U.S. Department of the Interior
Bureau of Land Management

DOI-BLM-ORWA-C000-2021-0003-EA

Late-Successional and Riparian Reserve Restoration Management Environmental Assessment

February 13, 2023

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CHAPTER 1 PURPOSE AND NEED

1.1 INTRODUCTION

This environmental assessment (EA) contains analysis of a program of actions to promote the development of structurally complex conifer forests through vegetation treatments, as well as to promote the development of larger trees near stream channels. The proposed action includes road-related activities such as construction, renovation, improvement, and decommissioning. The BLM is proposing vegetation treatments within the Late-Successional Reserve (LSR) and the Riparian Reserve (RR) Land Use Allocations (LUAs) (USDI-BLM 2016a, pp. 64–74) managed by the Umpqua and Myrtlewood Field Offices of the Coos Bay District (district), Bureau of Land Management. Associated activities (e.g., road work, tail holds, yarding corridors) would occur in any adjoining land use allocation except as prohibited by the Resource Management Plan (BLM 2016).

The project area is located within the geographic range of six Endangered Species Act (ESA) listed species: the northern spotted owl, marbled murrelet, coastal marten, Oregon Coast Coho Salmon, gray wolf, and Franklin's bumblebee. These species are all listed as threatened except the Franklin's bumblebee, which the U.S. Fish and Wildlife Service (USFWS) has listed as endangered (USDI-USFWS 1990; USDI-USFWS 1992; USDI-USFWS 2020; 63 FR 42587). Both the northern spotted owl and the marbled murrelet are associated with structurally complex conifer forest habitat. Coastal martens are found in large blocks of forest with a dense shrub layer (Moriarty et al. 2021). Oregon Coast Coho Salmon are associated with cold water streams that contain channel complexity, pool habitat, gravel, and large woody debris.

For implementation, based on staffing workload capacity and funding, the BLM would propose treatments on approximately 2,000 acres in any given year over approximately ten to fifteen years. Trees removed through thinning would be offered through timber sales. Under Alternative 2, about 80 percent of the treatment acres would occur within the LSR and the remaining 20 percent would be within the RR. Under Alternative 3, this would range from 90 percent in LSR and 10 percent in RR. While this analysis considers all LSR/RR stands that meet the density targets, it does not prevent other NEPA analyses from taking place concerning LSR/RR stand treatments in the future. Potential commercial products produced by the action alternatives would be consistent with the estimates provided by the 2016 RMP/EIS (decadal average 18 MMbf per year). The action alternatives may provide 15–25 MMbf of non-ASQ volume annually starting in 2023.

1.2 PROJECT AREA

The project area for the EA is all of the LSR/RR lands on the Coos Bay District (**Figure 1**). This includes approximately 73,700 acres of LSR and 55,083 acres of RR Land Use Allocations (LUAs). Of this, approximately 101,550 total acres within the Umpqua Field Office (58,000 acres LSR, 43,550 acres RR) and approximately 27,232 total acres of LSR and RR LUA stands within the Myrtlewood Field Office (15,700 acres LSR, 11,532 acres RR).[1] These are the total acreages

[1] The total acres are based on previously managed Forest Operational Inventory (FOI) units, or stands, within reserve allocations on the Coos Bay District that are between the ages of 30 and 80 years old. Within each of these identified stands are LSR and RR designations; within each RR, there are inner, middle, and outer zones. The BLM may only

for the 30- to 80-year age classes across the district from which the BLM could develop individual projects.

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propose commercial harvest in outer zones, non-commercial actions may occur in the middle and inner zones. These stands total approximately 129,000 acres; however, the BLM could only propose commercial actions in the LSR and outer zone RR totaling approximately 93,300 acres.

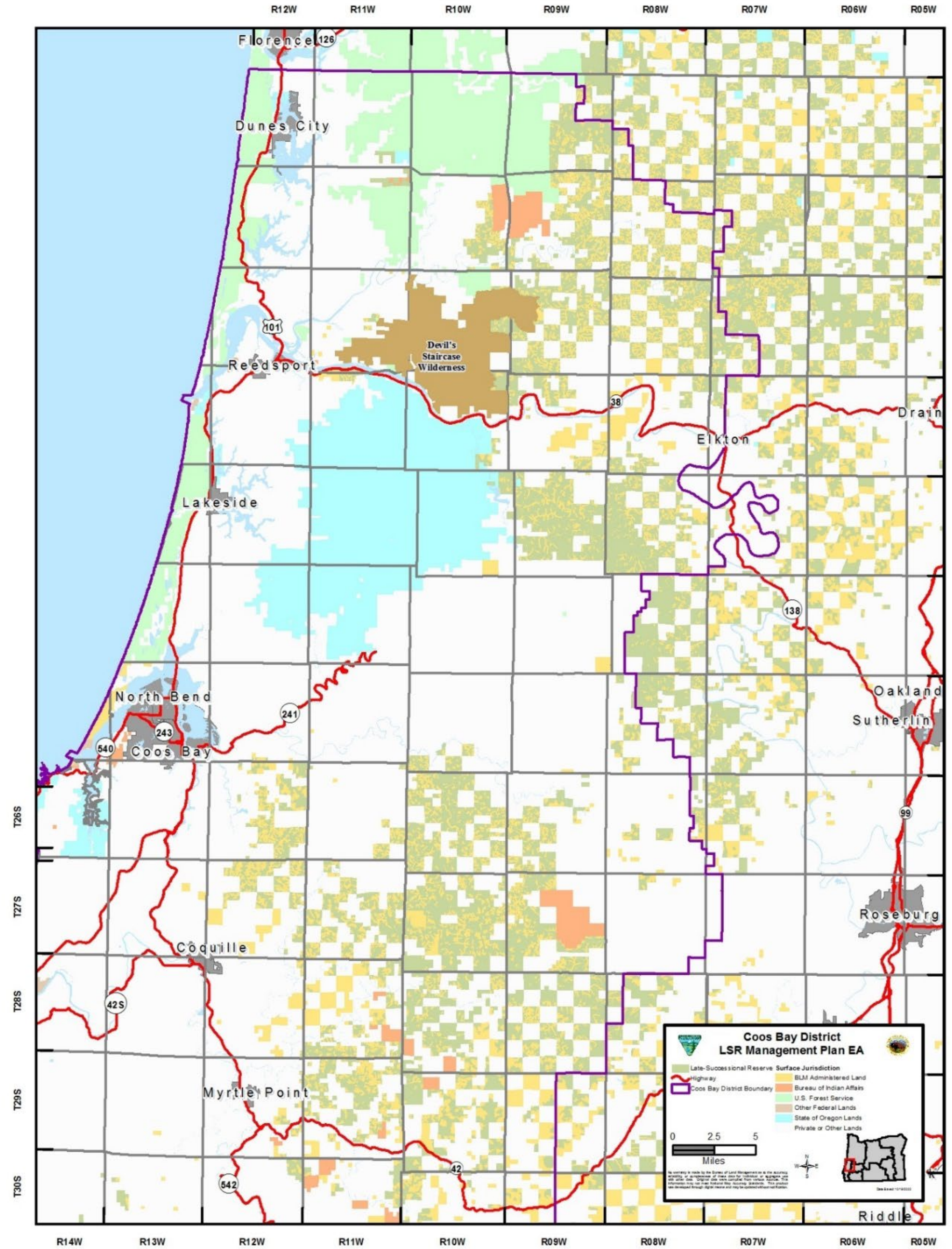

Figure 1. Map of the project area.

1.3 BACKGROUND

The 2016 Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (ROD/RMP) outlines management direction for both the LSR and RR LUA. Management direction identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM administered lands and resources" (USDI-BLM 2016b, p. 3).

Management direction for the LSR includes:

- Manage for large blocks of northern spotted owl nesting-roosting habitat that support clusters of reproducing spotted owls, are distributed across the variety of ecological conditions, and are spaced to facilitate the movement and survival of spotted owls dispersing between and through the blocks
- During silvicultural treatment of stands, retain existing––
    - Snags ≥ 6" DBH
    - Down woody material ≥ 6" in diameter at the large end and > 20 feet in length except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6" DBH cut for safety or operational reasons as down woody material unless they would also pose a safety hazard as down woody material.
- In stands that are not northern-spotted owl nesting-roosting habitat, apply silvicultural treatments to speed the development of northern spotted owl nesting-roosting habitat or improve the quality of northern spotted owl nesting-roosting habitat in the stand or in the adjacent stand in the long term. Limit such silvicultural activities (other than forest pathogen treatments) that do not preclude or delay by 20 years or more the development of northern spotted owl nesting-roosting habitat in the stand and in adjacent stands, as compared to development without treatment.
- Utilize integrated vegetation management in designing and implementing treatments. Conduct integrated vegetation management for any of the following reasons:
    - Promote development and retention of large, open grown trees and multi-cohort stands.
    - Promote or enhance the development of structural complexity and heterogeneity.

Management direction for the RR includes:

- Refer to Management Direction in LSR for snag creation in RRs.
- Allow yarding corridors, skid trails, road construction, stream crossings, and road maintenance and improvement where there is no operationally feasible and economically viable alternative to accomplish other resource management objectives.
- Where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement in the Inner Zone or Middle Zone, retain cut trees in adjacent stands as down woody material or move cut trees for placement in streams for fish habitat restoration at the distraction of the BLM. Where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement in the Outer Zone or in Riparian Reserves associated with features other than streams, retain cut trees in adjacent stands as down woody material, move cut trees for placement in streams for fish habitat restoration, or sell trees, at the discretion of the BLM. For any trees that are both ≥ 40" DBH and that the BLM identifies were established prior to 1850, retain cut trees in the adjacent stand as down woody material. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb, truck, or crown characteristics, or increment coring, at the discretion of the BLM.
- Use site-specific BMPs (**Appendix D**) to maintain water quality during land management

actions, including discretionary actions of others crossing BLM-administered lands.

- Do not operate ground-based machinery for timber harvest within 50 feet of streams (slope distance), except where machinery is on improved roads, designated stream crossings, or where equipment entry into the 50-foot zone would not increase the potential for sediment delivery into the stream.
- Do not operate ground-based machinery for timber harvest on slopes > 35 percent. Mechanical equipment with tracks (e.g., excavators, loaders, forwarders, and harvesters may be used on short pitch slopes of greater than 35 percent but less than 45 percent when necessary to access benches of lower gradient (length determined on a site-specific basis, generally less than 50 feet (slope distance).
- Tree tipping: When conducting commercial thinning in any portion of the Outer Zone in a stand in all watershed classes, cut or tip from 0 to 15 square feet of basal area per live trees, averaged across the RR portion of the treated stand. Leave cut or tipped trees on site or yard, deck, and make cut or tipped trees available for fish habitat restoration. The cut or tipped trees can be of any size and come from any zone.

The BLM has identified 129,000 acres of stands for potential treatment; these stands are predominantly homogenous single story timber plantations and have very low if any stand complexity or biological diversity and are not on a current trajectory to provide needed habitat for the recovery of declining species populations.

These stands are within the range of three terrestrial Endangered Species Act listed species, the northern spotted owl, the marbled murrelet, and coastal marten.

Most of the documented habitat-use by northern spotted owls and marbled murrelets is in complex forests with multi-layered canopies and a few giant trees. Complex forest stands with giant remnant conifer trees is where suitable nesting habitat is typically found for these species. Large limbs are common in nest trees used by marbled murrelets; large limbs are also indicative of open growing conditions. Coastal marten are associated with large contiguous blocks of forest with a dense shrub layer.

Endangered Species Act listed Oregon Coast Coho Salmon as well as Bureau Sensitive aquatic species are found within streams in the potential treatment. The aquatic habitat and stream conditions have been altered by earlier land management resulting in less than desirable aquatic conditions such as a lack of stable wood.

1.4 NEED

The Interdisciplinary Team (IDT) identified stands within the LSR and RR that were previously managed for timber production and lack critical elements of a late-successional forest such as large trees with large cavities and limbs, stable wood in streams, multi-cohort stands, and multi-layered canopies.

In the project area, spotted owls relied on large tracts of unfragmented late-seral forests. Historic land management actions, such as commercial timber harvest, have resulted in fragmentation of remaining natural forests and the overabundance of simplified young and overstocked stands. This has resulted in the decline of populations of species associated with late-successional stand conditions in the project area, such as the northern spotted owl and the marbled murrelet. The following table (**Table 1)** includes a description of the historic conditions that are representative of the project area.

Table 1: Conditions for late-successional forest in the central coast range of Western Oregon

Tree size	Trees per Acre*
Middle story conifers 21” to 32” DBH	8–22
Middle story hardwoods > 9” DBH	10–19
Overstory conifers† 32”– 48” DBH (large trees)	8–13
Overstory conifers† > 48” DBH (giant trees)	2–3
* Mature and old-growth data from the Oregon Coast province is used to approximate the desired conditions for complex, high-quality forest habitat. The quantities for live trees are based on characteristics described in the Late-Successional Reserve Assessment, Oregon Coast Province, Southern Portion (RO267, RO268) (USDA-USFS, USDI-BLM 1997 pp. 55–56) (See hemlock dry, moist, and wet) and research from Poage (2005, p. 19) † Data in the LSR Assessment indicates that 63 to 76 percent of the conifer species in structurally complex late-successional stands are Douglas-fir; giant trees (≥ 48” DBH) are only Douglas-fir (USDA-USFS, USDI-BLM 1997 p. 57)	

The stands have undergone some form of clearcut or regeneration harvest in previous management. The BLM primarily implemented these techniques in the 1970s and 1980s; however, the practice declined on federal lands following adoption of the Northwest Forest Plan in the 1990s. There are dispersed areas of structurally diverse older forest exist on federal lands that were reserved from previous harvest schedules, but these are fragmented and rarely spatially connected.

LSR and RR Class II and III subwatersheds[2]

Stand inventories show that there are approximately 93,000 acres of stands within the Coos Bay District LSR/RR Class II and III subwatershed land use allocations in the 30– to 80–year age classes that the BLM previously managed to maximize timber harvest production and thus are not on a trajectory to ever develop into complex habitat with old growth features without significant disturbance (Chamberlain et al. 2021).

To promote large open-grown trees, develop layered canopies and multi-cohort stands, develop diverse plant communities, and allow for hardwood vigor and persistence, the BLM could conduct vegetation management in the Outer Zone RR of Class II and III subwatersheds to meet RMP management direction. Approximately 1,760 acres are located within the Coos Bay District in the Outer Zone RR in Class II and III subwatersheds in the 30– to 80–year age class.

The BLM’s proposed actions would create conditions for missing stand complexity to develop faster than they would without treatment to benefit ESA-listed species, Special Status species, and other species dependent on late-successional complex forests (USDI-BLM 2016a, pp. 538, 544, 842, 905, and 986). In a recent environmental analysis on the Coos Bay District, the BLM determined that thinning dense, even-aged stands as early as possible would advance the desired complex stand conditions over time. The modelled stand results showed that longer durations of open growing conditions allowed for the greatest individual overstory tree growth and the development of canopy layering (Big Weekly Elk Forest Management Project, DOI-BLM-ORWA-

[2] RR Class II and III subwatersheds—For a description of RR widths and associated management direction see the ROD/RMP (pp. 73–74).

C040-2019-0006-EA, pp. 34–36). By creating these openings, these trees responded faster when compared to the reference no-treatment stand.

RR Class I subwatersheds [3]

The BLM's FOI dataset contains approximately 7,769 acres of Outer Zone RR stands in the 30– to 60–years age class within Class I subwatersheds. Lidar-derived stand metrics indicate that the quadratic mean diameter of these Outer Zones is 13.7 inches (standard deviation 2.9 inches). These densely stocked stands experience suppressed growth and vigor due to competition and competition-induced mortality under the current growing conditions. The existing condition of the Outer Zone RR is inconsistent with maintaining the proper functioning condition of riparian areas, which includes wood recruitment that functions as stable wood in streams.[4] In the Outer Zone RR of Class I streams, the BLM could conduct vegetation management to ensure that stands are able to provide trees that would function as stable wood in the streams to meet RMP management direction.

1.5 PURPOSE (OBJECTIVES)

LSR LUA

The purpose of the action in the LSR is to conduct integrated vegetation management (USDI-BLM 2016b pp. 66, 72–74) to enhance development of spotted owl nesting-roosting habitat and murrelet nesting habitat by:

Promoting the development and retention of large, open-grown trees and multi-cohort stands and promote or enhance the development of structural complexity and heterogeneity.

- To develop the late-successional forest characteristics of large, open-grown trees, and multi-cohort stands based on the definition of late-successional complex forests for overstory trees and middle story trees (both hardwoods and conifers).

RR LUA Class I subwatersheds:

Thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the streams. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the harvest unit within the Riparian Reserve (USDI-BLM 2016b, pp. 71–72).

RR LUA Class II and III subwatersheds:

Promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. The BLM would also apply silvicultural treatments to increase diversity of riparian species and develop structurally complex stands (USDI-BLM 2016b, pp. 72–74).

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[3] RR Class I subwatersheds—For a description of RR widths and associated management direction see the ROD/RMP (pp. 71–72).

[4] The Inner Zones of the Riparian Reserve account for up to 95 percent of the total wood volume recruited to streams (RMP/EIS Vol. 1, p. 248). The larger stable debris jams interact with the smaller wood provided in the Inner Zones and this larger wood development is a primary objective of the Outer Zone; "[f]or most streams in the planning area, a 20" DBH tree can provide functional wood in the stream" (RMP/EIS Vol. 1, p. 248).

Conducting vegetation treatments now would accelerate or enhance the development of these stand conditions that would provide quality nesting and roosting habitat for northern spotted owls, nesting habitat for marbled murrelets, and large wood for streams and fish habitat. These characteristics include a multi-story canopy with open grown trees, and with snags and down wood throughout the stand.

1.6 LAND USE PLAN CONFORMANCE

The ROD/RMP addresses how the BLM would comply with applicable laws, regulations, and policies in western Oregon including, but not limited to, the Oregon and California Revested Lands Sustained Yield Management Act (O&C Act), Federal Land Policy and Management Act (FLPMA), Endangered Species Act (ESA), National Environmental Policy Act (NEPA), Archaeological Resources Protection Act (ARPA), Clean Air Act (CAA), and Clean Water Act (CWA). The Coos Bay District Office initiated and designed this project to conform to the ROD/RMP. This EA tiers to the 2016 Proposed Resource Management Plan and Final Environmental Impact Statement for Western Oregon (RMP/EIS; USDI-BLM 2016a). The LSR and RR Restoration Management EA is in conformance with the ROD/RMP (USDI-BLM 2016b).

1.7 PUBLIC INPUT AND ALTERNATIVE AND ISSUE DEVELOPMENT

The public scoping period for this project ran from June 15 to July 16, 2021. The BLM also conducted a public field tour on June 29, 2021. The BLM received two comment letters. The first was jointly from Cascadia Wildlands, Oregon Wild, and the Klamath-Siskiyou Wildlands Center. The second comment letter was from the American Forest Resources Council. The BLM also conducted two public field tours, one during the scoping period on June 29, 2021 and one during the EA comment period on December 9, 2022.

In response to the comments provided by Cascadia Wildlands, Oregon Wild, and the Klamath-Siskiyou Wildlands Center, the BLM developed Alternative 3. Alternative 3 proposes treatment of LSR and RR stands 70 years of age and younger, while not conducting RR thinning in Class I subwatersheds or the creation of group selection openings greater than 0.25 acre. This alternative also retains hardwoods and a stand Relative Density of 40–45 in the LSR, which provides greater canopy cover post-treatment.

Issues Identified for Analysis

The BLM gathered external and internal comments from the public field tour, the 30-day public comment period, and the IDT. These comments led to issues considered for analysis, listed below.

The following are the issues carried forward for analysis in this EA:

1. How would the proposed vegetation management contribute to the development of spotted owl and marbled murrelet nesting habitat in the Late-Successional Reserve and stable wood in the Outer Zones of the Riparian Reserve?
2. What would be the short-term and long-term effects of the alternatives be on the ability of the spotted owl to nest in the project area?
3. How would the alternatives affect the spotted owl critical habitat within the project area?
4. What would be the short-term and long-term effects of the alternatives on the ability of the marbled murrelet to nest in the project area?

5. How would the alternatives affect marbled murrelet critical habitat within the project area?
6. How would the proposed vegetation management in the RR of Class I subwatersheds affect the stand's ability to provide stable wood in streams?

DECISION TO BE MADE

The BLM would decide on an alternative that would best meet the purpose and need, outlined above. This decision would guide the Myrtlewood and Umpqua Field Offices restoration of complex late-successional forest and ensure stands are able to provide trees that function as stable wood to streams on the approximately 129,000 acres considered within the LSR and RR LUA.

Site-specific project implementation would verify that treatment effects fall within the range of effects described in this EA for the selected alternative and would be consistent with the selected management approach. The BLM would evaluate whether actions could be implemented using a DNA and DR or subsequent project implementation specific NEPA documentation based upon the analysis in this programmatic document and the decision for this EA.

IMPLEMENTATION PANNING

Planning foresters, silviculturists, and wildlife biologists would select subsequent timber sales together to verify that the stands proposed for treatment meet the purpose and need and would respond to the proposed vegetation management prescriptions. The BLM would complete a Determination of NEPA Adequacy (DNA) Worksheet for each proposed timber sale or group of sales, but other documentation could occur. For any DNA, the BLM resource staff would assess and confirm whether the proposed action(s) were adequately analyzed in this EA, and that the action(s) are in conformance with the RMP. This DNA would include examination of the project location and the proposed activities and identify project design features and applicable Best Management Practices (BMPs). The BLM would publish the DNA and any associated Decision Record for the proposed action on the BLM's ePlanning NEPA Register. Each DNA would have a 30-day public comment period prior to the issuance of the Decision Record. Each Decision Record would have an administrative remedy in accordance with 43 CFR Part 4. The BLM would implement projects found to be consistent with the purpose and need and within the scope of the effects analysis in this EA.

CHAPTER 2 ALTERNATIVES

2.1 COMPARISON OF ALTERNATIVES

The BLM is proposing two action alternatives: one designed by the BLM and one generated from public scoping. Both alternatives include stand treatments but differ in thinning prescriptions by age class and LUA. The No Action alternative describes the current baseline conditions and the analysis of effects of not conducting vegetation management at this time. **Table 2** lists the acres within the project area, but not all acres would be treated as the BLM proposes approximately 2000 acres of treatment each year. The BLM would be limited to treatments in the Outer Zone in Class I watersheds and existing older stands in the LSR would potentially age out of prescriptions by age class and therefore not be treated over the length of this EA.

Table 2: Total acres in the project area.

LUA by Age Class (Years)	No Action (Acres)	Alternative 2 (Acres)	Alternative 3 (Acres)
Class I RR	47,778	7,769 outer zone	—
Class II and III RR	7,303	1,760 outer zone	1,716
LSR 30–60	56,313	53,667	50,120
LSR 70	7,147	6,217	6,217
LSR 80	4,736	4,087	—
Totals	**123,277**	**73,500**	**58,053**

Alternative 1—No Action

Under this alternative, the BLM would not implement vegetation management within the project area in LSR and RR stands. These stands within the project area would continue to grow on their current trajectories which would prevent stands from attaining vigorous conifer growth because stands proposed for management are already within the zone of competition mortality. Forest floors would continue accumulating fuel as trees continue to self-prune. Current densities threaten the persistence of minor species composition both directly by fire risk and indirectly by the effects of competition mortality.

PROPOSED ACTION ALTERNATIVES

Prescription elements common to both action alternatives (ROD/RMP pp. 64–72)

- The BLM would retain some understory conifers to develop multi-cohort stands and retain minor conifer species and hardwoods to enhance species diversity in the LSR.
- The BLM would conduct thinning “from below” in the RR.
- The BLM would retain trees with complex forms such as large limbs, forked stems, or broken tops unless those trees present a safety issue as part of normal timber management operations.
- The BLM would leave untreated skips on at least 10 percent of the stand area.
- The BLM would also conduct fuels reduction treatments (i.e., landing and roadside pile burning, and slash, lop, and scatter).

- Where Outer Zone thinning occurs, the BLM would follow Management Direction for snag creation and tree tipping (0 to 15 square feet of basal area per acre) throughout the RR in Outer, Middle, and Inner zones.

Table 3 shows the additional stand prescription elements of the two action alternatives based on the LUA. The essential differences are in how ‘heavy’ or ‘light’ the thinning prescription is by age class and LUA which is represented by the target Relative Density. Relative Density (RD) is a means of describing the level of competition among trees or site occupancy in a stand, relative to some theoretical maximum based on tree density, size, and species composition. Relative density percent is calculated by expressing Stand Density Index (SDI) (Reineke 1933) as a percentage of the theoretical maximum SDI, which varies by tree species and range. Curtis’s relative density (Curtis 1982) is determined mathematically by dividing the stand basal area by the square root of the quadratic mean diameter.

Table 3: Comparison of prescription elements of the Action Alternatives

Common Elements By LUA	Alt. 2—Proposed Alternative	Alt. 3—Scoping-Derived Alternative
RR Outer Zone: Class I watersheds	Thin stands aged 30–60* years to target RD of 35–45	No treatment
RR Outer Zone: Class II and III watersheds	Thin stands to the RD identified for the adjacent LSR: age 30–60 to RD of 20–30 age 70–80 to RD of 30–40	Thin stands to the RD identified for the adjacent LSR: age 30–70 to RD of 40–45
LSR Group Selection Openings	No greater than 4 acres, up to 25% of a stand area†	No greater than 0.25 acre
LSR—stand ages 30–60	Thin to RD of 20–30	Thin to RD of 40–45
LSR—stand age 70	Thin to RD of 30–40	Thin to RD of 40–45
LSR—stand age 80		No Treatment

* There would be no commercial activities in 70–80-year-old stands within RR Class I subwatersheds where trees are available to function as stable wood if they fell into adjacent stream channels (i.e., meet the minimum size criteria for stable wood).
† Criteria for group selects are identified below on pp. 20–22 in the description of the Proposed Alternative 2.

Project Design Features Common to All Action Alternatives

The IDT incorporated management direction associated with commercial thinning in the LSR and RR LUA, management direction related to other affected resources, and project design features (PDFs) to minimize effects to resources. See **Appendix D** for PDFs and management direction.

Road Management

As part of the project, the BLM would construct new roads and would renovate, improve, or maintain existing roads to access units proposed for harvest; these road activities would occur within the LSR and the RR and other adjoining land use allocations, and within adjacent private lands. Road management for the project consists of developing and maintaining a transportation system that serves resource management needs in an environmentally sound manner, as directed by the ROD/RMP (USDI-BLM 2016b, p. 81) and the Western Oregon Districts Transportation Management Plan (USDI-BLM 2018b *Update*). The BLM’s road work would include new construction, and road maintenance/improvements necessary to facilitate harvest operations, as well as the decommissioning of roads following completion of individual sale operations. Roadwork would include replacement or installation of culverts and cross drains, and the felling of additional roadside trees to establish proper road clearance widths.

The BLM would design new roads and use existing roads to allow timber harvest operations to take place at times of the year appropriate to adjacent nesting habitat during the breeding season for spotted owls and marbled murrelets while taking into consideration existing road conditions, unit size, unit volume, and logging costs. To facilitate harvest operations, year-round roads would have a rocked surface adequate to withstand winter operation. In other instances, the BLM would prioritize winter operation in areas that already have adequate all-weather haul routes.

Landing construction would consist of creating wide spots to facilitate safe yarding and loading of logs. Cable and ground-based landings are typically about 0.25-acre in size excluding the roadbed.

Table 4 compiles the roadwork amounts from past projects and indicates the average annual roadwork that is forecast to implement as part of this project under both action alternatives. The BLM would disclose final field verified roadwork mileage and roadwork locations in subsequent NEPA decisions.

Table 4: Compilation of roadwork from recently implemented timber sale projects

Coos Bay District NEPA Project	Commercial Thinning Treatment (acres)	Total New Road Construction All LUAs (miles)	Total New Road Construction RR Only (miles)	Total Renovation (miles)	Total Improvement (miles)	Total Decommissioning (miles)
Lone Pine EA	3,727	13.9	1.0	82.2	2.7	32.3
Fairview NWFP Project EA	7,344	31.2	2.5	54.6	14.5	24.5
Big Vincent EA	6341	18.2	5.0	76.1	5.5	22.6
West Fork Smith River EA	2,446	13.0	0.6	43.6	4.0	11.4
Total	**19,858**	**76.3**	**9.1**	**256.5**	**26.7**	**90.8**
Rate per 2,000 acres of treatment (annual) for Alts 2 and 3		11	1	40	4	13

The BLM would install, repair, or replace gates or place boulders or equivalent vehicular barriers, where necessary, for resource protection or as part of reciprocal right-of-way agreements. These gates or barriers would remain after the BLM concludes project activities. The Transportation Management Plan classifies this as ‘temporary closure’ (USDI-BLM 2018b *Update*). The BLM would incorporate applicable BMPs from the 2016 ROD/RMP for road and landing construction **(**ROD/RMP Appendix C; EA **Appendix D**) to eliminate or minimize erosion and sediment transport into the channel network.

New Road Construction

Based on **Table 4**, the Coos Bay District has been averaging 7.68 miles of new construction per 2,000 acres of recently implemented treatment across all land use allocations. This analysis will use the estimate of 11 miles per year based on an estimated 2,000 acres of annual treatments allowing for fluctuation and differing access conditions, of which one mile per year would be constructed within the RR LUA. The BLM would apply appropriate PDFs to road construction activities and the ROD/RMP BMPs would guide the type of road construction and road locations (**Appendix D**).

The BLM would design and construct roads and landings to BLM standards (USDI-BLM 2011). For this project, rocked roads would typically have a running surface of 16 feet wide, while natural-surfaced roads would have a typical running surface of 12 feet wide. Right-of-way clearing limits, including the roadbed, would typically be approximately 35 feet in width. Some instances would require wider clearing limits based upon side slope. Operators would have the option of rocking roads currently proposed as natural surface at their own expense, as approved by the authorized officer, providing it does not conflict with management direction and design features. Planned use and resource protection needs would decide road surface shape (crowning, insloping, and outsloping).

Road Renovation

Based on **Table 4**, the Coos Bay District has been averaging 25.8 miles of renovation per 2,000 acres of timber harvesting. This analysis will use the estimate of 40 miles per year allowing for fluctuation and differing access conditions. Road renovation would involve restoring or bringing an existing road back up to the original design standard. During road renovation, the BLM would fall trees within the right-of-way to reestablish safe road widths and clearing distances. Work would include clearing brush, cleaning or replacing ditch relief/stream crossing culverts, restoring proper road surface drainage, grading, or other maintenance. For a rocked road, road renovation would typically include adding rock, so the road is adequate for winter operations. The BLM would apply drainage and erosion control practices to renovated roads in the same manner as newly constructed roads and install drainage features upslope of each stream crossing to route ditch flow away from streams. The BLM may install or replace other stream culverts or cross drains in areas with deficient drainage during road renovation or maintenance. When installing or replacing stream culverts, the BLM would follow the Oregon Department of Fish and Wildlife (ODFW) instream work timing guidelines, and divert stream flow around the work area, contain sediment with appropriate filters or barriers, and pump turbid water from the excavation site onto a vegetated terrace or hillslope, where necessary. Depending on gradient and other site conditions, the BLM would install cross drains 50–100 feet upslope from the drainage feature outlet to the channel.

Road Improvement

Based on **Table 4**, the Coos Bay District has been averaging 2.7 miles of improvement per 2,000 acres of timber harvesting. This analysis will use the estimate of 4 miles per year allowing for fluctuation and differing access conditions. Road improvement for this project consists of increasing the existing road standard to a higher design standard by adding rock to existing natural-surface roads. Like renovation, road improvement would include clearing brush, removing trees within the road clearing limits, cleaning or replacing ditch relief/stream crossing culverts, restoring proper road surface drainage, grading, or other maintenance. Rock-surfaced roads would allow cable harvesting and hauling during the winter season.

Road Decommissioning
Based on **Table 4**, the Coos Bay District has been averaging 9.2 miles of decommissioning per 2,000 acres of timber harvesting. This analysis will use the estimate of 13 miles per year allowing for fluctuation and differing access conditions. Decommissioning would mean closing the roads to vehicles on a long-term basis (generally > 5 years); however, the BLM may use these roads again in the future. Prior to closure, the BLM would leave the road in an erosion-resistant condition by establishing cross drains, installing water bars or dips to route surface runoff to vegetated areas, eliminating diversion potential at stream channels, and stabilizing or removing fills on unstable areas, depending on site-specific conditions. The BLM would treat exposed soils with soil-stabilization techniques such as seeding, mulching, and fertilizing to reduce sediment delivery to streams. The BLM would close these roads with an earthen barrier or its equivalent. The IDT may determine that there are future administrative uses for these roads (USDI-BLM 2016b pp. 301–302). See **Appendix E** for definitions of road decommissioning.

Fuels Reduction Treatments
The BLM proposes to use a combination of prescribed fire and mechanical treatments to reduce hazardous activity fuel loadings at landings and roadsides. Hazard reduction treatments would include slash, lop, and scatter, hand or machine pile, cover, and burn. Prescribed fire treatments would include pile burning during the late fall/early winter months after wetting rains have occurred. The BLM could choose to use more than one type of fuels treatment in one unit. Fuels within units would be either hand-piled or machine-piled and burned, as necessary. Mechanical or manual treatments could include lop and scatter and cutting and piling, with or without subsequent burning. The BLM would comply with the Oregon Smoke Management Rules (2014 OAR 629-048-0001–629-040-0500) for all prescribed burning of piled fuels. Any prescribed fire operations would be conducted under a BLM-approved burn plan.

Alternative 2—Proposed Alternative

Under this Proposed Alternative, the BLM would apply treatment prescriptions as follows:

- In the following stand conditions only, create group selection openings[5] up to four acres in size in no more than 25 percent of the stand area to promote the development of new cohorts of open grown conifers in the LSR in:
    - Alder and other hardwood-dominated areas of previously managed stands that failed to regenerate with conifer.
    - Insect or disease damaged areas where a site appropriate for alternative tree species such as western redcedar is more resistant to the damage.
    - Stands where existing trees are unlikely to develop into large, > 30” DBH trees because of tree form and windthrow risk. This condition includes tree height: diameter ratios greater than 80:1, and poor crown ratios less than 20 percent.
- When the above stand conditions do not apply, conduct variable density thinning in the LSR:

[5] Group selection openings are defined as areas with ≤ 2 live trees ≥ 7” DBH per acre (ROD/RMP p. 66)

  - Achieve the Relative Density (RD)[6] described below and canopy cover at the stand level. Within stand variability is desired.
  - Create modified group selection openings not to exceed 4 acres in size, and no more than 25 percent of the stand area. Within modified group selection openings, retain 10–20 trees/acre on average in a variety of spatial patterns.
  - Establish minor species through natural or artificial regeneration.
- In stands with less than 64 snags per acre > 10" DBH and less than 19 snags per acre > 20" DBH on average across the harvest unit, create new snags in the amounts specified on page 67 of the ROD/RMP.

In stands approximately 30–60 years old:[7]

- LSR—apply prescription elements found above and thin stands to an RD of 20–30. Maintain at least 40 percent canopy cover expressed as an average of the stand, including group select openings and untreated skip areas.
- Outer Zone RR in Class II and III subwatersheds—thin stands to a target RD 20–30. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.
- Outer Zone RR in Class I subwatersheds—thin stands to an RD of 35–45 and meet Management Direction for commercial thinning. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.

In stands approximately 70–80 years old:[8]

- LSR—apply prescription elements found above, and thin stands to an RD 30–40. Maintain at least 40 percent canopy cover expressed as an average of the stand, including group select openings and untreated skip areas.
- Outer Zone RR in Class II and III subwatersheds—thin stands to a target RD 30–40 and meet Management Direction for commercial thinning. Maintain at least 30 percent canopy cover and 60 trees per acre expressed as an average at the scale of the portion of the harvest unit within the Riparian Reserve.
- Class I subwatersheds—there would be no commercial activities in the Riparian Reserve where trees already function as stable wood.

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[6] A means of describing the level of competition among trees or site occupancy in a stand, relative to some theoretical maximum based on tree density, size, and species composition. Relative density percent is calculated by expressing Stand Density Index (SDI) (Reineke 1933) as a percentage of the theoretical maximum SDI, which varies by tree species and range. Curtis's relative density (Curtis 1982) is determined mathematically by dividing the stand basal area by the square root of the quadratic mean diameter (ROD/RMP p. 301).

[7] These stand ages are approximate and stand conditions at or near this age range can vary across the Coos Bay District. For the purposes of this analysis, stands that are 30–60 represent high density, young stands where the trees are too large for pre-commercial thinning. Based on lidar-derived estimates, the average tree size ranges from 8–16" DBH, 70–110' tall, stand basal area ranges from 150–250 ft^2/ac.

[8] These stand ages are approximate and stand conditions at or near this age range can vary across the Coos Bay District. For the purposes of this analysis, stands that are 70–80 represent high-density, middle-aged stands that may have been previously thinned. Based on lidar-derived estimates, the average tree size ranges from 14–22" DBH, 80–140' tall, stand basal area ranges from 200–300 ft^2/ac.

Alternative 3—Scoping-Derived Alternative

Following the scoping period, the BLM reviewed comments jointly provided by Cascadia Wildlands, Oregon Wild, and the Klamath-Siskiyou Wildlands Center. This alternative includes suggestions from their scoping comments.

- Treat stands approximately 30 to no more than 70 years old
  - LSR and RR in Class II and III subwatersheds: apply prescription elements found above, and thin stands to a target RD of 40–45.
- Do not commercially thin stands in RR Class I subwatersheds.
- Do not create group selection openings more than 0.25 acre in size.
- Achieve RD and canopy cover at the stand level and design sales to promote within stand variability.
- Establish minor species through natural or artificial regeneration.
- To the extent possible, retain minor species, including hardwoods.

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

The IDT considered other alternatives for analysis during the interdisciplinary process. One of these alternatives were submitted in the form of public comments during scoping and the other based on IDT review and input.

1. An alternative that would only conduct non-commercial treatment
2. An alternative with no new road construction

Appendix B contains a summary of the alternatives considered and the reasons why the BLM eliminated them from detailed analysis.

CHAPTER 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ANALYSIS BACKGROUND

Reasonably Foreseeable Projects

The Coos Bay BLM maintains a 5-year sale plan to schedule timber sales from various project areas to meet projected district volume outputs. The Big Weekly Elk (BWE) Forest Management Project has begun offering Harvest Land Base (HLB) timber. That project EA contains analysis for providing 508 acres of regeneration harvest and 12 acres of commercial thinning under Alternative 2 and 715 acres of regeneration harvest and 12 acres of commercial thinning under Alternative 3. The BWE EA also contains analysis to provide 1,629 acres of commercial thinning in the LSR and RR under Alternative 2 and 1,839 acres of commercial thinning in the LSR and RR under Alternative 3. Other ongoing harvest projects include the Catching EA project which includes 956 acres of regeneration harvest in the HLB and the West Fork Smith River EA which includes 2,100 acres of commercial thinning treatments in the LSR and RR. Other ongoing annual activity examples include road maintenance, various instream restoration projects, and stand management in young stands (e.g., tree planting and pre-commercial thinning), recreation site operation, and noxious weed treatments. The BLM assumes a 40-year harvest rotation on industrial forest lands as well as associated hauling activities which are bound by the Oregon Forests Practices Act. The Forest Service operates under the Northwest Forest Plan (USDA/USDI 1994).

3.2 ISSUES ANALYZED IN DETAIL

Issue 1: How would the proposed vegetation management contribute to the development of spotted owl and marbled murrelet nesting habitat in the Late-Successional Reserve and stable wood in the Outer Zones of Riparian Reserves?[9]

Geographic Scale

The spatial extent for the silviculture direct and indirect effects analysis to forested vegetation is the treatment areas in the stand types proposed in this project.

Temporal Scale

The timeframe considered for short-term direct and indirect effects to stand structure, composition, forest health risk, and appearance is the time needed to complete the proposed silvicultural treatments, three to ten years from the beginning of individual project implementation. The timeframe for long-term direct and indirect impacts to forested vegetation is 60 years to better model long-term growth and change in species composition at 20-year intervals to model medium- and longer-term impacts, and to ensure that action alternatives do not preclude or delay by 20 years or more the development of NSO nesting-roosting habitat as compared to development without

[9] For the purposes of this analysis, the desired future condition of spotted owl and murrelet nesting habitat in the LSR is similar to the condition desired in RR in Class II and III sub-watersheds: large, open grown trees, layered canopies and multi-cohort stands. The stand indicators for NSO Nesting habitat are used for both of these Land Use Allocations because they are quantifiable stand metrics for older, structurally complex conifer forest that can be modelled in FVS. Ensuring stable wood is the only objective in the RR in Class I sub-watersheds so it is a separate component of this analysis.

treatment. The project silviculturist did not model effects out past 60 years for the following reasons: projected conditions would become increasingly speculative because the Forest Vegetation Simulator (FVS) does not predict stochastic events such as snow or wind damage, disease, insect infestation, or fire; FVS does not model natural regeneration beyond amounts that can be assumed from professional judgment, and these assumptions would also become increasingly speculative over time; at 60 years into the future, all stands proposed for action in this analysis would exceed 90 years of age, which is past the maturation phase described by Franklin et al. (2002), and beyond the culmination phase where growth rates begin to decline as discussed below in **Table 5**. Finally, by 60 years post-treatment there is sufficient difference in stand structural composition between the modelled alternatives as to provide an informed decision on the ability of each thinning intensity to approximate the desired condition in proposed stands over time.

Table 5: Plant Association Groups within potential LSR and RR stands*

Plant Association Group (PAG)	Description	PAG in Potential Stands (Percent of total acres, acres)
Western Hemlock	These forest types occur on sites that are wet and warm during the winter months, and humid during the summer. Soils are moderately deep and well drained loams with rock fragments, derived from sandstone. The overstory is dominated by Douglas-fir, with western hemlock and occasionally grand fir or western redcedar. Port-Orford-cedar is frequent, though at low covers. Big-leaf maple, tanoak, California-laurel and Port-Orford-cedar are frequent in the understory. Vine maple may be dense, along with huckleberry, Oregon grape, and salmonberry in the shrub layer. Western sword-fern is common.	83% 74,842
Douglas-fir Moist	This warm, moist forest type can be variable; however, salmonberry, and tanoak are frequently present in addition to overstory Douglas-fir and red alder. Understory species include Douglas-fir, western redcedar and tanoak, Port-Orford-cedar is also found occasionally. While salmonberry is usually dominant in the shrub layer, huckleberry, ocean-spray, salal, and elderberry are also common. Western sword-fern is the dominant herb species.	6% 5,410
Tanoak/ Douglas-fir Moist	On lower slopes, bottomlands and northern aspects stands transition into a Tanoak/Douglas-fir type. Soils are sandstone-derived sandy loams. The overstory tanoak and Douglas-fir is accompanied by golden chinquapin and Pacific madrone. Typically, tanoak dominates the regeneration layer. Wet site indicators such as western hemlock, western redcedar, Pacific yew, and red alder may be present at low cover. Salal and Pacific rhododendron dominate the shrub layers. Poison oak and beargrass characterize drier sites, while sword-fern characterizes the wetter sites.	5% 4,509
True Fir	Grand fir forest types occur at higher elevations and upper slope positions in the project area with high amounts of precipitation on soils derived from a mix of granite, sandstone, and others. In addition to Douglas-fir and grand fir, golden chinquapin and Pacific madrone are frequent. Other hardwoods include vine maple, big-leaf maple, red alder, Pacific dogwood, tanoak, and canyon live oak. In the shrub layer, Oregon grape, snowberry, salal, hairy honeysuckle, baldhip rose, and Pacific blackberry are frequent.	6% 5,410

*From Atzet et al. 1996, "Field Guide to the Forested Plant Associations of Southwestern Oregon"

Analytical Methodology and Assumptions

Methods for this analysis included project area reconnaissance, stand exams, and multiple Geographic Information System (GIS) datasets including: US Forest Service Region 6 insect and disease aerial surveys, aerial photos, Coos Bay District Forest Operations Inventory (FOI) and BLM Micro*Storms (activity tracking databases), South Coast Light Detection and Ranging (lidar) data products, as well as the analyses, direction, and conclusions found in the Northwest and Coastal ROD/RMP (2016) and the supporting Proposed Resource Management Plan/Final Environmental Impact Statement. The BLM also relocated and measured permanent plots within the North Soup and Blue Retro DMS sites in order to observe differences in tree diameter increases between the completed treatments and untreated controls after 20+ years of growth. FVS is a forest growth and yield model developed by the USDA Forest Service that has been calibrated for specific geographic areas of the United States (FVS Staff, 2008, revised 2022). FVS can simulate a wide range of silvicultural treatments for most major forest tree species, forest types, and stand conditions. The project silviculturist modeled the stand trajectories using the Pacific Northwest variant over a 60-year time horizon to model anticipated treatment outcomes. The detailed metrics and results of these model runs are presented in **Appendix C**. Over 100 stand exams within LSR and RR stands between the ages of 30–80 across the Coos Bay District are used in this analysis, combined by age classes 30–40, 50–60, and 70–80 to provide an overall assessment of stand conditions of the LSR and RR across the project area.

Affected Environment

As shown in **Table 5**, **Figure 2**, and **Figure 3**, the LSR and RR network is made up primarily of the Western hemlock, Douglas-fir, Tanoak/Douglas-fir and True fir plant association groups (PAGs) that can support diverse stand compositions of conifers such as Douglas-fir, western hemlock, Port-Orford-cedar, grand fir Pacific yew and western redcedar, as well as hardwood species such as red alder, tanoak, golden chinquapin, California-laurel/myrtlewood, Pacific madrone, and big-leaf maple. These PAGs have the potential to exhibit a wide variety of conditions, differing by slope, aspect, elevation, and soil transitions as shown in **Table 5**, **Figure 2**, and **Figure 3**; however, stands proposed for management have had this variability reduced through past harvest practices that emphasized timber production. These PAGs describe the desired future conditions.

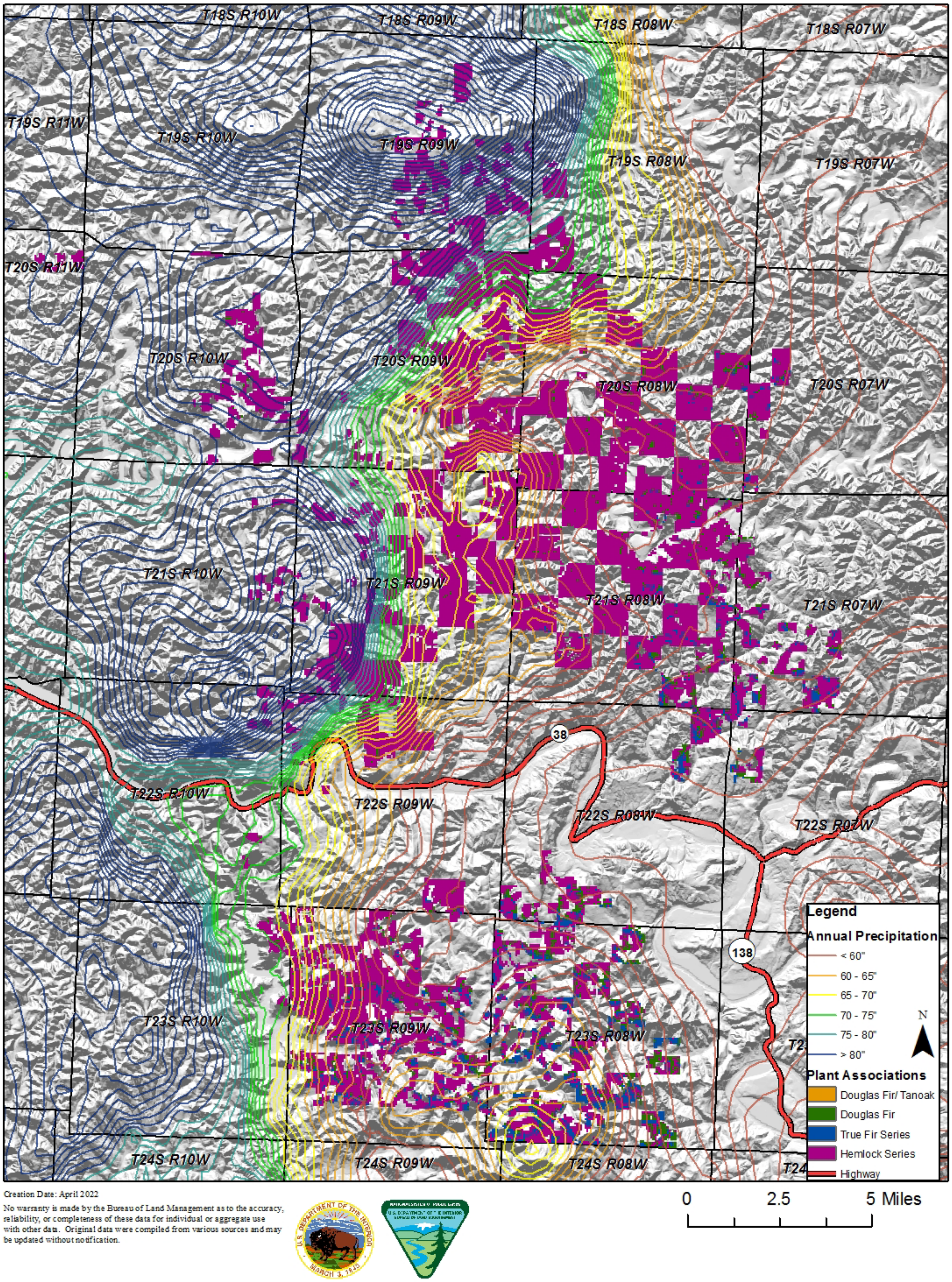


Figure 2: Plant association groups and precipitation in the northern half of the Coos Bay BLM

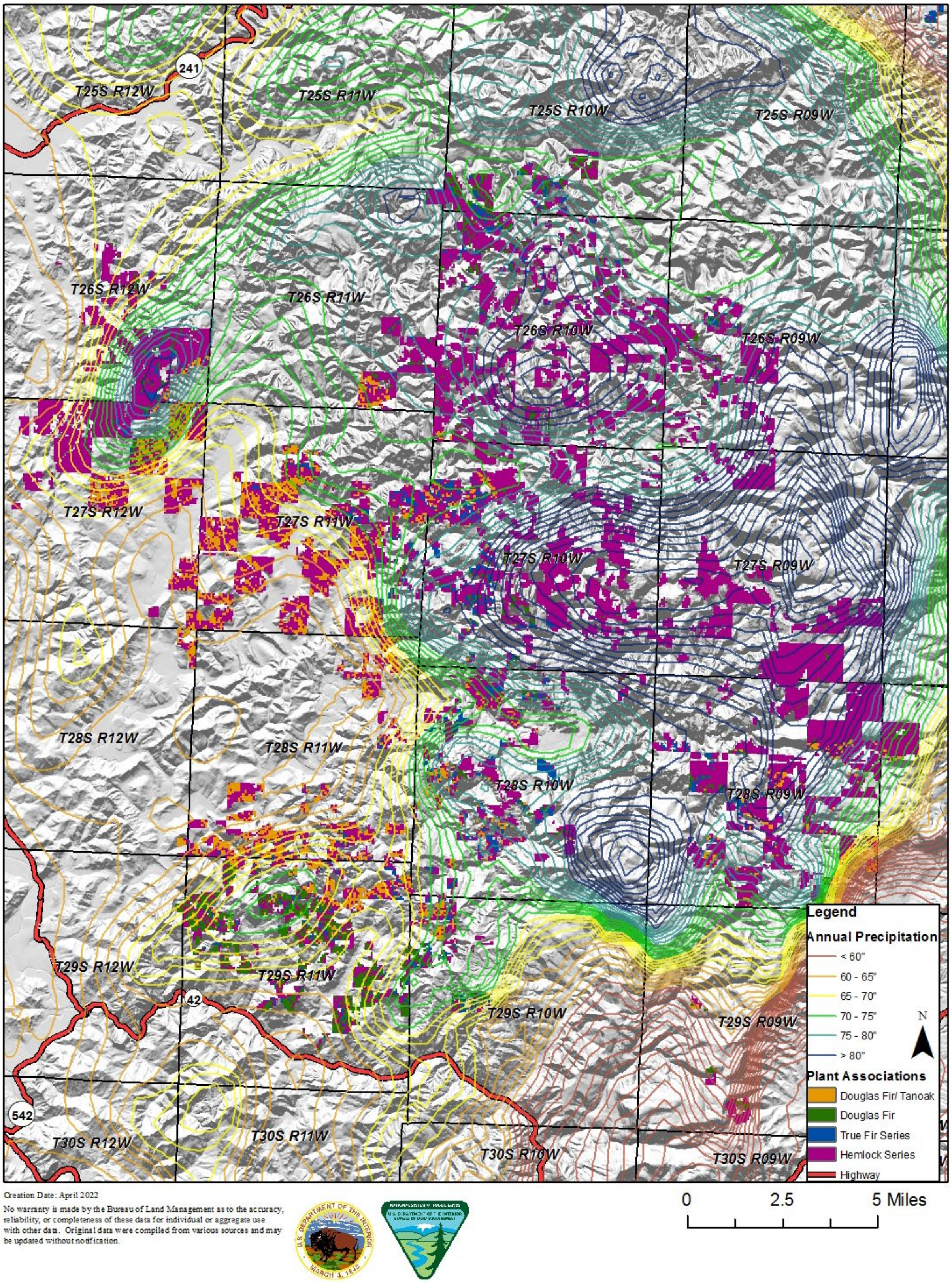


Figure 3: Plant association groups and precipitation in the southern half of the Coos Bay District

In order to accomplish this, in stands that are not northern spotted owl nesting-roosting habitat, the BLM would apply silvicultural treatments to speed the development of northern spotted owl nesting-roosting habitat or improve the quality of northern spotted owl nesting-roosting habitat in the stand or in the adjacent stand in the long term (USDI-BLM 2016b, p. 66).

Densely stocked stands such as those proposed for thinning in the LSR and RR do not exhibit the characteristics of stands in later stages of stand development (Oliver 1980), such as understory re-initiation; nor the maturation, or the vertical diversification stage of structural development as described by Franklin et al. (2002).

Environmental Effects

Alternative 1—No Action

Effects

The effect of past management practices including timber harvest and fire suppression at the proposed treatment unit scale is a continuation of closed canopy, simplified stand conditions. Overall stand growth would remain stagnant as stands would remain in overly dense conditions unless altered by unpredictable disturbance events. Because trees growing in dense conditions grow in height, but very little in diameter, stand stability would decline (Oliver and Larson 1996, p. 75; Tappeiner et al. 2007, p. 124). As a result of the limited resources for tree growth in the stands, diameter growth would lag behind height growth (O'Hara 2014, p. 100), and the risk for windthrow would increase over time as height to diameter ratios continue to increase and crown ratios decrease. While the windthrow risk will increase over time, an exact date cannot be predicted in a growth model. As seen below in **Figure 4**, however, the highest total growth rates in Douglas-fir occur from ages 0–80, and then decline annually. This means that the opportunity to direct that growth into a large diameter overstory trees of 32–48" DBH is at these younger ages rather than waiting for an unpredictable event at an indeterminant time.

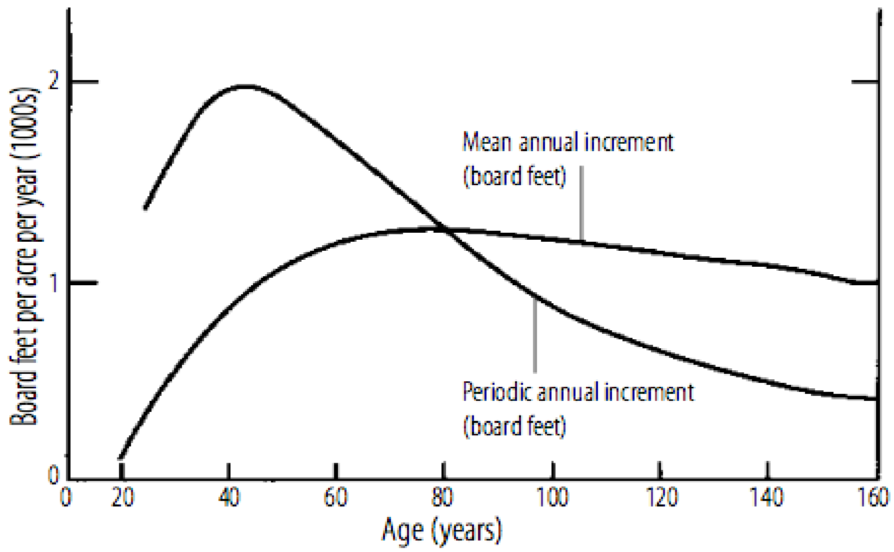


Figure 4: Periodic and mean annual increments of board-foot volume for Douglas-fir, showing culmination of mean annual increment at about 80 years. While these curves are often used for timber production, they also illustrate trees' ability to respond to growing conditions and increase in size at different ages

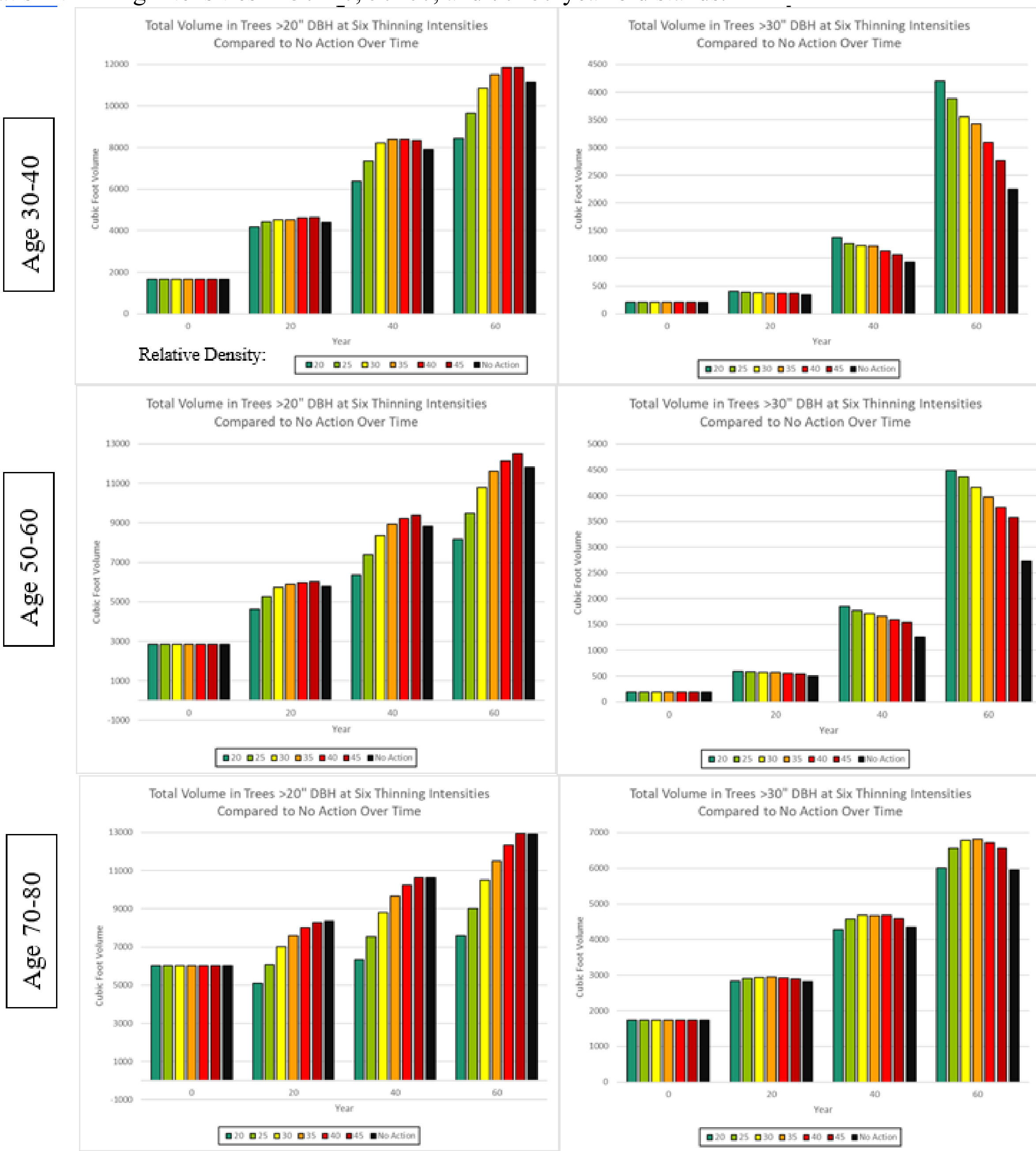
Alternative 1–No Action ensures the direct and indirect effects of declining individual tree and stand vigor because if a stand is allowed to grow for many years within the zone of imminent competition mortality, mortality would occur (Drew and Flewelling 1979). These trends exist in the literature and in model simulations, but they are also seen in real stands on the Coos Bay District. Based on the BLM's monitoring of DMS sites discussed in **Appendix C**, over a 23-year time period the BLM has observed an overstory tree diameter increase of only 19–20 percent in the untreated controls, compared to a 32–42 percent increase in the treated areas. This is roughly twice the diameter growth rate as a result of management actions designed to grow larger nest trees. These observations support the FVS model results and the conclusion that in dense stands, large trees are unlikely to persist or develop quickly, and a stand growing within the zone of imminent competition mortality is unlikely to develop large diameter snags or down wood without disturbance. The No Action Alternative would not ensure vigorous conifer growth because stands proposed for management are already within the zone of competition mortality.

Young stand management in the project area, such as tree planting, brush cutting, pre-commercial thinning, plantation maintenance, and protection treatments would continue. The BLM does not predict that suitable spotted owl or murrelet nesting habitat will develop within the next 60 years on non-federally managed lands in the project area based on the conventional short rotation commercial forestry practices on adjacent private lands. The BLM expects reduced biological and structural diversity on these lands, which would continue long-term if planted with single crop tree species. While annual harvest rates on private forest lands in western Oregon is market driven, it has remained stable at 3,000 MMBF (+/- 30 percent) since the 1960s (USDI-BLM 2016a, p. 309). As such, the BLM expects private lands to continue with single crop plantation forestry into the future. Fire suppression activities would continue on Federal and non-federally administered lands.

Figure 5 displays the total volume of wood in cubic feet available for recruitment to streams from trees greater than 20" DBH and 30" DBH. They are also presented at 20-year intervals under several thinning and no action scenarios. Thinning stands age 30–60 to 35–45 RD results in an increase of 3–6 percent of total wood from trees greater than 20” DBH, and 19–32 percent more from trees greater than 30” DBH compared to no action. This is important because a 30” DBH tree produces approximately three times the number of logs over 20” in diameter than a 20” DBH tree which ensures the development of stable wood with no net loss of trees greater than 20” DBH over time. In stands aged 70–80, there is an increase of 11 percent total wood from trees over 30” DBH at a cost of 4 percent reduced total wood from trees over 20” DBH. For example, just 20 years after thinning a 30–40-year-old stand, Outer Zones attain approximately 300 more cubic feet of wood in trees greater than 20” DBH than compared with the No Action, and over time a greater proportion is coming from trees over 30” DBH when thinning to 35–45 RD has occurred.[10] Refer to the discussion in Issue Question 6 for more context on the development of stable wood.

[10] Adapted from McArdle et al., The Yield of Douglas-fir in the Pacific Northwest, USDA Technical Pulletin 201, 1961.

Figure 5: Total cubic feet of wood from trees greater than 20” and 30” DBH, presented at 20-year intervals, at six thinning intensities in 30–40, 50–60, and 70–80-year-old stands.



In summary, the No Action Alternative would not promote the development of complex, multi-cohort stands, and open grown trees found in high-quality northern spotted owl nesting habitat, and regeneration as described in the Management Direction (USDI-BLM 2016b, p. 66). While thinning RR outer zones to 35–45 RD would ensure the development of stable wood in stands age 30–60 compared to no action, this clear net gain is not present in stands age 70–80.

Alternatives 2 and 3

Direct, Indirect, and Cumulative Effects

The BLM would use the following elements in Error! Reference source not found. for analysis when discussing effects.

Table 6: Core elements of the action alternatives that drive the vegetation effects analysis.

Alternative 2: Proposed Action Alternative	Alternative 3: Scoping-derived Alternative
• Treat stands ages 30–80 • LSR age 30–60 and RR in Class II and III: target RD 20–30 • LSR age 70–80 and RR in Class II and III: target RD 30–40 • RR in Class I age 30–60: target RD 35–45 • Group selection openings up to 4 acres, comprising no more than 25% of the stand area where appropriate*	• Treat stands ages 30–70 • All LSR and RR Class II and III ages RD 40–45 • No commercial thinning in RR Class I watersheds • No group selects greater than 0.25 acre

* Examples include alder and other hardwood-dominated areas of previously managed stands; insect and disease damaged areas where a site appropriate alternative tree species such as western redcedar, is more resistant to the damage; stands where existing trees are unlikely to develop into large, >30" DBH trees because of tree form and lack of windthrow risk. This condition includes tree height: diameter ratios greater than 80:1, and poor crown ratios less than 20 percent.

After several FVS modelling efforts of the sampled stand exams, and field review of the Coos Bay DMS sites as described in **Appendix C**, the BLM achieved the stand conditions that most closely resemble those identified in **Table 1**. Conditions for late-successional forests in the central coast range of Western Oregon through thinning from below to 20–30 RD at variable densities with group selection in younger stands (age 30–60). These sampled stands are already within the zone of competition mortality, and when an even-aged stand grows for many years, mortality occurs and individual tree growth is reduced compared to the growth rates found in open growing conditions (Drew and Flewelling 1979; Tappeiner et al. 2007, p.124). Trees growing in such dense conditions continue to grow in height, but little in diameter and the risk for windthrow increases over time as height to diameter ratios continue to increase and crown ratios decrease (Oliver and Larson 1996, p. 75; O'Hara 2014, p. 100). Because the stands are comprised of a single cohort of trees, smaller trees in the stands tend to be suppressed stems rather than new recruitment. This was not always the case in the stands from 70–80 years old, which occasionally displayed hardwood recruitment and small inclusions of younger trees which would be retained to promote vertical continuity. This difference in stand condition is a result of past management practices. Even-aged stands established in 1940–1950 were the result of aerial seeding, seed tree or shelterwood systems rather than the systematic planting of nursery stock and stand maintenance practiced in the following decades. The BLM has modelled the full range of allowable relative densities for all proposed stand age groups with the resulting stand composition and structure at 20–year intervals over 60 years in the tables in **Appendix C**.

These 70–80-year-old stands more closely attained the conditions described in **Table 1** following moderate thinning to 30–40 RD while allowing for the development of larger diameter snags and downed wood because they have already grown in overly dense conditions for several decades and they tended to benefit from moderate course corrections in general. For example, 30–60-year-old stands attain many of the key structural characteristics of nesting habitat 60 years following treatment when they are thinned heavily now. This is supported by classical Douglas-fir growth curves, which show that the period that trees have the greatest potential for rapid growth are from about age 20–60 (**Figure 4**). The heavy thinning with group selection openings allowed the stand to differentiate into multi-layered canopies and recruit new cohorts of trees, whereas the No Action retains an even-aged, single-story structure and dense canopies that restrict seedling recruitment. It is important to note that giant overstory trees may take centuries to develop, and thus do not appear within the 60-year modelling window. However, growing larger diameter overstory and midstory trees in the near term, (one to ten years) provides the opportunity for them to develop over time. **Table 7** below presents the desired tree per acre targets, and the FVS modelled outputs over 60 years. The results show that stands ages 30–-60 get the closest to the desired ranges 60 years post-treatment, while allowing for some additional stocking to account for mortality and disturbance that contributes desired snags and downed wood. Light thinning and no action result in over twice the desired mid-story density. Stands age 70–80 attain the desired condition by year 40 when thinned to 30–40 RD, while also allowing for some additional stocking to account for desired snag and downed wood recruitment over time. Heavy thinning in these older stands may reach the lower thresholds of these desired stand conditions but allows for little snag or down woods recruitment. Other stand metrics including canopy cover, basal area QMD, and RD are presented for these ages, years, and thinning intensities in **Appendix C**.

Table 7: This table presents the key nesting habitat metrics for Northern Spotted Owls at 20-year intervals compared to no action in 30–40-year-old stands.

30– 40-Year-Old Stands	**Year 20**		**Year 40**		**Year 60**	
Desired Stand Component	Mid-Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32–48” DBH (8–13 TPA Target)	Mid-Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32–48” DBH (8–13 TPA Target)	Mid-Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32–48” DBH (8–13 TPA Target)
20 RD	22	< 1	30	2	26	6
25 RD	23	< 1	36	2	34	5
30 RD	24	< 1	40	1	45	5
35 RD	24	< 1	41	2	50	4
40 RD	25	< 1	41	1	52	4
45 RD	25	< 1	42	1	52	4
No Action	23	< 1	41	1	51	3

Table 8: This table presents the key nesting habitat metrics for Northern Spotted Owls at 20-year intervals compared to no action in 50–60-year-old stands.

50–60-Year-Old Stands	**Year 20**		**Year 40**		**Year 60**	
Desired Stand Component	Mid Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32–48” DBH (8–13 TPA Target)	Mid Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32-48” DBH (8–13 TPA Target)	Mid Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32–48” DBH (8–13 TPA Target)
20 RD	25	1	25	3	22	7
25 RD	28	1	32	3	30	7
30 RD	30	1	39	3	38	7
35 RD	31	1	42	3	45	6
40 RD	31	1	44	2	49	6
45 RD	31	1	45	2	52	5
No Action	30	1	43	2	51	4

Table 9: This table presents the key nesting habitat metrics for Northern Spotted Owls at 20-year intervals compared to no action in 70–80-year-old stands.

70–80-Year-Old Stands	**Year 20**		**Year 40**		**Year 60**	
Desired Stand Component	Mid Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32–48” DBH (8–13 TPA Target)	Mid Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32-48” DBH (8–13 TPA Target)	Mid Story Conifer 21–32” DBH (8–22 TPA Target)	Overstory Conifers 32–48” DBH (8–13 TPA Target)
20 RD	15	5	12	8	10	10
25 RD	20	5	18	8	15	11
30 RD	25	5	25	8	22	11
35 RD	28	5	30	8	28	11
40 RD	31	5	33	8	33	11
45 RD	32	5	36	8	37	11
No Action	33	5	37	7	39	10

As shown in the above **Table 7 –Table** 9, the 30–60-year-old stands do not attain exactly the targets described by Poage and Tappeiner (2005) found in **Table 1**; however, the proposed treatments would take place within stand neighborhoods that include existing old growth with abundant large old trees as seen in **Figure 6** and **Figure 7** below. So, while individual treatment units may not achieve all benchmarks for late-successional forest in the central coast range, growth models indicate they will move towards the desired condition and improve connectivity and patch size among existing older stands. As shown in **Figure 6**, thinning the stand to lower relative densities early allowed the stand to develop a second cohort. The residual trees develop higher live crown ratios, and larger diameters relative to their heights when compared to no action or light thinning to 45 RD. As the younger stands develop following these treatments, they would serve to increase the patch size and continuity of existing habitat as described on pp. 42. Thinning in the Outer Zone of the riparian areas also increases the size of individual trees, and the greatest benefit is observed when stands are thinned before inter-tree competition and mortality occurs.

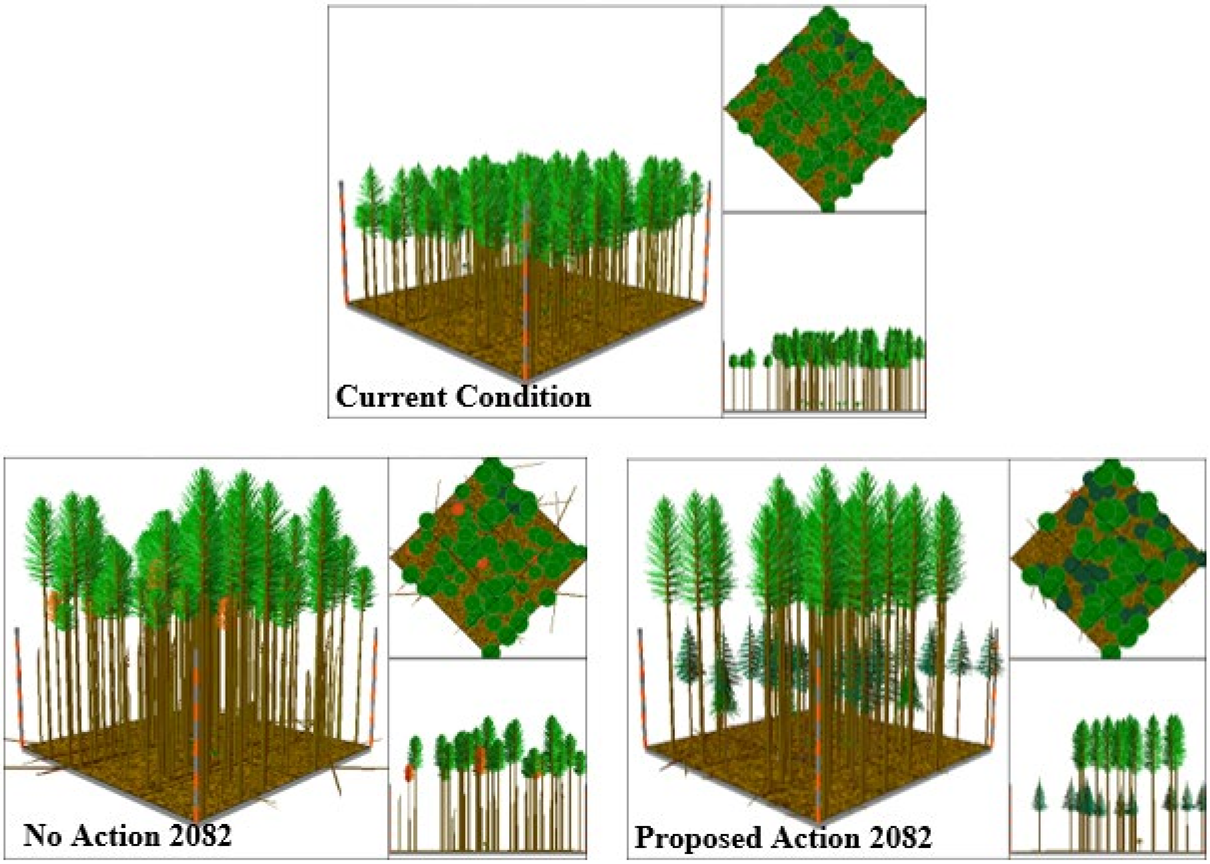


Figure 6: An example 40-year-old stand on the Coos Bay District modelled in FVS and the Stand Visualization System (SVS): Current Condition (top) The same 40-year-old stand after 60 years (total age 100) on the bottom left with no action and on the right under the proposed action.

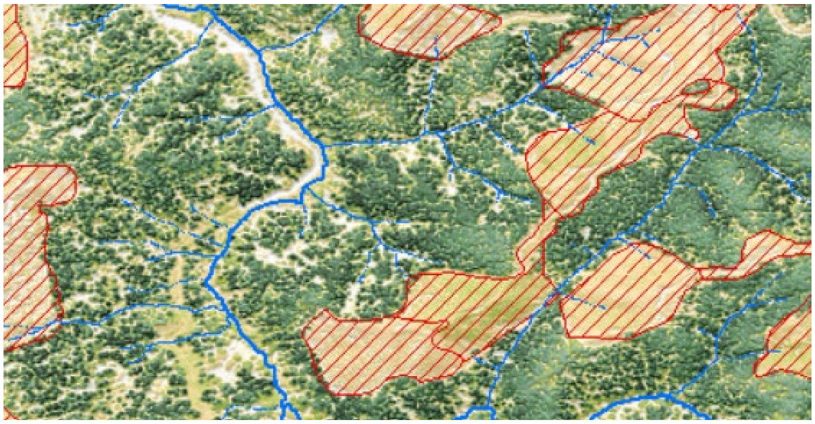


Figure 7: Young stands proposed for treatment are displayed in red crosshatching in this lidar-derived image.

The young stands in **Figure 8** are interspersed with older stands that already provide the desired conditions described for the LSR and RR. While individual treatment units may not achieve all benchmarks for late-successional forest in the central coast range that provides nesting habitat for spotted owls and murrelets, growth models indicate stand metrics would become much closer to the desired condition and improve connectivity and patch size among existing older stands.

Figure 8 depicts approximately 10 acres of forest, which underdoes a variable density thin and group selection harvest as described in the Proposed Action. Red crowns indicate competition induced mortality. The No Action Alternative appears visually similar to Alternative 3 in SVS overhead images do to the very light thinning from below, canopy cover maintenance, and avoidance of group selection.

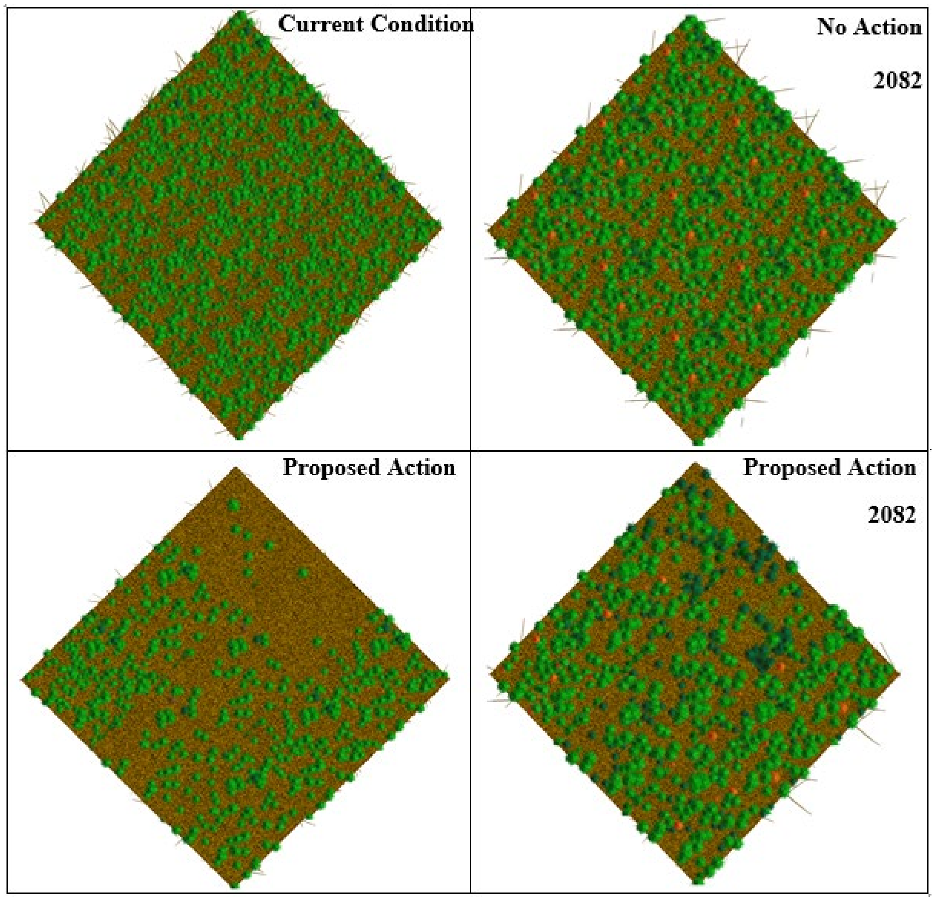


Figure 8: Stand Visualization System (SVS) overhead images of the No Action Alternative and the Proposed Action post-treatment and in 60 years.

In summary the direct and indirect effects of active management as described in the Alternatives 2 and 3, as opposed to the No Action Alternative are:

- A reduction in stand densities that promote growth and vigor; living vegetation expands in size and a tree diameter does not appreciably increase unless its growing space is increased through disturbance; residual trees would increase in diameter growth, including the diameter of the largest trees (Oliver and Larson 1996, p. 36; Tappeiner et al. 2007, p. 127).
- Tree species diversity would be increased, ensuring that RMP species diversity goals would be met (ROD/RMP 2016b, p. 66). This diversity in tree species and sizes is important for ecosystem function (Franklin et al. 2002).
- Short term risk of windthrow would be increased when thinning an even-age stand; however, windthrow occurs in both managed and unmanaged stands and low levels of windthrow is desirable for habitat objectives and stand complexity. The BLM designed silvicultural prescriptions to remove trees that are most susceptible, such as those with low vigor, poor crown ratios and those with high height to diameter ratios. Often 80:1 is used as a threshold, for example a 12” DBH tree at 85’ tall is more likely to fall over than a 12” DBH tree at 55’ tall (Worthington and Staebler 1962, p. 21; Moore et al. 2003; Wonn and O’Hara, p. 92; Tappeiner et al. 2007, pp. 129–130; O’Hara 2014). This is important because trees allocate resources to height growth before diameter growth, so in the absence of

disturbance (harvest, fire, etc.) resources become limited in a stand and the risk for windthrow increases as stability decreases (O'Hara 2014, p. 100).

- Selection of Alternative 2 would allow for up to 73,637 acres of previously managed stands in the LSR and Riparian Reserve Class II and III to attain many of the essential structural features of northern spotted owl and murrelet nesting habitat within 40 to 60 years. Additionally, selection of Alternative 2 would ensure that up to 16,534 acres of Class I Outer Zone Riparian Reserves develop stable wood. Alternative 3 would only allow for 7,368 acres to attain these NSO habitat features within 40 to 60 years because only the 70–year-old stands are projected to develop into near-habitat quality at high relative densities. The light thinning in younger stands was not sufficient to develop NSO habitat without potential subsequent thinning entries, which are beyond the scope of this project and were not proposed as part of Alternative 3. Alternative 3 represents a 90 percent decrease in potential habitat acreage within 40 to 60 years compared to Alternative 2.

Issue 2: What would the short-term and long-term effects of the alternatives be on the ability of the spotted owl to nest in the proposed action area?

Geographic Scale

Spotted owls are considered central place foragers, with a home range in which a pair's activities center around the nest site (Rosenberg and McKelvey 1999). Spotted owls' use of an area is inversely related to distance from the nest site (Rosenberg and McKelvey 1999). Spotted owls primarily occupy a 500-acre (0.5-mile buffer) core area around the nest tree. Their home range size relates to the primary prey in the area, with a 1.5-mile diameter home range in the Coast Region, where spotted owls primarily rely on flying squirrels and red tree voles (Zabel et al. 1995, Forsman et al. 2004, USDI-FWS 2011). These circular areas are commonly used for a simple measure of habitat availability at multiple, ecologically relevant scales. These circles provide a consistent method of predicting area use, but the BLM recognizes that actual spotted owl use is based on stand and landscape-level characteristics rather than simple circles Additionally, while this analysis focusses on development of old-growth NRF habitat, the BLM acknowledges that spotted owls' habitat use is more complex, with owls using a combination of older seral habitat and younger forest types (Franklin et al. 2000, Olson et al. 2004, Dugger et al. 2005).

For a variety of reasons, not all of the proposed units would be treated. Therefore, to show a reasonable example of units that the BLM is likely to treat, for this analysis the BLM used units that are under consideration for treatment in the first five years of implementation (hereafter example units). While these particular units may not be treated, they provide a reasonable approximation of the type and distribution of units that may be treated in a discrete timeframe. There are approximately 7,288 acres of example units in Alternative 2 and approximately 7,000 acres in Alternative 1.

Temporal Scale

For this analysis, the BLM modelled stand change for the three alternatives currently (time 0), and in 20, 40, and 60-years post-treatment. The BLM used this timeframe because 20-year intervals allow sufficient time for changes to be measurable. The BLM did not include a longer timeframe because model accuracy decreases beyond 60 years. Spotted owls have been documented to nest in stands as young as 46 years old with remnant trees present, and in trees as young as 41 years old with cavities or other appropriate structure (Irwin et al. 2000). However, they more often nest in trees older than 120 years in stands at least 100 years old (e.g., Irwin et al. 2000, Dugger et al. 2005). The stands proposed for treatment are 30–80 years old for Alternative 2 (30–70 years old for Alternative 3), so some of the stands, especially the older ones, are old enough to develop into NRF habitat within the 60-year timeframe.

Analytical Assumptions

The BLM assumed that home ranges need a minimum of 40 percent NRF, and cores need a minimum of 50 percent NRF for successful spotted owl reproduction (summarized in USDI-USFWS 2009, USDI-USFWS 2011).

Andrews et al. (2005) modelled the development of NRF habitat in stands 50 and 80 years old using a variety of thinning prescriptions out to when the stands were 160 years old. Their modelling showed that treatment, including heavy thinning, multiple thinning's, and planting to promote multistory development and species diversity, would result in NRF development by the time treated stands were 160 years old. By comparison, their modelling concluded that without stand-level disturbance, untreated plantations would not develop into NRF habitat in this timeframe.

BLM's modelling suggests that some sort of external disturbance would need to occur to change the trajectory of the dense, managed stands to promote the stand diversity necessary to develop open grown trees and a multi-story canopy with multiple species. The BLM acknowledges that some areas would experience disturbance events, ranging from individual trees falling to stand level events like snow-down, that would allow more complex stand conditions to develop. However, without treatment, these stochastic events would be uneven, and generally very small in scale.

In a study of 3,673 plots on U.S. Forest Service land in Oregon and Washington from the mid-1990s to the mid-2000s, researchers found that in wet Douglas-fir zones, tree mortality was less than 0.5 percent annually (Reilly and Spies 2016). This suggests that without external disturbance, stands would not naturally thin but would continue to develop in overstocked conditions. While there would be disturbance events that change the trajectory of some stands or portions of stands, these events are likely to be small and scattered, not resulting in widespread NRF development in the 60-year timeframe of the analysis.

For this analysis the BLM assumed that none of the example stands are already NRF habitat or are already developing NRF characteristics. Prior to final selection, BLM wildlife biologists would field-evaluate all stands to determine whether they would benefit from treatment or are already on a trajectory to become NRF without treatment, but this has not yet occurred for most of the example units. Characteristics that would indicate whether stands are already on a trajectory to become NRF include development of a second story, diversity in stand structure including some areas of open grown trees, and species diversity.

Analytical Methods

The BLM modelled how many acres of the example units would become NRF habitat at 20-year intervals out to 60 years for each of the three alternatives. The BLM also modelled NRF development outside of the proposed units based on data from Davis et al. (2022b) and subsequent analysis that quantified its relationship to BLM stand age data. For this analysis, the BLM assumed that at least 50 percent of the core and 40 percent of the home range must be in NRF habitat to support a successful reproductive pair (summarized in USDI-USFWS 2009, USDI-USFWS 2011). The BLM acknowledges that the actual amount of area necessary for spotted owls to be able to reproduce is dependent on pair experience and territory quality, but using these numbers gives a metric to evaluate differences between the proposed treatments.

To determine whether the example units would develop into NRF habitat within the 60-year analysis timeframe, the BLM used the Forest Vegetation Simulator (FVS) model to show whether the units would develop characteristics of NRF such as a defined mid-story and overstory layer as described in Poage and Tappeiner II (2005) for the three alternatives (see **Figure 8** and Issue 1).

To determine which of the other stands within the 1.5-mile analysis area may develop into NRF in the next 60 years, the BLM developed a logarithmic regression equation that quantified the relationship between nesting/roosting cover type suitability data from Davis et al. (2022b) and BLM stand age data to model how stands would develop at 20-year intervals out to 60-years. For each stand, the BLM applied the regression to stands ≥ 70 years of age today to adjust the nesting/roosting cover type suitability value from Davis et al. (2022b) at each time step to predict its habitat status in the future. Stands ≥ 70 years of age are typically of natural origin and could be predicted to develop along a natural trajectory reflected in the current cover type data from Davis et al (2022b). Younger stands typically developed from dense plantations and are on a different developmental trajectory. BLM modelling does not show the stands ≤ 60 developing into habitat within the 60-year analytical time frame.

For all stands, the BLM assumed that once the model identified a stand as NRF it would continue to function as NRF throughout the modelling timeframe. The BLM assumed any habitat currently on private lands or HLB would not develop into NRF since it would be unlikely to persist into the 20–60-year time steps given current management practices. Current habitat on state lands was modelled to persist into the future with no additions or subtractions at future time steps given the uncertainty of future management actions on the Elliott State Forest.

The BLM then ran a moving window analysis to identify how many acres were in areas with both 50 percent NRF within a 0.5-mile core-scale window and 40 percent NRF within a 1.5-mile home range-scale window for each alternative for each time period. These acres show where there are "good neighborhoods" that contain sufficient habitat in the core and home range areas around them to support reproductive spotted owls. The BLM evaluated differences between the proposed alternatives by comparing the number of acres in "good neighborhoods" across the 60-year analysis time period.

Affected Environment

The BLM evaluated all stands within a 1.5-mile buffer around the example units. There are approximately 7,300 acres in the example units in Alternative 2 (7,000 acres in Alternative 3) and 160,640 acres in a 1.5-mile buffer around the units. As shown in **Table 10** , there are currently 5,452 acres in a 1.5-mile analysis area around the example units with at least 50 percent NRF at the core scale and 40 percent NRF at the home range scale.

Table 10: Acres within the 1.5-mile analysis area which have at least 50 percent NRF at the 0.5-mile core scale and 40 percent NRF at the 1.5-mile home range scale for each alternative currently (year 0) and at 20-year intervals out to 60-years post-treatment.

Years Post-Treatment	Alternative 1 Acres	Alternative 2 Acres	Alternative 3 Acres
0	5,452	5,452	5,452
20	5,820	5,820	5,820
40	6,092	6,101	6,101
60	6,093	11,083	6,103

<u>*Environmental Effects*</u>

Alternative 1

Direct, Indirect, and Cumulative Effects

In 20 years, the number of acres in "good neighborhoods" would increase to 5,820 acres. At 40 years post-treatment, the number of acres would increase to 6,092, with essentially no increase after 60 years (6,093 acres) (**Table 10**).

Alternative 2

Direct, Indirect, and Cumulative Effects

As shown in **Table 10**, there are currently 5,452 acres in the 1.5-mile analysis area with at least 0.5 percent NRF at the core scale and 40 percent NRF at the home range. In 20 years, the number of acres in "good neighborhoods" would increase to 5,820 acres. At 40 years post-treatment, the number of acres would increase to 6,101, with a substantial increase to 11,083 acres after 60 years.

Alternative 3

Direct, Indirect, and Cumulative Effects

As shown in **Table 10**, there are currently 5,452 acres in the 1.5-mile analysis area with at least 50 percent NRF at the core scale and 40 percent NRF at the home range. In 20 years, the number of acres in "good neighborhoods" would increase to 5,820 acres. At 40 years post-treatment, the number of acres would increase to 6,101, with essentially no increase after 60 years (6,103 acres).

Conclusions

Direct, Indirect, and Cumulative Effects

As seen in **Table 10**, none of the alternatives show much differentiation through year 40 post-treatment. Since the conditions that result in NRF development take decades to develop, this slow response is not surprising. By year 60, modelling shows that if Alternative 2, were selected, the landscape would have almost twice the acres in areas with at least 50 percent of the 0.5-mile core-sized circle and 40 percent of the 1.5-mile home range sized circle surrounding them in NRF habitat compared with either Alternative 1 or Alternative 3. The analysis presented for Issue 1 shows how trees and stands would respond to proposed treatments, with the heavier treatments and larger gaps/group selects of Alternative 2 promoting the development of key attributes of spotted owl habitat on more acres and in shorter time. Analysis presented in this issue shows how those tree and stand-level effects synergize with existing and other developing habitat outside of the units through time to create landscape effects at scales meaningful for NSO. Treatments proposed in Alternatives 2 or 3 would accelerate development of NRF habitat compared with Alternative 1, and therefore would not preclude or delay NRF habitat development by more than 20 years.

While the BLM has not identified which stands would be treated beyond five years, the proposed treatments would be similar for all units, and thus the treated units would develop into NRF at the same rate, with some variation depending on the age of stands treated annually. Therefore, over time, the trends described here are likely to be similar for the three alternatives as shown here for the example units. While the BLM is only considering approximately 7,300 acres for the first five years of sales, the BLM may treat up to 2,000 acres per year. If that many acres were treated, proportionately more acres would be in areas capable of supporting spotted owl successful reproduction.

Issue 3: How would the alternatives affect the spotted owl critical habitat within the action area?

Geographic Scale

The USFWS designated spotted owl critical habitat in 1992 (57 FR 1796) and updated it in 2008 (73 FR 47326), 2012 (77 FR 71876), and 2021 (86 FR 62606). There are currently 9,571,189 acres of designated critical habitat in California, Oregon, and Washington. The USFWS identified four primary goals of the critical habitat units; 1) to create a network that provides habitat to support spotted owl populations across the range as well as within each recovery unit; 2) to ensure population distribution across the range of habitat conditions used by the species; 3) to incorporate uncertainty, including potential effects of barred owls, climate change, and wildfire risk; and 4) recognizing that the critical habitat protections are intended to work together with other recovery actions.

The entire proposed unit pool overlaps 64,993 acres of the Oregon Coast Range critical habitat Unit 2 (**Figure 9**, **Table 11**). Proposed units overlap subunit ORC-3 (14,118 acres), ORC-5 (21,555 acres), and ORC-6 (29,320 acres). These subunits include approximately 462,170 acres in Coos, Douglas, and Lane Counties, Oregon. Within Unit 2, the USFWS recommends managing for "large, continuous blocks of late-successional forest," and "in areas that are not currently late-seral forest or high-value habitat and where more traditional forest management might be conducted (e.g., Harvest Land Base), these activities should consider applying ecological forestry prescriptions." The BLM used both principles in identifying the proposed unit pool and designing prescriptions.

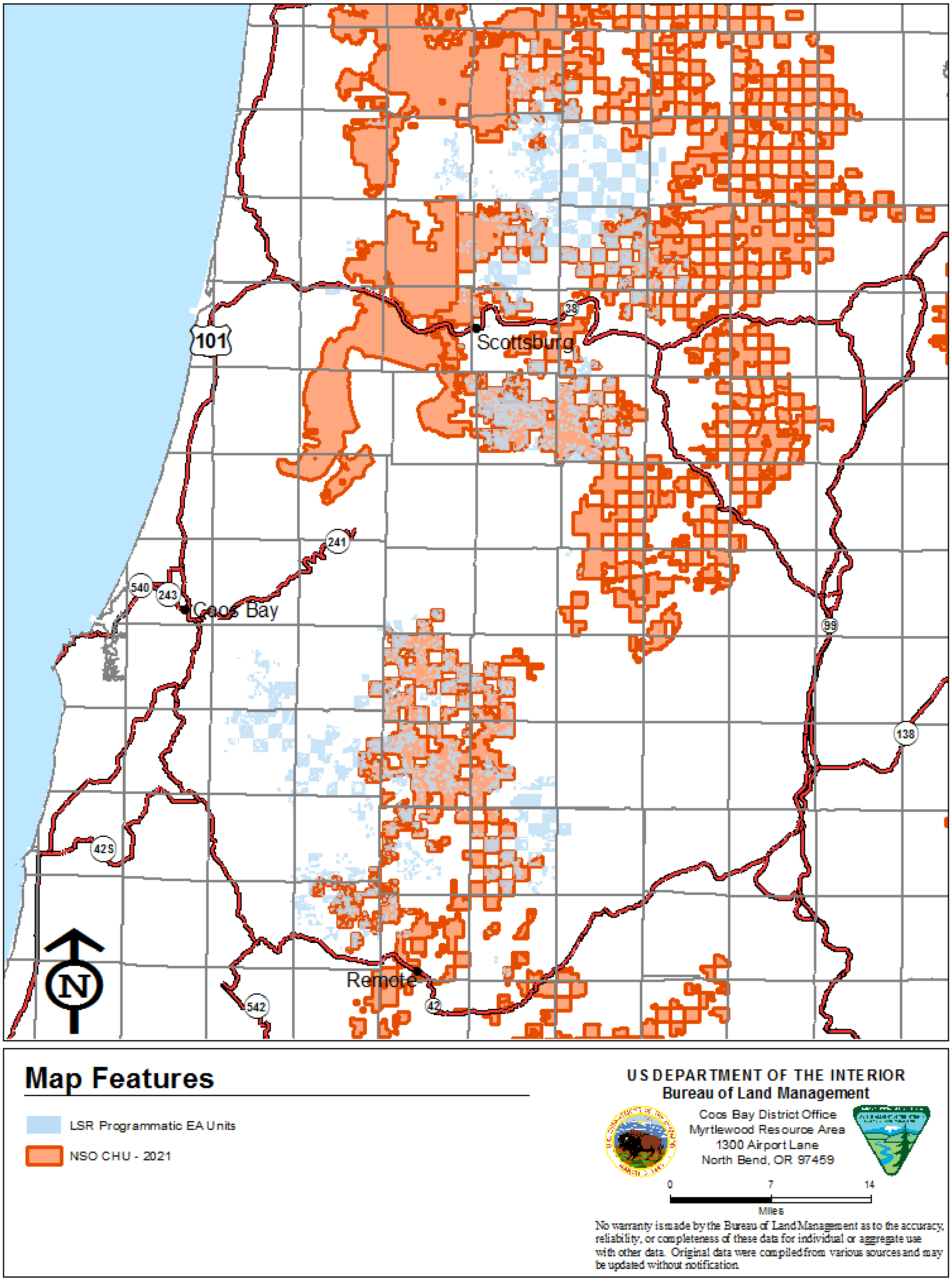


Figure 9: Proposed unit pool and spotted owl critical habitat.

Table 11: Spotted owl critical habitat sub-units overlapping the entire unit pool of proposed harvest units.

Critical Habitat Unit-Subunit*	Acres
ORC-3	14,118
ORC-5	21,555
ORC-6	29,320
Grand Total	**64,993**

*All the subunits are in the Oregon Coast Range unit**.**

As discussed in Issue 2, since not all of the proposed units would be treated. Therefore, to show the effects in a discrete timeframe, the BLM only evaluated the modelled outcomes on the example units. For critical habitat, the BLM only evaluated the changes to habitat in the example units. The example units include 5,062 acres of critical habitat in Alternative 2 (4,899 acres in Alternative 3), none of which are currently NRF habitat.

<u>Temporal Scale</u>
The BLM evaluated the proposed action immediately post-project, and at 20-year intervals out to 60-years post-treatment. See Issue 2 for a discussion of the timeframe.

<u>Analytical Assumptions</u>
The assumptions discussed in Alternative 2 are the same for this alternative.

<u>Analytical Methods</u>
The BLM used the same FVS modelling described in Issue 2 for within the proposed units.

<u>Affected Environment</u>
The proposed treatment example units are in the Oregon Coast Range critical habitat unit, within both subunit ORC 3, and subunit ORC 5. For simplicity, we combined both subunits to evaluate change under each of the three alternatives as shown in **Table 11**.

Table 11: Acres in Critical Habitat in the example units and modelled NRF development at 20-year increments modelled out to 60 years. All units are in the Oregon Coast Range Critical Habitat Unit.

	Critical Habitat Subunit	Total Acres	Year 0 Acres NRF	Year 20 Acres NRF	Year 40 Acres NRF	Year 60 Acres NRF
Alternative 1*	OCR 3	979	0	0	0	0
	OCR 5	4,083	0	0	0	0
Alternative 2	OCR 3	979	0	0	0	979
	OCR 5	4,083	0	0	337	4,083
Alternative 3	OCR 3	979	0	0	0	0
	OCR 5	3,920	0	0	174	174

*BLM analyzed Alternative 1 using the larger footprint of Alternative 2.

<u>Environmental Effects</u>

Alternative 1—No Action

Direct, Indirect, and Cumulative Effects
Under Alternative 1, modeling shows none of the critical habitat in the units proposed for treatment in the first 5 years would develop into NRF even after 60 years (**Table 11**). As discussed in Issue 2, while some portions of individual units may experience site-specific events that would develop into NRF, this is unlikely to occur at a large scale and would be unlikely to result in changes at the stands in the 60-year analysis period.

Alternative 2—Proposed Alternative

Direct, Indirect, and Cumulative Effects
Under Alternative 2, modelling shows none of the units in critical habitat would have developed into NRF by year 20. By year 40, 337 acres in subunit ORC 5 would have developed into NRF, and by year 60 post-treatment, 979 acres of ORC 3 and 4,083 acres of ORC 5 would have developed into NRF (**Table 11**).

Alternative 3—Scoping-Derived Alternative

Direct, Indirect, and Cumulative Effects
Under Alternative 3, modelling shows none of the units in critical habitat would have developed into NRF by year 20. By year 40, 174 acres in subunit ORC 5 would have developed into NRF, with no additional acres developing into NRF by year 60 (**Table 11**).

Conclusions:
As seen in Table A, none of the example units in critical habitat would develop into NRF until 40-years post treatment. By 60 years post treatment, all of the units in critical habitat would have developed into NRF under Alternative 2, compared with 174 acres if Alternative 3 were implemented. None of the example units in critical habitat would develop into NRF under the no-action alternative (Alternative 1).

Issue 4: What would the short-term and long-term effects of the alternatives be on the ability of the marbled murrelet to nest in the proposed project area?

Geographic Scale
Proposed treatment units are located approximately 5–37 miles from the Pacific Ocean (**Figure**). Approximately 122,000 acres (99 percent) of the units are within Management Zone 1, which extends from the coast to approximately 35 miles inland. The majority of murrelets nest in Management Zone 1 (USDI-BLM 2016a).

As discussed in Issue 2, not all of the proposed units will be treated. Therefore, the BLM used example units (the units under consideration for the first five years of sale) to show a reasonable approximation of the type and distribution of units that may be treated in a discrete timeframe. There are approximately 7,300 acres of example units. The BLM used a 0.25-mile buffer around the example units to evaluate effects. This distance is the distance the survey protocol recommends surveys extend if there is continuous habitat (Evans, Mack, et al. 2003). It is also the maximum disturbance distance for most of the activities associated with timber sales (**Table 40**). The disturbance distance is the distance from the project boundary outward beyond which the effects to listed species from noise, human intrusion, and mechanical movement are discountable or insignificant.

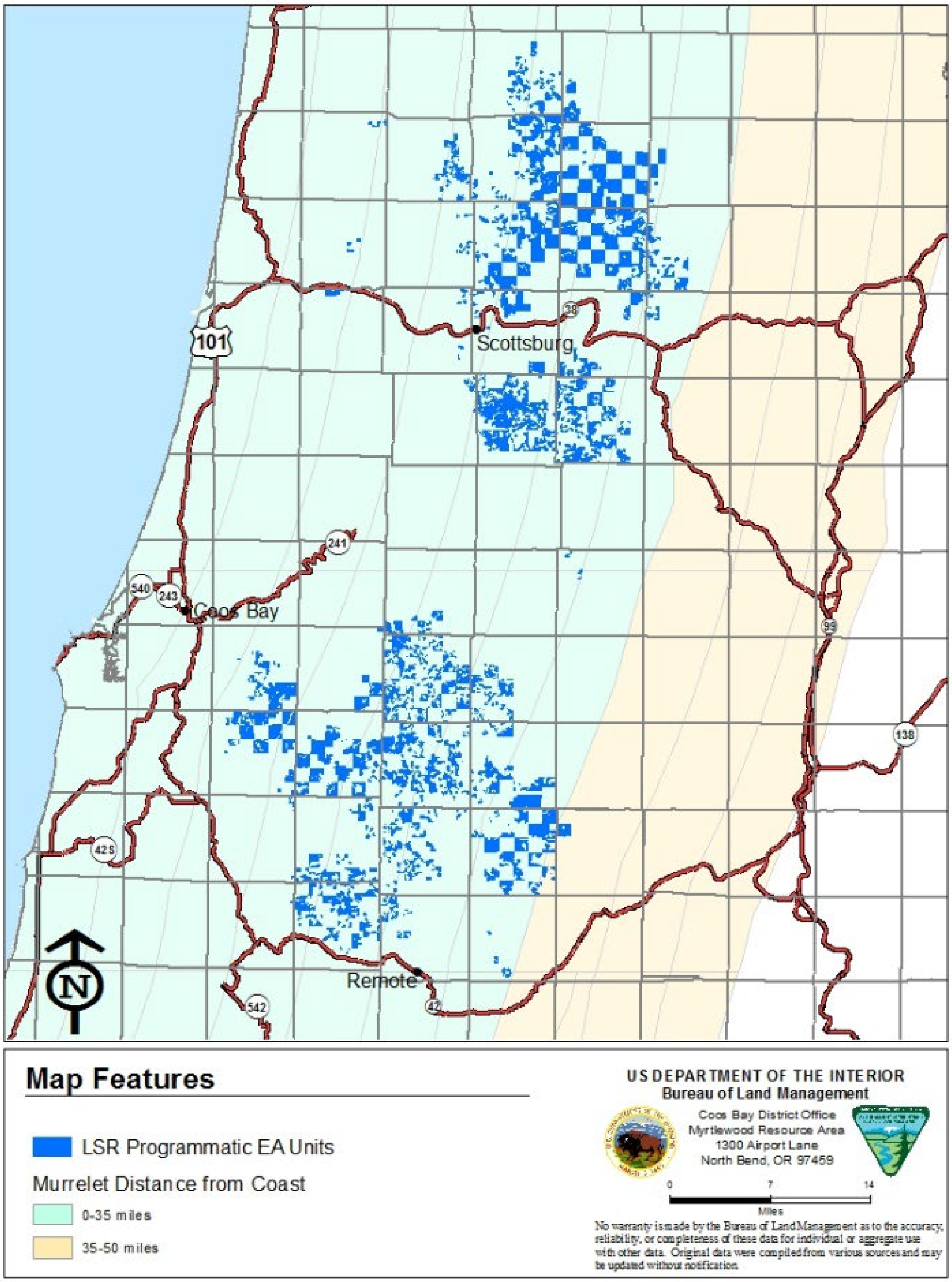


Figure 10: Proposed treatment units and distance from ocean.

Temporal Scale
The BLM evaluated the alternatives currently, and at 20-year intervals out to 60-years post treatment. As discussed above, the BLM evaluated out to the 60-year timeframe because model accuracy declines after this timeframe. Since large trees with branches suitable for murrelet nesting take decades to centuries to develop (Hershey 1998), the BLM focused on the 60-year timeframe in the murrelet analysis as the earliest time when murrelet trees might begin to be available in the oldest stands.

Analytical Assumptions
While the BLM acknowledges that the trees with structures and other features sufficient for murrelet nesting may not develop in the 60-year timeframe of this analysis, habitat identified as NRF has large trees that are likely to develop murrelet nesting structure more quickly than areas not identified as NRF in that timeframe. Variable density thinning with gaps, has been shown to promote development of the large, open grown trees that support nesting by both species (Poage and Tappeiner 2002, Harrington et al. 2005, Roberts and Harrington 2008). Therefore, assumptions described in Issue 2 also apply here.

For this analysis, the BLM evaluated murrelet nesting needs at three scales: stand, tree, and nest platform. As discussed below, the literature demonstrates that all three scales are important in murrelet nest site selection.

As discussed in the BA, incorporated by reference (Aron 2022, pp. 64–67), murrelets preferentially nest in areas with high percentages of suitable habitat and in stands with other nesting murrelets (Wilk et al. 2016, Raphael et al. 2018, Meyer et al. 2002). In the recovery plan and Critical Habitat designation, the USFWS recommended decreasing fragmentation to improve murrelet reproductive success (USDI-USFWS 1997, USDI-USFWS 2016).

Across the species' range, studies consistently report that murrelets select mature and old growth stands, or in some cases stands which were harvested and are dominated by younger trees but in which many remnant trees remain (Manley 1999, Nelson and Wilson 2002, Baker et al. 2006, Hamer et al 2008, Silvergieter and Lank 2011). Several studies suggest that murrelets selectively nest in areas with more interior habitat compared with availability (Raphael et al. 2018), suggesting that blocks of habitat are important for murrelet nesting. Nelson and Hamer (1995b) summarized stand size where nest trees were found. The average stand size was 1,418 acres (574 hectares (ha), range 7-4,201 acres, 3-1,700 ha), with the average stand size of unsuccessful nests 1,539 acres (623 ha), and of successful nests 1,315 acres (532 ha). (Note: for these calculations the BLM removed duplicates of stands that were reported for multiple years, so each stand is only represented once.) Minimum stand size was approximately 7 acres. This nest was not successful. The minimum stand size with documented nesting in the literature was a 5-acre (2 ha) stand, although the mean in that study area was much higher at 509 acres (206 ha) (Manley 1999). The study did not report whether the nest was successful.

Analytical Methods
The BLM evaluated potential effects of the three alternatives on the murrelet's ability to nest by evaluating the change in the amount of interior habitat in a 0.25-mile buffer around the units under consideration for treatment in the first five years (example units as discussed in Issue 2). The BLM used the same FVS model described in Issue 2 to model which of the example units would develop

into NRF within the 60-year timeframe. The BLM also used the same analysis based on the modeling from Davis et al. 2022b described in Issue 2 to identify which stands outside of the example units but within the 0.25-mile analysis area would develop into NRF habitat.

To evaluate increasing block size/decreasing fragmentation, the BLM evaluated how much interior habitat there was 60 m (197 ft) from the edge of a suitable nesting stand at 20-year intervals in the 60-year timeframe for the example units. The BLM selected 60 m based on Lorenz et al. (2021), which concluded that nests are most susceptible to depredation and nest failure within 60 m of edge and that the microclimate effects on moss have diminished after about that distance (van Rooyen et al. 2011).

For this analysis, the BLM defined edge as the edge of a stand mapped as suitable murrelet habitat.

<u>Affected Environment</u>
The BLM evaluated all stands within a 0.25-mile radius around the example units. There are approximately 7,288 acres of example units in Alternative 2 (7,000 acres in Alternative 3), and 23,830 acres total within the 0.25-mile buffer. Currently, there are 5,770 acres of murrelet nesting habitat within the action area. Of these, 3,041 acres are interior acres, i.e., at least 60 m from the nearest edge as shown in **Table 12**.

Table 12: Acres of suitable murrelet nesting habitat in the 0.25-mile analysis area and in blocks of interior habitat (at least 60 m from the nearest edge) under current conditions (year 0) to 60-years post treatment.

	Alternative 1		**Alternative 2**		**Alternative 3**	
Years Post-Treatment	**Total Suitable Acres in 0.25-Mile Buffer**	**Interior Habitat Acres**	**Total Suitable Acres in 0.25-Mile Buffer**	**Interior Habitat Acres**	**Total Suitable Acres in 0.25-Mile Buffer**	**Interior Habitat Acres**
0	5,770	3,041	5,770	3,041	5,770	3,041
20	5,827	3,121	5,827	3,109	5,827	3,121
40	5,904	3,154	6,461	3,418	6,187	3,294
60	5,905	3,154	13,145	9,456	6,187	3,294

<u>*Environmental Effects*</u>

Alternative 1—No Action
Direct, Indirect, and Cumulative Effects
If the BLM selected Alternative 1, the number of acres of suitable habitat within the 0.25-mile analysis area would increase to 5,827 acres in 20 years and to 5,904 acres in 40 years, with essentially no change after 60 years (**Table 12**).

The number of acres of interior habitat show a similar pattern, with an increase to 3,121 acres after 20 years, and to 3,154 acres after 40 years, with no additional increase after 60 years.

Alternative 2—Proposed Alternative
Direct, Indirect, and Cumulative Effects
If the BLM selected Alternative 2, the number of acres of suitable habitat within the 0.25-mile analysis area would increase to 5,827 acres in 20 years and to 6,461 acres in 40 years. After 60

years, the number of acres in the analysis area would more than double, to 13,145 acres (**Table 12**).

The number of acres of interior habitat show a similar pattern, with an increase to 3,121 acres after 20 years, and to 3,154 acres after 40 years, and with a three-fold increase to 9,456 acres after 60 years.

Alternative 3—Scoping-Derived Alternative
Direct, Indirect, and Cumulative Effects
If the BLM selected Alternative 3, the number of acres of suitable habitat within the ¼ mile analysis area would increase to 5,827 acres in 20 years and to 6,187 acres in 40 years, with no increase after 60 years (**Table 12**).

The number of acres of interior habitat show a similar pattern, with an increase to 3,121 acres after 20 years, and to 3,294 acres after 40 years, with no additional increase after 60 years.

Conclusions
Direct, Indirect, and Cumulative Effects
As seen in **Table 12**, none of the alternatives show much differentiation through year 40 post-treatment. Since the conditions that result in NRF or murrelet habitat development take decades to develop, this slow response is not surprising. By year 60, modelling shows that if the BLM selected Alternative 2, there would be more than twice as much suitable nesting stands at the 0.25-mile analysis scale and about three times as much interior habitat compared with Alternative 1 or Alternative 3.

The analysis presented for Issue 1 shows how trees and stands would respond to proposed treatments, with the heavier treatments of Alternative 2 promoting the development of larger trees and presumably larger limbs for nest platforms on more acres and in a shorter time compared with the other two alternatives. Analysis presented in this issue shows how those tree and stand-level effects synergize with developing habitat outside of the units through time to create interior habitat conditions that would be attractive for nesting murrelets and improve nest success since they are in larger patches.

While the BLM has not identified which stands would be treated beyond five years, the proposed treatments would be similar for all units in the entire unit pool. Therefore, the BLM reasonably concludes that the treated units would develop into suitable habitat at the same rate, with some variation depending on the age of stands treated annually and their specific location. While the BLM is only considering approximately 7,288 acres for the first five years of sales, the BLM may treat up to 2,000 acres per year. If more acres annually were treated, proportionately more acres would develop into suitable nesting habitat and interior stands.

Issue 5: How would the alternatives affect murrelet critical habitat within the action area?

Geographic Scale
The USFWS designated marbled murrelet critical habitat in 1996 (61 FR 26257) and revised it in 2008 (73 FR 44678), 2011 (76 FR 61599), and 2016 (81 FR 51348). There are approximately

3,698,100 acres of critical habitat total in Washington, Oregon, and northern California. Critical habitat includes areas with the physical and biological features necessary to support nesting, as well as areas that are currently unsuitable, but with the potential to become suitable in the future (USDI-BLM 2016a).

The action area of all the proposed units lies within critical habitat units OR-04 and OR-06 within numerous subunits as shown in **Table 13**, located in Coos and Douglas Counties, OR (**Figure 11**).

Table 13: Murrelet critical habitat units overlapping all the proposed harvest units

Critical Habitat Unit-Subunit	Total Acres
OR-04-c	4,872
OR-04-d	8,097
OR-04-e	13,965
OR-04-g	6,291
OR-04-i	1,364
OR-06-b	22,027
OR-06-d	2,628
Grand Total	**59,245**

In the Critical Habitat Designation (81 FR 51348, 2016), the USFWS noted that because murrelets appear to find nesting stands through social interaction, newly suitable habitat in close proximity to occupied sites may be more likely to become occupied than spatially disconnected habitat. The BLM selected the proposed treatment areas in this document because they are part of large-block LSR, in some cases also connected to land managed by the Forest Service or to the Elliott State Forest. Therefore, the BLM designed the restoration efforts to create large blocks of habitat across the landscape to provide a high-quality nesting block.

As discussed in Issue 2, since not all of the proposed units would be treated. Therefore, to show the effects in a discrete timeframe, the BLM only evaluated the modelled outcomes on the example units. For critical habitat, the BLM only evaluated the changes to habitat in the example units. The example units include 4,268 acres of critical habitat in Alternative 2, none of which are currently NRF habitat.

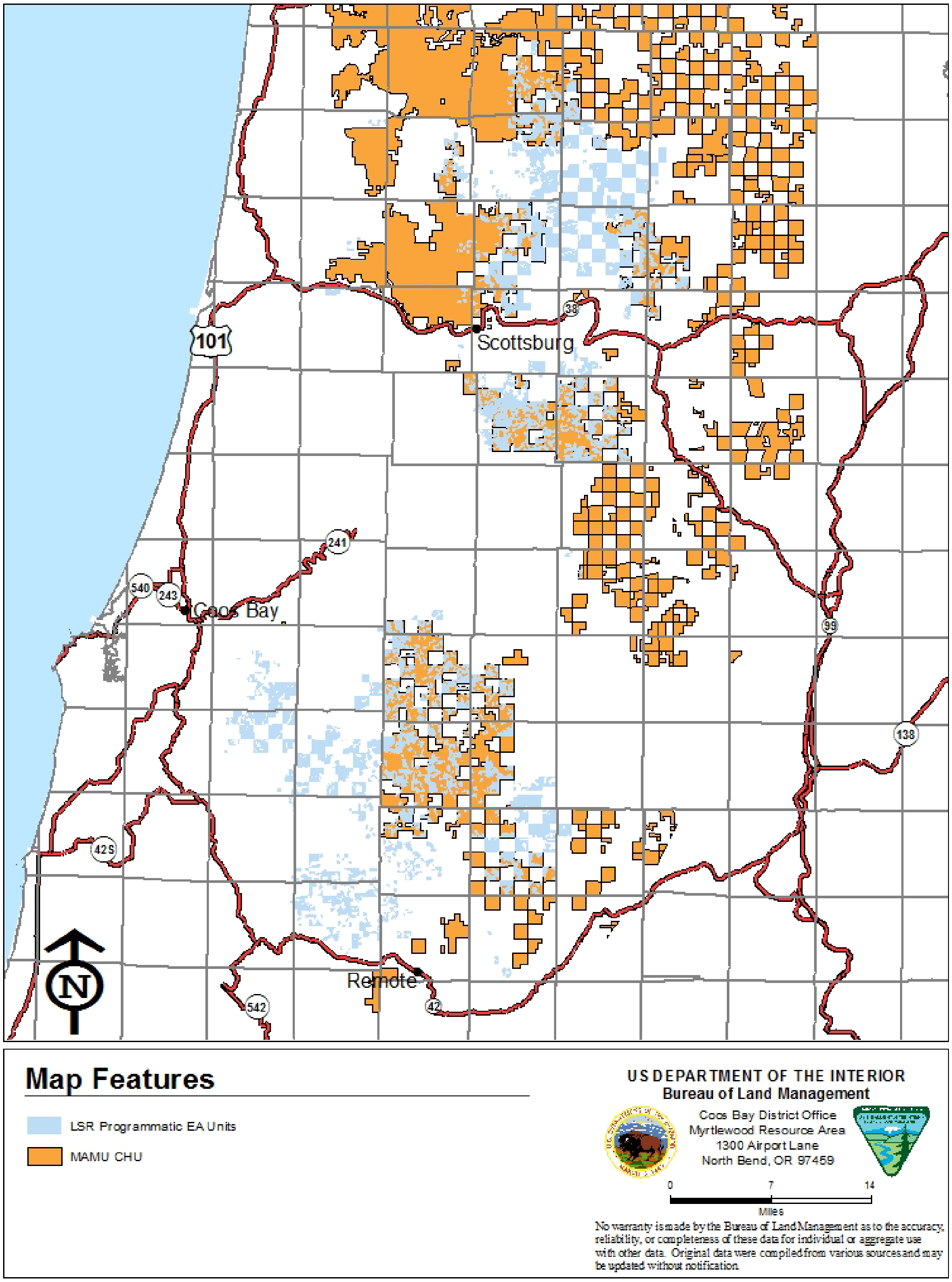


Figure 11: Murrelet critical habitat within the project area

Temporal Scale

The BLM evaluated the proposed action immediately post project, and at 20-year intervals out to 60-years post treatment. See Issue 2 for a discussion of the timeframe.

Analytical Assumptions
The BLM used the same assumptions discussed in Issue 3 to evaluate change in critical habitat.

Analytical Methods
The BLM used the same FVS modeling described in Issue 2 for within the proposed units.

Affected Environment
The example units are all in the Oregon critical habitat unit. They overlap murrelet critical habitat unit OR-04, subunits e and g as shown in **Table 14**.

Table 14: Acres in Critical Habitat in the example units and modelled NRF development at 20-year increments modelled out to 60 years. All units are in the Oregon Critical Habitat Unit.

	Critical Habitat Subunit	**Total Acres**	**Year 0 Acres NRF**	**Year 20 Acres NRF**	**Year 40 Acres NRF**	**Year 60 Acres NRF**
Alternative 1*	OR-04-e	4,203		0	0	0
	OR-04-g	65	0	0	0	0
Alternative 2	OR-04-e	4,203	0	0	175	4,203
	OR-04-g	65	0	0	0	65
Alternative 3	OR-04-e		0	0	0	0
	OR-04-g	65	0	0	0	0

*BLM analyzed Alternative 1 using the larger footprint of Alternative 2.

Environmental Effects

Alternative 1—No Action

Direct, Indirect, and Cumulative Effects

Under Alternative 1, none of the critical habitat in the units would develop into suitable murrelet nesting habitat even after 60 years (**Table 14**). As discussed in Issue 2, while some portions of individual units may experience site-specific events that would develop into suitable murrelet habitat, this is unlikely to occur at a large scale and would be unlikely to result in changes at the stands in the 60-year analysis period.

Alternative 2—Proposed Action

Direct, Indirect, and Cumulative Effects

Under Alternative 2, modelling shows none of the units in critical habitat would have developed into NRF by year 20. By year 40, 175 acres in subunit OR-04-e would have developed into suitable murrelet nesting habitat, and by year 60 years post-treatment, all 4,203 acres of OR-04-e and 65 acres of OR-04-g would have developed into NRF (**Table 14**).

Alternative 3—Scoping-Derived Alternative

Direct, Indirect, and Cumulative Effects

Under Alternative 3, modeling shows none of the critical habitat units would develop into suitable murrelet nesting habitat in the 60-year analysis timeframe. Because of the lighter thinning proposed in Alternative 3, smaller gap sizes, and exclusion of 80-year-old stands modeling does not show enough of a disruption for the large trees that murrelets require for nesting to develop.

Issue 6: How would the proposed vegetation management in the RR of Class I subwatersheds affect the stand's ability to provide stable wood in streams?

Geographic Scale

The geographic scale for this issue question includes 43 Class I subwatersheds (hydrologic unit code (HUC) 12), which consists of 47,778 acres found across the Coos Bay District. These are the Class I subwatersheds that have had units identified for treatment within this EA. There are 7,769 acres in Outer Zone RR in stands 30–60 years old considered for potential thinning in Class I subwatersheds. Sixteen percent of the total RR acres in Class I are proposed for treatment in the Outer Zone.

Temporal Scale

The temporal scale for analysis of this issue question matches that used in the forest vegetation modeling with intervals post-harvest of 0, 20, 40, and 60 years. The BLM completed modeling for this EA analysis using Forest Vegetation Simulator (FVS) with outputs displayed at intervals post-harvest of 0, 20, 40, and 60 years. The BLM used this timeframe because model accuracy decreases beyond 60 years and to better model long-term growth and change in species composition at 20-year intervals. This timescale is short enough to reflect the current need for larger trees in the RR stands, but long enough to reveal different outcomes among stand management approaches. The BLM used 20-year increments because this allows trends to emerge over periods long enough to observe change. Short-term as used in this analysis references 0–20 years. Long-term is 20–60 years.

Analytical Assumptions and Methods

This Issue Statement uses a general term "streams" which is the same terminology used in the RMP Management Direction for Class I RR. Within the Management Direction, streams are further broken down into fish-bearing, perennial, and intermittent streams (USDI-BLM 2016b p. 71–72). The term 'fish habitat or fish-bearing' includes the mapped upper extent of Chinook, Coho and steelhead distribution, and the mapped upper extent of Coho Critical Habitat. This mapping is inclusive of streams occupied by Endangered Species Act-listed fish and Bureau Sensitive fish on the BLM Oregon/Washington State Director's Special Status Species List (USDI-BLM 2021), Essential Fish Habitat for Coho and Chinook Salmon, and Coho Critical Habitat. The term 'stream' as used in this analysis includes fish-bearing, perennial, and intermittent streams.[11]

The Northwestern and Coastal Oregon ROD and RMP provides management direction for the Outer Zone of RR Class I subwatersheds to "[t]hin stands as needed to ensure that stands are able to provide trees that would function as stable wood in the stream" (USDI-BLM 2016b p. 71). The size of wood that can provide stable structure and contribute to habitat change varies by channel width (USDI-BLM 2016a, p. 283). The FEIS for the RMPs for Western Oregon found a 20" DBH

[11] An intermittent stream is a "non-permanent drainage feature with a dry period, normally for three months or more. Flowing water forms a channel feature with a well-defined bed and banks, and bed-forms showing annual scour or deposition, within a continuous channel network" (RMP/EIS USDI-BLM 2016a p. 296). A perennial stream is "a stream that typically has running water on a year-round basis. Their base level is at, or below, the water table" (ROD/RMP USDI-BLM 2016b p. 299).

tree can provide stable wood in most streams for the project area, and that discussion is incorporated here by reference (pp. 283–284). Beechie et al. (2000) determined size of functional wood as it relates to the width of active stream channels and for the size of most streams within the EA analysis area a 20” tree would be functional in a stream channel. Trees with a 20” DBH or greater need to be present in the RR to ensure a source of stable wood. The larger stable logs interact and capture smaller wood provided in the Inner and Middle Zones. Smaller wood, if not captured by larger wood, is flushed from streams during higher flow. Additionally, larger wood takes longer to decay and break down over time.

The analysis for this issue compares the proposed treatment in RR stands and how it would affect the stand’s ability to provide stable wood to stream channels and fish habitat. For this analysis, the Outer Zone is defined as 120’ from the edge of the stream to one site-potential tree height from the stream. The site potential tree height is a set distance by watershed (HUC 10). For the analysis area, the site potential tree heights range from 180’ to 240’ depending on watershed.

The FEIS established a tiered watershed approach and designated subwatersheds into Class I, II, or III. Class I subwatersheds includes a high density of High Intrinsic Potential (HIP) habitat for Chinook, Coho, and Steelhead and designated Critical Habitat (BA, USDI-BLM 2016). This issue statement is specific to the proposed thinning in RR stands in Class I subwatersheds.

Wood is an important channel-forming component in forested streams in the Pacific Northwest. Wood traps and stores gravel, generates scour that creates pool habitat, provides overhead cover, and protects banks by reducing stream energy. In headwater streams, small wood can retain fine sediments and prevent downstream transport to fish-bearing reaches (USDI-BLM 2016a, p. 283). Up to 95 percent of instream wood comes from distances ranging from 82 to 148 feet from the edge of the stream bank (Spies et al. 2013 as referenced in (USDI-BLM 2016a, p. 284)). Wood is delivered to streams through a variety of mechanisms including windthrow, bank erosion, debris flows, and landslides. Riparian tree mortality and subsequent recruitment to streams can represent the primary contribution of large wood in low-gradient meandering streams, while upslope and debris flow contributions can be greatest in higher gradient streams (Spies et al. 2013, Reeves et al. 2003, Bigelow 2007).

The EIS for the RMPs for Western Oregon contains analysis of the potential wood recruitment to streams over time, but not the actual wood delivery to streams. Wood delivery to streams is influenced by many factors and are often unpredictable. The EIS analysis, along with this analysis, evaluated the potential contribution of wood to streams by assessing the condition of forest stands that could potentially deliver wood to streams (USDI-BLM 2016a, pp. 282–283). The EIS evaluated stand conditions using several stand metrics within one site-potential tree height distance to streams to approximate the area likely to deliver wood to streams: density of large trees, percentage of forest stand canopy cover in hardwoods, the quadratic mean diameter of trees in the stand, and the number of trees per acre (USDI-BLM 2016a, pp. 282–283). That discussion is incorporated here by reference. These metrics provide a broad measure to evaluate the potential for stands to provide stable wood to streams.

The BLM conducted a tree growth analysis using the FVS to look at the effect of Outer Zone RR thinning. Refer to Issue 1 for a full description of the silviculture modeling methods. The BLM used a Pacific Northwest Variant of FVS, which is a forest growth simulation model, to show changes in response to natural succession, disturbances, and management (https://www.fs.fed.us/fvs/). Using the FVS model, the BLM compared co-dominant tree[12] sizes for Alternative 1, Alternative 2, and Alternative 3 because conifer species persist the longest in stream channels and tend to be the species within the co-dominant tree canopy layer. Hardwood cover was not used as a metric for this issue statement related to stable wood because conifers as opposed to hardwoods provide stable wood in terms of size and less decay over time. Stand conditions at set time intervals were used for the analysis, assuming stands within the same age range would exhibit similar stand characteristics over time. The BLM modeled each age class by treatment under each alternative.

To analyze the stand's ability to provide stable wood outputs from the FVS model were used. Trees per acre was not used because it doesn't provide information on stable wood specifically. Metrics from the FVS model used to determine if a stand is providing stable wood include cubic volume of trees > 20" DBH and > 30" DBH and Quadratic Mean Diameter[13] (QMD). Using cubic volume of trees > 20" DBH was selected because 20" is the definition used for stable wood. Thirty-inch trees were also used because they provide a metric for larger diameter trees. Larger diameter trees would result in providing a 20" log from a greater distance away from the stream due to tree height. A 30" DBH tree will maintain a diameter greater than 20" for more of the tree length, thus delivering a 20" diameter log to the stream channel from a greater distance away from the channel. Comparing volume of 30" diameter trees would give an indication of trees in the RR providing stable wood. Although QMD was used in this analysis, it does have limitations to model stand characteristics in multi-layered canopies. QMD is defined as the diameter of the tree of average basal area in a stand at breast height. As such it is intended for use in single cohort, even-aged stands. As a stand establishes more cohorts (i.e., different sizes of trees) through natural regeneration into multi-layered canopy conditions, this metric is of less utility because the smaller trees bring the diameter down.

In addition to the modeling, the BLM measured trees in the North Soup Density Management Study (DMS), as fully described in Issue 1. On the ground measurements by BLM found after 20 years the trees in the heaviest thinned area were growing in diameter about twice as fast as the trees in the control stand. A second site, Blue Retro DMS, through on the ground measurements the BLM found to have greater diameter growth in the overstory trees post thinning.

A study located on the western slope of the central Oregon Cascades consisting of four thinning treatments in second-growth Douglas-fir stands indicated that heavy thinning would accelerate development of large trees (Beggs 2004). Spies et al. (2013) concluded that the effects of thinning are variable depending on site-specific conditions, but that thinning can accelerate the development of very large diameter trees. A study of 30- to 40-year-old Douglas-fir stands in the Coast Range of Western Oregon used FVS modeling to predict diameter at various thinning levels (Pollock and Beechie 2014). The light or medium thinning levels is comparable to the 35–45 RD proposed in Class I subwatersheds. The study concluded light or medium thinning may provide some increase in diameter growth of live trees, while minimizing a decrease in large diameter dead trees (Pollock and Beechie 2014).

[12] Co-dominant trees are trees with crowns forming the top line of the highest canopy level within a forest

[13] Quadratic Mean Diameter (QMD) is the diameter at breast height of the tree of average basal area, a weighted average of the size of trees in the stand. QMD is a measure of central tendency which is considered more appropriate than arithmetic mean for characterizing a stand of trees.

Affected Environment

Approximately 47,778 acres within the project area are in RR Class I subwatersheds, with approximately 7,769 acres in RR Outer Zones in stands aged 30–60 years old. No stands in the 70–80-year-old range are included in Class I subwatershed Outer Zone RR in the proposed units. The Outer Zone of RR stands starts 120' from the edge of stream. Trees in the proposed units would grow taller than 120' and would be tall enough to fall into adjacent stream channels. Trees can also reach stream channels through debris flows or landslides. Riparian Reserve stands identified for potential treatment are young (less than 80 years old) and limited in their ability to provide stable wood to streams because they are dominated by small trees limited in height. The 2016 EIS described the effects of past harvest on riparian stands and found in general, current riparian stand conditions are denser, with smaller diameter trees, than riparian stands historically. Across the EIS planning area, conifers in riparian stands were found to have an average diameter of 8" QMD, averaging 316 trees per acre, of which 19 trees per acre were greater than 20" DBH. This discussion is incorporated here by reference (USDI-BLM 2016a, p. 285). Additionally, refer to Issue 1 for a complete description of stand development processes and characteristics in the proposed units. The ability of a stand to provide logs to a stream over time is dependent on the density, size, age, species composition, and growth trajectory of the stand.

Stand conditions in the proposed age classes are densely stocked. The stands consist primarily of small diameter trees, with a QMD of 13.3–13.7" DBH (**Table 15**) and fisheries biologists would not consider capable of being stable wood if they fell into stream channels.

Table 15: Current stand condition

Stand Age (years)	Acres by Age Class in Class I Subwatersheds in the RR Outer Zone	Quadratic Mean Diameter (inches)	Total Cubic Volume in Trees ≥ 20" DBH	Total Cubic Volume in Trees ≥ 30" DBH
30–40	3,386	13.7	1,665	204
50–60	4,383	13.3	2,839	192

The current condition of the instream habitat and wood volume in the stream is important; however, this analysis relies on the stand condition because of the importance of the RR in contributing stable wood to streams through time. Given the history of timber harvest in the proposed units, an assumption can be made along with field observations that the streams adjacent to the proposed units are lacking stable wood. Previously harvested stands removed sources of future large wood through harvesting trees in the riparian areas. The RR stand condition can be used as a surrogate for instream habitat conditions, with the assumption that streams adjacent to and within close proximity to the proposed units in 30–60-year-old stands are lacking in wood volume, particularly stable pieces of wood > 20" diameter.

Suppression mortality, as well as other agents of mortality such as wind, fire, insects, or disease (Harmon et al. 1986), would still occur within the RR Inner and Middle Zones in Alternative 2 and in Alternatives 1 and 3 throughout the RR where no treatment would occur, resulting in trees available for instream wood at their current growth trajectory. Benda et al. (2016) found no cut buffers of 10 meters, which is less than the Inner and Middle Zones of Class I subwatersheds, to be effective at protecting in-stream wood recruitment.

Table 16 shows current QMD and resulting conditions over time and **Table 17** includes current total cubic volume of trees ≥ 20" DBH and ≥ 30" DBH and resulting conditions over time. Both tables display FVS modeled data for QMD in Alternatives 1, 2, and 3 in stands 30–40 years old and 50–60 years old at current condition and at future time intervals of 20, 40 and 60 years. **Table 16** and **Table 17** also display the QMD and total cubic volume under Alternative 2 based on the proposed RD target post-thinning of 35, 40, and 45. Stands aged 70–80 years-old are not included in this analysis because there are no stands of that age within the RR Outer Zone of Class I subwatersheds.

Table 16: Comparison of Quadratic Mean Diameter at the current condition and after implementation of each alternative over time.

Stand Age, Acres†	2022	QMD–Alternatives 1 and 3 (No thinning in Outer Zone) (inches)			QMD–Alternative 2 (Thin to RD* 35-45 in Outer Zone) (inches)			
	Quadratic Mean Diameter (inches)	20 years	40 years	60 years	Immediate Post Treatment	20 years	40 years	60 years
30–40, 3,386	13.7	16.6	19.3	23	17.7	13	16.8	20.1
50–60, 4,383	13.3	16.3	19.0	21.2	19.0	13.2	17.1	20.5

*Numbers listed are the median of RD 35, 40, and 45.
†Acres include those within proposed units in the RR Outer Zone of Class I subwatersheds

Table 17: Comparison of total cubic volume at current condition and alternatives over time

Stand Age (years) by Tree Diameter	2022 (inches)	Total Cubic Volume Alternatives 1 and 3 (No Thinning in Outer Zone) (inches)			Total Cubic Volume Alternative 2 (Thin to RD* 35-45 in Outer Zone) (inches)		
	Total cu. vol.	20 years	40 years	60 years	20 years	40 years	60 years
30–40 ≥ 20" DBH	1,665	4,385	7,897	11,142	4,617	8,396	11,849
30–40 ≥ 30" DBH	204	341	931	2,244	365	1,133	3,094
50–60 ≥ 20" DBH	2,839	5,790	8,825	11,808	5,967	9,229	12,138
50-60 ≥ 30" DBH	192	503	1,253	2,729	550	1,593	3,770

*Numbers listed are the median of RD 35, 40, and 45.

<u>Environmental Effects</u>

Alternative 1—No Action and Alternative 3

Direct, Indirect, and Cumulative Effects

In Alternatives 1 and 3, the BLM would not treat Outer Zone RR of Class I subwatersheds; therefore, the dense, young stands would continue to grow on their current trajectory. Without treatment, these stands would have competition-induced mortality with the smaller suppressed trees dying. The remaining live trees would continue to grow more slowly due to high density and would take longer to become stable wood as compared to the conditions created under Alternative 2. The current QMD in the 30–60-year-old stands ranges from 13.3" to 13.7", which is not considered stable wood (**Appendix C, Table 27**).

From the FVS modeling, which projects the size of trees at 20, 40, and 60 years, **Appendix C, Table 27** shows the QMD if no treatment occurs. In the 30–60-year-old stands the QMD would remain between 16.3" and 19.3" at 20–40 years. At 60 years, with no treatment, the stand's QMD would be between 21.2" and 23" (**Appendix C, Table 27**). FVS models of QMD in stands includes small young trees regenerating in the stand. These small trees reduce the QMD. This can be seen in the QMD of stands with no treatment as the QMD increases more than compared to treated stands because no new small trees are regenerating in the dense single layer stands and thus the QMD shows an increase in single layer stands. With treatments, new tree regeneration occurs and the small trees bring the QMD average down. Comparing the QMD between Alternatives 1 and 3 (no treatment) to Alternative 2 (thinning) does show the QMD increases more without treatment. However, this is because the FVS model is including small regenerating trees in the thinned stand which decreases the QMD average as compared to no thinning which would perpetuate a single story stand with no regenerating seedlings. Even with the limitations of using

QMD to compare tree diameter in a single layer stand to a multi-story stand, it is still included in the analysis as it's a common metric used to model stand growth.

Another metric used for analysis is the total cubic volume of 20" DBH and 30" DBH trees in the stands at 20, 40, and 60 years (**Appendix C, Table 34–Table 39).** The current total cubic volume of 20" trees in the 30–60-year-old stands ranges from 1,665 to 2,839. When modeled out at 20, 40, and 60 years the 20" trees total cubic volume range from 4,385 to 11,808. The current total cubic volume of 30" trees in these stands range from 192–204. When modeled out at 20, 40, and 60 years the 30" trees total cubic volume range from 341 to 2,729. The total cubic volume of 20" and 30" trees in stands with no treatment increases but is less than modeled in stands with treatment under Alternative 2. There would be approximately 19–32 percent less within the 30" cubic volume metric without thinning.

Greater mortality rates from suppression mortality in early seral stands would produce small dead trees and smaller diameter trees available for wood recruitment. While suppression mortality would eventually release conifers for growth, the recruitment of stable wood to stream channels would remain deficient for a longer time if left untreated. The 2016 RMP/EIS found the No Action Alternative would result in a smaller increase in the number of large trees near streams and in 20 years would result in the least increase in the number of large trees near streams, barely above current levels (USDI-BLM 2016a, pp. 289–290). As described in Issue 1, under Alternative 1 dense stand conditions would perpetuate and not develop the desired stand conditions as quickly with larger diameter conifers for stable wood.

Densely stocked, small diameter stand conditions would perpetuate under Alternatives 1 and 3. Alternatives 1 and 3, with the lack of RR thinning in Class I subwatersheds, would not meet the purpose of the EA as timely or adequately as compared to Alternative 2. Refer to **Figure 5** in Issue 1. The model outputs show 19–32 percent less cubic volume of 30" trees 60 years post-thinning. At 40 years post-harvest the no treatment results in less 30" cubic volume of trees (**Figure 5**). Using the cubic volume metric as opposed to QMD gives a better indication of how many 30" trees are in the stand as opposed to QMD which includes smaller trees regenerating into the stand and lowering the QMD. The 30" size class is highlighted as a way to determine trees providing stable from higher on the tree bole and thus resulting in a 20" log reaching the stream channel. Using model outputs at 40 years and particularly 60 years gives a reasonable amount of time for the stand to respond to the thinning treatment.

The BLM would continue to plan and implement instream enhancement projects, placing logs and boulders, in stream channels within the analysis area to improve fish habitat conditions. These projects would occur across BLM and private timber company land in the checkerboard ownership. Wood placement would provide an immediate short-term source of instream structure but would not address the long-term wood recruitment necessary from adjacent young RR stands.

Alternative 2—Proposed Alternative

Direct, Indirect, and Cumulative Effects

Tree tipping would occur in RRs following the RMP Management Direction (See EA **Appendix D** and ROD/RMP USDI-BLM 2016b p. 70). Tree tipping could occur anywhere in RR stands when commercial thinning occurs in the Outer Zones. From 0 to 15 square feet of basal area per live trees would be cut or tipped, averaged across the RR portion of the treated stand. Tree tipping in RR stands would provide wood delivery to streams by directionally falling trees into stream channels. Benda et al. (2016) predicted an increase in in-stream wood with thinning and tree tipping. In addition, the RMP requires snag creation in RR stands (USDI-BLM 2016, p. 67 Table 3). Creating snags in RR stands would also result in trees eventually falling, although would take a longer time. Down logs resulting from tipping or created snags would be from stands aged 30–60 and with current QMD ranging from 13.3" to 13.7". While these logs could function in stream channels to improve fish habitat, they are not stable logs and would be an immediate supply of less than desirable direct wood recruitment.

Under Alternative 2, thinning would occur in the Outer Zone of Class I subwatershed RR stands aged from 30–60 years old at RDs ranging from 35–45. There are no 70–80-year-old stands identified in the proposed treatment units in the RR Outer Zone of Class I subwatersheds. RMP Management Direction for RR stands in Class I subwatersheds requires at least 60 trees per acre left at a minimum.

Based on the results of the FVS modeling, treated RRs would produce larger trees in a quicker timeframe. As shown in **Table 27**, the QMD number decreases over time because of natural tree regeneration occurring in stands. With smaller seedlings generating in the stand, it brings down the overall QMD. Another metric used for analysis of overstory comparison is the total cubic volume of trees ≥ 20" and 30" DBH (**Table 16).** The model results showed an increase in the total cubic volume of 20" and 30" and greater size trees at 20, 40, and 60 years at RD targets ranging from 35 to 45 in Alternative 2 compared with Alternatives 1 and 3. An additional FVS model as reported in Issue #1 of this EA, which looked at the number of mid story (21–32" DBH) and overstory conifers (32–48" DBH) per acre at 20, 40, and 60 years out. The model compared thinning RD targets to no thinning. The results for thinning to an RD of 35 to 45 produced more mid story and overstory conifers.

Larger cubic volume of > 30" DBH trees post thinning results in larger diameter at the tops of trees, which provides stable wood when the tops of trees reach the stream channel from the Outer Zone of RR stands. Windthrow is the primary delivery mechanism from RR stands and typically those trees fall and stay in place with limited rolling or sliding (Van Sickle and Gregory, 1990). This finding supports the importance of creating larger diameter trees in the Outer Zone RR because the trees would fall and stay in place. Taper equations and measurements show a 20" and particularly a 30" DBH tree would have a larger diameter size at the top of the tree which, from the Outer Zone, would be the portion of the tree to reach and interact with the stream channel.

As stated in Issue 1, "Thinning in the Outer Zone of the riparian areas also increases the size of individual trees, and the greatest benefit is observed when stands are thinned earlier than later. For example, just 20 years after thinning a 30–40-year-old stand, Outer Zones attain approximately 300 more cubic feet of wood in trees greater than 20" DBH than No Action, and over time a greater proportion is coming from trees over 30" DBH when thinning to 35–45 RD has occurred." Thinning from below in stands 30–60 years old to 35–45 RD has marginal but beneficial effects in total stable wood as compared to no action by year 20 but produces the most total large wood by year 40–60.

Based on this analysis, Alternative 2 would result in an increase of potential recruitment of in-stream stable wood, which would benefit fish habitat both directly and indirectly, and in the reasonably foreseeable future. Larger trees would be available for wood recruitment, both in and near streams in a shorter period than would occur without thinning. The increased availability of larger down logs in streams would benefit fish habitat by preventing downstream transport of large woody debris, storing large volumes of sediment and smaller wood, and creating pools and backwaters, which provide rearing habitat and places for fish to rest during high velocity flow events. Thinning would contribute to the conservation and recovery of Endangered Species Act-listed fish and habitat as well as benefit Bureau Sensitive fish and habitat on the Special Status Species list. The BLM would thin Outer Zones to ensure that stands are able to provide trees that would function as stable wood in streams and would begin to restore historic landscape-level vegetation patterns. This would help to maintain and restore natural channel dynamics, processes, and the proper functioning condition of riparian areas, stream channels and wetlands by providing sediment filtering, wood recruitment, stream bank and channel stability, water storage and release, vegetation diversity, nutrient cycling, and cool and moist microclimates.

The current stand conditions in the identified 14,625 acres of RR Outer Zone Class I subwatersheds do not ensure that the stands would be able to provide trees that would function as stable wood in stream channels without treatment. Reducing stand densities promote growth because growing space is increased, residual trees expected to increase in diameter growth. The BLM would accomplish the restoration of proper functioning conditions for riparian wood recruitment by following Management Direction to thin stands as needed to ensure that stands are able to provide trees that would function as stable wood in streams (USDI-BLM 2016b, pp. 71–72). The EIS found the PRMP would increase the number of trees per acre within one site potential tree height greater than 20” DBH and the average diameter from the current condition (USDI-BLM 2016a, pp. 289–290).

Under Alternative 2, the Outer Zone RR thinning would produce more and larger diameter trees in a shorter time period that would provide stable wood for future recruitment to streams across the proposed 14,625 acres as compared to Alternatives 1 and 3. Thinning under Alternative 2 would result in more cubic volume of 20” and 30” trees as modeled at 20, 40, and 60 years. There would be no short-, medium-, or long-term loss of 20” or greater trees. Of note is the increase of 30” cubic volume trees. Stands currently aged 30 to 40 with no treatment in 60 years would have 2,224 cubic volume of 30” trees compared to the same stands with treatment in 60 years with 3,094 cubic yards of 30” trees. This represents an increase of 870 cubic yards in cubic volume of 30” trees with treatment compared to no treatment in stands currently aged 30–40. Stands currently aged 50 to 60 with no treatment in 60 years would have 2,729 cubic volume of 30” trees compared to 3,770 cubic volume of 30” trees. This represents an increase of 1,041 cubic yards in cubic volume of 30” trees with treatment compared to no treatment in stands currently 50 to 60 years old. Thinning 30–60-year-old stands to 35–45 RD would result in approximately 19–32 percent more trees greater than 30” DBH compared to no action. As stated previously the 30” trees would deliver 20” or greater diameter logs to the stream channel from a greater distance away from the channel because a greater length of the tree would have larger diameter logs. This analysis used 20” logs as an indicator of stable wood.

By conducting Outer Zone RR thinning, the BLM would accelerate the timeframe in which the Management Objectives of maintaining and restoring natural channel dynamics, processes, and meet the proper functioning condition of riparian areas and stream channels (USDI-BLM 2016b, p. 68). This would help to maintain and restore natural channel dynamics, processes, and the proper functioning condition of riparian areas, stream channels and wetlands by providing sediment filtering, wood recruitment, stream bank and channel stability, water storage and release, vegetation diversity, nutrient cycling, and cool and moist microclimates. Altogether, the BLM would improve fish habitat and channel structure in streams within and near the proposed treatment units.

There are no reasonably foreseeable actions in the proposed units of Class I subwatershed Outer Zone RR stands that would affect the contribution of stable wood to the stream. The BLM would continue to plan and implement instream enhancement projects, placing logs and boulders, in stream channels within the project area to improve fish habitat conditions.

CHAPTER 4 CONSULTATION AND COORDINATION

4.1 CONSULTATION WITH U.S. FISH AND WILDLIFE SERVICE

The BLM has completed consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the ESA (16 U.S.C. 1536 (a)(2) and (a)(4)), as amended. The BLM has received a Letter of Concurrence (USFWS TAILS# 01EOFW00-2020-F-553) concurring with analysis of effects to the Northern spotted owl, marbled murrelet, and coastal marten. The BLM will incorporate the Terms and Conditions outlined in this LOC.

4.2 CONSULTATION WITH NATIONAL MARINE FISHERIES SERVICE

The BLM completed consultation with the National Marine Fisheries Service (NMFS) under Section 7 of the ESA (16 U.S.C. 1536 (a)(2) and (a)(4)), as amended. The Regional Administrator for NMFS signed the Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the BLM's Forest Management Program for Western Oregon (WCR-2017-7574) on October 28, 2020 (USDC-NMFS 2018b). The BLM would follow the review and verification process for timber sale activities, per the Biological Opinion, including sending project notifications to NMFS.

4.3 TRIBAL CONSULTATION

The BLM initiated tribal consultation in August 2021 with letters sent via certified return receipt mail to the following Tribes: Coquille Indian Tribe, Cow Creek Band of Umpqua Tribe of Indians, Confederated Tribes of Grand Ronde Community of Oregon, Confederated Tribes of Siletz Indians, and Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians. The BLM stated the intent and goals of the EA and invited the Tribes to initiate Government-to-Government consultation requesting their participation in the EA development process. To date, the BLM has not received comments from Tribes regarding the current planning effort. The BLM would continue to coordinate with the Tribes to address areas of concern prior to implementation of each timber sale and, as appropriate, the BLM would consult with the Tribal Historic Preservation Officers (THPOs).

4.4 STATE HISTORIC PRESERVATION OFFICE CONSULTATION

Until the BLM completes appropriate cultural resource surveys, it is unknown if there would be a need to consult with SHPO on the effects of Late Successional Reserve and Riparian Reserve EA actions to cultural resources. In the event surveys result in new resources being identified, and those as well as previously recorded resources cannot be avoided by project actions, they would be evaluated for their eligibility for listing in the NRHP. If found eligible or the sites remain unevaluated, BLM shall consult with SHPO to develop measures that protect these resources until both parties can concur on a finding of No Adverse Effect. Should surveys be negative, or newly or previously recorded resources can be readily avoided, no consultation on effects would be necessary. At minimum and in all cases, the SHPO would be provided with copies of all cultural resource review documentation as it is completed, which may include but not be limited to, Section 106 inventory reports, site and isolate records for newly recorded resources, and determinations of NRHP eligibility.

4.5 LIST OF PREPARERS

Wildlife Biologist	Carol Aron
Silviculturist	Andrew Spencer
Planning and Environmental Coordinator	Aimee Hoefs
Planning Foresters	Russell Furchner, John Goering
Fish Biologist	Stephanie Messerle
Botanist	Jennifer Sperling
Hydrologist	John Colby
Geologist	Greta Krost
Invasive Species Coordinator	Goldie Warncke
Fire/Fuels Specialist	Jamie Lilienthal
Archaeologist	William Kerwin
GIS Specialist	Tristan Holland

APPENDIX A ISSUES CONSIDERED BUT NOT ANALYZED IN DETAIL

The BLM considered the following issues but did not carry them forward to be presented in detail because preliminary review did not show an environmental effect beyond the level described by the Proposed RMP/Final EIS, and they did not relate to how the proposed action or alternatives respond to the purpose and need.

Botany

Issue 7: How would the proposed harvest and associated activities affect Bureau Sensitive vascular plants, lichens, and bryophytes?

Rationale for elimination: The BLM considered this issue but did not analyze it in detail because there would be no reasonably foreseeable significant effects to any of the 26 Bureau Sensitive vascular plants, lichens, or bryophytes (**Table 18**) of the proposed action beyond those disclosed in the 2016 Final Environmental Impact Statement (FEIS) to which this EA is tiered nor is it related to the project purpose and need. Coos Bay BLM would manage all known sites of any Special Status Species (SSS) sites such that the species would persist at each site, thus protecting them from any significant effects. The BLM would buffer Bureau Sensitive plant species located during pre-disturbance surveys using a circular one hectare (2.5 acre; 185–foot radius minimum) no-treatment zone, which research suggests is large enough to protect the micro-site, such that the species persist at the site (Heithhecker et al. 2007). For species that require disturbed or early seral habitat where a one-hectare acre buffer would not ensure the persistence of the species, the BLM botanist would use their professional judgement on buffer size such that the species would persist at a site and no significant effects would occur to these special status species. The BLM's proposed action does not increase the likelihood or need for listing of any SSS, because if found through pre-disturbance surveys, the BLM would manage SSS according to species management requirements within the 2016 ROD/RMP.

Table 18: Bureau Sensitive botany species with potential habitat within the project area

Species	Documented (D) or Suspected (S) on Coos Bay District BLM	No. of Sites in Project Area	Likelihood in Project Area	Reason
VASCULAR PLANTS				
Ferns				
Adiantum jordanii	D	—	Low	Preferred habitat is scarce in project area
Pellaea andromedifolia	D	—	Low	Preferred habitat is scarce in project area
Polystichum californicum	S	—	Low	No sites on district
Ribes laxiflorum	D	—	Low	Preferred habitat is scarce in project area
Senecio triangularis var angustifolius	D	—	Low	Preferred habitat is scarce in project area
Forbs				
Bensoniella oregona	D	—	Low	Preferred habitat is scarce in project area
Erigeron cervinus	S	—	Low	No sites on district
Eucephalus vialis	S	—	Low	No sites on district
Hydrocotyle verticillata	D	—	Low	Preferred habitat is scarce in project area
Iliamna latibracteata	S	—	Low	No sites on district
Romanzoffia thompsonii	D	—	Low	Preferred habitat is scarce in project area
Sidalcea hendersonii	D	—	Low	Preferred habitat is scarce in project area
Sidalcea malviflora ssp. *patula*	S	—	Low	No sites on district
Trillium kurabayashii (= *T. angustipetalum*)	S	—	Low	No sites on district
Rushes				
Scirpus pendulus	S	—	Low	No sites on district
NON-VASCULAR PLANTS				
Bryophytes (Hornworts)				
Phymatoceros phymatoides	D	1	Moderate-High	Six known sites on district, habitat is present
Bryophytes (Liverworts)				
Blepharostoma arachnoideum	D	—	Moderate	Six known sites on district, habitat is present
Cryptomitrium tenerum	S	—	Low	No sites on district
Porella bolanderi	S	—	Low	No sites on district
Bryophytes (Mosses)				
Racomitrium depressum (=*Codriophorus depressus*)	S	—	Low	No sites on district
Tetraphis geniculata	S	—	Low	No sites on district
Lichens				
Calicium adspersum	S	—	Low	No sites on district
Cladidium bolanderi	S	—	Low	No sites on district
Lobaria linita	S	—	Low	Preferred habitat is scarce in project areas
Microcalicium arenarium	D	—	Moderate	One site on district; habitat is present in analysis area
Usnea nidulans	S	—	Low	No sites on district

Bureau Sensitive Fungi

Issue 8: How would the proposed harvest and associated activities affect Bureau Sensitive fungi?

Rationale for elimination: The BLM considered this issue but did not analyze it in detail because this issue has previously been analyzed in detail in the 2016 Final Environmental Impact Statement (FEIS) to which this EA is tiered nor is it related to the project purpose and need.

The 2016 RMP established the Late-Successional land use allocation, which contain all high quality late successional (> 80 years old) forest habitat. This provides for the protection of all known sites of Bureau Sensitive fungi. There are no known Bureau Sensitive fungi located to date within the proposed action area; however, according to 2016 FEIS (USDI BLM 2016a, p. 525), incidental findings or strategic surveys, along with protection of known sites, is thought to be adequate in assuring that projects will not contribute to the need to list these species under the ESA.

Retention trees and retention areas (skips) in harvest units, and the retention of older, structurally complex stands in late-successional reserves, are also expected to benefit fungi by conserving unknown sites. Best habitat for Bureau Sensitive fungi would be within Late Successional Old Growth (LSOG) habitat; therefore, it is unlikely that these species would be located within these mid seral stands. While there is insufficient information to determine how the LSR proposed action would affect the distribution and stability of suspected fungi species (**Table 19**), if present, the loss of some individual sporocarps could occur through variable tree removal.

There would be no reasonably foreseeable significant effects to any of the 12 suspected Bureau Sensitive fungi that have potential habitat and are within range (**Table 19**) of the proposed action beyond those disclosed in the 2016 (FEIS). However, the BLM considers fungi impractical to survey due to their intermittent appearance (Cushman and Huff, 2007) so no surveys have or would be done on any of the proposed LSR EA units.

Table 19: Bureau Sensitive fungi (surveys not practical) with potential habitat within the action area.

NON-VASCULAR PLANTS: Fungi				
Species	**Documented (D) or Suspected (S) on Coos Bay District BLM**	**No. of Sites in Project Area**	**Likelihood in Project Area**	**Reason**
Albatrellus avellaneous	S	—	Low	No sites on district
Chamonixia caespitosa	S	—	Low	No sites on district
Cortinarius barlowensis (=*C. azureus*)	S	—	Low	No sites on district
Cortinarius pavelekii	S	—	Low	No sites on district
Hydropus marginellus	D	—	Low	Three sites on district
Lactarius siliviae	D	—	Low	Two sites on district
Phaeoclavulina abietina	S	—	Low	No sites on district

Phaeocollybia gregaria	D	—	Low	One site on district
Phaeocollybia oregonensis	D	—	Low	Two sites on district
Ramaria blanda var blanda	D	—	Low	Two sites on district
Rhizopogon exiguous	S	—	Low	No sites on district
Sarcodon fuscoindicus	S	—	Low	No sites on district

Under the 2016 RMP/EIS, the BLM protects known sites for these species, as are all the old-growth habitats within LSRs (USDI BLM 2016a, p. 520). Although the BLM would not complete formal surveys for fungi, any special status fungus found incidentally during pre-disturbance surveys, the BLM would provide management direction for the conservation of Bureau Special Status fungi species with features designed to conserve populations of the species (Brian et al. 2002, USDI BLM 2016a, p. 519) similarly to known sites such that the Special Status fungi would persist at the site with no significant effects to the species.

Carbon storage and greenhouse gas emissions

Issue 9: What are the effects of the alternatives on greenhouse gas emissions, carbon sequestrations, and carbon storage?

The BLM does not present this issue for detailed analysis because, regardless of project-specific or site-specific information, the issue is not related or respond to the projects purpose and need, and there would be no reasonably foreseeable significant effects of the proposed action beyond those disclosed in the 2016 Proposed Resource Management Plan and Final Environmental Impact Statement (RMP/EIS) to which this EA is tiered. Therefore, the issue would not inform the decision or influence a reasoned choice between alternatives. The RMP/EIS analyzed the effects of timber harvesting, and prescribed burning on greenhouse gas emissions and carbon storage, and the potential impacts of climate change on major plan objectives. Additionally, during public scoping the BLM did not receive requests to consider the effects of this EA on carbon storage or greenhouse gas emissions.

The effects of the proposed action on carbon storage and greenhouse gas emissions tiers to the analysis in the RMP/EIS. As described below, the proposed action is consistent with the Northwestern and Coastal Oregon ROD, and the BLM does not expect the proposed action to have measurable effects beyond those already analyzed in the RMP/EIS. While analysis of the project-specific and site-specific conditions could give greater specificity to the analysis in the RMP/EIS, there is no potential for reasonably foreseeable measurable effects of the proposed action beyond those disclosed in the RMP/EIS. The analysis in the EIS addressed the effects on carbon storage and greenhouse gas emissions of implementing the entire program of work in the timber sale program based on high quality and detailed information (USDI BLM 2016a, pp. 165–180, 1295–1304). The information available on project-specific and site-specific conditions, while more specific, is not fundamentally different from the information used in the RMP/EIS analysis of effects on carbon storage and greenhouse gas emissions, and thus cannot reveal any fundamentally different effects than that broader analysis.

The EIS upon which the 2016 ROD/RMP was based examined the most recent science regarding climate change, carbon storage, and greenhouse gas emissions. The analyses in V.1 on pp. 165–211 are relevant to this project and are incorporated by reference (USDI BLM, 2016a)
The key points from 2016 RMP/EIS analyses include:

- Net carbon storage would increase.
- Annual greenhouse gas emissions would increase although annual emissions would remain less than 1 percent of the 2010 Statewide greenhouse gas emissions.
- Climate change increases the uncertainty that reserves would function as intended and that planned timber harvest levels can be attained, with the uncertainty increasing over time.
- Active management provides opportunities to implement climate change adaptive strategies and potentially reduce social and ecological disruptions arising from warming and drying conditions.

The RMP/EIS concluded that the proposed RMPs would support the State of Oregon's interim strategy for reducing greenhouse gas emissions (USDI BLM 2016a, p. 173). Both the State of Oregon's strategy and Federal climate change strategies have goals to increase carbon storage on forest lands to partially mitigate greenhouse gas emissions from other sectors of the economy. Neither the State of Oregon nor the federal government have established specific carbon storage goals so quantifying BLM's contribution to that goal is not possible. Assuming no changes in disturbance regimes such as fire and insects (acres affected and severity of impact) from the recent past, timber harvesting is the primary activity affecting carbon storage (USDI BLM 2016a, p. 169).

The FEIS estimated the effects of implementing actions consistent with the Northwestern and Coastal Oregon and the Southwestern Oregon RMP in **Table 20**.

Table 20: Carbon Sequestration and Greenhouse Gas emissions in implementing the RMP

	Current	**2033**	**2063**
Carbon Storage	336 Tg. C	404 Tg. C	482 Tg. C
Greenhouse Gas Emissions	123,032 Mg CO_2e/yr.	256,643 Mg CO_2e/yr.	230,759 Mg CO_2e/yr.

The carbon storage and greenhouse gas emissions analysis was based on assumptions concerning the level of management activity:

- The RMP/EIS assumed an average annual harvest level of 278 MMbf per year (205 MMbf from the Harvest Land Base and 73 MMbf from non-ASQ related harvest) over the entire decision area (USDI BLM, 2016a, pp. 307, 353). The expected annual harvest for the Coos Bay District Sustained Yield Unit is 30 MMbf (12 MMbf from the Harvest Land Base and 18 MMbf from non-ASQ related harvest).
- Activity fuels treatments are aligned with the harvest program with estimated acres of prescribed fire treatment type provided by the Woodstock model (USDI BLM 2016a, p. 1300). The decadal average of activity fuels prescribed burning for the first 20 years of the RMP would be an estimated 64,806 acres over the entire decision area (USDI BLM 2016a, p. 362). For the Coos Bay District Sustained Yield Unit, the expected decadal average activity fuels program covers 5,589 acres.
- The RMP/EIS assumed that the non-commercial hazardous fuels (natural fuels) treatment levels would not differ from the 2003–2012 period although there is substantial year-to-year

variability in the size of the program over the project area and within any one District (USDI BLM 2016a p. 270). Approximately 173,300 acres of natural fuels treatment is expected to occur on average each decade across the project area (USDI BLM 2016a, p. 167). The expected natural fuels treatment program for the Coos Bay District Sustained Yield Unit is 4,713 acres per decade, on average (USDI BLM 2016a, p. 270).

The amount of activity fuels prescribed burning is the primary driver of greenhouse gas emissions (USDI BLM 2016a, p. 178). Greenhouse gas emissions would increase substantially largely due to the projected increases in activity fuels prescribed burning. The RMP/EIS assumed no change in the natural fuels prescribed burning program from the recent past. Greenhouse gas emissions analyzed included those from grazing, prescribed burning, and harvest operations (USDI BLM 2016a, p. 174). Under the Northwestern and Coastal Oregon ROD/RMP, no allotments would be available for livestock grazing through the issuance of a grazing lease (p. 84).

There is no new information or changed circumstances that would substantially change the effects anticipated in the 2016 RMP/EIS. This is because:

- The harvest levels remain within the range of that analyzed in the EIS. Within the RMP/EIS and ROD/RMP, harvest levels within the Coos Bay District Sustained Yield Unit were calculated based on stand composition and attributes on a yearly and decadal rate. Coos Bay District Sustained Yield unit has a target of 12 MMbf per year in the HLB for ASQ, with an allowance of 40 percent variance (+/-) per year, and 20 percent variance per decade. The RMP/EIS also estimated an additional 18 MMbf/year in non-ASQ (LSR) (USDI BLM 2016a, p. 353, Table 3-85), This project is expected to produce 15–25 MMbf per year, and a maximum of approximately 180 MMbf per decade. This harvest level, in conjunction with other planned sales, would contribute to the volume targets for 2023 through 2033. These harvest levels are directly in line with the range of harvest levels in the RMP/EIS and conforms to the assumptions in the RMP/EIS regional carbon and climate analysis, and consistent with the trends/patterns on the Coos Bay District under the RMP.

- The acres of activity fuels prescribed burning, predicted CO_2 emissions, and expected tonnage consumed remains within the range analyzed in the RMP/EIS. For the Coos Bay District, the activity fuels prescribed burning was 1,242 acres (3,121 tons) in FY 2021, which is within the ROD/RMP projection of 5,589 acres within the first decade of RMP implementation. These levels are within the analysis of the RMP/EIS and the numbers mean the Coos Bay District is on track to be within the decadal average.

- The acres of natural fuels prescribed burning and expected tonnage consumed does not exceed the levels analyzed in the RMP/EIS. For the Coos Bay District, the natural fuels prescribed burning was 50 acres (85 tons) in FY 2021, which is in conformance with the ROD/RMP. These levels are within the analysis of the RMP/EIS and the numbers mean the Coos Bay District is on track to be within the decadal average.

- Consideration of predicted changes in vegetation, fire, hydrological cycles, or other responses due to climate change would be speculative at the regional scale; predictions at the scale of the analysis area would be more uncertain (USDI BLM 2016a, pp. 175, 1304).

Therefore, potential changes in the analysis area attributable to climate change were not incorporated in this EA.

Based on this information, and because the level of management activity is reasonably foreseeable and within the levels disclosed in the RMP/EIS, the project effects on carbon storage and greenhouse gas emissions are within the range of variance analyzed in the RMP/EIS. Thus, the proposed action has no potential for significant effects beyond that analysis.

Cultural Resources

Issue 10: How would vegetation treatments affect historic and prehistoric cultural sites?

The BLM considered this issue but dismissed it from further analysis because the results of background records search for cultural resources indicates low potential for significant cultural resources being located within the proposed LSR/RR units. To determine this, the District Archaeologist conducted a BLM Class I overview for cultural resources was employed for this effort and was based on 242,970-acre analysis area exceeding the LSR/RR analysis area by approximately 120,000 acres.

The District Archaeologist conducting this Class I overview, examined existing cultural resources site and survey information at a minimum of one-mile radius of the proposed LSR/RR units and is organized into three subbasins; the Coquille River subbasin, the Coos River subbasin and the Lower Umpqua River subbasin (Toepel et al. 2019). Sources of information included datasets maintained by the Oregon State Historic Preservation Office (SHPO), as well as BLM online (Oregon Cultural Resources Information System) and district data sets, and file records of previously conducted cultural resource surveys, known cultural sites, and historic maps in addition to hard copy historic maps, including General Land Office survey plats, historic USGS (U.S. Geological Survey) quad maps, and BLM field office maps.

This subbasin analysis illustrates variability for presence of cultural resources among these subbasins containing mixed hardwood/coniferous forest at the contact zone between the Klamath Mountains and the Coast Range physiographic provinces. The former likely possessing a greater variety of critical resources targeted by Native Americans, than the more homogeneous coniferous forest of the Coos and Lower Umpqua subbasins within the Coast Range.

Numerous prominent ridgelines within the Coquille River subbasin provided reasonable travel corridors into the adjacent coastal mountains and interior valleys. The mixed flora zone offers opportune circumstances for intentional fall burning, thus maintaining important hunting and foraging areas. Conversely, the Coos River and Lower Umpqua subbasins are characterized as convoluted, steep, and heavily dissected terrain with an absence of prominent, connecting ridgelines; the presence of a heavy understory inhibiting access; and foreknowledge that critical resources are more readily and easily exploited, in nearby areas, both east and west of the interior Coast Range, outside the current project area.

Most precontact archaeological sites in the current project area are identified as lithic scatters containing debitage (chert flake-stone). Chert, as a critical local tool-stone, does not occur among the sandstones, siltstones, and other sedimentary rocks of the Coast Range Province. These site types rarely exhibit diagnostic artifacts or possess qualities making them eligible for listing in the National Register of Historic Places.

Evidence of late 20th century historic use in the project area, mostly relating to logging and administrative functions associated with fire suppression. Intact structures are not likely to remain but associated features such as foundations, rockwork, domestic plantings, and scatters of debris may still be identifiable. These types of cultural resources rarely exhibit diagnostic artifacts that offer information that possess qualities making them eligible for listing in the National Register of Historic Places.

Further, large tracts of land are held by private industry or by the State of Oregon (e.g., Elliott State Forest). BLM land holdings in the Coast Range are in public ownership largely because they were judged sub-optimal for occupation by 19th century homesteaders and those settlers to follow. The few desirable valleys for settlement in the interior Coast Range are small acreages in private ownership, beyond the reach of cultural resource surveys conducted in the public interest.

Utilizing a broader scale analysis including datasets for cultural survey and site location for BLM and adjacent lands, provided opportunity to view potential cultural resource types on federal, state, and private surface ownership, adjacent the LSR/RR project area. Additionally, information gathered by using a larger scale analysis area assists in refining existing BLM site and survey information that informs GIS cultural site probability modeling parameters.

Archaeological data in western Oregon shows that past human activity most often took place on level ground and near freshwater sources, as revealed by the location of archaeological sites across the landscape (USDI BLM 2014). This analysis indicates that a percentage of the project area is convoluted, steep and heavily dissected terrain with an absence of prominent, connecting ridgelines, and supports heavy understory inhibiting access.

The BLM acknowledges that ground disturbance from road construction and waste disposal sites and other heavy equipment operation in support of timber harvest has the potential to damage and displace cultural artifacts resulting in the loss of their scientific and heritage values. The BLM District Archeologist reviewed the project area stands and based on background records searches, previous survey of similar age-class stands, riparian area and terrain conditions determined that the likelihood of NRHP (National Register of Historic Places) eligible prehistoric cultural resources being located within the project area would be negligible.

The National Historic Preservation Act requires agencies to take into consideration the effects of their actions on properties listed or eligible for listing on the NRHP. The interdisciplinary team would review proposed thinning actions at the DNA level for each individual treatment area and assign PDFs as needed. The BLM would conduct a post-harvest survey for all ground-disturbing activities associated with the undertaking as required under the State Protocol (USDI BLM 2015, App. D). In so doing, BLM would meet its Section 106 responsibilities under the 2015 State Protocol as well as the 2012 National Programmatic Agreement.

The BLM would also coordinate with Tribes annually for each individual treatment area. This would provide opportunity for Tribes to inform the BLM of specific areas of concern or provide specific information for resources of concern.

Because of the following conditions, the BLM does not anticipate adverse effects to or loss of cultural or tribal resources:

- BLM's incorporation of PDFs as part of the proposed action, if cultural resources are discovered during project implementation, includes suspension of project activity in the vicinity of the site until an evaluation can be made by a qualified archaeologist to determine appropriate actions focused on preventing loss of significant cultural or scientific values (USDI BLM 2015, 2016).

- The BLM would conduct post-harvest inventories for units located within the Coast Range eco-region (USDI BLM 2015, Appendix D). The BLM would accomplish these post-harvest inventories via the district-wide annual post-harvest survey program.

- The BLM would design all inventories utilizing a GIS probability model to identify all areas within the project that have High, Medium, and Low probabilities (see staff report pp. 11 incorporated by reference) for containing cultural resource sites based on degree of slope and proximity to water. of The BLM would survey 100 percent of High probability acres unless on the ground conditions (e.g., impenetrable brush) prevent access to a specific, targeted area. In addition, the BLM would survey a 20 percent random sample of Medium probability acres. The BLM would not inventory Low probability acres, though some may be covered inadvertently. Pedestrian survey would consist of parallel linear transects spaced no more than 30 meters apart and clearing 1 × 1 meter surface scrapes down to mineral soil every 30 meters, or as determined by terrain.

Hydrology

Issue 11: How would the proposed thinning and group selections affect summer streamflow quantity in fish habitat?

The BLM eliminated this issue from detailed analysis because there is no possibility of significant detrimental effects. The proposed vegetation management would not result in a prolonged (years) reduction in summer streamflow quantity (i.e., low flow) in fish habitat.[14]

The BLM is proposing to treat up to 2,000 acres annually from approximately 81,948 potential treatment acres in 51 subwatersheds[15] north and south of the Umpqua River and in the Coquille and Coos River basins. Most BLM potential treatment acres are relatively young, annual treatments would consist mainly of thinning, and no group select openings would be created in the RR. Seventy-eight percent of the potential treatment acres are in the LSR, and nearly 84 percent of

[14] The BLM defines fish habitat as the mapped upper extent of Coho and steelhead distribution, and the mapped upper extent of Coho Critical Habitat.

[15] The 51 subwatersheds range in size from 9,072 acres (Upper Camp Creek) to 36,315 acres (Dean Creek-Umpqua River). Drainages nest within these subwatersheds, and drainages may contain one or more potential treatment units. Catchments containing a stream reach or reaches nest within drainages, and potential treatment units overlap portions but not entire catchments.

these LSR acres are 30–60-years old. Fifty-eight percent or 8,511 acres of the approximately 14,625 acres of Class I RR potential treatment acres are 50–60-years old and the remainder of the acres are 30–40-years old.

Forest vegetation can reduce low flow by intercepting rainfall that evaporates and transpiring soil moisture. Stand treatments can increase low flow by reducing both interception and transpiration (Moore et al. 2020). Streamflow changes are proportional to the amount of forest cover removed (Bosch and Hewlett 1982, Harr 1976, Harr et al. 1979), and harvested areas do not permanently change streamflow. The growth of forest vegetation following harvest can reduce low flow as rainfall interception and transpiration increase.

The BLM expects that the proposed thinning of 30–80-year-old stands with scattered, small group selections outside of the RR would produce relatively small and short-lived (few years) low flow surpluses relative to existing conditions without trending to low flow deficits relative to existing conditions. This expectation is based on results from regional experimental forest studies. Perry and Jones (2016) found that, relative to clearcutting entire catchments, initial summer streamflow surpluses were lowest and disappeared most quickly in a 50 percent thinned catchment, and summer streamflow deficits did not emerge over time in this 50 percent thinned catchment or in a catchment where small patch cuts (1.5–3.2 acres), some overlapping streams, occupied 30 percent of the area. Thinning of mature to old-growth forest produced streamflow surpluses for only five years in the H.J. Andrews Experimental Forest and less than 10 years in the South Umpqua Experimental Forest (Perry 2007). Thinning and small patch cuts produce less low flow surplus than clearcutting because remaining vegetation uses some of the soil moisture that becomes available following timber harvest (Reiter and Beschta 1995, Satterlund and Adams 1992, p. 253), Soil moisture potentially available for streamflow is also reduced by the growth of residual understory vegetation that increases rainfall interception and evapotranspiration. Catchments with riparian stream buffers may experience less of an initial post-harvest low flow increase than those without riparian buffers because transpiration from riparian forest can have a greater effect on streamflow than transpiration from upslope stands (Moore et al. 2020). In contrast, trees remaining after harvest exhibit declining transpiration with increasing age (Moore et al. 2004, Perry 2007, Perry and Jones 2016) potentially freeing some soil moisture for streamflow.

Because streamflow changes are generally proportional to the amount of forest cover removed, Alternative 3 would produce less low flow surplus than Alternative 2. Alternative 3 specifies a higher RD (40–45 versus 20–30), no harvest in stands greater than 70 years old, no thinning of Class I RR, and smaller group selections not to exceed 0.25 acres. Alternative 3 omits approximately 4,087 acres of 80–year-old LSR, 3,547 acres of 30–60-year-old LSR, and 14,625 acres of 30–60-year-old Class I RR from the potential treatment acres. Alternatives 2 and 3 are farther apart on paper than they would be in actual implementation, however. Both alternatives specify thresholds for RD, canopy cover, and trees per acre to limit treatment intensity. The BLM would not treat all potential treatment acres, and the BLM would not approach the thresholds in many cases because of varied treatments dictated by stand composition, management objectives, harvest feasibility, etc. BLM's post-harvest monitoring of RR thinning provides an example of the latter. BLM resource staff measured five plots in December 2021 in the Outer Zone Class I RR of the Nest Egg timber sale which was analyzed under the West Fork Smith River EA (DOI-BLM-ORWA-C030-2017-0001-EA) and found that RD, approximate percent canopy cover, and trees per acre averaged 35, 50, and 82, respectively (Spencer 2021). This RD value falls within the 35–

45 range specified in this EA, but the canopy cover and trees per acre values are greater than the 30 and 60 percent project targets. Leaving more of the forest means less immediate change in interception and transpiration, and less potential streamflow change.

The Alternative 2 group selections are a more intense treatment than either the Alternative 3 group selections or the proposed thinning, so they have more potential to initially create low flow surplus and perhaps eventual low flow deficit. The initial or direct[16] effect to streamflow is however lessened by limiting the size of group selections, retaining 10–20 trees per acre on average in a variety of spatial patterns in modified group selections, and locating group selections outside of the RR. Perry and Jones (2016) suggest that even-aged plantations in 20 acre or larger clearcuts are likely to develop summer streamflow deficits, but the maximum group selection size proposed in this EA is four acres or just one-fifth of this 20-acre size. Also, modeling by Abdelnour and others (2011) demonstrated that streamflow response is sensitive to harvest distance from the stream channel: "This streamflow sensitivity to harvest location stems from the fact that subsurface flow generated from an upland clearcut area, as opposed to a lowland clearcut area, has a relatively longer flow path. This longer flow path subjects subsurface flow to downslope plant water intake, which reduces the amount of water that reaches the stream channel."

The indirect[17] effect to streamflow is tempered by managing these group selection openings with fewer trees per acre than either BLM's Harvest Land Base or the tree densities reported in regional studies. LSR Management Direction requires reforestation of group selections with at least 75 trees per acre whereas the BLM's Low Intensity Timber Area and Moderate Intensity Timber Area have 130 and 150 trees per acre minimums, respectively. These values are far less than the densely planted clearcuts with greater than 360 trees per acre studied by Perry and Jones (2016). Fewer trees mean less interception and transpiration, and more soil moisture potentially available for streamflow.

The proximity of fish habitat to the potential treatment acres, and the anticipated relatively modest low flow surplus response lessen the probability that fish habitat would be exposed either directly or indirectly to a substantially different post-treatment flow regime. Less than six percent of the 1,522 miles of streams with fish habitat in the 51 subwatersheds are located adjacent to potential treatment acres. There would be more flow response in the first and second order[18] headwater streams adjacent to treatment units than in the higher order streams where fish habitat is located (Reiter and Beschta 1995, Surfleet and Skaugset 2013). Catchments have greater variability in streamflow and show a relatively larger impact of land use change than larger drainages and subwatersheds (Pilgrim et al. 1982). A continual supply of large wood from the RR to the proposed treatment unit streams would increase the storage of sediment and organics in and upstream of fish habitat, boosting the storage of water including flow surplus, however small. The magnitude of any treatment-related low flow response would be within the range of streamflow variability which is influenced by several factors other than tree harvest including climate, changes in stream morphology, and changes in forest species composition and cover due to forest succession and disturbance. The magnitude of low flow response would also attenuate downstream

[16] Direct effects are caused by the action and occur at the same time and place (USDI-BLM 2008).
[17] Indirect effects are caused by the action and are later in time or farther removed in distance (USDI-BLM 2008).
[18] First-order headwater streams have no tributaries. When two first-order channels join they form a second-order stream. When two second-order channels come together they form a third-order stream, and so on (Strahler 1957).

as a broader mosaic of stand ages occurs (Coble et al. 2020), and the low flow response would not be measurable at the subwatershed scale (USDI BLM 2016a, pp. 408–409).

This issue does not require further analysis because the retention and arrangement of vegetation would lessen post-treatment low flow response, and fish habitat, mostly beyond the bounds of the potential treatment acres, would not experience a significant detrimental treatment-related change in low flow quantity.

Issue 12: How would the proposed Outer Zone Riparian Reserve thinning and upslope vegetation management affect summer stream temperature in fish habitat?

The BLM eliminated this issue from detailed analysis because there is no possibility of significant effects. Based on information in the RMP/EIS and the Biological Opinion for the RMP summarized below, it is unlikely that the BLM's proposed vegetation management would increase summer stream temperature in the small amount of fish habitat adjacent to potential treatment acres. If summer stream temperatures are maintained within treatment units, then there would be no temperature effect downstream where greater than 94 percent of the fish habitat is distributed in the 51 subwatersheds.

The BLM already analyzed the effect of Outer Zone RR thinning on summer water temperature in the 2016 RMP/EIS to which this EA is tiered, and there would be no reasonably foreseeable effect beyond that disclosed in the RMP/EIS (USDI BLM 2016a, pp. 369–384). The RMP/EIS concluded that a limited number of perennial and fish-bearing stream miles would be susceptible to shade reductions and potential summer stream temperature increases if the BLM thinned Outer Zone RR in areas with less than 40 percent canopy cover in the Inner Zone. BLM-managed forests 30–80-years-old have Inner Zone canopy cover greater than 40 percent (**Table 27**); therefore, there will be no thinning-related summer stream temperature increases.

BLM's proposed tree tipping from the Inner, Middle, and Outer Zones of the RR for fish habitat creation and enhancement would not affect shade enough to produce a measurable increase in summer stream temperature. Most energy for summertime stream heating comes from solar radiation (Boyd and Sturdevant 1997) so it is important to maintain near-stream riparian vegetation that has a greater potential impact on stream shade production than riparian vegetation located farther away from the stream (EPA 2013). The BLM would maintain this near-stream riparian vegetation by not thinning within the Inner and Middle Zones of perennial and fish-bearing streams, and snag creation and tree tipping (0 to 15 square feet of basal area per acre) throughout the RR would not reduce Inner Zone canopy cover below 40 percent. The National Marine Fisheries Service does "not expect a measurable change in temperature from tree tipping without a substantive reduction in stand density (overall less than 40 percent canopy cover)" (USDC-NMFS 2016, p. 206). Also, Everest and Reeves (2007) report that although little research has been done on group selection opening dynamics in riparian buffers, it is reasonable to assume that stem snap of weakened trees and uprooting of healthy trees during small-scale wind events are normal disturbance processes that probably have minimal effects on summer and winter water temperatures. Likewise, the BLM expects that the felling of trees into streams for fish habitat, which is analogous to the toppling of trees due to stochastic events, would have minimal effect on summer stream temperatures (i.e., not result in measurable summer stream temperature increases within or downstream of treated acres).

Potential treatment acres are higher in the drainage network, and streams that originate in or flow almost entirely through these potential treatment acres are typically cool. Less than two percent or approximately seven miles out of a total of 515 miles of streams flagged as temperature impaired by the Oregon Department of Environmental Quality are adjacent to potential treatment acres according to the 2020 303(d) list. There are no temperature-listed stream miles adjacent to potential treatment acres in 43 of the 51 subwatersheds. In the eight subwatersheds where listed waterbodies are found adjacent to potential treatment acres, BLM management is not the root cause of impairment; listed waterbodies are lower in their respective subwatersheds where temperatures are normally higher, listed waterbodies including main stem streams, rivers and one slough are wide and difficult to shade (e.g., Tioga Creek, West Fork Smith River, Isthmus Slough), and listed waterbodies flow through several miles of private land where riparian buffers are not as wide as the RR. The Umpqua Field Office hydrologist deployed continuous water temperature loggers in previous BLM harvest units in the Coquille River basin and the data shows cool water before and after upslope and RR thinning. This RR thinning completed under the Northwest Forest Plan occurred closer to streams than is now allowed under the 2016 RMP. Continuous temperature loggers were placed at the downstream edge of four units (Steele 15 CT, Cloud 19 CT, Whiskey Train CT, and Triple Creek) between 2010 and 2017, and the 27 individual continuous data files (22 pre-harvest and 5 post-harvest) produced seven-day-average maximum temperatures[19] ranging from 54.9 to 60.6 °F (58.5 °F average). These values are below both the criterion for subwatersheds that support core cold-water habitat (60.8 °F) and the criterion for subwatersheds that support salmon and trout rearing and migration (64.4 °F). The BLM reasonably expects that this data, gathered from forests 50 to 80 years old, is representative of conditions elsewhere on BLM-administered land, and the BLM reasonably expects to continue meeting Oregon Department of Environmental Quality temperature standards while implementing the RMP.

BLM's proposed vegetation management would produce a relatively small and short-lived summer streamflow response with negligible influence on summer stream temperatures. Perry (2007) concluded "variable-intensity logging prescriptions over small areas to approximate natural forest structure may have the least effect on summer streamflows," and the bulk of BLM's proposed vegetation management is LSR variable density thinning. Other things being equal (e.g., stream width, shade), streams with greater water volume warm more slowly than streams with less water volume. Anticipated relatively small summer streamflow surpluses would increase stream volume only slightly and therefore have little effect on summer water temperatures.

This issue does not require further analysis because a thinned RR with or without tree tipping would continue to provide enough shade to prevent detrimental stream temperature increase in fish habitat and upstream of fish habitat.

Issue 13: How would the proposed thinning and group selections affect water quantity for human consumption and domestic use surface water points of diversion?

[19] The seven-day-average maximum temperature is the average of the daily maximum stream temperatures for the seven warmest consecutive days during the summer.

The BLM eliminated this issue from detailed analysis because there is no possibility of significant detrimental effects to water quantity for human consumption and domestic use surface water points of diversion. There is no possibility in part because the proposed vegetation management would produce modest low flow surpluses which, however small and short-lived, would increase water quantity for human use (see **Issue 11**).

There is also no possibility of significant detrimental effects to water quantity because points of diversion are removed spatially from the potential treatment acres eliminating water users' exposure to a substantially different post-treatment flow regime. The BLM Umpqua Field Office hydrologist searched the 2021 Oregon Water Resources Department water rights layer in GIS to identify all human consumption and domestic use, including domestic use expanded and group domestic, surface water points of diversion within five miles downstream[20] of potential treatment acres. Human consumption is the use of water for the purposes of drinking, cooking, and sanitation, domestic use is the use of water for human consumption, household purposes, domestic animal consumption that is ancillary to residential use of the property or related accessory uses, and domestic use expanded is use of water in addition to that allowed for domestic use, for watering up to 0.5 acre of lawn or noncommercial garden. All three categories fall under drinking water supply, a beneficial use of water under Oregon law. Group domestic is the use of water for domestic use by more than one residence or dwelling unit, and group domestic falls under community water supply (OWRD 2022). Twenty-nine of the 51 subwatersheds that make up the analysis area have no points of diversion within five miles of potential treatment acres. Another 13 subwatersheds have a total of 54 points of diversion within five miles of potential treatment acres, but the points of diversion are lower in drainage networks on larger named streams, main stem rivers, or lakes that would not be expected to go dry even in less than average rainfall years. This leaves nine subwatersheds where points of diversion are on smaller, typically unnamed streams or springs within or near potential treatment acres. One of these subwatersheds has two points of diversion on smaller waterbodies and the other eight subwatersheds contain both points of diversion on larger waterbodies and points of diversion on smaller waterbodies. All together there are 30 points of diversion on smaller waterbodies in these eight subwatersheds, 16 within potential treatment acres. If the BLM chooses to treat units containing points of diversion, the BLM would protect points of diversion and water transmission infrastructure from damage by excluding harvest in portions of treated units. Water users closer to treatments would benefit the most from flow surplus because catchments have greater variability in streamflow and show a relatively larger impact of land use change than larger drainages and subwatersheds (Pilgrim et al. 1982).

There is also no possibility of significant detrimental effects to surface water drinking water source areas because the four public water systems that utilize runoff from analysis area subwatersheds have intakes on larger waterbodies with year-round surface water, and the BLM's proposed vegetation management would not have a discernable effect on water quantity at intakes several miles downstream. Ten of the 51 analysis area subwatersheds are within the City of Myrtle Point source area, six subwatersheds are within the City of Coquille source area, three subwatersheds are within the City of Elkton source area, and one subwatershed is within the South Coast Water District, Inc. source area. Coquille and Myrtle Point have intakes on the main stem Coquille by

[20] The hydrologist arbitrarily chose this five-mile distance to capture a good representation of points of diversion both near and relatively far from potential treatment acres.

their respective towns, Elkton draws water from the main stem Umpqua near Elkton, and South Coast gets water from Siltcoos Lake.

One 25-acre groundwater drinking water source area with a spring overlaps LSR potential treatment acres in the Hudson Creek-North Fork Coquille subwatershed. If the BLM chooses to treat the forest in this source area, the spring would be included in the RR and water transmission infrastructure would be protected from damage by excluding harvest in a portion of the unit.

In conclusion, the retention and arrangement of vegetation would lessen post-treatment low flow response. Potential treatment acres containing surface water points of diversion would not be chosen for treatment or diversion and transmission infrastructure would be protected from treatment-related damage, and smaller waterbody points of diversion in and near treated acres would not experience a significant detrimental treatment-related change in low flow quantity. The proposed thinning and group selections would not adversely affect water quantity at city and water district intakes, and the lone groundwater drinking water source area is known to the BLM and would be protected.

Issue 14: How would the proposed thinning, group selection openings, and new roads in currently susceptible rain-on-snow subwatersheds affect peak flow and stream channel morphology?

The BLM eliminated this issue from detailed analysis because the proposed actions in Alternatives 2 and 3 would produce minor, not significant, increases in mean response peak flow. Maximum group selection harvest and new road construction in Alternatives 2 and 3 would produce a two percent or less increase in mean response peak flow compared to Alternative 1 conditions, and BLM vegetation management would not change the form and function of stream channels.

Geographic and Temporal Scales

Like the BLM's RMP/EIS, this EA will only address harvest-related effects on peak flows in the rain-on-snow (ROS) hydroregion, an area above 2,000 feet in the Coast Range where shallow snow accumulations come and go several times each winter. Specifically, the BLM will evaluate potential treatment-related peak flow changes in the three ROS hydroregion subwatersheds that the BLM identified as susceptible to peak flow increase in the 2016 RMP/EIS (USDI-BLM 2016a, p. 391): Lost Creek-East Fork Coquille River (Hydrologic Unit Code (HUC) #171003050301), Camas Creek (HUC #171003050302), and Upper Rock Creek (HUC #171003050103). A fourth ROS hydroregion subwatershed containing potential treatment acres (33.7 acres of 30–60-year-old LSR and 19.7 acres of 30–60-year-old RR), Wilson Creek-Williams River (HUC#171003040101), is identified in the RMP/EIS, but it was not flagged as susceptible and will therefore not be evaluated in this EA. The 47 rain hydroregion subwatersheds containing potential treatment acres will also not be evaluated in this EA because the lower elevation rain hydroregion is less susceptible than the ROS hydroregion to detectable peak flow increase with increasing harvest.

The temporal scope for this issue evaluation is the period 2013–2063. During preparation of the 2016 RMP/EIS, the BLM calculated the total open area from timber harvest and roads for all lands in the Lost Creek-East Fork Coquille River, Camas Creek, and Upper Rock Creek subwatersheds as a percent of the total ROS subwatershed area by decade. The BLM compared this percent total open area to a peak flow detection threshold to determine susceptibility to peak flow increase. The percent total open area in the base year, 2013, provides context for anticipated all-lands management-related changes in total open area and peak flow susceptibility.

Methodology and Assumptions

The BLM's 2016 RMP/EIS Hydrology Issue 2 (USDI-BLM 2016a, pp. 384–394) utilizes an analytical method in Grant et al. (2008) to determine ROS subwatershed susceptibility to peak flow increase. For consistency, the BLM is using the same method for this peak flow analysis. Grant and coauthors (2008) acknowledge that no paired watershed studies provide data on practices commonly used today including green tree retention, extensive riparian buffers, and limited-ground-disturbance logging methods; however, the clearcut treatments and untreated control watersheds bracket the intensity of today's treatments and provide a reasonable frame of reference for interpreting the potential effects of today's practices. Grant et al. (2008) provide a semi-quantitative approach for evaluating peak flow changes in large basins (> 4 mi^2 to < 193 mi^2) with complex management histories, and the authors provide guidance to land managers for distinguishing potential major from minor effects.

Timber harvest openings change local hydrologic processes. In a ROS subwatershed, more snow tends to accumulate in canopy openings than the adjacent forest, and accumulated snow can melt rapidly during cloudy periods with warm winds and rain. (Harr and Coffin 1992). Rain plus rapid snowmelt increase peak flow, the instantaneous maximum discharge generated by an individual storm or snowmelt event, thereby raising the potential for streambed and streambank erosion.

Evaluation of ROS subwatershed susceptibility to peak flow increase begins with calculating the total open area from timber harvest and roads for all lands as a percent of the total ROS subwatershed area. This value corresponds to the percentage harvested in **Figure 12**. Values on the y-axis correspond to the percentage change in peak flow with a recurrence interval greater than one year.[21] Peak flow of this magnitude can affect channel morphology in the coarse-grained streams of the Pacific Northwest by initiating bedload sediment transport (Grant et al. 2008). Intersecting a vertical line from the percentage harvested to the maximum reported change line (maximum response) establishes the upper bound of potential peak flow response with a lower bound of no response. Grant and coauthors (2008) suggest that land managers interpret potential peak flow increase in large basins from **Figure 12**, with the predicted increase falling around the mean reported change line (mean response) in most cases. The gray shading around zero in **Figure 12** indicates the +/- 10 percent limit of detection. The mean response rises above this detection limit at a percentage harvested value of 19 percent indicating that at least 19 percent of a large basin would need to be in an open condition to detect a peak flow response.

[21] Recurrence interval is the average number of years between peak flows of a certain size.

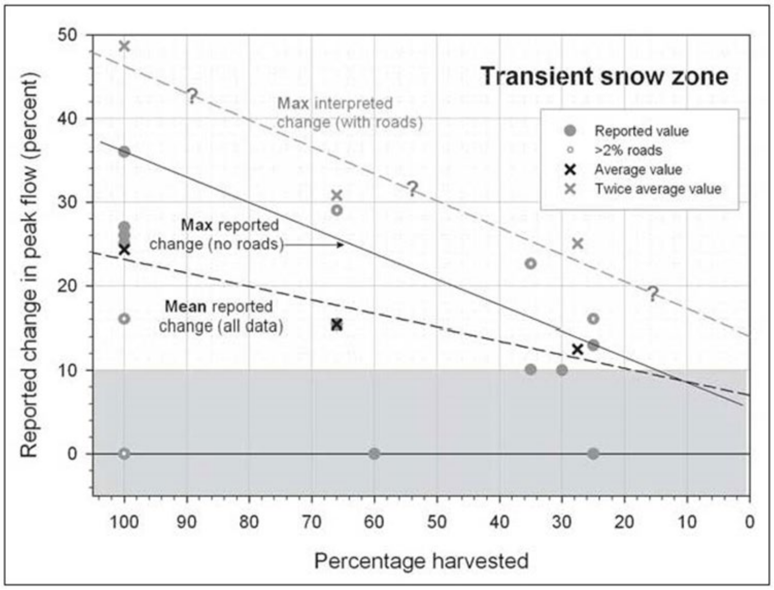


Figure 12: Peak flow response to harvest in the transient snow (ROS) zone. This graphic appears as Figure 10 on page 35 in Grant et al. 2008.

Road density, road connectivity, drainage efficiency, patch size, and riparian buffers affect interpretation of peak flow response (**Figure 13**). Grant et al. (2008) suggest that a greater weight of factors on the left side of **Figure 13** would lead to an interpretation of peak flow increase closer to the maximum response in **Figure 12**, and a greater weight on the right side would lead to an interpretation of increase at or below the mean response in **Figure 13**.

Likelihood of peak flow increase: High ←		→ Low	Potential considerations (High ↕ Low)
High	Moderate	Low	**Road density**
All or most	Some	Few or none	**Road connectivity**
Fast	Moderate	Slow	**Drainage efficiency**
Large	Small	Thinned	**Patch size**
Absent	Narrow	Wide	**Riparian buffers**

Figure 13: This graphic appears as Figure 12 on page 40 in Grant et al. (2008) with the caption “Site conditions and management treatment considerations that potentially influence peak flows. Considerations are listed in decreasing likelihood of effect. Grayscale represents theoretical range in impact of each factor (black = high, white = low).”

Grant et al. (2008) recognize that hydrologic effects may not be the same for areas with the same percentage of harvest but different harvest configurations. The authors predicted that hydrologic impacts would decrease in **Figure 14** presented order of diminishing intensity of treatment.

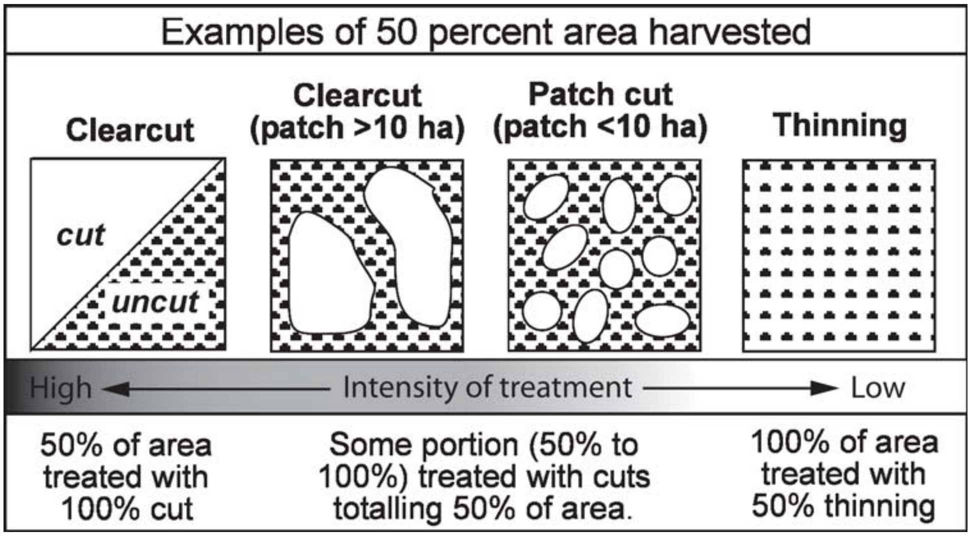


Figure 14: This graphic appears as Figure 3 on page 15 in Grant et al. (2008) with the caption "Forest harvest treatments that result in a reported value of 50 percent harvested. Theoretical intensity of treatment and predicted influence on peak flow changes decreases from left to right."

The 1- to 6-year recurrence interval peak flows considered in Grant et al. (2008) have little potential to affect certain channel types **(Figure 15**). Grant and coauthors (2008) found that regionally relevant studies do provide evidence that forest harvest can increase peak flows with recurrence intervals greater than one year, but these studies do not provide evidence that forest harvest increases peak flows with recurrence intervals greater than 6 years. Considering the recurrence interval for sediment transport in **Figure 15**, step-pool streams would likely retain their dimension, pattern, and profile (channel morphology) even when forest harvest increases peak flow.

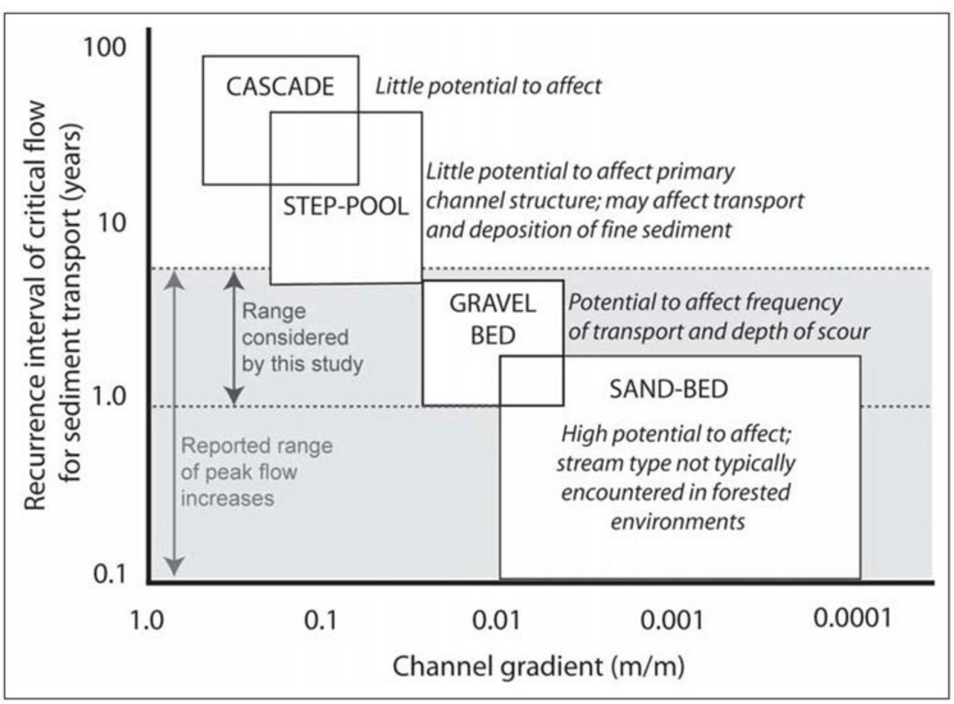


Figure 15: Initiation of bedload sediment transport as a function of channel type and recurrence interval. This graphic appears as Figure 13 on page 43 in Grant et al. (2008).

Affected Environment

The BLM assembled the data in **Table 21** during preparation of the 2016 PRMP/FEIS. The BLM Open Area values in **Table 21** represent projected early successional acres by decade in the Lost Creek-East Fork Coquille River, Camas Creek, and Upper Rock Creek subwatersheds. Early successional acres are very young forest (< 50 feet tall) with less than 30 percent canopy cover, with and without larger trees. The BLM used satellite imagery and vegetation classification to identify clearcut acres on non-BLM-administered land for the base period with available imagery (1996–2006), and these clearcut acres are in the Non-BLM Open Area column of **Table 21**. The BLM projected this rate of clearcut harvest forward in 10-year increments for 50 years. The BLM carried the Roads Area values forward from decade to decade in **Table 21** because after ten years of implementation of the RMP, the road system would be fully developed for the most part (i.e., the BLM would have built most of the road network necessary to provide access to the actively managed forest stands, and road construction would decline over time (USDI BLM 2016a, p. 401).

The **Table 21** Open Area values ((BLM Open Area + Non-BLM Open Area + Roads Area) / Total Area × 100) are at or slightly above the 19 percent peak flow detection threshold in **Figure 12**. The BLM classified these subwatersheds as susceptible to peak flow increase in the 2016 PRMP/FEIS because the Open Area values match (with rounding) or exceed 19 percent; however, the relatively small increase in Open Area relative to the Peak Flow Detection Threshold results in a less than one percent increase in mean response peak flow (10 percent (undetectable) to approximately 11 percent). It is evident in **Table 21** that harvest on non-BLM-administered land is the driver for the susceptible classification.

The BLM Umpqua Field Office hydrologist reviewed 2020 aerial photos square mile section by square mile section to determine the **Table 21** BLM Open Area Alternative 1 and Non-BLM Open Area acres for the susceptible subwatersheds. Open Area includes the bare ground of recent private clearcuts and BLM regeneration, and logging units planted in the last approximately five years with limited canopy cover. As described in footnotes 7 and 12 to **Table 22**, the BLM Open Area Alternative 1 values for Camas Creek and Upper Rock Creek include planned Upper Rock Creek EA regeneration harvest acres.

Table 21: BLM PRMP/FEIS Open Area calculations for comparison to Peak Flow Detection Threshold 2013–2063.

Subwatershed	Total Area (Acres)	Alternative*	Year	BLM Open Area (Acres)	Non-BLM Open Area (Acres)	Roads Area (Acres)	Open Area (Percent)	Peak Flow Detection Threshold (Percent)
Lost Creek-East Fork Coquille River	12,941.0	PRMP	2013	57.7	1,644.0	734.7	18.8	19
			2023	58.9			18.8	
			2033	1.4			18.4	
			2043	4.5			18.4	
			2053	55.9			18.8	
			2063	51.5			18.8	
Camas Creek	14,196.1	PRMP	2013	20.8	2,376.1	622.9	21.3	
			2023	20.8			21.3	
			2033	17.0			21.2	

Subwatershed	Total Area (Acres)	Alternative*	Year	BLM Open Area (Acres)	Non-BLM Open Area (Acres)	Roads Area (Acres)	Open Area (Percent)	Peak Flow Detection Threshold (Percent)
			2043	170.7			22.3	
			2053	231.0			22.8	
			2063	151.8			22.2	
Upper Rock Creek	18,440.2	PRMP	2013	170.8	2,519.6	1,007.2	20.1	
			2023	215.3			20.3	
			2033	160.7			20.0	
			2043	858.6			23.8	
			2053	817.5			23.6	
			2063	149.0			19.9	

*Proposed Resource Management Plan

Table 22: BLM Open Area calculations by Alternative for comparison to Peak Flow Detection Threshold.

Subwatershed	Total Area (Acres)	Alternative	Year[1]	BLM Open Area (Acres)	Non-BLM Open Area (Acres)	Roads Area (Acres)[2]	Open Area (Percent)	Peak Flow Detection Threshold (Percent)
Lost Creek-East Fork Coquille River	12,941.0	Alt 1	2020	100.4	987.1	726.1	14.0	19
		Alt. 2		1,027.9[3]		806.8[5]	21.8	
		Alt. 3		139.2[4]		781.1[6]	14.7	
Camas Creek	14,196.1	Alt. 1	2020	38.0[7]	2,575.0	635.7	22.9	
		Alt. 2		405.4[8]		682.4[10]	25.8	
		Alt. 3		58.8[9]		679.6[11]	23.3	
Upper Rock Creek	18,440.2	Alt. 1	2020	804.9[12]	3,552.5	1010.7	29.1	
		Alt. 2		863.3[13]		1,017.0[15]	29.5	
		Alt. 3		807.4[14]		1,015.7[16]	29.2	

[1] The most current aerial photos, 2020, were used to determine BLM Open Area and Non-BLM Open Area

[2] The Alternative 1 road area was determined using GIS assuming a 45-foot road width centered on the road

[3] 1,027.9 acres = 100.4 acres (2020) + 927.5 acres (4-acre maximum group selections on 25 percent of the 3,709.9 acres of 30–80-year-old LSR)

[4] 139.2 acres = 100.4 acres (2020) + 38.8 acres (0.25-acre maximum group selections on the number of 4-acre group selections that would occupy 25 percent of the 2,487.6 acres of 30–70-year-old LSR (0.25 × 155 4-acre openings))

[5] 806.8 acres = 726.1 acres + 80.7 acres (1 mile of new road construction per 260 acres of harvest (based on harvest and new road values from four previous EAs: Lone Pine, Fairview NWFP Project, Big-Vincent, and West Fork Smith River × 3,845.1 acres of 30–80-year-old LSR and RR in potential treatment acres × 5,280 feet per mile × 45-foot road width divided by 43,560 square feet per acre)

[6] 781.1 acres = 726.1 acres + 55.0 acres (1 mile of new road construction per 260 acres of harvest × 2,622.8 acres of 30–70-year-old LSR and RR in potential treatment acres × 5,280 feet per mile × 45-foot road width divided by 43,560 square feet per acre)

[7] 38.0 acres = 3.9 acres (2020) + 34.1 acres planned Upper Rock Creek EA regeneration harvest

[8] 405.4 acres = 38.0 acres (2020) + 367.4 acres (4-acre maximum group selections on 25 percent of the 1,469.4 acres of 30–80-year-old LSR)

[9] 58.8 acres = 38.0 acres (2020) + 20.8 acres (0.25-acre maximum group selections on the number of 4-acre group selections that would occupy 25 percent of the 1,334.5 acres of 30–70-year-old LSR (0.25 × 83 4-acre openings))

[10] 682.4 acres = 635.7 acres + 46.7 acres (1 mile of new road construction per 260 acres of harvest × 2,227.4 acres of 30–80-year-old LSR and RR in potential treatment acres × 5,280 feet per mile × 45-foot road width divided by 43,560 square feet per acre)

[11] 679.6 acres = 635.7 acres + 43.9 acres (1 mile of new road construction per 260 acres of harvest × 2,092.5 acres of 30–70-year-old LSR and RR in potential treatment acres × 5,280 feet per mile × 45-foot road width divided by 43,560 square feet per acre)

[12] 804.9 acres = 72.6 acres (2020 including completed Upper Rock Creek EA regeneration harvest) + 732.3 acres planned Upper Rock Creek EA regeneration harvest

[13] 863.3 acres = 804.9 acres + 58.4 acres (4-acre maximum group selections on 25 percent of the 233.5 acres of 30–80-year-old LSR)

[14] 807.4 acres = 804.9 acres + 2.5 acres (0.25-acre maximum group selections on the number of 4-acre group selections that would occupy 25 percent of the 171.9 acres of 30–70-year-old LSR (0.25 × 10 4-acre openings))

[15] 1,017.0 acres = 1,010.7 acres + 6.3 acres (1 mile of new road construction per 260 acres of harvest × 300.0 acres of 30–80-year-old LSR and RR in potential treatment acres × 5,280 feet per mile × 45-foot road width divided by 43,560 square feet per acre)

[16] 1,015.7 acres = 1,010.7 acres + 5.0 acres (1 mile of new road construction per 260 acres of harvest × 238.4 acres of 30–70-year-old LSR and RR in potential treatment acres × 5,280 feet per mile × 45-foot road width divided by 43,560 square feet per acre)

Environmental Effects

Alternative 1

The Lost Creek-East Fork Coquille River Alternative 1 Open Area is below the 19 percent peak flow detection threshold. The 2020 Open Area value in Table 22: BLM Open Area calculations by Alternative for comparison to Peak Flow Detection Threshold.**Table 22** is approximately 5 percent lower than the 2013 value in **Table 21** mainly because of a reduction in Non-BLM Open Area (987.1 acres vs. 1644.0 acres). The Camas Creek and Upper Rock Creek Alternative 1 Open Area are elevated compared to their 2013 values; however, the greater Open Area, +1.6 percent and + 9 percent respectively, only result in an approximately one percent and two percent increase in mean response peak flow. These 2020 Alternative 1 Open Area values provide context for the BLM's proposed group selection treatments in Alternatives 2 and 3.

Alternatives 2 and 3

BLM Open Area acres are increased in **Table 21** Alt. 2 and Alt. 3 by the maximum amount of group selection openings. That is, this evaluation assumes that the BLM would thin and create the maximum amount of group selections on all potential treatment acres in the respective subwatersheds. This is unlikely because the BLM is proposing a relatively limited program of work, up to 2,000 acres of treatment in any given year from approximately 81,948 potential treatment acres. Treating the maximum number of acres is also unlikely because there would be stands or portions of stands that do not meet the criteria for treatment and some group selections would be less than four acres. Thinned stands are not counted as openings because they are not early successional as defined in the 2016 RMP/EIS.

Non-BLM Open Area is four to six times greater than the Alternative 2 BLM Open Area in Upper Rock Creek and Camas Creek. As such, harvest on non-BLM-administered land is largely responsible for the susceptibility of these subwatersheds to peak flow increase. Both subwatersheds are over the peak flow detection threshold, and BLM's proposed treatment with relatively small and scattered openings does little to add to the susceptibility. Constraining treatment to 30–70-year-old forest and creating group selections smaller than allowed under the RMP (0.25 acres vs. 4 acres) under Alternative 3 produces little variation in Open Area when compared to Alternative 1 and essentially no change in mean response peak flow. Alternative 2 with maximized group selection size increases Open Area compared to Alternative 1 in Camas Creek and Upper Rock Creek, but the mean response peak flow increases are small, one percent and less than one percent, respectively. Implementing Alternative 3 in Lost Creek-East Fork Coquille River would keep the Open Area below the peak flow detection threshold and implementing Alternative 2 would move the Open Area over the detection threshold by approximately three percent. This Open Area increase only results in an approximately two percent increase in mean response peak flow (nine percent (undetectable) to 11 percent).

Answers to the potential considerations in **Figure 13** lead to an interpretation of peak flow increase at or near the mean response, not the maximum response. Grant et al. (2008) listed the potential considerations in decreasing likelihood of effect meaning road density, road connectivity to streams, and drainage efficiency, the routing and timing of water delivery to a channel and through a stream network (Tague and Grant 2004), have more of an effect on peak flow increase than harvest patch size and riparian buffers. In a review of potential hydrologic effects of timber harvest and riparian buffers on stream flows, the National Marine Fisheries Service stated, "It is difficult to separate effects of timber harvest on stream flows from effects from roads, but the major influences appear to be from roads." (Collier 2005). Regarding **Figure 13**, the BLM classifies road density in the three subwatersheds as moderate based on information in the Oregon Watershed

Assessment Manual (WPN 1999, pp. IV-15–IV-16). The Manual considers road impacts to basin hydrology and assigns a moderate potential risk for peak flow enhancement when roads occupy 4–8 percent of a subwatershed. Roads occupy 4.9 to 6.4 percent of the subwatersheds under the maximum road area of Alternative 2. The BLM classifies road connectivity in **Figure 13** as some meaning there is a moderate likelihood of peak flow increase. Some level of road and stream connectivity in the forest is inevitable; however, contemporary forest practices, best management practices, and project design features lessen adverse effects to water resources. The BLM classifies drainage efficiency in **Figure 13** as moderate. Drainage efficiency is closely associated with connectivity so activities that hydrologically disconnect roads from streams slow drainage efficiency and decrease the likelihood of peak flow increase. Water movement through a stream network is a component of drainage efficiency and the RR on BLM-administered land and riparian buffers on non-BLM-administered land ensure a continual source of wood to streams. Wood and sediment accumulations slow flows and make channels more resilient to peak flow events (Collier 2005).

The patch size and riparian buffer potential considerations in **Figure 13** are important but less so than road density, road connectivity, and drainage efficiency according to Grant et al. (2008). Grant and coauthors (2008) do not define large and small patch size in **Figure 13**, but they do distinguish between clearcut patches greater than 24 acres and smaller patch cuts less than 24 acres in **Figure 14**. The BLM classifies patch size in **Figure 13** as small based on this 24-acre value, indicating a lower intensity of treatment and decreased hydrologic impacts. Thinned areas with dispersed group selections outside of the RR would affect patterns of snow accumulation and melt moderating peak flow by changing the volume and timing of runoff. Less snow accumulation would occur under areas of tree retention, and snow intercepted by retained canopy would melt faster than snow in openings because of greater surface area exposure to wind-aided transfers of heat (Harr and McCorison 1979). The BLM classifies riparian buffers in **Figure 13** as wide indicating a low likelihood of peak flow increase. Grant et al. (2008) include riparian buffers as a potential consideration at the large basin scale because riparian forests may reduce hydrologic connectivity between roads, compacted areas, and streams; however, the authors acknowledge that they are not aware of research that specifically links the presence, absence, or extent of riparian forests to changes in peak flows in mountain landscapes.

There is little risk that the proposed BLM vegetation management and road building in the headwaters of Lost Creek-East Fork Coquille River, Camas Creek, and Upper Rock Creek would increase peak flow to the detriment of channel form and fish habitat. Grant and coauthors (2008) indicate that peak flow effects on channel morphology are likely to be minor (i.e., little potential to affect channel structure but may affect transport and deposition of fine sediment) in most step-pool channels. Step-pool channels are typical within the potential treatment acres, and large wood and rock within these channels are resistant to movement, even with increasing flow. Lost Creek-East Fork Coquille River has no fish habitat; the Class III subwatershed has neither designated critical habitat nor high-intrinsic potential streams. Camas Creek and Upper Rock Creek are Class II subwatersheds that include designated critical habitat or high-intrinsic potential streams, but neither subwatershed has fish habitat adjacent to proposed treatments acres. Lower gradient gravel bed streams at lower elevations in the analysis area are more susceptible to erosion with peak flow increase than step-pool streams (**Figure 15**); however, it is unlikely that BLM's projected two percent or less contribution to mean response peak flow increase would be the causative factor for detrimental downstream channel change.

This issue does not require further analysis because Alternative 2 and 3 proposed actions would not produce significant increases in mean response peak flow. Maximum group selection harvest and new road construction in Alternatives 2 and 3 would produce a two percent or less increase in mean response peak flow compared to Alternative 1 conditions. An assessment of the potential considerations in **Figure 13** and **Figure 14** support an interpretation of peak flow increase at or near the mean response in **Figure 12**. Even with BLM vegetation management, the form and function of headwater channels without fish habitat would remain unchanged, and downstream channel effects are unlikely. Finally, the ROD/RMP does not prohibit timber harvest in subwatersheds identified in the 2016 RMP/EIS as susceptible to peak flow increase because the effects of timber harvest on peak flow increases are not certain to occur (USDI BLM 2016a, p. 32).

Issue 15: How would the proposed new roads in the Riparian Reserve affect sediment delivery to stream channels?

The BLM eliminated this issue from detailed analysis because new road construction, use, and decommissioning in the RR would result in minor (i.e., localized, short-term (hours)) sediment delivery to streams and not significant (i.e., widespread, chronic, and long-term (days)) sediment delivery to streams.

The 2016 ROD/RMP does not preclude the BLM from locating roads in the RR (USDI BLM 2016b, BMP R 03, p. 143), but new road construction in the RR is generally avoided for slope stability, water quality, and water quantity reasons. The BLM constructs comparatively few RR roads, so it is reasonable to expect that most new road miles for this project would be outside of the RR. For example, proposed new roads in the RR account for just 12 percent (**Table 4**) of the total new road miles in four previous thinning EAs (Lone Pine (DOI-BLM-OR-C040-2011-0006-EA), Fairview NWFP Project (DOI-BLM-OR-C030-2010-0001-EA), Big-Vincent (DOI-BLM-OR-C030-2011-0003-EA), and West Fork Smith River (DOI-BLM-ORWA-C030-2017-0001-EA)). The BLM also expects that most new road miles within the RR would be in the Outer Zone and not hydrologically connected to the stream network via surface drainage features. For example, 0.5 of the 0.6 miles of new RR roads in the West Fork Smith River were located 120 feet or farther from stream channels, a distance nearly four times greater than the mean sediment travel distance (31 feet) below ditch relief culverts on new roads in the Oregon Coast Range (Brake et al. 1997). There are three Class II subwatersheds in this proposed project where the intermittent stream Outer Zone begins 50 feet from the stream and five Class III subwatersheds that do not allow commercial timber harvest within 50 feet of intermittent streams. Roads constructed upslope beyond 50 feet with no culvert crossings, outsloped to disperse surface flow, or drained with sufficiently spaced ditch relief culverts (USDI BLM 2016b, BMP R 40, p. 149) pose little risk of delivering sediment to channels considering the mean sediment travel distance in Brake et al. (1997) and the results of Rashin and others (2006) who found that stream buffers were most effective at preventing sediment delivery when ground disturbing activities were kept at least 33 feet from streams.

The BLM installs few new stream crossing culverts for timber harvest, and it is reasonable to expect that this proposed project would also result in few new stream crossings. For example, the Lone Pine EA and Fairview NWFP Project EA each proposed just two new crossings on intermittent streams with eventual removal, the Big-Vincent EA had no new stream crossings, and the West Fork Smith River EA proposed two new perennial stream crossings and one new intermittent stream crossing, all to be eventually removed. The BLM would install new stream crossings during the Oregon Department of Fish and Wildlife's in-water work period (July 1–September 15), which falls within the BLM's dry season for roads.[22] The BLM would isolate worksites from the stream network with filter materials and bypass pumping of surface flow, if necessary, to minimize or prevent off-site sediment movement. The BLM anticipates decommissioning some new roads in the RR and some if not all stream crossings installed for vegetation management under this proposed project. Decommissioning work on segments of road with potential surface flow connection to streams would occur during the dry season for roads, and culvert removal would occur during the in-water work period to minimize potential impacts to fish.

This issue does not require further analysis because comparatively few new roads would cross into the RR, and sediment delivery from new RR roads would be minimized or eliminated by BMPs (USDI BLM 2016b, pp. 143–158 and EA **Appendix D**), and working within the designated in-stream period.

Issue 16: *How would the proposed wet season commercial haul affect sediment delivery to fish habitat?*

The BLM eliminated this issue from detailed analysis because there is no possibility of significant effects, such as widespread, chronic, and long-term (days) sediment delivery to streams from wet season[23] commercial haul. The BLM's management direction, project design features (PDFs), and Best Management Practices (BMPs) limit the amount of haul-generated sediment that reaches fish habitat.

There is a high probability that the use of hauling roads would introduce some sediment into roadside ditches and, in some cases, into streams (USDC NMFS 2016, p. 185). Although this EA does not identify and analyze specific haul routes and haul seasons by route, it does highlight the program of actions that the BLM would apply to subsequent decisions to prevent sediment delivery to fish habitat. Wet season haul on non-paved roads that cross or drain directly to fish habitat is of most concern. Hauling during the wet season would mobilize sediment that could potentially be delivered to streams, paved roads are the smallest contributors of sedimentation to streams, and the storage capacity of streams upslope from fish habitat minimize the amount of sediment reaching fish habitat at one time (USDC NMFS 2018, p. 122).

The BLM, according to management direction, must select and implement site-level BMPs to maintain water quality for BLM actions, and the BLM must implement road improvements including installing cross drains at appropriate spacing (USDI BLM 2016b, pp. 79–80). The BLM must also "suspend commercial road use where the road surface is deteriorating due to vehicular rutting or standing water, or where turbid runoff is likely to reach stream channels." Road deterioration in the absence of hydrologic connectivity or surface flow connection between roads

[22] Dry season for roads is generally June through October but may start or end earlier depending on seasonal precipitation. The dry season for roads is an annually variable period starting after spring rains cease and hillslope subsurface flow declines drying intermittent streams and roadside ditches (USDI BLM 2016b, p. 294).
[23] The BLM defines the wet season for roads as an annually variable period, generally November through May, starting with the onset of continuous fall rains which result in ephemeral and intermittent stream runoff and road surface and ditch runoff (USDI BLM 2016b, p. 307).

and streams is a contract administration problem and not a water quality concern. Suspending commercial road use before turbid runoff reaches stream channels or as soon as possible after it starts is a water quality concern, and the BLM addresses this concern with PDF #23 (**Appendix D)**.

Commercial use of roads with a surface flow connection to streams or wetlands would occur year-round provided the roads are paved or surfaced with durable rock of sufficient depth and appropriate gradation, and the roads are not rutting, developing a layer of mud, developing areas of standing water, and haul-related turbid water is not reaching streams or wetlands. The authorized officer would monitor the condition of BLM-administered roads with a surface flow connection to streams or wetlands and suspend commercial use if ruts are channeling water to fill slopes or ditches with direct discharge to streams or wetlands, if roads are developing a mud layer on running surfaces, if roads are developing areas of standing water, or if turbid road runoff is likely to reach streams or wetlands. The authorized officer would evaluate road conditions and allow commercial use after the area(s) in question are repaired to prevent sediment delivery to streams or wetlands, or sediment-delivery conditions cease.

This PDF incorporates BMP R 93 (USDI BLM 2016b, p. 157 and EA **Appendix D**, "during the wet season use durable rock surfacing and sufficient rock depth to resist rutting or development of sediment on road surfaces," and BMP R 97 (USDI BLM 2016b, p.157 and EA **Appendix D** "maintain the road surface by applying the appropriate gradation of aggregate… to protect road surfaces from rutting and erosion under active haul." This PDF also eliminates wet season haul on hydrologically connected natural surface roads, and natural surface roads have the highest potential fine sediment yield (USDC NMFS 2018, p. 97).

The BLM applies BMPs, including wet season road use BMPs R 93, R 94, and R 97 (USDI BLM 2016b, p. 157 and EA **Appendix D**), to protect fish habitat from adverse, haul-related sediment delivery. Interdisciplinary coordination on the Blair Creek all-season haul route in the Catching EA (DOI-BLM-ORWA-C030-2019-0003-EA) provides an example of the BLM implementing R 94 and increasing the frequency of cross drains prior to winter hauling activities. BLM road engineers incorporated the installation of three new culverts recommended by the Umpqua Field Office hydrologist into the Blair Creek contract package. The hydrologist identified two ditch relief culvert installation sites to better disconnect roadside ditches from Blair Creek fish habitat, and the hydrologist identified a third culvert installation site to take spring flow out of a roadside ditch and route it directly across the road for infiltration in the RR. After recommending road drainage work, the Umpqua Field Office hydrologist and District fisheries staff helped District engineers design a new fish passage pipe for main stem Blair Creek that complies with BMP R 17 (USDI BLM 2016b, p. 145 and EA **Appendix D**). The new, 12-foot-wide pipe eliminates the plugging potential of the existing three-foot diameter pipe, and the new pipe eliminates the potential for fill erosion and fill failure in fish habitat. This Blair Creek project package illustrates BLM's implementation of BMPs, and it also demonstrates how proposed timber sale road improvement can lead to better drainage on road segments that would otherwise not necessarily be treated.

The BLM has surface type information for 912 of the approximately 1,499 miles of road in the analysis area that fall within a 200-foot sediment delivery distance[24] of fish habitat. Approximately 16 percent of these miles are natural surface and are of no consequence to this issue discussion because they would not be used for wet season haul. Another 40 percent of these miles are paved, and paved roads have the lowest potential fine sediment yield (USDC NMFS 2018, p. 97). The amount of sediment eroded from road surfaces depends in part on the amount of precipitation, and there are a higher proportion of paved roads in the precipitation-dominated Coast Range province than in the drier Klamath province (USDI BLM 2016a, p. 402). Aggregate roads, where the BLM would focus the application of management direction, PDFs, and BMPs, account for about 44 percent of the 912 miles. Wet season haul would occur on a fraction of these fish-habitat-proximate road miles, and wet season haul, concentrated locally for a finite period, would be spatially and temporally separated throughout the analysis area.

Individual decisions would document BLM's steps to minimize haul-related sediment. Disclosing wet season haul routes, road surface types, proximity to fish habitat, and actions taken to disconnect road drainage from fish habitat would be part of this documentation. The BLM's robust program of sediment abatement, including management direction, PDFs with active contract administration, and BMPs, would limit the amount of haul-generated sediment that reaches fish habitat.

Issue 17: How would the proposed action affect slope stability?

Background

The Late-Successional and Riparian Reserve Restoration Management project occurs on LSR landscapes proposed for thinning treatments, which were not analyzed for landslide frequency or slope instability in detail in the RMP/EIS due to the assumed negligible increases in landslide risk. The RMP/EIS concluded that regeneration, or clearcut harvest, would increase the relative landslide density, but that thinning was assumed to not affect landslide risk, since in thinning unit, living trees with viable roots would remain in place to provide soil cohesion on slopes and transpire water, which is a causative factor in slope failures (USDI BLM 2016a, p. 394). For this reason, the RMP/EIS focused its analysis on the Harvest Land Base, where regeneration harvests were expected to occur.

The RMP/EIS explains that not all steep slopes are at high risk of landslides. The Tyee sandstone bedrock core area in the Coast Range is at a higher risk of landslides (USDI BLM 2016a, p. 395). Slopes are classified as a landslide hazard initiation area outside the Riparian Reserve if they are > 80 percent, except for the Tyee area, where it is a > 75 percent slope (ODF 2003). Comparatively, similar landslide initiation risk inside the Riparian Reserve in steep and convergent topography occurs on lower slopes (70 percent, except for the Tyee area, where 65 percent slopes are considered a threshold) (ODF 2003).

The RMP/EIS (p. 396) also acknowledged that roads do have the potential to increase landslide risk in addition to harvest activities. However, the BLM concluded that because the amount of new road construction was very small relative to the miles of existing roads, the increase in landslide risk because of new road construction was negligible. Further, the EIS states that most new roads

[24] The BLM modeled sediment delivery from roads for the RMP/EIS using a 200-foot distance to analyze existing roads paralleling streams and existing roads with inside ditches that carry concentrated flow.

under the RMP would be built on stable areas such as ridge top locations and would mostly be short in length. The BLM ensures road work meets BLM engineering specifications; these specifications prevent road failures.

Rationale

The effect of the proposed action and alternatives on unstable slopes in the project area is not analyzed in detail, because the RMP/EIS, to which this EA is tiered, concluded that regeneration, or clearcut harvest, would increase the relative landslide density, but that thinning was assumed to not affect landslide risk, since in thinning unit, living trees with viable roots would remain in place to provide soil cohesion on slopes and transpire water which is a causative factor in slope failures (USDI-BLM 2016a, p. 394). Retention of larger, living trees under all alternatives would provide soil cohesion and water uptake a causative factor in slope failures. The process below will avoid unstable areas and therefore the issues was not analyzed in detail since the proposed action does not have an effect on slope stability.

a. The BLM would follow the Management Direction in the Northwestern and Coastal Oregon Record of Decision and Approved Resource Management Plan (USDI BLM 2016b):
b. Soil Resources: The BLM would avoid road construction and timber harvest on unstable slopes where there is a high probability to cause a shallow, rapidly moving landslide that would likely damage infrastructure (e.g., BLM or privately owned roads, State highways, or residences) or threaten public safety' (USDI BLM 2016b, p. 90).
c. Riparian Reserve: Follow Zone-specific management direction for streams in Class I, II and III subwatersheds (USDI-BLM 2016b, pp. 71–74). The no-commercial harvest stream buffers that are 50' to 120' feet on perennial and intermittent streams ould further protect the areas with steep slopes that could initiate a shallow rapidly moving landslide.
d. Implement the pertinent Best Management Practices (BMPs) and Project Design Features (PDFs) for site-specific proposed activities. BMPs: (R 01 – R 52, R61-R 99, TH 01-TH 25) (ROD/RMP pp. 143–161). PDFs–Avoid piling machine slash piles on steep slopes (generally > 70 percent) or on active slides slopes where there is a high probability to cause a shallow, rapidly moving landslide that would likely damage infrastructure (e.g., BLM or privately owned roads, State highways, or residences) or threaten public safety.
e. The BLM would complete the following process in implementation project planning to comply with the management direction regarding shallow landslides and downslope risk (p. 90) and avoid impacting or creating unstable areas:
   1) Identify the High Landslide Hazard Locations and the downslope extent, determine the risk (high to low) when necessary.[25] Re-design roadwork, waste area or unit treatments and add site-specific project design feature (e.g., retention area, smaller group select area, extend Riparian Reserve, drop portion of unit, decommission road/pull culvert or unstable fill) to avoid landslide risk.

[25] When there is a high probability to cause a shallow, rapidly moving landslide that would likely damage infrastructure (e.g., BLM or privately owned roads, State highways, or residences) or threaten public safety.

2) Review and update TPCC withdrawn designations for mass movement category, before a treatment occurs, and determine proper operations adjustments or update the TPCC database if necessary.
3) Select BMPs and PDFs for proper road construction, waste site location, harvest locations, and slash pile burning.

Issue 18: How would project activities affect soil quality?

The BLM completed soil monitoring for pre/post timber sales from 2018 to present to determine the percent of detrimental soil disturbance (Page-Dumroese et al. 2009). The BLM has monitored a total of 126.7 acres; of those, 38 acres were pre-harvest monitoring, and 88.7 acres were post-harvest monitoring.

For the pre-harvest monitoring, the detrimental soil disturbance was 6.7–13.3 percent. For the post-harvest monitoring, the detrimental soil disturbance has never been over the 20 percent threshold and has ranged from 6.7 to 17.0 percent. Based on the geology and the NRCS soil data the soil types within in the proposed action are comparable and like the soil types that have been monitored: a fine-grained silty soil weathered from sedimentary rock (parent material).

On the Coos Bay District-managed lands, the district has concluded that the detrimental soil disturbance would be under 20 percent threshold because the BLM would follow the BMPs. The BMPs, high rainfall, thick vegetation, and mass amounts of organic matter make the soils resilient to management actions.

Rationale

The effect of the proposed action and alternatives on detrimental soil disturbance in the project area is not analyzed in detail, because effects and the nature of disturbance associated with the proposed action would not create substantive effects to soil productivity because the BLM would follow management direction and stay within the range of effects described in the PRMP/FEIS of soil disturbance. The extensive rationale is in the staff report which supports the following conclusions:

- The effects have already been analyzed in the RMP/EIS, to which this EA is tiered (USDI-BLM 2016a). The RMP/EIS concluded that:
    - Past monitoring data supports the conclusion that timber harvest disturbance is highly unlikely to exceed 20 percent because similarly harvested areas in/around the project area have been found to be below 20 percent.
    - Road construction activities have detrimental soil impacts and by their very nature limit vegetative growth. The analysis framework of the RMP/EIS accounted that new road construction would constitute up to five percent of the 20 percent limit on detrimental soil disturbance (p. 764). The RMP/EIS did not account for any road decommissioning that could mitigate detrimental disturbance (p. 753).
    - Hand pile burning, landing pile burning, and lop and scatter methods of fuel reduction treatment would not result in measurable detrimental soil disturbance. Hand-piling material that is smaller in diameter and in smaller piles typically does not generate lethal soil temperatures. Landing piles can be large enough to generate lethal temperatures, but the area already has detrimental soil disturbance from road construction. Neither manual or mechanical grinders to cut and disperse excess material

would result in detrimental soil disturbance that would be measurable at this scale of analysis (p. 756). Further, these treatments occur in areas (roads and landings) that have already have detrimental soil conditions. Effects would further be reduced because they would occur after the wetting rains when there is more moisture in the soil to protect the soil. The proposed fuel treatments would not contribute to detrimental soil conditions.

The BLM would comply with the management direction for Soil Resources in the ROD/RMP (pp. 89–90):

- Applying Best Management Practices (BMPs), as needed, to maintain or restore soil functions and soil quality and limit detrimental soil disturbance. See BMPs R 01–R 52, R61–R 99, TH 01–TH 25 (ROD/RMP pp. 143–161).
- Limiting the cumulative spatial extent of detrimental soil disturbance to < 20 percent of a treatment area.[26]
- Applying the 20 percent detrimental soil disturbance threshold, if the BLM proposes to treat 2,000 acres per year, then detrimental soil conditions from timber harvest, road work, and fuel treatments combined would not exceed 400 acres per year. The BLM would complete the following process in implementation project design to minimize disturbance to soils and stay within or below the 20 percent threshold:
- Identifying sensitive soils within proposed project boundaries, which most often include unstable or wet areas and modify the project to protect these areas.
- Selecting BMPs and design features for the site-specific conditions that would minimize effects.
- Identifying residual impacts from historic activities and calculate proposed disturbance from landings (~ 0.25 acres) and new roads[27] (~ 20' width). Providing site-specific feedback if individual sale areas are at risk of creating greater than 20 percent detrimental soil disturbance. The BLM would incorporate design modifications into the project and based on what would be most effective and appropriate for site conditions. These type of design modifications include adjusting the proposed treatment area, requiring operations over a slash mat, reutilizing existing disturbance features, or identifying restorative actions that the BLM can complete in conjunction with the sale (such as road decommissioning), such that post-project soil disturbance is projected to be < 20 percent.
- Following requirements in the RMP Monitoring Plan for Soils (USDI BLM 2016b, Appendix B, p. 127), in which the BLM evaluates a percentage of units post-

[26] The treatment unit is defined as the harvested/thinned areas plus green tree retention areas (skips) and snagging acres (if there are separate snag creation areas planned). The treatment unit does not include areas that are excluded from treatment such as inner/middle zone Riparian Reserve, areas that are dropped from the analysis due to wildlife nest trees or other sensitivities (e.g., Non-forest, TPCC, or landslide prone). In short, if it is a part of the silvicultural prescription, it is part of the treatment area, and if it outside the silvicultural prescription, it is not included.

[27] Permanent road construction acres would become a 'District Designated Reserve' land use allocation and not contribute to the 20 percent detrimental soil disturbance threshold. Temporary road construction and potential road decommissioning post-harvest would be incorporated in estimates of detrimental soil disturbance and contribute to the 20 percent detrimental soil disturbance threshold. For road decommissioning activities, the district assumes a 50 percent recovery factor if the roads are de-compacted, stabilized and reseeded, since that will accelerate soil recovery/function.

treatment to determine the percentage (acres) of detrimental soil conditions using the Forest Soil Disturbance Monitoring Protocol for a specific period.

Weeds

Issue 19: How would the alternatives affect the risk of invasive plant introduction and spread?

Rationale for Elimination:
The proposed vegetation management is considered but not analyzed in further detail because the potential for significant effects from the introduction, continued existence, or spread of noxious weeds or non-native invasive species are known to occur are in isolated sites and along BLM roadways. Infestations range from 0.01 to 15 acres (**Table 23**) and would, be in conjunction with direct control measures.

Table 23: Acres of invasive species mapped in the LSR Project Area (surveys from 2010-2022).

Species	Common Name	Total Acres
Acaena novae-zelandieae	Biddy-biddy	3
Brachypodium sylvaticum	False brome	50
Centaurea moncktonii	Meadow knapweed	14
Cirsium arvense	Canada thistle	10
Cytisus scoparius	Scotch broom	371
Genista monspessulana	French broom	152
Hendra spp.	English/Atlantic ivy	10
Rubus armeniacus	Himalayan blackberry	275
Ulex europaeus	Gorse	30

The BLM would implement invasive plant control projects in future project area(s) to prevent the introduction of new infestations and to reduce the potential spread of existing non-desirable plant species. Prevention measures include but are not limited to:

- Avoid creating soil conditions that promote weed germination and establishment. Retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives.
- Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas or restrict travel to periods when the spread of seeds or propagules is least likely. Move weed-infested sand, gravel, borrow, and fill material away from the project area.

- Inspect material sources on-site and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material.
- Survey the area where material from treated weed-infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled.
- Prevent weed establishment by not driving through weed-infested areas.
- Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent spread within the project area.
- Avoid acquiring water for dust abatement where access to the water is through weed-infested sites.
- Identify sites where equipment can be cleaned. Clean equipment before entering public lands.
- Clean all equipment before leaving the project site if operating in areas infested with weeds.
- Inspect and treat weeds that establish at equipment cleaning sites.
- Ensure that rental equipment is free of weed seed.
- Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing.

The BLM treats invasive plants per the Management Direction in the Northwest and Coastal Oregon Resource Management Plan/Record of Decision (p. 80). The Coos Bay District controls invasive plants in compliance with the Integrated Invasive Plant Management for the Coos Bay District Environmental Assessment (DOI-BLM-ORWA-C000-2017-0003-EA), the Aquatic Restoration Biological Opinion (ARBO II) and under the management directions consistent with the BLM manual 9015. This Manual includes invasive species risk assessments that are designed to work in conjunction with BLM's policy requiring that planning for ground-disturbing projects in the Field Office, or those that have the potential to alter plant communities, include an assessment of the risk of introducing noxious weeds. If there is a moderate or high risk of spread, the BLM would implement actions to reduce the risk and conduct monitoring of the site to prevent establishment of new infestations.

Herbicide application consists of the treatment of individual plants. No aerial application of herbicides for general brush eradication is authorized on lands managed by the Coos Bay District BLM. Application measures restrict the manner and conditions under which herbicides are applied. Application is limited to the use of truck-mounted sprayers, backpack and hand sprayers, and wick wipers. Other measures restrict application dependent on circumstances that include weather conditions, proximity to bodies of water and riparian areas, and proximity to residences or other places of human occupation.

Undesirable plant species control projects are based on the Coos Bay BLM Annual Treatment Plan, which prevents, controls, and/or contains undesirable plant species. The Coos Bay BLM treats invasive plants regardless of future timber sale area(s) (DOI-BLM-ORWA-C000-2017-0003-EA, Appendix K, PDFs #58–64). The mixture of private lands in the context of BLM O&C lands create a condition of routine ground disturbance, such that future BLM timber management actions would not significantly increase the likelihood of new infestations of undesirable plant species to occur when compared with the no-action alternative. The actions that would promote the introduction, growth, or expansion of the range of invasive plants, or new infestations are minimal between 0.25 acres to 15 acres. Therefore, the BLM expects negligible net changes in invasive plant populations under either action alternative when compared with the no-action alternative, therefore, no further discussion is necessary in this analysis.

Wildfire

Issue 20: How would the proposed treatments affect acres at risk from residual activity fuels associated with timber management?

Rationale for Elimination: The BLM eliminated this issue from further analysis because there is no potential for significant effects beyond those analyzed in the RMP EIS, to which this EA tiers. The 2016 RMP/EIS analyzed the effects of the RMP alternatives on post-harvest fuel loading (pp. 264–270). In that analysis regarding effects of residual activity fuels associated with timber management (**Issue 4**: What would the short-term and long-term effects of the alternatives be on the ability of the marbled murrelet to nest in the proposed project area?), the BLM used weighted variables to estimate risk categories based on predicted residual activity fuel following harvest, proximal location to Wildland Development Areas (WDAs), and Wildland Fire Potential which is hereby incorporated by reference (RMP/EIS p. 266). There are no new circumstances or information at the site-specific level that would be inconsistent with the analysis presented in the RMP/EIS.

Wildfire risk describes the likelihood, susceptibility, and intensity for a wildfire to adversely affect human values (e.g., life, property, and ecological functions and resources). The BLM considers WDAs a highly valued resource.

Historically, the BLM has treated a portion of residual activity fuels following timber management activities for both site preparation and hazardous fuels reduction purposes. The BLM incorporated these assumptions into the modeling as a reasonable expectation of future levels of treatments (RMP/EIS, p. 267). Within the project harvest areas, the BLM would implement BMPs and PDFs to reduce activity slash by using a combination of fuels treatment tools. Slash around landings would typically be treated by machine piling, covering the piles with plastic, and burning in the fall or winter when moisture is high and the chance of fire escape is low. Additional fuels treatment may include machine or hand piling and burning along roads that would remain open for public use, hand or machine pile and burn along property lines within the WDA, and slash, lop and scatter in Group Select Areas to reduce fuel depth and concentrations. A combination of these tools may be used after treatment if it is recommended by the fuels specialist and subsequently approved by the authorized officer that the residual activity fuel presents an unacceptable increase in risk. Fuels and slash disposal activities would focus on reducing material less than six inches diameter (tops, limbs, brush, etc.) because this is the size of material that contributes the most to fire spread and ignition potential.

The RMP/EIS analyzed how different timber management types (i.e., thinning vs. regen harvest) would affect the residual surface fuel loading (pp. 264–270). Thinning, along with moderate to light selection harvest had the lowest residual fuel loading weighted value—2—with heavy selection harvest scoring a 3 (RMP/EIS Table 3-37, p. 266). Based on review of the proposed action and the RMP/EIS, and the incorporation of Best Management Practices from the ROD/RMP (pp. 163–164), the Coos Bay BLM Fuels Specialist determined that fuel loading following treatment would be within the scope of effects analyzed in the RMP/EIS. Because the project effects would be within scope of those analyzed in the RMP/EIS, the BLM is not analyzing this issue in further detail.

Issue 21: How would the action alternatives affect wildfire hazard in the project area?

Rationale for elimination: The BLM eliminated this issue from detailed analysis because there is no potential for significant effects beyond those analyzed in the RMP EIS, to which this EA tiers. The FEIS contains analysis of the effects of the PRMP alternatives on fire hazard within close proximity to developed areas (pp. 253–264). The PRMP/FEIS defines close proximity to developed areas as a one-mile buffer around the West Wide Wildfire Risk Assessment Wildland Development Areas data layer. All of the acres proposed for treatment will have a similar short-term increase in wildfire hazard due to an increase in residual activity fuels. Approximately 21 percent of the acres proposed for treatment fall within the Wildland Development Area (WDA). The BLM focuses special attention on activities and impacts to the WDA, as they represent the areas most substantially affected by wildfire hazard. Areas outside the WDA have fewer values at-risk than WDA and wildfire hazard would be less affected. More aggressive fuel reduction treatments may be used in WDAs to reduce the hazard after stand treatment.

The PRMP/FEIS analyzed the stand-level fire hazard within close proximity to developed areas. Fire hazard refers to the ease of ignition, potential fire behavior, and resistance to control of the fuel complex, defined by the volume and arrangement of several strata, including surface, ladder, and canopy fuels (Calkin et al. 2010; PRMP/FEIS p. 254). **Table 24** shows the current stand-level fire hazard and the expected change in fire hazard under the RMP over 50 years within the WDA. The analysis assigned a value of Low, Moderate, Mixed, and High hazard at the stand level. The RMP/EIS analysis shows that 50 years of management under the RMP would increase the number of acres in Low and Mixed hazard areas and decrease the number of acres in High hazard areas by 33 percent.

Table 24: Stand-level fire hazard for BLM-administered lands on the Coos Bay District within the WDA, current condition, and condition in 2063

Stand-level Fire Hazard	2022 Condition* Acres/Percentage of BLM acres	Year 2063 Acres/Percentage of BLM acres	Change by Acreage
Low	12,875 17%	23,056 31%	14% increase
Moderate	2,852 4%	3,245 Acres 4%	<1% change
Mixed	23,089 30%	37,237 49%	19% increase
High	36,737 49%	12,016 16%	33% decrease

* Percentage represents total of BLM-administered lands in this condition

The RMP/EIS notes that fuels arrangement is only one of the many factors that influence fire behavior, and the RMP/EIS analysis could not account for all the complex interactions among fuels, topography and weather that influence fire behavior, resultant burn severity, and fire effects. However, the relative ranking of stand-level hazard using forest structural stage does provide a consistent basis for comparing treatment effects over time.

The RMP/EIS assigned structural stages to a relative ranking of stand level fire hazard (Table 3-34, p. 254). The stands proposed for treatment in the action area may begin with High, Moderate or Low fire hazard rating depending on stand density and structural stage.

Low to Moderate Wildfire Hazard Potential within the project area indicates that stands are likely to be able to grow over time, resulting in Mixed, Moderate, or Low fire hazard stands. The historical fire occurrence, in combination with the Wildfire Hazard Potential, further increases confidence in the likelihood that a particular stand would be able to grow to a structural stage that would have a higher resistance to stand replacement fires (RMP/EIS Table H-6, p. 1321).

The BLM acknowledges that treatment activities would increase fire hazard in the short-term (immediately after harvest) at the project level due to the increase in residual activity fuels (See fuels staff report pp. 3–5 for more information); however, the proposed fuel reduction tools incorporated into the project would reduce that hazard and the hazard would not exceed that which was analyzed in the FEIS. Furthermore, after 3–5 years the untreated activity fuels would break down and decay and the stands would have surface fuel loading similar to pre-treatment conditions as described previously.

In conclusion, effects from the alternatives on fire hazard were previously described in the analysis for the EIS (USDI BLM 2016a, pp. 253–264) and there are no new circumstances or information at the site-specific level that would change the effects anticipated for this EA. Therefore, the BLM determined that all action alternatives analyzed in detail would remain within the range of effects described in the RMP/EIS and did not present this issue in detail because it does not inform the decision.

Wildlife

Issue 22: How would the alternatives affect the ability of the action area to support coastal marten habitat and coastal marten populations, including proposed critical habitat?

Rationale for Elimination

The Biological Assessment (BA), which is incorporated by reference, includes an analysis of the biology of martens and their habitat needs (pp. 54, 73–76). This includes areas with a dense ericaceous shrub layer that have sufficient snags, defective trees, and trees with features to support marten resting and denning as well as to support the small birds and mammals that make up a majority of their diet.

<u>Potential Habitat in the Proposed Project Area</u>

The stands in the project area range from 5 to 18 or more miles from the nearest Extant Population Area (EPA), the only known areas where coastal martens persist. The nearest EPA is the Central Coast Oregon EPA which is characterized by shore pine and transitional shore pine-hemlock-Douglas-fir forests with a dense ericaceous shrub understory (Slauson et al. 2019a). This shore pine dominated forest does not extend beyond the dune system in Oregon and is not similar to the forest structure in any of the proposed unit pool.

To evaluate potential landscapes that could support a marten population, Schrott and Shinn (2020) postulate that a viable area that could support long-term marten occupancy is greater than 1,500 ha (about 3,700 acres). Using the 330 ha (816 acre) home range size (Moriarty et al. 2017), this would support about 4.5 female martens, and presumably 1 to 2 male martens. We acknowledge that a 1,500-ha block is not large enough to support a viable marten population in the long term unless there is connection between blocks, but it provides a metric for landscape evaluation. Martens appear to require at least 70 percent of their home range in suitable habitat conditions (Thompson et al. 2012), and we assume that they require at least that much at a landscape scale.

For marten to persist, there must be sufficient habitat at the landscape scale to support dispersal of juveniles from home ranges and ultimately sufficient connection on the landscape to allow for gene flow between areas (Slauson et al. 2019). Dispersal distances were found to be approximately twice as far, and survival was halved in intensively logged areas (Johnson et al. 2009). Schrott and Shinn (2020) modelled least cost corridors that martens could theoretically use for migration. However, all of their modelled routes require crossing of several sections of private land in addition to major roads and/or rivers and are unlikely to provide feasible dispersal pathways. Therefore, the BLM concludes that marten would not be able to travel to the proposed project area from any known marten population.

Surveys and Detections in the Project Area

There are 11 ad-hoc detections of individual martens in the project area from 1984–2018, 6 of which have a good or excellent reliability rating (reflecting the observers' confidence of their identification) (USDI BLM 2022). However, recent focused surveys using cameras and scat dogs have not detected martens. There are two published models evaluating the potential to support a marten in the project area (Slauson et al. 2019, Moriarty et al. 2021). Moriarty et al. (2021) identified two small areas of "suitable habitat" that partially overlap approximately 31 acres of the proposed units. None of the proposed units overlap areas that the Slauson et al. (2019) model predicts would have a high likelihood of containing marten habitat. Therefore, the BLM concludes that there is not currently sufficient habitat in the project area to support martens.

Potential of Project Area to Support a Marten Population

While there is no information about marten habitat selection in the proposed project area, the District Wildlife Biologist determined that martens would select areas with a dense ericaceous shrub layer that have sufficient snags, defective trees, and trees with features to support marten resting and denning as well as to support the small birds and mammals that make up a majority of their diet since these factors are important elsewhere in the range (Moriarty et al. 2019, Slauson et al. 2019a). To evaluate potential areas around the proposed unit pool that may support marten, we first buffered the unit pool by 2,183 m, the radius of the 1,500-ha landscape scale analysis area. Unlike the other federally listed species that overlap the proposed project area, the available information, including lack of verifiable survey data, distance from the nearest EPA, and minimal modelled suitable habitat overlapping the proposed unit pool (Slauson et al. 2019a, Slauson et al. 2019b, Moriarty et al. 2021), suggest that marten are not present. In our analysis for spotted owls and murrelets, we evaluated the effects using a suite of example sales. Since martens are unlikely to currently be present, and because they are reliant on much larger landscape-scale habitat to support a population than spotted owls or murrelets, we did a broader-scale analysis evaluating potential areas that could support martens at the home range and landscape scales rather than looking at a specific suite of sales.

We only included stands with a minimum canopy height of 50 ft to exclude plantations that are unlikely to support martens. In a habitat study in Lassen National Forest, researchers found a strong correlation with marten use and canopy cover at 63 percent (SD[28] 17) (Tweedy et al. 2019). Therefore, we only included stands that have between 40 to 80 percent canopy cover. The most influential of these habitat criteria appears to be the upper limit on canopy cover. We filtered out canopy cover > 80 percent because mature and old-growth stands with very high canopy lack observationally lack robust shrub cover due to insufficient light penetration. In general, though, forest stands within the analysis area have very high canopy cover. Interestingly, with these habitat criteria, many previously thinned stands are identified as habitat.

With these criteria, none of the analysis area supports at least 70 percent of a home range scale in suitable habitat conditions, the threshold noted in Thompson et al. (2012).

While there are sufficiently large blocks in Federal, State, or tribal management (Schrott and Shinn 2020), there is no evidence that these areas have suitable habitat over a large enough area to support a population. Therefore, the BLM concludes that there is not a marten population in the proposed project area.

Proposed Critical Habitat

The proposed units do not overlap with proposed critical habitat, so there is no potential for the proposed action or other action alternatives to affect critical habitat for coastal marten.

Issue 23: How would the alternatives affect the ability of northern spotted owls to disperse?

Rationale for elimination: Due to the nature of the proposed project and implementation of the PDFs, the ability of the landscape to support NSO dispersal would not differ regardless of whether BLM implements either of the action alternatives or selects the no-action alternative. Post-treatment, there would be at least 40 percent canopy cover in the LSR at the stand level, including treatment areas, group selection openings, and retention areas. Canopy cover would drop to 30 percent in the RR, but because these areas are narrow strips (a 240-foot-wide buffer along a fish bearing stream or a 100-foot-wide buffer around non-fish bearing intermittent streams) and linear, and because no treatment would occur in the Inner Zone RR, these areas would not present an obstacle to NSO dispersal. Similarly, other actions associated with implementation such as landings, roads, and yarding corridors would not present a barrier to dispersal due to their relatively small size (15–45 feet width) and linear nature. Therefore, there would be no net adverse effects to dispersal habitat, and no immediate effect to dispersing NSOs from either action

[28] Standard Deviation

alternative. As treated stands begin developing complexity characteristics (20–60 years), more habitat would become available for owl dispersal across the landscape, and dispersal habitat would begin to develop multi-layer characteristics and larger trees suitable for spotted owl foraging and ultimately nesting use.

Issue 24: How would the alternatives affect barred owl and northern spotted owl interactions?

Rationale for elimination:
As modelled in the RMP/EIS (pp. 947–973) to which this analysis tiers, none of the alternatives would result in a measurable difference in encounter rates between spotted and barred owls since habitat effects alone did not alter the negative population trajectory. RMP/EIS modelling shows a barred owl removal program would slow the spotted owl decline but would not change the trajectory downward (USDI-BLM 2016a, pp. 960–961).

In the 2011 Revised Recovery Plan for the Northern Spotted Owl (USDI-FWS 2011), the USFWS identified competition from barred owls as an important threat to spotted owls. Barred owls are more aggressive and more habitat generalists than spotted owls, but also are associated with the same spotted owl habitats and prey. As a result, barred owls are outcompeting spotted owls for both habitat and food (USDI-FWS 2011, Wiens et al. 2011, Wiens 2012, Wiens et al. 2014). Within the demographic study areas, there has been a sustained increase in the number of barred owls as measured by the proportion of spotted owl sites that overlap barred owl sites (Lesmeister et al. 2017, Lesmeister and Horn 2018, Lesmeister and McCafferty 2018). A summary of recent information from the demography study areas can be found in the BA which is incorporated by reference (pp. 38–39).

Franklin et al. (2021) evaluated long-term trends in the demography areas extending from Washington to California. They concluded that barred owls are a primary factor in the decline of the spotted owl population across its range. This conclusion is in line with previous studies evaluating barred owls' effects on spotted owls (Forsman et al. 2011, Wiens et al. 2014).

Dugger et al. (2016) modeled extinction and colonization rates for spotted owl pairs in the South Cascade Demographic Study area where they detected barred owls within spotted owl site territories. They found that extinction rates for spotted owls increased with decreasing amounts of old forest in the core area, and that the effect was two to three times greater when barred owls were detected. They also found that colonization rates for spotted owls decreased as the distance between patches of old forest increased (i.e., fewer spotted owl colonization with increased habitat loss and fragmentation), and that barred owl presence similarly decreased the rate of colonization of spotted owl pairs.

Both spotted and barred owls use mid-seral and older types of conifer forest with a preference for older forests, especially for nesting. However, barred owls appear to be more tolerant of younger and lower quality forest conditions and seem to use these forest stand types in proportion to their availability, while spotted owls are comparatively more reliant on older forests (Dugger et al. 2011, Wiens et al. 2014). Several researchers have suggested that while barred owls are a major driver in the spotted owl population decline, the amount of old growth and fragmentation of old growth is also a factor in spotted owl extinction rates (Dugger et al. 2011, Yuckulic et al. 2014, Franklin et al. 2021, Davis et al. 2022). While barred owls are a major driver of the spotted owl population, management of existing NRF habitat, along with actions such as the restoration activities proposed for this project to reduce fragmentation, are also essential to conserve the spotted owl (Franklin et al. 2021, Wiens et al. 2021).

Treatment of dispersal, dispersal-forage, and low-quality RF throughout the LSRs and RRs would not exacerbate the competitive interactions between barred and spotted owls as pre-project surveys would identify occupied spotted owl territories, which would be subsequently protected from treatments in the core area. Additionally, the proposed action limits habitat impacts in NRF habitat and in occupied spotted owl nest patch and core areas.

As discussed in Issue 2, over the 60-year analysis of the proposed action, habitat blocks of NRF capable of supporting spotted owl home ranges would increase under all three alternatives, with the greatest increase in habitat blocks if Alternative 2 were implemented. While this increase in NRF would help to improve old-growth habitat conditions, even with this increase, barred owls would continue to take over the landscape without barred owl control. Therefore, the BLM concludes that the proposed project would not change the effect of barred owls on spotted owls throughout the proposed project area.

Issue 25: How would the alternatives result in disruption of spotted owls?

Rationale for elimination: The BLM eliminated this issue because the BLM would survey for spotted owls prior to any work that may cause disruption. If there is a resident spotted owl or pair, the BLM would implement the PDFs which would ensure that disruption of nesting spotted owls would not occur.

Issue 26: How would the alternatives result in disruption of marbled murrelets?

Rationale for elimination: The BLM eliminated this issue because the BLM would implement seasonal and daily timing restrictions, per the PDFs within the disruption distance of trees with nesting structure as defined in the RMP (USDI-BLM 2016b, p. 98, footnote 36) unless protocol surveys determined that the area was unoccupied. With the implementation of surveys or PDFs, disruption to nesting murrelets would not occur.

Issue 27: How would treatments in stands with fewer than six trees with murrelet structure in a five-acre circle affect nesting murrelets?

Rationale for elimination: Young, dense stands sometimes contain remnant trees with suitable structure for murrelet nesting as defined by the RMP (USDI-BLM 2016b, p. 98, footnote 36). As discussed in **Issue 4**: What would the short-term and long-term effects of the alternatives be on the ability of the marbled murrelet to nest in the proposed project area?, murrelets have been documented to nest in stands that are primarily younger but contain remnant trees (Manley 1999, Nelson and Wilson 2002, Baker et al. 2006, Hamer et al. 2008, Silvergieter and Lank 2011). However, the BLM eliminated this issue because the likelihood of murrelets nesting in an area with fewer than six suitable trees in a five-acre area is discountable, so there are no measurable differences between alternatives. The RMP made a distinction between areas with more than six and less than six trees in a five-acre moving circle to allow treatment to occur in stands with small numbers of trees without surveys (USDI-BLM 2016b, pp. 98–100).

Numerous studies report that murrelets nest in areas with numerous platform trees, and select trees with multiple platforms (Naslund et al. 1995, Manley 1999, Nelson and Wilson 2002, Baker et al. 2006, Hamer et al. 2008, Silvergieter and Lank 2011, Wilk et al. 2016). Not all studies provided density of trees, but those that did reported an average of 13 to 26 platform trees per acre (32 to 63 platform trees per hectare (ha)) (Manley 1999, Nelson and Wilson 2002, Hamer et al. 2008, Silvergieter and Lank 2011, Wilk et al. 2016). The smallest number of suitable nest trees per acre reported is 2 trees per acre (5 trees per ha, Manley 1999). However, Manley (1999) used 5.9 inches (15 cm) as a minimum branch size, so presumably the study would have found a higher suitable tree if she had used a smaller minimum platform size. The RMP defines minimum platform size for a murrelet nesting structure as 4 inches (USDI BLM 2016b, p. 98, footnote 36).

Using a 4-inch limb size minimum, Nelson and Wilson (2002) reported a mean of 22 platform trees per acre (55 per ha), and a minimum of 4 platform trees per acre (10 per ha) in a nest tree study that included the Elliott, Clatsop, and Tillamook State Forests. Since those forests are relatively close to the proposed project area, the BLM assumes that murrelets selection would be similar in the project area. The study did not report minimum stand size.

As discussed in **Issue 4**, mean stand sizes reported in the literature range from 509 to 1,418 acres (Nelson and Hamer 1995, Manley 1999), with the minimum reported 5 acres.

From this information, the BLM concludes that there is no evidence that murrelets would select areas with less than six suitable trees in five acres for nesting. Therefore, treatments in those stands would not impact murrelets since the likelihood of them nesting in the area is discountable.

Issue 28: How would the alternatives affect Special Status Species, Bald or Golden Eagles, and migratory birds and their habitat?

Rationale for elimination: The BLM eliminated this issue because there is no potential for significant effects beyond those analyzed in the RMP/EIS to which this EA is tiered (pp. 832–852). This analysis concluded that habitat availability for Special Status wildlife and land bird focal species, dependent on forest stands would increase within 40 years in the LSR/RR. As the proposed activities under this EA fall within the effects analyzed in the EIS, the BLM has designed vegetation treatments in the proposed actions to contribute to the development of habitat for late-successional associated Special Status wildlife species within the project area. The EIS concluded overall benefits to these species based on an increase in habitat across the project area. As the proposed actions comply with the ROD/RMP and EIS, the BLM anticipates the same effects due to the implementation of the vegetation harvest prescriptions.

Special Status Wildlife Species

Table 25 shows the Special Status Species documented or suspected in the proposed project area. The BLM eliminated additional analysis for several reasons, including that any potential beneficial or adverse effects would not be measurable. The BLM discusses the species that would experience more than discountable effects (either beneficial or adverse) from the proposed area below.

Table 25: Special Status Species Documented (D) or Suspected (S) to occur on the Coos Bay District

Common Name	Scientific Name	Documented (D) or Suspected (S) in the proposed action area
Amphibians		
Foothill yellow-legged frog	*Rana boylii*	D
Birds		
Bald eagle	*Haliaeetus leucocephalus*	D
Purple martin	*Progne subis*	D
Invertebrates		
Pacific walker	*Pomatiopsis californica*	S
Western bumble bee	*Bombus occidentalis*	S
Mammals		
Pallid bat	*Antrozous pallidus*	D
Townsend's big-eared bat	*Corynorhinus townsendii*	D
Reptiles		
Western pond turtle	*Actinemys marmorata*	D

<u>Bald and Golden Eagles</u>
If the BLM documents either bald or golden eagle species to be nesting or roosting within the analysis area, BLM would implement buffers as described in the 2016 RMP to ensure that they are protected (USDI BLM 2016b, p. 97). Therefore, the proposed project would not impact bald or golden eagles under any of the proposed alternatives.

<u>Pollinators</u>
The BLM is eliminating this issue because the effects would be minor, immeasurable, and not significant at the landscape scale, given the context of mixed ownership with BLM O&C lands, and the fact that the proposed alternatives would not treat all potential action acres. Proposed LSR/RR treatments would provide smaller patches of early succession vegetation that can contribute to habitat for forest pollinators (Taki et al. 2018).

<u>Migratory Birds</u>
The BLM considered potential effects to migratory birds but did not analyze the issue in detail because there is no potential for significant effects beyond those analyzed in the RMP/EIS (USDI BLM 2016a, pp. 850–851). While the data is not available to predict future populations for these species, the BLM modeled in the EIS the changes in habitat availability for Bureau Sensitive and Strategic species (as of 2015) and focal landbird species (USDI BLM 2016a, pp. 850–851, 1,667–1,697) as a proxy for effects to these populations. The RMP/EIS concludes that the implementation of the RMP would lead to an increase in available habitat for most Bureau Sensitive and focal landbird species within the analysis area. Because of the large range of habitats utilized by migratory birds in a single season across migration routes, any project-level effects to migratory bird populations would be immeasurable and not significant under NEPA.

Issue 29: How would vegetation treatments and related activities affect visual resource management?

Rationale for elimination: The objective of Visual Resource Management is to maintain public lands in a manner that protects the quality of the scenic (visual) values of these lands (BLM Manual 8400.02). Visual Resource Management includes an inventory of all district lands and their corresponding management level classes, which are ranked I through IV. All the project area units are entirely within Visual Resource Management Class IV. The Northwestern and Coastal Oregon Resource Management Plan direction is to "Manage Visual Resource Management Class IV areas for high levels of change to the characteristic landscape. Management activities may dominate the view and will be the major focus of viewer attention" (USDI BLM 2016b, p. 94). The BLM dismissed this action from further analysis because the project area would retain the features of the surrounding landscape which is comprised of a patchwork pattern of some treated and intact stands of varying ages and would not have a discernable effect on the visual resource management of the area.

Issue 30: How would vegetation treatments and related activities affect recreation?

Rationale for elimination: A portion (approximately 9,502 acres) of the project area overlaps with the Dean Creek Elk Viewing Area Special Recreation Management Area and three Extensive Recreation Management Areas (the existing Blue Ridge Trail System and two areas proposed for development Smith River Corridor and Wasson Creek) in addition to non-Recreation Area Management lands. Management direction is to "Manage Special and Recreation Management Areas and Extensive Recreation Management Areas, identified in Appendix G, in accordance with their planning frameworks" and "Protect recreation setting characteristics within Special Recreation Management Areas to prohibit activities that would degrade identified characteristics." (USDI BLM 2016b, p. 88). Impacts to recreation opportunities were not analyzed in detail because the proposed portion (342 acres out of 1,146 acres) of the Dean Creek Elk Viewing Area Special Recreation Management Area is closed to public use via supplemental rule (published in Federal Register on March 12, 1992) and the alternative actions are consistent with the planning frameworks in all four Recreation Management Areas.

Recreational use in and near the project area, including non-Recreation Management Area lands, is predominantly dispersed, which includes wildlife viewing, hiking, driving, and hunting. While action alternative activities are occurring, the BLM or approved operator would close vehicle access to the project area when operation of equipment occurs. This would temporarily affect motorized access to recreation opportunities near the project when hazardous conditions exist. More than 300,000 acres on the Coos Bay District is designated as "limited to existing" roads and trail network unless closed or restricted due to circumstances such as public safety (USDI BLM, 2016, pp. 273–274). In comparison, the project area is proposed to treat approximately 2,000 acres in any given year. Temporary displacement of motorized access would not be discernable. The BLM recreation staff identified and dismissed this issue because the action alternatives do not directly or indirectly impact the ability of individuals to recreate within the Coos Bay District.

In addition, these issues were not analyzed in detail because they do not inform the decision and are not associated with environmental effects beyond those analyzed in the EIS (USDI BLM 2016, p. 41).

APPENDIX B ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

An alternative that would allow for no commercial harvest

The BLM has determined that cutting trees and yarding them away for purposes other than commercial sale does not warrant analysis because it is substantially similar in design to the alternatives that have been analyzed, and the effects would be substantially similar. As such, under a non-commercial alternative, the BLM would use manual restoration treatments to restore complex late-successional habitat in the LSR and ensure that stands are able to provide trees that would function as stable wood in streams in the RR. This alternative would not sell timber volume on the commercial timber market; instead, the BLM would pay contractors to cut, pile and burn the resulting slash so that stands reach 20–45 RD (densities that the RMP prescribes and that most effectively develop the desired features described in the Purpose and Need).

The Coos Bay BLM has conducted comparable non-commercial stand treatments in the form of Sudden Oak Death (SOD) eradication treatments. Chainsaw operators cut and pile the unwanted material in a stand and later burn the slash that results. As of 2022, these treatments cost approximately $5,000 per acre. The Coos Bay BLM spends approximately $500,000 annually on these treatments, and this cost is incurred because of Congressionally directed funds for the eradication of this non-native tree disease. A similar non-commercial alternative that manages stands at the scale described in the Purpose and Need is economically infeasible because the associated cost would be approximately $10,000,000 annually, a sum that is about twice the entire annual operations budget of the Coos Bay BLM including building lease fees, fuels reduction, road maintenance, tree planting, post-fire rehabilitation, recreation facility maintenance and more. Additionally, it is remote or speculative for the BLM to assume a new congressional mandate that would direct funds for these habitat development treatments when they can be feasibly conducted commercially and generate a revenue for the federal government.

APPENDIX C SILVICULTURE

Forestry principles used in the analysis

The Role of Relative Density

The 2016 ROD/RMP (p. 301) defines relative density as "*A means of describing the level of competition among trees or site occupancy in a stand, relative to some theoretical maximum based on tree density, size, and species composition. Relative density percent is calculated by expressing Stand Density Index (SDI) (Reineke 1933) as a percentage of the theoretical maximum SDI, which varies by tree species and range. Curtis's relative density (Curtis 1982) is determined mathematically by dividing the stand basal area by the square root of the quadratic mean diameter.*" The onset of competition is at 25 percent, 35 percent is the lower limit of full site occupancy, and 60 percent is associated with the lower limit of self-thinning, which is tree mortality (Long and Daniel 1990). The 2016 ROD/RMP specifies that when conducting commercial harvest in the LSR, stands are to retain 20–45 percent relative density (p. 66).

'Low Thinning' versus 'Selection/Free Thinning' Methods

Traditional thinning regimes are intermediate operations that are usually associated with even-aged systems but are also applicable to habitat development. Two classical thinning methods and their effects on stand development are of particular interest in this analysis: low thinning/thinning from below, which cuts mostly smaller trees to reduce densities while retaining a higher proportion of large trees, and selection harvest/free thinning, which allows for tree removal of various sizes to reduce densities. The former would remove entire cohorts of trees and simplify stand structure if diversity is present, but it promotes the development of the largest trees, which is desirable for some species. The latter allows for greater structural diversity, and adjustments of species composition over time when these elements are present. In addition to the stand maintenance operations such as thinning, multi-cohort management systems must consider regeneration or else the system cannot be sustained over time (O'Hara 2014, pp. 84–97). Group selection openings dynamics account for this.

Group Selection Opening Dynamics and Regeneration

York et al. (2004) and York and Battles (2008) studied the effect of various created group selection opening sizes on the residual stand growth and the new cohorts of trees that were established post-harvest. The results indicated that group selection needed to be larger than 0.6 hectares (ha) (about 1.5 acres) to avoid height suppression in the newly established seedlings, and that 1 hectare (about 2.5 acres) and larger maximized growth potential of seedlings. They also suggest that to maximize the availability of resources to the residual trees, thinning should also occur throughout the stand, rather than implementing group selection only. Group selections smaller than 0.5 an acre (0.2 ha) are associated with stunted tree growth; such a management approach would inhibit tree regeneration and is less likely to promote the development of multi-cohort stands, open grown trees or allow for shade intolerant hardwood persistence.

The Coos Bay Density Management Studies

In the mid-1990s, the BLM in western Oregon undertook a large-scale forest management study in collaboration with a group of researchers and ecologists. The objective of the study was to test the effects of various thinning intensities in high-density, even-aged Douglas-fir stands between the ages of 50 and 80, including a control that was not thinned. The study included two stand types, those that were previously thinned and those with no previous thinning entry. There are two study sites on Coos Bay District, the North Soup initial thinning study, and the Blue Retro re-thinning study. The variable densities that the BLM tested in North Soup are of the most interest (**Figure 16)**.

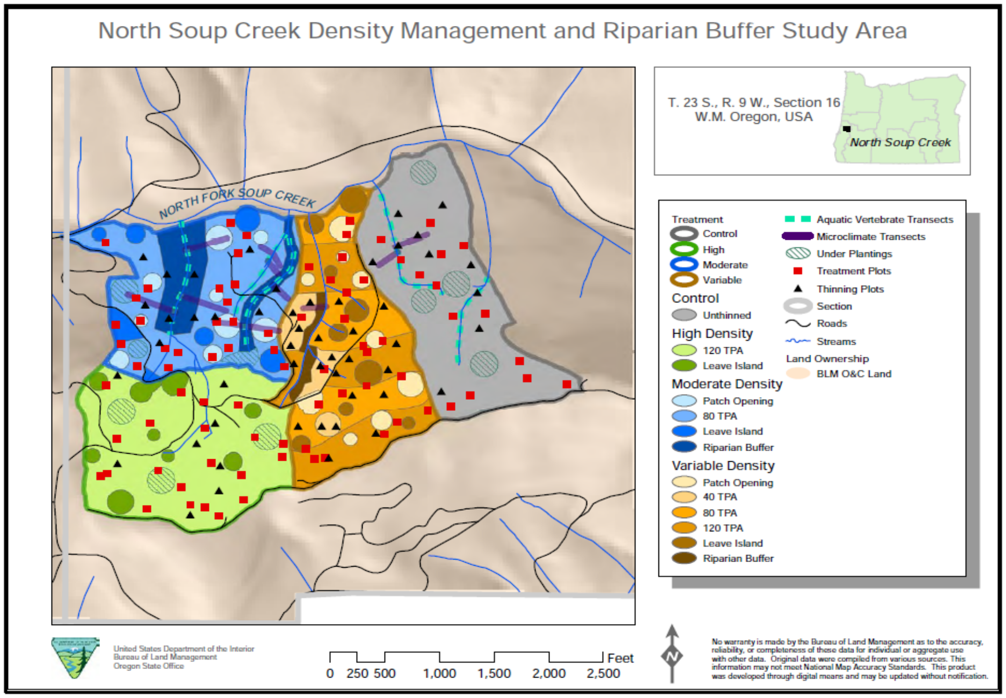


Figure 16: North Soup DMS prescriptions and design

The following are the prescription elements common to all densities:

- Thinning would generally be 'from below.' Leaving the largest trees will result in a somewhat clumpy distribution of overstory trees.
- Retain all hardwoods.
- Retain conifers that are minor species for that stand.
- Retain all understory conifers less than 5.0 inches in diameter.
- Retain all residual overstory trees from the previous old-growth stand.
- Retain all existing large down logs and snags from trees in the previous stand.
- Retain limby/wolf trees from all canopy levels.
- Select larger trees on the margins of root disease centers to thin around for coarse woody debris recruitment.
- Maintain or enhance species diversity. Vary spacing or marking guidelines as needed to retain desired species or even to retain a single tree.

In preparing this analysis, BLM foresters relocated three of the permanent plots in the North Soup experimental stand (approximately age 50 at the time of the DMS) and remeasured the trees to examine how the different densities impacted growth rates. After 22 years of growth, the untreated control area had an overstory diameter increase of only 3.6" DBH, a 20 percent increase. The moderately thinned area (approximately 30 RD) had an overstory diameter increase of 5.1" DBH, a 32 percent increase. The area that was thinned to 40 trees per acre (approximately 20 RD) had an overstory diameter increase of 7.1” DBH, a 37 percent increase from the starting diameter. There was an alder component in the stand that was harvested in the treatment area, and this was also present in the control area: there were 13 alders at the time of first measurement on the control plot. Now, 22 years later, only one remains—the others had died incrementally through years 5 and 10 during other re-measurements. This slow thinning through accrued mortality has not resulted in the release that the BLM observes on the treated plots. In summary, after 20+ years the trees in the heaviest thinned area are growing in diameter about twice as fast as the trees in the control, which has had naturally occurring, slow thinning through mortality (**Figure 17**). Trees continue to grow in height annually, so this stagnant diameter growth in the control has led to unstable trees that are prone to windthrow as seen below in **Figure 18**.

Figure 17: North Soup DMS, canopy condition, and stand re-initiation in the thinned area

Figure 18: Trees in the untreated control, exhibiting poor height to diameter ratios, abundant windthrow, mortality, and low levels of regeneration

The Blue Retro stand (approximately stand age 70 at time of DMS) is the second DMS site and unlike North Soup, it had already been thinned once in the 1980s. This even-aged stand established following harvests and fire in the 1930s as seen below in **Figure 19** and is now approximately 90 years old. In 1999 and 2010 it was thinned according to the prescription elements above with a target of 30–40 RD, again leaving an untreated control for comparison. The BLM located and remeasured a plot in both the control and thinned portion of the stand as well.

Figure 19: View from the Blue Ridge Lookout in 1936, towards the Blue Retro site. The top of Blue Ridge was logged without leaving seed trees. The Fairview Fire burned through this area soon after this photo was taken.

The Control Plot

- The stand was 200 ft^2/ac in 2000, has since grown to 260 ft^2/ac
- Live crown ratios are generally poor, around 30 percent with narrow crown widths and understory hemlock is under 10 feet tall on the plot
- Overstory canopy cover is approximately 85–90 percent
- The average DBH was 19.1 inches and is now 22.8 inches, this is an increase of 3.7 inches or **19 percent larger in diameter**

The Thinned Plot

- The stand was thinned to 150 ft^2/ac, it has since grown to 190 ft^2/ac
- It was thinned to 35 RD and is still free to grow
- Live crown ratios are over 40 percent or better on average and the understory hemlock have formed a second layer after releasing
- Overstory canopy cover is approximately 60 percent
- The average DBH was 17.7 inches and is now 25.1 inches this is an increase of 7.4 inches or **42 percent larger in diameter**

Observable stand improvement resulting from the thinning prescription is just as notable in the older Blue Retro stand as it is in the younger North Soup site. The diameter growth in the thinned plot is more than twice the rate observed in the control, additionally the crown ratios are higher, as are the crown widths and resulting limb diameter. The treatment released understory minor species such as hemlock and western redcedar, which are now developing into a mid-story canopy layer that remains suppressed in the control. The increased light below the canopy has also stimulated growth and regeneration in the shrub layer, while the control's shrub layer consists primarily of shade tolerant ferns. Both stands function as NSO foraging habitat; however, the thinned stand does exhibit much greater diameter growth in the overstory trees which is a key factor in attaining NSO nesting quality over time.

For the later stages of stand development to occur, closed canopy conditions undergo disturbance such as insects and disease mortality, fire, windthrow or harvest, which allows accelerated diameter growth of residual trees and canopy layering through understory tree re-establishment. Maturation is typified by a shift from density dependent to density independent overstory tree mortality (Franklin et al. 2002). Douglas-fir trees complete most of their growth in height and crown spread during the maturation stage, and at 100 years have typically achieved only 60–65 percent of their eventual height (Franklin et al. 2002). The characteristics of vertical diversification would include increased tree height diversity, presence of large shade-tolerant trees, deciduous shrub layer, large snags, and large down woody material. **Table 26** offers a general characterization of structural development stages in relation to stand age. The BLM discusses this in more detail above in section 3.0 Environmental Effects.

Table 26: Comparison of stand stages by stand age as referenced by Oliver and Larson (1990), Franklin et al. (2002)

<table>
<tr><th>Typical stand age* (years)</th><th>Oliver and Larson (1990) Stand Development Stages</th><th>Franklin et al. (2002) Structural Stage</th></tr>
<tr><td>0</td><td colspan="2">Disturbance and legacy creation</td></tr>
<tr><td rowspan="2">20</td><td rowspan="2">Stand Initiation</td><td>Cohort establishment</td></tr>
<tr><td rowspan="2">Canopy closure</td></tr>
<tr><td>30</td><td rowspan="2">Stem Exclusion</td></tr>
<tr><td>50</td><td rowspan="2">Biomass accumulation/ competitive exclusion</td></tr>
<tr><td rowspan="2">80</td><td rowspan="2">Understory Reinitiation</td></tr>
<tr><td rowspan="2">Maturation</td></tr>
<tr><td rowspan="2">150</td><td rowspan="5">Old Growth</td></tr>
<tr><td rowspan="2">Vertical diversification</td></tr>
<tr><td rowspan="2">300</td></tr>
<tr><td>Horizontal diversification</td></tr>
<tr><td>800-1200</td><td>Pioneer cohort loss</td></tr>
<tr><td colspan="3">* Stand ages provided as references. However, stands can achieve structural classes at different stand ages depending on disturbance and site conditions.</td></tr>
</table>

Stand Metric Tables

Table 27: No Action stand metrics

Stand Metric	**Basal Area (ft²/ac)**				**Quadratic Mean Diameter (inches)**				**Relative Density (RD)**				**Canopy Cover (%)**			
Age	2022	Year 20	Year 40	Year 60	2022	Year 20	Year 40	Year 60	2022	Year 20	Year 40	Year 60	2022	Year 20	Year 40	Year 60
30–40	223	240	257	275	13.7	16.6	19.3	23	60	59	59	59	85	83	82	80
50–60	246	265	283	301	13.3	16.3	19.0	21.2	68	66	64	62	87	86	85	84
70–80	256	268	283	298	15.9	19.0	21.4	23.5	65	62	62	62	85	84	82	81

Table 28: 20 RD stand metrics

Stand Metric	**Basal Area (ft²/ac)**				**Quadratic Mean Diameter (inches)**				**Relative Density (RD)**				**Canopy Cover (%)**				**Mbf/ Acre**
Age	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	
30–40	78	108	149	189	20.2	11.0	15.0	18.3	20	33	39	45	34	**66**	**74**	**77**	**15.3**
50–60	79	106	142	178	21.6	109	14.5	17.5	20	32	38	43	33	**63**	**72**	**75**	**19.9**
70–80	87	107	136	165	28.1	11.8	15.1	17.9	20	31	35	39	28	**56**	**66**	**70**	**23.2**

Table 29: 25 RD stand metrics

Stand Metric	**Basal Area (ft²/ac)**				**Quadratic Mean Diameter (inches)**				**Relative Density (RD)**				**Canopy Cover (%)**				**Mbf/ Acre**
Age	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	
30–40	90	127	168	207	19.5	11.7	15.7	18.9	25	37	43	48	42	**70**	**76**	**79**	**13.1**
50–60	96	125	160	195	20.9	11.6	15.3	18.5	25	37	41	46	41	**67**	**73**	**76**	**17.2**
70–80	106	126	154	181	26.9	12.7	16.3	19.4	25	36	38	41	36	**59**	**67**	**70**	**19.8**

Table 30: 30 RD stand metrics

Stand Metric	**Basal Area (ft^2/ac)**				**Quadratic Mean Diameter (inches)**				**Relative Density (RD)**				**Canopy Cover (%)**				**Mbf/ Acre**
Age	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	
30–40	115	148	190	227	18.8	12.3	16.3	19.4	30	42	47	52	51	**74**	**78**	**80**	**10.6**
50–60	117	146	181	215	20.1	12.3	16.1	19.4	30	42	46	49	51	**71**	**75**	**77**	**14.2**
70–80	128	149	175	201	25.6	13.6	17.5	20.8	30	40	42	44	45	**63**	**69**	**71**	**16.0**

Table 31: 35 RD stand metrics

Stand Metric	**Basal Area (ft^2/ac)**				**Quadratic Mean Diameter (inches)**				**Relative Density (RD)**				**Canopy Cover (%)**				**Mbf/ Acre**
Age	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	
30–40	131	165	204	239	18.2	12.7	16.6	19.7	35	46	50	54	59	**76**	**79**	**80**	**8.7**
50–60	133	163	198	230	19.5	12.8	16.7	20	35	46	49	52	58	**73**	**77**	**78**	**12.0**
70–80	146	167	192	217	24.7	14.3	18.3	21.8	35	44	45	47	52	**67**	**71**	**72**	**13.1**

Table 32: 40 RD stand metrics

Stand Metric	**Basal Area (ft^2/ac)**				**Quadratic Mean Diameter (inches)**				**Relative Density (RD)**				**Canopy Cover (%)**				**Mbf/ Acre**
Age	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	
30–40	**146**	**180**	**217**	**249**	**17.7**	**13**	**16.8**	**20.1**	**40**	**50**	**53**	**56**	**64**	**77**	**80**	**80**	6.9
50–60	**149**	**179**	**214**	**245**	**19.0**	**13.2**	**17.1**	**20.5**	**40**	**50**	**52**	**54**	**64**	**76**	**78**	**79**	9.9
70–80	**163**	**184**	**209**	**232**	**23.7**	**14.8**	**19.0**	**22.5**	**40**	**48**	**48**	**49**	**59**	**70**	**73**	**73**	10.5

Table 33: 45 RD stand metrics

Stand Metric	**Basal Area (ft^2/ac)**				**Quadratic Mean Diameter (inches)**				**Relative Density (RD)**				**Canopy Cover (Percent)**				**Mbf/ Acre**
Age	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	Post-harvest	Year 20	Year 40	Year 60	
30–40	**165**	**196**	**231**	**259**	**17**	**13.4**	**17.1**	**20.3**	**45**	**54**	**56**	**58**	**70**	**79**	**81**	**81**	5.1
50–60	**168**	**198**	**260**	**273**	**18.3**	**13.6**	**17.5**	**20.8**	**45**	**54**	**56**	**57**	**70**	**78**	**80**	**80**	7.7
70–80	**182**	**204**	**228**	**250**	**22.6**	**15.4**	**19.6**	**23.1**	**45**	**52**	**52**	**52**	**66**	**73**	**75**	**75**	7.7

Table 34: Total cubic volume in trees > 20” DBH at six thinning intensities compared to No Action over time, stand age 30–40.

Treatment Density	Current Condition	Year 20	Year 40	Year 60
20 RD	1665	4,176	6,385	8,428
25 RD	1665	4,426	7,355	9,638
30 RD	1665	4,524	8,227	10,864
35 RD	1665	4,525	8,384	11,520
40 RD	1665	4,617	8,396	11,849
45 RD	1665	4,631	8,348	11,849
No Action	1665	4,385	7,897	11,142

Table 35: Total cubic volume in trees > 30*”* DBH at six thinning intensities compared to No Action over time, stand age 30–40.

Treatment Density	Current Condition	Year 20	Year 40	Year 60
20 RD	204	409	1,377	4,195
25 RD	204	391	1,271	3,880
30 RD	204	378	1,230	3,556
35 RD	204	364	1,221	3,432
40 RD	204	365	1,133	3,094
45 RD	204	366	1,069	2,763
No Action	204	341	931	2,244

Table 36: Total cubic volume in trees > 20” DBH at six thinning intensities compared to No Action over time, stand age 50–60.

Treatment Density	Current Condition	Year 20	Year 40	Year 60
20 RD	2,839	4,626	6,355	8,170
25 RD	2,839	5,261	7,394	9,484
30 RD	2,839	5,737	8,342	10,781
35 RD	2,839	5,886	8,927	11,600
40 RD	2,839	5,967	9,229	12,138
45 RD	2,839	6,006	9,384	12,487
No Action	2,839	5,790	8,825	11,808

Table 37: Total cubic volume in trees > 30” DBH at six thinning intensities compared to No Action over time, stand age 50–60.

Treatment Density	Current Condition	Year 20	Year 40	Year 60
20 RD	192	594	1,854	4,489
25 RD	192	585	1,771	4,359
30 RD	192	569	1,708	4,157
35 RD	192	566	1,660	3,974
40 RD	192	550	1,593	3,770
45 RD	192	542	1,538	3,573
No Action	192	503	1,253	2,729

Table 38: Total cubic volume in trees > 20” DBH at six thinning intensities compared to No Action over time, stand age 70–80.

Treatment Density	Current Condition	Year 20	Year 40	Year 60
20 RD	6,028	5,109	6,336	7,593
25 RD	6,028	6,080	7,536	9,014
30 RD	6,028	7,024	8,809	10,511
35 RD	6,028	7,597	9,675	11,505
40 RD	6,028	8,001	10,253	12,333
45 RD	6,028	8,275	10,646	12,944
No Action	6,028	8,353	10,623	12,910

Table 39: Total cubic volume in trees > 30” DBH at six thinning intensities compared to No Action over time, stand age 70–80.

Treatment Density	Current Condition	Year 20	Year 40	Year 60
20 RD	1,730	2,828	4,274	6,010
25 RD	1,730	2,904	4,570	6,555
30 RD	1,730	2,936	4,683	6,781
35 RD	1,730	2,943	4,674	6,816
40 RD	1,730	2,917	4,686	6,718
45 RD	1,730	2,887	4,590	6,567
No Action	1,730	2,817	4,343	5,956

APPENDIX D PROJECT DESIGN FEATURES, BEST MANAGEMENT PRACTICES, AND MANAGEMENT DIRECTION

Project Design Features (PDFs)

<u>Standards Common to All Alternatives</u>

General Harvest Operations

1. Areas unsuitable for ground-based systems, would be harvested with a skyline cable logging system to minimize soil disturbance. In cable yarding areas, a skyline cable system with 75-foot lateral yarding capability and ability to obtain one-end log suspension would be utilized to minimize soil disturbance and the number of corridors.
2. Trees in skyline cable yarding corridors would be cut to facilitate yarding operations and minimize stand damage. Skyline corridors would be kept to the minimum width necessary to facilitate the removal of cut trees. Corridor widths would be no wider than 12 feet. The location, number, and width of cable yarding corridors would be specified prior to yarding, with natural openings used as much as possible.
3. Where operationally feasible, the distance between skyline corridors would be required to be at least 150 feet apart at the far unit edge opposite from the landing.
4. Where skyline corridors cross a stream, the corridors would be kept as perpendicular to the stream as possible to minimize potential ground disturbance.
5. Within yarding corridors in the Riparian Reserve Inner or Middle Zones, fallers would directionally fall trees toward the stream channel to the extent feasible.
6. Trees in the cable yarding thinning unit would be cut into log lengths not exceeding 40 feet prior to yarding to minimize stand damage.
7. Lift trees or intermediate supports may be needed to attain required log suspension. Lift trees and intermediate supports would be left on site to provide snag recruits for potential habitat.

Road Management

Wildlife Restrictions

8. If roads cannot be designed to avoid murrelet trees, refer to PDF 41.
9. Seasonal restrictions are required for construction activities and haul on new roads or roads that received heavy renovation within the disruption distance of murrelet occupied or unsurveyed suitable murrelet habitat or within the disruption distance of a surveyed occupied spotted owl nest patch.
10. All new roads or roads that would require heavy renovation (Aron and Bailey 2020) within the disruption distance of an occupied spotted owl nest patch, or occupied, or unsurveyed trees with murrelet nesting structure would be closed to public vehicle traffic following project completion.

New Road Construction, Maintenance, Improvement, or Renovation

11. Rocked roads would typically have a 16-foot-wide road width (running surface plus subgrade), while natural-surfaced roads would typically have a 12–14-foot-wide road width.

12. Design or reestablish right-of-way clearing limits (including the roadbed) to the minimum width necessary for safe road operations (**Figure 20**).

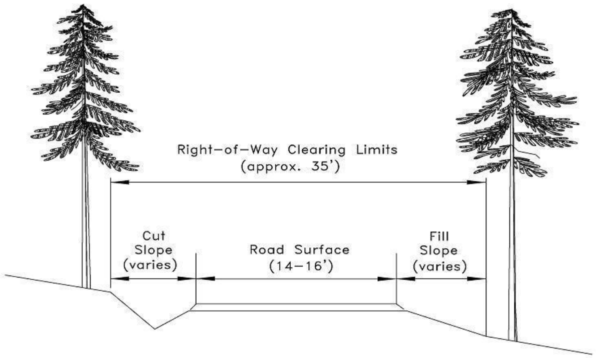


Figure 20: Standard road clearing limits

13. Contractors or operators would have the option of rocking roads currently proposed as natural-surface roads at their own expense providing it does not conflict with other resource objectives and design features contingent to authorized officer approval.
14. Engineers would design road drainage to minimize soil erosion and stream sedimentation by using energy dissipaters, culvert down pipes, or drainage dips where water discharges onto loose material and onto erodible or steep slopes.
15. Determine road surface shape (crowning, insloping, outsloping) based on planned use and resource protection needs.
16. Locate stable end-haul (waste) sites prior to end hauling. These sites would be kept properly shaped, drained, and vegetated.
17. Move excess or excavated overburden from road activities or culvert replacements to an approved waste disposal area. Install suitable erosion control measures (e.g., tarps, silt fences, or weed-free hay bales).
18. Place sediment filters at designated locations as part of renovation or maintenance activities. The BLM contract administrator would require placement of additional sediment filters to prevent sediment from entering stream channels from road ditch lines if determined necessary. All sediment filters would be monitored and receive maintenance as necessary. Maintenance would include removal and disposal of the captured sediment as needed to maintain function. Sediment (waste) disposal areas would not be located in areas with potential of delivery to stream channels.

Road Closures

19. Use soil stabilization techniques, such as seeding, mulching, and fertilizing exposed soils, when decommissioning roads. If needed, install water bars or dips to route surface runoff to vegetated areas based on site-specific conditions.
20. Decommission roads identified for decommissioning prior to winter rains (generally November 1).
21. If available, operators would scatter slash material over the road surface on natural-surfaced roads to protect and reintroduce organic material to the soil. Slash material would also be used to prevent vehicle access.
22. Remove stream crossing structures when roads are fully decommissioned. Remove the structure and associated fill, including floodplain fill, to reestablish a natural channel

dimension, pattern, and profile. Stream banks would be excavated to establish a maximum 50 percent side-slope, if feasible. Banks would be protected from erosion using seed, fertilizer, and mulch, geotextiles, rock or other soil stabilization materials.

Wet-season Road Use

23. Commercial use of roads with a surface flow connection to streams or wetlands would occur year-round provided the roads are paved or surfaced with durable rock of sufficient depth and appropriate gradation, and the roads are not rutting, developing a layer of mud, developing areas of standing water, and haul-related turbid water is not reaching streams or wetlands. The authorized officer would monitor the condition of BLM-administered roads with a surface flow connection to streams or wetlands and suspend commercial use if ruts are channeling water to fill slopes or ditches with direct discharge to streams or wetlands, if roads are developing a mud layer on running surfaces, if roads are developing areas of standing water, or if turbid road runoff is likely to reach streams or wetlands. The authorized officer would evaluate road conditions and allow commercial use after the area(s) in question are repaired to prevent sediment delivery to streams or wetlands, or sediment-delivery conditions cease.
24. During wet-weather haul, maintain road surface shape to decrease the likelihood of flow concentration on the road surface.
25. As needed, additional cross drain and stream crossing culverts would be added before haul occurs on roads to reduce sediment delivery.
26. The BLM would identify and protect all sensitive soils (e.g., hydric soils or mass wasting prone areas) prior to project implementation.

Site Preparation/Pile Burning

27. To reduce fire hazard and facilitate reforestation, slash remaining after slash disposal treatments would not exceed 6–18 inches in depth. Treatment recommendations would be based on a fuels assessment completed by the fuels specialist, in consultation with affected specialists.
28. Conduct prescribed burning in compliance with the Oregon Department of Forestry's Smoke Management Plan. Smoke emission control would also include conducting mop-up as soon as possible after ignition is complete, covering hand piles to permit burning during the rainy season, burning lighter fuels with lower fuel moistures to facilitate rapid and complete combustion, and burning larger fuels with higher moisture levels to minimize consumption.
29. Chemical retardant, foam, or water additives will not be used within 50 feet of streams.
30. Pile and Burn:
    a) Piles would be located at least 20 feet from property lines, culverts, large snags, green trees, and other reserved trees to minimize damage.
    b) Locate machine and hand piles away from stream channels to prevent sediment from post-burn exposed soils entering the channel. Piles would not be placed in channel bottoms and dry draws.
    c) Fuels more than eight inches diameter at the large end and longer than eight feet in length would not be piled. Piles would not be constructed on top of stumps or existing coarse woody debris.
    d) To prevent fire escapes and to minimize resource damage, schedule pile burning to occur when weather and fuel conditions limit fire spread outside the pile. When

feasible, piles would be burned in the first wet season following the completion of treatment.

e) To prevent detrimental soil disturbance, burn slash piles when soil and duff moisture content is high.

f) Avoid piling machine slash piles on steep slopes (generally > 70 percent) or on active slides or slopes where there is a high probability to cause a shallow, rapidly moving landslide that would likely damage infrastructure (e.g., BLM or privately owned roads, State highways, or residences) or threaten public safety.

Wildlife

31. Seasonal and daily timing restrictions would be required as described in **Table 40** and **Table 41** for all work that would cause disruption of an occupied spotted owl nest patch, occupied murrelet nesting habitat, or unsurveyed murrelet or spotted owl nesting habitat.

Burning Activities

32. Seasonal restrictions are required as described in the spotted owl **Table 40** and murrelet **Table 41**.

Spotted Owls

33. The BLM would conduct surveys, using a protocol with a defined methodology and a resultant probability of detection, to ensure that the proposed timber sale activities, including roads, yarding corridors, landings, and other facilities, would not affect the spotted owl. Under the current FWS protocol (USDI FWS 2012), the general survey schedule would be as follows. After two years of six-visit surveys, spot checks would continue as need to ensure take avoidance, including from disruption. Per the protocol, after two years of spot checks, BLM would discuss with the FWS annually whether six-visit visits should be reinitiated or whether spot checks would continue. During each year of surveys (either six-visit or spot checks), the BLM would conduct an activity center search in known owl activity centers.
34. Regardless of whether surveys detect occupancy or not:
    a) Treatment units would not include NRF habitat.
    b) Associated features, such as road construction or yarding corridors would be designed to avoid NRF habitat if feasible. If NRF cannot be avoided, the BLM would design associated features such as new roads, landings, and yarding corridors so that the openings are no larger than 0.25 acre within a continuous stand of NRF habitat.
    c) Associated features, such as road construction or yarding corridors would be designed to avoid NRF habitat if feasible. If NRF cannot be avoided, the BLM would remove no more than a cumulative total of one acre of NRF in a continuous stand of NRF.
35. If protocol surveys determine occupancy of a site by a resident single or pair:
    a. No treatment units would occur within the nest patch or core.
    b. No treatment units would occur within RF habitat in the entire home range.
    c. No associated features, such as road construction or yarding corridors would occur in the nest patch or in NRF/RF habitat in the core area.

d. Associated features, such as road construction or yarding corridors would be designed to avoid NRF/RF habitat if feasible. If NRF/RF cannot be avoided, no more than one acre of NRF/RF in the entire home range would be removed.

36. If protocol surveys determine a site is unoccupied:
    a) Associated features such as road construction and yarding corridors could occur in NRF or RF habitat within the nest patch and core with concurrence from the Level 1 team per the BA (Biological Assessment).
    b) Treatment units may include RF habitat. Post-treatment, the units would maintain RF characteristics, i.e., 60 percent canopy cover; existing large trees, snags, and large down wood; existing adequate understory to support prey; and existing structural diversity important to spotted owls.

37. Avoid disruption by seasonally restricting activities within the disruption distance **(Table 40)** from an occupied nest patch. This includes chainsaw and heavy equipment use, and prescribed burning. Habitat that is surveyed and determined to be unoccupied does not require seasonal restrictions.

Table 40: Disruption distances and seasonal restrictions for northern spotted owl (NSO) during the critical and late breeding seasons based on activity type

Activity That Creates Noise Above Ambient Levels or Source of Disturbance/Disruption*	Disruption Distance◊ During the NSO Critical Breeding Period (Restrictions: Mar 1–Jul 7)	Disruption Distance◊ During the NSO Late Breeding Period (Restrictions: Jul 8–Sep 30)
Timber haul and renovation of open roads†	No Restrictions	No Restrictions
Heavy renovation‡ and new construction	65 yards	No Restrictions
Haul on new roads or roads requiring heavy renovation.	65 yards	No Restrictions
Chainsaw and heavy equipment operation for culvert replacements, yarding, mechanical harvest, etc.	65 yards	No Restrictions
Blasting	0.25 mile	0.25 mile
Pile-driving, Rock Crushing & Screening Equipment	120 yards	No Restrictions
Pile/Broadcast Burning (where the smoke will drift into occupied or unsurveyed habitat)	0.25 miles	No Restrictions
Tree climbing	25 yards	No Restrictions
Helicopter with decibels similar to Chinook 47d	265 yards	100 yards (Hovering only)
Helicopter with decibels similar to Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	150 yards	50 yards (Hovering only)

Activity That Creates Noise Above Ambient Levels or Source of Disturbance/Disruption*	Disruption Distance◊ During the NSO Critical Breeding Period (Restrictions: Mar 1–Jul 7)	Disruption Distance◊ During the NSO Late Breeding Period (Restrictions: Jul 8–Sep 30)
Helicopter with decibels similar to K-MAX, Bell 206 L4, Hughes 500	110 yards	50 yards (Hovering only)
Small fixed-wing aircraft with decibels similar to a Cessna 185	110 yards	—
Drone	65 yards	-

◊ Disruption distance is measured from the nest tree, if known. If nest tree not identified, measured from the edge of the nest patch.
* The BLM biologist would evaluate individual disturbance effects and recommend the authorized officer waiving seasonal restrictions for activities if they are determined to be short duration or the activity is separated from the habitat by topographic features.
† Open roads, for the purposes of determining disturbance effects, are roads not officially closed with the use of a tank trap, rock pile, or other permanent barrier and are passable with the use of a 4 × 4 vehicle.
‡ Heavy renovation is defined as renovation that would take > 1.0 hr/Station -Closed/not drivable, natural surfaced, no drainage, merchantable timber to remove from the right-of-way, clearing and grubbing to restore the road prism to the original design (Aron and Bailey 2020).

Marbled Murrelets

38. The BLM would complete an evaluation to identify murrelet trees, using available digital tools and field surveys, of all proposed units and up to 110 yards (330 feet), outside of proposed units. This effort would be sufficient to identify stands with nesting habitat and trees with high quality nesting structure (i.e., large trees with many platforms and adequate cover and access). No treatment buffers and other PDF considerations associated with the results of these habitat assessments are described in Table 34. The BLM acknowledges that some trees that meet the minimal definition of nesting structure may be missed. When these trees are identified during implementation, the BLM would ensure compliance with the 2016 RMP by applying one of the options described in the ROD/RMP (pp. 98–100) or one of the management actions in table 34 below.
39. Tailhold use in murrelet occupied or unsurveyed suitable sites: Seasonal and daily timing restrictions would be applied to any use of tailhold, guyline, or lift trees within a murrelet occupied site. Selection of tailhold trees would be subject to the following specifications:
    a) Do not use trees with murrelet nesting structure as identified by a wildlife biologist.
    b) Select the smallest trees that are suitable for tailhold trees. Suitability for use as a tailhold would be determined by a BLM authorized officer, such as a sale administrator.
    c) As operationally feasible, avoid trees that:
        i) Have a DBH > 34 inches
        ii) Have visible nests, or nesting structures (e.g., platforms).
        iii) Are the only large conifer present in a visible area.
    d) If the tailhold tree(s) would remain standing, prevent damage by using appropriate protection (i.e., tree plates, tires, or nylon straps) where possible to avoid girdling of the tree. Girdling or notching should not exceed 60 percent of the tree's circumference.
40. When economically viable and practically feasible, engineers/foresters would design new features such as roads, yarding corridors, and landings to avoid removal of trees with

murrelet nest structure. Should a tree with murrelet nesting structure, or an adjacent tree with interlocking branches, need to be felled in a remnant stand or in a stand with more than six trees in five acres, the following restrictions would apply:

   a. Felling would be restricted to outside the full breeding season (April 1–Sept. 15) unless protocol surveys have determined the stand to be unoccupied.
   b. Any stand with murrelet nesting habitat would retain that nesting habitat following project activities.
   c. A variance (see Biological Assessment) would be required to be approved by the Level 1 team in cases where a murrelet tree or buddy tree would be removed in a stand with the minimum of six trees in five acres.

41. Activities that would result in above ambient noise or activity carried out within the disruption distance of occupied or unsurveyed suitable murrelet habitat would be subject to seasonal restrictions from April 1 to August 5 and to daily timing restrictions from August 6 to September 15 (**Table 41**). Activities subject to daily timing restrictions would be carried out from two hours after sunrise until two hours before sunset. Common activities and their disruption distances are shown in **Table 42**. Full seasonal restrictions (April 1–September 15) would be required for felling trees within 150 feet of murrelet trees unless the area were surveyed and determined to be unoccupied.
    Exception: Daily timing restrictions are not required for actions that would result in noise or activity above ambient conditions within the disruption distance of stands if full protocol surveys indicate the stand is unoccupied. **Table 42** shows the proposed potential actions and the habitat association/survey status that would require restrictions or avoidance.
42. Seasonal and daily timing restrictions are required for haul on new roads or roads that received heavy renovation (Aron and Bailey 2020) through murrelet occupied or unsurveyed suitable habitat, unless a biologist determines that the disruption effects are mitigated, e.g., because of a topographical break or because of existing ambient noise.
43. Trees designated by a wildlife biologist as having murrelet structure that need to be felled for operational purposes would have concurrence by the Level 1 team as part of the pre-project clearance process. These trees would be left on site, used for RR restoration, or sold per BLM discretion.
44. Secure or remove generated food, food trash, and garbage daily in project areas to minimize attraction of predators, specifically corvids.

Table 41: Disruption distances and seasonal and daily timing restrictions for marbled murrelet during the critical and late breeding seasons based on activity type

Activities that Create Noise Above Ambient Levels or Sources of Disturbance/Disruption*	Disruption Distance† During the Marbled Murrelet Critical Breeding Period (Restrictions: Apr 1–Aug 5)	Disruption Distance† During the Marbled Murrelet Late Breeding Period (Restrictions: Aug 6–Sep 15) With DTR¶ except where noted "no DTR" indicating that activity is not allowed at that distance regardless of time of day.
Tree felling	150 ft	150 ft Full seasonal restrictions with no DTR exception
Timber haul and renovation of open roads‡	No Restrictions	No Restrictions
Renovation and new construction on closed roads§	110 yards	110 yards
Haul on new roads or roads that required heavy renovation.	110 yards	110 yards
Chainsaw and heavy equipment operation for culvert replacements, yarding, mechanical harvest, etc.	110 yards	110 yards
Blasting	0.25 miles	0.25 miles
Pile-driving, Rock Crushing & Screening Equipment	120 yards	120 yards
Pile/Broadcast Burning (where the smoke will drift into occupied or unsurveyed habitat)	0.25 miles	0.25 miles
Tree climbing	110 yards	110 yards
Helicopter with decibels similar to a Chinook 47d	265 yards Full seasonal restrictions with no DTR exception	
Helicopter with decibels similar to a Boeing Vertol 107, Sikorsky S-64	150 yards Full seasonal restrictions with no DTR exception	
Helicopter with decibels similar to a K-MAX, Bell 206 L4, Hughes 500	110 yards Full seasonal restrictions with no DTR exception	
Small fixed-wing aircraft with decibels similar to a Cessna 185	110 yards Full seasonal restrictions with no DTR exception	
Drones	110 yards Full seasonal restrictions with no DTR exception	

* The BLM biologist may evaluate individual disturbance effects and recommend the authorized officer waive seasonal restrictions for activities if they are determined to be short duration or the activity is separated from the habitat by topographic features.

† Distances are measured from the closest suitable murrelet-nesting platform.
‡ Open roads, for the purposes of determining disturbance effects, are roads not officially closed with the use of a tank trap, rock pile, or other permanent barrier and are passable with the use of a 4×4 vehicle.
§ Closed roads, for the purposes of determining disturbance effects, are roads officially closed with the use of a tank trap, rock pile, or other permanent barrier, or due to the overgrowth of vegetation to the point where the road is no longer passable.
¶ Daily timing restrictions limit activities that create noise above ambient levels from two hours after sunrise until two hours before sunset.

Table 42: Murrelet PDFs broken out by habitat information and proposed activity. *

	≥ 6 Trees with Murrelet Structure/5 Acres		< 6 Trees with Murrelet Structure/5 Acres	
Activity	**Surveyed Unoccupied**	**Unsurveyed or Surveyed Occupied[1]**	**Surveyed Unoccupied**	**Unsurveyed or Surveyed Occupied[1]**
• New road construction or heavy renovation • Yarding corridors and landings • Other facilities	• Attempt to avoid felling trees with murrelet structure and buddy trees[2], but no required restrictions. • Avoid placing newly constructed landings ≥ 0.25 acre in size within 150' of good or best[3] trees with murrelet structure[4] to the extent possible.	• Avoid placing yarding corridors within 150 ft of the trees with murrelet structure to the extent possible. • Yarding corridors allowed after wildlife biologist review but no trees with murrelet structure or buddy trees[2] removed without review as discussed in PDF 43. • No newly constructed landings[6] ≥ 0.25 acre in size within 150' of good or best[3] trees with murrelet structure.[4] • New roads placed along the stand edge rather than going through the stand.	• Attempt to place yarding corridors to avoid trees with murrelet structure and buddy trees, but no required restrictions. • Attempt to place newly constructed landings further than 150' of trees with murrelet structure, but no required restrictions. Trees with murrelet structure would be removed only if necessary to the implementation of the larger treatment unit	• Attempt to place yarding corridors to avoid trees with murrelet structure and buddy trees. • Attempt to place newly constructed landings further than 150' of trees with murrelet structure. • Trees with murrelet structure and buddy trees may be removed if necessary. Removal would only occur outside of the entire breeding season.
Treatment units post treatment ≥ 40% canopy cover[5]	• Do not remove trees with murrelet structure or buddy trees. No group selection opening ≥ 0.25 acre in size within a distance equal to one site-potential tree height of good or best trees[3] with nesting structure. • Pre-project planning would include a site-specific evaluation of trees with murrelet structure to explain how treatment within 150' of these trees would be of benefit.	No treatment buffer[4] 150' from trees with nesting structure.	• Do not remove trees with murrelet structure.	• Do not remove trees with nesting structure, and buddy trees. • Follow Option 4 in the ROD/RMP (p. 100) including no openings (i.e., a group selection opening ≥ 0.25 acre in size) within a distance equal to one site-potential tree height of nesting structure.
• Treatment Units Post-treatment < 40% canopy cover[5] • Group selection openings ≥ 0.25 acre	• Do not remove trees with murrelet structure or buddy trees. No gap ≥ 0.25 acre in size within a distance equal to one site-potential tree height of good or best trees3 with nesting structure. • Pre-project planning would include a site-specific evaluation of trees with murrelet structure to explain how treatment within 150' of these trees would be of benefit.[4]	No treatment buffer[4] within 300' from trees with nesting structure.	• Do not remove trees with murrelet structure.	• Do not remove trees with murrelet structure or buddy trees.[2] • Follow Option 4 in the ROD/RMP (p. 100) including no openings (i.e., a group selection opening ≥ 0.25 acre in size) within a distance equal to one site-potential tree height of nesting structure.
Snag creation	• Do not use trees with murrelet structure • No buddy trees[2] used to create snags. • Snagging within 150 ft. of trees with murrelet structure would be included in pre-project planning to ensure consistency with the overall murrelet analysis.[4]		Do not use trees with murrelet structure.	Do not use trees with murrelet structure or buddy trees.[2]

*Follow the guidance in Options 1 through 4 of the ROD/RMP (USDI-BLM 2016b, pp. 98–99) or in this table if not directly modifying nesting habitat or removing nesting structure. Unless the area is surveyed as unoccupied, seasonal and daily timing restrictions would be in place within the disruption distance of trees with murrelet structure (no work from April 1 to August 5, daily timing restrictions from August

6 to September 15). Felling of murrelet trees or buddy trees is restricted outside of the entire breeding season (April 1–September 15) unless the area has been surveyed as unoccupied.

[1] Seasonal and daily timing restrictions required within the disruption distance of trees with murrelet structure. Felling of murrelet trees or buddy trees is restricted outside of the entire breeding season (April 1–September 15) unless the area has been surveyed as unoccupied.

[2] Buddy trees are defined as trees with interlocking branches with trees with murrelet structure.

[3] The Coos Bay District identifies trees with murrelet structure as marginal, good, or best, as defined in Seely (2019), (Appendix F).

[4] Buffer extends to reported distance, or until the canopy of the treatment stand and nesting platform tree(s) no longer interact (e.g., topography, existing stand edge, roads in some cases). Up to 20 snags per 1.6 acres may be created in the no-treatment buffer if they are created using a method that results in gradual tree death over time (e.g., placing a band around the tree or partial girdling).

[5] Canopy cover is measured at the stand level, including group select openings and retention areas.

[6] Existing landings may be reused as long as they do not require heavy renovation using the same definition as for roads described in Aron and Bailey 2020.

<u>Coastal Marten</u>

45. If a verified marten detection occurs within the project area treatment stands, determine steps to avoid adverse effects to denning martens.

<u>Gray Wolf</u>

46. Follow the Project Design Criteria from USFWS (2020) as follows: If an active den[29] or rendezvous site[30] is located within the vicinity of the project, project activities would be suspended during the period of use (April 1 to July 15) to avoid human disturbance of the site. The distance could be determined on a site-by-site basis and would depend on topography and forest cover around the site; however, these PDFs would include the restriction of activities within 1 mile of a denning or rendezvous sites from April 1 to July 15 to avoid disturbance to wolves during the breeding season. Those actions that are not expected to disturb wolves, as determined by the Level 1 Team or local biologist could continue.

<u>Bald and Golden Eagles</u>

47. Follow the management direction in the RMP (p. 96):

Protect known bald eagle or golden eagle nests (including active nests and alternate nests) and bald eagle winter roosting areas. Prohibit activities that will disrupt bald eagles or golden eagles that are actively nesting.

a. Continue routine use and maintenance of existing roads and other facilities.

b. Do not remove overstory trees within 330 feet of bald eagle or golden eagle nests, except for removal of hazard trees.

c. Do not conduct timber harvest operations (including road construction, tree felling, and yarding) during the breeding season within 660 feet of bald eagle or golden eagle nests. Decrease the distance to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, or after eggs laid in another nest within the territory have hatched.

d. Prohibit activities that will disrupt roosting bald eagles or golden eagles at communal winter roosts.

[29] **Den site:** a physical location where a wolf's natal den is established and where pups are born. Den sites can be located in excavated burrows, under large logs and deadfall, or at other locations where micro site conditions are suitable for providing for the protection and thermoregulation for juvenile and adult wolves.

[30] **Rendezvous site:** a physical location that may be used by wolves after they leave the natal den site when pups are able to travel from April 1–July 15. Wolves may move their pups to other sites after they are old enough to move with the pack.

Table 43: Seasonal restriction months and dates for road construction, timber harvest, and associated activities to protect water resources and timber damage.

Activity	Reason for Restriction	Restricted Dates
Construction of new roads with stream crossings	In-water work period, erosion, sedimentation	Sep 16–Jun 30
Construction of new roads (without stream crossings); renovation and improvement of existing roads	Erosion, sedimentation	The wet season is generally November 1–May 31 unless dry conditions exist that would extend these dates as approved by the authorized officer
Conventional tree falling	Tree bark damage	Apr 1–Jun 30
Ground-based yarding	Tree bark damage	Apr 1–Jun 30
	Potential soil compaction in rainy season	When soil moisture exceeds 25 percent
Cable yarding	Tree bark damage	Apr 1–Jun 30
Hauling on natural-surface roads	Potential road surface damage in rainy season	The wet season is generally November 1–May 31 unless dry conditions exist that may extend those dates as approved by the authorized officer

Note: The BLM may alter the operating season for individual actions if authorized during extended dry periods.

Botany Special Status Species

46. Special Status botany species found during pre-disturbance surveys in thinning and group selection units would be buffered, if necessary, using no-treatment zones to protect the microsite so the species persist at the site.

Port Orford cedar

47. Apply the POC risk key and mitigation measures found in **Appendix G**.

Invasive Plants/Noxious Weeds

54. The Authorized Officer would ensure that all logging and road equipment is cleaned by removing soil, plant parts, and seed prior to arrival on BLM-administered lands to reduce the spread of invasive plant species.
55. Botanists or other BLM specialists would identify sites of rare plants, high-quality native understory community or high-priority invasive plant species that would be incorporated into skips not used for project administration, (e.g., logging corridors, burn piles, or parking vehicles) where operationally feasible and consistent with BLM Policy for management of such species.
56. The BLM would evaluate project area using BLM Manual 9015 for invasive plant species risk assessment, based on site conditions. Depending on assessment outcomes, BLM would treat high priority weed species, i.e., false brome, shining geranium, meadow knapweed, bindweed, English ivy, and new invaders to the district prior to project activity and monitor for at least three to five consecutive years after timber sale completion, controlling new infestations of high priority invasive plant species.

57. The BLM would sow native species (mostly grass seed) for invasive weed exclusion on areas of exposed soil, as appropriate to control invasive weed spread, after operations have been completed.
58. The BLM would use weed mats, hydro-mulch, and other weed blocks where high priority invasive plant species are not satisfactorily controlled, i.e., pretreatments or skips.
59. The BLM would avoid placement of logging slash on closed roads in cases where it would inhibit ongoing weed control efforts.
60. The Authorized Officer would ensure the use of weed-free straw and mulch.

Cultural Resources

61. If necessary, at the project level, the BLM would redesign the project to avoid cultural resource values that may be present. If avoidance is not possible, the BLM would evaluate cultural resources and if the BLM determines they are eligible for listing in the NRHP, specific protection measures shall be implemented based on the recommendations from the archaeologist(s) and concurrence by the authorized officer and SHPO and tribal consultation (USDI 2015, Stipulation VI.C. (2)(9) and VI.D; USDI 2016b, p. 76).
62. If cultural resources are discovered during project implementation, the BLM would suspend all operations in the immediate area of such a discovery until an evaluation can be made by a professional archaeologist to determine appropriate actions that would prevent the loss of significant or scientific values (USDI 2016b, p. 76).

Best Management Practices (BMPs)

Table 44: BMPs from the ROD/RMP

BMP Number	Best Management Practice
General Construction	
R 01	Locate temporary and permanent roads and landings on stable locations, e.g., ridge tops, stable benches, or flats, and gentle-to-moderate side slopes. Minimize road construction on steep slopes (> 60 percent).
R 02	Locate temporary and permanent road construction or improvement to minimize the number of stream crossings.
R 03	Locate roads and landings away from wetlands, Riparian Reserve, floodplains, and waters of the State, unless there is no practicable alternative. Avoid locating landings in areas that contribute runoff to channels.
R 04	Locate roads and landings to reduce total transportation system mileage. Renovate or improve existing roads or landings when it would cause less adverse environmental impact than new construction. Where roads traverse land in another ownership, investigate options for using those roads before constructing new roads.
R 05	Design roads to the minimum width needed for the intended use as referenced in BLM Manual 9113 – 1 – Roads Design Handbook (USDI BLM 2011).
R 06	Confine pioneer roads (i.e., clearing and grubbing of trees, stumps and boulders along a route) to the construction limits of the permanent roadway to reduce the amount of area disturbed and avoid deposition in wetlands, Riparian Reserve, floodplains, and waters of the State. Install temporary drainage, erosion, and sediment control structures, as needed to prevent sediment delivery to streams. Storm proof or close pioneer roads prior to the onset of the wet season.
R 07	Design road cut and fill slopes with stable angles, to reduce erosion and prevent slope failure.
R 08	End-haul material excavated during construction, renovation, or maintenance where side slopes generally exceed 60 percent and any slope where side-cast material may enter wetlands, floodplains, and waters of the State.

BMP Number	Best Management Practice
R 09	Construct road fills to prevent fill failure using inorganic material, compaction, buttressing, sub-surface drainage, rock facing, or other effective means.
R 10	Design and construct sub-surface drainage (e.g., trench drains using geo-textile fabrics and drainpipes) in landslide-prone areas and saturated soils. Minimize or avoid new road construction in these areas.
R 11	Locate waste disposal areas outside wetlands, Riparian Reserve, floodplains, and unstable areas to minimize the risk of sediment delivery to waters of the State. Apply surface erosion control prior to the wet season. Prevent overloading areas, which may become unstable.
R 12	Use controlled blasting techniques to minimize loss of material on steep slopes or into wetlands, Riparian Reserve, floodplains, and waters of the State.
R 13	Use temporary sediment control measures (e.g., check dams, silt fencing, bark bags, filter strips, and mulch) to slow runoff and contain sediment from road construction areas. Remove any accumulated sediment and the control measures when work or haul is complete. When long-term structural sediment control measures are incorporated into the final erosion control plan, remove any accumulated sediment to retain capacity of the control measure.
Permanent Stream Crossings	
R 15	Minimize fill volumes at permanent and temporary stream crossings by restricting width and height of fill to amounts needed for safe travel and adequate cover for culverts. For deep fills (generally greater than 15 feet deep), incorporate additional design criteria (e.g., rock blankets, buttressing, bioengineering techniques) to reduce the susceptibility of fill failures.
R 16	Locate stream-crossing culverts on well- defined, unobstructed, and straight reaches of stream. Locate these crossings as close to perpendicular to the streamflow as stream allows. When structure cannot be aligned perpendicular, provide inlet and outlet structures that protect fill, and minimize bank erosion. Choose crossings that have well-defined stream channels with erosion-resistant bed and banks.
R 17	On construction of a new culvert, major replacement, or fundamental change in permit status of a culvert in streams containing native migratory fish, install culverts consistent with ODFW fish passage criteria (OAR 635-412-0035 (3)), and at the natural stream grade, unless a lessor gradient is required for fish passage. On abandonment of a culvert (i.e., removal of a culvert without replacement) in streams containing native migratory fish, restore the natural stream grade, unless a lessor gradient is required for fish passage. On construction of new culverts in streams with ESA listed fish, stream crossings must also meet ARBO II (USDC NMFS 2013 and USDI FWS 2013) fish passage criteria and state fish passage criteria.
R 18	Design stream crossings to minimize diversion potential in the event that the crossing is blocked by debris during storm events. This protection could include hardening crossings, armoring fills, dipping grades, oversizing culverts, hardening inlets and outlets, and lowering the fill height.
R 19	Design stream crossings to prevent diversion of water from streams into downgrade road ditches or down road surfaces.
R 20	Place instream grade control structures above or below the crossing structure, if necessary, to prevent stream head cutting, culvert undermining and downstream sedimentation. Employ bioengineering measures to protect the stability of the streambed and banks.
R 21	Prevent culvert plugging and failure in areas of active debris movement with measures such as beveled culvert inlets, flared inlets, wingwalls, over-sized culverts, trash racks, or slotted risers.
R 22	To reduce the risk of loss of the road crossing structure and fill causing excessive sedimentation, use bridges or low-water fords when crossing debris-flow

BMP Number	Best Management Practice
	susceptible streams. Avoid using culverts when crossing debris-flow susceptible streams, when practicable.
R 23	Utilize stream diversion and isolation techniques when installing stream crossings. Evaluate the physical characteristics of the site, volume of water flowing through the project area, and the risk of erosion and sedimentation when selecting the proper techniques.
R 24	Limit activities and access points of mechanized equipment to streambank areas or temporary platforms when installing or removing structures. Keep equipment activity in the stream channel to an absolute minimum.
R 25	Install stream crossing structures before heavy equipment moves beyond the crossing area.
R 26	Disconnect road runoff to the stream channel by outsloping the road approach. If outsloping is not practicable, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Prevent or reduce ditch flow conveyance to the stream through cross drain placement above the stream crossing.
Temporary Stream Crossings for Roads and Skid Trails	
R 27	When installing temporary culverts, use washed rock as a backfill material. Use geotextile fabric as necessary where washed rock will spread with traffic and cannot be practicably retrieved.
R 28	Use no-fill structures (e.g., portable mats, temporary bridges, and improved hardened crossings) for temporary stream crossings. When not practicable, design temporary stream crossings with the least amount of fill and construct with coarse material to facilitate removal upon completion.
R 29	Remove temporary crossing structures promptly after use. Follow practices under the Closure/Decommissioning section for removing stream crossing drainage structures and reestablishing the natural drainage.
Surface Drainage	
R 30	Effectively drain the road surface by using crowning, insloping or outsloping, grade reversals (rolling dips), and waterbars or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and erosion resistant.
R 31	Outslope temporary and permanent low volume roads to provide surface drainage on road gradients up to 6 percent unless there is a traffic hazard from the road shape.
R 32	Consider using broad-based drainage dips or lead-off ditches in lieu of cross drains for low volume roads. Locate these surface water drainage measures where they will not drain into wetlands, floodplains, and waters of the State.
R 33	Avoid use of outside road berms unless designed to protect road fills from runoff. If road berms are used, breach to accommodate drainage where fill slopes are stable.
R 34	Construct variable road grades and alignments (e.g., roll the grade and grade breaks) which limit water concentration, velocity, flow distance, and associated stream power.
R 35	Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow down gradient in ditchlines.
R 36	Design roads crossing low-lying areas so that water does not pond on the upslope side of the road. Provide cross drains at short intervals to ensure free drainage.
R 37	Divert road and landing runoff water away from headwalls, slide areas, high landslide hazard locations, or steep erodible fill slopes.
R 38	Design landings to disperse surface water to vegetated stable areas.
Cross Drains	

BMP Number	Best Management Practice
R 39	Locate cross drains to prevent or minimize runoff and sediment conveyance to waters of the State. Implement sediment reduction techniques such as settling basins, brush filters, sediment fences, and check dams to prevent or minimize sediment conveyance. Locate cross drains to route ditch flow onto vegetated and undisturbed slopes.
R 40	Space cross drain culverts at intervals sufficient to prevent water volume concentration and accelerated ditch erosion. At a minimum, space cross drains at intervals referred to in the BLM Road Design Handbook 9113-1 (USDI BLM 2011), Illustration 11 – 'Spacing for Drainage Lateral.' Increase cross drain frequency through erodible soils, steep grades, and unstable areas.
R 41	Choose cross drain culvert diameter and type according to predicted ditch flow, debris and bedload passage expected from the ditch. Minimum diameter is 18".
R 42	Locate surface water drainage measures (e.g., cross drain culverts, rolling dips and water bars) where water flow will be released on convex slopes or other stable and non-erosive areas that will absorb road drainage and prevent sediment flows from reaching wetlands, floodplains, and waters of the State. Where practicable locate surface water drainage structures above road segments with steeper downhill grade. Locate cross drains at least 50 feet from the nearest stream crossing and allow for a sufficient non-compacted soil and vegetative filter.
R 43	Armor surface drainage structures (e.g., broad based dips and lead-off ditches) to maintain functionality in areas of erosive and low-strength soils.
R 44	Discharge cross drain culverts at ground level on non-erodible material. Install downspout structures or energy dissipaters at cross drain outlets or drivable dips where alternatives to discharging water onto loose material, erodible soils, fills, or steep slopes are not available.
R 45	Cut protruding 'shotgun' culverts at the fill surface or existing ground. Install downspout or energy dissipaters to prevent erosion.
R 46	Skew cross drain culverts 45–60 degrees from the ditchline and provide pipe gradient slightly greater than ditch gradient to reduce erosion at cross drain inlet.
R 47	Provide for unobstructed flow at culvert inlets and within ditch lines during and upon completion of road construction prior to the wet season.
Timing of In-water Work	
R 48	Conduct all nonemergency in-water work during the ODFW instream work window unless a waiver is obtained from permitting agencies. Avoid winter sediment and turbidity entering streams during in-water work to the extent practicable.
R 49	Remove stream crossing culverts and entire in-channel fill material during ODFW instream work period.
Low-water Ford Stream Crossings	
R 50	Harden low-water ford approaches with durable materials provide cross drainage on approaches. Limit ford crossings to the ODFW instream work period.
R 51	Restrict access to unimproved low-water stream crossings.
R 52	Use permanent low-water fords (e.g., concrete and well-anchored concrete mats) in debris-flow susceptible streams.
Maintaining Water Quality—Non-native Invasive Plants, including Noxious Weeds	
R 53	Locate equipment-washing sites in areas with no potential for runoff into wetlands, Riparian Reserve, floodplains, and waters of the State. Do not use solvents or detergents to clean equipment on site.
Erosion Control Measures	
R 61	During roadside brushing, remove vegetation by cutting rather than uprooting.

BMP Number	Best Management Practice
R 62	Limit road and landing construction, reconstruction, or renovation activities to the dry season. Keep erosion control measures concurrent with ground disturbance to allow immediate storm-proofing.
R 63	Apply native seed and certified weed-free mulch to cut and fill slopes, ditchlines, and waste disposal sites with the potential for sediment delivery to wetlands, Riparian Reserve, floodplains and waters of the State. If needed to promote a rapid ground cover and prevent aggressive invasive plants, use interim erosion control non- native sterile annuals before attempting to restore natives. Apply seed upon completion of construction and as early as practicable to increase germination and growth. Reseed if necessary to accomplish erosion control. Select seed species that are fast-growing, provide ample ground cover, and have adequate soil-binding properties. Apply mulch that will stay in place and at site-specific rates to prevent erosion.
R 64	Place sediment-trapping materials or structures such as straw bales, jute netting, or sediment basins at the base of newly constructed fill or side slopes where sediment could be transported to waters of the State. Keep materials away from culvert inlets or outlets.
R 65	Use biotechnical stabilization and soil bioengineering techniques to control bank erosion (e.g., commercially produced matting and blankets, live plants or cuttings, dead plant material, rock, and other inert structures).
R 66	Suspend ground-disturbing activity if projected forecasted rain will saturate soils to the extent that there is potential for movement of sediment from the road to wetlands, floodplains, and waters of the State. Cover or temporarily stabilize exposed soils during work suspension. Upon completion of ground-disturbing activities, immediately stabilize fill material over stream crossing structures. Measures could include but are not limited to erosion control blankets and mats, soil binders, soil tackifiers, or placement of slash.
R 67	Apply fertilizer in a manner to prevent direct fertilizer entry to wetlands, Riparian Reserve, floodplains, and waters of the State.
R 68	Apply water or approved road surface stabilizers/dust control additives to reduce surfacing material loss and buildup of fine sediment that can enter into wetlands, floodplains and waters of the State. Prevent entry of road surface stabilizers/dust control additives into waters of the State during application. For dust abatement, limit applications of lignin sulfonate to a maximum rate of 0.5 gal/yd2 of road surface, assuming a 50:50 (lignin sulfonate to water) solution.
Road Maintenance	
R 69	Prior to the wet season, provide effective road surface drainage maintenance. Clear ditch lines in sections where there is lowered capacity or is obstructed by dry gravel, sediment wedges, small failures, or fluvial sediment deposition. Remove accumulated sediment and blockages at cross-drain inlets and outlets. Grade natural surface and aggregate roads where the surface is uneven from surface erosion or vehicle rutting. Restore crowning, out sloping or in sloping for the road type for effective runoff. Remove or provide outlets through berms on the road shoulder. After ditch cleaning prior to hauling, allow vegetation to reestablish or use sediment entrapment measures (e.g., Sediment trapping blankets and silt fences).
R 70	Retain ground cover in ditch lines, except where sediment deposition or obstructions require maintenance.
R 71	Maintain water flow conveyance, sediment filtering, and ditch line integrity by limiting ditch line disturbance and groundcover destruction when machine cleaning within 200 feet of road-stream crossings.

BMP Number	Best Management Practice
R 72	Avoid undercutting of cut-slopes when cleaning ditch.
R 73	Remove and dispose of slide material when it is obstructing road surface and ditch line drainage. Place material on the stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. Reseed areas with native seed and weed-free mulch.
R 74	Do not side cast loose ditch or surface material where it can enter wetlands, Riparian Reserve, floodplains, and waters of the State.
R 75	Retain low-growing vegetation on cut-and-fill slopes.
R 76	Seed and mulch cleaned ditch lines and bare soils that drain directly to wetlands, floodplains, and waters of the State, with native species and weed-free mulch.
Road Storm-proofing	
R 77	Inspect and maintain culvert inlets and outlets, drainage structures and ditches before and during the wet season to diminish the likelihood of plugged culverts and the possibility of washouts.
R 78	Repair damaged culvert inlets and downspouts to maintain drainage design capacity.
R 79	Blade and shape roads to conserve existing aggregate surface material, retain or restore the original cross section, remove berms and other irregularities that impede effective runoff or cause erosion, and ensure that surface runoff is directed into vegetated, stable areas.
R 80	Stormproof open resource roads receiving infrequent maintenance to reduce road erosion and reduce the risk of washouts by concentrated water flows. Stormproof temporary roads if retained over winter.
R 81	Suspend stormproofing/decommissioning operations and cover or otherwise temporarily stabilize all exposed soil if conditions develop that cause a potential for sediment-laden runoff to enter a wetland, floodplain, or waters of the State. Resume operations when conditions allow turbidity standards to be met.
Road Closure and Decommissioning	
R 82	Inspect closed roads to ensure that vegetation stabilization measures are operating as planned, drainage structures are operational, and non-native invasive plants, including noxious weeds, are not providing erosion control. Conduct vegetation treatments and drainage structure maintenance as needed.
R 83	Decommission temporary roads upon completion of use.
R 84	Prevent use of vehicular traffic utilizing methods such as gates, guard rails, earth/log barricades, to reduce or eliminate erosion and sedimentation due to traffic on roads.
R 85	Convert existing drainage structures such as ditches and cross drain culverts to a long-term maintenance-free drainage configuration such as an out sloped road surface and waterbars.
R 86	Place and remove temporary stream crossings during the dry season, without overwintering, unless designed to accommodate a 100-year flood event. See also R 49.
R 87	Place excavated material from removed stream crossings on the stable ground outside of wetlands, Riparian Reserve, floodplains, and waters of the State. In some cases, the material could be used for recontouring old road cuts or be spread across roadbed and treated to prevent erosion.
R 88	Reestablish stream crossings to the natural stream gradient. Excavate sideslopes back to the natural bank profile. Reestablish natural channel width and floodplain.
R 89	Install cross ditches or waterbars upslope from stream crossing to direct runoff and potential sediment to the hillslope rather than deliver it to the stream.
R 90	Following culvert removal and prior to the wet season, apply erosion control and sediment trapping measures (e.g., seeding, mulching, straw bales, jute netting, and

BMP Number	Best Management Practice
	native vegetative cuttings) where sediment can be delivered into wetlands, Riparian Reserve, floodplains, and waters of the State.
R 91	Implement tillage measures, including ripping or subsoiling to an effective depth, when needed. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites.
R 92	After tilling the road surface, pull back unstable road fill and end-haul or contour to the natural slopes.
Wet-season Road Use	
R 93	On active haul roads, during the wet season, use durable rock surfacing and sufficient rock depth to resist rutting or development of sediment on road surfaces that drain directly to wetlands, floodplains, and waters of the State.
R 94	Prior to winter hauling activities, implement structural road treatments such as: increasing the frequency of cross drains, installing sediment barriers or catch basins, applying gravel lifts or asphalt road surfacing at stream crossing approaches, and armoring ditch lines.
R 95	Remove snow on surfaced roads in a manner that will protect the road and adjacent resources. Retain a minimum layer (4”) of compacted snow on the road surface. Provide drainage through the snow bank at periodic intervals to allow snowmelt to drain off the road surface.
R 96	Avoid removing snow from unsurfaced roads where runoff drains to waters of the State.
R 97	Maintain road surface by applying appropriate gradation of aggregate and suitable particle hardness to protect road surfaces from rutting and erosion under active haul where runoff drains to wetlands, Riparian Reserve, floodplains, and waters of the State.
R 98	To reduce sediment tracking from natural surface roads during active haul, provide a gravel approach before entrance onto surfaced roads.
R 99	Install temporary culverts and washed rock on top of low-water ford to reduce vehicle contact with water during active haul. Remove culverts promptly after use.
Cable Yarding	
TH 01	Design yarding corridors crossing streams to limit the number of such corridors, using narrow widths, and using the most perpendicular orientation to the stream feasible. Minimize yarding corridor widths and space corridors as far apart as is practicable given physical and operational limitations, through practices such as setting limitations on corridor width, corridor spacing, or the amount of corridors in an area. For example, such practices could include, as effective and practicable: —Setting yarding corridors at 12–15 foot maximum widths, and —Setting corridor spacing where they cross the streams to no less than 100 feet apart when physical, topography, or operational constraints demand, with an overall desire to keep an average spacing of 200 feet apart.
TH 02	Directionally fall trees to lead for skidding and skyline yarding to minimize ground disturbance when moving logs to skid trails and skyline corridors.
TH 03	Require full suspension over flowing streams, non-flowing streams with highly erodible bed and banks, and jurisdictional wetlands (unless a site-specific analysis indicates that water quality and aquatic habitat will not be adversely affected).
TH 04	When logging downhill into Riparian Reserve, design the logging system to prevent converging yarding trails from intersecting the stream network.
TH 05	Prevent streambank and hillslope disturbance on steep slopes (generally > 60 percent) by requiring full-suspension within 50 feet of definable stream channels. Yard the remaining areas across the Riparian Reserve using at least one-end suspension.

BMP Number	Best Management Practice
TH 06	Implement erosion control measures such as waterbars, slash placement, and seeding in cable yarding corridors where the potential for erosion and delivery to waterbodies, floodplains, and wetlands exists.
Ground-based Harvesting	
TH 07	Exclude ground-based equipment on hydric soils, defined by the Natural Resources Conservation Service.
TH 08	Limit designated skid trails for thinning or regeneration harvesting to ≤ 15 percent of the harvest unit area to reduce displacement or compaction to acceptable limits.
TH 09	Limit width of skid roads to single width or what is operationally necessary for the approved equipment. Where multiple machines are used, provide a minimum- sized pullout for passing.
TH 10	Ensure leading-end of logs is suspended when skidding.
TH 11	Restrict non-road, in unit, ground-based equipment used for harvesting operations to periods of low soil moisture; generally from May 15 to Oct 15. Low soil moisture varies by texture and is based on site- specific considerations. Low soil moisture limits will be determined by qualified specialists to determine an estimated soil moisture and soil texture.
TH 12	Incorporate existing skid trails and landings as a priority over creating new trails and landings where feasible, into a designated trail network for ground-based harvesting equipment, consider proper spacing, skid trail direction and location relative to terrain and stream channel features.
TH 13	Limit non-specialized skidders or tracked equipment to slopes less than 35 percent, except when using previously constructed trails or accessing isolated ground-based harvest areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow.
TH 14	Limit the use of specialized ground-based mechanized equipment (those machines specifically designed to operate on slopes greater than 35 percent) to slopes less than 50 percent, except when using previously constructed trails or accessing isolated ground-based harvesting areas requiring short trails over steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow.
TH 15	Designate skid trails in locations that channel water from the trail surface away from waterbodies, floodplains, and wetlands, or unstable areas adjacent to them.
TH 16	Apply erosion control measures to skid trails and other disturbed areas with potential for erosion and subsequent sediment delivery to waterbodies, floodplains, or wetlands. These practices may include seeding, mulching, water barring, tillage, and woody debris placement. Use guidelines from the road decommissioning section.
TH 17	Construct waterbars on skid trails using guidelines in Table C-6 (ROD/RMP) where potential for soil erosion or delivery to waterbodies, floodplains, and wetlands exists.
TH 18	Subsoil skid trails, landings, or temporary roads where needed to achieve no more than 20 percent detrimental soil conditions, and minimize surface runoff, improve soil structure, and water movement through the roadbed. See also R 91–92.
TH 19	Block skid trails to prevent public motorized vehicle and other unauthorized use at the end of seasonal use.
TH 20	Allow harvesting operations (cutting and transporting logs) when ground is frozen or adequate snow cover exists to prevent soil compaction and displacement.

BMP Number	Best Management Practice
TH 21	Minimize the area where more than half of the depth of the organically enriched upper horizon (topsoil) is removed when conducting forest management operations.
TH 22	Maintain at least the minimum percent of effective ground cover needed to control surface erosion, as shown in Table C-3 (ROD/RMP), following forest management operations. Ground cover may be provided by vegetation, slash, duff, medium to large gravels, cobbles, or biological crusts.
Pile and Burn	
F 07	Avoid burning piles within 35 feet of a stream channel.
F 08	Avoid creating piles > 16 feet in height or diameter. Pile smaller diameter materials and leave pieces > 12" diameter within the unit. Reduce burn time and smoldering of piles by extinguishment with water and tool use.
F 09	When burning machine-constructed piles, preferably locate and consume organic materials on landings or roads. If piles are within harvested units and more than 15 percent of the burned area mineral soil (the portion beneath the pile) surface changes to a reddish color, then consider that amount of area towards the 20 percent detrimental soil disturbance limit.
Mechanical and Manual Fuels Treatments	
F 10	Do not operate ground-based machinery for fuels reduction within 50 feet of streams (slope distance), except where machinery is on improved roads, designated stream crossings, or where equipment entry into the 50-foot zone would not increase the potential for sediment delivery into the stream. Do not operate ground-based machinery for fuels reduction on slopes > 35 percent. Mechanical equipment with tracks may be used on short pitch slopes of greater than 35 percent but less than 45 percent when necessary to access benches of lower gradient (length determined on a site- specific basis, generally less than 50 feet (slope distance)).
F 11	Use temporary stream crossings if necessary to access the opposite side with any equipment or vehicles (including OHVs). Follow Temporary Stream Crossing practices under Roads section.
F 12	Place residual slash on severely burned areas, where there is potential for sediment delivery into waterbodies, floodplains, and wetlands.
Operations Near Waterbodies	
SP 01	Take precautions to prevent leaks or spills of petroleum products (e.g., fuel, motor oil, and hydraulic fluid) from entering the waters of the State.
SP 02	Take immediate action to stop and contain leaks or spills of chemicals and other petroleum products. Notify the Oregon Emergency Response System, through the District Hazard Materials specialist, of any spill that enters the waters of the State.
SP 03	- Inspect and clean heavy equipment as necessary prior to moving on to the project site, in order to remove oil and grease, non-native invasive plants, including noxious weeds, and excessive soil. - Inspect hydraulic fluid and fuel lines on heavy-mechanized equipment for proper working condition. - Where practicable, maintain and refuel heavy equipment a minimum of 150 feet away from streams and other waterbodies. - Refuel small equipment (e.g., chainsaws and water pumps) at least 100 feet from waterbodies (or as far as practicable from the waterbody where local site conditions do not allow a 100-foot setback) to prevent direct delivery of contaminants into a waterbody. Refuel small equipment from no more than 5-gallon containers. Use absorbent material or a containment system to prevent spills when re-fueling small equipment within the stream margins or near the edge of waterbodies.

BMP Number	Best Management Practice
	- In the event of a spill or release, take all reasonable and safe actions to contain the material. Specific actions are dependent on the nature of the material spilled. - Use spill containment booms or as required by ODEQ. Have access to booms and other absorbent containment materials. - Immediately remove waste or spilled hazardous materials (including but not limited to diesel, oil, hydraulic fluid) and contaminated soils near any stream or other waterbody and dispose of it/them in accordance with the applicable regulatory standard. Notify Oregon Emergency Response System of any spill over the material reportable quantities, and any spill not totally cleaned up after 24 hours. - Store equipment containing reportable quantities of toxic fluids outside of Riparian Reserve.
SP 04	If more than 42 gallons of fuel or combined quantity of petroleum product and chemical substances would be transported to a project site as project materials, implement the following precautions: - Plan a safe route and material transfer sites so that all spilled material would be contained easily at that designated location. - Plan an active dispatch system that can relay information to appropriate resources. - Ensure a spill containment kit that can absorb and contain 55 gallons of petroleum product and chemical substances is readily available. - Provide for immediate notification to OERS in the event of a spill. Have a radio-equipped vehicle lead the chemical or fuel truck to the project site. - Assemble a spill notification list that includes the district hazardous materials coordinator, ODEQ, and spill clean-up contractors. - Construct a downstream water user contact list with addresses and phone numbers. - When operating within source water watersheds, pre-estimate water flow travel times through the watershed to predict downstream arrival times. - Be prepared to sample water and carry sample containers. - Be prepared to assist OSP and ODFW to assess wildlife impacts of any material spilled.
Spill Abatement	
SP 05	Spill Prevention, Control, and Countermeasure Plan (SPCC): All operators shall develop a modified SPCC plan prior to initiating project work if there is a potential risk of chemical or petroleum spills near waterbodies. The SPCC plan will include the appropriate containers and design of the material transfer locations. No interim fuel depot or storage location other than a manned transport vehicle would be used.
SP 06	Spill Containment Kit (SCK): All operators shall have a SCK as described in the SPCC plan on-site during any operation with potential for run-off to adjacent waterbodies. The SCK will be appropriate in size and type for the oil or hazardous material carried by the operator.
SP 07	Operators shall be responsible for the clean-up, removal, and proper disposal of contaminated materials from the site.

Late-Successional Reserve LUA (ROD/RMP pp. 64–67)

- During silviculture treatment of stands, retain existing
  a) Snags ≥ 6” DBH

b) Down woody material ≥ 6” in diameter at the large end and > 20 feet in length except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6” DBH cut for safety or operational reasons as down woody material unless they would also pose a safety hazard as down woody material.

- Stands ≥ 10 acres treated with selection harvest or commercial thinning,
  a) Conduct harvest to result in stand average relative density percent between 20 percent and 45 percent after harvest.
  b) Do not create group selection openings more than 4 acres in size.
  c) Do not create group selection openings on more than 25 percent of the stand area.
  d) Leave untreated skips on at least 10 percent of the stand area.
- In stands < 10 acres treated with selection harvest or commercial thinning, do not create group selection openings more than 2.5 acres in size.
- Use natural or artificial regeneration or both to reforest group selection openings created from selection harvest or commercial thinning with a mixture of species appropriate to the site to an average density across the group selection openings of at least 75 trees per acre within 5 years of harvest.
- In stands that are not northern spotted owl nesting-roosting habitat, apply silvicultural treatments to speed the development of northern spotted owl nesting-roosting habitat or improve the quality of northern spotted owl nesting-roosting habitat in the stand or the adjacent stand in the long term. Limit such silvicultural treatments (other than forest pathogen treatments) to those that do not preclude or delay by 20 years or more the development of northern spotted owl nesting-roosting habitat in the stand and adjacent stands, as compared to development without treatment. Allow silvicultural treatments that do not meet the above criteria if needed to treat infestations or reduce the spread of forest pathogens.
- When conducting commercial harvest, in stands with < 64 snags per acre > 10” DBH and < 19 snags per acre > 20” DBH on average across the harvest unit, create new snags in the amounts and sizes specified within 1 year of completion of yarding the timber in the timber sale. If insufficient trees are available in the size class specified, use trees from the largest size class available. Meet snag creation levels as an average at the scale of the harvest unit; snag creation levels need not be attained on every acre. When creating the required number of snags, locate them according to the following criteria:
  a) Create snags in a variety of spatial patterns, including aggregated groups and individual trees.
  b) Do not create snags within falling distance of power lines, structures, or roads that would remain open after harvesting activities are complete. If it is not possible to create snags beyond the falling distance of power lines, structures, or roads that would remain open after harvesting activities are complete, cut trees equivalent to the required number of snags and retain as down woody material within the harvest unit.
- Concentrate created snags in areas of the stand where the BLM does not presently anticipate skidding or yarding would occur within 20 years.

<u>Riparian Reserve LUA (ROD/RMP pp. 68–74)</u>

- Refer to Management Direction in LSR for snag creation in RRs.
- Allow yarding corridors, skid trails, road construction, stream crossings, and road maintenance and improvement where there is no operationally feasible and economically viable alternative to accomplish other resource management objectives.
- Where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement in the Inner Zone or Middle Zone, retain cut trees in adjacent stands as down woody material or move cut trees for placement in streams for fish habitat restoration at the distraction of the BLM. Where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement in the Outer Zone or in Riparian Reserves associated with features other than streams, retain cut trees in adjacent stands as down woody material, move cut trees for placement in streams for fish habitat restoration, or sell trees, at the discretion of the BLM. For any trees that are both ≥ 40” DBH and that the BLM identifies were established prior to 1850, retain cut trees in the adjacent stand as down woody material. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb,

truck, or crown characteristics, or increment coring, at the discretion of the BLM.
- Use site-specific BMPs to maintain water quality during land management actions, including discretionary actions of others crossing BLM-administered lands.
- Do not operate ground-based machinery for timber harvest within 50 feet of streams (slope distance), except where machinery is on improved roads, designated stream crossings, or where equipment entry into the 50-foot zone would not increase the potential for sediment delivery into the stream.
- Do not operate ground-based machinery for timber harvest on slopes > 35 percent. Mechanical equipment with tracks (e.g., excavators, loaders, forwarders, and harvesters may be used on short pitch slopes of greater than 35 percent but less than 45 percent when necessary to access benches of lower gradient (length determined on a site-specific basis, generally less than 50 feet (slope distance).
- Tree tipping: When conducting commercial thinning in any portion of the Outer Zone in a stand in all watershed classes, cut or tip from 0 to 15 square feet of basal area per live trees, averaged across the RR portion of the treated stand. Leave cut or tipped trees on site or yard, deck, and make cut or tipped trees available for fish habitat restoration. The cut or tipped trees can be of any size and come from any zone.
- Refer to ROD/RMP Tables 5–8 for RR distance by feature type and zone-specific management directions (pp. 70–74).

Cultural Resources (ROD/RMP pp. 76)
- For all sites that are listed or eligible for listing on the National Register of Historic Places, protect sites through avoidance or other protection measures.

Hydrology (ROD/RMP pp. 79–80)
- Select and implement site-level BMPs to maintain water quality for BLM actions (including, but not limited to, road construction, road maintenance, silvicultural treatments, recreation management, prescribed burning, and wildfire management actions/activities) and discretionary actions of others crossing BLM-administered lands.
- Design culverts, bridges, and other stream crossings for a 100-year flood event, including allowance for bed load and anticipated floatable debris. Culverts would be of adequate width to preclude ponding of water higher than the top of the culvert. For streams with ESA-listed fish, design stream crossings to meet design standards consistent with existing ESA consultation documents that address stream crossings in the decision area.
- Implement road improvements, storm-proofing, maintenance, or decommissioning to reduce or eliminate chronic sediment inputs to stream channels and water bodies. This could include maintaining vegetated ditch lines, improving road surfaces, and installing cross drains at appropriate spacing).
- Suspend commercial road use where the road surface is deteriorating due to vehicular rutting or standing water, or where turbid runoff is likely to reach stream channels.
- Decommission roads that are no longer needed for resource management and are at risk of failure or are contributing sediment to streams, consistent with valid existing rights.

Wildlife (ROD/RMP pp. 95–101)
- Protect known bald eagle or golden eagle nests (including active nests and alternate nests) and bald eagle winter roosting areas. Prohibit activities that would disrupt bald eagles or golden eagles that are actively nesting.
  - Continue routine use and maintenance of existing roads and other facilities.
  - Do not remove overstory trees within 330 feet of bald eagle or golden eagle nests, except for removal of hazard trees.
  - Do not conduct timber harvest operations (including road construction, tree felling, and yarding) during the breeding season within 660 feet of bald eagle or golden eagle nests. Decrease the distance to 330 feet around

alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, or after eggs laid in another nest within the territory have hatched.
    - Prohibit activities that will disrupt roosting bald eagles or golden eagles at communal winter roosts.
- Implement conservation measures to mitigate specific threats to Bureau Sensitive species during the planning of activities and projects. Conservation measures include altering the type, timing, location, and intensity of management actions.
- Prohibit activities that disrupt marbled murrelet nesting at occupied sites, or at unsurveyed stands that contain potential murrelet nesting habitat.
- Do not authorize timber sales that would cause the incidental take of northern spotted owl territorial pairs or resident singles from timber harvest.

APPENDIX E ROADS AND ACCESS

The following definitions are excerpted from the Western Oregon Districts Transportation Management Plan (USDI BLM *revised* 2018) for road-related activities.

Road-related Activities

<u>Road Construction</u>
Roads, culverts, and bridges shall be designed and constructed in accordance with policies, standards in BLM Manuals in the 9100 Series, the ROD/RMP, and BMPs contained within the ROD/RMP.

<u>Road Improvement</u>
Road improvement includes work and materials expended to better a road by increasing its construction standards when compared to its original construction standards. Examples may include but are not limited to widening; surfacing; the addition of drainage structures and turnouts; and bridge replacement.

<u>Road Closures</u>
Temporary/Seasonal/Limited Access—These are typically resource roads, closed with a gate or barrier. The road will be closed to public vehicular traffic but may be open for BLM/Permittee commercial activities. The road may or may not be closed to BLM administrative uses on a seasonal basis depending upon impacts to the resources. Drainage structures will be left in place.

Decommission (long-term)—These will be based on resource protection needs and the RMP directives. The road segment will be closed to vehicles on a long-term basis but may be used again in the future. Prior to closure the road will be left in an erosion-resistant condition by establishing cross drains, eliminating diversion potential at stream channels, and stabilizing or removing fills on unstable areas. Exposed soils will be treated to reduce sediment delivery to streams. The road will be closed with an earthen barrier or its equivalent. This category can include roads that have been or will be closed due to a natural process (abandonment) and may be opened and maintained for future use.

Full Decommission (permanent)—Roads determined through an interdisciplinary process to have no future need may be subsoiled (or tilled), seeded, mulched, and planted to reestablish vegetation. Cross drains, fills in stream channels, and unstable areas will be removed, if necessary, to restore natural hydrologic flow. The road will be closed with an earthen barrier or its equivalent. The road will not require future maintenance. This category includes roads that have been closed due to a natural process (abandonment) and where hydrologic flow has been naturally restored.

Legal Public Access
BLM typically negotiates exclusive easements with private landowners to obtain access for forest management activities when a reciprocal agreement is not needed. Unlike reciprocal right-of-way agreements, exclusive road easements typically grant rights for public use.

Legal public access can vary greatly because most BLM-administered lands in western Oregon are intermingled with private lands. Reciprocal right-of-way agreements, exclusive and non-exclusive easements across adjacent private lands have a determining effect on public access.

Legal public access includes public access rights that have been secured by the United States, including roads constructed by BLM on public lands. Additionally, public access rights are typically included in the acquisition of exclusive road easements on private roads where the United States has acquired control of the right-of-way.

While administrative access is legally available to the BLM, reciprocal right-of-way agreements do not include legal access rights for the public. All roads tributary to roads without legal public access also do not have legal public access.

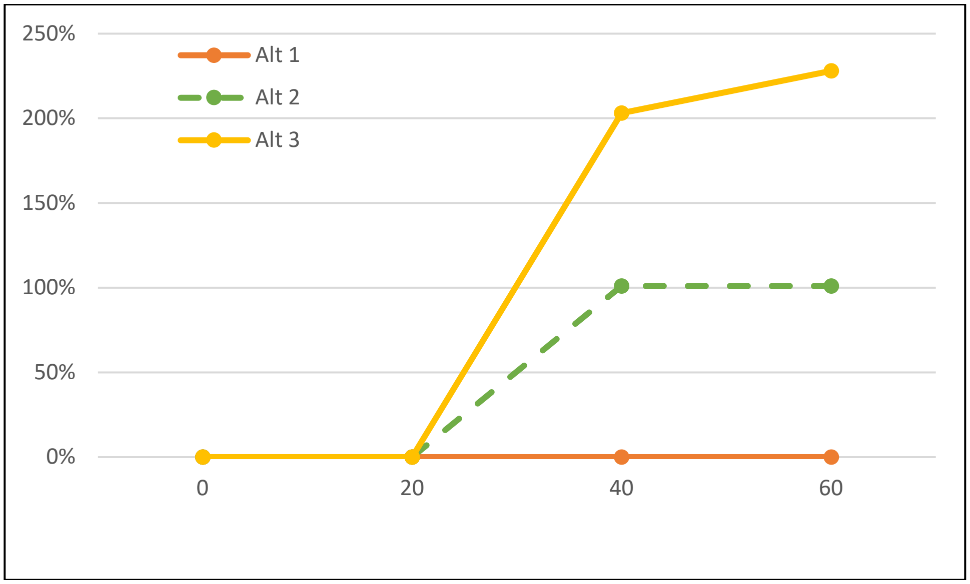


Figure 21: Percent change in acres of NRF within the 1.5-mile action area of the units being evaluated for treatment in the first five years and modelled out to 60 years for all three alternatives

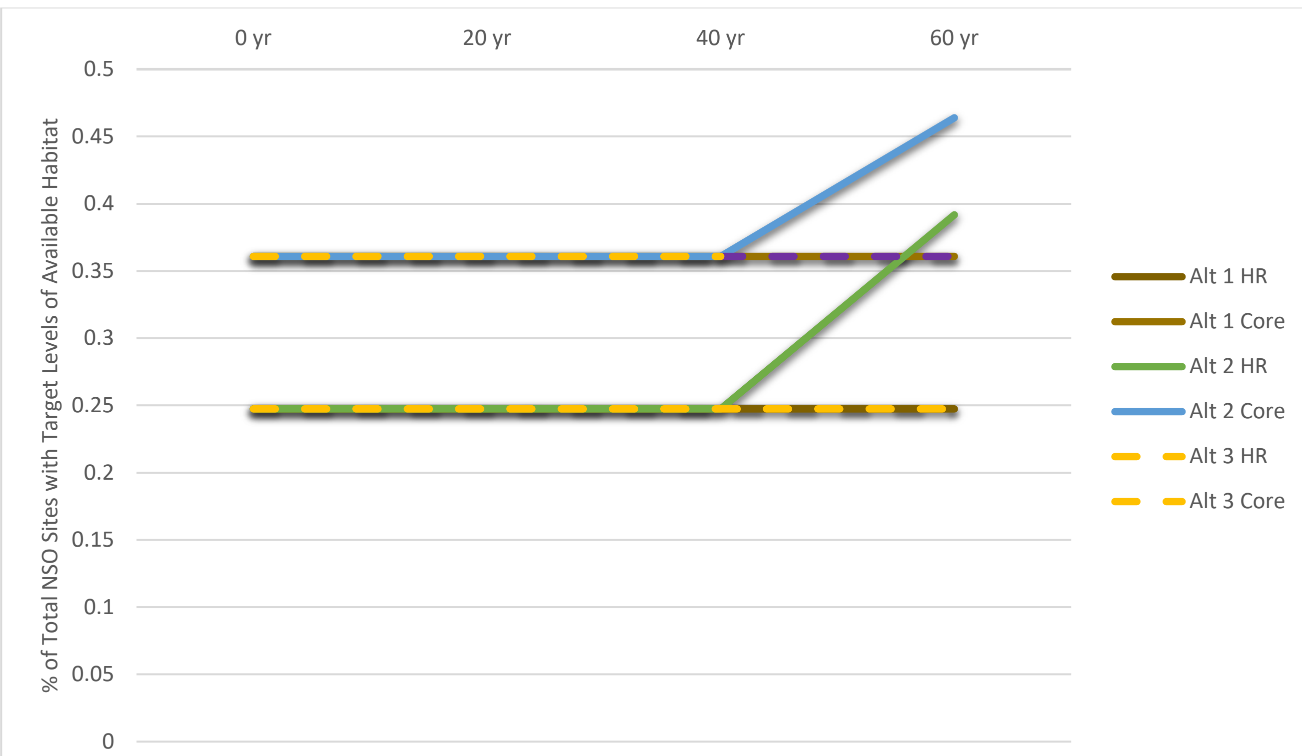


Figure 22: Percent change in the number of existing spotted owl sites that have at least 40 percent NRF at the home range scale and 50 percent NRF at the core scale for each of the three alternatives at 20-year intervals out to 60 years.

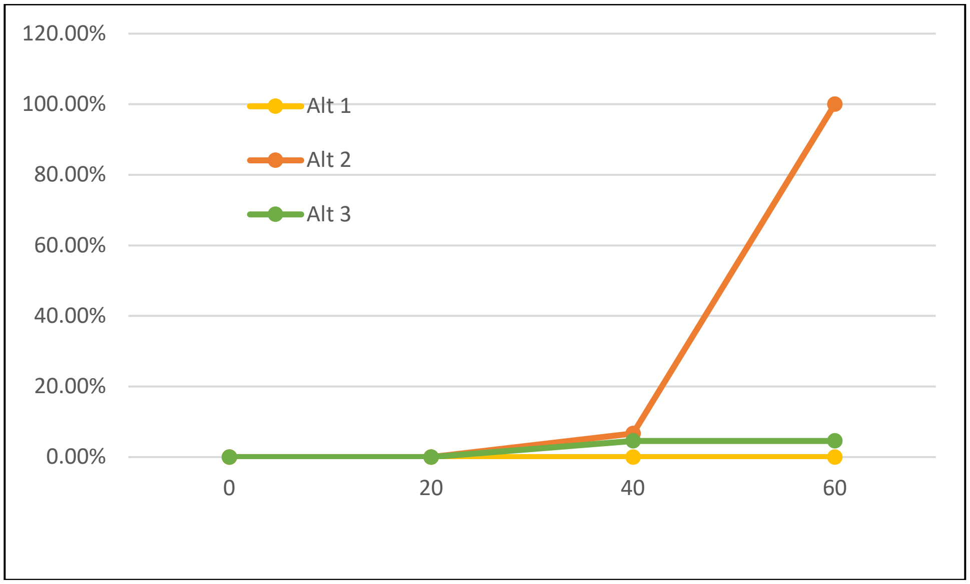


Figure 23: Change in the percent of spotted owl critical habitat (subunits ORC 3 and ORC 5 combined within the Oregon Coast Range critical habitat unit) in NRF for each of the three alternatives at 20-year intervals out to 60 years.

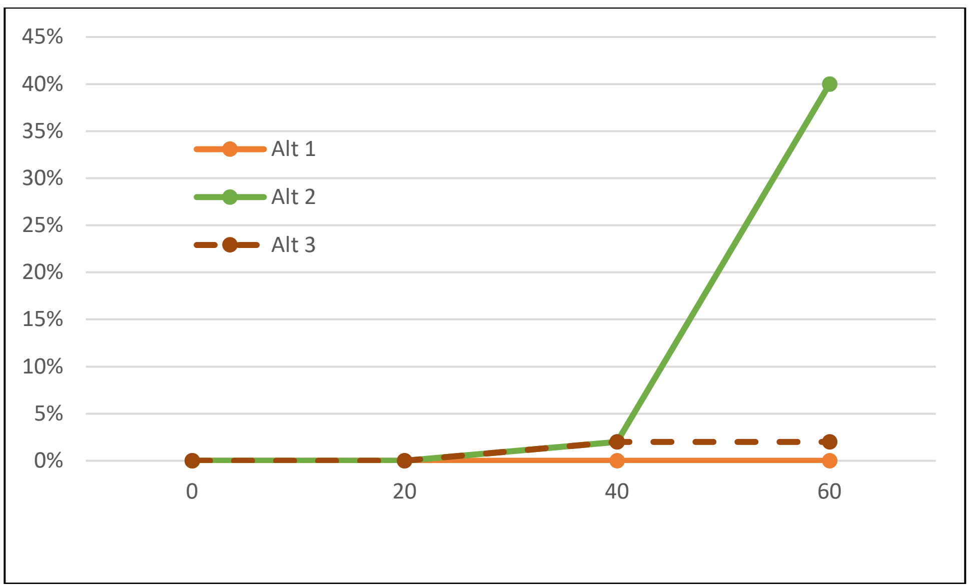


Figure 24: Percent change in the amount of interior (> 60 m from the stand edge) murrelet nesting stands in the proposed first 5-years of sales and in 20-year intervals out to 60 years for each alternative.

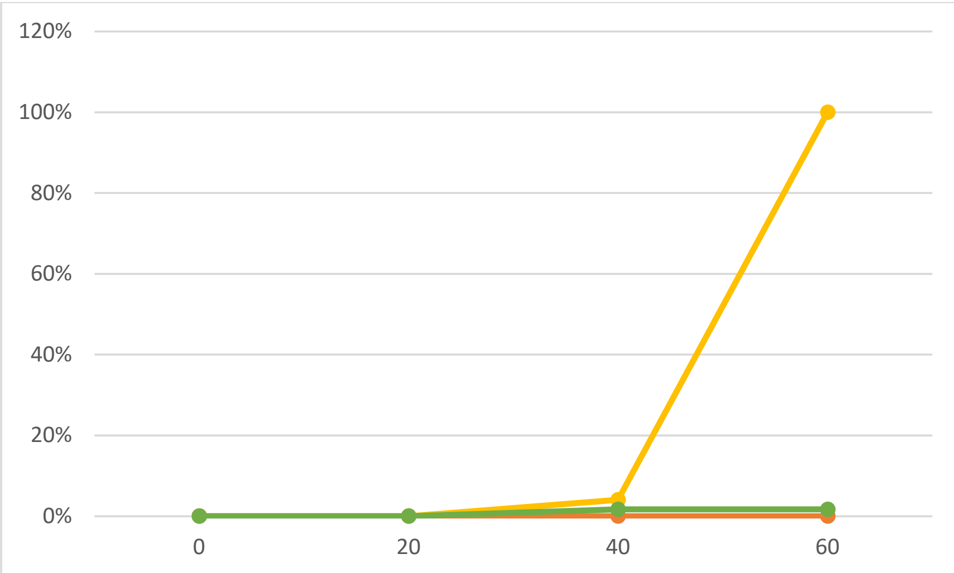


Figure 25: Percent change in the amount of murrelet critical habitat subunits OR-04-3 and OR-04-g in NRF for each of the three alternatives at 20-year intervals out to 60 years for all three alternatives.

Marbled Murrelet Tree Rating Guidance

E. Seely, Coos Bay BLM March 2019

The MAMU Tree Rating Guide is to be used **AFTER** a tree has been classified as a potential MAMU nesting tree. If the tree was not determined to be a nesting tree, the observer is not required to enter any further information. Keep in mind, for a tree to be classified as a MAMU nesting tree, it must meet ALL of the minimum requirements.

Minimum MAMU nesting structure requirements:

1) A DBH of at least 19.1 inches and a height greater than 107 feet.
2) A nest platform at least 32.5 feet above the ground (a nest platform is a relatively flat surface at least 4 inches wide, with nesting substrate (moss, duff, etc.), and an access route through the canopy that murrelet could use to approach and land on that platform.
3) A tree branch or foliage, either on the tree with potential structure or on an adjacent tree, which provides protective cover over the platform.

There are three additional categories that a MAMU tree could be classified as: Marginal, Good, and Best. Characteristics of these trees can be seen below.

Optional: Take a geo-reference photo of the MAMU tree, attached to the MAMU Tree Geodatabase waypoint. Photos will help others analyze the tree stand for timber sales as well determine what category the tree may fit in to.

*Keep in mind that not all trees will display correctly on GIS Lidar layers. Broken top trees will not be apparent until on the ground, and trees displaying on Lidar, may have since had the tops broken off.

Tree Categories

Marginal:

- Meets BARE minimum requirements for RMP MAMU Nesting Structure
- DBH: ≥ 19.1 inches
- Height: ≥ 107 feet
- 1 or 2 nesting platforms over 32.5 feet high, 4–6 inches diameter
- Minimal duff (moss) on trees
- Minimal cover provided from surrounding branches or trees
- Access route through the canopy
    - Discussion and anthropomorphizing: These are the trees that the observer is on the fence about for classifying as MAMU nesting tree or not. They meet the basic requirements set by the RMP; however, they are the minimal RMP tree requirements for a MAMU nest, but barely. They should not be eliminated from consideration but will have a lower classification during final analysis.

Good:

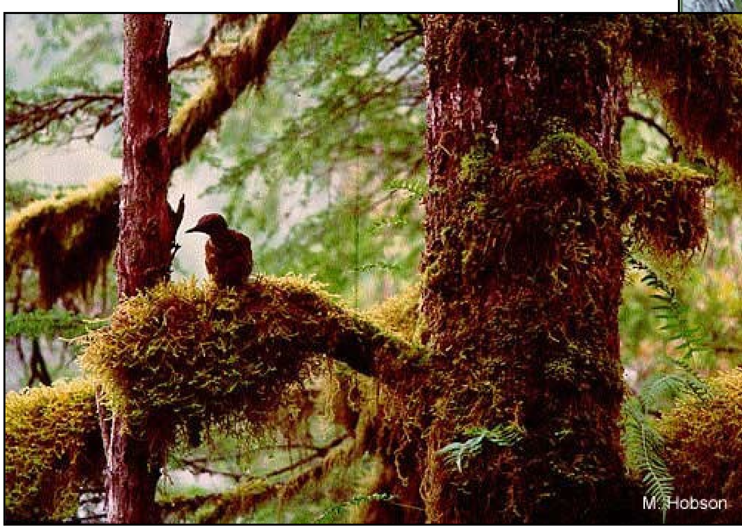
- DBH: Average 25-35 inches
- Height: > 107 feet
- Approximately 5 nesting platforms over 32.5 feet high, with at least 1 platform ≥ 6 inch diameter

- Moderate duff (moss) coverage on the nesting platforms
- Moderate cover provided from surrounding branches or trees
- Access route through the canopy
- Majority of trees will most likely fall under this category
    - o Discussion and anthropomorphizing: These trees are ones that are the average MAMU tree requirements and look good all the way around. The observer immediately looks at the tree and thinks, "yes," MAMU nesting tree. However, it does not exceed in all aspects of the requirements.

Best:

- Left for the jaw-dropping perfect trees :)
- DBH: Average 30+ inches
- Approximately 5-10+ nesting platforms over 32.5 feet high, with at least two platforms ≥ 6 inch diameter
- Moderate to thick duff on the nesting platforms
- Moderate to full coverage of the nesting platforms from surrounding branches or trees
- Access route through the canopy
- o Discussion and anthropomorphizing: The observer thinks, "YES!," absolutely MAMU nesting habitat. It exceeds your MAMU nesting tree expectations and makes the observer feel like they would even build a nest there.

Duff/Moss Coverage Examples



Example of THICK duff on tree branches. Note: duff/moss is hanging below all the branches, this will be visible from the ground.

M.Hobson.

Example of MAMU nest site on platform with minimal duff, minimal canopy cover, and an over 4-in-wide branch.

Humboldt State University

MAMU Nest in Moderate/Thick duff on approximately 8 inch diameter branch, in a "y" intersection of two branches.

Hamer Environmental

Confirmed MAMU nest site from CA Dept of Fish and Game. Branch looks approximately 10 inches or more in diameter, platform is approximately 3 ft in length.

S.Osborn CA Dept of Fish and Game

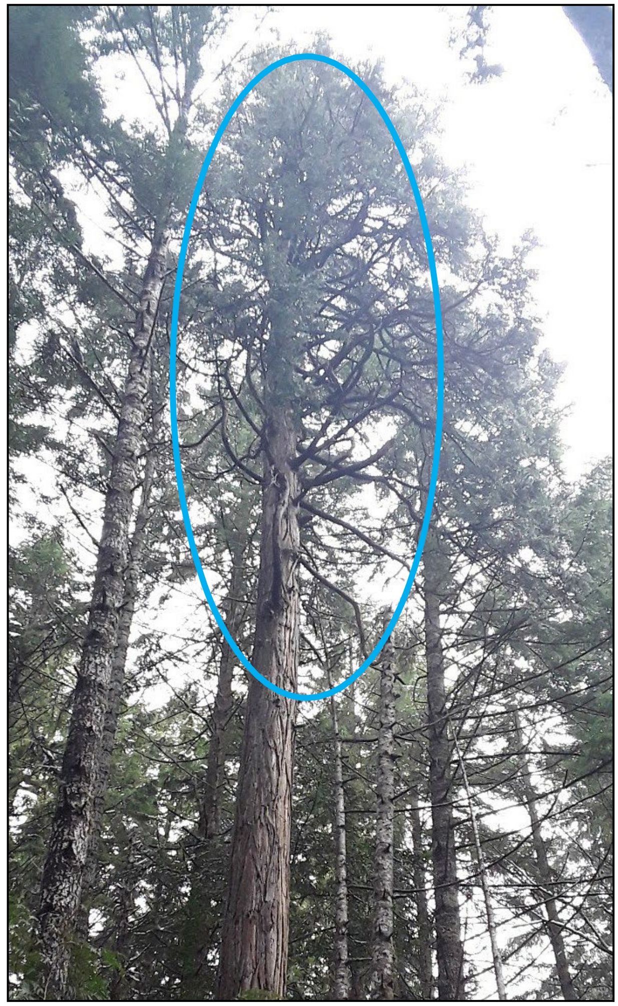
Example of a 4-inch diameter branch with light to moderate coverage of duff/moss. *This is not a MAMU tree! It is an example of how small a 4-inch diameter branch, approx. 30 ft in the air, can look to an observer from the ground.

E Seely 2019 – UMP RA 10 survey area.

“Marginal” MAMU Tree Examples

Example of a “Marginal” MAMU tree. This Douglas fir tree has a 37-inch DBH, has approx. 3 good nesting platforms, with the best platform at approx. 30ft, and is over 107 ft tall. It also has minimal duff/moss on the branches, provides canopy cover (depending on the branch), and is situated in a stand with younger Douglas firs.

E.Seely 2019, photo from MW URC stand.



Example of a “Marginal” MAMU tree. This Western Cedar tree has a 36-inch DBH, has many good nesting platforms, and is over 107ft tall. It has minimal duff/moss on the branches, provides canopy cover (depending on the branch), has few interlocking branches, and is situated in a stand with younger Douglas firs.

E.Seely 2019, photo from MW URC stand.

<u>“Good” MAMU Tree Examples</u>

Example of a “Good” MAMU tree. This Douglas fir tree has a 52-inch DBH, has a minimum of 5 good nesting platforms, is over 107 ft tall, has moderate duff/moss on the branches. It provides moderate canopy cover (depending on the branch), with interlocking branches at the top, and is situated in a stand with similar DBH Douglas firs.

E.Seely 2019, photo from MW URC stand.

Example of a “Good” MAMU tree. This Douglas fir tree has a 42-inch DBH, has a minimum of 3 good platforms, and is over 107 ft tall. It has moderate duff/moss on the branches, upper branches provide canopy cover, not too many interlocking branches, in a younger Douglas fir stand.

S. Pirkl 2019, photo from MW BWE stand.

"Best" MAMU Tree Examples

Example of a "Best" MAMU nesting tree. It exceeds all of the RMP requirements. This Douglas Fir tree is tall, has multiple platforms well over 32.5 ft high, all greater than 4 inches. It has significant duff/moss on the branches, canopy cover, canopy access, interlocking branches, and is in a stand of big leaf maple trees and Douglas fir.

E Seely 2018 – Signal Tree, tree within Jet noise

Example of a "Best" MAMU Nesting tree. Douglas fir tree, 41-inches DBH, and is close to 200 ft tall. It has lots of canopy cover, canopy access, interlocking branches from surrounding trees, large quantities of duff/moss on the branches, in a stand with Douglas fir, all approximately the same size and height.

E Seely 2018 – Signal Tree, tree within jet noise tree stand from MW 2018 surveys.

APPENDIX G PORT-ORFORD-CEDAR (POC)

Project-Specific Direction and Port-Orford-Cedar Risk Key

One or more of the management practices listed under the following Management Practices subheading would be applied to site-specific management activities when a need is indicated by the Port-Orford-Cedar Risk Key. This approach precludes the need for additional project-specific analysis of risk because the risk key describes conditions where risk reduction management practices are assumed (expected) to be applied. When a project specific application of the risk key shows the risk is low, no additional management practices are needed. Project-specific NEPA analysis would appropriately document the application of the risk key and the consideration of the available management practices. BLM application of the risk key and application of resultant management practices (if any) would make the project consistent with the mid- and large-geographic and temporal-scale effects described by the SEIS analysis and would permit the project analysis to tier to the discussion of those effects.

1a. Are there uninfected POC within, near[31], or downstream of the activity area that, whose ecological, Tribal, or product use or function measurably contributes to meeting land and resource management plan objectives?
1b. Are there uninfected POC within, near, or downstream of the activity area that, were they to become infected, would likely spread infections to trees whose ecological, Tribal, or product use or function measurably contributes to meeting land and resource management plan objectives?
1c. Is the activity area within an un-infested 7th field watershed[32] as defined for Alternative 6 (see Table A12-2 p. A-187 of FSEIS).

If the answer to all three questions, 1a, 1b, and 1c, is no, then risk is low and no POC management practices are required. If the answer to any of the three questions is yes, continue.

2. Would the proposed project introduce appreciable additional risk[33] of infection to these uninfected POC?

If no, then risk is low and no POC management practices are required.
If yes, apply management practices from the list below to reduce the risk to the point it is no longer appreciable, or meet the disease control objectives by other means, such as redesigning the project so that uninfected POC are no longer near or downstream of the activity area. If the risk cannot be reduced to the point no longer appreciable through practicable and cost-effective treatments or design changes, the project may proceed if the analysis supports a finding that the value or need for the proposed activity outweighs the additional risk to POC created by the project.

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[31] In questions 1a and 1b, 'near' generally means within 25–50 feet down slope or 25 feet upslope from management activity areas, access roads, or haul routes; farther for drainage features; 100–200 feet in streams.
[32] Un-infested 7th field watersheds are listed on Table A12-2 (p. A-187 of FSEIS), as those with at least 100 acres of POC stands, are at least 50 percent Federal ownership, and are free of Phytophthora lateralis except within the lowermost two acres of the drainage.
[33] Appreciable additional risk does not mean 'any risk.' It means that a reasonable person would recognize risk, additional to existing uncontrollable risk, to believe mitigation is warranted and would make a cost-effective or important difference (see Risk Key Definitions and Examples for further discussion).

For the application of this risk key, the definition of project would not be limited to any one type of management activity. For example, projects such as road maintenance projects, livestock grazing permits, recreation management projects and permits, fuelwood permits, non-POC special forest products permit, and other uses likely to introduce significant risk to essential POC would require implementation of applicable management practices at the time of planning or reissuance of permits when indicated by application of the key.

The objective of the risk key is to identify project areas/situations where new infections should be avoided and guide the application of one or more of the management practices until the risk is mitigated. The risk key describes circumstances under which the various risk-reducing management practices which the BLM would apply where needed.

Port-Orford-Cedar Risk Key Definitions and Examples

Additional risk ~ The intent is to mitigate or avoid the potential risk for infection, commensurate with the value of the potentially affected resource and the cost of the mitigation or avoidance, which is appreciably above background or existing risk levels. Where background or existing potential risk of infection levels are low, such as in un-infested inventoried roadless areas, a minor activity such as a permitted one-time event or trail maintenance, might create appreciable additional risk. In checkerboard ownerships near private timberlands, near roads that have reciprocal rights-of-way agreements not addressing POC, or near major public use areas, such activities would not create appreciable "additional" risk since the risk already exists. In other words, mitigation (application of management practices or other options identified in the risk key) is only required by the key when, in the context of the risk coming from already existing activities beyond the practical control of the Agencies, it can make a cost-effective and important difference.

Measurably contributes to meeting land and resource management plan objectives ~ The uninfected POC in question is so located, or covers such a geographic area such, that it measurably contributes to meeting land and resource management plan objectives and/ or all applicable laws and regulations. The effects discussions in this SEIS provide much of the basis for this determination; if no adverse effect is identified for POC mortality, then the likelihood of various mortality having an adverse effect on land and resource management plan objectives is low.

Land and resource management plan objectives ~ Includes, but is not limited to, maintaining forested landscapes, species diversity, soil stability, stream temperatures (including State 303(d) requirements), buffering seasonal stream flow fluctuations, supplying large wood from streams and wildlife, visual quality, habitat for rare or unique plants, habitat for threatened, endangered, sensitive/special status, Survey and Manage, or other Agency-emphasis species, product collection and harvest, wilderness values, research opportunities, and genetic diversity.

Measurably contributes to ~ Means the POC at risk from the proposed activity makes a meaningful and unique contribution to the plan objective in question. Where POC is a small percentage of the stand or does not provide unique stand attributes (not providing the largest trees in the stand, for instance), its loss is not meaningful when measured against management objectives. Similarly, where stream shading, bank stability, and other riparian functions are readily performed by other species onsite, POC mortality is not meaningful. Where POC mortality could affect rare or unique plants, but mortality has been demonstrated to benefit such plants, POC mortality is not meaningful.

On the other hand, where POC is a significant portion of the riparian vegetation and its loss would lead to creating or exacerbating stream temperature, bank stability, turbidity, or other problems, POC is making a meaningful contribution to land and resource management plan objectives. Significant geographic areas in wilderness are making a meaningful contribution. POC as a large percentage of the stand in recreation or visually sensitive areas are probably making a meaningful contribution. Where POC is part of the reason for the designation of a research natural area or area of critical environmental concern, it is making a meaningful contribution. POC protecting rare plants, or serving as nest structures for listed species, are making a meaningful contribution if substitutes are not readily available. It is more likely that POC is making a meaningful contribution to land and resource management plan objectives if the site is within the 90,900 acres in Oregon where POC is prominent in the overstory.

Management Practices

Management practices are designed to:

- Prevent/reduce the import of disease into un-infested areas (offsite spores picked-up and carried into an un-infested project area).
- Prevent/reduce the export of disease to un-infested areas (onsite spores moved to offsite, un-infested area).
- Minimize increases in the level of inoculum or minimize the rate of spread in areas where the disease is localized, or infection is intermittent.

One to several of the management practices from the list below would be selected and implemented when there is a management need indicated by the POC Risk Key. No priority is assumed by the order listed below; the one or combination of specific practices best fitting the nature of the risk and the site-specific conditions would be applied when indicated by the risk key. Practices can be modified or partially implemented if such changes still meet risk reduction objectives and/or better fit site conditions. As noted in the Pathology section of the SEIS, combinations of practices can be more effective than single practices, depending on site-specific circumstances.

1) Project Scheduling: Schedule projects during the dry season or incorporate unit scheduling (Management Practice 3) and vehicle and equipment washing (Management Practice 11) as part of project design.
2) Utilize Un-infested Water: Use un-infested water sources for planned activities such as equipment washing, road watering, and other water-distribution needs, or treat water with Clorox bleach to prevent/reduce the spread of PL (see Appendix 4 of the FSEIS for Clorox bleach label and instructions for use).
3) Unit Scheduling: Conduct work in all timber sale and other activity units or areas where PL is not present before working in units infested with PL.
4) Access: Designate access and egress routes to minimize exposure to PL.
5) Public Information: Increase public awareness of the root disease and the need to control it by using informational signs on or at trailheads, gates, and other closures, and holding coordination meetings with adjacent industrial and small woodland landowners.
6) Fuels Management: Clean boots, vehicles, and incorporate other management practices to avoid moving infested soil out of treatment areas. Incorporate unit scheduling and vehicle and equipment washing as described in Management Practice 1 as part of project design. Select water sources as described in Management Practice 2. Specify travel routes as shown in Management Practice 4.

7) Incorporate POC Objectives into Prescribed Fire Plans: Incorporate POC objectives (such as sanitation) into prescribed fire treatment plans. These include using uninfested or treated water sources and, potentially, aiding with eradication treatments.

8) Routing Recreation Use: Route new trails (off-highway vehicle, motorcycle, mountain bike, horse, and foot) away from areas with POC or PL or provide other mitigation such as seasonal closures. Trailheads would be relocated and/or established trails would be rerouted in the same manner where trails present significant risk to POC or provide other mitigation such as site hardening.

9) Road Management Measures: Implement proactive disease-prevention measures including not building roads, not using existing roads, seasonal or permanent road closures, road maintenance, and/or sanitation removal of roadside POC to help reduce the likelihood of spreading the disease—especially to high-risk areas and/or identify prevention measures at a site-specific or drainage-specific level. Road design features include pavement over other surfacing, surfacing over no surfacing, removal of low water crossings, drainage structures to divert water to areas unfavorable to the pathogen, and waste disposal.

10) Resistant POC Planting: Plant resistant POC 25 feet apart or in approximately 10 tree clusters at 100 to 150-foot spacing to lessen the potential for root grafting (a source of PL spread). Silvicultural prescriptions for sites having potential for growing POC would provide for the establishment of the species through natural or artificial regeneration and maintenance as a viable stand component through the current and future rotations.

11) Washing Project Equipment: Wash project equipment prior to beginning work in un-infested project areas, when leaving infested areas to work in un-infested areas, and when leaving the project area to minimize the transportation of infested soil to un-infested areas. Equipment includes maintenance and harvest equipment coming in contact with soils, and project vehicles, including trucks and crew vehicles, leaving surfaced roads or traveling on other roads deemed at risk for spreading disease (generally project area secondary roads around diseased POC). Project areas should be compartmentalized by road system in areas with mixed ownership (Federal and private). A road system with infested areas and un-infested areas would be considered infested. Washing areas should be placed at optimum locations for minimizing spread, such as at entry/exit points of the road system with Federal control. Washing should take place as close as possible to infested sites. Wash water would be from un-infested water sources or treated with Clorox bleach. Wash water should not drain into watercourses or into areas with uninfected POC. Ideally, equipment should not travel for any substantial distance prior to being washed unless being transported on surfaced roads. Equipment moving into un-infested areas may be washed miles away as long as they do not travel through infested areas to reach their destination. Effectiveness testing indicates large reductions in inoculum by washing. Additional information about washing, and suggested parameters for washing stations, can be found in Appendix 2 of the BLM "Port-Orford-Cedar Management Guidelines," which can be found in Appendix 1 of this SEIS. An updated equipment cleaning checklist can be found in Appendix 13 of the SEIS, and a Clorox bleach label and updated mixing instructions are in Appendix 4 of this SEIS.

12) Logging Systems: Use non-ground-based logging systems (cable or helicopter).

13) Spacing Objectives for Port-Orford-Cedar Thinning: POC spacing objectives during thinning projects (commercial or precommercial) should be to create discontinuous POC populations across the management unit.

14) Non-Port-Orford-Cedar Special Forest Products: No special forest products permits, including firewood permits, would be issued in the wet season where POC is present, unless administration previously mentioned for Bough Cutting under General Direction can be implemented. Educate the public on the risks associated with collecting in areas with POC.

15) Summer Rain Events: Apply permit or contract clause or otherwise require cessation of operations when indicators such as puddles in the roadway, water running in roadside ditches, or increases in soil moisture (as measured by moisture meter or equivalent) indicate an unacceptable increase in the likelihood of spreading PL.

16) Roadside Sanitation: Remove or kill POC along both sides of the road. Recommended minimum width is 25 feet above the road or to the top of the cutbank, and 25 to 50 feet below the road. Roads that are open year-round generally pose the highest risk and would benefit most from sanitation treatment. Maintenance would be essential to retain benefits. POC should be re-treated as soon as possible after they reach a height of 6 inches above ground level. Sanitation treatments could be incorporated as part of routine road maintenance.

17) Site-Specific POC Management: Where possible, emphasize management of POC on sites where conditions make it likely that they would escape infection by PL, even if the pathogen has already been established nearby or may be introduced in the future. POC above roads, uphill from creeks, on ridgetops, and on well-drained sites are less likely to become infected. Emphasis may include priority retention during thinning or other silvicultural treatments, and planting to increase the presence of POC in areas unfavorable to the pathogen."

APPENDIX H RESPONSE TO COMMENTS

Comment Number	CW/OW/KSWild Comment Summary (comment page number)	Topic	Response
1	We remain adamantly opposed to the proposed EA/DNA structure for NEPA review p. 1	NEPA compliance	This approach is guided by the BLM NEPA Handbook. For DNAs "a new proposed action may rely on a single or multiple existing NEPA documents. The relevant documents that may be relevant include: …EISs or EAs on BLM programmatic actions" (p. 22). Media_Library_BLM_Policy_Handbook_h1790-1.pdf pp. 22–24.
2	The array of environmental impacts associated with the proposed plan should be thoroughly evaluated in an EIS p. 1	NEPA compliance	This EA is tiered to the EIS for the RMP. We have appropriately applied management direction from the RMP. Based on analysis in the EA, we have reached a FONSI conclusion there are no additional significant effects warranting an EIS. The BLM is not required to prepare an EIS because "EA analysis shows that the action would have no significant effects beyond those already analyzed in an EIS to which the EA is tiered." BLM Handbook (p. 83). Media_Library_BLM_Policy_Handbook_h1790-1.pdf pp. 83–85
3	Conduct site specific analysis. This analysis is inappropriate because it (1) tiers to the RMP rather than site-specific p. 2	NEPA compliance	From the NEPA Handbook- "tiering provide[s] opportunities to reduce paperwork and redundant analysis in the NEPA process." "Tiering allows you to narrow the scope of the subsequent analysis and focus on issues that are ripe for decision-making…" (p. 25). "The tiered EA for the individual action need not re-analyze the effects on resources fully analyzed in the broader EIS" (p. 28). Media_Library_BLM_Policy_Handbook_h1790-1.pdf pp. 25–28
4	(2) excludes issues from detailed analysis p. 2	NEPA compliance	Issue-based NEPA is encouraged by the BLM NEPA handbook- "Preliminary issues are frequently identified during the development of the proposed action through internal and external scoping" (p. 41). However, "While many issues may arise during scoping, not all of the issues raised warrant analysis in an EA or EIS. Analyze issues raised through scoping if: • Analysis of the issue is necessary to make a reasoned choice between alternatives. That is, does it relate to how the proposed action or alternatives respond to the purpose and need? (See section 6.6, Alternatives Development). • The issue is significant (an issue associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of impacts)" (p. 41). Further, "you need not analyze issues associated with the proposed action that do not meet the criteria described in section 6.4.1, Identifying Issues for Analysis" (p. 42).

Comment Number	CW/OW/KSWild Comment Summary (comment page number)	Topic	Response
			The EA contains issues not analyzed in detail with appropriate supporting rationale as to how they do not meet these criteria in Appendix A (pp. 65–107). Media_Library_BLM_Policy_Handbook_h1790-1.pdf
5	(3) fails to analyze compliance with relevant RMP standards p. 2	NEPA compliance	This project was developed following the Management Direction for the LSR/RR in the RMP (EA pp. 10–14). The commenter does not provide any specific information as to how they assert this project does not comply with the RMP.
6	(4) restricts public review of site-specific analysis p. 2	Public comment opportunities	The EA clearly states the future public review process: "The BLM would publish the DNA and any associated Decision Record for the proposed action on the BLM's ePlanning NEPA Register. Each DNA would have a 30-day public comment period prior to the issuance of the Decision Record. Each Decision Record would have an administrative remedy in accordance with 43 CFR Part 4" (EA p. 15). The commentor has not described how this project would "restrict public review."
7	The EA appears to leave the door open for future analyses: p. 2	NEPA	We are merely clarifying that other stand management projects under other NEPA documentation could also occur in the LSR land use allocation. The DNA process is an EA conformance review. If a future proposed action does not meet the conditions of this EA, other NEPA analysis would be required.
8	We must also note our concerns about BLM's sole reliance on modelling p. 3	Supporting analysis	As stated in the EA, "Over 100 stand exams within LSR and RR stands between the ages of 30–80 across the Coos Bay District are used in this analysis, combined by age classes 30–40, 50–60, and 70–80 to provide an overall assessment of stand conditions of the LSR and RR across the project area" (p. 24). The BLM used these extensive ground surveys to inform the modelling as well as long term monitoring of real-world Density Management Studies on the Coos Bay District.
9	The draft EA lacks a critical piece of the LSR development puzzle: snags and downed wood p. 3	Project design	Management direction in the RMP and the project design will result in snags and downed wood, both post-project and in the future as the stands develop. As shown on p. 3 of the EA, existing snags and down wood will be retained: During silvicultural treatment of stands, retain existing—— ○ Snags ≥ 6" DBH ○ Down woody material ≥ 6" in diameter at the large end and > 20 feet in length except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6" DBH cut for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material.

Comment Number	CW/OW/KSWild Comment Summary (comment page number)	Topic	Response
			Per the RMP (pp. 66–67, referenced on p. 21 of the EA): the BLM will create 10 snags per acre within one year of completion of yarding the timber unless the stand has sufficient snags pre-treatment as described in the RMP (p. 66). The BLM anticipates that these snags will fall over time and become downed wood. Tables 7–9 in the EA (pp. 33–34) show the modelled number of mid-story and overstory conifers that would develop in 20, 40, and 60-years post treatment for the three alternatives. Even at the heaviest thinning prescription proposed, the number of mid-story trees in 60-years is modelled to be at or above the target for spotted owl habitat. The BLM anticipates that some of these trees will develop into overstory conifers in the ensuing decades to centuries, while some will die and become snags and downed wood, thus providing these important features over time. Finally, the retention areas as well as the untreated inner riparian zones will not be treated. In these dense areas, trees will experience suppression mortality and provide snags and downed wood.
10	Gap creation up to 4 acres, as proposed in Alt 2, is not indicated for creating LSR characteristics – Citation Knowles 1996 p. 4	Scientific literature	We disagree. As stated in the 2016 FEIS "These group selection openings would function as small inclusions (i.e., functional created canopy openings) of Early Successional habitat within Young, Mature, and Structurally-complex stands, … Created canopy openings would enhance structural development by contributing to multiple layered canopies, creating growing space for desirable understory vegetation and hardwoods, and increasing edge-tree limb development and diameter growth" (p. 329). The FEIS concluded that with implementation of the RMP, BLM would have 8,505 acres of created functional canopy openings by 2043 across the FEIS planning area (p. 330).
11	BLM is proposing large-scale, heavy-handed logging in LSR and RR set aside for development of high quality LSR habitat and conservation of T&E species p. 4	P&N	The purpose of this EA is to conduct treatments in the LSR and RR to develop high-quality habitat to aid in the recovery of T&E species (EA pp. 11–14). The BLM designed stand treatments following RMP management direction which does not "set aside" these land use allocations as no-treatment areas. The BLM is also following the appropriate management direction for the LSR and RR. The commentor does not provide context as to what they describe as "heavy-handed logging" in following the RMP.

Comment Number	CW/OW/KSWild Comment Summary (comment page number)	Topic	Response
12	The modeling and the NEPA analysis fail to take a hard look at the full suite of impacts and benefits to LSR habitat alternative approaches to thinning p. 4	Analytical assumptions and NEPA compliance	The BLM NEPA Handbook defines a hard look as a "reasoned analysis containing quantitative or detailed qualitative information" (p. 55). The EA contains two action alternatives and a no action alternative as well as others not analyzed in detail with supporting rationale. In each issue question, particularly those concerning wildlife and silviculture (EA pp. 23–53), the BLM provided the analytical methodology, assumptions, and effects analysis which constitutes a hard look (BLM NEPA Handbook pp. 55–56). The commentor has not provided any specific information to what might be lacking in that analysis to not constitute a hard look by the BLM.
13	The EA exhibits a lack of appreciation for the still-active natural processes that thin the forest and produce desired stand characteristics p. 5	P&N	The BLM recognizes that even without treatment, stands will continue to develop and may eventually produce the desired stand conditions. However, modelling and field evaluation of the DMS sites show that these conditions will develop faster and with higher certainty with treatment compared with the no-action alternative. The BLM has identified the desired future condition for late-successional forest in Table 1, based on the best available science (EA p. 12). This includes the quantities of trees in differing size classes. Tables 7–9 (pp. 33–34) show an increase in the number of mid-story conifers for all Alternatives. By 60-years post treatment, for all age classes, the number of both mid-story and overstory trees would increase. Alternative 2 and 3 provide more trees in the desired mid-story size classes than the upper end of the targets identified in EA Table 1. Some of the excess trees will grow to become overstory conifers, while others will be available for large snag and downed wood recruitment over time. The DMS studies (Appendix C, pp. 109–114) provide on-the-ground support for the model's conclusions. While both the control and treatment plots have shown development towards the desired stand conditions in the decades since treatment, the treatment stands exhibit larger DBH trees, larger crown ratios, a mid-story canopy developing, and a more robust shrub layer compared with the control. Both the treatment and control units will likely develop the desired stand conditions, but the treatment units are developing those conditions sooner.
14	Alt 2 must consider best available science – Lutz 2005, Lutz/Halpern 2006, Franklin et al. 2002 p. 5	Studies on LSR development	The EA and staff reports used Franklin et al. 2002 as well as Anderson, P.D. and K.L. Ronnenberg, editors. 2013. Density management in the 21st Century: west side story;

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			Chamberlain, C.P., V.R. Kane and M.J. Case. 2021. Accelerating the development of structural complexity: lidar analysis supports restoration as a tool in coastal Pacific Northwest forests; Cissel, J., P. Anderson, D. Olson, K. Puettmann, S. Berryman, S. Chan and C. Thompson. 2006. BLM density management and riparian buffer study: establishment report and study plan.; and Reilly, M.J. and T.A. Spies. 2016. Disturbance, tree mortality, and implications for contemporary regional forest change in the Pacific Northwest. While we did consider these suggested references, the BLM specialists used professional judgment in determining the range of sources needed to assess natural stand mortality of the no action alternative compared to the action alternatives. The references that the commentors have provided address the ability of stands to recruit snags and downed wood over time. That concern is addressed in detail in comment Numbers 9, 13, and 15.
15	Mortality from mechanical damage “crushing disturbance” from falling limbs and trees and snow loads can be a more significant factor than suppression mortality. p. 5	Passive restoration	In order to adequately respond to this concern, the BLM reviewed a recently completed EA that had a similar purpose and need in the LSR/RR and was also conducted using the 2016 RMP Management Direction in Coos Bay, the West Fork Smith River EA. These are the conclusions: • After removing mapping slivers, portions of about 96 FOIs (stands) were used to develop the units for the site-specific EA. These account for a total of approximately 4,120 acres of forested stands. • After removing untreated retention areas, inner zones of streams, inaccessible areas, and other buffers there are approximately 2,156 acres of harvested areas (variable density thinning and patch openings, etc.) • Based on these actual observations of the Coos Bay LSR/RR thinning program including all required buffers, untreated skips, etc. approximately half of an analyzed forested area would remain in an untreated condition wherein natural processes of competition induced mortality, “crushing disturbance” from falling limbs and trees and snow loads will result in downed wood accumulation and snag development as described. • While this is an observation, and not a result of a specific RMP Direction that would apply in all areas, and all conditions- it is a reasonable assumption that similar patterns would occur with the Programmatic EA unit pool.

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			• This conclusion, that approximately half of analyzed forested stands will remain in un-thinned conditions due to adherence to Management Direction and BMPs, underscores the importance of actively managing the remaining portions of stands to provide a diversity of pathways towards late-successional habitat. • For a detailed review see the action vs. no action effects analysis (EA pp. 28–37).
16	The EA lacks an appreciation of the diversity of late successional stand types and the pathways that lead to them. P. 7	Other treatment types	Please refer to the responses provided in Comment Numbers 9, 13, and 15.
17	Open grown trees – managing for open grown trees in currently mid-seral stands requires heavy thinning that will harm some LSR characteristics p. 8	Project design	Please refer to the responses provided in comment Numbers 9, 13, and 15.
18	The EA fails to recognize that the abundance of large trees (alt 3 vs Alt 2) has several benefits for LSR habitat not disclosed in the EA (snags/prey base) p. 8	Effects analysis	Please refer to the responses provided in comment Numbers 9, 13, and 15.
19	The draft EA provides a misleading analysis of the no action alternative – competition mortality p. 9	Effects analysis	The EA acknowledges that "Short term risk of windthrow would be increased when thinning an even-age stand; however, windthrow occurs in both managed and unmanaged stands and low levels of windthrow is desirable for habitat objectives and stand complexity" (p. 35). Additionally, "wood is delivered to streams through a variety of mechanisms including windthrow, bank erosion, debris flows, and landslides. Riparian tree mortality and subsequent recruitment to streams can represent the primary contribution of large wood in low-gradient meandering streams, while upslope and debris flow contributions can be greatest in higher gradient streams" (p. 53).

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			This literature review is supplemented with field observations on EA page 107: "there were 13 alders at the time of first measurement on the control plot. Now, 22 years later only one remains—the others had died incrementally through years 5 and 10 during other re-measurements. This slow thinning through accrued mortality has not resulted in the release that is observed on the treated plots. In summary, after 20+ years the trees in the heaviest thinned area are growing in diameter about twice as fast as the trees in the control, which has had naturally occurring, slow thinning through mortality."
20	Heavy thinning causes long-term reduction in snag recruitment p. 9	Effects analysis	Please refer to the responses provided in comment Numbers 9, 13, and 15.
21	BLM must factor new EO into NEPA analyses p. 11	Policy	The purpose and need is to treat previously managed stands to promote mature and old-growth characteristics. Executive Order 14072 states that the Administration will "manage forests on Federal lands, which include many mature and old-growth forests, to promote their continued health and resilience; retain and enhance carbon storage; conserve biodiversity; mitigate the risk of wildfires; enhance climate resilience; enable subsistence and cultural uses; provide outdoor recreational opportunities; and promote sustainable local economic development." (Sec. 2). Executive Order 14072 specifically directs that the Secretary of the Interior, with respect to public lands managed by the BLM "… shall, within 1 year of the date of this order, define, identify, and complete an inventory of old-growth and mature forests on Federal lands, accounting for regional and ecological variations, as appropriate, and shall make such inventory publicly available." (Sec. 2(b)). Following completion of the inventory, Executive Order 14072 directs the Secretary to complete other tasks, including analyzing threats and developing policies (Sec. 2(c)). The Department is currently working on the inventory required by Section 2(b) and therefore has not yet begun the tasks required by Section 2(c) those steps.
22	Heavy thinning reduces spotted owl prey such as flying squirrels and red tree voles p. 10 Thinning is adverse to flying squirrels and snags p. 11	Effects analysis	Most of the stands proposed for thinning do not currently support much, if any, forage function. Only approximately one percent of the unit pool is mapped as foraging habitat. However, in stands that do, the BLM acknowledges that thinning may negatively affect the prey species that spotted owls rely on, although how long this effect continues after thinning is not well understood (Sakai and Noon 1997, Hansen and Dunk 2016). The BLM could find limited research on small mammal response

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			several years post-treatment. Two studies found that small mammal populations had not recovered by 10–12 years post thinning (Wilson 2008, Manning et al. 2012), but a third found that medium and high-density thinned stands had significantly more northern flying squirrels than the control or old growth stands after 12–14 years (Ransome et al. 2004). Flying squirrels and red tree voles, important components of spotted owls diet, are both expected to increase with the development of a midstory layer, which may take decades to develop (Wilson and Forsman 2013). While there may be a short-term decrease in habitat availability for prey species, over the long term, thinning would lead to improved conditions for prey species (Garman et al. 2003, Manning et al. 2012). Within the proposed treatments, there would be at least 10 percent skips of the stand area and no treatment would occur in the inner riparian zone. These untreated areas would provide refugia to small mammals as well as a source population once the shrub and midstory layers develop. Treatments would include the creation of 10 snags per acre, some of which will fall and become down wood over time. These components would provide structure used by prey species. Most of the stands (99%) proposed for treatment are not foraging habitat. The BLM anticipates that the treated stands would provide improved habitat for spotted owl prey sooner than the control as discussed in Issue 2 in the EA (pp. 38–41). The comments reference Central Cascades Adaptive Management Partnership (2014), which appears to be a research proposal. The referenced language is a research question posed by the research proponent but does not provide information to analyze the theory. The reference to Mazza (2010) summarizes a study by Wilson. While the document does not say, we assume that Wilson (2010) and Wilson and Forsman (2013) discussed above provide the analysis for that summary.
23	Roads have long-term impacts that are not compatible with LSR objectives p. 12	Effects analysis	For stands not currently accessible, but need treatment, there would likely be new road construction. The FEIS analyzed that road management actions including road construction, renovation, improvement, and closure would be needed to facilitate the RMP Management Direction to speed the development or improve the quality of NSO habitat in LSR/RR stands (RMP pp. 66). Specific Management direction includes “allow yarding corridors, skid trails, road construction, stream crossings, and road maintenance and improvement where there is no operationally feasible and

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			economically viable alternative to accomplish resource management objectives" (RMP p. 68).
24	The NEPA analysis needs to provide evidence to support assertion that treatments would not preclude or delay NR habitat by 20 yrs. p. 13	RMP conformance	Added this sentence (in track changes) to the Conclusions section in Issue 2: Treatments proposed in Alternatives 2 or 3 would accelerate development of NRF habitat compared with Alternative 1, and therefore would not preclude or delay NRF habitat development by more than 20 years.
25	Widespread thinning will cause long-term delay in attainment of desired dead wood levels p. 13	Effects analysis	Please refer to the responses provided in comment Numbers 9, 13, and 15.
26	Planting and thinning may further promote uniformity in tree species, size, and spacing p. 14	Effects analysis	The prescriptions described in the Proposed Action allow for the greatest diversity of stand conditions and forested light environments that promote species diversity through modified group selection, variable density thinning, and untreated skips. Alternative 3 allows for less diversity of light environments by requiring higher densities and limiting gap creation.
27	Conduct a full roads analysis p. 15	Effects analysis	The EA does contain and effects analysis of roads in Issues 14, 15, and 16, pp. 78–92. These issues focused on the potential effects to rain-on-snow events, sediment delivery to stream channels, and sediment delivery to fish habitat. The commentor has not qualified as to how this is not a "full roads analysis." More information about specific road locations will be provided in DNAs, but the effects analysis is contained in the EA. Also, PDFs and BMPs are included to be applied in the DNAs to prevent road related effects to water quality at site-specific locations.
28	EA fails hard look at what conditions any type of stand management or fuels treatments would reduce wildfire risk and extent p. 16	Effects analysis	The BLM NEPA Handbook defines a hard look as a "reasoned analysis containing quantitative or detailed qualitative information" p. 55. However, this comment is odd because "reducing wildfire risk and extent" is not proposed in the Purpose and Need for this project. The BLM would implement some burning to reduce post-harvest fuel loadings and the EA contains analysis in Issues 19 and 20 (EA pp. 97–99) as to the effects of the project on wildfire hazard. In these two Issues, the BLM provided the analytical methodology, assumptions, and effects analysis which constitutes a hard look. The commentor has not provided any specific information to what might be lacking in that analysis to not constitute a hard look by the BLM.

Comment Number	CW/OW/KSWild Comment Summary (comment page number)	Topic	Response
29	BLM should take a hard look at climate impacts associated with the alternatives p. 16	Effects analysis	The BLM NEPA Handbook defines a hard look as a "reasoned analysis containing quantitative or detailed qualitative information" (p. 55). As stated in the EA concerning the analysis on climate impacts in the FEIS to which this EA is tiered, "based on this information, and because the level of management activity is reasonably foreseeable and within the levels disclosed in the FEIS, the project effects on carbon storage and greenhouse gas emissions are within the range of variance analyzed in the FEIS. Thus, the proposed action has no potential for significant effects beyond that analysis" (EA pp. 70–71). The commentor has not provided any specific information to what might be lacking in that analysis to not constitute a hard look by the BLM.
30	This issue (climate) would not inform the decision or influence a reasoned choice between alts – does not meet new EO p. 16	Effects analysis/ Policy	As stated in comment response 21, it will be several years before there is official policy and guidance as to how to implement this Executive Order.
31	Analyze climate in detail p. 16	NEPA compliance	As stated in the EA, "the proposed action has no potential for significant effects beyond that analysis" which is the climate analysis in the FEIS to which this EA is tiered (EA p. 71). As there are no significant effects an issue does not need to be analyzed in detail. Handbook p. 42.
32	Sensitive plants/fungi no site-specific analysis p. 17	Effects analysis	As stated in the EA, site-specific surveys would be conducted for each DNA and any Bureau sensitive species found would be buffered to ensure species persistence at the site. As stated in the EA "the BLM's proposed action does not increase the likelihood or need for listing of any SSS, because if found through pre-disturbance surveys, the BLM would manage SSS according to species management requirements within the 2016 ROD/RMP" (p. 64).
33	Programmatic NEPA circumvents the required analysis of cumulative effects and is illegal	NEPA compliance	As stated in the BLM NEPA Handbook "Cumulative actions are proposed actions which potentially have a cumulatively significant impact together with other proposed actions and "should be discussed" in the same NEPA document." p. 48. The EA included reasonably foreseeable projects in the beginning of Chapter 3 (p. 23) and each issue analysis included those actions in the cumulative effects analysis. The Handbook also states "include relevant reasonably foreseeable development scenarios for certain programmatic EISs and for cumulative effects analysis" p. 96. There is no regulation, guidance, or policy that indicates the cumulative effects analysis of a programmatic EA is "illegal."

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34	Concern with how we will spatially distribute sales so the effects are clustered, especially near old growth or NSO/MAMU known sites	Effects analysis, project design	As discussed in the EA (pp. 11–12), spotted owls rely on large tracks of forest for reproductive success. The BLM designed the proposed project to be in line with recommendations from the spotted owl recovery plan (USFWS 2011, pp. III-17 to III-20), including retaining existing nesting habitat while using ecological forestry principles to accelerate development of nesting and roosting habitat. Since the goal is to develop large, contiguous blocks of habitat, sales may be clustered and will often be intermixed with areas that already have NRF or suitable murrelet nesting characteristics. Only approximately one percent of the proposed unit pool is mapped as foraging habitat; the remainder is dispersal habitat which does not support spotted owl nesting or roosting functions or habitat for nesting murrelets. The EA ensures that the proposed project will not alter the ability of spotted owls to nesting in the area by implementation of the project design features (EA pp. 121–123), including surveys prior to all harvest activities. Similarly, project design features for murrelets (pp. 123–128) ensure that the proposed project will not cause disruption of nesting murrelets or alter existing murrelet nesting habitat. With these design features in place, while units may be clustered, they will not affect either species' ability to nest in the project area.

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