Threatened, Endangered, and Proposed species.

Northern Spotted Owl

The Eagle Creek Project includes a suite of vegetation management and road-related activities that would occur intermittently over a 15-year implementation period. These actions range from commercial and non-commercial thinning to prescribed fire, pile burning, hazard tree removal, and temporary road work. Each activity has the potential to affect Northern Spotted Owls through two primary pathways: disturbance and habitat modification.

Disturbance Effects

All activities that involve human presence and noise—such as tree felling, yarding, burning, and road maintenance— would create audiovisual disturbance above ambient levels. This disturbance could temporarily displace owls from portions of their home ranges, causing increased energy expenditure and potentially reducing foraging success or fledgling survival. However, these effects are expected to be minor and short-lived. Adults and fledglings can move to alternate habitat within their home ranges, and project design criteria (PDCs), including seasonal restrictions and survey requirements, would prevent disturbance during the critical early breeding season. As a result, disturbance effects are considered Not Likely to Adversely Affect (NLAA) the species. Nestlings and eggs are highly unlikely to be exposed due to these safeguards.

Habitat Removal and Downgrade

Commercial thinning would result in the long-term removal of approximately 351 acres of nesting, roosting, and foraging (NRF) habitat and 483 acres of dispersal habitat across the action area. This represents a long-term 10% reduction in NRF and 9% reduction in dispersal habitat in the action area. While these losses represent a small proportion of the overall habitat, they reduce the availability of high-quality sites for future nesting pairs and may disrupt connectivity for dispersing juveniles. Forest succession would eventually restore these habitat components, but recovery would take decades—80 to 125 years for NRF and 50 to 80 years for dispersal. Because these changes are long-term and affect essential habitat functions, commercial thinning is determined to be Likely to Adversely Affect (LAA) the species.

Non-commercial thinning and prescribed fire treatments would primarily downgrade or degrade habitat rather than remove it. For example, fuel reduction treatments would downgrade about 704 acres of NRF habitat (shifting N/R to foraging and foraging to dispersal) and degrade roughly 1,000 acres of dispersal habitat. These changes are temporary, with canopy cover generally remaining near dispersal thresholds and recovery expected within 10 to 50 years. Similarly, prescribed fire would degrade approximately 2,792 acres of NSO habitat, but burn plans are designed to retain large trees and canopy cover, minimizing long-term impacts. Due to the downgrade of NRF habitat in the action area from non-commercial thinning of 11 inches DBH and lower, these effects are expected to Likely Adversely Affect

Northern spotted owls. The degradation effects are considered NLAA because they are short-term, dispersed across the landscape, and mitigated by PDCs.

Other Actions

Hazard tree removal and road-related vegetation clearing would cause localized, short-duration habitat degradation, primarily affecting understory vegetation and prey species rather than overstory canopy. These effects are minor and temporary, and thus also NLAA. Smoke from prescribed fire and pile burning may temporarily displace owls or cause stress, but these bouts are brief (typically one to two days per unit), and owls can avoid smoky areas. With seasonal restrictions in place, smoke exposure is also considered NLAA

Cumulative Effects

While all proposed actions would occur only on USFS lands, the action area encompasses substantial private lands as well as WA State Lands. Fuels reduction is often an activity that occurs on these types of ownerships as the action area lie in the eastern cascades fire-prone landscape. Fuel reduction efforts can remove important structural habitat components—such as large trees, canopy cover, snags, and downed logs—reducing habitat complexity needed for nesting, roosting, and foraging. Fragmentation of habitat patches reduces landscape connectivity, exacerbating dispersal limitations. State managed lands are required to follow the Forest Practices Act (FPA) Guidelines. The 1996 Owl Memo #3 and SEPA rules require review for timber harvest, road building, and aerial chemical applications in or near suitable habitat. These rules refer to critical thresholds for canopy retention, landscape-level retention patterns, and minimize 'take' consistent with ESA habitat standards. Despite regulatory protections on state lands, extensive fuel reduction and harvest activities on private lands remove and fragment mature forest stands. Even on state lands, fuel and restoration efforts—if not carefully designed—can diminish habitat complexity required by the owls

In summary, the Eagle Creek Project would have minor, short-term disturbance and habitat degradation effects on Northern Spotted Owls across most activities, resulting in NLAA determinations. However, commercial thinning that removes NRF and dispersal habitat is considered LAA due to its long-term impact on habitat availability and connectivity. For all treatments combined, the project would result in a 20% reduction in NRF (nesting/roosting and foraging combined), 9% reduction in dispersal capable habitat (NRF and dispersal habitat combined), and a 7% increase in unsuitable habitat in the action area (Table 17).

Table 17. Pre- and post-project amounts of northern spotted owl habitat in the action area.

Habitat Type	Pre-project Acres	Post-project Acres	Percent Change
Nesting / Roosting	1,891	1,275	-32.6%
Foraging	1,455	1,409	-3.2%
Dispersal	5,454	5,282	-3.2%
Unsuitable	12,282	13,116	+6.8%

Determination: **May affect, likely to adversely affect** the Northern spotted owl due to removal of Nesting, Roosting, and Foraging habitat.

Norther Spotted Owl Critical Habitat

The proposed vegetation management project would result in a reduction of primary constituent elements (PCEs) within designated Northern spotted owl critical habitat. The 2012 final rule for northern spotted owl designated critical habitat identifies four Primary Constituent Elements (PCEs) that provide for the species' life history processes and are essential for its conservation (USFWS 2012):

- PCE 1 – Forest types that may be in early-, mid-, or late-seral stages and that support the northern spotted owl across its geographical range;
- PCE 2 – Nesting and roosting habitat;
- PCE 3 – Foraging habitat; and
- PCE 4 – Dispersal habitat that supports both the transient and colonization phases.

The project affects habitat features essential for nesting, roosting, foraging, and dispersal, Table 18 summarizes the changes.

Table 18. Summarization of changes to habitat features essential for nesting, roosting, foraging, and dispersal

PCE	Pre-Project Acres	Post-Project Acres	Change (Acres)	Percent Reduction
PCE 1 (NRFD)	6,601	5,848	753	11.4%
PCE 2 (N/R)	1,380	881	499	36.2%
PCE 3 (F)	1,103	1,017	86	7.8%
PCE 4 (D)	4,1117	3,950	167	4.1%

Effects to Northern Spotted Owl Critical Habitat are similar to the effects described in the habitat removal, downgrade, and degrade section of the effects summary determination for the species. Commercial thinning would result in the removal of nesting, roosting, foraging, and dispersal habitat across the action area. While these losses represent a small proportion of the overall habitat, they reduce the availability of high-quality sites for future nesting pairs and may disrupt connectivity for dispersing juveniles. Forest succession would eventually restore these habitat components, but recovery would take decades—80 to 125 years for NRF and 50 to 80 years for dispersal. Because these changes are long-term and affect essential habitat functions, commercial thinning is determined to be Likely to Adversely Affect (LAA) the species.

Non-commercial thinning units in the 11 inches dbh and below category would result in the downgrade of NRF and a degrade of dispersal habitat, as the expected average canopy cover post treatment would be approximately 39%. These changes are temporary, with canopy cover generally remaining near dispersal thresholds and recovery expected within 10 to 50 years. Due to the downgrade of NRF, these effects are considered LAA. Prescribed fire treatments and non-commercial thinning of 7 inches dbh and below would primarily degrade habitat rather than remove it. However, burn plans are designed to retain large trees and canopy cover, minimizing long-term impacts. These degradation effects are considered NLAA because they are short-term, dispersed across the landscape, and mitigated by PDCs.

In summary, Nesting/Roosting/Foraging/Dispersal (NRFD) habitat would experience an 11.4% reduction, primarily due to thinning and removal of structural components that provide cover and prey base. Nesting/Roosting (N/R) habitat would be most affected, with a 36.2% reduction, significantly decreasing high-quality nesting and roosting opportunities. Foraging (F) habitat would see a 7.8% reduction, which

may temporarily reduce prey availability. Dispersal (D) habitat would be minimally impacted (4.1% reduction), maintaining connectivity but slightly reducing cover.

Cumulative Effects

While all proposed actions would occur only on USFS lands, the action area encompasses substantial private lands as well as WA State Lands. Fuels reduction is often an activity that occurs on these types of ownerships as the action area lie in the eastern cascades fire-prone landscape. Fuel reduction efforts can remove important structural habitat components—such as large trees, canopy cover, snags, and downed logs—reducing habitat complexity needed for nesting, roosting, and foraging. Fragmentation of habitat patches reduces landscape connectivity, exacerbating dispersal limitations. State managed lands are required to follow the Forest Practices Act (FPA) Guidelines. The 1996 Owl Memo #3 and SEPA rules require review for timber harvest, road building, and aerial chemical applications in or near suitable habitat. These rules refer to critical thresholds for canopy retention, landscape-level retention patterns, and minimize 'take' consistent with ESA habitat standards. Despite regulatory protections on state lands, extensive fuel reduction and harvest activities on private lands remove and fragment mature forest stands. Even on state lands, fuel and restoration efforts—if not carefully designed—can diminish habitat complexity required by the owls.

The project would reduce the availability and quality of critical habitat features, particularly nesting and roosting components. While dispersal pathways remain largely intact, the loss of high-quality nesting habitat could affect site occupancy and reproductive success in the short term. Long-term effects may be mitigated if vegetation management promotes structural diversity and accelerates development of late-successional characteristics.

Determination: This project **may affect, likely to adversely affect** Northern spotted owl critical habitat due to reduction in PCEs, particularly nesting/roosting habitat.

Gray Wolf

The proposed action is anticipated to have direct and indirect effects on the gray wolf. Project implementation would result in increased personnel in the action area, and the use of hand tools and heavy equipment that would increase audio-visual disturbance above baseline levels. Prescribed fire (broadcast burning and pile burning) could directly expose wolves to smoke. Use of the action area by wolves would be influenced by the amount, configuration and distribution of vegetation remaining on the landscape after implementation. Wolves may change their use of the action area in response to a reduction in hiding cover and potential changes to prey distribution. Adults and pups could be impacted.

Adult wolves are anticipated to respond to disruptions from increased audiovisual disturbance, smoke, and habitat change by temporarily avoiding impacted areas. The PDCs that prescribe the avoidance of dens and rendezvous sites by personnel and the control of potential attractants (food subsidies, chewables) would prevent human/wolf interactions during project implementation. The anticipated reduction in hiding cover may reduce wolf use of the action area, but this temporary habitat loss is likely to be offset by the large territories maintained by wolves in the action area and their adaptable life history. The action area comprises a fraction of the current wolf territories considered, and ample suitable habitat exists outside the action area for packs to use for foraging. Potential reductions in foraging opportunities for adult wolves due to avoidance of the action area are anticipated to result in insignificant changes in body condition or ability to provision pups when considering the scale of existing territories and suitable habitat. Therefore, effects to adults from project activities are anticipated to be insignificant and Not Likely to Adversely Affect (NLAA) individuals.

Pups present in dens or rendezvous sites likely lack the agency to avoid disturbances on their own volition. Activities during denning and rendezvous seasons, such as thinning, prescribed fire, and road work may prompt tending adults to leave dependent pups, resulting in increased predation risk, and smoke exposure if pups are unable to relocate on their own. While disturbance from noise, visual presence, and smoke during sensitive periods can directly impact pup survival and condition, the PDC for protecting known den or rendezvous sites would mitigate the magnitude of effects. However, potential impacts to pups cannot be completely discounted since the knowledge of den and rendezvous sites is dependent on data from collared individuals. One pack in the action area does not currently have a tracking collar, and the presence of collared individuals over the life of the project is not guaranteed. Thus, project activities could potentially harm pups in the event of an unidentified den or rendezvous site in the action area, resulting in adverse effects (Likely to Adversely Affect, LAA).

Cumulative Effects

The wolf pack territories in the action area include a mix of federal, state, and private lands. All land ownership types have an existing baseline of human activity and disturbance. State-managed lands and private timberlands provide important habitat corridors for wolves, but they are subject to ongoing forestry, recreation, and development activities. Management of state lands is consistent with Washington's Forest Practices Act and the Washington Department of Natural Resources' Habitat Conservation Plan. Both documents provide guidance and stipulations for managing wolves and aim to balance resource use with wildlife conservation.

On private lands in the action area, road building, residential expansion, and resource extraction fragment habitat and increase human-wolf encounters. Development and infrastructure expansion on private lands reduce habitat connectivity and limit prey movement. Fragmentation forces wolves into marginal habitats, increasing the likelihood of livestock conflicts and human interactions. Landscape-level strategies and continued adaptive management are necessary to support the species' conservation.

Determination of Effect

The analysis concludes that while most effects on adults are insignificant, activities that may overlap with the wolf denning period may pose harm to pups. While a PDC is in place to protect known dens and rendezvous sites, it does not provide protection for uncollared packs or individuals that may establish a den or rendezvous site in the action area. Denning in the project area is unlikely due to the packs' current territory boundaries. The project area is at the edges of their ranges, while denning tends to occur more centrally within the territory boundaries. No known dens or rendezvous sites have been detected in the project area in the past (Maletzke, 2026, pers. comm.). However, there is still the potential for pups at unknown dens or rendezvous sites to be harmed by project activities. Therefore, the project may affect, and is **may affect, likely to adversely affect** the gray wolf.

Special Status Species

Regional Forester Special Status Species (RFSSS) considered for this Biological Evaluation are those known or likely to occur on the Okanogan-Wenatchee NF. The RFSSS updated list was updated on January 26, 2026 and is pending Regional Forester signature. There are many species designated as RFSSS on the Okanogan-Wenatchee NF that do not occur on Wenatchee River Ranger District. Each species has a primary association with a particular habitat, although they may use others during different life stages.

The project would have no impact on Clark's grebe, Bald eagle, common loon, Harlequin duck, long-billed curlew, Sandhill crane, Larch mountain salamander, western ridged mussel, Grand coulee

mountainsnail, ashy pebblesnail, shortface lanx, frigid bumble bee, high country bumble bee, Mardon skipper, meadow fritillary, Peck's skipper, tawny-edged skipper, blue grey tail dropper, Puget Oregonian, eastern-tailed blue, big horn sheep, Astarte fritillary, Freija fritillary, labrador sulfur, lustrous copper, Melissa arctic, subartic bluet, subarctic darner, Cascade red fox, and mountain goat because the project area is either outside of the known range of the species or no suitable habitat is present.

The project may impact individuals, but is not likely to result in a loss of species viability in the planning area, nor cause a trend toward federal listing because project activities may modify habitat acres or create disturbance but design elements would prevent or minimize the potential for adverse impacts to individuals of the following species: gray flycatcher, great gray owl, Lewis's woodpecker, American goshawk, burrowing owl, white-headed woodpecker, Brewer's sparrow, lesser goldfinch, giant Palouse earthworm, shiny tightcoil, western bumble bee, half black bumble bee, great basin fritillary, zigzag darner, little brown myotis, western grey squirrel, Townsend's big eared bat, hoary bat, fisher, and gray wolf.

See the Wildlife Report for a table summarizing the biological evaluation determinations for each species.

Management Indicator Species

The National Forest Management Act of 1976 (NFMA) requires each National Forest to "provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives." Management Indicator Species (MIS) is a concept adopted by Forest Service ("1982 rule" provision in 36 CFR 219.19 (a)(1)) to monitor for species viability at the Forest level. As described in the 1982 Rule, MIS are "plant and animal species, communities, or special habitats selected for emphasis in planning, and which are monitored during forest plan implementation in order to assess the effects of management activities on their populations and the populations of other species with similar habitat needs which they may represent" (Forest Service Manual 2620.5).

There would be no adverse impacts to management indicator species and/or their habitats that would result in a loss of population viability. For those species present or with habitat present in the project area, the project may impact individuals, but is not likely to result in a loss of species viability in the planning area, nor cause a trend toward federal listing because project activities may modify habitat acres or create disturbance but design elements would prevent or minimize the potential for adverse impacts to individuals.

See the Wildlife Report for a table summarizing the determination of effects for management indicator species.

Other Effects

This EA incorporates by reference the following resource reports: Botany, Recreation, Scenery, and Soils. Table 19 summarizes the potential impacts of the proposed actions on these resources. Review of these reports found that the cause-effect relationship between the proposed action and the resource was limited, and/or the effects associated with alternative management actions would not result in any significant or unintended effects. A full description and analysis of these resources can be found in the associated resource reports.

Table 19. Resources analyzed but not detailed in this environmental assessment

Resource	Findings
Air Quality	We would follow the State's smoke management plan and must have approval to burn thus ensuring ambient air quality standards are met. Air quality was not identified as a potential issue for this project and a stand-alone report was not produced, issues relating to air quality were addressed via project design criteria.
Botany	The proposed actions, combined with the implementation of design features, would minimize potential impacts on sensitive species. While individual FS sensitive species or their habitat may experience localized disturbances, the activities would not lead to a trend toward Federal listing or loss of viability. Based on analysis and findings, there are no federally listed threatened or endangered, or designated critical habitats that are present in the project area for botanical resources. Project design criteria are in place to protect Forest Service sensitive species that are present and populations that could be found in future surveys.
Cultural Resources	Cultural resources are non-renewable. The general use, access, and development of the locations in which they rest, or their surrounds have a high potential to impact them on multiple scales. Pending completion of inventory surveys any unevaluated cultural resources or resources determined to be eligible for listing on the National Register of Historic Places, cemeteries, culturally important plant stands, traditional cultural properties, and other locations of cultural importance as expressed to the Forest by the consulting parties need to be avoided and/or have mitigation measures specifically developed to ensure their protection. Avoidance and protection-in-place are the preferred methods for ensuring the longevity of these resources. But these resources must be regularly monitored to ensure their stability. And, if avoidance is not feasible, then mitigation plans for the specific resource would need to be negotiated. It is only by actively being stewards of these resources can they be protected. An inventory survey and required reporting will be completed for the area of effect or the project area to identify cultural properties before the initiation of activities. Then, if present and pending evaluation, any cultural sites would likely need to be avoided during project activities. A stand-alone cultural resources report was not produced. Cultural resources were not identified as a potential issue for this project and all reporting for this resource is taking place as part of the Section 106 process. Cultural resources would be protected via project design criteria as needed.
Recreation	The recreation resource is limited to dispersed recreation, an unknown mileage of unauthorized trails and a snowmobile route. There are no developed recreation sites or designated trails within the project area. The proposed actions would not be expected to affect existing recreation settings or change long-term recreation use patterns. Short-term, localized disturbances to use and access may occur during implementation, due to visual activity, noise, exhaust, and smoke
Scenery	The Eagle project contains some of the most sensitive mapped/adopted Visual Quality Objectives (VQOs) (Retention) and Land Use Designations (LUDs) (Scenic Travel – Retention LUD). VQOs in the Eagle project area are: Retention, Partial Retention and Modification. Project design features ensure the proposed actions are consistent with Forest wide Goals, Desired Conditions and Standards and Guidelines for scenery.
Soils	All proposed activities are expected to remain below 20 percent DSD threshold after implementation. Although project activities may contribute to soil displacement and soil instability. These effects are aligned with established management plans while recognizing the varied, complex nature of soil impacts. However, no soil in the project area was rated as highly susceptible to erosion, because soil reactions are highly dependent on soil type (e.g., texture), moisture content, and the specific management treatment used. Nonetheless, any activity that would destabilize the soil, such as erosion, compaction or displacement during treatment activities would be minimized through the implementation of the PDCs.

Compliance with Other Environmental Reviews

Northwest Forest Plan

This project is consistent with Northwest Forest Plan standards and guidelines. See resource reports for consistency.

The Wenatchee Forest Plan (1990) was amended by the Northwest Forest Plan and its subsequent January 2001 Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines ("Northwest Forest Plan" or "NWFP", USDA and USDI 1994). Northwest Forest Plan requires specific standards and guidelines (S&Gs) to be followed during project development and implementation (USDA 1990, 2004).

The project is predominately designated as 'Matrix', which are lands outside of reserved allocations where most timber harvest and silvicultural activities were expected to occur.

The project contains a portion of LSR and MLSA allocation. To remain consistent with the LSR standards and guidelines only thinning for tree 7 inches DBH or less would occur. No prescribed fire would be used.

For the portions of the project that involve commercial thinning, stands are generally younger than 80 years old and lack any characteristics of old forest. This has been field verified and no habitat for survey and manage species exists except for the potential of the Great Grey Owl. Surveys for the Great Grey Owl are completed in conjunction with Northern Spotted Owl Surveys via Acoustic Recording Units. This project is consistent with category 3, informally known as the "Pechman Exemptions." The four categories of projects exempt from the Survey and Manage standards and guidelines as stipulated by Judge Pechman (October 11, 2006, "Pechman Exemptions") are:

a. Thinning projects in stands younger than 80 years old;

b. Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;

c. Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream improvement work is the placement of large wood, channel and floodplain reconstruction, or removal of channel diversions; and

d. The portions of projects involving hazardous fuel treatments where prescribed fire is applied. Any portions of a hazardous fuel treatment project involving commercial logging will remain subject to the survey and manage requirements except for thinning of stands younger than 80 years old under subparagraph (a) of this paragraph.

Endangered Species Act

This project complies with the Endangered Species Act.

Consultation is ongoing with the U.S. Fish & Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NMFS) to comply with the Endangered Species Act (ESA). Consultation will be completed before any decision is issued regarding this project.

Wildlife

The project May Affect, Likely to Adversely Affect the Gray Wolf, Northern Spotted Owl, and Northern Spotted Owl Critical Habitat.

The project would have No Effect on Canada lynx, Canada Lynx Critical Habitat, Wolverine, Mt. Rainer White-tailed Ptarmigan, or Yellow-billed Cuckoo. These species, nor their critical habitat or suitable habitat exist in the project area and if discovered would be protected via project design criteria.

Botany

There are no botanical ESA listed species or critical habitats that are present in the project area, therefore there would be no effect to botanical ESA listed species. Showy stickseed, Wenatchee Mountains checkermallow, and whitebark pine are all present on the Wenatchee River Ranger District. Showy stickseed is only known west of the project area in Tumwater Canyon. All populations of Wenatchee mountains checkermallow are located south of the project area, and the critical habitat falls within the Camas Creek watershed and the tributary in Pendelton Canyon before the confluence with Peshastin Creek (USFWS 2001). There is no whitebark pine habitat present in the project area.

Fisheries

Listed fish species in or near the project area include Upper Columbia River steelhead Distinct Population Segment (DPS) (Threatened), Columbia River Bull Trout (Threatened), and Upper Columbia River spring-run Chinook Salmon (Endangered). Steelhead may use the lower-most reaches of Eagle and Grindstone Creek (rearing habitat) and have designated critical habitat near the proposed project area.

The effects determination for Upper Columbia River steelhead Distinct Population Segment (DPS) (Threatened) and its designated critical habitat is **May Affect, Likely to Adversely Affect**.

The effects determination for Columbia River Bull Trout (Threatened), Upper Columbia River spring-run Chinook Salmon (Endangered), and their critical habitats is **Not Likely to Adversely Affect**.

National Historic Preservation Act – Section 106 Review

NHPA Section 106 requires that Federal agencies consider the effects of proposed undertakings on cultural resources and that the agencies consult with State and Tribal Historic Preservation Offices.

Government-to-government consultations have been initiated between the Forest and interested Tribes; coordination of field surveys and identification of historic properties is underway; effects will be determined once this has been completed for each phase of the project; adverse effects to National Register of Historic Places-eligible or unevaluated sites would be avoided through project design; Tribal Historic Preservation Officers and the State Historic Preservation Office will be given 30-days to review survey results, provide comments and concerns.

Consultation with Federally Recognized Tribes

The Okanogan-Wenatchee National Forest has obligations to adhere to various Federal laws relating to the management and protection of cultural or heritage resources including, but not limited to those as specified in the Antiquities Act of 1906 as amended, Historic Sites Act of 1935 as amended, the Archaeological and Historic Preservation Act of 1960 as amended, National Historic Preservation Act (NHPA) of 1966 as amended, the National Environmental Policy Act of 1969 as amended, the American Indian Religious Freedom Act of 1978 as amended, the Archaeological Resources Protection Act of 1976

as amended, and the Native American Graves and Repatriation Act of 1990 as amended. In addition, a series of Presidential Executive Orders (EO) including, but not limited to, EO No. 13006, 13007, 13061, 13175, 13647 and 13287, and the 2021 Presidential Memo on the incorporation of Indigenous Traditional Ecological Knowledge and Federal Decision Making also provide additional guidance to Federal agencies on the management of cultural or heritage resources, and the level of consultation Federal agencies must engage.

Tribal use of ceded lands can be affected by Forest Service land management policies and actions. Federal agencies have a responsibility to consult, coordinate, and communicate with American Indian Tribes on a government-to-government basis to disclose potential impacts to Tribal government interests and provide the opportunity for comment on those potential impacts. Prior to the comment period, Tribal consultation letters were sent to the Yakama Nation and to the Confederated Tribes of the Colville.

Clean Water Act

Complies with State requirements for protection of waters of the State of Washington (Washington Administrative Code, Chapters 173-201 and 202) through planning, application, and monitoring of Best Management Practices in conformance with the Clean Water Act, regulations, and federal guidance issued thereto.

Clean Air Act

We would follow the State's smoke management plan and must have approval to burn thus ensuring ambient air quality standards and the Clean Air Act are met. Issues relating to air quality were addressed via project design criteria.

Infrastructure Investment and Jobs Act, Section 40807

Section 40807 of the Infrastructure Investment and Jobs Act (IIJA) authorized emergency determinations that allow emergency actions on National Forest System (NFS) lands. Within an area where an emergency determination has been made, "authorized emergency actions" can be implemented to provide relief from (1) hazards threatening human health and safety or (2) mitigate threats to natural resources. The subsequent environmental analysis on emergency actions is not subject to the objections process under 36 CFR 218.

This project is within the landscape identified by Secretary Rollins on April 3, 2025, and the use of the Fuels and Forest Health Emergency Action Determination has been approved for this project. The proposed activities are consistent with applicable land management direction and the Forest will fulfill the required public notice and public comment period for using this authority. As such, this project is consistent with the IIJA Section 40807.

Pertinent Executive Orders

Executive Order 11988, Floodplain Management – requires determination of action occurring in a floodplain, using HUD floodplain map or more detailed map if available.

Implementation of project design criteria would result in negligible effect to these resources.

Executive Order 11990, Protection of Wetlands – avoid actions within wetlands unless there are no practical alternatives, and the action includes all practicable means to minimize harm to wetlands.

Implementation of project design criteria would result in negligible effect to these resources.

Executive Order 13112, Invasive Species – 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.

The proposed action incorporates project design criteria to prevent, reduce, detect, and treat invasive plants. These actions and the continued implementation of the 2017 IPM ROD (USDA Forest Service, 2017) and the 2005 PNW ROD (USDA Forest Service, 2005b) meet this order.

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments - agencies consult with Indian tribes and respect tribal sovereignty as they develop policy on issues that impact Indian communities.

Executive Order 13007, Indian Sacred Sites – avoid adversely affecting the physical integrity of these sites.

Government-to-government consultation with the Tribal Historical Preservation Offices is being conducted for compliance with the National Historic Preservation Act and the recent commitment to cooperative management of the forest with the assistance of Tribal partners through the development of new agreements provides these opportunities. If comments or concerns are raised, then they would be addressed and commemorated as appropriate in a memorandum of understanding.

Executive Order 13186, Migratory Birds – identify actions that may have a measurable negative effect on migratory bird populations.

The Okanogan-Wenatchee National Forest falls within the Bird Conservation Region (BCR) 9-Great Basin identified by the North American Bird Conservation Initiative (U.S. NABCI Committee, 2000a, 2000b). Within this BCR, the USFWS developed a list of 28 species of conservation concern from other bird conservation plans to support federal land-managing agencies and their partners in their efforts to abide by the bird conservation principles embodied in the MBTA and EO 13186 (USFWS, 2008). Approximately one-third of the species within BCR 9 are more associated the Columbia Plateau rather than eastern slope of the Cascade Range and unlikely to utilize habitats found within the Project area.

The project complies with the Migratory Bird Treaty Act of 1918, Executive Order 13186 of January 10, 2001, and the April 11, 2018 Department of the Interior memorandum.

Executive Order 14225, Immediate Expansion of American Timber Production – increase timber production and sound forest management, reduce time to deliver timber, and decrease timber supply uncertainty.

This order directs the expansion of timber production and wood products. The proposed thinning directly supports timber production and wood products. In response to EO 14225 Secretary Rollins made a determination that an IIJA emergency situation is occurring on 112,646,000 acres of National Forest System lands on April 3, 2025. This project is within the landscape identified by Secretary Rollins and has been approved to utilize the Fuels and Forest Health EAD in support of this EO.

Agencies and Persons Consulted

Given the nature of the proposal, the responsible official consulted the following parties: U.S. Fish and Wildlife Service; U.S. Environmental Protection Agency; U.S. Bureau of Land Management; National Oceanic and Atmospheric Administration Fisheries ; Washington Department of Natural Resources; Washington Department of Fish and Wildlife Service ; Washington Department of Transportation; Washington Department of Ecology; Chelan County Department of Natural Resources; and the North Central Washington Forest Health Collaborative. In addition, numerous private individuals and organizations have been included in project communications.

Project information was made available to these parties during the development of the Chumstick to LP Project and will again be made available during the comment period.

The responsible official is following the formal consultation process with the Confederated Tribes of the Colville Reservation and the Confederated Tribes and Bands of the Yakama Nation.

Certifying Statement for EA Page Limit and Deadline

The responsible official certifies that this environmental assessment:

☒demonstrates the agency has thoroughly considered the factors mandated by NEPA;

☒represents the agency’s good-faith effort to prioritize documentation of the substantive issues and most important considerations required by NEPA within the Congressionally mandated page limits;

☒reflects the agency's expert judgment;

☒addressed briefly, or left unaddressed, any issues or considerations that were, in the agency’s judgment, comparatively not of a substantive nature;

☒represents the agency’s good-faith effort to fulfill NEPA’s requirements within the Congressional timeline (or within the minimally extended timeline) and this effort is substantially complete; and

☒ includes an analysis provided by an interdisciplinary team that is adequate to inform and reasonably explain the responsible official’s final decision regarding the proposed action or selected alternative.

Preliminary Finding of No Significant Impact

This finding of no significant impact (FONSI) incorporates the environmental assessment and relies on documentation in the associated proposal record.

In accordance with 7 CFR § 1b.2(f)(3)(iii), I have considered the tradeoffs between the short- and long-term adverse impacts of implementing the Eagle Creek Project and the consequences of taking no action.

Short-term adverse impacts of the proposed action include site specific measurable negative effects to UCR steelhead and designated critical habitat from road management, increased sediment and erosion impacts to water quality, removal of vegetation, localized air quality degradation from prescribed fire, modification of wildlife habitat, and wildlife disturbance during implementation. Long-term adverse impacts include reduction in NSO habitat availability and connectivity.

Short- and long-term beneficial impacts include positive benefits to UCR steelhead and critical habitat, improved forest structure and composition, reduced hazardous fuels and risk of high-severity wildfire, enhanced wildfire resiliency, and improved wildlife habitat. Public health and safety benefits include reduced wildfire threat to communities and infrastructure. Offering commercial timber sales would provide economic benefits.

Project design features have been developed to protect sensitive resources, including water quality, soils, and wildlife species and their habitat. Short- and long-term adverse impacts remain within forest management guidelines and meet other law, regulation, and policy.

Compared to the no action alternative, which would leave hazardous fuels on the landscape and leave the risk of future high-severity wildfire and associated ecological impacts, including impaired water quality and loss of soil productivity, the proposed action provides substantial benefits for public health and safety, forest structure, water quality, and wildlife habitat.

There are no irreversible commitments associated with the project. Irretrievable commitments of resources include the removal of merchantable trees during commercial harvest; however, this commitment is necessary to restore forest productivity and reduce future fire risk. These considerations informed the decision to proceed with the proposed action, as the long-term benefits to ecosystem resilience, water quality, and community safety far exceed the short-term adverse effects and limited irreversible resource commitments.

I have determined that the approved activities will not have a reasonably foreseeable significant impact on the quality of the human environment, based on analysis and evidence provided in the Environmental Assessment and proposal record. For these reasons, an environmental impact statement will not be prepared.

Implementation

I intend to implement the activities beginning in the summer of 2026. Implementation will not occur until all required Section 106 consultation has been completed.

Emergency Authority

This environmental assessment received approval to use the following emergency authority: Infrastructure Investment and Jobs Act, Section 40807 Forest Health and Fuels Emergency Situation Determination on February 6, 2026 and is therefore not subject to the pre-decisional objection process (36 CFR 218).

Signature

Signature Reserved for final FONSI

Appendix A - Stand Condition Descriptions and Treatment Descriptions

Condition 1—Stand Initiation

Stand Condition Description

Condition 1 stands are mostly classified as stand-initiation structure and typically include younger, noncommercial-sized trees. These stands have regenerated following a harvest or other disturbance, then developed as an even-aged, single-layered stand. They are distributed throughout the dry, mesic mixed-conifer and moist vegetation groups. Conifer species include ponderosa pine, Douglas-fir, western white pine, grand fir, and lodgepole pine.

In plantations, competition for growing space and resources has decreased tree vigor. These conditions increase the susceptibility to insects, disease, and density-related mortality. Mortality may be increasing the fuel loading and increasing fire hazard. Interlocking crowns increase the potential for a running crown fire when fire reaches into the canopy. As stands age, dead limbs and shade-tolerant trees establishing in the understory provide ladder fuels to carry fire to crowns and initiate a crown fire. Table 20 includes the desired conditions, stand objectives, and preliminary prescription for Condition 1.

Table 20. Condition 1—Stand-Initiation Treatment Prescription

Desired Conditions	Stand Objectives	Preliminary Prescription
Dry and mesic forest types contain stands where ponderosa pine and Douglas-fir are dominant species, with the proportion of each determined by site conditions. Moist forest contains stands where Douglas-fir, western redcedar, western white pine, and western hemlock are dominant species, with the proportion of each determined by site conditions. Stands resilient to insect outbreak would have high vigor and contain at least one major nonhost tree species. Stands resilient to crown fires would have tree crown separation and limited amounts of ladder fuels.	Encourage tree diameter growth to attain large tree structure more rapidly. Where conditions allow, set stands on a trajectory to develop spotted owl nesting habitat. If site conditions preclude nesting habitat development, grow dispersal habitat. Reduce potential insect- and disease-caused mortality. Reduce potential crown fire risk. Meet ACS objectives of maintaining and restoring species composition and structural diversity of plant communities in riparian reserves by improving stand conditions to encourage development of large tree structure.	Reduce stand density to 50 to 200 trees per acre (TPA), depending on size class distribution. Use stand density index (SDI) as a guide to determine residual tree density at the stand level. Retain large and old trees.[a] Protect high-valued snags.[b] Remove ladder fuels from within 30 to 40 feet of overstory trees greater than 25-inch DBH. Determine the fine-scale arrangement of stems within stands by site conditions; it would generally include proportions of the stand as individuals, clumps, and openings (ICOs).[c] Enhance huckleberry production by strategically placing openings across areas where this shrub is present. Apply prescribed fire as needed to modify the fuels profile and attain desired amounts of fuels loading, specifically in the dry forest types. Within riparian reserves, apply activity-dependent design criteria to meet ACS objectives.[d, e]

a Use Van Pelt (2008) as a guide.

b Snag retention criteria are provided in the Northwest Forest Plan Record of Decision, Attachment A (USFS and BLM 1994, C-41 to C-48); the Forest-Wide Assessment for Late Successional Reserve and Managed Late Successional Areas (USFS 1997; see table VII-1LSRA for numerical criteria by forest type); and the Late Successional Reserve and Managed Late Successional Areas Assessments (USFS 1997b; see tables I-8, IV-11, X-11, and X-13). High-valued snags are defined as >20 inches in diameter, existing cavities present, or currently occupied by wildlife.

c The “ICO Method” (Churchill et al. 2016) would help guide this approach.

d Within riparian reserves, activity-dependent design criteria would be applied to maintain existing wood recruitment along streams, retain microclimate condition, and filter activity-related sediment (see Riparian Design Features).

e Within the riparian reserves the same prescriptions apply, but as treatments near the riparian buffers described in Riparian Design Features, the residual density would be feathered to nearer the higher end of the resulting stocking range.

Condition 2—Early Seral Stem Exclusion Closed Canopy and Understory Reinitiation

Stand Condition Description

Condition 2 stands have regenerated following regeneration harvesting or other disturbance, then developed into dense, closed stands. The closed-canopy stands are typically single storied, while the understory reinitiation stands have a second layer and would be considered two storied. The stands are distributed throughout the dry, mesic mixed-conifer and moist vegetation groups. Conifer species include ponderosa pine, Douglas-fir, western white pine, grand fir, and lodgepole pine.

Competition for growing space and resources is decreasing tree vigor. Increased insect, disease, and density-related mortality is evident. This mortality is increasing fuel loading and increasing fire hazard. Interlocking crowns increase the potential for a running crown fire when fire reaches into the canopy. Dead limbs and shade-tolerant trees establishing in the understory as stands age provide ladder fuels to carry fire to crowns and initiate a crown fire.

Table 21 includes the desired conditions, stand objectives, and preliminary prescription for Condition 2.

Table 21. Condition 2—Early Seral Stem Exclusion Closed Canopy and Understory Reinitiation

Desired Conditions	Stand Objectives	Preliminary Prescription
Dry and mesic forest types contain stands where ponderosa pine and Douglas-fir are dominant species, with the proportion of each determined by site conditions. Moist forest contains stands where Douglas-fir, western redcedar, western white pine, and western hemlock are dominant species, with the proportion of each determined by site conditions. Stands resilient to insect outbreak would have high vigor and contain at least one major nonhost tree species. Stands resilient to crown fires would have tree crown separation and limited amounts of ladder fuels.	Encourage tree diameter growth to attain large tree structure more rapidly. Reduce potential insect- and disease-caused mortality. Reduce potential crown fire risk. In riparian reserves, meet ACS objectives of maintaining and restoring species composition and structural diversity of plant communities by improving stand conditions to encourage development of large tree structure.	Reduce stand density to 30 to 100 TPA depending on size class distribution. Basal area targets are generally 40 to 80 square feet per acre for dry and mesic forest and 60 to 100 square feet per acre for moist forests. Use SDI as a guide to determine residual tree density at the stand level. Retain very large and old trees.[a] Retain snags at recommended levels, favoring high-valued snags.[b] Remove ladder fuels from within 30 to 40 feet of very large trees. Determine the fine-scale arrangement of stems within stands by site conditions; it would generally include proportions of the stand as ICOs.[c] Enhance huckleberry production by strategically placing openings across areas where this shrub is present. Apply prescribed fire as needed to modify the fuels profile and attain desired amounts of fuels loading, specifically in the dry forest types. Leave a portion of the younger plantations classified as stem exclusion closed canopy, to develop and provide this otherwise limited habitat at the landscape level within the Lake Wenatchee and Lower Chiwawa drainages. Within riparian reserves, apply activity-dependent design criteria to meet ACS objectives[d, e, f]

a Use Van Pelt (2008) as a guide.

b Snag retention criteria are provided in the Northwest Forest Plan Record of Decision, Attachment A (USFS and BLM 1994, C-41 to C-48); the Forest-Wide Assessment for Late Successional Reserve and Managed Late Successional Areas (USFS 1997a; see table VII-1 LSRA for numerical criteria by forest type); and the Late Successional Reserve and Managed Late Successional Areas Assessments (USFS 1997b; see tables I-8, IV-11, X-11, and X-13). High-valued snags are defined as >20 inches in diameter, existing cavities present, or currently occupied by wildlife.

c The “ICO Method” (Churchill et al. 2016) would help guide this approach.

d Within riparian reserves, activity-dependent design criteria would be applied to maintain existing wood recruitment along streams, retain microclimate condition, and filter activity-related sediment (see Riparian Design Features).

e Within the riparian reserves, apply variable retention prescription that retains undisturbed forest patches and individual live and dead trees.

f Residual stocking would be feathered to increase density within the riparian reserve sections that are closest to the actual riparian area. This would be measured in terms of percent SDI max and target areas with tree diameters less than 15 inches DBH.

Condition 3—Dry Forest – Young-Forest Multistory

Stand Condition Description

Condition 3 stands are dominated by grand fir, Douglas-fir, and ponderosa pine on dry to mesic sites. Historic stand characteristics were controlled by short to moderate return interval, low- to mixed-severity fires. With logging and fire exclusion, grand fir has moved into the upper canopy in many of these stands and increased proportionally compared with historic conditions. And increased density of insect and disease host species, especially grand fir, has resulted in elevated insect and disease hazards in these stands. Insect- and disease-caused mortality has contributed to fuel loading and fire hazard. Additionally, higher competition within stands can result in decline and mortality of existing large ponderosa pine, multilayered conditions with increased late seral species encroachment, and increased crown fire and insect/disease hazards. Upland forest conditions extend into the outer reaches of the riparian reserve and are primarily departed from natural conditions due to fire exclusion.

Table 22 includes the desired conditions, stand objectives, and preliminary prescription for Condition 3.

Table 22. Condition 3—Dry Forest – YFMS Treatment Prescription

Desired Conditions	Stand Objectives	Preliminary Prescription
Dry forest desired conditions consist of a stem exclusion open-canopy or old-forest single story where ponderosa pine and Douglas-fir are dominant species, with the proportion of each determined by site conditions. Stands on the drier sites would appear more open with little conifer understory. They would have low-density conifer understory that is predominately distributed in smaller even-aged groups. These conditions would be made resilient to insect outbreak by containing at least one major nonhost tree species and removing the layered tree canopy from beneath large and old trees. Stands resilient to crown fires would have tree crown separation and limited amounts of ladder fuels.	Protect large trees, especially ponderosa pine. Restore fine-scale stem distribution and density. Reduce potential insect- and disease-caused mortality. Reduce potential crown fire risk. In riparian reserves, meet ACS objectives of maintaining and restoring species composition and structural diversity of plant communities by improving stand conditions to encourage development of large tree structure.	Reduce density by thinning from below to a residual 20 to 60 TPA of overstory. Residual canopy cover would range from approximately 20 to 50 percent. Preferred leave trees are ponderosa pine followed by Douglas-fir. Retain very large and old trees.[a] Retain snags at recommended levels, favoring high-valued snags.[b] Remove ladder fuels from within 30 to 40 feet of very large trees. Maintain groups of early seral understory trees across these stands where they do not impact fire risk objectives. Determine the fine-scale arrangement of stems within stands by site conditions; it would generally include proportions of the stand as ICOs.[c] Use prescribed fire to reduce surface fuels that exceed the desired ranges along with maintaining a low-density understory. Within riparian reserves, apply activity-dependent design criteria to meet ACS objectives.[d, e] Remove Conifers from quaking aspen stands

a Based on Identifying Old Trees and Forests in Eastern Washington (Van Pelt 2008).

b Snag retention criteria are provided in the Northwest Forest Plan Record of Decision, Attachment A (USFS and BLM 1994, C-41 to C-48); the Forest-Wide Assessment for Late Successional Reserve and Managed Late Successional Areas (USFS 1997a; see table VII-1 LSRA for numerical criteria by forest type); and the Late Successional Reserve and Managed Late Successional Areas Assessments (USFS 1997b; see tables I-8, IV-11, X-11, and X-13). High-valued snags are defined as >20 inches in diameter, existing cavities present, or currently occupied by wildlife.

c The “ICO Method” (Churchill et al. 2016) would help guide this approach.

d Within riparian reserves, activity-dependent design criteria would be applied to maintain existing wood recruitment along streams, retain microclimate condition, and filter activity-related sediment (see Riparian Design Features).

e Within the riparian reserves, apply variable retention prescription that retains undisturbed forest patches and individual live and dead trees.

f Residual stocking would be feathered to increase density within the riparian reserve sections that are closest to the actual riparian area. This would be measured in terms of percent SDI max and target areas with tree diameters less than 15 inches DBH.

Condition 4—Dry Forest – Stem Exclusion Open Canopy

Stand Condition Description

Condition 4 stands are dominated by a ponderosa pine and Douglas-fir overstory with little understory, creating a more open forest setting. These stand conditions provide within-stand resiliency from fire and insect disturbances. These forests are dynamic, and continued treatments would help ensure that excess fuel accumulation (litter and fine fuels) and conifer encroachment are maintained at desirable amounts.

Table 23 includes the desired conditions, stand objectives, and preliminary prescription for Condition 4.

Table 23. Condition 4—Dry Forest – Stem Exclusion Open-Canopy Treatment Prescription

Desired Conditions	Stand Objectives	Preliminary Prescription
Dry forest desired conditions include a stem exclusion open-canopy or old-forest single story structure where ponderosa pine and Douglas-fir are dominant species, with the proportion of each determined by site conditions. Stands on the drier sites would appear more open with little conifer understory. This would allow for a low-density conifer understory that is predominately distributed in smaller even-aged groups. Low-density conifer understories are made resilient to insect outbreak by containing at least one major nonhost tree species and removing the layered tree canopy from beneath large and old trees. Stands resilient to crown fires would have tree crown separation and limited amounts of ladder fuels.	Protect large trees, especially ponderosa pine. Restore fine-scale stem distribution and density. Decrease potential insect- and disease- caused mortality. Decrease potential crown fire risk. In riparian reserves maintain a variable distributed cohort layer within the understory.	Reduce density by thinning from below to a residual 20 to 60 TPA of overstory. Residual canopy cover would range from approximately 20 to 50 percent. Preferred leave trees are ponderosa pine followed by Douglas-fir. Retain very large and old trees.[a] Protect high-valued snags.[b] Remove ladder fuels from within 30 to 40 feet of very large trees. Maintain groups of early seral understory trees across these stands where they do not impact fire risk objectives. Determine the fine-scale arrangement of stems within stands by site conditions; it would generally include proportions of the stand as ICOs.[c] Use prescribed fire to reduce surface fuels that exceed the desired ranges along with maintaining a low-density understory. Within riparian reserves, apply activity-dependent design criteria to meet ACS objectives.[d, e]

a Use Van Pelt (2008) as a guide.

b Snag retention criteria are provided in the Northwest Forest Plan Record of Decision, Attachment A (USFS and BLM 1994, C-41 to C-48); the Forest-Wide Assessment for Late Successional Reserve and Managed Late Successional Areas (USFS 1997a; see table VII-1 LSRA for numerical criteria by forest type); and the Late Successional Reserve and Managed Late Successional Areas Assessments (USFS 1997b; see tables I-8, IV-11, X-11, and X-13). High-valued snags are defined as >20 inches in diameter, existing cavities present, or currently occupied by wildlife.

c The “ICO Method” (Churchill et al. 2016) would help guide this approach.

d Within riparian reserves, activity-dependent design criteria would be applied to maintain existing wood recruitment along streams, retain microclimate condition, and filter activity-related sediment (see Riparian Design Features).

e Within the riparian reserves, apply variable retention prescription that retains undisturbed forest patches and individual live and dead trees.

Condition 5—Moist Forest – Young-Forest Multistory

Stand Condition Description

Condition 5 stands contain a diverse overstory of Douglas-fir, grand fir, lodgepole pine, and western white pine. Older stands with less disturbance are dominated by the late seral grand fir. Multilayered stand conditions are susceptible to increased crown fire and insect risk, specifically from western spruce budworm, Douglas-fir tussock moth, and Douglas-fir beetle.

Table 24 includes the desired conditions, stand objectives, and preliminary prescription for Condition 5 for areas within the matrix land allocation. Table 25 describes Condition 5 within LSR allocations.

Table 24. Condition 5—Moist Forest – YFMS: Matrix Treatment Prescription

Desired Conditions	Stand Objectives	Preliminary Prescription
Moist forest stands have understory reinitiation and stem exclusion open-canopy stand structures with a wide canopy break between the overstory and understory layers. Stands resilient to insect outbreaks contain at least one major nonhost tree species and are not multilayered. Grand fir is not a major component. Stands resilient to crown fires would have tree crown separation and limited amounts of ladder fuels. Trees that have a higher fire resilience include Douglas-fir, ponderosa pine, and western larch.	Protect existing and develop large tree structures, especially Douglas-fir. Restore fine-scale stem distribution and density. Reduce potential insect- and disease-caused mortality. Reduce potential crown fire risk.	Transition to understory reinitiation structure—Reduce density by thinning from below while protecting the trees less than 7 inches DBH; residual stocking for trees greater than 7 inches is 20 to 60 TPA depending on size class distribution and approximately 30 to 50 percent canopy cover for the overstory trees. Preferred leave trees are western larch and ponderosa pine, followed by Douglas-fir, western hemlock, and western redcedar. Transition to stem exclusion open canopy where risk reduction is the primary objective; follow the previous overstory treatments plus remove most trees less than 7 inches DBH. Retain very large and old trees.[a] Retain snags at recommended levels, favoring high-valued snags.[b] Remove ladder fuels from within 30 to 40 feet of very large trees. Determine the fine-scale arrangement of stems within stands by site conditions; it would generally include proportions of the stand as ICOs.[c] Within riparian reserves, apply activity-dependent design criteria to meet ACS objectives.[d, e] Remove conifers from aspen stands

a Use Van Pelt (2008) as a guide.

b Snag retention criteria are provided in the Northwest Forest Plan Record of Decision, Attachment A (USFS and BLM 1994, C-41 to C-48); the Forest-Wide Assessment for Late Successional Reserve and Managed Late Successional Areas (USFS 1997a; see table VII-1 LSRA for numerical criteria by forest type); and the Late Successional Reserve and Managed Late Successional Areas Assessments (USFS 1997b; see tables I-8, IV-11, X-11, and X-13). High-valued snags are defined as >20 inches in diameter, existing cavities present, or currently occupied by wildlife.

c The “ICO Method” (Churchill et al. 2016) would help guide this approach.

d Within riparian reserves, activity-dependent design criteria would be applied to maintain existing wood recruitment along streams, retain microclimate condition, and filter activity-related sediment (see Riparian Design Features).

e Within the riparian reserves, apply variable retention prescription that retains undisturbed forest patches and individual live and dead trees.

Table 25. Condition 5—Moist Forest – YFMS: LSR Treatment Prescription

Desired Conditions	Stand Objectives	Preliminary Prescription
Structure is YFMS and old-forest multistory. Stands resilient to insect outbreaks contain multiple tree species and are not multilayered. Grand fir is not a major component. Stands resilient to laminated root disease contain high proportion of more resistant species such as western white pine, western redcedar, western larch, ponderosa pine, and western hemlock. Stands resilient to crown fires would have tree crown separation and limited amounts of ladder fuels. Trees that have a higher fire resilience include Douglas-fir, ponderosa pine, and western larch.	Protect existing and develop large tree structure, especially Douglas-fir. Restore fine-scale stem distribution and density. Reduce potential insect- and disease-caused mortality. Reduce potential crown fire risk.	Remove ladder fuels from within 30 to 40 feet of very large trees. Thin from below to a residual density at 20 to 60 TPA depending on size class distribution. Preferred leave trees are western larch and ponderosa pine, followed by Douglas-fir, western hemlock, and western redcedar. Retain complex patches for horizontal and vertical structural diversity. Determine the fine-scale arrangement of stems within stands by site conditions; it would generally include proportions of the stand as ICOs.[c] Protect and improve resilience to large and old trees.[a] Protect high-valued snags.[b] Within riparian reserves, apply activity-dependent design criteria to meet ACS objectives.[d, e]

a Use Van Pelt (2008) as a guide.

b Snag retention criteria are provided in the Northwest Forest Plan Record of Decision, Attachment A (USFS and BLM 1994, C-41 to C-48); the Forest-Wide Assessment for Late Successional Reserve and Managed Late Successional Areas (USFS 1997a; see table VII-1 LSRA for numerical criteria by forest type); and the Late Successional Reserve and Managed Late Successional Areas Assessments (USFS 1997b; see tables I-8, IV-11, X-11, and X-13). High-valued snags are defined as >20 inches in diameter, existing cavities present, or currently occupied by wildlife.sc The “ICO Method” (Churchill et al. 2016) would help guide this approach.

d Within riparian reserves, activity-dependent design criteria would be applied to maintain existing wood recruitment along streams, retain microclimate condition, and filter activity-related sediment (see Riparian Design Features).

e Within the riparian reserves, apply variable retention prescription that retains undisturbed forest patches and individual live and dead trees.

Condition 6—Old-Forest Multistory

Stand Condition Description

Condition 6 stands contain greater than 30 percent canopy cover for large trees (greater than 25 inches DBH) and have multiple layers of smaller tree sizes in the mid and understory. These multilayered stands provide important habitat for many wildlife species and are typically the most sustainable in the moist forests. The condition is susceptible to loss from wildfire where it occurs in the dry forest types.

Table 26 includes the desired conditions, stand objectives, and preliminary prescription for Condition 6.

Table 26. Condition 6—Old-Forest Multistory Treatment Prescription

Desired Conditions	Stand Objectives	Preliminary Prescription
Structure is old-forest multistory. Ladder fuels are limited, and crown spacing between trees or clumps of trees is sufficient to limit the potential for crown fire.	Protect old and large trees.	Reduce density by thinning from below, targeting the ladder fuels near trees greater than 25 inches DBH. Maintain total canopy cover greater than 50 percent and canopy cover for trees greater than 25 inches DBH at greater than 30 percent. Preferred leave trees are ponderosa pine, Douglas-fir, western redcedar, and western white pine. Retain very large and old trees. Protect high-valued snags.

Condition 7—Non-Forest Shrublands, Herblands

Stand Condition Description

These non-forest areas are most common in the lower elevations and support a suite of grasses, forbs, and shrubs. Invasive weed populations are common here and are a threat to these ecosystems.

The majority of the project area falls into the YFMS structural class (Conditions 3 and 5), and this represents a departure from both historical and future reference conditions. These young, multistoried forest patches also represent late-successional forest, and they contain a fair amount of medium and large trees—attributes that also represent a departure from reference conditions. Furthermore, many of these larger trees qualify as "Remnant Large" trees, as they are contained in structure classes other than old forest.

Table 27 includes the desired conditions, stand objectives, and preliminary prescription for Condition 7.

Table 27. Condition 7—Non-Forest Shrublands, Herblands Treatment Prescription

Desired Conditions	Stand Objectives	Preliminary Prescription
Native plant populations are healthy. Invasive plant populations are limited. Woody shrub populations are minimized adjacent to WUI.	Reduce woody and fine fuels primarily in areas adjacent to WUI.	Apply herbicide to reduce invasive weed populations. Remove (masticate, cut, or burn) woody plant populations directly adjacent to WUI. Prescribe burn consistent with the frequent fire return interval of the site (5–10 years).

Appendix B - Project Design Features

Riparian Design Features

Table 28. Fish-bearing and perennial non-fish-bearing streams – design features

RR Width	Activities	Design Features/Mitigation Measures
300 feet from the edge of the channel, or the outer edge of the 100-year floodplain, or the edge of riparian vegetation, or the extent of seasonally saturated soil, or the distance equal to the height of two site-potential tree heights, whichever is greatest	Noncommercial Thinning/Fuels Reduction	No treatment (e.g., understory hand thinning) will be conducted within 60 feet of the inner edge of the RR for 11" DBH treatments and 40 feet for 7" DBH treatments.
		No mechanical treatment will be conducted within 150 feet of the inner edge of the RR, but equipment can reach in (this is the Inner RR). >50% canopy cover will be maintained within Outer RR and will not be altered within Inner RR.
		Thinning and machine piling with equipment within Outer RR (150-300 feet) may occur during winter conditions to minimize soil impacts during implementation. To provide some operational flexibility, there is the option for summer harvest in Outer RRs if an equivalent harvest method that maintains low soil disturbance impacts with no more than 1-2% ground disturbance which is consistent with winter harvest's low impacts is vetted through the timber, hydrology, soils, and fisheries specialists and deemed effective in meeting this low impact design criteria. If either of these two riparian harvest conditions are not met, the use of equipment will not be approved but hand thinning may proceed.
	Prescribed Fire	There will be no active ignition within 25 feet of the inner edge of the RR but low-intensity fire will be allowed to back toward streams. Handlines will be no closer than 100 feet of the inner edge of the RR.
		Ninety-five percent of overstory trees, 2/3 of understory/shrub, and 50 percent of ground cover/organic material on surface will be maintained.
	Commercial Harvest	No commercial harvest will be conducted within 150 feet of the inner edge of the RR.
		Thinning with equipment within Outer RR (150-300 feet) may occur during winter conditions to minimize soil impacts during implementation. To provide some operational flexibility, purchasers have the option for summer harvest in Outer RRs if they can provide an equivalent harvest method that maintains low soil disturbance impacts with no more than 1-2% ground disturbance, which is consistent with winter harvest's low impacts. Any such proposal would be vetted through the timber, hydrology, soils, and fisheries specialists and must be deemed effective in meeting this low impact design criteria before approval. If either of these two riparian harvest conditions are not met, there would be no commercial harvest in RRs.
		>50% canopy cover will be maintained within Outer RR and will not be altered within Inner RR.

Table 29. Intermittent streams, wetlands, and unstable and potentially unstable areas – design features

RR Width	Activities	Design Features/Mitigation Measures
150 feet from the edge of the channel, or the outer edge of the 100-year floodplain, or the edge of riparian vegetation, or the extent of seasonally saturated soil, or the distance equal to the height of one site-potential tree height, whichever is greatest	Noncommercial Thinning/ Fuels Reduction	No treatments (e.g., 11" and 7" DBH hand thinning) will occur within 40 feet of the inner edge of the RR except where hand treatment is designed to reduce conifer encroachment on wetlands and wet meadows. >50% canopy cover will be maintained within Outer RR and will not be altered within Inner RR.
		No mechanical equipment within 75 feet of the inner edge of the RR but equipment can reach in (this is the Inner RR). Hand thinning of the understory from below may occur from 25-75 feet. Thinning and machine piling with equipment can occur within the Outer RR (75-150 feet). Alternative methods of harvest within Outer RRs may be approved by soils/hydro specialists as detailed for fish-bearing streams.
	Prescribed Fire	No ignition within 25 feet of the inner edge of the RR; handlines 50 feet from inner edge of the RR; no prescribed fire within wetlands.
		Backing fire toward streams may occur but cannot back into wetlands
		Ninety-five percent of overstory trees, 2/3 of understory/shrub, and 50 percent of ground cover/organic material on surface would be maintained.
	Commercial Harvest	No commercial harvest or mechanical equipment within 75 feet of the inner edge of the RR.
		>50% canopy cover will be maintained within Outer RR and will not be altered within Inner RR.
		Thinning and machine piling with equipment within Outer RR (75-150 feet) may occur in winter; otherwise no equipment in riparian reserves. Alternative methods of harvest within Outer RRs may be approved by soils/hydro specialists. Alternative methods of harvest within Outer RRs (75-150 feet) may be approved by soils/hydro specialists as detailed for fish-bearing streams.

All Resource Project Design Features

The project would use BMPs, standards and guidelines, and design criteria to reduce the overall impacts and effects from the implementation of the project. These are grouped by the potentially affected resource type.

Table 30. Resource Project Design Features

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Aquatics 1	Commercial and Non-commercial Thinning, Fuel Breaks, Hazard Trees	• Equipment will be limited to areas with slopes <35% within RRs • No-cut buffers for non-commercial hand thinning are 40 feet on intermittent streams and 60 feet on perennial and fish-bearing streams. • Canopy cover within Inner RRs will not be altered and overstory thinning will not occur • Canopy cover in the Outer RRs will not be reduced below 50% • Hand thinning in RRs will avoid removal of hardwoods • Hazard trees felled within RR will be felled downslope whenever possible and left on site
Aquatics 2	Temporary Road Construction and Reconstruction	• Avoid constructing temporary roads in Riparian Reserves. If temporary roads are necessary, minimize stream crossings and other sensitive areas and consult with aquatics and soils specialist for locating them. • Temporary road alignments should avoid Riparian Reserves and be located to minimize disturbance to wetlands, streams, and groundwater emergence and recharge. • Temporary stream crossings will be designed to handle expected flows during the life of use. Crossings will be designed to minimize disturbance to stream banks and channels; material used for the road will be removed after implementation and placed in a stable location to prevent sediment from entering the stream. Erosion control measures will be in place during and after use of the crossing • New or reconstructed road segments originating from existing roads within Riparian Reserves should not exceed a 10% slope gradient within the first 200 feet of the road segment in order to avoid or minimize the risk of concentrating and channeling runoff and sediment down road surfaces and into streams. • Cross-drain road surfaces through a vegetative filter strip prior to the road approach reaching a stream-crossing structure. • All temporary roads would be decommissioned within 18 months of last use, to a standard which prevents use by all motorized vehicles, including off-highway vehicles, and effectively returns the road to a stable hydrologic state.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Aquatics 3	Road Management	• Appropriate erosion control measures such as: seasonal closures, gravelling, maintenance, ditching water routing structures, sediment traps, water bars, and drivable dips would be employed to minimize erosion. Route water off road prisms and fills and disperse across a vegetated slope. • Unpaved haul routes crossing fish bearing streams must be maintained appropriately before and during haul operations, including graveling road surface and installing any needed water bars. Log haul should not occur while road surface is saturated. • Cross drain and ditch cleanout would be used to remove sediment, debris, and other blockages which impede surface water routing. • Road edge berms would not be left after cleanout. Mechanized cross drain and ditch cleanout would not occur within 25 feet of stream channels or crossings. • Avoid cutting the toe of cut slopes when grading roads or pulling ditches.
Aquatics 4	Water Drafting	• Water drafting sites for dust abatement and road compacting will be identified by a fish biologist or hydrologist to avoid adverse dewatering effects to fish. Water drafting/pumping would maintain a continuous surface flow of the stream, reduce flows by <10%, and without altering the original wetted width. The channel must not be dewatered to the point of isolating fish. Need for this treatment will be determined by aquatic or hydrologic specialists with input engineering staff as appropriate. • Screen mesh openings for all intake screens shall not exceed 3/32 inch (2.38 mm) for woven wire or perforated plate screens, or 0.0689 inch (1.75 mm) for profile wire screens, with a minimum 27% open area. The screened intake will consist of enough surface area to ensure that the velocity through the screen is less than 0.4 feet per second. Screen maintenance will be adequate to prevent injury or entrapment of juvenile fish and the screen will remain in place whenever water is withdrawn from the stream through the pump intake
Aquatics 5	Dust Abatement	• Water will be preferred for dust abatement • Lignin-based products may be used for dust abatement but is prohibited during or just before wet weather and within 100 feet of stream crossings or other locations that could result in direct delivery to a water body. • If magnesium chloride is used, 1) maintain a 1-foot no-spray buffer on edges of roads; 2) no application within 100 feet of stream crossings and 50 feet of any waterbody, wetland, or aspen; 3) no application within 24 hours of predicted rain; no application limit, future needs TBD by monitoring effects to vegetation • Application of magnesium chloride will not occur within 100 feet of roadside occurrences of Federally listed or proposed threatened or endangered species and/or FSS species, botanical Special Interest Areas (SIAs), or serpentine soil communities.
Aquatics 6	Ephemeral Draws	• Avoid hand piling in bottom of draws • No machine piling in bottom of draws • Do not use the bottom of draws as a skid trail • Machine crossings and skid trails should cross the bottom of draws perpendicularly and have appropriate BMPs to prevent erosion downslope; minimize the number of crossings

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Aquatics 7	Landings	• Use existing landings outside Riparian Reserves wherever possible • New landings will not be constructed in Riparian Reserves unless no other options exist. If needed, new landings will not be constructed within no treatment buffers but can be located/constructed elsewhere in the Riparian Reserve on slopes <5% that has a well-developed riparian vegetation buffer strip and is not located downslope of a road; soils or hydrology specialists will be consulted on the location of the landing and BMPs • Landings will be located in upland portions of the reserves, on flat terrain, and disconnected from surface or groundwater flow paths. Landing construction locations will avoid seeps, springs and wetlands, as well as draws and ephemeral channels. • Erosion control measures such as silt fences or other retention methods will be installed prior to landing construction and would be maintained and remain in place during operations • All landings within Riparian Reserves will be restored after project completion by de-compacting and covering with slash, placing barriers or other methods to prevent erosion, offsite sediment delivery and to prevent mechanized and motorized use • Post-logging soil scarification and reseeding will be done on landings to restore infiltration and ground cover on all compacted soils.
Aquatics 8	Felling and Yarding	• Skid trails will not cross intermittent streams with one exception that will use an existing skid trail and site-specific PDCs designed in cooperation with soils and aquatics specialists. • Avoid downhill yarding and skid trail layout converging into Riparian Reserves, particularly where skid trails converge onto a road surface within the reserve. This action increases the risk of capturing and concentrating overland flow and storm runoff and delivering it to streams, which affects peak flows downstream. • Designate skid trails at a minimum of 50-foot spacing to minimize risk of overland flow. • No logging equipment or skidding, within the no-treatment portions of Riparian Reserves, and, to the extent feasible, avoid downhill yarding onto roads located in Riparian Reserves, using either ground or skyline yarding systems, in order to prevent soil movement into Riparian Reserves. • Use full suspension when yarding through RRs; minimize overstory trees cut for corridors and leave all cut trees in place. Trees will be cut by hand. Corridors will be 20 feet wide and about 125 feet apart. Skyline yarding will only occur through RRs along intermittent streams. • Install waterbars on all skidding corridors, or other methods to divert surface water as needed, upon completion of yarding operations. • Skid trails will have a minimum of 6 inches of slash • Trees that fall into no treatment zones should be left on site

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Aquatics 9	Fuels Management/ Slash Disposal	• Slash would not be piled or concentrated within the no treatment portions of the Riparian Reserves. • Firelines would have waterbars (ditches or dips built into the fireline, not berms) constructed to divert surface water off of the line and onto vegetative surfaces. Waterbars would be constructed at the time of fireline construction. • Hand firelines may be constructed no closer than 100 feet of the inner edge of the RR for wetlands, fish-bearing, and perennial non-fish bearing streams. For intermittent streams, hand firelines may be constructed within 50 feet of the inner edge of the RR • Fireline would be rehabilitated using methods that prevent public use as hiking trails, bike routes, motorcycle routes, etc. • Locate re-fueling and fuel storage areas outside of Riparian Reserves or on a road, away from water and drainage areas, in locations where the largest possible spill can be contained before entering water. In the event of a fuel spill during a burn project, the Forest Hazardous Materials Coordinator would be contacted to coordinate clean up. • Fuel would be located in containment basins, and hazard materials spill kits would be available for spill containment. • No surfactants or foams would be used within 100 feet of the edge of wetted channels or wetlands. Engines which have had surfactant would not draft from fish-bearing waters. The deployment of hose will not require any ground disturbance, and in many cases the use of hose for wetline could reduce the need for hand fireline construction.
Aquatics 10	Herbicide Use	• Follow all standards and guidelines and BMPs in the Forest-wide Site-Specific Invasive Plant Management Record of Decision (USFS 2017).
Aquatics 11	Underburning	• Where underburning occurs in riparian reserves, activities will be designed with a goal of 90% low, 10% moderate and 0% high burn severity when averaged across all RRs within the burn area. • Test fire will be conducted in the riparian reserves to confirm appropriate low intensity burning conditions before stand ignition. If prescribed fire in riparian reserves is not meeting these objectives, ignition will continue only as needed to create safe holding conditions, then further ignition in riparian reserves will not occur until aquatics, hydrology, and/or soils staff can assess effects and determine the need for mitigating measures to reduce erosion and sedimentation potential. • If fire suppression is needed within riparian reserves, Minimum Impact Suppression Tactics (MIST) will be used if personnel safety is not compromised.
Aquatics 12	Pile burning	• Do not create piles for burning in the low points of draws; piles will be created no closer than 50 feet from intermittent streams and 100 feet from perennial streams, wetlands, and ponds

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Invasives 1	All Activities	• Minimize soil disturbance with all operations consistent with the standards and guidelines in the Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants Final Environmental Impact Statement (USFS 2005) and the NWFP (USFS 1994). • Monitor treated areas for infestations and treat them before they can become established and spread (Early Detection Rapid Response). • Use weed-free seed in all seeding operations. • Avoid burning where invasive annual grasses are present and likely to become dominant post-burn. • After burning slash piles, seed with native species. • Monitor and continue treatments of infestations, prioritizing recently disturbed areas near existing infestations (USFS 2017). • Follow standards and guidelines in the Forest-Wide Site-Specific Invasive Plant Management Record of Decision (USFS 2017).
Botany 1	All Activities	• Survey treatment units for Interagency Special Status / Sensitive Species Program (including whitebark pine), and survey and manage plants prior to implementation. If new plants are found during implementation, they will be protected from project activities. • Sensitive plant populations will buffered a minimum of 50 feet and flagged prior to implementation in order to preserve the microsite conditions. • Locally adapted native plant material or seeds are the first choice in revegetation or restoration where timely regeneration is not likely to occur. Under no circumstances will nonnative invasive plant species be used for revegetation purposes (FSM 2070, 2008; USFS 2005; and Record of Decision Standard 13). • Minimize the travel of machinery through unique habitats such as lithosols and meadows. If necessary, designate route in consultation with botanist. •

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Wildlife 1	All Activities	• All known listed Proposed, Endangered, Threatened, or Sensitive species, along with those discovered prior to or during implementation of project activities would be protected from adverse effects. Implementation activities, including contracts, would be modified or cancelled if protective measures proved inadequate, new species were discovered within treatment units, or a new species is listed that could be affected. • In recently active spotted owl home ranges (within last 5 years), treatments would retain NRF features (>60% Canopy Cover, multi-storied canopy, snags and down logs) and may degrade but not downgrade or remove suitable habitat. • Limiting Operations Periods (LOPs) will be imposed between March 1 through July 15 for activities within the 0.7 mile breeding core of an active NSO home range and within 0.25 miles of mapped nesting/roosting/foraging habitat unless surveys indicate the habitat is unoccupied or the owl(s) is not nesting. o If a new spotted owl is detected, a 0.7 mile buffer around the suspected activity center would be created and an LOP will be imposed between March 1 through July 15 for that year. • In high quality northern spotted owl habitat (Recovery Action 32), Treatments would retain RA 32 features (>70 percent canopy cover, multi-storied canopy, large trees, snags, logs). • In Old Forest Multi-story, treatments will retain NRF features (>60% canopy Cover, multi-storied canopy, snags and down logs). • Treatments may remove spotted owl dispersal habitat but will need to maintain landscape connectivity objectives. • Dozer lines created for prescribed fire burning will avoid tree removal and will be rehabilitated post burn. • If raptor nests are found prior to contract award, nest stands and post-fledgling area will be delineated and managed by retaining high-canopy closures, diversity of stand structures, and large overstory trees. If raptor nests are found after contract award, major project activities (road construction, logging) should be avoided to the extent practicable within 1/4 mile from the onset of nesting until the young are fledged (mid- August).

Wildlife 1 continued

All Activities (Continued)

- Manage snags and down wood at levels within the natural range of variability to contribute to the viability of species dependent on this habitat (USFS 2024; Harrod et al. 1998; Mellen-McLean et al. 2017). Manage LSR/MLSA at the higher end of the range. The goal is to retain sufficient snags in the appropriate size classes to meet species needs until stands reach an age that snag recruitment is occurring at natural-historic levels. Snag levels at that point would reflect the "natural disturbance" regime and be based on the ecological capability of the site. Design the burn plan to retain or protect larger snags and hard logs to meet these goals. Leave snags cut for safety reasons on the ground as logs, if below these levels.

Table PDC 1. Desired conditions for the percent of the Forest in snag density classes by forest vegetation group and size classes for snag greater than 20 inches DBH (USDA 2024)

Forest Type	0-1 snag per acre	2-4 snag per acre	4-6 snag per acre	6-10 snag per acre	Greater than 10 snag per acre
Moist Forest	79%	6%	1%	10%	2%
Dry Forest	83%	6%	2%	6%	3%
Cold Forest	49%	9%	4%	19%	9%

Table PDC 2. Desired conditions for the amounts of down wood by forest vegetation Group (USDA 2024)

Forest Group	Down Wood (tons per acre)
Moist Forest	5-40
Dry Forest	3-7
Cold Forest	5-40

- In Matrix, a minimum of 120 linear feet of logs per acre greater than or equal to 16 inches in diameter and 16 feet long should be retained. Decay class 1 and 2 logs can be counted towards these totals. Down logs should reflect the species mix of the original stand.
- In Matrix, coarse woody debris already on the ground should be retained and protected to the greatest extent possible from disturbance during treatment (e.g., slash burning and yarding) which might otherwise destroy the integrity of the substrate. Down logs should be left within forest patches that are retained under green-tree retention guidelines in order to provide the microclimate that is appropriate for various organisms that use this substrate.
- Piles shall not be placed on or near down logs that are 16" in diameter and a minimum of 16 feet long. Piles shall be placed a minimum of 10 feet from the base of any leave tree or snag (where possible), unless a live tree is designated for snag creation.
- No project activities would occur within 1 mile of active wolf dens or rendezvous sites. With written approval from the USFWS, adjustments may be made to the 1-mile den and rendezvous buffer distance based on site-specific conditions and/or surveys (Autonomous Recording Units, field surveys, or other, as determined in coordination with the USFWS) that allow for adjustments without exposing dens and rendezvous locations to adverse effects.
- The USFS would meet with the Washington Department of Fish and Wildlife and the USFWS prior to May 15 each year for an update on the locations and tracking collar status of any wolf packs that may be affected by the action.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
		• When a wolf pack includes an individual with a GPS collar, no project activities will occur within one mile of likely wolf den or rendezvous sites from April 1 to July 15. With written approval from the Service, adjustments may be made to the buffer distance or limited operating period based on site-specific conditions and/or surveys (Autonomous Recording Units, field surveys, or other methods as determined in coordination with the Service) that ensure dens and rendezvous sites will not be exposed to adverse effects. • If a wolf pack's territory intersects the action area and the pack does not include an individual with a GPS collar, no project activities will occur within one mile of likely den or rendezvous sites from April 1 to July 15 until it can be confirmed the territory has become unoccupied. With written approval from the Service, adjustments may be made to the buffer distance or limited operating period based on site-specific conditions and/or surveys (Autonomous Recording Units, field surveys, or other methods as determined in coordination with the Service) that ensure dens and rendezvous sites will not be exposed to adverse effects. • Culvert inspection during road deconstruction: to reduce the potential for disturbance or harm to gray wolf pups denning within or adjacent to road culverts, the Service recommends that, for any road deconstruction, culvert removal, or culvert disturbance occurring between April 1 and July 15, the action agency conduct a culvert inspection prior to initiating work. If wolf pups are detected within a culvert or immediately adjacent to the structure, the Service recommends that all activities in the immediate area be delayed until July 16 or until the site is confirmed inactive, in coordination with the Service. This measure would reduce the risk of disturbance, displacement, or injury to dependent pups that may utilize culverts as den structures. • In deer or elk winter range, from December 1 to April 15, limit activities to one drainage at a time so ungulates could move to adjacent undisturbed winter range area. Avoid burning more than 30 percent of the winter range in a subwatershed, or 2,000 acres, whichever is smaller, in a single year.
Recreation 1	All Activities	• Coordinate early in the planning process with recreation staff regarding fuel treatment implementation details, landing locations, and project timing to facilitate consideration of concurrent planning and implementation plans of other projects that overlap this project area. Warning signs regarding logging traffic would be posted at the forest boundary and on any NFS road where public access is not restricted and logging traffic is expected. • During periods of winter log haul, NFS roads would be closed to the public, except for access to private property. Log haul would be restricted on weekends and holidays during the snowmobile route-grooming season (typically December–March). If winter logging/log haul occurs, the contractor would retain at least 4 inches of snow on plowed routes where winter conditions allow. • Winter logging operations would be coordinated with winter sports recreation and permit administration staff. Alternate routes for winter sports would be provided as possible. • All utility lines and other right-of-way structures would be avoided during treatment application. Above-ground structures associated with buried utility lines would also be avoided. Any potential right-of-way holders within the treatment units would be notified prior to treatment and coordinated with permit administration staff.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Scenic Resources 1	All Activities	• Slash created by project activities would be removed, burned, chipped, or lopped and scattered to a height of 2 feet or less. Burning of slash piles would be prioritized in areas of retention to be burned within one season of treatment (weather permitting) and within two seasons of treatment for areas within partial retention. • Where mastication will be used should be determined by consultation with the interdisciplinary team or related specialists (soil, fuels, silviculture, scenery, recreation, etc.).
Scenic Resources 2	Prescribed Fire/ Control Lines/ Fuelbreaks	• Prescribed fire that emulates natural-appearing scenic character and utilizes natural fire/fuelbreaks may be considered consistent with a retention visual quality objective. Once management activities are complete, rehabilitate fire control features, safety zones, and staging areas. Methods may include returning to original contours, installing erosion control features, scarifying to eliminate compaction, and/or planting with native seed mix. Block access with natural barriers. • Blend fuelbreaks with natural landscape features such as natural openings, rock outcrops, and topography where possible. Minimize use of straight lines or geometric shapes along edges during unit design where feasibility and safety allow. Once management activities are complete, rehabilitate fire control features, safety zones, and staging areas. Methods may include returning to original contours, blocking access with naturalistic barriers (rocks or logs), installing erosion control features, scarifying to eliminate compaction, and/or planting with native seed mix. • If system trails must be used, treat both sides of the trail. When using system trails for control features, feather treatment (that is, gradually transition between treated and untreated forest) on both sides of trail. • Restore tread conditions to standard and maintain vegetative edge of the trail post-treatment. • (Partial Retention) Construct handline only within the immediate foreground (300 feet) of roads, trails, dispersed and developed recreation sites, rivers considered eligible for wild and scenic designation, and private property. • (Retention) To the maximum extent practicable, locate fireline/handline outside of areas visible from priority travel routes. Fireline/handline should, through construction or reclamation, not develop unnatural, continuous linear features (>300 feet) on the landscape. • (Retention) If trails are used for fire line, treat both sides of the trail. Avoid constructing fire holding lines within the immediate foreground (300 feet or visual sight distance if less) of roads, system trails, dispersed and developed recreation sites, and private property unless no other viable alternatives exist.
Scenic Resources 3	Recreation Sites/ Travel Routes	• Where mastication of vegetation is implemented, within 300 feet or visual site distance of priority travel routes, system trails, dispersed and developed recreation sites, the maximum stump/stubble height is 12 inches above the ground or above an obstacle such as a rock or log and the maximum allowable depth of masticated material is 4 inches averaged over the treatment unit. Up to 20 percent of the treatment unit may have depths of masticated material up to but no more than 6 inches. No trees larger than 12-inch DBH would be masticated. • Hand-pile only within the immediate foreground (300 feet or visual sight distance if less) of priority travel routes, system trails, dispersed and developed recreation sites, and private property. Use terrain and retained vegetative buffers to the maximum extent practicable to screen piles from view. Ensure 95 percent pile consumption within the immediate foreground (300 feet or visual sight distance if less) scatter unburnt remainder to height of 6 inches or less. • Hand thinning and burning treatments should avoid removing visual screening for developed and dispersed recreation sites.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Scenic Resources 4	Stumps	• Within 100 feet of priority travel routes, recreational facilities, campgrounds, and system trails, stumps less than 8 inches in diameter shall be flush cut and stumps 8 inches and greater shall be cut to 6 inches or less in height measured on the uphill side. Within 100 feet of these features, directionally fell trees away from the feature to minimize visible cut faces on stumps.

Scenic Resources 5	Landings/ Skid Trails/ Temporary Roads	• Favor siting landings and temporary roads in areas with a visual quality objective of modification.
		• Rehabilitate landings along roads as described in design features in the Soils and Aquatics sections above, prioritizing those along priority travel routes.
		• Locate landings outside of seen areas or leave vegetation screening where possible. When landings are on NFS roads, keep them within the existing road prism and do complete cleanup of roadside when done.
		• To the maximum extent practicable, landings should be placed in locations not visible from developed recreational facilities using natural screening features.
		• Designate boundaries of staging areas and stockpile areas. Existing disturbed areas, such as roads and landings, would be utilized whenever possible. Development of new staging and stockpile areas would use the smallest area possible.
		• A USFS landscape architect or qualified scenic environment specialist would be consulted for identification of temporary road l, skid trail, and landing locations to minimize long-term visual impacts of these features from sensitive travel routes and use areas.
		• (Retention) Where temporary roads and skid trails meet a primary travel route, they should curve (135 degrees minimum) within 100 feet of the primary travel route to minimize the length of the route visible from the primary travel route.
		• Cut and fill banks shall be regraded post-project to accommodate natural revegetation.
		• When skid trails are no longer needed, carry out the following restoration activities:
		  ○ Recontour access points the first 100 feet or sight distance, whichever is less. If needed, place barriers, such as rock, earthen berms, or large CWD, to deter unauthorized use.
		  ○ Scarify the trail tread to address soil compaction and initiate soil restoration.
		  ○ Place logs or slash against the ground surface (not stacked) and perpendicular to the slope fall-line over the scarified/ripped surface to achieve at least 30 percent coverage of the disturbed area. Upon completion of project activities, landings would be reshaped and rehabilitated as described in the vegetation and soils specialist reports to provide adequate surface water drainage. Landings would be ripped to a depth of 12–18 inches and a USFS-approved seed mixture applied to the entire disturbed area.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Scenic Resources 6	Recreation Sites/ Travel Routes	• Where mastication of vegetation is implemented within 300 feet or visual site distance of priority travel routes, system trails, and dispersed and developed recreation sites, the maximum stump/stubble height is 12 inches above the ground or above an obstacle such as a rock or log. The maximum allowable depth of masticated material is 4 inches averaged over the treatment unit. Up to 20 percent of the treatment unit may have depths of masticated material up to but no more than 6 inches. No trees larger than 12-inch DBH would be masticated. • Hand-pile only within the immediate foreground (300 feet or visual sight distance if less) of priority travel routes, system trails, dispersed and developed recreation sites, and private property. Use terrain and retained vegetative buffers to the maximum extent practicable to screen from view. Ensure 95 percent pile consumption within the immediate foreground (300 feet or visual sight distance if less). Scatter unburnt remainder to height of 6 inches or less. • Hand thinning and burning treatments should avoid removing visual screening for developed and dispersed recreation sites. Within 100 feet of priority travel routes, recreational facilities, campgrounds, and system trails, stumps less than 8 inches in diameter shall be flush cut and stumps 8 inches and greater shall be cut to 6 inches or less in height measured on the uphill side. Within 100 feet of these features, directionally fell trees away from the feature to minimize visible cut faces on stumps.
Scenic Resources 7	Tethered/Cable logging within Scenic Retention and Scenic Partial Retention Management Areas	• Locate skyline/tethered corridors to follow natural landforms such as ridges or drainages, where possible, rather than cutting straight lines across slopes or directly down the fall lines of the slope. • Minimize the number of corridors visible from scenic travel ways to the extent practicable • Avoid corridors on skyline ridges when possible, where they contrast strongly with the sky. • Limit corridor width to smallest operationally necessary to limit clearing impacts. • Suspend logs during skyline yarding to prevent soil gouging. • On steep slopes/corridors, use slash matting to reduce visible bare soils/gouging.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Soils 1	Mechanized treatments within RRs, wet meadows, areas with hydric soils. Maintain long term soil productivity. Avoid impacting habitat for ESA-listed species. To prevent soil degradation and subsequent erosion of mineral soil.	• All mechanized treatments within RRs, wet meadows, and areas with hydric soils outside of RRs will require winter harvest soil specifications unless the purchaser or operator can present a plan of operations that does not exceed an additional 2% of detrimental soil conditions (Page-Dumrose et al., 2009) to the unit. Technology and methods proposed for operations outside of winter must be supported by monitoring data and/or peer-reviewed research that demonstrate effectiveness of the proposal in similar conditions. Proposals will be evaluated by USFS soils, hydrology, aquatics, and botany staff. • Winter soil specifications are: Require 8 inches compacted snow or a combination of compacted snow and hard, frozen ground equaling 8 inches. Prior to approval of winter logging operations, an assessment of suitable snow and soil conditions will be conducted by the FS soils scientist (or the TSA following an initial site visit with a Soil Scientist). Periodic assessments will be conducted during winter operating periods, especially during warming trends. Overnight temperatures should drop to 25ºF or lower, and afternoon temperatures should stay below 35 º F to maintain frozen conditions. Afternoon temperatures can exceed 35 º F for short periods if previous nighttime temperatures are below 20 º F. If skid trails begin thawing and show signs of rutting and water runoff, relocate main skid trails to suitable snow and frozen soil conditions. • Hydric soils are mapped at a coarse scale in the project GIS data. Smaller-scale areas with hydric soils can be identified by referencing the NRCS Field Indicators of Hydric Soils. Consult the USFS hydrologist or soils scientist for a regular onsite verification. • Exposed soil in RR and wetland areas would be protected by applying protective cover where natural vegetation is inadequate.
Soils 2	Temp roads and landings Maintain long-term soil productivity	• Where feasible, design the logging plan to minimize the need for additional ground disturbance from new temporary roads and landings. Use existing roads, road templates, landings, and skid trails as much as possible; use project-specific LiDAR whenever possible to identify these features.
Soils 3	Temporary roads, landings, skid trails Maintain long-term soil productivity	• Prior to implementation, the FS must approve temporary roads, landing, skid trails and concentrated use site locations to minimize potential soil degradation. • Skid trail spacing should be at a minimum 50 ft apart edge-to-edge to minimize detrimental soil disturbance in each harvest unit. Locations where skid trails need to be less than 50 ft apart will be evaluated on a case-by-case basis and approved by the Timber sale administrator in consultation with the district soil scientist or equivalent. • On multipass skid trails place and maintain slash mats of 12 inches to 18 inches depth, or other methods, to prevent compaction, displacement, or puddling.
Soils 4	Mechanized thinning on unstable slopes Maintain long term soil productivity	• Unstable or potentially unstable areas may need to be protected from harvest operations with no-cut buffers. These areas are defined in the project soil report using the NRCS Web Soil Survey interpretation report for erosive soils. and by using project specific LiDAR to identify slumps, or slides. Thinning or partial cuts on unstable areas may be considered if identified mitigations are deemed likely to be successful.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Soils 5	Maintain long-term soil productivity	• Low PSI equipment (8 PSI or less) should be used during treatment activities such as, but not limited to, biomass removal, mastication, or machine piling.
Soils 6	Fireline construction Maintain long-term soil productivity	• Erosion control measures will be implemented on firelines during construction and rehabilitation. Waterbars will be constructed when the fireline is created using Best Management Practices (BMPs) soils erosion slope designations. Use Minimum Impact Suppression Tactics (MIST) wherever feasible and defensible to reduce soil and vegetation disturbance, especially in Riparian Reserves. • If prescribed fireline is to be left on the landscape for multiple seasons while awaiting implementation, waterbars will be installed to prevent unnecessary soil erosion. See the waterbar specifications below for spacing requirements and examples.
Soils 7	Temporary roads Minimize soil erosion impacts from temporary roads and temporary road stream crossings.	• Temporary roads will be constructed to USFS safety standards and decommissioned/rehabilitated following completion of harvest activities. These roads shall be decompacted, re-contoured, seeded and mulched to promote recovery of soil, and ingress will be blocked to prevent unauthorized OHV use. These actions will occur as soon as access is no longer needed for harvest, preferably in the same season of use or within 18 months of construction.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Soils 8	Thinning units Adds ground cover which impedes raindrop impact and avoids or minimizes accelerated erosion and soil loss caused from surface water run-off. Increase organic matter, soil moisture, and increase nutrient availability. Provides habitat for some wildlife species. requirements.	• In thinning units, coarse woody debris material (>3" in diameter) will be left from designated leave trees, both standing and down, and from breakage of limbs and broken tops that occur during harvest. During thinning and prescribed fire treatments, retain the largest size downed debris wherever possible to meet the post-treatment levels of coarse woody debris described by forest vegetation group: ○ * Dry Forest: 5-7 tons/ac ○ * Moist Forest: 5-40 tons/acre ○ * Cold Forest: 5-40 tons/acre
Soils 9	Ground based harvest, steep slopes Reduce the number of passes made by heavy equipment in one area which reduces severe soil compaction and displacement.	• Ground-based harvest equipment will primarily be used on slopes <35%. This equipment may be allowed on slopes ranging from 35-45% at the discretion of the Timber Sale Administrator in consultation with the Soil Scientist. Cable yarding systems, including tethered machines, may be used on slopes 45% and greater. Use of these specialized systems in this project will require equipment that is designed and manufactured for use on steep slopes

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Soils 10	Yarding, Skyline Yarding, Tethered Systems Minimize soil erosion. Maintain long-term soil productivity. Minimize impacts on residual vegetation.	Yarding: • Yarding systems will be designated by the Timber Sale Administrator depending on how well they meet all applicable standards and guidelines, minimize soil disturbance, and are economically viable and physically feasible. • Except during lateral yarding or yarding in areas where total suspension is required, one-end log suspension during inhaul is required on all areas designated for cable yarding systems to reduce soil displacement and compaction. In areas of gentle (0-34%) to moderate (35-59%) slopes or broken terrain, small sections of ground lead may be acceptable along some skyline corridors (on a case-by-case basis). Cable corridor spacing should be set to minimize damage to standing timber and the soil resource. Skyline Yarding: • Minimize the amount of side-hill yarding. The use of parallel corridors while yarding (more or less) straight up and downhill is preferred. Construct skyline-cable landings in stable areas using existing landings where feasible. • To facilitate log suspension with skyline operations, corridors for cable rigging will be spaced a minimum 125 feet apart. Maximum corridor width is 20 feet. Proposed skyline corridors will be flagged on the ground by the operator and approved by the sale/contract administrator prior to felling. Trees will be felled in a manner that facilitates yarding while minimizing damage to residual stands. Tethered Systems: • Tethered felling machines can be used outside of RRs to fell timber for either tethered yarders or skyline systems and will travel directly up and down the slope and limit lateral movements to minimize soil disturbance from track slippage, compaction, rutting and soil displacement. Minimum corridor spacing for tethered forwarders is 50 feet. Processed slash will be placed directly in the corridor as an operational mat to minimize soil compaction and displacement.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Transportation 1	All Activities	• Temporary roads would be constructed no sooner than necessary. Temporary roads would be constructed to minimal standards necessary for safe use and would be decommissioned/rehabilitated upon completion of harvest activities. Rehabilitation activities would include decompaction, recontouring, seeding and mulching. Entrances would be blocked to prevent all motorized use. Roads would be generally out-sloped and constructed with drainage structures. Temporary roads located in an area with risk of unauthorized use would maintain a closure to public use. Temporary roads to be closed within 18 months of construction, unless otherwise authorized by TSA and relevant resource specialists. • To control dust from roads during log haul, water, lignin, or magnesium chloride would be applied to the road surface as needed, to ensure that water quality standards are not impaired. See PDC Aquatics 4 and 5 for more dust abatement direction. • Appropriate erosion control measures, such as seasonal closures, graveling, maintenance, ditch water routing structures, sediment traps, water bars, and drivable dips, would be employed to minimize erosion. Route water off road prisms and fills, and disperse across a vegetated slope. • Snow plowing would include water drainage outlets (not placed on erodible fills), constructed and maintained in the dike of the berm caused by the snow removal operation. • The removal of dead and unstable live trees (hazard trees) of all sizes would occur along timber haul roads and landings to provide for safety of workers and the public throughout project implementation, except where restrictions for removal apply.

Resource Type and Number	Resource Concern or Activity	BMPs, Standards and Guidelines, and Design Criteria
Cultural and Heritage 1	All Activities	**Avoidance and Mitigation (Protection) Measures** • Unevaluated historic properties and traditional cultural places (TCPs) shall be treated as eligible for all actions. • Initiate tribal consultations early when new treatments are proposed within the project area to avoid adverse impacts on TCPs. • All eligible and unevaluated historic properties within and/or intersecting phased areas of potential effect shall be clearly delineated by an archaeologist prior to implementing any activities that have the potential to affect historic properties. • When using mechanized equipment, prohibit any activities within a site either unevaluated, eligible, or listed on the NRHP, or within a known TCP unless tribal consultations affirm that there is no risk to such properties. • No vehicles or other heavy mechanized equipment may be used within site boundaries that are designated for avoidance. • No equipment, materials, slash, or waste may be staged within site boundaries. • No construction of fire control lines and no ignition points will occur within a site either unevaluated, eligible, or listed on the NRHP. • Allow broadcast burning over noncombustible sites or site feature that the Forest and Consulting parties agree can be burned over, provided that (1) no staging of equipment occurs within site boundaries, and (2) no slash piles or pile burning is conducted within site boundaries. **Project Design Criteria to Minimize Impacts on Historic Properties and Known TCPs** • All work will be conducted under the guidance of the Forest Inadvertent Discovery Plan (IDP). • Activities will avoid eligible and unevaluated cultural resources/historic properties by coordinating with the USFS heritage professional during the layout phase of planned activities. • Burn plans and contracts will contain clauses allowing the USFS to modify or cancel portions of the operations to protect known or newly discovered cultural resources. • If cultural resources are discovered as a result of project activity, all work in the vicinity of the discovery will cease until an assessment by a USFS heritage professional is completed; additional consultations with the State of Washington Department of Archaeology and Preservation and Tribal Historic Preservation Officers may be necessary before work in the activity area can resume.

Additional Soil PDCs

Waterbar Construction Guidelines

Waterbars are constructed to:1) divert the destructive overland flow of water off the fireline; 2) discharge the overland flow onto areas where the erosive energy can be dissipated; and 3) aid in the establishment of vegetation. The last objective will be achieved if erosion is prevented on the fireline surface. Erosion removes topsoil, which holds most of the organic matter, nutrients, and water holding capacity of the soil profile. Regulatory directions from federal and state statutes direct land managers to eliminate or minimize erosion and sediment transport to streams. Key direction from Clean Water Act directs the states to regulate pollution discharges (including sediment) into waterways (which includes ephemeral and intermittent streams). USFS guidance and direction requires the use of BMPs to protect watershed resources during fire management. USFS National Core BMPs (Fire-3 and Fire-4) specify:

- **Fire-3:** Locate and construct fireline in a manner that minimizes erosion and runoff from directly entering waterbodies by considering site slope and soil conditions, and by using and maintaining suitable water and erosion control measures.
- **Fire-4:** Reclaim and stabilize disturbed areas, including safety zones, fireline, and base camps that have increased erosion potential or drainage patterns altered by fire-suppression activities. Reshape the ground surface and install suitable drainage features to promote dispersed runoff from the site.

Installation of waterbars should occur as described in the below specifications.

Spacing: Use spacing distances as a guide; they are not intended to restrict the implementation of more or fewer waterbars as needed. To prevent erosion of firelines above 60% slope, generally additional soil cover would need to be added (e.g., certified weed-free wheat or rice straw, wood shreds, or hydromulch). Firefighter/crew safety should be considered. If slopes are above 60% then waterbars should not be constructed unless sensitive resources (e.g., aquatic habitat) are present, due to firefighter safety. Judgment should be used in locating waterbars to minimize erosion potential. Install waterbars at the recommended intervals shown in Table B-3 and Table B-4.

Table B-1. Recommended Intervals for Waterbar Installation – Dozer Line

Fireline Gradient (% Slope)	Distance Between Waterbars
0-6	350 feet
7-9	250 feet
10-14	175 feet
15-20	120 feet
21-40	70 feet
41-60	40 feet

Table B-2. Recommended Intervals for Waterbar Installation – Hand Line

Fireline Gradient (% Slope)	Distance Between Waterbars
0-5	No waterbars needed
6-15	200 feet
16-30	100 feet
31-50	75 feet
51-60	50 feet
>60	25 feet

Location: Water should be directed to unburned areas, and/or resistant surfaces with high-vegetation cover when possible. Waterbars should discharge into undisturbed areas and preferably rocky ground or filter areas that are well protected with ground and vegetative cover, whether rocks or organic materials. Waterbars should not direct water into stream channels.

Depth and Width: Waterbars need to be cut into surface; do not simply push up soil.

- Waterbar depths for dozer lines should be at least 6 inches; total height from bottom of ditch to the top of the waterbar should average at least 18 inches and not exceed 24 inches.

1. Waterbar depths for hand lines should be at least 4 inches; total height from bottom of ditch to top of waterbar should average at least 8 inches and not exceed 12 inches.

The width of the waterbar channel should be enough to handle expected water flows and to avoid plugging when a normal amount of sloughing or sediment movement occurs. Higher waterbars do not necessarily mean better waterbars. The outflow of the waterbar should be as wide as feasible to prevent deposited sediment from blocking water flow. Small storm events will often move sediment and vegetative litter into the outlets of waterbars. Overtime these small events obstruct the outflow and prevent waterbars from working properly in larger storm events.

Angle: Waterbars should be placed at an angle relative to the fireline. The angle should be directed downhill into unburned vegetation and between 30-60 degrees relative to the fireline. Angle is important; if the angle is too shallow, the water will slow down and deposit the sediment it carries in the waterbar making the waterbar ineffective. If the angle is too steep, water will continue at high velocity and be able to erode and carry additional sediment where it exits the waterbar. See Figure B-1 for an example of proper waterbar design.

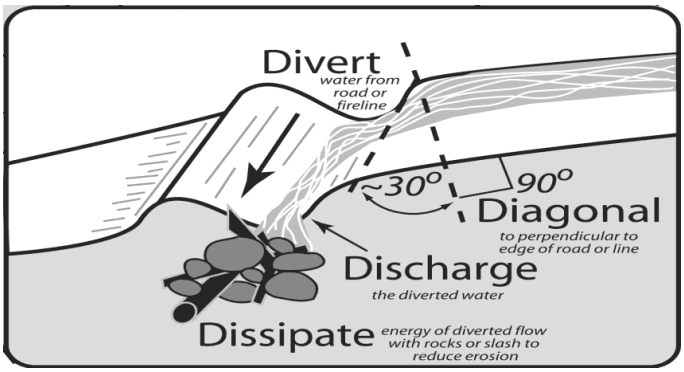

Figure B-1. Diagram of Proper Waterbar Design

Timing: At the minimum, waterbars should be installed prior to damaging storm events.

Summary: Waterbars should be placed at the right distance apart so water does not have sufficient distance to build up erosive energy, should divert water onto unburned surfaces at the proper angle, and most importantly, should be installed before damaging storm events. Waterbars should be placed at regular intervals fitting the specifications as above.

Additional Fireline Rehabilitation

Where feasible, additional restoration of fireline should be conducted. This is especially important with dozer lines due to their larger area and often larger extent. Greater restoration success is typically achieved using an excavator rather than the dozer that constructed the line.

1. Pull back and replace any topsoil, litter layer, or vegetative debris displacement by the fireline.
2. Block access to firelines from roads or trails to prevent unauthorized use. Camouflaging these points has been effective.
3. Placement of additional soil cover.

Wet and/or Winter Condition Log Haul PDCs

Roads must meet design standards to support wet weather hauling as determined by an engineer in consultation with a hydrologist or soil scientist during timber sale planning.

Timber hauling operations will be stopped immediately if wet, saturated road conditions exist that result in ruts >4 inches deep for a distance of 100 feet or greater; if there is ponding of water on the road or road surface is saturated on more than 10% of a road length on ML 2 roads and above; occurs within 150 feet of a stream crossing or within 150 feet to a parallel stream; if there is failure of any drainage structure; if sediment is observed moving into ditches, perennial streams, or intermittent streams; or any other situation occurs which may result in sediment delivery to a stream. For log hauling to resume, road conditions should sufficiently dry out as determined by an engineer in consultation with a hydrologist or soil scientist. If damage occurs that exceeds the contract maintenance plan, the road will need to be repaired before hauling can continue.

Over-snow haul is permitted when roads are covered by a minimum of 2-4 inches of compacted snow or frozen road surface conditions, and air temperatures at the lowest elevation on the unpaved haul route have remained below 30 degrees F over the prior 24 hours. All winter haul routes would stop immediately if conditions warmed up and roads became saturated as described above.

Snowplowing will include water drainage outlets appropriately spaced, constructed and maintained in the dike of snow or berm caused by snow removal operations. Water drainage holes will be placed to obtain surface drainage without discharging on erodible fills. Typically, snow removal is conducted while keeping the blade at least 2 inches above the road surface.

Additional PDC for log hauling out of Derby Canyon on FS roads 7401000 and 7400-000

On these roads, if any ruts occur >4 inches deep for any distance; if there is ponding of water on the road surface; if there is failure of any drainage structure; if sediment is observed moving into ditches or the adjacent streams; or any other situation occurs which may result in sediment delivery to a stream in the lower 1.75 miles of FS Roads 74701-000 (upper switchback and below) or 7400-000 along Derby Canyon Creek, hauling will immediately stop until conditions dry out and log hauling can resume as described above.

Appendix C - Project Maps

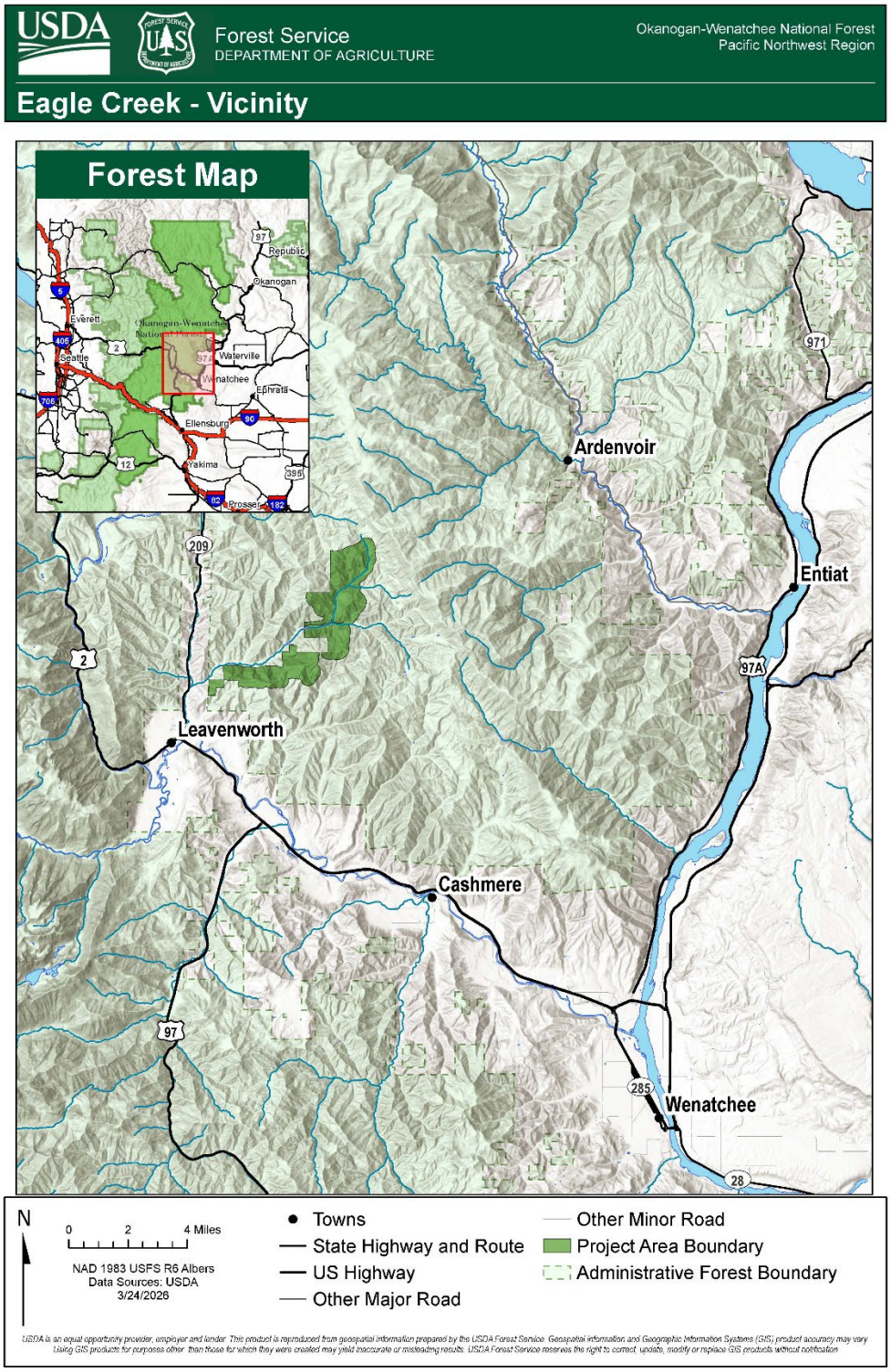

Figure 9. Eagle Creek project location

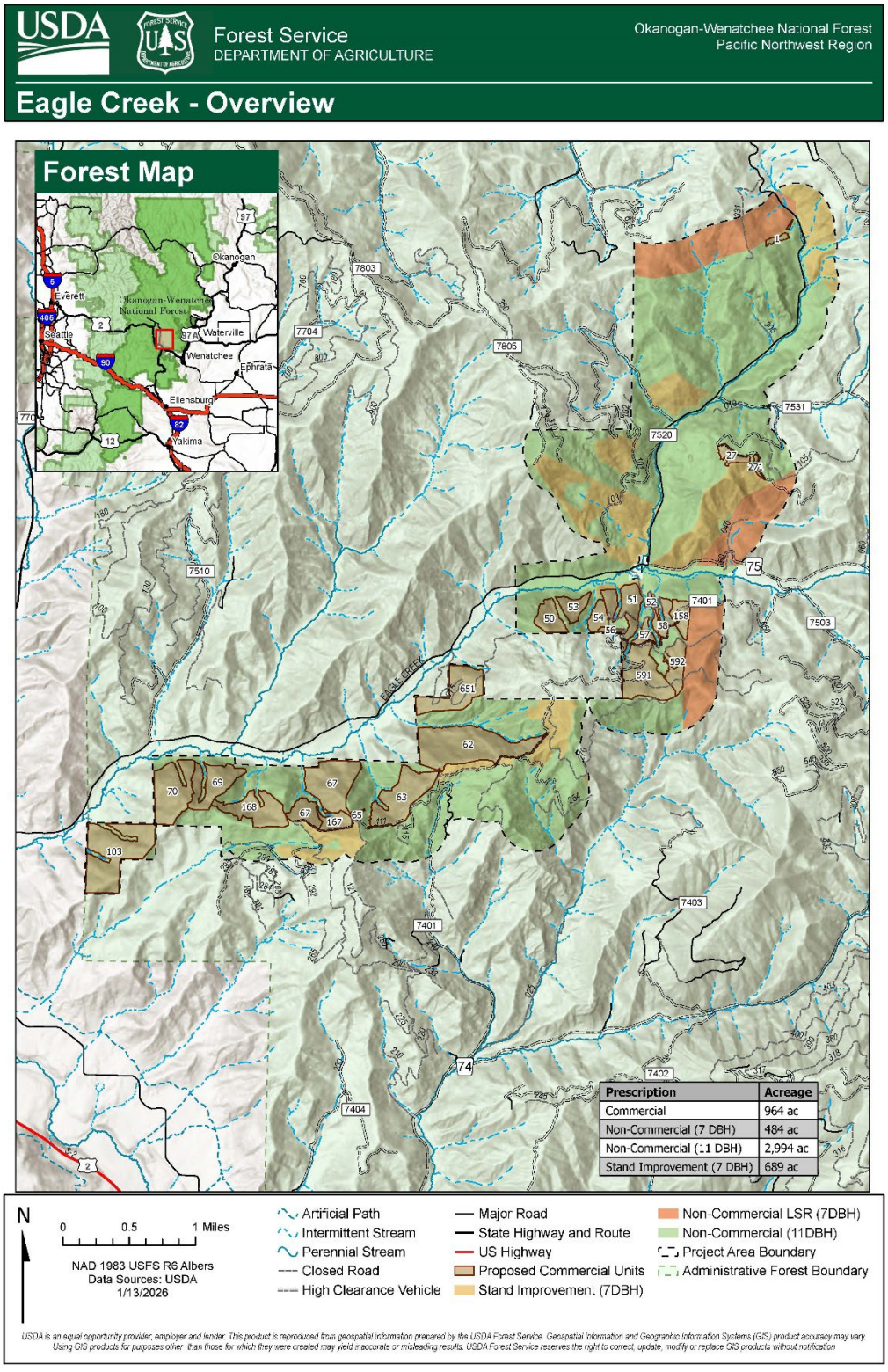

Figure 10. Proposed activities

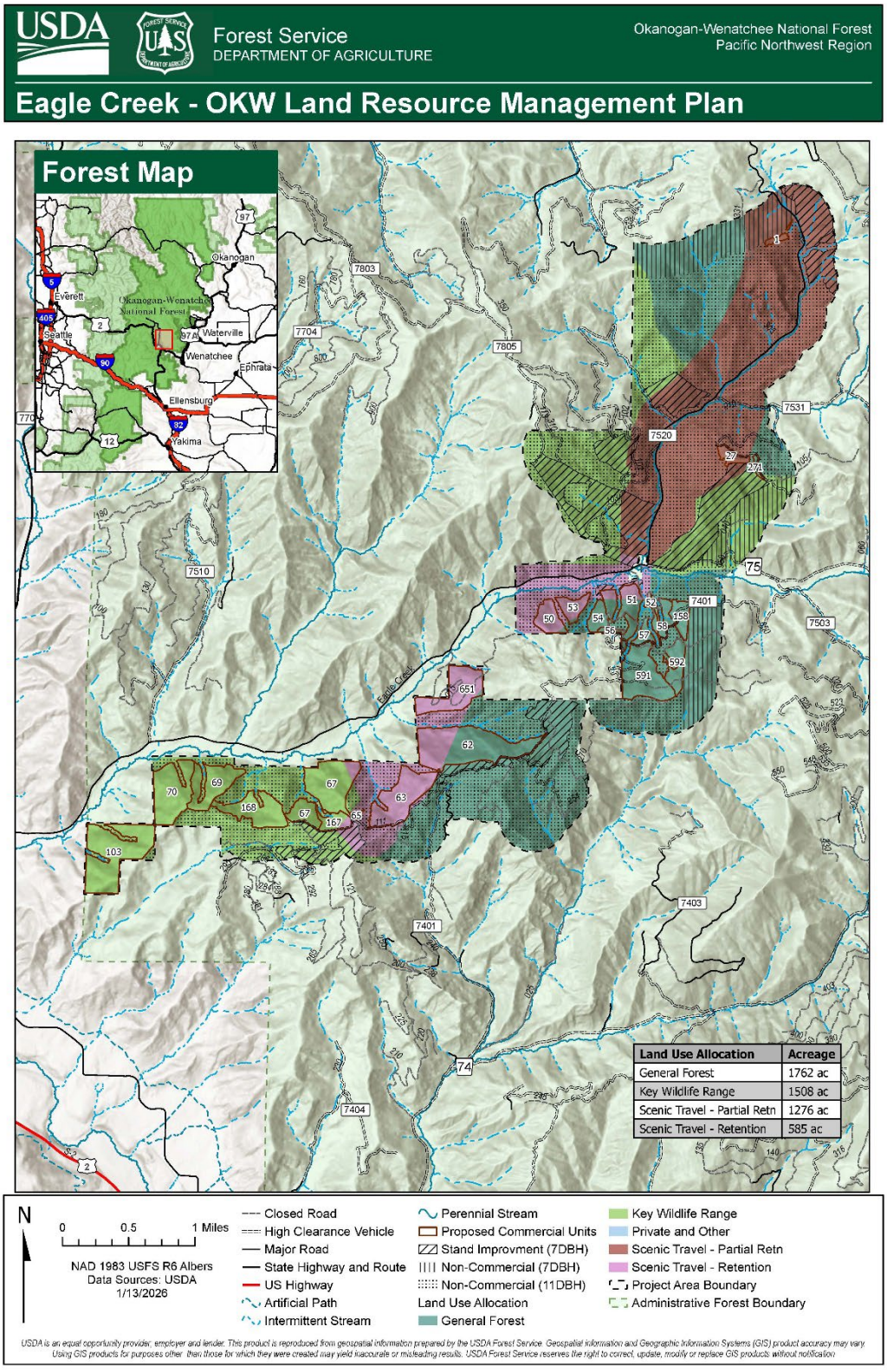

Figure 11. Wenatchee Forest Plan land allocations and proposed actions in the Eagle Creek Project area

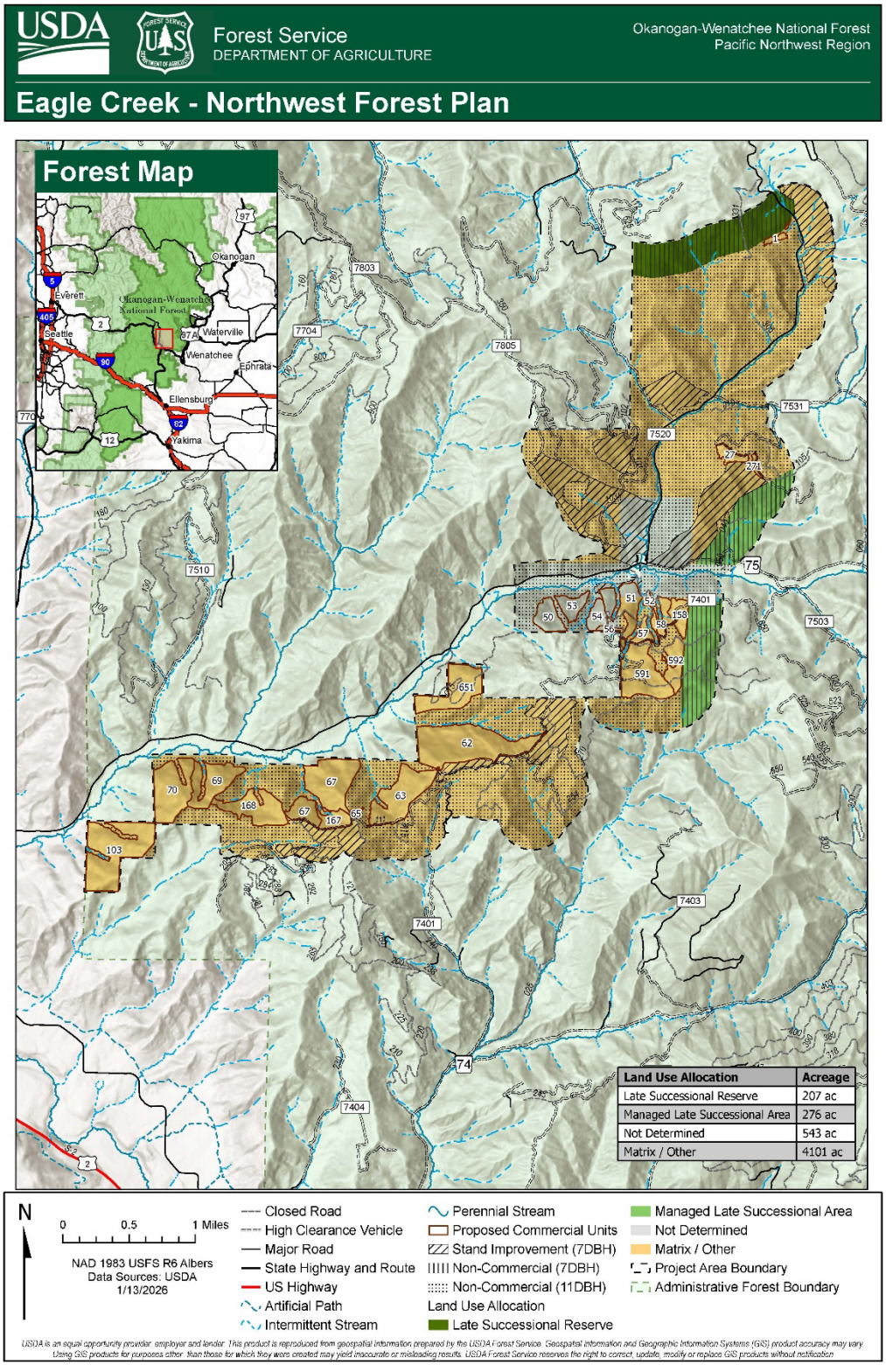

Figure 12. Northwest Forest Plan land allocations and proposed actions in the Eagle Creek Project area

Appendix D - References

Amaranthus, M.P. 1990. Factors affecting ectomycorrhizae and forest regeneration following disturbance in the Pacific Northwest. Proceedings—Management and Productivity of Western-Montane Forest Soils (April 1990). Missoula, Montana.

Atchley, A.L., R. Linn, A. Jonko, C. Hoffman, J.D. Hyman, F. Pimont, C. Sieg, and R.S. Middleton. 2021. Effects of Fuel Spatial Distribution on Wildland Fire Behaviour. International Journal of Wildland Fire 30(3): 179–189. https://www.publish.csiro.au/wf/WF20096 (accessed March 14, 2024).

Barrios, E. 2007. Soil biota, ecosystem services and land productivity. Ecological Economics 64(2): 269–285.

Binkley, D. and R.F. Fisher. 2013. Ecology and Management of Forest Soils, Fourth Edition. John Wiley & Sons, Ltd. Hoboken, New Jersey. pp. 40–41.

Brown, J.K. and J.K. Smith. 2000. Wildland fire in ecosystems: Effects of fire on flora. Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Brown, J.K., E.D. Reinhardt, and K.A. Kramer. 2003. Coarse woody debris: Managing benefits and fire hazard in the recovering forest. Gen. Tech. Rpt. RMRS-GTR-105. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Bull, E.L. 2002. The Value of Coarse Woody Debris to Vertebrates in the Pacific Northwest. Proceedings of the symposium on the ecology and management of dead wood in western forests; November 2–4, 1999; Reno, NV. Gen. Tech. Rep. PSW-GTR-181. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. Albany, CA. pp. 171–178.

Bull, E.L., C.G. Parks, and T.R. Torgersen. 1997. Trees and logs important to wildlife in the interior Columbia River basin. Gen. Tech. Rep. PNW-GTR-391. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Cannon, S. H., J. E. Gartner, C. Parrett, and M. Parise. 2003. Wildfire-related debris-flow generation through episodic progressive sediment-bulking processes, western USA. In: International Conference on Debris-Flow Hazards Mitigation: Mechanics, Prediction, and Assessment, Proceedings (D. Rickenmann and C. Chen, eds). Davos, Switzerland: Millpress Rotterdam Netherlands. Pp. 71–82.

Churchill, D. J., S. M. A. Jeronimo, A. J. Larson, P. Fischer, and M. C. Dahlgreen. 2016. The ICO Approach to Quantifying and Restoring Forest Spatial Pattern: Implementation Guide. ScholarWorks at University of Montana.

County of Chelan. 2006. Final Wenatchee Watershed Management Plan. https://www.co.chelan.wa.us/natural-resources/pages/wenatchee-watershed-plan?parent=planning (accessed March 14, 2024).

Dove, N. C. and Hart, S. C. 2017. Fire reduces fungal species richness and in situ mycorrhizal colonization: A Meta-analysis. Fire Ecology 13(2): 37–65.

Elliot, W., K. Hyde, L. MacDonald, and J. McKean. 2010. Cumulative Watershed Effects of Fuel Management in the Western United States. Chapter 13. USDA Forest Service RMRS-GTR-231.

EPA (United States Environmental Protection Agency). 2004. Understanding the Safe Drinking Water Act. EPA 816-F-04-030. https://www.epa.gov/sites/default/files/2015-04/documents/epa816f04030.pdf (accessed March 11, 2024).

EPA. 2024. How's My Waterway? Community Overviews for Chumstick Creek, Derby Canyon-Wenatchee River, Eagle Creek, Lower Peshastin Creek, Olalla Canyon-Wenatchee River. https://mywaterway.epa.gov/ (accessed March 11, 2024).

Fischer, W.C. and A.F. Bradley. 1987. Fire ecology of western Montana forest habitat types. Gen. Tech. Rep. INT-GTR-223. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Graham, R.T., A.E. Harvey, M.F. Jurgensen, T.B. Jain, J.R. Tonn, and D.S. Page-Dumroese. 1994. Managing coarse woody debris in forests of the Rocky Mountains. Report INT-RP-477. Department of Agriculture, Forest Service, Intermountain Research Station.

Harrod, R. J., W. L. Gaines, W. E. Hartl, and A. Camp. 1998. Estimating historical snag density in dry forests east of the Cascade Range. Gen. Tech. Rep. PNW-GTR-428. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Harvey, A. E., M. F. Jurgensen, M. J. Larsen, and R. T. Graham. 1987. Decaying organic materials and soil quality in the Inland Northwest: A management opportunity. General Technical Report INT-GTR-225. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Harvey, Alan E.; Geist, J. Michael; McDonald, Gerald L; Jurgensen, Martin F.; Cochran, Patrick H.; Zabowski, Darlene; Meurisse, Robert T. 1994. Biotic and abiotic processes in eastside ecosystems: the effects of management on soil properties, processes, and productivity. Gen. Tech. Rep. PNW-GTR-323. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Hillel, D., J.H. Hatfield, D.S. Powlson, C. Rosenzweig, K.M. Scow, M.J. Singer, and D.L. Sparks (Eds.). 2005. Encyclopedia of Soils in the Environment. Elsevier/Academic Press.

Hornbeck, J. W., C. W. Martin and C. Eagar. 1997. Summary of water yield experiments at Hubbard Brook Experimental Forest, New Hampshire. Canadian Journal of Forest Research 27:2043-2052.

Isaak, D., S. Wenger, E. Peterson, J. Ver Hoef, D. Nagel, C. Luce, S. Hostetler, J. Dunham, B. Roper, S. Wollrab, G. Chandler, D. Horan, S. Parkes-Payne. 2017. The NorWeST summer stream temperature model and scenarios for the western U.S.: A crowd-sourced database and new geospatial tools foster a user community and predict broad climate warming of rivers and streams. Water Resources Research, 53: 9181-9205. https://doi.org/10.1002/2017WR020969

Isaak, D.J., Young, M.K., Nagel, D.E., Horan, D.L. and Groce, M.C., 2015. The cold-water climate shield: delineating refugia for preserving salmonid fishes through the 21st century. Global Change Biology 21(7): 2540 –2553.

Jeronimo, S. 2022. Midnight Restoration Project: Landscape Evaluation and Prescription. Prepared for Resilient Forestry. Internet website: https://www.ncwfhc.org/wp-content/uploads/2022/07/midnight_lrx_2022-04-22.pdf

Larson, A.J., and Churchill, D. 2008. Spatial patterns of overstory trees in late-successional conifer forests. Canadian Journal of Forest Research, Volume 38, Number 11.

Larson, A.J., and Churchill, D. 2012. Tree spatial patterns in western North America, including mechanisms of pattern formation and implications for designing fuel reduction and restoration treatments. Forest Ecology and Management. Volume 267, pages 74-92.

Mellen-McLean et al. 2017. DecAID, the decayed wood advisor for managing snags, partially dead trees, and down wood for biodiversity in forests of Washington and Oregon. Version 3.0. USDA Forest Service, Pacific Northwest Region and Pacific Northwest Research Station; USDI Fish and Wildlife Service, Oregon State Office; Portland, Oregon. https://apps.fs.usda.gov/r6_DecAID

Michigan State University. 2002. K Factor. Institute of Water Research. http://www.iwr.msu.edu/rusle/kfactor.htm (accessed March 25, 2024).

Neary, D. G., K. C. Ryan, L. F. DeBano, eds. 2005. Wildland fire in ecosystems: effects of fire on soils and water. Gen. Tech. Rep. RMRS-GTR-42-vol.4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 250 p.

NRCS (Natural Resources Conservation Service). 2024. Web Soil Survey. https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm (accessed March 25, 2024).

Page-Dumroese, D.S., M.F. Jurgensen, W. Elliot, T.M. Rice, J. Nesser, T. Collins, and R. Meurisse. 2000. Soil quality standards and guidelines for forest sustainability in northwestern North America. Forest Ecology and Management 138: 445–462.

Page-Dumrose et al., 2009. Forest Soil Disturbance Monitoring Protocol: Volume I: Rapid Assessment. Gen. Tech. Rep. WO-GTR-82a. Washington, DC: U.S. Department of Agriculture, Forest Service. 31 p.

Pellant, M., P. L. Shaver, D. A. Pyke, N. Lepak, G. Riegel, J. E. Herrick, E. Kachergis, et al. 2020. Interpreting Indicators of Rangeland Health, Version 5. Tech Ref 1734-6. Denver, CO: U.S. Department of the Interior, Bureau of Land Management, National Operations Center.

Powers, R.F. 2002. Effects of soil disturbance on the fundamental, sustainable productivity of managed forests. General Technical Report PSW-GTR-183. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. pp. 63–82. A. Callaham, Jr., editors. Elsevier Inc. Cambridge, Massachusetts.

Powers, R.F., D.A. Scott, F.G. Sanchez, R.A. Voldseth, D. Page-Dumroese, J.D. Elioff, and D.M. Stone. 2005. The North American long-term soil productivity experiment: Findings from the first decade of research. Forest Ecology and Management 220: 31–50.

Reilly, M.J., J.E. Halofsky, M.A. Krawchuk, D.C. Donato, P.F. Hessburg, J.D. Johnston, A.G. Merschel, M.E. Swanson, J.S. Halofsky, T.A. Spies. 2021. Fire Ecology and Management in Pacific Northwest Forests. In: Fire Ecology and Management: Past, Present, and Future of US Forested

Ecosystems. Managing Forest Ecosystems, vol 39. (Springer, Cham) 393–435. https://doi.org/10.1007/978-3-030-73267-7_10 (accessed May 7, 2024).

Richmond, T. 2024. Chumstick to LP Restoration Project Landscape Evaluation and Prescription. Resilient Forestry. June 4, 2024.

Rillig, M.C. and Mummey, D.L., 2006. Mycorrhizas and soil structure. New phytologist, 171(1): 41–53

Simard, S. W. 2009. The foundational role of mycorrhizal networks in self-organization of interior Douglas-fir forests. Forest Ecology and Management 258S: S95–S107.

Soil Science Division Staff. 2017. Soil Survey Manual. Edited by C. Ditzler, K. Scheffe, and H. C. Monger. USDA Handbook 18. Government Printing Office, Washington, D.C. Include page(s)?

Stednick, J. D. 1996. Monitoring the effects of timber harvest on annual water yield. Journal of Hydrology 176(1–4): 79–95. https://doi.org/10.1016/0022-1694(95)02780-7 (accessed July 5, 2024).

The Endangered Species Act (1973) as Amended by Public Law 97-304 (1982). Washington, D.C.; G.P.O., 1983.

Troendle, C. A., L. H. MacDonald, C. H. Luce, and I. J. Larsen. 2010. Cumulative Watershed Effects of Fuel Management in the Western United States. Gen Tech. Rep. RMRS-GTR-231. Fort Collins, CO: U.S. Department of Agriculture Forest Service, Rocky Mountain Research Station. Pp. 126–148. https://www.fs.usda.gov/treesearch/pubs/34312 (accessed July 5, 2024).

USDA (United States Department of Agriculture). 2016. Revised Universal Soil Loss Equation 2 - How RUSLE2 Computes Rill and lnterrill Erosion. https://www.ars.usda.gov/southeast-area/oxford-ms/national-sedimentation-laboratory/watershed-physical-processes-research/research/rusle2/revised-universal-soil-loss-equation-2-how-rusle2-computes-rill-and-interrill-erosion/ (accessed March 25, 2024).

USFS (United States Forest Service). 1977. The 6-Class Dwarf Mistletoe Rating System. General Technical Report RM-48. December 1977. Internet website: https://www.fs.usda.gov/rm/pubs_series/rm/gtr/rm_gtr048.pdf

USFS (United States Forest Service). 1990a. Wenatchee National Forest Land and Resource Management Plan. Wenatchee National Forest. Wenatchee, Washington.

USFS and BLM (United States Forest Service and United States Department of Interior, Bureau of Land Management). 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl. https://www.fs.usda.gov/r6/reo/library/ (accessed March 14, 2024).

USFS GIS (United States Forest Service Geographic Information System). 2024. GIS data used in the Chumstick to Lower Peshastin Project Environmental Assessment. Wenatchee River Ranger District, Okanogan-Wenatchee National Forest, Pacific Northwest Region.

USFS. 1990b. Final Environmental Impact Statement for the Land and Resource Management Plan. Wenatchee National Forest. Chelan, Kittitas, and Yakima Counties, Washington.

USFS. 1994. Slope Stability Reference Guide for National Forests in the United States. Publication EM-7170-13. Washington, DC: U.S. Department of Agriculture, U.S. Forest Service, Engineering Staff. 3 volumes, 1091 p.

USFS. 1997b. Assessments for Late Successional Reserve and Managed Late Successional Areas Assessments, Eastern Washington Cascades Province, Wenatchee National Forest. Leavenworth, Washington.

USFS. 1998. Watershed Protection and Management. FSM 2520. R-6 Supplement 2500-98-1, effective August 24, 1998. https://www.fs.usda.gov/cgi-bin/Directives/get_dirs/fsm?2500 (accessed March 14, 2024).

USFS. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines. Portland, Oregon.

USFS. 2005. Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants Final Environmental Impact Statement. Pacific Northwest Region. Internet website: https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3812803.pdf.

USFS. 2005. Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision. Portland, Oregon.

USFS. 2012a. The Okanogan-Wenatchee National Forest Restoration Strategy: Adaptive ecosystem management to restore landscape resiliency. Okanogan-Wenatchee National Forest. Wenatchee, Washington.

USFS. 2012b. Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-990a.

USFS. 2014. FSM 2500 – Watershed and Air Management, Chapter 2550 – Soil Management.

USFS. 2014. ICBEMP Midscale Vegetation Data Key. Wenatchee Forestry Science Lab. Revised April 10, 2014. Leavenworth, Washington.

USFS. 2017. Forest-Wide Site-Specific Invasive Plant Management Record of Decision. Okanogan-Wenatchee National Forest. May 2017. https://www.govinfo.gov/content/pkg/GOVPUB-A13-PURL-gpo73837/pdf/GOVPUB-A13-PURL-gpo73837.pdf

USFS. 2020. Upper Wenatchee Pilot Project Draft Environmental Assessment. Wenatchee River Ranger District, Okanogan-Wenatchee National Forest, Chelan County, Washington. December 2020.

USFS. 2024. Okanogan-Wenatchee National Forest Late Successional Reserve Assessment (LSRA). U.S. Department of Agriculture, Forest Service, Okanogan-Wenatchee National Forest. https://www.fs.usda.gov/sites/nfs/files/r06/okanogan-wenatchee/publication/OkaWen%20Late%20Successional%20Reserve%20Assessment%20May%202024.pdf

USFS. 2026. Eagle Creek Project Biological Analysis. Wenatchee National Forest, Wenatchee River Ranger District. Leavenworth, WA.

USGS (United States Geological Survey). 2003. Wenatchee National Forest Water Temperature Total Maximum Daily Load Technical Report. Publication Number 03-10-063.

USGS. 2023. Water Quality after Wildfire. https://www.usgs.gov/mission-areas/water-resources/science/water-quality-after-wildfire#overview (accessed April 13, 2024).

USGS. 2024a. Water Data for the Nation. Wenatchee River at Monitor, WA – 12462500. Discharge Statistics. https://waterdata.usgs.gov/monitoring-location/12462500/#parameterCode=00060&showMedian=true&startDT=2010-10-01&endDT=2024-06-25 (accessed June 26, 2024).

USGS. 2024b. Water Data for the Nation. Wenatchee River at Peshastin, WA – 12462500. Discharge Statistics. https://waterdata.usgs.gov/monitoring-location/12459000/#parameterCode=00060&showMedian=true&startDT=2010-10-01&endDT=2024-06-25 (accessed June 26, 2024).

Van Pelt, R. 2008. Identifying Old Trees and Forests in Eastern Washington. Washington State Department of Natural Resources, Olympia. Internet website: https://www.dnr.wa.gov/publications/lm_hcp_eastside_oldgrowth_guide.pdf

Washington Department of Ecology (WDOE). 2022. Washington 2014-2018 Water Quality Assessment and 303(d) List, approved by EPA on Aug. 26, 2022. State of Washington Department of Ecology. https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d (accessed March 11, 2024)

Washington State Department of Ecologoy. 2022. Washington State Water Quality 303(d)/305(b) List. https://apps.ecology.wa.gov/ApprovedWQA/ApprovedPages/ApprovedSearch.aspx (accessed March 11, 2024).

Weil, R. R., and N. C. Brady. 2019. Elements of the Nature and Properties of Soils, Fourth Edition. Pearson, New York, New York.

Wiensczyk, A. M., S. Gamiet, D. M Durall, M. D. Jones, and S. W. Simard. 2002. Ectomycorrhizae and forestry in British Columbia: A summary of current research and conservation strategies. B.C. Journal of Ecosystems and Management 2(1): 28–47.