U.S. Department of the Interior
Bureau of Land Management
Medford District Office

Integrated Vegetation Management for Resilient Lands

Final Environmental Assessment

DOI-BLM-ORWA-M000-2020-0001-EA March 2022

OR/WA Bureau of Land Management
Medford District Office
3040 Biddle Road
Medford, Oregon 97504
541-618-2200

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Note to Readers

Based on internal and external review of the environmental assessment (including public comments), the environmental assessment was updated to clarify information and to make factual corrections. New or rewritten text appears in purple in this March 2022 version of the environmental assessment. The environmental maps and graphic displays were also updated to correct display information and to improve reader understanding of the information displayed. Non-substantial editorial and grammatical revisions (such as document formatting, use of acronyms, and references) do not appear in purple text.

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Maps can be found under a separate “Maps” tab on the project website.

CHAPTER 1 PURPOSE AND NEED FOR ACTION

1.0 Introduction

This environmental assessment (EA) analyzes a program of potential integrated vegetation management (IVM) actions intended to promote and develop safe and effective wildfire response, fire resilient lands and fire-resistant stands, and habitat for special status species (wildlife and botanical) on certain portions of Bureau of Land Management (BLM) Medford District lands. This EA provides the basis for determining if there are significant impacts not already analyzed in the 2016 Proposed Resource Management Plan (PRMP)/Final Environmental Impact Statement (FEIS) for Western Oregon (PRMP/FEIS) (USDI BLM 2016a)—to which this EA tiers—and if a Finding of No Significant Impact (FONSI) is appropriate.[1]

1.1 Location of the Proposed Actions

The **"Planning Area"** for this EA is the Medford District boundaries, including the small southeastern portion of the Coos Bay District managed by Medford District. The Planning Area, an estimated 875,290 acres (Map 1) was used reviewed initially to develop the issues and resources that would be analyzed in this EA.

Treatments evaluated in this EA could occur anywhere within the **"Treatment Area",** which for purposes of this EA includes any BLM-administered lands in the Planning Area within the Harvest Land Base (HLB), Riparian Reserve (RR), Late Successional Reserve (LSR), and certain portions of the District Designated Reserve land use allocations (LUAs) (Table 1). The Treatment Area ***excludes*** the area designated as the Cascade Siskiyou National Monument (CSNM)[2]; Congressionally Reserved Lands (CRL), including designated wilderness, wilderness study areas[3], national trails, national wild and scenic rivers; and District-Designated Reserve—Lands with Wilderness Characteristics (DDR-LWC).

The estimated 684,185-acre Treatment Area is comprised of 82,382 acres of Public Domain Lands and 601,793 acres of Oregon and California ("O&C") Railroad Revested lands (Map 1).

While the actions discussed in this EA could occur anywhere within the Treatment Area, actions would not occur on every acre in the Treatment Area; rather, the Treatment Area represents the possible extent of where actions may occur over the 10-year lifetime of this EA.

The specific areas where treatments and prescriptions may occur for a given alternative are known as "**Eligible Footprints.**" Eligible Footprints vary by action alternative and by treatment, and represent potential areas of specific treatments, based on each alternative design (see Appendix 1 and Appendix 12), not specific project locations or annual or decadal limits on acres treated.

Additionally, the specific types of treatments and the limitations on those treatments vary by LUA and by the different alternatives presented in this EA (Chapter 2, Appendix 1). The Treatment Area is further divided by 2016 Southwestern Oregon Record of Decision and Resource Management Plan (SWO ROD/RMP) LUAs.

[1] This project was initiated prior to September 14, 2020 and is in compliance with the 1978 Council on Environmental Quality NEPA regulations (43 CFR 1500-1508).

[2] The Treatment Area for this EA excludes both the original Cascade-Siskiyou National Monument, designated by presidential proclamation on June 9, 2000, and the expanded monument, designated on January 12, 2017, by presidential proclamation.

[3] The wilderness and wilderness study areas excluded from the Treatment Area are the Soda Mountain Wilderness, the Wild Rogue Wilderness, and the Brewer Spruce Instant Study Area.

Table 1 summarizes at a high-level general treatment types by LUA, and estimated acres by LUA included in the Treatment Area.

Table 1. Land Use Allocations Included in the Treatment Area.

<table>
<tr><th colspan="2">Land Use Allocations</th><th>Commercial Harvest</th><th>Small Diameter Thinning, Non-Conifer Treatment, Prescribed Fire</th><th>Barrier and Boardwalk Placement</th><th>Acres by Land Use Allocation</th></tr>
<tr><td colspan="2">DDR-ACEC</td><td>No</td><td>Yes</td><td>Yes</td><td rowspan="3">121,853</td></tr>
<tr><td rowspan="2">DDR-TPCC</td><td>Non-Suitable Withdrawn TPCC Classification in DDR-TPCC [4]</td><td>No</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Suitable TPCC Classifications in DDR-TPCC [5]</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td colspan="2">Riparian Reserve</td><td>Yes</td><td>Yes</td><td>Yes</td><td>142,939</td></tr>
<tr><td colspan="2">Late Successional Reserve</td><td>Yes</td><td>Yes</td><td>Yes</td><td>234,104</td></tr>
<tr><td colspan="2">Harvest Land Base</td><td>No</td><td>Yes</td><td>Yes</td><td>185,289</td></tr>
<tr><td colspan="2">Total Acres</td><td></td><td></td><td></td><td>684,185</td></tr>
</table>

The alternatives considered in this EA include a range of maximum number of acres that could be treated annually, with a decadal cap. The acreage maximums and **Eligible Footprints** vary by alternative and by treatment type. See Chapter 2 Summary Comparison of Action Alternatives, Table 2. Eligible Footprints are quantified in the environmental effects sections of this EA in Chapter 3.

1.2 "Programmatic" Analysis: Additional Public Involvement and Future Decisions

This "programmatic" EA analyzes the effects of a range of activities that would form an ongoing program of work likely to span about 10-years[6]. While this analysis does not analyze specific, discretely identified site-specific projects, the BLM is able to estimate the anticipated site-level environmental effects for project(s) that would meet the criteria outlined in the alternatives, as well as the broader impacts of the program of work as a whole. BLM staff, with years of professional experience, have reviewed available literature, assessed local data and conditions, and consulted with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (FWS) to analyze anticipated project-level effects. The programmatic analysis relies on project design features (PDFs) and best management practices (BMPs) to reduce or avoid impacts to different resources.

Based on the analysis in this EA, the Medford District will decide whether to implement a program of work in the Medford District that includes the actions outlined in one or more of the alternatives described in Chapter 2. Following this programmatic decision, the BLM could implement site-specific projects based on this EA. When designing subsequent site-specific projects, the BLM would evaluate each project to determine if the project is adequately analyzed by this EA and the PRMP/FEIS, and whether the project conforms to any programmatic decision for this EA. The BLM would document whether this EA provides adequate analysis for site-specific project(s) in a Determination of NEPA Adequacy (DNA) worksheet. To

[4] Non-Suitable Withdrawn, or Non-suitable woodland, areas of the DDR were identified in initial TPCC mapping as having un-mitigatable silviculture or soil issues (e.g., high surface rock fragment content or erosion potential) that would cause harvest of commercial sized trees to be unsustainable as defined in the TPCC handbook. These areas are evaluated by a soil scientist and updated on a site-by-site basis before any harvest action for operations and safety.

[5] Suitable areas require the application of individual BMPs or project design features specific to individual silviculture or soil issues to maintain the sustainability of commercial harvest.

[6] For analytical purposes only, the BLM assumes the actions analyzed in this EA would occur over a period of about 10-years. However, the EA does not have a specific "sunset" date after which the BLM will no longer use it. Through the Determination of NEPA Adequacy process for specific projects, the BLM will regularly consider whether the EA analysis, including assumptions and methodology, continues to remain valid and relevant.

implement projects that are not adequately analyzed by this EA, the BLM would prepare additional National Environmental Policy Act review (e.g., a separate EA).

For each site-specific project involving commercial harvest treatments, the BLM at a minimum would provide an opportunity for public involvement. The type of public involvement for each site-specific project will vary depending on site-specific circumstances, including the scope, scale, and nature of the site-specific project). The BLM may conduct additional public notification, meetings, field trips, comment periods, or other public involvement for any site-specific project (including non-commercial projects), subject to Authorized Officer discretion.

Following the DNA process and any public involvement processes, the BLM would release a project-specific decision that would provide for any applicable administrative appeal opportunities for that specific decision[7].

This process is consistent with the Council on Environmental Quality (CEQ) guidance for Effective Use of Programmatic NEPA Reviews (CEQ 2014) and the BLM's NEPA Handbook (USDI BLM 2008).

1.3 The Purpose of the Program of Work

The purpose of the integrated vegetation management for resilient lands program is—to remove vegetation (***except*** removal of commercial size material in the HLB[8] or Areas of Environmental Critical Concern), to apply prescribed fire, and to install protective structures in the Treatment Area to promote and develop:

- Safe and effective wildfire response and reduce wildland fire risk to Highly Valued Resources and Assets (HRVAs), (specifically, Communities at Risk, northern spotted owl [NSO] [*Strix occidentalis caurina*] habitat and sites, marbled murrelet [*Brachyramphus marmoratus*] habitat and sites, special status plants, and special plant communities);
- Fire and disturbance resilient lands and fire-resistant stands;
- Habitat for Special Status Species and unique native plant communities.

1.4 Why we Need the Program of Work

The need for this program of work and its purposes are established in the SWO ROD/RMP (USDI BLM 2016b), the Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (NCO ROD/RMP) (USDI BLM 2016c) (collectively RODs/RMPs), and the supporting PRMP/FEIS (USDI BLM 2016a).

Conditions in southwestern Oregon are at high risk of large, severe wildfires that put HVRAs at risk (Appendices 3-5, Figure 8). Scott and others (2018) identified 50 communities in Oregon with the highest cumulative wildfire risk; nearly half of those communities are located in southwestern Oregon (**Figure 1**). Trends and forecasts suggest that wildfire will continue to be a major change agent affecting ecosystems, further increasing wildfire risk across Oregon (Mote et al. 2019; USDI BLM 2016a, Appendix D, pp. 1240-1242).

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[7] See 186 IBLA 51, *Western Watersheds Project* v. *Bureau of Land Management* (July 21, 2015) (IBLA 2015-152).

[8] The Medford District's program of commercial harvest in the HLB is covered in other environmental assessments and National Environmental Policy Act documents and is excluded from the purpose of the program of work described in this EA.

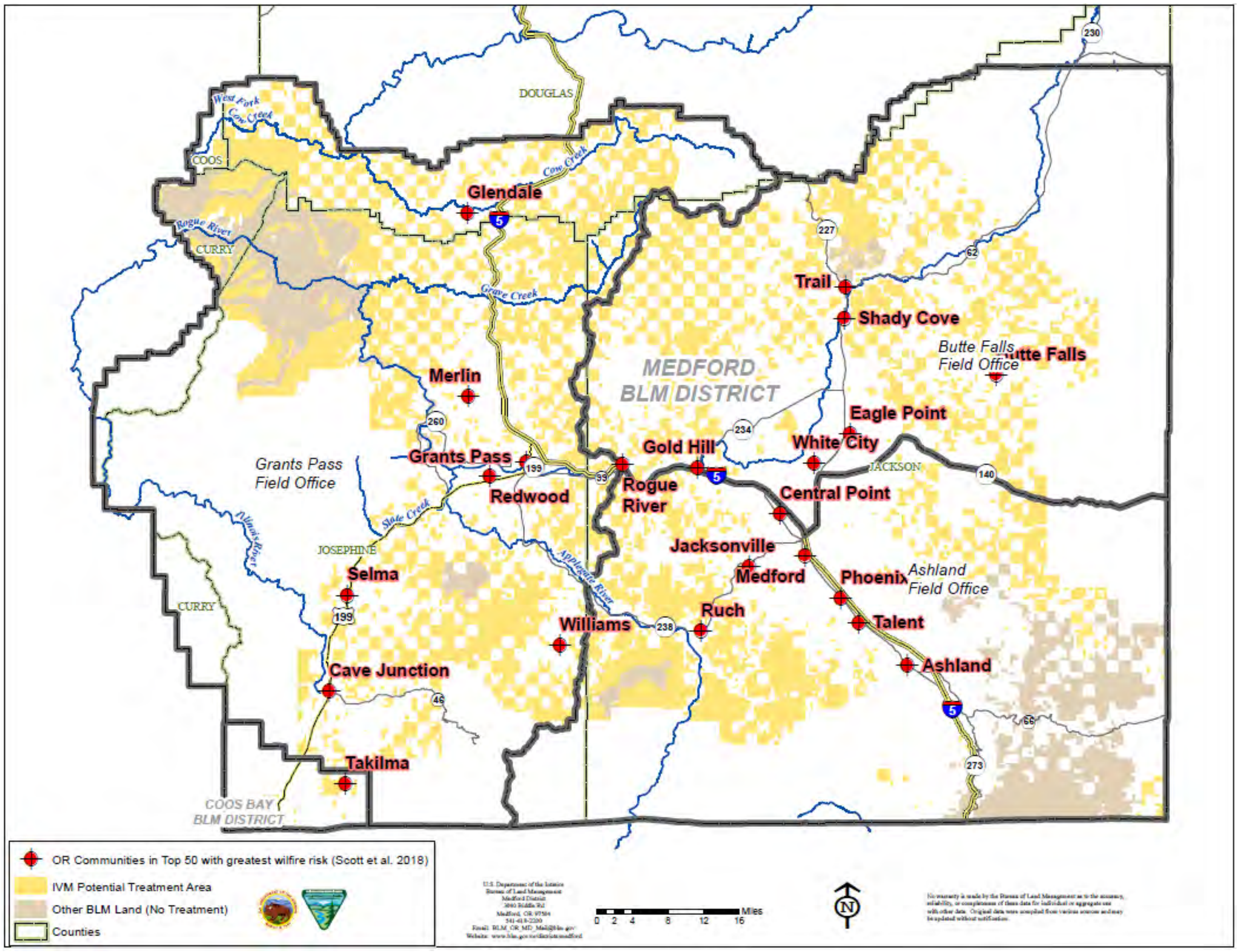


Figure 1. Southwestern Oregon Communities in the Top 50 Oregon Communities Most at Risk to Wildfire (Scott et al. 2018).

The altered landscape, including fuel build up, in combination with drought conditions, continued expansion of human development into wildland areas, and checkerboard ownership patterns, make managing wildfire hazard increasingly complex and challenging (USDI BLM 2016a, pp. 255-256; Prichard et al. 2021; Hessburg et al. 2021). In the past decade, over 95 percent of BLM-administered lands burned by wildfire in western Oregon were lands included in the SWO ROD/RMP (which covers the majority of the Medford District) (USDI BLM 2016a, p. 258). Fire will continue to threaten HVRAs and will continue to require suppression activities, particularly in the expansive wildland-urban interface represented by the Treatment Area. Actions to improve safe and effective wildfire response to limit large fire growth (Stratton 2020), to reduce the risk of habitat loss (Jones et al 2021), and to create vegetation conditions resilient to disturbance are needed now (Haugo et al. 2015; Hessburg et al. 2015; Hessburg et al. 2021; Prichard et al. 2021).

To promote and maintain safe and effective wildfire response and reduce wildland fire risk to HRVAs, there is a need to:

- "Create fuel beds or fuel breaks that reduce the potential for high-intensity/high-severity fire spread within the wildland urban interface or in close proximity to highly valued resources" (USDI BLM 2016b, p. 91; USDI BLM 2016c, p. 78).
- "Treat both management activity fuels and natural hazardous fuels [to] . . . [m]odify the fuel profile (e.g., raise canopy base heights or reduce surface and ladder fuels and crown bulk density); [r]educe potential fire behavior (e.g., crown fire activity, wildfire spread, and intensity); [r]educe potential fire severity; and [i]mprove effective fire management opportunities within the Wildland Urban Interface or in close proximity to other highly valued resources" (USDI BLM 2016b, p. 91; USDI BLM 2016c, p. 78).

Effective fire exclusion in southern Oregon, along with other land management practices of the twentieth century, has altered natural fire return intervals and landscape vegetation patterns, decreasing resilience to natural disturbance, such as fire, insects, and drought, relative to a natural range of variability ((USDI BLM 2016a, p. 226; Hagmann et al. 2021; Prichard et al. 2021). "Landscape resiliency has been defined in various ways, but at its core are sustainability and resistance to and recovery from disturbance" (USDI and USDA 2014). Historically, there was a resilient distribution of open and closed vegetation patterns across the landscape. These patterns were cultivated by frequent low-mixed severity disturbance so that when disturbance occurred, the balance of vegetation patterns would continue to persist on the landscape. Less departure from this natural range of variability represents greater fire resiliency.

The BLM found in the PRMP/FEIS analysis that compared to the natural range of variability, there is currently an abundance of forest stands in the mid-closed successional stage and a deficit of stands in the late successional stages, particularly the late-open successional stage (USDI BLM 2016a, pp. 223-242). This imbalance, illustrated in Figure 2, conveys the need to retain existing late-seral stages and the need for disturbance (via thinning or fire) coupled with successional growth in order to develop late seral stands in these frequent-fire dry forests (DeMeo et al. 2018; Haugo et al. 2015). The imbalance in open and closed forest stages has resulted in an abundance of overly dense, structurally homogenous forest stands; a lack of large fire-resistant trees and fire-resistant species; and increased surface ladder, and canopy fuels (Hagmann et al. 2021). These conditions have limited the growth and vigor of stands, increased susceptibility to wide-spread insect and disease infestations (e.g., epidemic vs. endemic), and heightened the potential for larger-scale, stand-replacing fires that are difficult to control (USDI BLM 2016a, pp. 225–226).

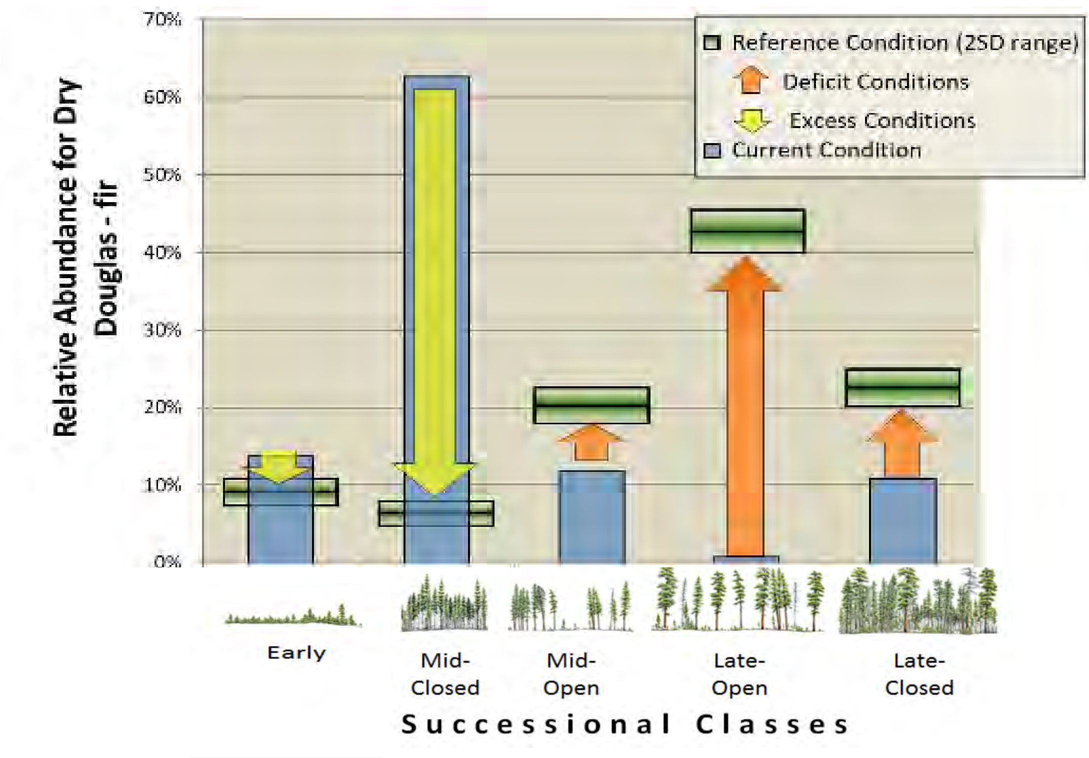


Figure 2. Relative abundance of current departure (deficit or excess) of successional class from the natural range of variability reference condition (two standard deviation range from mean) (green box) for Dry Douglas fir in the Medford District (USDI BLM 2015). (Forest Illustrations adapted with permission, Van Pelt 2008).

To promote and maintain fire and disturbance resilient lands and fire-resistant stands, there is a need to:

- "Apply thinning or prescribed fire to forest stands as needed to achieve appropriate stocking and density levels." (USDI BLM 2016b, p. 92; USDI BLM 2016c, p. 79).
- "Conduct integrated vegetation management [to] . . . [p]romote the development and retention of large, open grown trees and multi-cohort stands; [d]evelop diverse understory plant communities;

[i]ncrease or maintain vegetative species diversity; [r]estore and maintain habitat for Bureau Special Status species; [p]romote or enhance the development of structural complexity and heterogeneity; [c]reate growing space for hardwood and pine persistence and regeneration; [c]reate and maintain areas for hardwood and shrub dominance; [a]djust stand composition or dominance; [r]educe stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation." (USDI BLM 2016b, p. 68, 72; USDI BLM 2016c, p. 60).

- "Modify fuel beds to produce characteristic fire behavior and fire effects representative of the fire regime. Implement interim fuels treatments (e.g., hand pile and burn) in areas that are highly departed from natural conditions in order to facilitate prescribed fire in the future." (USDI BLM 2016b, p. 75)
- "Apply prescribed fire in low/mixed severity or high-frequency fire regimes to emulate historic fire function and processes. Apply prescribed fire across the landscape to create a mosaic of spatial and temporal stand conditions and patterning (appropriate to the fire regime)" (USDI BLM 2016b, p. 75).
- "Apply prescribed fire and mechanical or hand fuels treatments to reduce the potential for uncharacteristic wildfires. Apply maintenance treatments at appropriate intervals to retain or improve fire-resilient conditions" (USDI BLM 2016b, p. 75).

The same conditions described above that limit the extent of structurally-complex forests, also delay and hinder their development, and increase the risk of their loss to wildfire. Structurally complex forests provide important habitat for the federally-listed northern spotted owl, marbled murrelet, and coastal marten *(Martes caurina humboldtensis)* (threatened under the Endangered Species Act (ESA)), as well as other special status species, such as fisher (*Pekania pennanti*). The BLM found at the western Oregon analysis scale, the current amount of mature and structurally-complex forest (51 percent) is substantially less than the average historical condition (58–80 percent). Additionally, the current amount of young forest (56 percent) is well above the average historic condition (15–21 percent) (USDI BLM 2016a, p. 840).

Within the LSR LUA of the Treatment Area, an estimated 169,184 acres are currently not functioning as nesting-roosting habitat for NSOs because they are currently foraging, dispersal-only, or capable habitat (Table 16). Once these stands have developed into nesting-roosting habitat in the future, approximately 78,256 of these acres (46 percent) of these stands have the potential to be used by spotted owls for nesting based on their location on the landscape and the vegetation series (see Spotted Owl Relative Habitat Suitability Discussion in Appendix 6). Current general forest conditions are preventing or delaying development of such nesting-roosting habitat in many areas across the landscape.

To promote and develop habitat for special status wildlife species there is a need to:

- "…apply silvicultural treatments [in LSR] 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 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 in 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." (USDI BLM 2016b, p. 72; USDI BLM 2016c, p. 66).
- "Promote the development of nesting habitat for the marbled murrelet in stands that do not currently meet nesting habitat criteria" (USDI BLM 2016b, p. 70; USDI BLM 2016c, p. 64).
- "Modify fuel beds to produce characteristic fire behavior and fire effects representative of the fire regime. Implement interim fuels treatments (e.g., hand pile and burn) in areas that are highly departed from natural conditions in order to facilitate prescribed fire in the future." (USDI BLM 2016b, p. 75)
- "Apply prescribed fire in low/mixed severity or high-frequency fire regimes to emulate historic fire function and processes. Apply prescribed fire across the landscape to create a mosaic of spatial and temporal stand conditions and patterning (appropriate to the fire regime)" (USDI BLM 2016b, p. 75).

- "Apply prescribed fire and mechanical or hand fuels treatments to reduce the potential for uncharacteristic wildfires. Apply maintenance treatments at appropriate intervals to retain or improve fire-resilient conditions" (USDI BLM 2016b, p. 75).
- "Apply selection harvest or commercial thinning treatments to at least 17,000 acres per decade in the Medford District" in Dry LSR (USDI BLM 2016b, p. 74).

The altered landscape has also degraded habitat for some of the Medford District's rare plant species, including Bureau Sensitive and federally-listed species, particularly within fire-adapted plant communities. Long-term monitoring, habitat evaluations, and species' conservation assessments (Pacific Crest Consulting 2020; Pfingsten et al. 2017; Giles et al. 2018; USDI FWS 2003; USDI FWS 2012c) indicate declining habitat quality for these species. Degraded conditions include declining size and number of forest gaps; reduction in the proportion of fire-adapted conifers, hardwoods, shrubs and herbaceous species; increasing shade from woody vegetation; conifer regeneration in non-conifer plant communities; heavy accumulations of leaf/needle litter and thatch; low herbaceous-layer diversity; increasing abundance of non-native invasive plants; and damage from off-road vehicles or hikers going off designated trails. High-severity fires and associated fire suppression activities can also adversely affect some rare plant populations through direct injury, mortality, and adverse habitat modifications.

Re-introduction of fire to emulate natural processes, stimulate native fire-dependent species (including native deciduous riparian associate tree species), and enhance culturally significant plant populations is needed.

Meadows, grasslands, and openings in other plant communities are susceptible to resource damage from unauthorized uses, especially where there is access from nearby authorized roads or trails. Off-highway vehicles (OHVs), other vehicles, bicycles, horses, and hikers that travel off authorized roads or trails create new tracks that often become eroded, disrupting hydrological function, wearing away native vegetation and creating bare areas that are vulnerable to establishment of invasive nonnative plants. Trash dumping and illegal camping on BLM lands cause habitat degradation by killing native vegetation and leaching toxic substances into the soil and water. These activities also import invasive nonnative seeds or other plant parts that become established and compete with native vegetation. Resource damage to special status plants and their habitats, ACEC relevant and important values, and desired vegetation in native plant communities has resulted in the Medford District from these unauthorized activities. Some of the species affected include Cook's lomatium (*Lomatium cookii*) (USDI FWS 2019, p. 2; Kaye et al. 2019, pp. 2, 23, Johnson 2019), Gentner's fritillary (*Fritillaria gentneri*) (Pacific Crest Consulting 2020, pp. 73-74), winged water starwort (*Callitriche marginata*), dwarf wooly meadowfoam (*Limnanthes pumila* ssp. *Pumila*) (Schomaker and Bahm 2018, pp. 2, 12), Bellinger's meadowfoam (*Limnanthes floccosa* ssp. *Bellingeriana*) (Brown 2017, p. 53), redroot yampah (*Perideridia erythrorhiza*) (Malaby 2005, p. 12), and serpentine wetland species - Oregon willow-herb (*Epilobium oreganum*), Waldo gentian (*Gentiana setigera*), purple-flowered rush-lily (*Hastingsia bracteosa* var. *atropurpurea*), large-flowered rush-lily (*Hastingsia bracteosa* var. *bracteosa*), western bog-lily (*Viola primulifolia* ssp. *occidentalis*) (USDI BLM, USDA FS 2018, pp. 6, 30). Areas where barriers have stopped damage and rehabilitation has repaired damage in meadows include French Flat ACEC, Waldo-Takilma ACEC, Reeves Creek ACEC, Table Rocks ACEC, Round Top Research Natural Area (RNA), Poverty Flat ACEC, Baker Cypress ACEC, Worthington and Obenchain Roads, and Right Fork Salt Creek.

To promote and develop habitat for special status plant Species and unique native plant communities, there is a need to:

- Maintain or restore natural processes, native species composition, and vegetation structure in natural communities through actions such as applying prescribed fire, thinning, removing encroaching vegetation [and] retaining legacy components (e.g., large trees, snags, and down logs)." (USDI BLM 2016b, p 106; USDI BLM 2016c, p. 87).
- In the District Designated Reserve-Areas of Critical Environmental Concern (DDR-ACEC) LUA, "implement activities as necessary to maintain, enhance, or restore relevant and important values." (USDI BLM 2016b, p. 55).
- In the DDR-timber production capability classification (TPCC) LUA, "apply silvicultural or fuels treatments, including prescribed fire, that restore or maintain community-level structural

characteristics, promote desired species composition, and emulate ecological conditions produced by historic fire regimes, in areas identified as unsuitable for sustained-yield timber production through the Timber Production Capability Classification system." (USDI BLM 2016b, pp. 55-56).

- "Manage naturally occurring special habitats to maintain their ecological function, such as … natural meadows, … oak savannah/woodlands…." (USDI BLM 2016b, p. 115; USDI BLM 2016c, p. 95).
  "Manage habitat to maintain populations of ESA-listed, proposed, and candidate plant species" (USDI BLM 2016b, p. 106; USDI BLM 2016c, p. 106).
- Manage mixed conifer communities to maintain and enhance ponderosa (*Pinus ponderosa*), Jeffrey pine (*Pinus jeffreyi*), and sugar pine (*Pinus lambertiana*) persistence and structure by removing competing conifers, thinning, and applying prescribed fire, to the extent consistent with management direction for the land use allocation." (USDI BLM 2016b, p. 107; USDI BLM 2016c, p. 87).
- "Manage mixed hardwood/conifer communities to maintain and enhance [Oregon white oak (*Quercus garryana*) and California black oak (*Quercus kelloggii*)] persistence and structure by removing competing conifers, thinning, and prescribed fire, to the extent consistent with management direction for the land use allocation." (USDI BLM 2016b, p. 107; USDI BLM 2016c, p. 87).
- "Manage ESA candidate and Bureau Sensitive species consistent with any conservation agreements or strategies including the protection and restoration of habitat…and other strategies designed to conserve populations of the species" (USDI BLM 2016b, p. 106).
- Install barriers (fences, boulders, gates, barricades, trenches, etc.) or boardwalks when and where unauthorized uses occur to redirect traffic back onto authorized routes and prevent on-going or future resource damage. Tire tracks or other soil disturbance can be rehabilitated by ripping, blading, or raking to reestablish hydrological flow. Seeding or planting native species would reestablish vegetation.

The ROD/RMP management direction requires action by the Medford District (including small portion of Coos Bay District) consistent with the purpose and need described above. Please note, specific management direction may apply to one or more of the purposes identified above. Specific management direction establishing the need for the program of work can be viewed in BLM's SWO and NCO ROD/RMPs.

1.5 Land Use Plan Conformance

The actions in this EA are in conformance with the SWO ROD/RMP (USDI BLM 2016b). The SWO ROD/RMP directs management of the entire Treatment Area except for a small portion in the southwestern corner, which lies within the Coos Bay District but authority to manage the area has been delegated to the Medford District. Actions that would occur in this area are in conformance with the 2016 Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (NCO ROD/RMP) (USDI BLM 2016c). The NCO ROD/RMP directs management of lands within the Coos Bay District.

1.6 Relationship to Statues, Regulations, or Other Documents

The purpose and need for this program of work aligns and is responsive to recent direction from Congressional Acts and Executive Orders. Growing concern over cost and lasting effects of large wildfires in part prompted Congress to pass the 2009 FLAME Act (43 U.S.C. 1701) which launched "The National Cohesive Wildfire Strategy" to develop fire-adapted communities, effective and efficient wildfire response, and resilient landscapes. In December of 2018 the President signed an Executive Order (E.O. 13855) "Promoting Active Management of America's Forests, Rangelands, and other Federal Lands to Improve Conditions and Reduce Wildfire Risk." Additionally, in January of 2019 the Secretary of the Interior issued an Order (No. 3372) "Reducing Wildfire Risks on DOI Land Through Active Management", which includes a directive to use active land, vegetation, and wildfire response techniques supported by best practices and best available science, and maximize the wildfire response benefits of physical features within landscapes. Analytical Issues

The BLM generated a list of issues based on internal scoping discussions and from substantive public comments submitted during scoping, including during public review of the draft Chapters 1 and 2. From that list, the BLM identified issues to analyze in detail in this EA. Those issues are listed and analyzed in Chapter 3.

Issues the BLM considered but did not analyze in detail are discussed in Appendix 10, including rationale for why each issue was not further analyzed.

The BLM analyzed a No Action Alternative and three action alternatives in detail, which this EA documents. This chapter provides a brief, largely qualitative and comparative summary of the key points and differences among the alternatives analyzed in detail.

Alternatives the BLM considered but eliminated from detailed analysis, including some alternatives or alternative elements submitted by the public, are discussed in Appendix 9.

2.1 No Action Alternative

The No Action Alternative does not implement any aspect of the action alternatives in the Treatment Area at this time. Under the No Action Alternative, the present environmental conditions and trends in the Treatment Area would continue. Because the BLM would not implement action alternatives, vegetation growth rates, stand densities, fuel conditions, the ratio of open and closed forest, and so forth, would continue to change based on current existing forces and disturbance, or lack thereof.

The reasonably foreseeable cumulative actions that would still apply to the analysis of the environmental effects of the No Action Alternative, may vary by resource and will be discussed specific to each resource issue analysis presented in Chapter 3. In addition, the No Action Alternative does not suggest that the BLM would stop implementing the SWO and NCO RODs/RMPs. However, the No Action Alternative does not attempt to speculate as to which actions the BLM would use in place of the actions this EA proposes, thus allowing the No Action Alternative to serve as a baseline to represent current conditions and trends, and a reference point from which to compare the environmental effects of the action alternatives. Inclusion of this alternative is without regard to meeting the purpose and need identified above.

2.2 Action Alternatives – Common Elements

The EA analyzed three action alternatives in detail. These action alternatives were developed based on internal and external input. In all action alternatives (subject to the Eligible Footprint for each alternative):

- **Commercial thinning** could occur, subject to limitations in each alternative, in the Treatment Area in the LSR and RR LUAs, and areas of the DDR-TPCC other than Non-Suitable Withdrawn TPCC Classification (see Table 1 in Section 1.1); commercial harvest is *not* included in any action alternative in the HLB or DDR-ACEC or in areas outside the Treatment Area.
- Timber harvest that would cause the incidental take of NSO territorial pairs or resident singles would not occur (USDI BLM 2016b, p. 30; USDI BLM 2016c, p. 30).
- **Small diameter and non-conifer treatments** could occur within any LUA within the Treatment Area (including HLB and DDR-ACEC), subject to the limitations described in each alternative.
- **Prescribed fire (low to moderate severity)** could occur within any LUA within the Treatment Area, unless otherwise noted in the alternative.
- **Barrier placement, boardwalk construction,** and rehabilitation of ground disturbance to protect sensitive plant populations and special areas could occur in any LUA in the Treatment Area, subject to the Eligible Footprint of each alternative.
- **Safety or operational reasons** would form exceptions to most limitations on treatments established in the alternatives.

2.3 Alternative A

Alternative A emphasizes (1) improving opportunities to limit large wildfire growth by creating strategic fuel breaks and buffers around Communities at Risk support protection of HVRA's; and (2) thinning to moderately variegate the structure of younger plantations (<60 years).

Compared to the other action alternatives, Alternative A includes the most limited range of commercial and small diameter thinning. This alternative would use commercial thinning, small-diameter thinning, non-conifer treatments and prescribed fire only along operationally strategic areas for wildfire response within a quarter mile of communities at risk to create shaded fuel breaks, or in plantations less than 60 years of age. Commercial thinning would not exceed 2,000 acres per year and 17,000 acres over 10-years. All proposed actions would maintain NSO nesting-roosting habitat function within LSR LUA. Prescriptions would retain relatively closed forest condition (thus suppressing understory re-growth). While prescriptions would not include skips or gaps, retention and thinning around trees greater than 30 inches in diameter would occur. Small diameter thinning of shrubs and of conifers no larger than eight inches in diameter (or twelve inches in plantations) would be used to reduce surface and ladder fuels and raise canopy base heights (CBH) in conifer and non-conifer (oak woodlands, savannas, and chaparral) communities on up to 2,000 acres annually and up to 17,000 acres over 10-years. Prescribed fire would not exceed 2,000 acres annually or 17,000 acres every 10-years. Alternative A would not include any new road construction and would only allow removal of dead trees for operational or safety reasons. Installation of barriers or boardwalks and rehabilitation of tracks and other soil disturbance in meadows and other open vegetation communities would occur within the Eligible Footprint of the alternative.

2.4 Alternative B

Alternative B is based on an alternative proposed by Klamath-Siskiyou Wildlands Center during the draft Chapters 1 and 2 public comment period. The alternative incorporates nearly all elements from the publicly submitted alternative; those elements that were not included are discussed in Appendix 9, Section 4, along with rationale for why they were not included.

Alternative B proposes commercial and small-diameter treatments only in dry forest types (*moist* and *dry* forest as defined in the PRMP/FEIS Table C-11, pp. 181-183), except in plantations where thinning could include moist forest. Commercial treatments of no more than 3,000 acres per year and 20,000 acres every 10-years would include light thinning in young stands and dry forest and prescriptions would retain relatively closed canopy at greater than 40 percent cover. There would be no commercial thinning in stands greater than 120 years old and stands 80-120 years old would be less than 25 percent of annual actions. Commercial treatments would not cut conifer trees larger than 25 inches in diameter or hardwood trees greater than 16 inches in diameter except as needed for safety or operational reasons. If trees are cut for safety or operational reasons, retain all cut trees 25-36 inches in diameter as down wood. All proposed actions would maintain all NSO habitat function. In dry forest types, such as Jeffery pine and Oregon white oak, and strategic areas for wildfire containment, prescriptions may retain lower canopy cover, when they are not located in spotted owl habitat. In the RRs, commercial treatments would be as described above. Alternative B would create heterogeneity through comparatively smaller skips and gaps (including thinning around certain large or old trees) than in Alternative C. Small diameter thinning would be similar to Alternative A and occur in plantations up to 12 inches in diameter and could occur on 4,000 acres per year or up to 30,000 acres over 10-years. Thinning and prescribed fire would only be applied in oak chaparral and chaparral plant communities that are in strategic areas for wildfire containment. Prescribed fire would be used in all other non-conifer and dry forest types at a maximum of 4,000 acres per year or 30,000 acres over 10-years. Alternative B would allow some temporary road construction and only remove dead trees for operational or safety reasons. Installation of barriers or boardwalks and rehabilitation of tracks and other soil disturbance in meadows and other open vegetation communities would occur within the Eligible Footprint of the alternative.

2.5 Alternative C

Alternative C strives to fully integrate protecting and promoting habitat for special status species, improving safe and effective wildfire response, and creating a balance of open and closed vegetation patterns at multiple scales to increase resilience to fire, insects, and drought.

Alternative C allows the same amount of commercial treatment over 10-years as Alternative B; however, the annual maximum acres allowed (up to 4,000 acres) is greater than Alternative B. Alternative C varies commercial treatments more precisely by moist and dry forest types, abiotic factors (such slope and aspect), current NSO habitat conditions, and the potential for developing into nesting-roosting habitat in the future, as reflected in the relative density index (RDI) target table (Table 32 in Appendix 1, Section C.2). Like Alternative A, within a quarter mile of Communities at Risk this alternative would use small diameter thinning, prescribed fire, and commercial thinning to create shaded wildland fuel breaks of reduced surface, ladder, and canopy fuels. Further than a quarter mile from Communities at Risk, commercial treatments would vary to create a range of open and closed conditions, depending on topography and potential vegetation type, as well as whether treatments are located in NSO nesting-roosting habitat, or NSO high

Relative Habitat Suitability (RHS) areas. Commercial treatments would not occur in late-closed NSO nesting-roosting habitat in areas of *high* RHS; these areas are functioning nesting-roosting habitat in locations where it is likely to persist. Treatments would occur in nesting-roosting habitat in strategic areas for fuel reduction, in areas with a prominent pine or oak component, in areas prone to insect attack, or in simple structure mid-closed successional stages. All proposed actions would maintain NSO nesting-roosting habitat function at the stand level in LSR. Some portions of stands may be treated to greater intensity for forest health, fuels reduction, or to control insects and disease (USDI BLM 2016b, p. 70); however, the overall stand condition would continue to function as spotted owl nesting-roosting habitat post-treatment (Appendix 6). Unlike Alternative B, this alternative would not be required to maintain NSO foraging or dispersal-only habitat function. Alternative C does not restrict commercial treatments based on stand age in the LSR. Large trees that meet the criteria in the SWO ROD/RMP would be retained in all LUA's. In the RR, commercial treatments would occur in the middle and outer zones (as defined in RMP).

Alternative C would create heterogeneity through comparatively larger group selection openings, skips and gaps (including thinning around certain large or old trees) than Alternative B, with larger gaps allowed in the LSR than other LUA's. As in Alternative B, small diameter thinning would extend to conifers no more than 12 inches in diameter, even outside of plantations, to improve botanical habitat, reduce surface and ladder fuels, and raise CBHs on up to 6,500 acres per year with a maximum of 60,000 acres over 10-years. Prescribed fire would also be used in dry forest and non-conifer plant communities potentially occurring on up to 7,500 acres per year with a maximum of 70,000 acres over 10-years. Alternative C would allow treatment on more acres than any other alternative for these actions. This alternative allows slightly more miles of road building (temporary or permanent) than any other alternative but does not allow any net increase in permanent road density. Installation of barriers or boardwalks and rehabilitation of tracks and other soil disturbance in meadows and other open vegetation communities would occur within the Eligible Footprint.

2.6 **Summary Comparison of Action Alternatives.**

In Table 2, in a side-by-side fashion, the key elements of each alternative, particularly those elements that vary by alternative. The table does not include all details of each alternative. Full details are contained in Appendix 1. For definitions of abbreviations used in this table, see Appendix 17.

Table 2. Comparison of Action Alternatives.

MANAGEMENT ACTION			NO ACTION ALTERNATIVE**	ACTION ALTERNATIVES		
				Alternative A	**Alternative B**	**Alternative C**
Common to All			No incidental take of NSO In the LSR, maintain Nesting Roosting habitat function (including key elements – see Appendix 1 Detailed Alternative Descriptions) at the stand-level and protect older structurally-complex forest			
Commercial Treatments	**Commercial Thinning Selection Harvest Group Selection Openings** **No Commercial actions in HLB under any alternative**	**Implementation Acres***	None	Annual maximum 2,000 acres/year. 10 years maximum: 17,000 acres.	Annual Maximum: 3,000 acres/year. 10 years maximum: 20,000 acres (17,000 in LSR).	Annual Maximum 4,000 acres/year. 10 years maximum: 20,000 acres (17,000 in LSR).
		Relative Density Index prescription (R_x) ranges And Treatment Parameters	No commercial harvest in those areas that could be commercially treated under the action alternatives (i.e., the portions of the Treatment Area outside of the HLB)**	Thin to 35-40 percent RDI along operationally strategic areas for wildfire containment or within ¼ mile of Communities at Risk and in plantations < 60 years. Diameter limit: Retain large trees >30 inches diameter at breast height (DBH)*** Maintain a minimum average stand canopy cover of ≥ 40 percent.	No treatment of stands > 120 year. Dry forest thin to 35-45 percent RDI, except Jeffery pine and Oregon white oak (20-35 percent RDI). Moist forest – no treatment, except in plantations, thin to 35-45 percent RDI. Maintain all NSO habitat function (including key elements – see Detailed Alternative Description). In nesting, roosting, foraging (NRF): retain habitat function and ≥60 percent canopy cover (CC). In Dispersal only habitat: retain habitat function ≥40 percent CC. All other locations: maintain ≥ 40 percent CC, except Jeffery pine and Oregon white oak, which would be ≥ 30 percent CC. Diameter limit: retain all conifers >25 inches DBH and hardwoods > 16 inches DBH; In RRs retain >20 inches DBH; killed or cut trees 25-36 inches (20-32 inches DBH in RR) would be retained as snags or as down wood when adjacent to roads. *** Stands 80-120 years would be <25 percent of planned annual treatment acres.	No treatment of NSO nesting-roosting (NR) habitat within late-closed, *high* RHS‡ locations. Elsewhere, use RDI table by *Prescriptive Theme* as follows (see Section C.2, Table 32 and Section C.2.1 for additional details): NSO nesting-roosting (NR) habitat in strategic areas for fuel reduction, areas with a prominent pine or oak component, areas prone to insect attack, or in simple structure mid-closed successional stands: *Near-Term NSO* (maintain function and key elements at stand level). Within ¼ mile of Communities at Risk: *Fuels Emphasis.* Within *high* RHS mid-closed (non-NR) habitat*: Long-Term NSO.* † Everywhere else: *Ecosystem Resilience.* ** Maintain a minimum average stand canopy cover of ≥ 30 percent. Retain large trees (pine and Douglas fir > 36 inches DBH and hardwoods >24 inches DBH that were established prior to 1850; SWO ROD/RMP p. 74) in all LUA's. ***
		Riparian Reserve constraints	N/A	Treatment allowed only along operationally strategic fire management features or within ¼ mile of Communities at Risk. RR – Moist & Dry, all zones: Treatments follow RDI targets above and RMP management direction (retain ≥ 60 TPA and ≥ 40 percent CC), SWO ROD/RMP pp. 78-87.	RR-Moist: No treatments. RR-Dry: Treatment allowed in available commercial treatment areas described above; treatments retain ≥ 60 TPA and ≥ 40 percent CC.	Outer & Middle Zone: Treatment allowed in available commercial treatment areas described above, following RMP management direction (retain ≥ 60 TPA and ≥ 30 percent CC), SWO ROD/RMP pp. 78-87.
				RR Inner Zone: no treatment		
		Tools for creating stand structure (legacy tree culturing, skips, gaps)	N/A	No group selection openings or skips Thin around large trees >30 inches DBH (up to two times dripline of the tree) as a stand-alone treatment.	Variable sized skips: >20 percent of stand. Variable sized Group Selection Openings and modified openings (large tree retention): up to 1 acre in size (0.5 acres in stands < 10 acres) in up to 10 percent of stand. Legacy tree (see diameter limit above) culturing.	In LSR: variable sized Skips – minimum 10 percent of stand. In LSR: Variable sized Group Selection Opening (SWO ROD/RMP p. 72) up to 2 acres in size and modified openings (with large tree retention) up to 4 acres in size (under limited conditions) in up to 25 percent of the stand (≤2.5 acres size in stands < 10 acres). See Appendix 1 detailed descriptions for gap size considerations. Legacy tree (see diameter limit above) culturing.
		Cutting of Dead Trees	N/A	Allowed only for operational safety and feasibility		

Surface and Ladder Fuel Reduction	**Small Diameter Thinning** **Non-conifer Treatments** **Prescribed Fire (handpile burning and underburning)** **Actions proposed in all Land Use Allocations**+	**Implementation Acres***	None	Maximum thinning: 2,000/year & 17,000/10 year. Maximum Rx fire: 2,000/year & 17,000/10 year.	Maximum thinning: 4,000/year & 30,000/10 year. Maximum Rx fire: 4,000/year & 30,000/10 year.	Maximum thinning: 6,500/year & 60,000/10 year. Maximum Rx fire: 7,500/year & 70,000/10 year.
		Prescriptions	No small diameter thinning, non-conifer treatments, or prescribed fire anywhere in the Treatment Area.**	No skips or group selection openings Small diameter thinning (<12 inches) in plantations <60 years. Small diameter thinning ≤ 8 inches DBH of conifers and shrubs along operationally strategic areas for wildfire containment or within ¼ mile of Communities at Risk (in conifer and non-conifer communities (oak woodlands, savannas, and chaparral, chaparral forest, and meadows)). Prescribed fire allowed only in along operationally strategic areas for wildfire containment or within ¼ mile of Communities at Risk and in plantations < 60 years.	Small diameter thinning ≤ 8 inches DBH of conifers and shrubs in dry forest conifer (no thinning in meadows). Small diameter thinning ≤ 12 inches DBH in plantations. Skips and group selection openings, as above. Prescribed fire and small diameter thinning in oak chaparral or chaparral only in strategic fuels locations for wildfire containment. No prescribed fire in moist forest, except plantations. Prescribed fire allowed in dry forest conifer and non-conifer plant communities (forest, oak woodlands, savannas, and meadows).	In NR within late-closed, *high* RHS: No treatment. Small diameter thinning ≤ 12 inches DBH of conifers and shrubs in conifer (dry and moist) and non-conifer plant communities (oak woodlands, savannas, and chaparral, chaparral forest, and meadows) (includes plantations). Skips and group selection openings, as above, except chaparral, where skips are up to 5 acres. Prescribed fire allowed.
	Activity fuel reduction		None**	Activity fuel reduction allowed for all commercial treatments		
Access	**New Road Construction**		No road construction or renovation.**	No new road construction. Fully decommission (as defined in SWO ROD/RMP, p. 312) roads renovated during projects.	Only temporary new road construction allowed (except in, LOCO8 CH, ACECs, and those special recreation management areas (SRMAs)/extensive RMAs (ERMAs) listed in Appendix 11). New roads (temporary): 5 miles maximum/year, 40 miles maximum/decade Fully decommission SWO ROD/RMP p. 312. No mid-slope roads. No new stream crossings or fords.	New road construction (temporary or permanent) allowed (except in, LOCO8 CH, ACECs, and those SRMA/ERMAs listed in Appendix 11). New roads (temporary or permanent): 10 miles maximum/year, 90 miles maximum/decade. No net increase of permanent road density. Only temporary stream crossings or fords on perennial and/or fish-bearing streams. Temporary Roads: decommission after use (minimum long-term decommission, as defined in SWO ROD/RMP p. 311). No new permanent road construction within 200 feet of a water feature (SWO ROD/RMP Table 6, p. 77).
	Landing Construction		N/A	New temporary or permanent landing construction allowed for all commercial treatments, except in, LOCO8 CH, ACECs, and those SRMA/ERMAs listed in Appendix 11.		
	Road Renovation/Maintenance		None**	Road renovation and maintenance allowed for all treatments.		

* Implementation acres – management actions may overlap on the same footprint: for example, thinning and hand pile burning typically occur on the same acre, thus total acres of actions may exceed actual implementation footprint acres.
** The No Action Alternative assumes that commercial harvest, small diameter thinning, activity fuel reduction, and ongoing road maintenance and road building associated with HLB timber sales, implemented under other NEPA documents, is a reasonably foreseeable action for purposes of cumulative effects for the No Action Alternative and all action alternatives, but is not a direct effect of any alternative.
*** Except where falling is necessary for safety or operational reasons. If such trees need to be cut for safety or operational reasons, retain cut trees in the stand (USDI BLM 2016a, p. 74).
† "Unless treatment would preclude or delay by 20 years or more the development of NSO NR habitat in the stand and in adjacent stands, as compared to development without treatment" in the LSR (USDI BLM 2016b, p.72).
⁑ High RHS is further described in Appendices 1 and 6 and includes stands meeting the intent of *high* value RHS (i.e., bottoms and cool mid-slopes).
+ Actions could occur on any BLM-administered lands in the Treatment Area, as defined in Section 1.1.

3.1 Introduction

This chapter describes the affected environment and the environmental consequences of the alternatives discussed in Chapter 2 as they relate to the issues identified for detailed analysis. Under each issue, there is a discussion of affected environment information specific to the analysis of that issue, the methodologies and assumptions used in analyzing effects, and the anticipated effects of the alternatives as they relate to the issue.

The over-arching analytic process applied to derive Eligible Footprints for proposed actions in each action alternative is described in Appendix 12. To summarize, the BLM processed the various geospatial inputs according to the parameters described for each action alternative (see Detailed Description of Action Alternatives, Appendix 1) to create two footprints for each alternative: 1) non-commercial actions (i.e., small-diameter and prescribed fire proposed actions) and 2) commercial proposed actions. To define the commercial action Eligible Footprint of each action alternative as a reasonable analytic assumption the BLM identified stands potentially needing treatment in the short-term (<10-years) by comparing the current relative density (RD) with the target RD as specified in Detailed Description of Action Alternatives (Appendix 1).

Issues Analyzed in Detail

3.2 How Would the Alternatives Affect Landscape Scale Resiliency in Terms of Successional Class Distribution (i.e., Distribution of Open and Closed Forest Conditions) in the Dry Forest?

3.2.1 Methodology

One of the purposes of this EA is to develop disturbance resilient lands (i.e., wildfire, insects, drought), see Section 1.3. Resiliency in this EA refers to the range of vegetation patterns (balance of open and closed forest conditions) that would persist on the landscape in the face of disturbance. This issue compares how treatments would deviate from the current successional class distribution towards the historic range of variability by increasing the amount of open forest conditions towards a more appropriate balance of open and closed conditions. The measurement indicator is the percentage of open forest conditions that could be created across the Treatment Area per each action alternative. The key metrics used for comparing the modeled prescriptions are:

- **Open forest condition at the landscape scale (percent):** The potential amount of open forest condition created across the Treatment Area, which is a compilation of the treatment types that would create open forest conditions based on residual percent canopy cover.
- **Canopy cover at the stand scale (percent):** residual canopy cover is used to determine if the forest condition is open or closed.

Methods for this analysis included using stand exams in representative example units from the BLM EcoSurvey database (stand exam database). The sample stand trajectories were modeled using ORGANON (Southwest Oregon variant) over a 50-year time horizon to model anticipated treatment outcomes. Stand Visualization System (SVS), developed by the Forest Service, was used to create visuals and graphs of stand treatments using ORGANON output tree lists. ORGANON is an individual tree growth model used for predicting future conditions for forested stands. For more information about ORGANON, see Appendix 4.

Spatial and Temporal Extent

The spatial extent for the silviculture analysis to forested vegetation is the Treatment Area. Geographic Information System (GIS) modelling was used to query the Eligible Footprint Areas to find the acreage of potential open treatments per alternative. This acreage is then used as a percentage within the Treatment Area proposed in this EA. The timeframe considered for short-term direct and indirect impacts to stand structure, composition, forest health risk, and appearance is the time needed to complete the proposed treatments, which is 10-years. The timeframe for long-term direct and indirect impacts to forested vegetation is 50 years in order to better model long-term growth and change in species composition. This issue pertains to dry forest only. Within the Treatment Area, only 6 percent of forest types are considered moist forest, which is scattered and intermixed with dry forest throughout the Treatment Area. The remaining 94 percent consists of dry and very dry forest. Refer to Table C-11 (USDI FEIS 2016a, pp. 1181-1183) for moist/dry forest classifications by Potential Vegetation Type (PVT). Only the western hemlock (cool/moist) and the tan oak-Douglas fir (moist) PVTs within the Treatment Area are considered moist forest types.

Transition from Closed Forest to Open Forest

The Vegetation Modeling Appendix of the PRMP/FEIS (USDI BLM 2016a, pp. 1163-1228) describes the forest structural stage classification conditions for the 5-stage structural classifications: early successional, stand establishment, young, mature, and structurally-complex. The forest structural classification conditions were cross-walked with the successional classes in the Fire and Fuels Appendix of the PRMP/FEIS (USDI BLM 2016a, pp. 1305-1332). This crosswalk provided an average minimum and maximum canopy cover for the successional classes based on the PVT. These PVTs are categorized as 'dry', 'very dry', and 'moist'. Averaging the minimum canopy cover for the successional classes in these categories provides a threshold from when forest conditions go from 'open' to 'closed'. The PRMP/FEIS lumped the 'very dry' in with the 'dry' forest, and this analysis does the same. Moist was not considered in this issue as mentioned above in Spatial and Temporal Extent, because changes in forest conditions in the 'moist' forests would not alter resiliency at the landscape scale. Therefore, this analysis is considering the break from 'closed' to 'open' forest condition in the 'dry' forest, which is at 40 percent canopy cover.

3.2.2 Assumptions

For purposes of this analysis, the BLM relied on the following assumptions:

- The PRMP/FEIS assumed that in dry forests, "…management would emphasize increasing fire resistance and resilience, which would often also increase resistance to drought, insects, and pathogens" (p. 201).
- Changes in forest conditions in the moist forests would not alter resiliency at the landscape scale.
- In dry forests, the transition from open to closed forest is 40 percent canopy cover, as discussed above.
- Stand-alone surface and ladder fuel reduction treatments were not analyzed in this issue, which is consistent with the assumptions in the PRMP/FEIS that states "The results of this analysis do not include vegetation changes resulting from non-commercial hazardous fuels work, which would likely contribute toward decreasing acres in mid closed seral stage similarly among all alternatives" (p. 233). Stand-alone surface and ladder fuel reductions treatments in young plantations (i.e., young high density stands) have the potential to contribute towards decreasing acres in the mid closed seral stage by shifting those stand types to young low density stands (see Issue 3.3). Surface and ladder fuel reduction treatments would not transition mid-seral or late-seral closed forest conditions to open forest conditions because the understory would generally be targeted for removal (proposed actions are for removal of <12-inch diameter trees), while the overstory would remain post treatment.
- Riparian reserve treatments would resemble the adjacent upland treatments and would maintain a minimum of 30 percent canopy cover and 60 trees per acre (Alternatives A and B would maintain a minimum of 40 percent canopy cover). Riparian reserve treatments were not modeled because it is assumed the treatments in the riparian reserves would resemble the upland treatment.
- In implementing treatments under Alternative C, the BLM would prioritize treatments in the mid-closed stands by planning ≥60 percent of commercial treatments, on average annually, within mid-closed stands.

- In implementing treatments under Alternative B, stands 80-120 years would be <25 percent of the annual treatment acres.

The Climate Change section of the PRMP/FEIS (USDI BLM 2016a, pp. 165-211), to which this EA tiers, acknowledges scientifically opposing literature on “Whether thinning would increase or reduce forest resiliency in the face of climate change…”, which included some of the literature submitted during scoping (USDI BLM 2016a, p. 199). This section addressed how there are different definitions of fire severity categories and how “scientists disagree on how much high severity can be present before the appropriate bin should be mixed severity. The BLM uses the fire severity classes developed under the LANDFIRE project” (USDI BLM 2016a, p. 200). Additionally, the PRMP/FEIS acknowledged that several fire regime classifications exist along with uncertainty around measures and models of departure (USDI BLM 2016a, p. 223, 229, Appendix W, pp. 1899-1900) and a variety of perspectives exist regarding historic vegetation reference conditions and natural range of variability (USDI BLM 2016a, p. 229), the assumptions regarding historic fire regimes and departure in the PRMP/FEIS were based on the LANDFIRE (Barrett et al. 2010) fire regime classification (USDI BLM 2016a, p. 223).

The Climate Change section of the PRMP/FEIS provides recommended actions for responding to climate change which consists of reducing existing stresses, increasing resistance and resilience to climate change and other stressors, and enabling change where it is inevitable. Thinning is a recommended action:

- “Thinning forest stands to reduce competition and drought stress, increase diversity (species, structure, age classes, sizes, patch sizes, spacing) at the stand and landscape scales, and increase resistance to fire, insects, and pathogens…” (USDI BLM 2016a, p. 199).

3.2.3 Affected Environment

The current balance of open and closed forest conditions are departed from the historic range of variability, with an overrepresentation of mid-closed forest condition and a deficit of late-open forest condition (see Section 4 of Appendix 3 and Section 1.6).

Table 3. Natural Range of Variability (NRV) and Current Successional Condition/Structural Stage in the Treatment Area.

Successional Condition/Structural Stage	NRV for Douglas Fir-Dry and Moist: SW Oregon[9]	Current Approximate BLM Only Acres (Percent of Total BLM)
Early Seral	7-17%	6% (40,546 acres)
Mid Seral Closed Canopy	2-8%	70% (450,650 acres)
Mid Seral Open Canopy	11-22%	10% (66,440 acres)
Late Seral Open Canopy	40-55%	1% (7,521 acres)
Late Seral Closed Canopy	16-25%	13% (82,184 acres)

See Appendix 3 and the discussion of stand modeling in Appendix 4, for information on the current condition of the Affected Environment. The stand modeling provides a comparison of treatments under the action alternatives and the No Action Alternative using ORGANON. Percent canopy cover retention post treatment provides the basis for determining if forest conditions would be considered open (<40 percent) or closed (≥40 percent) at the stand scale. The percentage of open forest condition is the compilation of treatment types across the Treatment Area that create open forest conditions by alternative.

[9] The upper and lower limits for NRV were combined for Douglas fir Dry and Douglas fir Moist associations to provide concise results and are only intended to provide general context. The dataset used to calculate current seral classification and NRV was derived based on the rules established by Haugo and others (2015) in Appendix A.

3.2.4 Environmental Effects

No Action Alternative

The No-Action Alternative would not create open forest conditions.

The cumulative effect of past management practices including timber harvest and fire suppression has led to an over-representation of closed canopy, mid seral stand conditions as discussed in the Appendix 3: General Current Condition of Vegetation (*Departure*). The No Action Alternative would not create open forest conditions and therefore would not deviate from an over-representation of closed canopy.

Young stand management in the Planning Area, such as tree planting, brush cutting, pre-commercial thinning, plantation maintenance and protection treatments would continue. Reduced biological and structural diversity is expected in private industrial forestland which could continue long-term if planted with single crop tree species. Private industrial forestlands would contribute a range of forest conditions primarily in the mid-closed and early seral conditions. Forest operations on private land were anticipated in the development of the SWO ROD/RMP. The BLM anticipates that stand replacing wildfire disturbance (or other stand replacing disturbance) could increase early seral conditions. Outside of stand replacing disturbance, areas within the No Action Alternative would continue to increase in closed forest conditions. Foreseeable actions within the HLB outside of this EA would contribute to changes in structural stages/successional classes. The Forest Management section of the PRMP/FEIS (USDI BLM 2016a, pp. 307-368), to which this EA tiers, modeled changes in structural stages in the NCO and SWO RODs/RMPs in the HLB, which took into account the treatment types in the SWO ROD/RMP, and how these changes would impact structural stages. The allowable sale quantity (ASQ) for the Medford sustained yield unit in the SWO ROD/RMP is 37 MMbf, harvest will continue according to management direction and these impacts were anticipated. In summary, the PRMP/FEIS anticipated that "[t]he structural stage progression in the reserve land use allocations would represent the majority of the forested land in the decision area, because the BLM would allocate no more than 30 percent of the decision area to the Harvest Land Base in the RMP" (USDI BLM 2016a, p. 320). Since the majority of forested land resides in reserve LUAs, the PRMP/FEIS analyzed the reserves separate from the HLB. The No Action Alternative would change the distribution of successional classes in the HLB with anticipated projects. In the short-term (10-years), there would be a slight shift (nearly flat line) towards Mature Single-Layered Canopy structural stages, a decrease in young stands with and without structural legacies, and an increase in the amount of Early Successional and Stand Establishment with structural legacies (USDI BLM 2016a, p. 324). In the long-term, "[t]he harvest land base would mostly trend towards multi-layered stands and structural stages with structural legacies, with mature multi-layered canopy and structurally-complex stands occupying around 50 percent of the area in 100 years" (USDI BLM 2016a, p. 325). The No Action Alternative would not treat in the LSR-Dry, which would otherwise contribute the majority of shifting the successional classes by a reduction in mid-closed forest if treated. In other words, the change in successional class distribution cannot soley rely on treatments in the HLB by not treating in the LSR-Dry LUA.

Alternative A

Treatments modeled for Alternative A have shown that Alternative A would not create open forest conditions, because residual canopy cover in treated stands would be ≥40 percent.

At the landscape scale, Alternative A would not appreciably alter the successional class distribution across the Eligible Footprint Area as compared to the No Action Alternative. Proposed treatments under Alternative A would retain 40 percent canopy cover or greater with a post-harvest RD range of 35-40 percent. Even at the low end of this RD range (35 percent), treatments would not reduce stand densities enough to shift a stand from a closed to an open successional class in the dry forest. The relative abundance of open and closed forest conditions within the Treatment Area would be nearly identical to the relative abundance under the No Action Alternative (0 percent change); any shift in relative abundance would, as in the No Action Alternative, be a result of other reasonably foreseeable actions, and not the cumulative effects of Alternative A. In comparison to the other action alternatives, Alternative A does not create open forest conditions beyond those anticipated in the No Action Alternative. In summary, within the Treatment Area there is an overrepresentation of the mid-closed successional classes and a deficit of late-closed successional classes in comparison to the historic range of variability. Alternative A treatments would not shift into open categories. Because Alternative A would not create open forest conditions, there would be no decrease in the overabundance of closed conditions. With no treatments in mid-closed stands to create mid-open conditions, these stands would not grow into late-open conditions over time.

Alternative B

Treatments modeled for Alternative B have shown that Alternative B would create open forest conditions only within the Jeffery pine or Oregon white oak PVT treatments, other treatments would not create open forest conditions because residual canopy cover in treated stands would be ≥40 percent.

At the landscape scale, Alternative B would alter the successional class distribution in Jeffery pine and Oregon white oak PVTs, which would increase open conditions by no more than 305 acres per decade. All other treatments in Alternative B would not appreciably alter the successional class distribution across the Treatment Area as compared to the No Action Alternative. Proposed treatments under Alternative B would retain 40 percent canopy cover or greater with a post-harvest RD range of 35-45 percent. Even at the low end of this RD range (35 percent), treatments would not reduce stand densities enough to shift a stand from a closed to an open successional class in the dry forest. The relative abundance of open and closed forest conditions within the Treatment Area would be nearly identical to the relative abundance under the No Action Alternative (0 percent change); any shift in relative abundance would, as in the No Action Alternative, be a result of other reasonably foreseeable actions, and not the cumulative effects of Alternative B.

Table 4. Alternative B: Maximum 10-year Implementation Acres in "Open" Commercial Treatments Across the Treatment Area.

Scale	Acres per decade
Maximum 10-year Implementation Acres	17,000
Alternative B Open Treatment	367
Treatment Area Total Acreage	647,341[10]
Treatment Area total shift to Open = 0%	

Alternative C

Treatments modeled for Alternative C have shown treatments in the 'Ecosystem Resiliency: Open' category of the RDI Target Table (Table 32 in Appendix 1) would create open forest conditions because residual canopy cover in treated stands would be <40 percent. Treatment types within the Ecosystem Resilience prescriptions would be based on topographic position on the landscape and the potential vegetation type. This would be comparable to one of the seven core principles Hessburg et al. (2015 p. 1809) developed: "topography provides a natural template for vegetation and habitat patterns: use topography and soils as a successional and environmental template for fitting more characteristic successional patterns to the landscape".

At the landscape scale, Alternative C would alter the current successional class distribution across the Treatment Area by creating open forest conditions within the Ecosystem Resiliency: 'Open' treatment. Implementation acres within Alternative C would be up to 20,000 acres (17,000 in LSR) for the decade. Unlike Alternatives A and B, Alternative C does not have limitations on creating open forest conditions; therefore, has the greatest potential increase in the amount of open forest conditions. For the purpose of comparison of alternatives, this analysis assumes up to 20,000 acres per decade could be in the Ecosystem Resiliency: Open treatment. However, Alternative C includes a variety of prescriptions to apply either an open, intermediate, or closed forest prescription type (Table 32 in Appendix 1), as indicated by site conditions (potential vegetation type, slope position, insolation) and treatment objectives (maintain NSO habitat, fuels emphasis prescription, ecosystem resilience, etc.); therefore, the entire decadal acreage would

[10] The S-Class (departure) analysis contains a different total acreage amount in comparison to the Treatment Area total acreage amount due to the coverage of S-Class raster data, which removes major linear, non-vegetated features such as streams and roads.

not be in treatments to create open forest conditions. The relative abundance of open and closed forest conditions within the Treatment Area would differ from the relative abundance under the No Action Alternative by up to 3.1 percent across all successional classes, and 4.4 percent of the mid-closed successional class if this were to be the exclusive focus (see Table 5). This would add to the cumulative effects of other reasonably foreseeable actions addressed in the No Action Alternative. In summary, within the Treatment Area there is an overrepresentation of the mid-closed successional classes and a deficit of late-closed successional classes in comparison to the historic range of variability. When closed successional classes are treated to shift to an open class (primarily treating the mid-closed successional classes), there will be a decrease in the overabundance of closed conditions. Treatments creating open conditions in mid-closed stands would create mid-open conditions, which would allow these stands to grow into late-open conditions over time. Alternative C would prioritize treatments in the mid-closed stands by planning ≥60 percent of commercial treatments, on average annually, within mid-closed stands. As shown in Table 3, 70 percent of the Eligible Footprint areas are in mid-closed successional classes and is therefore the majority existing condition in need of treatment.

While BLM's analysis documented that under the PRMP/FEIS (and all the alternatives), there would be a continued overabundance of mid-seral closed, "[t]he results of this analysis do not include vegetation changes resulting from non-commercial hazardous fuels work, which would likely contribute toward decreasing acres in mid closed seral stage similarly among all alternatives" (USDI BLM 2016a, p. 233). Alternative C would treat 70,000 acres over 10-years using non-commercial fuels reduction methods having a similar effect as reported in the PRMP/FEIS of decreasing acres in mid-closed condition.

Table 5. Alternative C: Maximum 10-year implementation acres in "Open" Commercial Treatments for all Successional Classes and Exclusively Mid-Closed Successional Classes Across the Treatment Area.

Scale	Current Successional Class: Location of Treatment	Acres per Decade
Maximum "Open" Implementation Acres Alternative C	Mid-Closed	20,000
Maximum "Open" Implementation Acres Alternative C	All	20,000
Treatment Area Existing Conditions	Mid-Closed	450,649
Treatment Area Total Acreage	All	647,341[11]
Treatment Area Shift from Mid-Closed to Mid-Open = 4.4%		
Treatment Area total shift to Open = 3.1%		

3.3 How Would the Proposed Vegetation Treatments Affect Stand Level Hazard or Fire Resistance in the Fire-Adapted Dry Forests?

3.3.1 Background

In the frequent fire-adapted dry forest, there are important stand attributes that improve resistance to stand-replacing fire, reducing "the likelihood of atypical large-scale crown fires (Agee and Skinner 2005; Jain et al. 2012; Franklin et al. 2013). In general, stands with higher fire resistance have reduced surface fuel loading, lower tree density, large diameter trees of fire-resistant species, increased height to live crown (Brown et al. 2004; Peterson et al. 2005; USDI BLM 2008a), and discontinuous horizontal and vertical fuels" (USDI BLM 2016a, p. 243). In these fire-resistant stands, it is more likely that a "…wildfire can burn through …. without substantially altering its structure, composition, or function (Franklin et al. 2013)." (USDI BLM 2016a, p. 242). These principles are consistent with those articulated in the Rogue Valley Integrated Fire Plan (RVIFP) (CWPP 2019, Table 5-1, p. 103).

[11] The S-Class (departure) analysis contains a different total acreage amount in comparison to the Treatment Area total acreage amount due to the coverage of S-Class raster data, which removes major linear, non-vegetated features such as streams and roads.

3.3.2 Methodology

For this analysis, the BLM evaluated the efficacy of the proposed actions in meeting the purpose to promote and develop fire and disturbance resistant stands in the Treatment Area.

In this analysis section, the BLM tiers to the assumptions and results from the PRMP/FEIS (Issue #2 pp. 243-252, Appendix H) to assess effects of the alternatives on the fuel profile continuity and thus the relative resistance to stand-replacement fire rating (i.e., expected fire behavior). The PRMP/FEIS found that the PRMP/FEIS would reduce the acreage in the low or moderate resistance to stand-replacement fire categories within the LSR after 50 years within the dry forest (USDI BLM 2016a, p. 249) and across the Medford District from nearly 50 percent to 30 percent of the landscape (USDI BLM 2016a, Figure 3-29, p. 246). The PRMP/FEIS also found that the majority of LSR acres and Medford District would be in the Mixed fire resistance category.

In the PRMP/FEIS, the BLM assumed that vegetation structural stage is an important component affecting resistance to stand replacing fire, and assigned forest structural stages (USDI BLM 2016a, Appendix C pp. 1203-1206) to a relative ranking of resistance to stand-replacement fire (USDI BLM 2016a, p. 243 Table 3-32), based on assumptions regarding horizontal and vertical fuel profile continuity (USDI BLM 2016a, Appendix H pp. 1320-1321). These categories range from *low* fire resistance (i.e., greater tendency for a stand-replacement) to *moderate* to *high* fire resistance (i.e., less probability of a stand-replacement). Very simply put, a crown fire or a very intense surface fire would result in stand-replacement. The PRMP/FEIS also identified a *mixed* fire resistance category, which indicates the potential to exhibit the full range of resistance categories (*low*, *moderate*, or *high*), for example, the PRMP/FEIS acknowledged that some structural stages in certain landscape locations can harbor conditions more likely to result in lowered fire severity (USDI BLM 2016a, Appendix H pp. 1320-1321). The PRMP/FEIS analysis did "…not account for the complex interaction among fuels (including vertical and horizontal composition and moisture), topography (e.g., slope, topographic position, elevation, and aspect), and weather (e.g., wind, temperature, relative humidity, fuel moisture, and drought) that influence fire behavior, resultant burn severity, and fire effects (Andrews and Rothermel 1982, Scott and Reindhardt 2001) and the specific conditions related to crown fire initiation (stand-replacement fire) and spread (Van Wagner 1977)" (USDI BLM 2016a, p. 243). The PRMP/FEIS concluded that "ultimately, fire behavior in the "mixed category" will result from several factors, including weather, fuel moisture, and topographic influences, along with the vertical and horizontal continuity of the fuel profile" (USDI BLM 2016a, Appendix H p. 1320). In short, fire behavior is a product of fuels, weather, and topography.

To provide an informative analysis of this EA Alternative effects in the "mixed" relative resistance to stand-replacing fire category, the BLM considered the vertical and horizontal continuity of the wildland fuel profile (i.e., canopy, ladder and surface fuels, and fuel heterogeneity). The BLM then compared fuel profiles among alternatives within the Nexus 2.1 crown fire model program under typical fire weather conditions (90th percentile), as assumed in the PRMP/FEIS (p. 228), and 50 percent slope (see Appendix 4 for more details).

Nexus links separate models of surface and crown fire behavior, to calculate indices of relative crown fire potential (e.g., crowning index [CI] and torching index [TI]). The BLM used a standard approach to derive a relative resistance to stand-replacement fire for Mixed relative resistance to stand-replacing fire categories, based on CI and TI. The rating was as follows: if CI is less than 20 mph, relative resistance is Low, however if TI is greater than 30 mph, relative resistance is High/Low conditional; if CI is between 20-30 mph, relative resistance is Moderate, however, if TI is greater than 30 mph relative resistance is *high*/*moderate* conditional; and if predicted CI is greater than 30 mph, relative resistance is High, unless the TI is less than 30 mph, then resistance would be *moderate*. However, if TI is greater than CI and greater than 30mph, this indicates that within-stand crown fire initiation is unlikely and these stands are categorized as *high* resistance, however the conditions may support crownfire spread from adjacent areas (i.e., independent crownfire) at the relative rating, based on CI.

In the PRMP/FEIS, the BLM assumed that non-commercial hazardous fuel reduction would contribute toward improving fire resistance (USDI BLM 2016a, p. 243), which is consistent with local Medford

District monitoring data (USDI BLM 2021a) and a growing body of literature related to proactive treatment effect on moderating fire behavior (USDI BLM 2016a, p. 228; Martinson and Omi 2013; Prichard et al. 2014), even in some cases under extreme weather (Prichard et al. 2021; Lydersen et al. 2017). In the PRMP/FEIS, the BLM acknowledged that extreme weather could compromise the effectiveness of fuel (canopy, ladder, and surface) reduction treatments and that there is a presumed low instance of wildfires intersecting fuel treatments (USDI BLM 2016a, p. 228). However, the PRMP/FEIS includes several instances of treatments that have been intersected by wildfire and resulted in moderating fire behavior and providing improved fire management opportunities (USDI BLM 2016a, p. 228, Appendix W p. 1906). Additionally, local Medford District monitoring data of surface and ladder fuel reduction (including and some canopy thinning) within conifer and non-conifer plant communities has shown treatments to be effective at reducing surface fuel loading and raising CBHs, improving resistance to stand-replacing fire (USDI BLM 2021b). These treatments have been intersected by wildfires and have been effective at altering fire behavior (Appendix 4 – Maintenance).

To analyze effects of surface and ladder fuel reduction (i.e., small diameter thinning and prescribed fire) among alternatives, the BLM considered the vertical and horizontal continuity of the ladder and surface fuel components of the wildland fuel profile and the effect on relative resistance to within-stand crown fire initiation (or likelihood of torching). The BLM used a standard approach to derive a relative resistance to stand-replacement fire rating, based on the relationship between CBH and surface fuel fire behavior fuel models (Scott and Burgan 2005) (specifically flame length) under a dry fire weather scenario (90th percentile) and 20 mph 20-foot wind speeds (Appendix 0). The rating was as follows: if predicted flame lengths would be above, or no less than 1 foot below, CBH, relative resistance is “low”; if predicted flame length is between 1 and 6 feet below CBH, relative resistance is “moderate,”; and if anticipated flame lengths are 6 feet or more below CBH, relative resistance is “high.”

For potential effects, the BLM quantified structural stage resistance to stand-replacement crown fire based on eligible acres of commercial harvest, small-diameter thinning and prescribed burning by prescriptive objective (or treatment theme) for each alternative, via GIS analytic process (Appendix 12) and considered the incremental impact of proposed actions when added to other past, present and reasonably foreseeable future actions or natural disturbance for cumulative effects.

3.3.3 Assumptions

Location of Actions

As in the PRMP/FEIS, this issue applies to dry forest (i.e. does not include Moist forest) as defined for Medford District in PRMP/FEIS Appendix C (USDI BLM 2016a, p. 1181 Table C-11) and as indicated in PRMP/FEIS (p. 1899) the classification of moist and dry forest in no way discounts the existence of low to mixed-severity fire regimes in the Medford District (USDI BLM 2016a, Table 3-29 p. 225, Appendix W p. 1899).

Actions would be implemented in stands with dense continuous canopy, ladder, and surface fuels and/or the presence of suppressed fire tolerant species, or in previously treated areas, or in areas to develop NSO habitat. The prescribed fire acres for each alternative represent the possible total implementation footprint acres. In many cases, prescribed fire will be applied on the same acreage that commercial thinning and small diameter thinning actions are implemented. Additionally, the BLM assumes that handpile burning will be conducted on many of the same acres that will be underburned. However, prescribed underburning may be applied as a stand-alone treatment. Therefore, the total prescribed fire implementation acreage is a reasonable assumption of treatment footprint. The BLM analyzed effects of proposed actions on relative stand-level resistance to replacement fire, throughout this issue, the BLM assumed that “stand” describes areas where proposed actions would occur.

For analytic purposes, the BLM represented strategic areas for wildfire containment, by using locally developed (2017 Draft) Potential Wildfire Operational Delineation (POD) boundaries (see Appendix 12) for additional details) as described by Thompson and others (2016) and Stratton (2020). The POD boundaries (linear features) were buffered by 150 feet on either side to provide a reasonable estimate of the “eligible treatment footprint” of *strategic areas* for wildfire containment. This estimated Eligible Footprint represents a reasonable analytic assumption, in that shaded fuel breaks of approximately 300 feet have been found to be effective at aiding in wildfire suppression operations (Agee et al. 2000). Project implementation will be based on operationally relevant units to facilitate the application of prescribed fire (i.e., underburning) along areas for strategic wildfire containment and may be wider or less than the 300-foot buffer along POD boundaries.

The BLM assumed short-term (<10 year) initial entry proposed actions in young plantations or in stands where prescriptions would maintain NSO nesting-roosting (and foraging in Alternative B) habitat function would consist only of handpile burning. Young stands have low CBHs, leaving them vulnerable to mortality from underburning. Layering is an important component of maintaining NSO habitat function (see Section 3.5, below; PDF#s 269 and 272), which can be compromised by underburning. In project implementation, underburning may be consistent with maintaining NSO habitat function or be applied with limited or desired mortality in a young stand or plantation.

The BLM assumed in the short-term (<10 year) underburning would occur in *strategic areas* for wildfire containment and areas within ¼ mile of Communities at Risk, (see Section 2.2 Alternative A for detailed description), unless in a plantation less than 60 years or in NSO Nesting-roosting (and foraging in Alternative B). In some instances, underburning may not be needed to meet surface and ladder fuel reduction objectives. Underburning every acre may be unattainable, due to operationally relevant unit configuration, burn windows, smoke clearance constraints, etc. For example, units less than 10 acres or units that are not bound by containment features present logistical and operational limitations for implementing prescribed underburning. The PDF#286 will contribute toward implementation of prescribed fire, as needed.

In all other areas, including non-commercial proposed actions, the BLM assumed a mix of handpile burning and underburning.

Fuel Profile

<u>Vegetation Structural Stage</u>

Non-commercial and commercial proposed thinning actions will shift forest structural stage from young stands – High Density to young stands – Low Density and thus shift resistance rating from low to moderate (USDI BLM 2016a, Table 3-32 p. 243, Appendix H pp. 1320-1321). Non-commercial surface and ladder fuel reduction would not shift mature and structurally complex forest structural stages, because proposed actions would not affect the overstory.

Commercial thinning and group selection openings actions would not shift mature and structurally-complex forest structural stages because proposed actions would not harvest the entire stand.

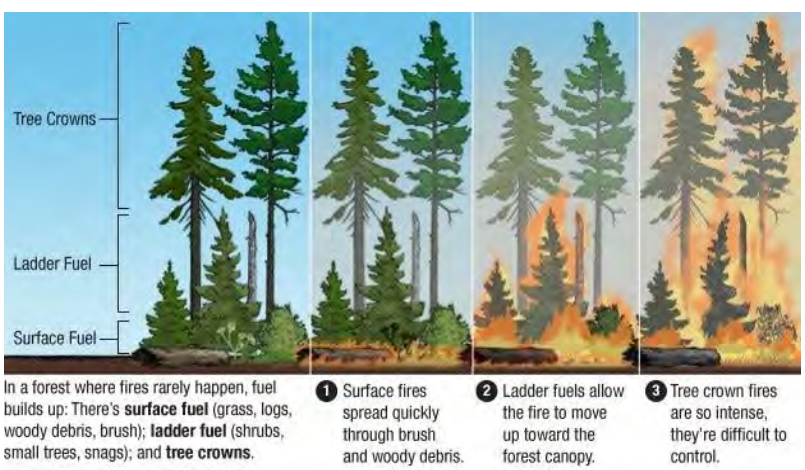


Figure 3. Forest Fuel Profile: Surface, Ladder, and Canopy Fuels. Image from the Idylwild Fire Protection District, Idylwild, California.

The BLM assumed the following metrics define continuity of the wildland fuel profile (Figure 3): canopy fuels (canopy connectivity (canopy cover and canopy bulk density) and large trees), ladder fuels (CBH), surface fuels (surface fuel models) (Scott and Burgan 2005) and fuel heterogeneity, (prescriptive heterogeneity elements) (Additional description is located in 0 Fire and Fuels Supporting Information).

For the affected environment, the BLM assumed LANDFIRE (LF) (USDI GS 2014) data represents CBH and Pacific Northwest Quantitative Wildfire Risk Assessment (PNW QWRA) (2019) surface fire behavior fuel model calibration data represents surface fuels. The BLM assumed that the No Action Alternative short-term fuel profile would be the same as the current condition.

The BLM assumed CBH and standard surface fire behavior fuel models (Scott and Burgan 2005) represent the elements of the wildland fuel profile that inform predicted fire behavior and stand level fire resistance for surface and ladder fuel reduction proposed actions (i.e., small diameter thinning and prescribed fire). The BLM assumed CBH and surface fuel models resulting from the action alternatives proposed actions (small diameter thinning and prescribed burning) would reflect outcomes indicated by local Medford District monitoring data (USDI BLM 2021b), literature, assumptions in the Rogue Basin Strategy for post-treatment fuel transitions (Metlen et al. 2017; Metlen et al 2021), and LANDFIRE post-disturbance rules, and professional local knowledge.

Canopy fuels *(Large Trees and Canopy Connectivity (Canopy Bulk Density and Canopy Cover)*
For commercial thinning and group selection actions in Mixed relative resistance to stand-replacement category, the BLM derived post-harvest canopy bulk density from estimated post-harvest canopy cover, based on prescriptive RD targets (Appendix I) using LANDFIRE lookup tables (Metlen et al. Appendix 7, Metlen et al 2021). The BLM assumed existing vegetation height in all stands to be greater than 75 feet (25 meters). The BLM applied these assumptions to the acres estimated to be in need of treatment within each action alternative commercial treatment Eligible Footprint (Appendix 12).

Ladder Fuels *(Canopy Base Height)*
In areas of only handpile burning, proposed actions would result in CBHs of approximately 8 feet on average, while areas that are underburned would be expected to have relatively high CBHs (approximately 12 feet on average). Where prescriptions would maintain NSO Nesting-roosting (and foraging in Alternative B) habitat function, CBHs would be relatively low (less than 5 feet on average). Greater vertical and horizonal discontinuity in ladder fuels improves stand resistance to replacement fire.

The RMP directs that within five years of harvest, group selection openings in LSR-dry would be stocked to at least 75 trees per acre (minimum/understocked (USDI BLM 2016a, Appendix C), via natural or artificial regeneration (USDI BLM 2016b, p. 73). To reflect this RMP management direction, the BLM incorporated post-harvest tree planting into the vegetation modeling and thus post-harvest structural stages (USDI BLM 2016a, Appendix C), thus the PRMP/FEIS analysis of structural stage resistance to stand-replacement fire accounts for presumed post-harvest replanting.

Surface Fuels (Fire Behavior Fuel Model)
Following handpile burning, *moderate* to *very high* load surface fuels would shift to *moderate* load surface fuels in the short-term, (up to 10-years). Following underburning, *moderate* to *very high* load surface fuels would shift to *low* load surface fuels in the short-term (up to 10-years). Low surface fuel loading results in lower flame lengths than *very high* load surface fuels (see Figure 12 and Figure 13 in Appendix 5) and reduces the probability of flames traveling into ladder fuels and canopy fuels (VanWagner 1977), thus increasing stand-resistance to crown fire.

The BLM assumed a range of short–term (<10-years) to moderate (<50 years) surface fuel models resulting from proposed actions. Based on examination of FIREMON plot data, the BLM assumed a mix of *low* to *moderate* grass-shrub and hardwood litter surface fuel models in stands with <40 percent canopy cover; and a mix of *low* to *moderate* timber understory and timber litter surface fuel models in stands with >40 percent canopy cover.

Activity Fuel Treatments:

Common to all action alternatives, the BLM would conduct an assessment to determine the need for treatment of residual activity fuels generated from commercial thinning (see Section ALL-4). As needed, activity fuels would be treated (e.g., lop and scatter, prescribed fire, removal, or via pyrolysis) to result in expected flame lengths less than 4 feet under typical fire weather conditions within 1-2 years, thus any increase in surface fuel loading would be temporary (1-2 years).

The effects of the temporary increase (1-2 years) in risk from residual activity fuels are within the scope of those effects analyzed for in the PRMP/FEIS (USDI BLM 2016a, pp. 260 and 263, Figure 3-380). That analysis, which is incorporated here by reference, concluded that immediately following commercial harvest, residual activity fuels left on the forest floor (e.g., tree tops and limbs) would increase surface fuel loadings and have the potential to increase surface fire behavior and pose a risk to the residual stand and other human values (i.e. WDAs), if not adequately treated (USDI BLM 2016a, p. 269; Martinson and Omi 2013; Weatherspoon and Skinner 1995; Fule et al. 2001).

Fuel Heterogeneity

Patchy stand composition in vegetation or fuel patterns representative of frequent-fire dry forest low-mixed fire regime fuel loading contributes toward stand resistance to replacement fire (USDI BLM 2016a, pp. 225-226) by disrupting fuel profiles which may inhibit the spread of crown fires, creating variability in litter fall and surface fuel accumulations, and promoting regeneration of diverse species to respond to disturbance (e.g., wildfire, drought and insects). The BLM assumed dry forest stand reconstruction reference sites in low-mixed severity fire regimes provide a guide for vegetation patterning representative of these fire regimes, where gap sizes were historically less than 2 acres and generally less than 1 acre.

Maintenance

Maintenance would not be needed in the short-term (up to 10-years after initial treatments). In treated areas *high* to *moderate* stand-level fire resistance would be maintained if intersected by wildfire for up to 30 years after treatment.

Resistance to Other Disturbance

Consistent with the PRMP/FEIS, to which this issue tiers, the BLM assumes that relative stand-level fire resistance ratings would also apply to stand-level resistance to drought and insect disturbance, as increased fire resistance often also increases resistance to drought and insects (USDI BLM 2016a, p. 201). The combined effects of reducing stand density and reintroducing fire in drought-prone and fire-prone regions, can increase water availability and tree growth and vigor (Halofsky et. al 2016; Hood et. al 2017), allowing individual trees to better withstand drought and insect attacks (Hood et. al 2015) (see Appendices 4 and 5 for additional detail).

3.3.4 Measurement Indicator

The BLM used the proportion of the "Treatment Area" acres in relative resistance to stand replacement fire category as a measurement indicator to assess environmental effect by alternative. This rating is based on likely fire behavior, given the structural stage (i.e., fuel continuity) (see Methods and Assumptions sections, above). The BLM also analyzed change in average stand diameter and small-scale heterogeneity consistent with fuel loadings and arrangements associated with frequent fire, dry forest low and mixed severity fire regimes.

3.3.5 Affected Environment

The general current condition of vegetation illustrates the current abundance of canopy, ladder, and surface fuels and compromised heterogeneity departed from historic frequent-fire conditions in forested and non-conifer plant communities and recent wildfire severity (Appendix 3).

Within the Treatment Area, 47 percent of the acreage has greater than 60 percent canopy cover and large fire-resistant trees are at risk or lacking (USDI BLM 2016a, p. 226), for example, late seral conditions only comprise approximately 14 percent of the Treatment Area. The current CBH is less than five feet across approximately 80 percent of the Treatment Area. The majority (55 percent) of the area is best represented by *very high* load forested surface fuel models, while *moderate* load forest surface fuel models represent 16 percent of the area and *moderate* load grass-shrub fuel models represent 16 percent (see Appendix 5 for additional detail).

Additionally, the Medford District has implemented several thousands of acres of hazardous surface and ladder fuel reduction treatments (handpile burning and underburning) in the recent past (Appendix 3, Figure 8, Table 36) and many of these areas are in need of follow-up maintenance actions.

3.3.6 Environmental Effects

Direct and indirect effects are discussed at short-term, up to 10-years after initial entry treatments (i.e., handpile burn or underburn), and moderate-term (50 years after prescribed fire) time frames at the stand scale.

No Action Alternative

Direct and Indirect Effects (stand-resistance rating, fuel heterogeneity, and large trees). The No Action Alternative would have no short-term direct effects to current stand level fire resistance, which would remain low for 65 percent of the area and moderate across 32 percent. A portion (26 percent) of the area would support crown fire from adjacent stands, but initiation of crown fire within the stand would be unlikely. Current fire resistance would persist because the activities comprising the proposed action would not be implemented and would not alter the vertical and horizontal fuel profile continuity (i.e., surface, ladder, or canopy fuels or heterogeneity). The lack of small-scale patchiness (or heterogeneity) would persist as described in Appendix 3.4. The average stand diameter (QMD) would range from 8-15 inches in the short-term.

Table 6. No Action Alternative Short-Term Relative Resistance to Stand Replacement Fire Ratings and Percentage Distribution Across the Treatment Area.

Timeframe	Estimated Canopy Cover (%) (Wind Adjustment Factor)	Fire Behavior Model Inputs			Fire Behavior Model Outputs		Relative Resistance Rating	Alternative Eligible Footprint Percentage of Treatment Area (Acres)
		Canopy Bulk Density (kg/m3)	Canopy Base Height (feet)	Surface Fuel Model	Crowning Index (mph)	Torching Index (mph)		
Short-Term	> 60 (0.1)	0.12	<5	TU5	19.9	0	Low	55% (376K)
	50-60 (0.1)	0.09	<8	TL8	25.5	>50*	High *(Moderate ind.)**	16% (109K)
	>60 (0.1)	0.12	<5		19.9	36.8	High *(Low ind.)**	10% (68K)
	40-50 (0.15)	0.06	<5	GS2	33.1	0	Moderate	16% (109K)

*Indicates that within-stand crown fire initiation is unlikely (i.e., TI>CI) and are categorized as HIGH resistance, however the conditions may support crownfire spread from adjacent areas (i.e., independent crown fire) at the indicated relative rating as conditional.

Per the following relationship between CI and TI: CI <20 mph = Low; CI 20-30 mph = Moderate; CI >30 mph = High, unless TI<30 mph, then = Moderate. Fire behavior was modeled under 90th percentile fire weather, with 15 mph 20-foot wind speeds and 50% slope. (See Appendix 5 for additional information).

In the Treatment Area for small-diameter and prescribed fire only proposed actions, the same *very high*, *high*, and *moderate* loading surface fuel models would represent the area, as discussed above and all acres would have a CBH of less than 5 feet. The short-term relative fire resistance would be low for 80 percent of the area and moderate for 20 percent (Table 7).

Table 7. Short-Term Relative Resistance to "Stand-Replacement" Fire Ratings in Mature and Structurally Complex Structural Stages and Non-Conifer Plant Communities and Approximate Percentage and Acreage Distribution in Treatment Area for Non-Commercial Fuels, Given a Dry Fuel Moisture Scenario (90th percentile fire weather) and 20 mph 20-foot Wind Speeds and no Slope.

Timeframe	CBH (feet)	FBFM	FL (feet)	Relative Stand-level Fire Resistance Rating	Alternative Eligible Footprint Percentage of Treatment Area (Acres)
Short-Term	<8	GS2	3.5	Low	20% (137K)
	<5	TU5	6	Low	60% (410K)
	<5	TL8	2	Moderate	20% (137K)

CBH – canopy base height; FBFM – Fire Behavior Fuel Model (code – Appendix 5); FL- flame length. IF CBH< FL; OR IF CBH>FL and CBH-FL ≤ 1 foot = Low; IF CBH is > FL and CBH - FL IS < 6 feet = Moderate; IF CBH is > FL and CBH - FL IS > 6 feet.

Canopy, ladder and surface fuels would continue to increase in both conifer and non-conifer plant communities, thus increasing the potential for crown fire initiation and the potential for uncharacteristically large areas of high severity fire effects (or stand replacing crown fire) in the event of a wildfire.

In 50 years, areas of low relative resistance to stand replacement fire would remain low, this would represent 80 percent of the small-diameter Treatment Area and 55 percent of the commercial Treatment Area. The remaining acreage would be in the Mixed resistance category, which can exhibit the range of Low to Moderate to High relative resistance to replacement fire, depending on cumulative effects of vegetation re-growth, wildfire interactions, and other actions implemented under the SWO ROD/RMP are outside the scope of this EA. The average stand diameter (QMD) would continue to increase in the moderate term to 13-20 inches (Appendix 5).

Cumulative Effects

Based on climate and wildfire trends discussed in Appendix 3, wildfire and drought will continue to challenge the persistence of forested stands in southwestern Oregon. Heterogeneity representative of low-mixed severity fire regimes and fire resistant species will continue to decline, and vegetation will continue to accumulate and die, increasing fuel loading and threatening the persistence of large fire-resistant trees; these aspects, coupled with expected climatological changes, such as increased background tree mortality, due to longer periods of hot drought (USDI BLM 2016a, p. 185), increase the likelihood for larger proportions of high severity fire (Mote et al. 2019) and reduced stand resistance to replacement fire.

Under the No Action Alternative, high fire resistance would not be created by proposed actions, so there would be nothing to maintain, and intersection by wildfire would likely not provide beneficial maintenance. There would be no maintenance of previous treatments, unless if burned by wildfire or conducted as part of a different vegetation management project (e.g., commercial and non-merchantable actions, including prescribed fire).

Direct and Indirect Short-Term (10-years) Effects Common to All Action Alternatives

Natural Hazardous Surface and Ladder Fuel Reduction

Among all action alternatives, the combined direct effects to the fuel profile continuity (surface and ladder fuels) resulting from small-diameter thinning and prescribed fire proposed actions would improve resistance to stand-replacement fire in dry forest and non-conifer plant communities in treated areas, compared to the No Action Alternative in the short-term (Table 7). In the short-term, nearly all proposed actions would result in high relative fire resistance, where implemented (Table 8). Treatments would shift fuel loading to a *low* loading grass-shrub (GS1), hardwood (TL2) or conifer (TL3), and timber understory (TU1) surface fuel models. Average short-term CBH would be raised to approximately to 8 feet after handpile burning and 12 feet after underburning. However, proposed actions would result in moderate stand-level resistance in 1 percent of the Treatment Area under Alternative A, 11 percent of the Treatment Area under Alternative B, and 4 percent under Alternative C, where prescriptions would maintain NSO nesting-roosting (and foraging in Alternative B) habitat function, including low CBHs of less than 5 feet and a coarse woody debris surface fuel component.

Table 8. Small-Diameter and Prescribed Fire Only Short-Term Resistance to Stand-Replacement Fire Structure Ratings in Mature and Structurally Complex Structural Stages and Non-Conifer Plant Communities, Given a Dry Fuel Moisture Scenario (90th Percentile Fire Weather) and 20 mph 20-foot Wind Speeds and no Slope.

Action Alternatives – Short-Term (<10-years)				Alternative A	Alternative B	Alternative C
CBH (feet)	FBFM	FL (feet)	Relative Stand-level Fire Resistance Rating	Alternative Eligible Footprint Percentage of Treatment Area (Acres)		
8	GS1	2.5	High	1.5% (10K)	6% (44K)	7% (46K)
12				1.5% (10K)	6% (44K)	7% (46K)
<5	TU2	2	Moderate	1% (8K)	11% (77K)	4% (30K)
8	TL3/TL2 /TU1	1	High	6% (40K)	25% (174K)	28% (187K)
12				6% (40K)	25% (174K)	28% (187K)
Plantations less than 60 years old			Moderate	19% (130K)	19% (130K)	19% (130K)

CBH – canopy base height; FBFM – Fire Behavior Fuel Model (code – Appendix 5); FL- flame length. Relative stand-level fire resistance rating: IF CBH< FL; OR IF CBH>FL and CBH-FL ≤ 1 foot = LOW; IF CBH is > FL and CBH – FL IS < 6 feet = MODERATE; IF CBH is > FL and CBH – FL IS > 6 feet).

Stand Level Fire Resistance Rating and Representatives Approximate Percentage of Treatment Area by Alternative, *if* Treated Under Proposed Action Implementation Acres.

The alternatives vary in the amount of small diameter thinning and prescribed fire implementation acres under each alternative (Table 9).

Table 9. Approximate Treatment Acreage and Maximum 10-year Footprint (Acres) of Prescribed Fire Proposed Actions by Action Alternative (see Assumptions Section 3.3.3).

Scope of Proposed Actions	Alternative A	Alternative B	Alternative C
Treatment Area (acres)	684,000		
Maximum 10-year implementation acres	17,000	30,000	70,000
Proportion of Treatment Area	2%	4%	10%

Combined Commercial Actions and Natural Hazardous Surface and Ladder Fuel Reduction
Non-commercial and commercial proposed thinning actions will shift structural stage from young stands – *high* density to young stands – *low* density and thus shift resistance rating from low to moderate (USDI BLM 2016a, Table 3-32 p. 243, Appendix H pp. 1320-1321) in the short-term. Further effects to surface and ladder fuels were not considered. The amount of plantation acreage available for proposed actions is common to all alternatives (130,000 acres) and represents 19 percent of the Treatment Area (Table 8)

The combined direct effects to the fuel profile continuity (surface, ladder, and canopy fuels) resulting from commercial and non-commercial thinning and prescribed fire proposed actions were used to refine the mixed relative resistance to stand-replacement fire rating category (USDI BLM 2016a, Table 3-32 p. 243 and Appendix H pp. 1320-1321). Under all action alternatives, the proposed commercial thinning actions would reduce canopy fuels (i.e., canopy bulk density and canopy connectivity). The reduction of canopy fuels (i.e., canopy bulk density and canopy connectivity) would decrease the likelihood of tree-to-tree crown fire spread under typical fire weather indices (Scott and Reinhardt 2001), over a greater proportion of the Treatment Area than the No Action Alternative. Thinning will also increase stand diameter discussed in this section and (Appendix 4), thus improving resistance to stand-replacing fire, as thinned stands with remaining large trees have been shown to have less severe fire effects when intersected by wildfires (USDI BLM 2016a, p. 228; Martinson and Omi 2013, Lydersen et al. 2014) (see Appendix 4 and 5 for more details).

The alternatives vary in the amount of commercial thinning, small diameter thinning and prescribed fire proposed actions and eligible treatment footprint, under each alternative (Table 2). Proposed actions would modify resistance to stand-replacement fire, through the reduction of surface, ladder, and canopy fuels. Proposed actions in mature or structurally-complex structural stages would result in the following short-term refinements to the mixed relative resistance to stand-replacement fire rating among action alternatives.

Table 10. **Combined Commercial, Small-Diameter, and Prescribed Fire Short-Term Effects on Relative Resistance to Stand-Replacement Fire Categories by Action Alternative Eligible Footprint and Representative Approximate Percentage of Treatment Area.**

Treatment Theme (RDI Target Range)	**Fire Behavior Model Inputs**				**Fire Behavior Model Outputs**		**Relative Resistance Rating**	**Eligible footprint percentage of Treatment Area (Acres)**
	Canopy Cover (%) (wind adj.)	**Canopy Bulk Density (kg/m3)**	**Canopy Base Height (feet)**	**Surface Fuel Model**	**Crowning Index (mph)**	**Torching Index (mph)**		
Alternative A (Implementation Acres 17,000 (2.5% of Treatment Area)								
Strategic Areas & 1/4 mile of CAR (0.35-0.4)	40-50 (0.15)	0.06	12(8)	GS1/ TL6	33.1	38/>50*	High	2% (13K)
Alternative B (Implementation Acres 20,000 – 2.9% of IVM Treatment Area)								
NSO Dispersal-Only Habitat, Capable and Non-Habitat (0.35-0.45)	40-50 (0.15)	0.06	8	TU1/ TL6	33.1	>50*	High	3% (17K)
NSO NRF (0.45)	>60 (0.1)	0.12	<5	TU2	19.9	>28.3	Moderate *(Low ind.)**	2% (10K)
Jeffery Pine and Oak - open (0.2-0.35)	30-40 (0.15)	0.05	8	GS1/ TL6	38.2	38/>100*	High	0.05% (367)
Alternative C (Implementation Acres 20,000 – 2.9% of Treatment Area)								
Near-Term NSO (0.45)	>60 (0.1)	0.12	<5	TU2	19.9	>28.3	Moderate *(Low ind.)**	2% (12K)
Ecosystem Resilience - CLOSED (0.4-0.45)	50-60 (0.1)	0.09	8	TU1/ TL3	25.5	>100*	High *(Moderate ind.)**	0.2% (1K)
Long-Term NSO (≥0.3)	>40 (0.15)		8	TU1/ TL3	33.1	>100*	High	5% (32K)
Fuels Emphasis (1/4 mile of CAR) (0.35-0.4)	40-50 (0.15)	0.06	12(8)	GS1/ TL6	33.1	38/>50*	High	1% (6K)
Ecosystem Resilience - INTERMEDIATE/ Riparian (0.3-0.4)	40-50 (0.15)		8	TU1/ TL3	33.1	>100*	High	7% (49K)

Treatment Theme (RDI Target Range)	Fire Behavior Model Inputs				Fire Behavior Model Outputs		Relative Resistance Rating	Eligible footprint percentage of Treatment Area (Acres)
	Canopy Cover (%) (wind adj.)	Canopy Bulk Density (kg/m3)	Canopy Base Height (feet)	Surface Fuel Model	Crowning Index (mph)	Torching Index (mph)		
Ecosystem Resilience - OPEN (0.2-0.3)	30-40 (0.15)	0.05	8	GS1/ TL6	38.2	38/>100*	High	5% (31K)

If treated under proposed action implementation acres. Rating is based on CI and TI: CI <20 mph = *low*, unless TI> 20 mph, then = Moderate; CI 20-30 mph = *moderate*; CI >30 mph = *high*, unless TI<30 mph, then = Moderate. *Indicates that within-stand crown fire initiation is unlikely (i.e., TI>CI) and are categorized as HIGH relative resistance, however the conditions support crown fire spread from adjacent areas (i.e., conditional crown fire) at the indicated conditional relative rating based on CI.

Alternative A

Direct and Indirect Effects (stand-resistance rating, fuel heterogeneity, and large trees)
Implementation acres over 10-years would represent 2.5 percent of the Treatment Area. In *strategic areas* for wildfire containment *(Alternative A)* and areas within ¼ mile of Communities at Risk (Alternatives A and C), the combined direct effects of proposed actions to reduce surface fuels (low loading) and ladder fuels (high CBHs) and canopy fuels (moderate canopy cover) would result in High relative resistance to stand replacement fire category across all implemented acres on 2 percent of the Treatment Area (Table 10). The average stand diameter (QMD) would be 16 inches, which is slightly larger than the No Action Alternative (Appendix 4).

Fuel Heterogeneity and Climate
While legacy tree culturing and prescribed fire (Martin and DeJuilio 2009) would introduce heterogeneity into uniform stands on a micro scale, there are no other prescriptive actions that would create patchy stand composition in vegetation or fuel patterns. Thus, actions would minimally contribute to moving vegetation patterns toward a patchier configuration representative of frequent-fire dry forest low-mixed fire regime fuel loading associated with fire-resistant vegetation patterns (USDI BLM 2016a, pp. 225-226).

Alternative B

Direct and Indirect Effects (stand-resistance rating, fuel heterogeneity, and large trees)
Implementation acres over 10-years would represent 2.9 percent of the Treatment Area. In NSO nesting-roosting and foraging (NRF), habitat function would be maintained and while surface fuels and ladder fuels would be reduced and ameliorate within-stand torching and result in short-term *moderate* stand-level resistance for proposed actions implemented on 2 percent of the Treatment Area, relatively high canopy cover (canopy bulk density), would provide fuel connectivity for fire to spread in canopy fuels advancing from adjacent stands (Table 10). For proposed actions implemented on 3 percent of the Treatment Area, resistance to stand-replacement fire would be High. Large trees will be retained, and thinning will increase average stand diameter (QMD) to 10-16 inches in the short-term, which is slightly larger than the No Action Alternative (Appendix 4).

Fuel Heterogeneity and Climate
The proposed action would create small openings (up to 1 acre), leave skips and apply prescribed fire (Martin and DeJuilio 2009) to introduce heterogeneity in uniform stands and create patchy stand composition. This small-scale heterogeneity would start to move vegetation patterns, species composition, and fuel loadings and arrangements toward conditions associated with frequent fire, dry forest low and

mixed severity fire regimes (USDI BLM 2016a, pp. 225-226; Churchill et al. 2013; Hesburg et al. 2015) as discussed in Appendix 5 and similar to Alternative C.

Alternative C

Direct and Indirect Effects (stand-resistance rating, fuel heterogeneity, and large trees)
Implementation acres over 10-years would represent 2.9 percent of the Treatment Area. The combined direct effects of proposed actions to reduce surface fuels (low-moderate loading) ladder fuels (high CBHs) and canopy fuels would result in High relative resistance to stand replacement fire category for proposed actions implemented across approximately 18 percent of the Treatment Area. A portion (0.2 percent) of these *high* resistance acres would retain relatively high canopy cover (canopy bulk density), providing fuel connectivity and remain moderately susceptible to fire to spreading in canopy fuels advancing from adjacent stands (Table 10). Similar to Alternative B, in NSO NR, habitat function would be maintained and while surface fuels and ladder fuels would be reduced and ameliorate within-stand torching and result in short-term *moderate* stand-level resistance for proposed actions implemented on 2 percent of the Treatment Area, relatively high canopy cover (canopy bulk density), would provide fuel connectivity and result in relatively low resistance to fire spreading in canopy fuels advancing from adjacent stands (Table 10). Large trees will be retained, and thinning will increase diameter growth to an average stand diameter (QMD) of 15-22 inches in the short-term, which is moderately larger than other alternatives (Appendix 4).

Fuel Heterogeneity and Climate
The proposed action would have larger variable sized openings (or gaps) typically 2 acres or less. Gaps up to 4 acres could occur in limited conditions in up to 25 percent of a stand and would retain scattered overstory trees (pp. 104-105). These variable sized gaps would introduce heterogeneity reflective of fuel loadings and arrangements comparable to low and mixed severity fire regimes, (USDI BLM 2016a, pp. 225-226; Churchill et al. 2013; Hesburg et al. 2015), where gaps were variable in size, typically less than 2 acres and most were less than 1 acre (Appendix 5).

The sheltering effect vegetation has on surface wind speeds is well established in predictive fire behavior modeling (Albini and Baughmann 1979; NWCG 2021) and has been incorporated in the weather inputs in analysis of this issue based on projected post-harvest canopy cover (Appendix 5). Thus, thinning and group selection openings may indirectly increase surface wind gusts. Bigelow and North (2012) found evidence of this, observing moderate increases in average wind gusts in thinned stands (up to 1.5 mph) and greater increases in openings (up to 5.6 mph in openings of 2 acres). Increased surface wind speeds could contribute toward increased surface fire behavior.

An increase in variable sized openings would promote species diversity and growing space for fire adapted species, such as pine and oak. Grulke and others (2020) observed a greater improvement in ponderosa pine vigor two years following a patchy harvest prescription over an even harvest prescription, even amidst a drought period.

The area in un-thinned skips, would contribute toward heterogeneity through retention of continuous canopy fuels, low CBHs, and existing surface fuel loading. These skips would result in lower relative resistance to group torching of trees during a wildland fire or a prescribed fire. However, these untreated areas, either burned or unburned, will contribute toward heterogeneous vegetative patterns at the stand scale.

Proposed actions to create openings, leave untreated skips, and apply prescribed fire (Martin and DeJuilio 2009) will introduce heterogeneity in uniform stands, promote a disruption of horizontal fuel connectivity and alter patterns of litter fall and surface fuel accumulation. Increased spatial heterogeneity will contribute toward disrupting vertical and horizontal fuel continuity, alter potential fire behavior (Finney 2001; Fule et al. 2001), improve stand-level fire resistance and the ability to respond to other disturbances and climatic influences (Jain et al. 2012). Additionally, the prescriptions in Alternative C, which are varied by moist and dry forest types, tree species, and abiotic factors (such slope and aspect), could promote species diversity and provide multiple pathways for individual species to adapt to future disturbance or changing climate.

Where Alternatives A and B only include treatments in chaparral in *strategic areas*, which would maintain *low*-load surface fuel profiles, Alternative C would expand treatments in chaparral beyond *strategic areas*. This would allow for treatments designed to reduce fuel continuity and surface fuel loading, particularly adjacent to large old oak trees and within special status species habitat, while attempting to balance ecological considerations of variable sized vegetation patterning indicative of a functioning ecosystem (Stephens and Gillespie2016; Duren et al. 2012) and promoting diverse native understory vegetation.

Moderate-Term

In 50 years, all treated stands would shift to Mixed relative resistance stand-replacement fire, which can exhibit the range of Low to Moderate to High relative resistance to replacement fire, depending on cumulative effects of vegetation re-growth, wildfire interactions, and maintenance actions implemented under other projects. Additionally, among action alternatives, in proposed commercial actions, stand average tree diameter (QMD) would continue to increase, thus improving resistance to stand-replacing fire. Average stand diameter would continue to increase among all action alternatives, under Alternative A, it would be 19 inches, and 17-21 inches under Alternative B, both would be slightly larger than the No Action Alternative. Under Alternative C, average stand diameter (19-26 inches) would continue to be moderately greater than all action alternatives (Appendix 4).

Cumulative Effects at the Stand-Level

The potential cumulative effects would be a result of the proposed actions, combined with reasonably foreseeable actions at the stand-level and recent and future trends of wildfire and fire suppression efforts.

Direct and indirect short-term effects have considered the incremental cumulative effect of prior stand condition, combined with commercial thinning, small diameter thinning and prescribed burning (handpile burning or underburning). There would be no additional short-term cumulative effects at the stand scale, unless intersected by a wildfire, which would provide fuel maintenance and re-set conditions to short-term effects.

Without frequent maintenance disturbance, understory fuels would re-grow (including natural or artificial regeneration), vegetation would also die, and surface and ladder fuels would re-accumulate. As part of its standard, ongoing silvicultural program practices, the BLM will monitor and evaluate natural regeneration in treated stands to ensure stocking rates meet RMP direction and plant trees as appropriate (see assumptions). This accumulation of fuel would contribute toward reducing stand-level fire resistance over time and require frequent low-moderate intensity disturbance to maintain *low-moderate* loading surface fuel profiles, remove regrowth of ladder fuels, and raise CBH.

Vegetation growth is dependent on a variety of factors including variables such as, but not limited to, available sunlight and moisture, which can be influenced by large climatic patterns, and soil nutrient and structure (Wayman and North 2007). Most treated areas would require maintenance every 10 to 30 years to maintain *low-moderate* load surface fuel profiles and raised CBHs. This maintenance timeframe is consistent with estimates of local historic fire-intervals (Appendix 3). Metlen and others (2018) found 90 percent of historic fire return intervals to be between 3 and 30 years, with median return intervals of 8 years. In areas thinned to open canopy conditions, regeneration of a diverse understory (Wayman and North 2007) could contribute toward more rapid live fuel loading accumulation or shift fuel models from *moderate* timber litter to *moderate* timber understory or grass-shrub in the moderate-term (10-50 years) (local BLM monitoring data, Agee et al. 2000) (Appendix 5). While higher levels of overstory cover, are associated with increased potential for independent crown fire, the additional cover may restrict or delay understory regeneration and allow more time between maintenance treatments (Agee et al. 2000). Local FIREMON plot data is consistent with this, indicating that areas with less than 40 percent canopy cover often have a greater understory regrowth response (see Appendix 5 – Maintenance for additional details). Maintenance actions, such as low intensity prescribed underburning, or thinning and handpile burning, if enough time has passed, would contribute toward maintaining high stand-level fire resistance and return stand-resistance to short-term conditions. As each stage is completed, the stand's resistance to fire would increase and reflect short-term effects.

Based on climate and wildfire trends discussed in Appendix 3, wildfire and drought will continue to challenge the persistence of forests in southwestern Oregon. However, proactive treatments designed to moderate fire behavior, so that a wildfire can burn through a stand without detrimental consequences can help minimize uncharacteristic high severity fire. Thus, low intensity wildfires can also provide maintenance of treated areas. In recent years, nearly 4,000 acres of hazardous surface and ladder fuel reduction treatments (some commercial thinning) on Medford District lands have been intersected by wildfire. For many of these treated areas (65 percent), the results have been similar to outcomes desired from prescribed underburning, resulting in low-moderate severity fire effects and surface fuel loading (Appendix 5). Plantations are included in the Eligible Footprint of all three action alternatives and the acreage is common to all, accounting for 19 percent of the Treatment Area. The expected maintenance treatment in plantations would be thinning and handpile burning. Maintenance treatments would be needed every 20-30 years after "initial entry" treatments, in order to maintain moderate resistance to stand-replacement fire, averaging 1.5 maintenance entries over 50 years (Table 11). Among all action alternatives, maintenance entries would be needed every 10-20 years after "initial entry" treatments, in order to maintain high resistance to replacement fire in small-diameter and prescribed fire only proposed actions, averaging 3 entries in 50 years (Table 11) again the alternatives differ in implementation acres (Table 9).

Proposed actions implemented in Alternative A would primarily be used as places to contain wildfires, although the stand-level resistance may be maintained to some extent if intersected by wildfire. The limited linear design of treatments may complicate future maintenance and underburning opportunities, as linear boundaries do not necessarily follow operationally relevant landscape features, such as ridgelines or sub-ridges, etc., challenging sustained maintenance of stand-level resistance. The higher post-treatment cover, combined with the objective to maintain low-load fuel profiles would result in a need for moderately frequent maintenance, with approximately 2 entries over the moderate-term for commercial actions implemented under Alternative A, representing 2 percent of the Treatment Area (Table 11). Implementation of all commercial actions under Alternative A, would result in no small-diameter and prescribed fire only treated acres to maintain, as the commercial actions would also be followed by small-diameter and prescribed fire actions on those same acres.

Under Alternative B, proposed actions high to moderate stand-level resistance would be maintained if intersected by wildfire. For proposed actions in NSO habitat, maintenance would be needed every 20-30 years after "initial entry" treatments, in order to maintain moderate resistance to stand-replacement fire, averaging 1.5 maintenance entries over 50 years for 3 percent of the Treatment Area (Table 11). Proposed actions implemented on a very small percentage (0.05 percent) of the Treatment Area would require more frequent maintenance, averaging 4 entries over 50 years to maintain high stand-level resistance to wildfire under open canopy conditions. Implementation of all commercial actions under Alternative B, would result in an additional 10,000 acres of small-diameter and prescribed fire only treatments to maintain. Alternative C includes the most acres of proposed actions, which would result in the greatest amount of maintenance need, simply due to total treatment acreage. The larger acreage in Alternative C would also provide more opportunities to implement maintenance on previously treated acres, as the larger acreage would result larger areas of high relative stand-level resistance to wildfire available to be maintained by prescribed fire or wildfire, compared with the other action alternatives. Under Alternative C, proposed actions implemented on approximately 14 percent of the Treatment Area would need maintenance every 20-30 years after "initial entry" treatments, in order to maintain moderate resistance to stand-replacement fire, averaging 1.5 maintenance entries over 50 years. Proposed actions implemented on a small percentage (5 percent) of the Treatment Area would require more frequent maintenance, averaging 4 entries over 50 years to maintain high stand-level resistance to wildfire under open canopy conditions. Similar to Alternative A, in "fuels emphasis areas" the higher post-treatment cover, combined with the objective to maintain low-load fuel profiles would result in a need for approximately 2 entries over the moderate-term for commercial actions implemented on approximately 1 percent of the Treatment Area (Table 11). Implementation of Alternative C would result in the same amount of commercial harvest as Alternative B and an additional 50,000 acres of small-diameter and prescribed fire only treatments to maintain (Table 2).

Ultimately, maintenance of high to moderate stand-level fire resistance in the frequent-fire adapted dry forest, hinges on frequent low-moderate intensity disturbance.

Table 11. A Side-by-Side Comparison of Estimated Maintenance Entries Needed Over 50 years by Action Alternative on Total Eligible Footprint Acres by Alternative, for Incremental Cumulative Effects of Foreseeable Actions Needed to Maintain High to Moderate Stand-Level Resistance on Proposed Action Implementation Acres.

Action Alternative	Estimated Canopy Cover (%)	Maintenance Frequency (Average Number of Entries Over 50 Years)	Percentage of IVM Eligible Treatment Acreage	Acres (approximate)
Common to all				
Young Moderate - Density Stands	N/A	20-30 years (1.5)	19%	130,000
Alternative A (Implementation Acres: 17,000 Commercial Actions and 17,000 Prescribed Fire)				
Strategic Areas & 1/4 mile of CAR (0.35-0.4)	40-50	10-20 years (2)	2%	13K
Surface and Ladder Fuels	N/A	10-20 years (3)	16%	107K
Alternative B (Implementation Acres: 20,000 Commercial Actions and 30,000 Prescribed Fire)				
Maintain NSO Dispersal-Only Habitat (0.35-0.45)	40-50	20-30 years (1.5)	3%	17K
Maintain Spotted Owl Nesting-Roosting and Foraging Habitat (0.45)	>60		2	10K
Jeffery Pine and Oak - Open (0.2-0.35)	30-40	10-20 years (4)	0.05%	367
Surface and Ladder Fuels	N/A	10-20 years (3)	75%	513K
Alternative C (Implementation Acres: 20,000 Commercial Actions and 70,000 Prescribed Fire)				
Near-Term Spotted Owl (0.45)	>60	20-30 years (1.5)	2%	12K
Ecosystem Resilience - CLOSED (0.4-0.45)	50-60		0.2%	1K
Long-Term NSO (≥0.3)	>40		5%	32K
Ecosystem Resilience - INTERMEDIATE (0.3-0.4)	40-50		7%	49K
Fuels Emphasis (1/4 mile of CAR) (0.35-0.4)	40-50	10-20 years (2)	1%	6K
Ecosystem Resilience - OPEN (0.2-0.3)	30-40	10-20 years (4)	5%	32K
Surface and Ladder Fuels	N/A	10-20 years (3)	73%	500K

3.4 How will Proposed Actions Effect Short and Long-Term Wildfire Risk to Forests and HVRAs, Namely Communities, or Contribute Toward Safe and Effective Wildfire Response?

3.4.1 Background

Wildland fire risk describes the likelihood of wildfire, intensity of wildfire (aka hazard), and susceptibility of human values (e.g., communities, homes, infrastructure, resources, etc.) to adverse wildfire effects (see Appendix 5.1 for additional details).

3.4.2 Methodology

For this analysis, the BLM evaluated how alternatives contribute toward the purpose to promote and develop safe and effective wildfire response and reduce wildland fire risk to (HVRAs. There are two general strategies for treatments intended to modify landscape-level fire growth and behavior, and thus reduce landscape wildfire risk: 1) linear fuel breaks intended to aid in fire containment and limit fire size or acres burned (Agee et al. 2000, Weatherspoon 1996); and 2) area-based treatments that modify fire behavior (Finney 2001). *In either scenario, proactive treatments will not eliminate fire from the landscape.*

To assess the alternatives' anticipated performance related to these two strategies, the BLM quantified, by alternative, the proportion of maximum 10-year implementation acres relative to: 1) the "linear feature" fuel break footprint; and 2) the area-based footprint. The BLM quantified the treatment footprints for each Alternative, via the analytic process described in Appendix 12.

This analysis tiers to the PRMP/FEIS analysis of the effects of the temporary increase in risk from residual activity fuels, the effects of relative stand-level fire hazard within close proximity to Wildland Development Areas (WDA) (USDI BLM 2016a, pp. 253-264). These issues both considered elements of wildfire risk: intensity and susceptibility, and likelihood, in the case of effects from activity fuels. That analysis, which is incorporated here by reference, concluded that immediately following commercial harvest, residual activity fuels left on the forest floor (e.g., tree tops and limbs) would increase surface fuel loadings and have the potential to increase surface fire behavior and pose a risk to the residual stand and other values, if not adequately treated (USDI BLM 2016a, p. 269; Martinson and Omi 2013; Weatherspoon and Skinner 1995; Fule et al. 2001). The PRMP/FEIS indicates that residual activity fuel loading depends on harvest type and the amount of material removed (USDI BLM 2016a, pp. 265-266). The risk these activity fuels pose increases near human values. In the PRMP/FEIS, "the BLM assumed that a one-mile buffer around the West Wide Wildfire Risk Assessment WDA data layer (WWRA 2013) represents the geographic scope of possible immediate risks to the public and firefighter safety within close proximity to communities located within the Wildland Urban Interface (WUI)" (USDI BLM 2016a, p. 253), essentially using the WDA as a surrogate for WUI and representing an area of high human value. That analysis concluded that in the interior/south, the SWO ROD/RMP would result in an average of approximately 72,000 acres/decade of very high and high risk from activity fuels on dry forest sites (USDI BLM 2016a, pp. 268-269). The analysis in the PRMP/FEIS provided an estimate of potential future work needed to reduce the risk associated with activity fuels. The PRMP/FEIS also identified that a variety of follow-up treatments (e.g., prescribed fire, biomass removal, and mechanical manipulation, etc.) can reduce surface fuels and reduce the risk associated with activity fuels (USDI BLM 2016a, pp. 266, 269). Proposed actions within this EA would treat activity fuels, as needed, to reduce the temporary risk similarly among alternatives (see Fire and Fuels Issue #1).

In the PRMP/FEIS, the BLM assumed vegetation community structure is an important factor affecting potential fire behavior, postfire effects, fire resistance, and fire hazard. As such, the BLM assigned forest structural stages (USDI BLM 2016a, Appendix C, pp. 1203-1206) to a relative ranking of stand-level fire hazard (USDI BLM 2016a, Table 3-34, p. 254, Appendix H.) (for all of western Oregon) and relative ranking of stand-level resistance to replacement fire (USDI BLM 2016a, Table 3-32, p. 252) (for dry forest). The BLM concluded in the PRMP/FEIS that the ROD/RMP would increase the acres of *low* stand-level hazard, relative to current conditions, on all BLM-administered lands within close proximity to WDAs (USDI BLM 2016a, p. 260) over 50 years. In turn, the SWO ROD/RMP would reduce the amount of acreage in *high* or *moderate* fire hazard (USDI BLM 2016a, pp. 260 and 263, Figure 3-38) over this same period. This issue incorporates the effects to relative stand-level resistance replacement fire (i.e., hazardous fuel profiles) as described in Fire Resistance Issue 3.3, inform direct and indirect effects on risk to forests, rural communities and firefighters analyzed in this issue. In that issue, all action alternatives improve stand-level fire resistance in treated areas, over the No Action Alternative.

3.4.3 Assumptions

In this issue, the BLM incorporated effects discussed in the Fire Resistance Issue (above), regarding the alternatives' effects on stand-level fire resistance to stand-replacement fire (or fire hazard), which were that all action alternatives would improve stand-level fire resistance in the short-term. A stand with high fire resistance, has low fire hazard and vice versa (USDI BLM 2016a, Appendix H). The BLM assumes that the previous Fire Resistance issue analyzes the short-and moderate-term effects of wildfire risk to forests at the stand scale. The BLM assumed that the prescribed fire acres for each alternative represent the possible total implementation footprint acres. The BLM assumed maintenance of the prescribed fire implementation acreage for each Action Alternative would occur as needed to maintain high to moderate stand-level fire resistance. This is a reasonable assumption, as stated in the PRMP/FEIS natural hazardous fuel reduction would contribute toward improved stand-level resistance on approximately 85,000 acres per decade (Table 3-40 p. 270). In many cases, prescribed fire will be applied on the same acreage that commercial thinning and small diameter thinning actions are also implemented. Additionally, the BLM assumes that handpile burning would be conducted on many of the same acres that will be underburned. However, prescribed underburning may be applied as a stand-alone treatment. Therefore, the total prescribed fire implementation acreage is a reasonable assumption of treatment footprint.

In terms of community risk, reducing loss of homes to wildfire is best achieved by reducing the susceptibility of homes to ignition and reducing the probability of home exposure to wildfire (Caulkin et al. 2014). Home material construction (i.e., fire resistant) and home ignition zone (100-200 feet circumference of vegetation around home), managed by the homeowner, influence home ignition susceptibility (Cohen 2008). The probability of home (or community) exposure to wildfire is influenced by production of embers and large wildfire growth. Treatments that reduce the probability of torching (or increase stand-level fire resistance) and limit ember production or provide effective opportunities to limit large wildfire growth, limit wildfire hazard and likelihood (Caulkin et al. 2014, Finney 2007), or probability of exposure. Additionally, Prichard et al. 2021 recently examined several of these same topics and conclude that only focusing treatments within the home ignition zone, which is critically important, ignores broader inter-connected social and ecological issues, such as smoke from wildfire emissions, ecosystem service impacts, such as clean water, and impacts to other HVRAs that occur beyond the home ignition zone, such as forests providing wildlife habitat and banking carbon stores that can slow negative climate-fire feedback loops.

The BLM assumed locally developed (2017) POD boundaries, as described by Thompson and others (2016) Stratton (2020), represent the extent of the "linear feature" fuel break strategy (Map 9) and (see Alternative A Description and GIS Appendix for more information regarding PODs) represent geographic features that *could* aid in wildfire containment and limiting large fire growth. These features include major topographical breaks (ridgelines), road systems, rivers and waterbodies, barren areas, prior treatments, previous wildfires, etc. In this context, POD boundaries are used as an operationally relevant analytic extent. The POD boundaries do not dictate future actions and in no way establish a committal for fire management to use, nor do they account for specific circumstances (i.e., weather, wind, and fuel moisture, etc.) that may require deviation from a POD boundary in actual wildfire response (see Appendix 12 for more information regarding 2017 PODs). The BLM assumed strategically placed treatments across as little as 10 percent of the landscape, at an optimal rate of one to two percent of the landscape per year (Finney, 2007), have been shown effective at reducing potential wildfire severity and extent.

The BLM defined two "area based" extents, including all ownerships, in order to evaluate wildfire risk at a landscape scale (or large fire risk to forests, communities, etc.) and a local scale (or local fire risk to communities). The BLM defined the landscape scale extent based on PODs that contain the Treatment Area and the local scale extent based on a focused component of the WUI (CWPP, 2019; Metlen et al., 2017) represented by a ¼ mile buffer around Communities at Risk (Map 9). The BLM assumed optimal landscape treatment for reducing fire risk at "area based" extents is approximately 20-40 percent (Tubbesing et al., 2019; Salis et al., 2014; Metlen et al., 2017; Schmidt et al., 2008; Finney, 2001). Additional treatments beyond 40 percent have been shown to have little added effect at reducing fire rate of spread or fire size at the landscape scale (Finney, 2007).

As in the PRMP/FEIS (pp. 232–233), the BLM assumes that the future distribution of forest structure conditions on non-BLM-administered lands would continue to reflect the current distribution of forest structure on those same lands.

3.4.4 Measurement Indicators

The BLM measured effects on wildfire risk (hazard and likelihood) based on the proportion of 10-year implementation footprint acres within the "linear feature" extent, which represents areas for potential strategic containment of wildfire, and two "area based" extents: a landscape and local scale (see Methods and Assumptions sections, above) for each alternative.

3.4.5 Affected Environment

An integrated risk-sharing, or "all-lands" approach is necessary to achieve the goals of the National Cohesive Wildland Fire Management Strategy: fire-adapted communities, coordinated wildfire response, and resilient landscapes (CWPP 2019; Caulkin et al. 2014), particularly in the checkerboard pattern of ownership common to southwestern Oregon (USDI BLM 2016a, p. 255; CWPP 2019). In recent years, the Medford District and southwestern Oregon have had several wildfire risk assessments conducted at local, regional, and national levels, which the BLM has used in recent analyses. There is concurrence among all recent risk assessment outputs that wildfire risk to forests, communities, firefighters and other HVRAs in southwestern Oregon is high. See Section 3.2 of Appendix 5 for additional details.

Nearly all of Josephine and Jackson County are typed as WUI in Rogue Valley Integrated Fire Plan (RVIFP p. 75 – Figure 3.24). As such, nearly 70 percent of Medford District BLM-administered lands fall within the Rogue Valley WUI boundary. Additionally, according to recent analysis 22 of the top 50 communities in Oregon with the highest cumulative wildfire risk occur within the Medford District boundary (Map 8; Scott et al. 2018). Jackson and Josephine counties top the Oregon list for wildfire risk to communities (Scott et al. 2019). In both counties, private non-industrial lands account for the greatest potential risk transmission of wildfire to communities, while BLM-administered lands represent the second largest portion of potential transmitted risk in both counties (Figure 4) (Scott et al., 2019 Table 7). The analysis indicates that wildfire originating from areas not immediately adjacent to populated zones have the potential to transmit wildfire to those areas (Scott et al., 2019; Figure 4).

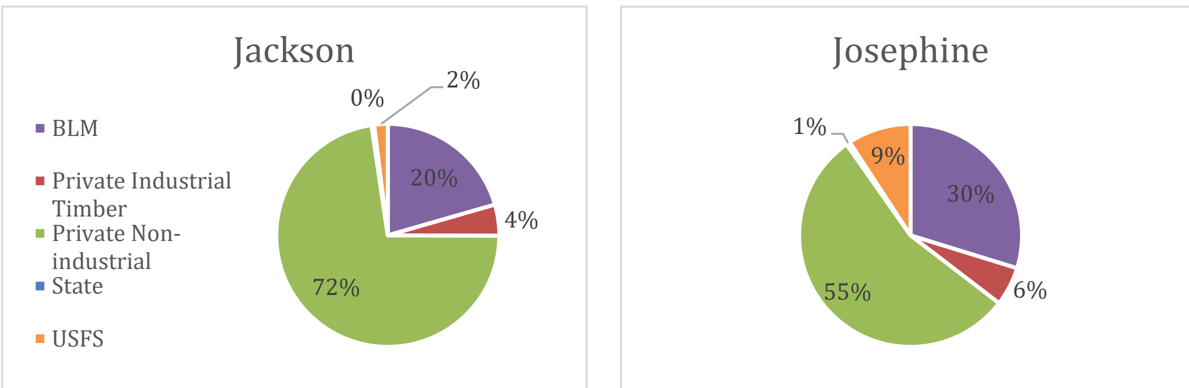


Figure 4. Ownership Share of Transmitted Wildfire Risk to Communities in Jackson and Josephine Counties, Based on Data from Scott and Others (2019).

This pattern is consistent with typical ownership patterns within western Oregon (USDI BLM 2016a, p. 255). For example, BLM-administered lands (approximately 32,000 acres) comprise 35 percent of the "linear feature" risk reduction strategy extent (Table 12; Map 8), while private lands (approximately 45,000 acres) account for 50 percent of the "linear features." The same pattern holds true for the approximately 2.3 million acre "area-based" landscape strategy extent, which is 35 percent BLM-administered lands (approximately 800,000 acres) and 50 percent private lands (approximately 1.2 million acres). BLM-administered lands (approximately 96,000 acres) represent 21 percent of the local "area based" extent and private lands (approximately 336,000 acres) represent 74 percent.

Table 12. Distribution of BLM-Administered and Private Lands Within Area-Based and Linear Feature Wildfire Risk Reduction Extents. Proportion is proportion of landscape extent.

Wildfire Risk Reduction Strategy Extent	All Ownerships		BLM		Private Lands	
	Proportion	Acres	Acres	Proportion	Acres	Proportion
Landscape Extent	100%	2,300,000	800,000	35%	1,147,800	50%
Local Extent	20%	452,000	95,600	21%	336,250	74%
Linear Features	4%	90,900	31,700	35%	45,260	50%

3.4.6 Environmental Effects

No Action Alternative

Direct and Indirect Effects

Because no new management is proposed under the No Action Alternative, the effects described reflect current conditions. As described in the Fire Resistance Issue, stand-level fire resistance would not improve, therefore fire hazard would remain high across approximately 80 percent of IVM treatment acres and moderate in 20 percent, thus wildfire risk would not be reduced in any portion of the "linear feature" strategy or "area based" strategies and would reflect current conditions (Appendices 3-5). These conditions would continue to put forests and Communities at Risk and would not promote or develop safe and effective wildfire response. Expected fire intensity would require fuel (vegetation) removal in order to engage in direct attack fire suppression methods, this would delay the effectiveness of fire line construction and would not provide time for thoughtful ecological consideration of species diversity, stocking levels, or seral stage.

Initial attack wildfire suppression would continue to become increasingly difficult, due to increased fire line heat and flame length. Initial attack success would decline over time resulting in larger fire sizes. Aerial attack effectiveness would decrease with extreme fire behavior and, as upper and mid-level canopies close, penetration of aerial applications of water or retardant would be reduced. As a result, in the event of a wildfire, many stands would experience stand replacing wildfires and there would be limited safe and effective wildfire response to effectively contain large wildfire growth.

Cumulative Effects

Under the No Action Alternative, treatments would not occur to reduce stand-level fire hazard and based on climate and wildfire trends discussed in Appendix 3, the suitability for large wildfire growth will increase and continue to challenge safe and effective wildfire response and increase wildfire risk to HVRAs, namely communities.

Initial attack and direct attack wildfire suppression would continue to become increasingly difficult and continue to decline over time, resulting in larger fire sizes. Aerial attack effectiveness would decrease with extreme fire behavior and, as upper and mid-level canopies close, penetration of aerial applications of water or retardant would be reduced. As a result, in the event of a wildfire, many stands would experience stand replacing wildfires and there would be limited safe and effective wildfire response to effectively contain large wildfire growth and protect HVRAs, namely communities.

Many Jackson and Josephine county residents and businesses are actively implementing measures to protect their property and homes from wildfire and there are several certified Firewise Communities (CWPP 2019) and this proactive risk reduction will continue. However, under the No Action Alternative, no treatments would be implemented that reduce the probability of torching and limit the production of burning embers (or increase stand-level fire resistance) or provide effective opportunity to limit large wildfire growth, thus neither the hazard or likelihood of problematic wildfire would not be reduced.

As in the PRMP/FEIS (pp. 232-233), the BLM assumes that the future distribution of forest structure conditions on non-BLM-administered lands would continue to reflect the current distribution of forest structure on those same lands, so overtime there would be no change in the contribution to wildfire risk from those lands. In 50 years, non-commercial natural hazardous fuel reduction would occur across approximately 85,000 acres/decade (USDI BLM 2016a, p. 270) and contribute toward high to moderate stand-level resistance or reduced hazard (USDI BLM 2016a, p. 243). Additionally, in 50 years, stand-level fire resistance would be improved and shift to *high* resistance (or reduced stand-level hazard) across approximately 73,000 acres on the Medford District (USDI BLM 2016a, Figure 3-29, p. 246), including actions on approximately 20,000 acres within the HLB (including the suite of commercial actions directed in uneven-aged timber area [UTA], low intensity timber area [LITA], and moderate intensity timber area [MITA]) (USDI BLM 2016a, p. 1324, Figure H-9), or 7,300 acres per decade. The combined decadal effect of future foreseeable actions would improve or maintain stand-level fire resistance to *high* or *moderate* across approximately 92,300 acres per decade or 5.2 percent of the landscape area-based extent (Table 13), but only at a rate of 0.005 percent per year. If all actions were implemented in the local area extent, this would reduce hazard on 21 percent of this area, as BLM-administered lands only comprise 21 percent of this extent, at approximately 2 percent annual treatment rate (Table 13). Approximately 2,500 of these decadal acres (or 25,000 acres in 50 years) with improved resistance (*high*) or reduced stand-level fire hazard located in the local "area based" extent would be commercial actions within the HLB (USDI BLM 2016a, p. 1327, Figure H-14). If all actions were implemented in the linear extent, this would reduce hazard on 35 percent of this area, as BLM-administered lands only comprise 35 percent of this extent, at a rate of 4 percent per year. Additionally, given minimal annual treatment rates and ownership patterns across the Medford District, these treatments would only be so effective. For example, the Rogue Basin Strategy (RBS), which identifies a strategy for proactive treatments across the Rogue Basin, compared treatment footprint alternatives, and demonstrated that a scenario which treats federal land in areas across the landscape along the existing road network (Max Federal) along with treatments of both federal and private lands comprising 40 percent of the Communities at Risk (All Lands) was most successful at reducing wildfire risk to communities. The All Lands scenario reduced wildfire risk to HVRAs by 70 percent over the current condition, vs. the Max Federal scenario only, which reduced wildfire risk by only 37 percent (Metlen et al. 2017, Metlen et al. 2021). The RBS All-Lands and Max Federal scenarios both assume a combination of commercial and small-diameter thinning and prescribed fire actions of would occur annually on an approximately 16,000 acres of BLM-administered lands.

Table 13. Cumulative Effects of No Action per Decade, Relative to the Strategies for Modifying Landscape-Level Fire Growth and Behavior: 1) "Linear Features" [POD Boundaries] and 2) "Area-Based" [1/4 mile Around Communities at Risk] and "Area-Based" [PODs that Encompass the Treatment Area].

Risk Reduction Strategy Extent	Percent of Strategy Extent Potentially Treated	
	No Action Alternative	**Cumulative Effect of Other BLM Actions per Decade**
Landscape "Area based" [PODs area] (2.3 Million Acres Across all Ownerships) Encompassing the Treatment Area)	0%	5.2%
Local "Area-based" [¼ Mile Around Communities at Risk] (452,000 Acres Across all Ownerships)	0%	21%*
"Linear features" [POD Boundaries] (31,700 acres of BLM-Administered Lands within Total 90,000 acres)	0%	35%*
Decadal Implementation Acreage	0	92,300

*BLM-administered lands only comprise 21% of the local "area-based" extent and only 35% of the entire "linear features" extent (see Table 14 and Map 8).

Additionally, approximately 386,000 additional acres would be in mixed stand-level resistance across the Medford District (USDI BLM 2016a, Figure 3-29, p. 246) and 172,000 acres within the WDA, a portion of which may be high resistance, however this is dependent on the fuel profile (see methodology and assumptions in Issue 3.3) resulting from prescriptions. To the extent that these actions also create post-treatment conditions that set stands up to better receive fire (prescribed or wildfire) and are grouped in adjacency, these will provide greater influence to modify fire behavior and slow fire spread (Finney 2001), and create safer opportunities to limit large fire growth; thus protecting resources, among those timber, threatened and endangered (T&E) species habitat, and communities (Ager et al. 2007; Finney 2009; and Metlen et al. 2017; Metlen et al. 2021, etc.).

Direct Effects Common to all Action Alternatives

As described in Issue 3.3 proposed actions will reduce the potential for stand-replacing crown fire (i.e., stand level hazard). Where implemented, proposed actions would indirectly improve opportunities for safe and effective wildfire response (Moghaddas and Craggs 2007) and containment (Salis et al. 2016; USDI BLM 2016a, p. 271). The reduced flame lengths, resulting from proposed actions, would indirectly improve safe and effective wildfire response and improve opportunities for direct attack of a wildfire, as indicated in Fuel Treatment Effectiveness Monitoring between 2013-2018. Forty percent of treatments intersected by wildfires aided in wildfire containment and 65 percent of treatments resulted in surface fire, which is favorable for direct attack. Flame lengths less than 4 feet are considered safe for direct attack by firefighters (Andrews and Rothermel 1982). Even at low fuel moistures and high wind speeds, fuel models with low to moderate fuel loading typically exhibit flame lengths less than 4 feet (Scott and Burgan 2005). Flame lengths greater than 4 feet require mechanical equipment and/or indirect attack methods such as burnout operations ahead of the fire. Additionally, thinned canopies increase effectiveness of air resources, by allowing water and retardant to better penetrate the canopy (local Fuel Treatment Effectiveness Monitoring (FTEM) observations 2014 Salt Creek Fire and 2018 Spencer Creek Fire (USDI BLM 2021b), Moghaddas and Craggs 2007). Treatments would also improve efficiency and effectiveness of fire line production rates for suppression forces, because there would be less forest fuel (vegetation) to remove in advance of a fire, burn out operations, and aerial resources to be more effective (2014 Twincheria Fire and 2018 Spencer Creek Fire – FTEM observations (USDI BLM 2021b; Moghaddas and Craggs 2007).

Treating all fuels across an entire landscape is practically impossible, due to many limitations. Often priorities driving vegetation treatments (e.g., access, volume, ownership, etc.) are not spatial or topological in nature, nor do they explicitly consider fire movement or growth across the landscape or between treatment units (Finney 2001). The spatial arrangement and proportion of the landscape treated have been found to be important factors influencing effectiveness of treatments in modifying fire spread and reducing fire severity/intensity and area burned (Tubbesing et al., 2019; Salis et al., 2014; Metlen et al., 2017; Metlen et al., 2021; Schmidt et al., 2008; Finney, 2001). The alternatives differ in the number of implementation acres and eligible Treatment Area, and thus the proportion of the “linear feature” and “area based” wildfire risk reduction strategy extents in which proposed actions would occur (Table 14).

Table 14. Side by Side Comparison of Alternatives Maximum 10-year Implementation (Acres).

Risk Reduction Strategy Extent	Percent of Strategy Extent Potentially Treated		
	Alternative A	Alternative B	Alternative C
“Area based” [PODs area] (2.3 Million Acres Across All Ownerships) Encompassing the Treatment Area)	1%	1.7%	3.9%
“Area-based” [¼ Mile Around Communities at Risk] (452,000 Acres Across all Ownerships)	4%	7%	15%
“Linear features” [POD Boundaries] (31,700 acres of BLM-Administered Lands Within Total 90,000 acres)	19%	33%	35%*
Maximum 10-year Implementation Acres	17,000	30,000	70,000

*BLM-administered lands only comprise 35 percent of the entire “linear features” extent and 21 percent of the local “area-based” extent (see Table 13 and Map 8).

Relative to the two Strategies for Modifying Landscape-Level Fire Growth and Behavior: 1) “linear features” [POD boundaries] and 2) “area-based” [1/4 mile around Communities at Risk] and “area-based” [PODs that encompass the Treatment Area]. Acres and percent of “linear features” display all treatments only placed in strategic areas for Alternatives A and B.

Alternative A

See Chapter 2 and Appendix 1 for description of proposed actions. Also, see effects common to all action alternatives.

Alternative A would directly reduce the fire hazard on up to 17,000 acres over 10-years (Table 14). Proposed actions in Alternative A could contribute toward the strategy of treating linear landscape features within the Treatment Area. These proposed IVM treatments would create defensible areas able to moderate fire behavior (Fire and Fuels Issue 1) on up to 19 percent of the entire “linear features” extent (including all ownerships) over 10-years (an approximate rate of 2 percent per year).

Proposed actions could also contribute to the local “area-based” treatment strategy to modify fire behavior on up to 4 percent of the area within ¼ mile around Communities at Risk over 10-years (at an approximate treatment rate of 0.4 percent per year).

In 10-years, Alternative A would treat approximately nearly 1 percent of the landscape "area-based" extent covering the Treatment Area (Map 8). However, these may be isolated stands not adjacent to other IVM-RL actions and may not contribute toward landscape moderation of fire behavior.

Alternative B

See Chapter 2 and Appendix 1 for description of proposed actions. Also, see effects common to all action alternatives.

Alternative B would directly reduce hazard on up to 30,000 acres over 10-years (Table 14). Proposed actions in Alternative B could contribute toward the strategy of treating "linear features". These proposed IVM treatments would create defensible areas on up to 33 percent of "linear features" over 10-years (an approximate rate of 3 percent per year).

Proposed actions could also contribute to the local "area-based" treatment strategy to modify fire behavior on up to 7 percent of the area within ¼ mile around Communities at Risk over 10-years (at an approximate treatment rate of 1 percent per year).

In 10-years, proposed actions under Alternative B would treat slightly more than 1 percent of the landscape "area-based" extent, contributing toward conditions in which wildfire can occur without detrimental consequences and reduce overall area experiencing stand-replacing fire (Tubbesing et al., 2019; Jain et al., 2012; USDI BLM 2016a, p. 228), thus reducing impacts to highly valued resources, including communities, timber, and wildlife habitat, etc. (Ager et al. 2007; USDI BLM 2016a, p. 254).

Alternative C

See Chapter 2 and Appendix 1 for description of proposed actions. Also, see effects common to all action alternatives.

Alternative C would directly reduce hazard on up to 70,000 acres over 10-years (Table 14). These proposed IVM treatments would create defensible areas throughout the Medford District in up to 35 percent of "linear features" over 10-years (an approximate rate of 3 percent per year). BLM-administered lands (approximately 31,700 acres) comprise 35 percent of the "linear feature" extent. If the entirety of these acres were treated under Alternative C, this would leave up to approximately 48,000 acres to be applied toward "area-based" risk reduction strategies within the local or landscape extents.

Proposed actions implemented within the local "area-based" extent, could modify fire behavior on up to 18 percent of the area within ¼ mile around Communities at Risk over 10-years (at an approximate treatment rate of 2 percent per year). BLM-administered lands comprise approximately 21 percent of this local "area based" extent.

Proposed actions implemented within the landscape "area-based" extent could moderate fire behavior on 3 percent of the landscape.

Comparison of Alternatives

Optimal landscape treatment for reducing fire risk is approximately 20-40 percent (Tubbesing et al., 2019; Salis et al., 2014; Metlen et al., 2017; Schmidt et al., 2008; Finney 2001). Additional treatments beyond 40 percent have been shown to have little added effect at reducing fire rate of spread or fire size at the landscape scale (Finney, 2007). Over 10-years, proposed actions implemented under Alternative A could treat up to 4 percent of the local "area based" extent, up to 7 percent under alternative B and up to 15 percent under Alternative C. If all proposed actions under Alternative C were implemented in the local "area based" extent, nearly 20 percent (which is an optimal proportion for wildfire risk reduction) would be treated. Of note, BLM-administered lands only comprise 21 percent of this local "area based" extent.

Strategically placed treatments across as little as 10 percent of the landscape, at an optimal rate of one to two percent of the landscape per year (Finney, 2007), have been shown effective at reducing potential wildfire severity. Over 10-years, proposed actions implemented under Alternative A could treat up to 19 percent of "linear features", up to 33 percent under Alternative B, and up to 35 percent under Alternative C.

All action alternatives would be over the suggested minimum treatment of 10 percent of strategic landscape locations at a rate of 1 to 2 percent per year.

Under a scenario where all proposed actions under any action alternative were implemented along “linear features,” Alternative C would be the only alternative with remaining acres to contribute toward “area-based” treatments.

Cumulative Effects

Unlike the No Action Alternative, treatments would occur to reduce stand-level fire hazard among the action alternatives and contribute incrementally in varying amounts toward improving safe and effective wildfire response and reducing wildfire risk to HVRAs, namely communities. In addition to other reasonably foreseeable actions described in the No Action Alternative cumulative effects, the action alternatives would contribute incrementally in varying amounts toward reducing wildfire hazard and probability by implementing actions that moderate fire behavior and improve wildfire containment opportunities, through the reduction of the probability of torching or crown fire (limiting production of fire brands or embers). Alternative A will focus treatments in strategic areas (or dispersed plantations), but would reduce hazard on the least amount of acreage (17,000), Alternative B would implement hazard reduction on more acreage (30,000) across the landscape, and Alternative C would reduce hazard across the most acreage (70,000).

While fuel breaks are often good points to tie in prescribed fire lines, adhering to linear features only, as in Alternative A, may introduce operational complexity in implementation of prescribed fire. In historically low- to moderate-severity fire regimes, such as southwestern Oregon, a combination of linear fuel breaks and area-wide fuel treatments, placed in adjacency on the landscape, can reduce the size and intensity of wildland fires and help achieve more broad-based ecosystem management goals, particularly those located on portions of the landscape (e.g. upper thirds of slopes, south and west aspects) that under historic fire regimes would have burned more frequently and likely have been more open, relative to the rest of the landscape (Agee et al., 2000). Alternatives B and C would provide opportunities to tie ridgetop treatments into “area based” treatments, and other foreseeable future actions in the HLB, or those on adjacent private lands. Alternative C would provide the greatest opportunity to meet neighbors at the fence and contribute toward all-lands wildfire risk reduction.

To the extent that cumulative actions describe on other HLB prescriptions and actions on BLM-administered lands within the HLB create post-treatment conditions that set stands up to better receive fire (prescribed or wildfire) and are grouped adjacent to IVM treatments, these will provide greater influence to modify fire behavior and slow fire spread (Finney 2001), and create safer opportunities to limit large fire growth; thus protecting resources, among those timber, T&E species habitat, and communities (Ager et al., 2007; Finney, 2009; and Metlen et al., 2017; Metlen et al., 2021, etc.). These combined actions could also provide more opportunities to conduct prescribed underburning as a future maintenance action. Over the moderate- to long-term, maintenance is essential for both area treatments and linear fuel breaks (Agee et al., 2000) to maintain reduced fire hazard and likelihood, as discussed in Issue 3.3.

3.5 How Would Proposed Forest Vegetation Treatments and Road Construction Affect NSO Habitat and Critical Habitat?

3.5.1 Methodology:

The spotted owl is listed federally as threatened under the ESA. The analysis for this issue evaluates changes to the existing spotted owl habitat baseline from the three action alternatives. This methodology will describe the categories of spotted owl habitat, the factors in determining changes to spotted owl habitat, and the scales of analysis used to compare the changes between alternatives.

NSO habitat is categorized into five types: nesting-roosting, foraging, dispersal-only, capable, and non-habitat. Another habitat category is, older, structurally-complex conifer forests, which represents the highest value NSO habitat. For this programmatic analysis, these habitat definitions are derived from the SWO ROD/RMP, Medford District habitat evaluations, spotted owl scientific literature, local habitat definitions, and local GIS modeling. The FWS identified nesting, roosting, foraging, and dispersal habitat as Primary or Biological Features (PBFs) in the final Critical Habitat Rule (USDI FWS 2012). These are specific elements considered to essential to the conservation of the spotted owl. See Appendix 6 for the definitions used for each of these habitat types and for more details on PBFs.

The effects of the proposed vegetation treatments on spotted owl habitat depends on the current stand condition how many trees are removed, the residual overstory, the residual decadence of standing and down wood, the canopy complexity, and the type of tree removal. The range of effects to spotted owl habitat from vegetation treatments include nesting-roosting removal and downgrade (outside of LSR only); foraging and dispersal-only removal; foraging downgrade; and modifying nesting-roosting, foraging, and dispersal-only habitat, but still maintaining habitat function post-treatment. These effects categories are described in more detail in Appendix 6. Multiple stand attributes are important to measure to determine the condition of the habitat. However, in order to assess potential effects at the programmatic scale, this analysis correlates proposed RD in commercial treatment prescription targets with an estimated post-harvest canopy cover (Table 15). While Table 15 does not include effects by LUA, please note that certain prescriptions listed in Table 15 below, would not be applied in LSR because no removal or downgrading of nesting-roosting habitat from vegetation treatments would occur under the proposed actions. Common to all action alternatives (Table 16) nesting-roosting habitat function would be maintained at the stand scale in the LSR.

Table 15. RD Index Target Range and Effects Assumptions for Commercial Actions.

RDI Category Description	Post-Treatment RDI Target Range[1]	Analysis Assumptions for Effects Estimates			
		Canopy Cover Retention	Nesting Roosting Habitat	Foraging Habitat	Dispersal-Only Habitat
Alternative A					
Thinning Along Operationally Strategic Areas, within 1/4 miles of Communities at Risk, and Plantations < 60 years old	35-40%	40-50%	Downgrade to Dispersal/Prescription not Applied in NR in LSR	Downgrade to Dispersal	Modify, but Maintain Function
Alternative B					
Maintain Spotted Owl Nesting-Roosting and Foraging Habitat	Maintain NR and F[2]	60+%	Modify, but Maintain Function	Modify, but Maintain Function	Modify, but Maintain Function
Maintain Spotted Owl Dispersal-Only (DO) Habitat	Maintain DO	40+%	N/A	N/A	Modify, but Maintain Function
Dry Forest (non-NSO Habitat)	35-45%	40-60%	N/A	N/A	N/A
Dry-Forest-Jeffery Pine and Oregon White Oak (non-NR, F, or DO)	20-35%	30-45%	N/A	N/A	N/A
Moist Forest-Plantations (Non-NSO Habitat)	35-45%	40-60%	N/A	N/A	N/A
Alternative C					
Near-Term Spotted Owl	Maintain NR and F[2]	60+%	Modify, but Maintain Function	Modify, but Maintain Function	Modify, but Maintain Function
Long-Term Spotted Owl	≥30%	40% (min)	Downgrade to Dispersal/ Prescription not Applied in NR in LSR	Downgrade to Dispersal	Modify, but Maintain Function
Fuels Emphasis	35-40%	40-50%	Downgrade to Dispersal/ Prescription not Applied in NR in LSR	Downgrade to Dispersal	Modify, but Maintain Function
Ecosystem Resilience - Open	20-30%	30-40%	Remove/ Prescription not Applied in NR in LSR	Remove	Remove

RDI Category Description	Post-Treatment RDI Target Range[1]	Analysis Assumptions for Effects Estimates			
		Canopy Cover Retention	Nesting Roosting Habitat	Foraging Habitat	Dispersal-Only Habitat
Ecosystem Resilience - Intermediate	30-40%	40-50%	Downgrade to Dispersal/ Prescription not Applied in NR in LSR	Downgrade to Dispersal	Modify, but Maintain Function
Ecosystem Resilience - Closed	40-45%	50-60+%	Downgrade to Dispersal/ Prescription not Applied in NR in LSR	Downgrade to Dispersal	Modify, but Maintain Function

[1]=See Tables 2 and 32

[2]= NSO nesting-roosting habitat function (including key elements) would be maintained.

Changes in habitat are addressed and summarized at the NSO Analysis Area and designated critical habitat sub-unit scales. The NSO Analysis Area for evaluating impacts to NSOs includes all spotted owl habitat on federal lands within the provincial home range distances of BLM-administered lands within the Treatment Area, as well as adjacent BLM districts (1.3 miles for the Klamath Province and 1.2 for the western Cascades province [Thomas et al., 1990; Courtney et al., 2004]) (Map 9). This NSO Analysis Area is used because it includes all lands within any overlapped associated provincial home ranges of known spotted sites that could be directly, indirectly, or cumulatively impacted by the proposed action. The FWS designated critical habitat for spotted owls in 2012 (USDI FWS 2012, pp. 71876-72068) and identified geographic units and sub-units that contain primary biological features essential for the conservation of the spotted owl. The EA analysis assesses the change in habitat baseline from the proposed actions within the two critical habitat units and nine sub-units that overlap the NSO Analysis Area.

Two SWO ROD/RMP management directions in the LSR LUA require the BLM to maintain NSO nesting habitat at the stand level and to protect stands of older, structurally-complex conifer forest (USDI BLM 2016b, p. 71). Therefore, the effects to nesting-roosting and older, structurally-complex conifer forests, will be analyzed at the stand scale. The SWO ROD/RMP defines a stand as “an aggregation of trees occupying a specific area managed as discrete operational or management unit” (USDI BLM 2016b, p. 314). On the Medford District, the Forest Operational Inventory (FOI) units are used as the initial stand boundary. However, when planning projects, these are often updated to represent areas of more ecological or similar vegetation types. Due to the variety of conditions on the landscape, the acre sizes vary for each FOI. The ability of a stand to maintain spotted owl nesting-roosting habitat function would be based on the proportion of the treated and open areas (areas of low canopy cover below desired nesting-roosting conditions) in relation to the entire stand of nesting-roosting habitat, the distribution of the retained key habitat elements, and the amount of edge created. See the nesting-roosting habitat and effects definitions in Appendix 9.

Defining a stand as a particular “habitat type” is a functional assessment based on the relative contribution of each individual habitat element. The interaction of these conditions estimates the “habitat type” for a stand. Each individual attribute has a particular, but variable relative weight (importance) in overall stand function compared to other attributes. The combination of several factors in variable quantities influence the likelihood of spotted owl use (Zabel et al., 2003; Irwin et al., 2007). NR habitat function evaluation has to take all of the fundamental habitat elements into consideration, and none should be considered in isolation. Determining the lower bound of stand condition that provides habitat function is therefore an analysis based on quantification of and distribution of key habitat elements remaining post-treatment. There is not a clearly demarcated threshold that can be generically or numerically depicted, but a transition zone where lack of habitat elements or quality make it progressively unlikely that particular stand would provide habitat function. Ultimately the function of a stand can be measured by GIS data, stand exam data, field observational methods, professional evaluation of all factors known to be associated with specific use, or a combination of all methods.

For analysis purposes, the results of the RHS MaxEnt model, as described in Revised Recovery Plan for the Northern Spotted Owl (USDI FWS 2011), were used to predict spotted owl habitat use on the landscape that would support spotted owl occupancy and nesting over the long-term. It is based on several variables including elevation, mean precipitation, slope position, insolation, and curvature, and vegetation series (see Appendix 6 for more detailed RHS definitions and information). For this analysis, these abiotic factors were used to develop treatment objectives and to rate the potential use by spotted owls for nesting in the future. Treated stands in non-NR habitat and in *high* RHS, or areas meeting the intent of high RHS (i.e., cooler aspects and mid to lower slopes), would develop into nesting habitat in the long-term and would be more likely to support occupancy in the future due to the preferred location on the landscape. These areas are generally in the lower third of the slope and north-facing and represent areas where owls typically nest. Treatments in non-NR habitat and in *low* RHS may improve stand and habitat structure, but the treated stands are in a location that would not support spotted owl occupancy and nesting over the long-term (generally upper third of the slope, ridges, or south facing). These RHS results are combined with the proposed treatments and potential landscape location to assess the ability of each proposed alternative to improve nesting-roosting habitat in LSR within the NSO Analysis Area.

The ability of treatments to protect spotted owl habitat from loss from wildfire is based on the total acres of commercial treatment and small diameter thinning in each alternative. These acres would represent the proportion of the NSO Analysis Area that would be in a condition to reduce large scale fire risk and increases the persistence of NSO habitat.

3.5.2 Assumptions

This IVM-RL sets a 10-year period for proposed treatment acres by alternative (Table 2). However, this analysis uses a 50-year time frame to assess direct, indirect, and cumulative effects to spotted owls from the proposed actions, as well as to account for both the long-term habitat loss and the development of new habitat. This analysis timeframe is also consistent with the PRMP/FEIS for spotted owls (USDI BLM 2016a, p. 931).

As indicated in Table 19 the commercial harvest acres proposed in the action alternatives would occur in reserve LUAs. The majority of these commercial harvest acres would occur within the LSR LUA. The estimated acres of commercial treatment in the reserve allocations are based on the IVM-RL specific modeling assumptions used to identify areas available to meet the purpose and need, as well the RMP modeling and management direction targeting 17,000 acres of commercial treatment per decade in the LSR LUA (USDI BLM 2016b, p. 74). These proposed action modeling assumptions were applied to the methodologies described above to correlate each prescription type to spotted owl habitat based on the estimated acres of proposed treatment by alternative (Table 2).

Under Alternative C, the BLM would prioritize treatments by planning ≥ 60 percent of commercial treatments (annual average) within mid-closed stands. Based on the definition of mid-closed stands, approximately 77 percent of the available the mid-closed Eligible Footprint stands are in spotted owl non-nesting-roosting habitat, while 23 percent are in nesting-roosting habitat.

Canopy cover is believed to be important to spotted owls because of prey associations (Forsman et al. 1984, pp. 55-56), acting as a thermal mediator (Forsman et al. 1984, pp. 29-30; Barrows 1981; Thomas et al. 1990, pp. 171, 278) and providing concealment cover for predator protection (Thomas et al. 1990, pp. 299-300). Canopy alone is unlikely to provide good insight into a stands ability to provide spotted owl habitat; rather, it is one of the factors associated with use. There is little evidence that stands with <40 percent canopy cover is substantially used by owls, and that 40 to 60 percent canopy may not preclude use if other features are present (e.g., perches and relatively higher prey density), while stands with denser canopy cover are most commonly used by spotted owls for nesting and roosting. Sovern et al. (2019, pp. 714, 720, 723) found that spotted owl activity center selection (around the nest site) was most strongly related to higher canopy cover and structural complexity, as a result of taller, older trees (average of 79 percent).

No commercial harvest would occur in LSR NR if habitat function cannot be maintained with ROD/RMP for post-harvest RD requirements (20 to 45 percent) (USDI BLM 2016b, p. 72; USDI BLM 2016c, p. 66).

3.5.3 Measurement Indicators

The total change of spotted owl habitat within the NSO Analysis Area and critical habitat sub-unit scales will be used as a measurement indicator. These effects will be measured by acres and the percent change to the affected environment conditions from the proposed actions will be used to compare the differences between the proposed alternatives. The total acres and percent change of the habitat baselines will also be used to demonstrate the ability of each proposed alternative to improve non-nesting habitat conditions in the LSR and protect spotted owl habitat by reducing wildfire potential.

3.5.4 Affected Environment

Spotted Owl Habitat within the NSO Analysis Area

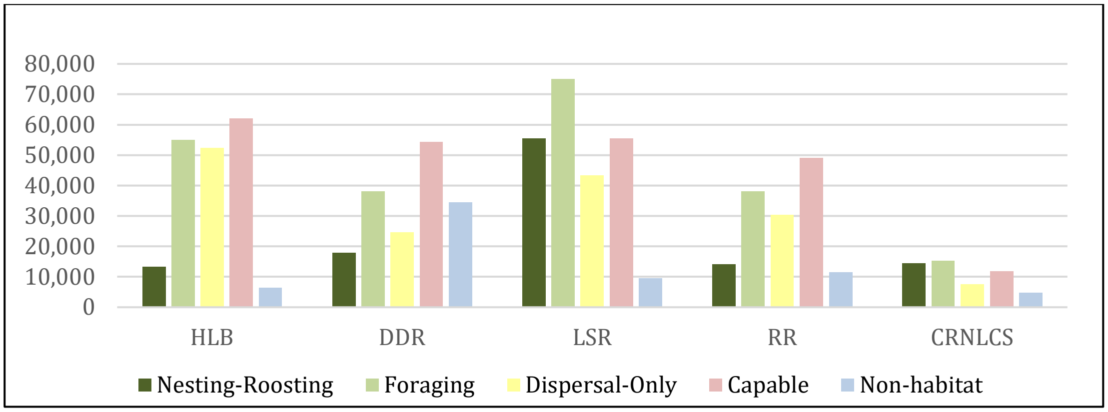
The NSO Analysis Area for this issue covers approximately 793,485 acres of BLM-administered lands. There are approximately 494,375 acres of spotted owl habitat (nesting-roosting, foraging, and dispersal-only habitat) on BLM-administered lands on the Medford District within the NSO Analysis Area, which is 62 percent of the total BLM-administered lands within the NSO Analysis Area (Table 16 and Figure 5).

There were three large fires on the Medford District in 2020 (South Obenchain, Slater, and Grizzly). In total, these fires resulted in a loss of 1,001 acres (0.3 percent) of the nesting-roosting and foraging habitat, an increase of 636 acres (0.4 percent) of dispersal-only habitat, and an increase of 191 acres (0.1 percent) of capable habitat. These changes do not represent a measurable change to the overall baseline in Table 16 and would not affect conclusions in the analysis in Section 3.5.5. Approximately 188 acres of wildfire burned on BLM managed lands in the NSO Analysis Area in 2021. These were all small fires less than 100 acres in size (the largest on BLM managed lands was 60 acres). Only a small percentage of these fires occurred in NSO dispersal-only habitat, nesting-roosting, or foraging habitat. Post-fire reviews estimated approximately 20 acres of NSO habitat was removed or downgraded on BLM Managed Lands from the 2021 fires, which is less than 0.004 percent of the total NSO habitat within the NSO Analysis Area. Therefore, the analysis uses the pre-2020 fire data because it remains valid. Additionally, the Medford District habitat baseline is updated annually to account for change from habitat from wildfires, other disturbances, and harvesting activity. These updates would be considered at the project-level in the preparation of a DNA or additional NEPA compliance prior to a project-specific decision.

Table 16. Spotted Owl Habitat Conditions in the NSO Analysis Area by LUAs.

Land Use Allocation	Nesting-Roosting	Foraging	Dispersal-Only	Capable	Non-Habitat	Total
Harvest Land Base	13,361	55,072	52,303	62,041	6,419	189,196
District-Designated Reserve	17,809	37,956	24,509	54,441	34,393	169,108
Late Successional Reserve	55,402	74,939	43,396	55,432	9,494	238,664
Riparian Reserve	14,033	38,059	30,355	49,051	11,438	142,936
Congressionally Reserved	14,431	15,171	7,579	11,722	4,678	53,582
TOTAL	**115,037**	**221,197**	**158,141**	**232,687**	**66,422**	**793,485**

Figure 5. Spotted Owl Habitat by LUA.



The LSR LUA includes Large Block Forest Reserves (Late-Successional Reserve – Moist and Late-Successional Reserve – Dry) and older, structurally-complex conifer forests. The BLM identified structurally-complex conifer forests within the LSR LUA from existing, Medford District-specific information (USDI BLM 2016a, p. 90). These were also referred to as Medford District mapped RA32 stands (USDI BLM 2016a, p. 1215). There are 114,092 acres of Medford District mapped RA32/older, structurally-complex conifer forests within the NSO Analysis Area. These were mapped at the Medford District scale and based on previous ground verified RA32 habitat, Light Detection and Ranging (LiDAR) data, and Forest Inventory Data. However, because it was a broad scale representation of potential habitat, not all of these stands are currently older. Therefore, these acres are just an estimate of the amount of older structurally-complex forest habitat may exist within the NSO Analysis Area. As mentioned above, at the time of each project, stands identified for treatment in the LSR LUA would be surveyed according to the Medford District's RA32 Field Verification Methodology to determine if the stands meet older structurally-complex conditions.

Nesting-Roosting Habitat Development Conditions within the NSO Analysis Area

As described in the Methodology Section above, stands in *high* NSO RHS demonstrate areas across the landscape that have the greatest potential to be used by spotted owls for nesting in the future once the stands have developed into nesting-roosting habitat. Approximately 79,411 of the of these Foraging, Dispersal-Only, and Capable habitat acres (46 percent) are located in *high* RHS. The remaining 92,663 acres (54 percent) are in low RHS, where the objective is to focus on the restoration of open seral stage conditions (Table 17). Approximately 1,694 acres do not have a RHS determination.

Table 17. Spotted Owl Habitat Relative Habitat Suitability Conditions in the LSR.

LSR	Foraging	Dispersal-Only	Capable	Total
High RHS (Best Location for NR Habitat Development)	36,304	20,488	22,619	79,411
Low RHS (Best Location for Open Seral Restoration)	38,033	22,598	32,032	92,663

Foraging, dispersal-only, and capable habitat are generally simple stands and lack the diversity, structure, layering, large trees, higher canopy cover, and other important habitat elements required to function as nesting-roosting habitat. These stands have the potential for eventually developing into nesting-roosting habitat. However, as described in (Appendix 3), the current forest conditions limit the extent of nesting-roosting habitat, increase the risk of their loss to wildfire, and delay and hinder the development of new nesting-roosting habitat.

Spotted Owl Critical Habitat within the NSO Analysis Area

There have been many iterations and publications of the spotted owl critical habitat designation since the August 2020 publication of the EA. The FWS published proposed revisions to the critical habitat designation in the *Federal Register* on August 11, 2020, proposing to exclude certain areas for the current designation, including the areas designated as HLB managed by the BLM in Southwestern Oregon (USDI

FWS 2020b, pp. 48487 and 48494). The Final Rule was published on January 15, 2021, with an effective date of March 16, 2021 (USDI FWS 2021a, pp. 4820-4860). The effective date was delayed to April 30, 2021 (USDI FWS 2021b) and later delayed until December 15, 2021 (USDI FWS 2021c). On July 20, 2021, the FWS proposed withdrawing the January 2021 rule and replacing it with exclusions similar to those proposed on August 11, 2020 (USDI FWS 2021d). The FWS published the Final Rule for the spotted owl critical habitat on November 10, 2021, with an effective date of December 10, 2021 (USDI FWS 2021g). The analysis in the EA is based on the 2012 critical habitat because January 2021 and December 2021 versions were a reduction of acres from the 2012 version. However, a preliminary analysis of the Final December 2021 Revised Critical Habitat within the Resilient Lands Action Area is provided in Appendix 6.

Approximately 55 percent (427,603 acres) of federal land within the NSO Analysis Area is designated as critical habitat (only federal and state lands are designated as critical habitat) (Table 53, Appendix 6). Of the BLM-administered lands within spotted owl critical habitat in the NSO Analysis Area, 70 percent (300,955 acres) are dispersal quality habitat (nesting-roosting and foraging plus dispersal-only habitat), and 50 percent (210,356 acres) are nesting-roosting and foraging habitat.

3.5.5 Environmental Effects:

No Action Alternative

As described in Section 2.1, the No Action Alternative would not implement any aspect of the action alternatives in the Treatment Area. Therefore, vegetation growth rates, stand densities, fuel conditions, the ratio of open and closed forest, would continue to change based on current existing forces and disturbance, or lack thereof. See the No Action Alternative analysis in Sections 3.2, 3.3 and 3.4 for the effects to landscape resilience and the changes to seral conditions, stand level fire resistance, and wildfire risk. Under the No Action Alternative, present and reasonably foreseeable actions would still occur within the NSO Analysis Area and would affect spotted owl habitat. These actions include BLM commercial harvest in HLB, hazardous fuels reduction treatments proposed outside of the EA, and the Pacific Connector Gas Pipeline (PCGP). [12]Over the next 50 years, these projects could remove nesting-roosting, foraging, and dispersal-only habitat; downgrade nesting-roosting and foraging habitat, and modify, but maintain habitat function for nesting-roosting, foraging, and dispersal-only habitat. The BLM estimated the effects to owl habitat using management direction in the SWO ROD/RMP and acres from past spotted owl consultation on the Medford District. The estimated habitat effects in the next 50 years from commercial harvest in HLB are described in Table 18. The PCGP effects are described below for the entire PCGP area because the effects were not analyzed by the Medford District.

Table 18. Effects to Spotted Owl Habitat from Present and Future Foreseeable Actions.

Alternative/ Activity Type	NRF Removed	NRF Downgrade	NRF Modify	Dispersal-Only Removal	Dispersal-Only Modify	Treatment in Capable or Non-Habitat	Total Acres
BLM Commercial Harvest in HLB	74,000	8,000	13,000	38,000	9,500	5,000	147,000
Hazardous Fuels Reduction Treatments	0	0	55,000	0	90,000	130,000	275,000
TOTAL	74,000	8,000	68,000	38,000	99,500	135,000	422,000

If The Jordan Cove LNG/Pacific Connector Gas Pipeline project were to be restarted at some unknown time in the future, it could cross 15 miles of land administered by the Medford District. This could result in

[12] The Jordan Cove LNG/Pacific Connector Gas Pipeline project was cancelled on December 1, 2021. Therefore, the project is no longer a reasonably foreseeable future action under the NEPA. However, the potential effects were already incorporated into the cumulative effects analysis and but could change if the project were to be re-started.

the potential loss of NSO nesting-roosting, foraging, and dispersal-only habitat. According to the 2017 PCGP FEIS, the entire pipeline project construction would have removed a total of approximately 517 acres of NRF habitat for NSOs, of which 134 acres would have been permanently lost within the 30-foot-wide corridor maintained in an herbaceous state. Additionally, 214 acres of nesting-roosting and foraging habitat for NSOs would have been modified and used as UCSAs. Approximately 1,158 acres of total dispersal habitat (nesting-roosting, foraging, and dispersal-only habitat) would have been removed by the Project (USDE 2019, pp. 4-343).

BLM estimated that 50 percent of the LSR acres in Medford and Klamath Falls districts would be treated in the first five decades (USDI BLM 2016a, p. 1215; additional relevant modeling assumptions on p. 1196). However, under the No Action Alternative, this percentage would not be reached because LSR treatments in present and future NEPA projects would be limited.

The PRMP/FEIS predicted an increase of mature and structurally-complex forest habitat on the BLM-administered lands within the Western Oregon PRMP/FEIS Decision Area (USDI BLM 2016a, pp. 1655, 1656) within the next 50 years. At the PRMP/FEIS Decision Area scale, mature forest habitat would increase by 392,605 acres and structurally-complex forest habitat would increase by 143,789 acres by 2063. These structural stages are not a direct correlation with spotted owl habitat, however, the mature and structurally-complex forest attributes are similar to nesting-roosting habitat. The increase in habitat is attributed to an increased development of mature and structurally-complex habitat in the reserves that contain snag and down woody material legacy structures (USDI BLM 2016a, p. 844), as well as an increased amount of LSR LUA within the PRMP/FEIS Decision Area. These estimates were modeled at the PRMP/FEIS Decision Area scale and a specific numeric value for the Medford District are not available. However, under the No Action Alternative, the Medford District would not be contributing to treating at least 17,000 acres of LSR per decade and LSR treatments would be limited to projects planned outside of the EA. Additionally, at the stand level, as RD targets increase (> 55 percent RD) without treatment or disturbance intervention, regeneration and potentially layering would not develop in some stands (Bailey and Tappeiner 1997 p. 105), which would decrease the likelihood of developing multi-layering structure in the future which is important to nesting-roosting habitat. While spotted owl nesting-roosting may increase in the HLB over the next 50 years, the HLB treatments would be designed to maximize growth and yield and not for providing future spotted owl nesting-roosting habitat in the NSO Analysis Area. Therefore, even with the ability of some stands to reach nesting-roosting habitat without treatment intervention, based on the potential low acres of LSR treatments without the EA, the ability of the No Action Alternative to substantially increase nesting-roosting habitat in the Treatment Area is low.

As noted in Appendix 5 many Medford District-administered lands are at a high risk from negative wildfire effects, which would result in the reduction of spotted owl habitat within the NSO Analysis Area. Approximately 96,244 acres of the fires on the Medford District in the past seven years burned at a moderate or high severity (Table 34). Based on previous post-fire habitat effects from these fires, approximately 7,995 acres of nesting-roosting and foraging habitat was lost from fires within the NSO Analysis Area in the past 7 years (the previous analysis combined nesting-roosting and foraging habitats). This represents a two percent reduction of nesting-roosting and foraging habitat from the pre-fire conditions of 2013.

Action Alternatives

<u>Effects Common to All Action Alternatives – Nesting-Roosting and Older, Structurally-Complex Habitat in LSR</u>

All action alternatives propose commercial harvest and small diameter thinning in spotted owl nesting-roosting habitat. This is consistent with the PRMP/FEIS modeling assumption that 50 percent of the acres in Medford District would be treated in the first five decades, regardless of age (USDI BLM 2016a, p. 1215 and p. 1196). Additionally, all action alternatives would follow SWO and NCO ROD/RMP management direction to maintain nesting-roosting habitat function at the stand scale within the LSR LUA (including road and landing construction) when treating in spotted owl nesting-roosting habitat (USDI BLM 2016b, pp. 70-71). As described in the definition and in the proposed actions under Alternative C, some portions of the stand may be treated at higher intensity including gap creation (USDI BLM 2016b, p. 70), as long as the stand would still function as nesting-roosting habitat post-treatment. The objectives for treating in nesting-roosting in LSR are for resilience of forest stands to wildfire, drought, and insects by reducing stand density and ladder fuels, and increase stand diameter and growing space and decrease competition for large and/or legacy pine, oak, and cedar while maintaining habitat function for NSOs (see Sections 3.2 and 3.3 for more information). Therefore, if habitat function cannot be maintained at the stand level post-treatment, then these areas of higher intensity patches would not occur.

The ability of a stand to maintain spotted owl nesting-roosting habitat function would be based on the proportion of the treated and open areas (higher intensity treatment patches) in relation to the entire stand of nesting-roosting habitat, the distribution of the retained key habitat elements, and the amount of edge created. Treatments would be designed to avoid dividing larger patches of nesting-roosting habitat into smaller, more fragmented patches of habitat with greater amounts of edge in order to maintain nesting-roosting habitat at the stand scale. This would be accomplished by avoiding large areas of lower canopy within the stand in relation to the overall stand size and increasing and distributing the RD target as needed to ensure enough of the desired habitat elements are retained.

As noted in Appendix 6, in southwestern Oregon nesting-roosting habitat are conifer stands with a multi-layered, multispecies canopy dominated by large conifer overstory trees, canopy cover ≥ 60 percent, overstory tree diameter of ≥21 inches DBH, ≥12 trees with 20 inches or greater DBH trees/acre, QMD ≥ 15 DBH, basal area from 180 to 240 $feet^2$/acre (most often greater than 240 $feet^2$/acre), and a basal area from larger trees of ≥ 30 $feet^2$ for trees ≥ 26 inches DBH. These NR habitat elements would be maintained at these levels in LSR at the stand level. Additional considerations for smaller stands would include no more than 20 percent of the existing basal area would be removed in NR habitat (based on Wagner and Anthony, 1998) and openings would be limited in size (approximately 0.25 acre to 1 acre) and distributed throughout the unit in a manner to retain sufficient canopy cover, basal area, and key habitat features as described above. The total acres of openings would not exceed 20 percent of the treated area in the unit to maintain NR quality and canopy cover. Fewer openings would be considered in units with additional thinning in order retain sufficient basal area and canopy cover. See the nesting-roosting habitat and effects definitions in Appendix 6 for more information.

As described in Section 2.6, all action alternatives would protect structurally-complex forests at the stand scale within the LSR LUA. This would be accomplished by limiting commercial harvest to only the felling of live or dead hazard trees and logs for streams, the construction, modification, maintenance and removal of linear and nonlinear rights-of-way (ROW), spur roads, yarding corridors or other facilities, as long as the forest stand continues to support the same NSO life history requirements (USDI BLM 2016b, p. 71). This is consistent with the PRMP/FEIS modeling assumption that no harvest would occur in older forest reserves (Medford District mapped RA32 stands [USDI BLM 2016a, p. 314]) in the dry-forest LSR (USDI BLM 2016a, p. 1215). The proposed action would also protect these older structurally-complex forests by implementing commercial thinning and small diameter thinning in adjacent stands. The discussion below regarding long-term benefits to spotted owl habitat would also apply to older structurally-complex forests. In summary, the proposed treatments in nesting-roosting and older structurally-complex forests in all alternatives are consistent with the PRMP/FEIS wildlife and rare plants analyses which relied on the assumptions that reserves "would largely limit stand treatments to thinning to improve habitat conditions and fuels treatments to reduce the risk of uncharacteristic wildfire, and would generally preclude stand treatments that would remove or degrade Mature and Structurally-complex habitat" (USDI BLM 2016a, pp. 537, 845, 1112).

Summary Effects – Spotted Owl Habitat

Table 19 below, provides a summary of estimated effects by alternatives to spotted owls and are only used for comparison purposes for this analysis. These estimated effects are based on the IVM-RL specific modeling proposed action assumptions that included parameters such as potential vegetation type, seral stage, and RD. The estimated effects are also displayed below in Figure 6. The removal of nesting-roosting habitat from commercial thinning would only occur outside of the LSR LUA.

Table 19. Estimated Effects (acres) to Spotted Owl Habitat Over a 10-year Period (all LUAs)[1].

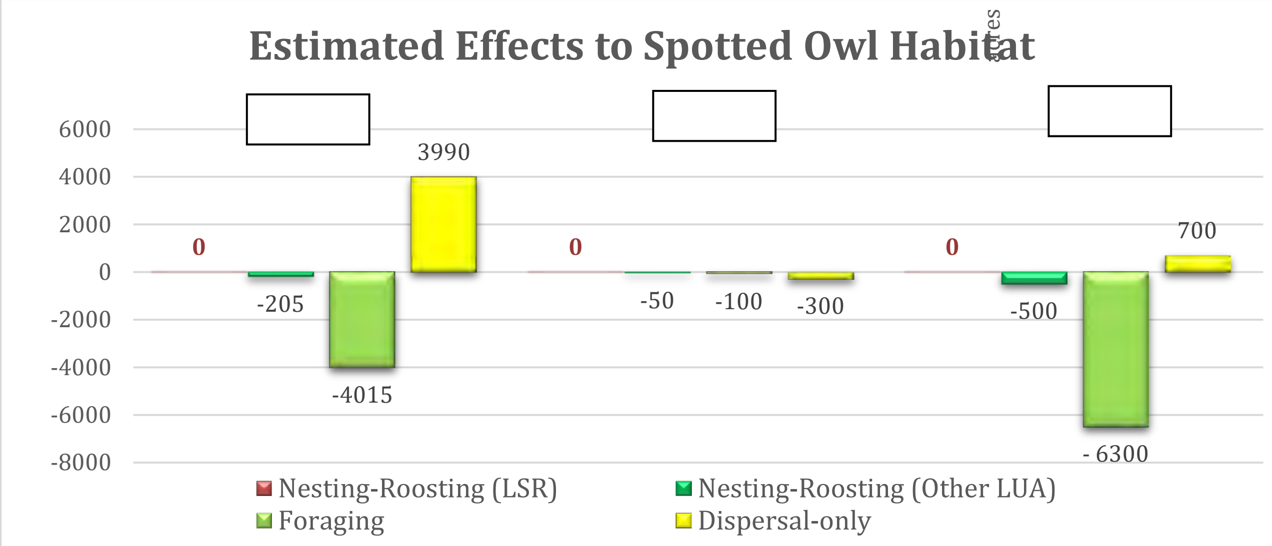
Alternative/ Activity Type	Removed		Downgrade		Modify		Dispersal -only Removal	Dispersal -only Modify	Treatment in Capable or Non-Habitat	Total Acres
	NR	F	NR	F	NR	F				
Alternative A	5	15	200	4,000	11,800	13,000	25	16,000	6,045	51,090
Small Diameter Thinning	0	0	0	0	4,000	5,000	0	6,000	2,000	17,000
Understory/ Hand pile Burning	0	0	0	0	4,000	5,000	0	6,000	2,000	17,000
Commercial Thinning[2]	0	0	200	4,000	3,800	3,000	0	4,000	2,000	17,000
LSR	*0*	*0*	*0*	*3,500*	*3,300*	*2,500*	*0*	*3,500*	*1,500*	*14,300*
OTHER	*0*	*0*	*200*	*500*	*500*	*500*	*0*	*500*	*500*	*2,700*
Landing Construction[3]	5	15	0	0	0	0	25	0	45	90
LSR	*0*	*10*	*0*	*0*	*0*	*0*	*20*	*0*	*35*	*65*
OTHER	*5*	*5*	*0*	*0*	*0*	*0*	*5*	*0*	*10*	*25*
Alternative B	50	100	0	0	8,000	18,000	300	26,000	28,100	80,550
Small Diameter Thinning	0	0	0	0	3,000	7,000	0	9,000	11,000	30,000
Understory/ Hand pile Burning	0	0	0	0	3,000	7,000	0	9,000	11,000	30,000
Commercial Thinning[2]	0	0	0	0	2,000	4,000	0	8,000	6,000	20,000
LSR	*0*	*0*	*0*	*0*	*2,500*	*3,500*	*0*	*7,000*	*5,000*	*17,000*
OTHER	*0*	*0*	*0*	*0*	*500*	*500*	*0*	*1,000*	*1,000*	*3,000*
Road/Landing Construction[3]	50	100	0	0	0	0	300	0	100	550
LSR	*10*	*80*	*0*	*0*	*0*	*0*	*250*	*0*	*80*	*420*
OTHER	*40*	*20*	*0*	*0*	*0*	*0*	*50*	*0*	*20*	*130*
Alternative/ Activity Type	**Removed**		**Downgrade**		**Modify**		**Dispersal -only Removal**	**Dispersal -only Modify**	**Treatment in Capable or Non-Habitat**	**Total Acres**
	NR	**F**	**NR**	**F**	**NR**	**F**				
Alternative C	300	2,600	200	3,900	9,800	24,400	3,200	54,600	51,900	150,900
Small Diameter Thinning	0	0	0	0	4,000	10,000	0	24,000	22,000	60,000
Understory/ Hand pile Burning	0	0	0	0	4,000	12,000	0	26,000	28,000	70,000
Commercial Thinning[2]	200	2,300	200	3,800	1,800	2,400	2,800	4,600	1,900	20,000
LSR	*0*	*2,000*	*0*	*3,500*	*1,500*	*2,000*	*2,500*	*4,000*	*1,500*	*17,000*
OTHER	*200*	*300*	*200*	*300*	*300*	*400*	*300*	*600*	*400*	*3,000*
Road/Landing Construction[3]	100	200	0	0	0	0	400	0	200	900
LSR	*20*	*150*	*0*	*0*	*0*	*0*	*300*	*0*	*150*	*620*
OTHER	*80*	*50*	*0*	*0*	*0*	*0*	*100*	*0*	*50*	*280*

[1]=These acres represent an estimated of individual project effects, which are based on the impacted footprint of the action.

[2] =Commercial Harvest would only occur on reserve land LUA, and primarily within LSR.

[3]=The road and landing construction acres account for actions that would remove vegetation and trees and could affect spotted owl habitat. These can be permanent or temporary road construction, as well as road renovation and reconstruction.

Figure 6. Estimated Direct Effects to Spotted Owl Habitat by Alternative.



Summary Effects – Nesting-Roosting Habitat Development Summary

Table 55 in Appendix 6 summarizes the level of nesting-roosting development that could occur based on the prescriptions and the effects analyzed above. The ability for an action alternative to develop nesting-roosting habitat is based on the following factors: 1) acres of potential commercial treatment in non-NR habitat (foraging, dispersal-only, and capable habitat) (see Tables 2 and 19); 2) the acres of potential treatments within the RD range to reduce competition mortality and promote regeneration and canopy layering. These factors are also measured against what would happen to the baseline conditions within the Treatment Area without the application of the proposed actions described in the alternatives. A higher rating would be given to treatments that downgrade foraging or maintain dispersal-only habitat, including the Ecosystem Resilience-Intermediate and Spotted Owl Long-Term themes, because these RD retention ranges shows the greatest ability to improve the trajectory of the habitat development. Treatments with higher canopy cover retention of at least 60 percent (typically maintaining foraging habitat function) would be rated lower because as mentioned above, as RD targets increase without proposed treatments, regeneration and potentially layering would not develop in these stands. As noted in the Table 2, some action alternatives are proposing varying amounts of commercial thinning and with varying post-treatment RD target retention (or canopy cover retention), which would affect factors 1 and 2 listed above.

General Effects – Spotted Owl Critical Habitat

Table 55 in Appendix 6 summarizes the estimated effects to spotted owl critical habitat by project type. The same short-term adverse effects for long-term benefits described above, would also apply in critical habitat (see Appendix 6 for more details of these benefits). The proposed action would remove, downgrade, and modify, but maintain the function of all primary biological features (forest types, nesting-roosting, foraging, and dispersal). However, the potential reduction of spotted owl habitat would not alter the intended functions of critical habitat sub-units to provide demographic support to the overall population and to provide connectivity between subunits and critical habitat units. Incidental take of spotted owls would not occur under all action alternatives, so the proposed actions would not affect spotted owl occupancy at active sites. Therefore, the proposed actions would not affect the ability for the critical habitat subunits to provide demographic support.

The removal of dispersal habitat (NRF + dispersal-only) would not affect the intended connectivity function of the sub-units within the action area. Forest landscapes traversed by dispersing owls typically include fragmented mosaics of roads, clear-cuts, and non-forested areas, and a variety of forest age classes ranging from fragmented forests on cutover areas to old-growth forests. Spotted owls are able to move successfully through highly fragmented landscapes typical of the mountain ranges in western Washington and Oregon (Forsman, et al. 2002). Additional analysis of the effects from the proposed action to spotted owl dispersal function at the landscape scale can be found in Table 71 in Appendix 10.

The PRMP Biological Opinion concluded the proposed treatments in the PRMP/FEIS, to which this EA tiers, would retain greater quantities of older forest on the landscape by protecting LSRs from high-intensity wildfires and conifer and stand mortality from insect infestations. These treatments would provide a more diverse landscape and protect against losses of critical habitat, in which the FWS expects to result in a net habitat improvement for the spotted owl critical habitat (USDI FWS 2016, p. 641).

Effects by Action Alternative

Alternative A

Effects to Spotted Owl Habitat

Under Alternative A, commercial treatments would downgrade nesting-roosting or foraging habitat in the reserve LUAs, but not within the LSR. Nesting-roosting and foraging downgrade would be limited within the NSO Analysis Area and would only occur along operationally strategic areas for wildfire containment or within ¼ mile of Communities at Risk and nesting-roosting downgrade would only occur outside of the LSR. Additional acres of nesting-roosting, foraging, and dispersal-only habitat would be removed from landing construction (no new road construction would occur in Alternative A). The removal and downgrading of spotted owl habitat would result in an estimated 0.2 percent reduction of nesting-roosting, 1.8 percent reduction of foraging habitat, and a 2.7 percent increase in dispersal-only habitat within the NSO Analysis Area over an estimated 10-year scale. Approximately, 114,832 acres (99.8 percent) of nesting-roosting, 221,197 acres (98.2 percent) foraging habitat, and 162,316 (102.7 percent) of dispersal-only habitat would be retained within the NSO Analysis Area. The PRMP/FEIS accounted for habitat loss within the Western Oregon Planning Area and these percentages are immeasurable at the Western Oregon Planning Area and NSO Analysis Area scales.

Alternative A would also treat, but maintain nesting-roosting, foraging, and dispersal-only habitat function in all LUAs, primarily in non-commercial treatments. Approximately 10 percent of NR, 6 percent of foraging, and 10 percent of dispersal-only would be impacted. However, since habitat modification would not impact the function of the habitat, the overall habitat baseline within the NSO Analysis Area would not change.

Commercial treatments in the reserve LUAs and small diameter thinning in HLB would prevent the loss of spotted owl habitat from wildfire effects. These acres of treatment would also provide potential protection to adjacent spotted owl habitat, as well as making spotted owl habitat more resistant in some areas. Alternative A would reduce the potential acres of spotted owl habitat lost from wildfire effects in seven percent of the spotted owl habitat within the NSO Analysis Area by proposing 17,000 acres of commercial and 17,000 acres of non-commercial treatments over a 10-year period.

Effects to Nesting-Roosting Habitat Development

Overall, under Alternative A, the level of potential NR habitat development is low (Table 54) because the potential acres of treatment in non-NR habitat is low, especially in foraging habitat. The commercial treatments would be limited to operationally strategic areas for wildlife containment or within ¼ mile of Communities at Risk and plantations under 60 years old. However, treatments in plantations would have a higher likelihood for NR habitat development. Assuming all of the commercial treatments occur in the LSR LUA, Alternative A would treat up to 17,000 acres in a 10-year period (7 percent of the LSR in the NSO Analysis Area).

Effects to Spotted Owl Critical Habitat

The proposed treatments would result in a 1.2 percent reduction of NRF habitat and a 0.01 percent reduction of dispersal quality habitat (NRF + dispersal-only) in critical habitat in the NSO Analysis Area. However, as described above, the proposed removal and downgrade of nesting-roosting and foraging habitat and removal of dispersal-only habitat would not alter the intended function of providing connectivity within and between subunits because only 0.6 percent of NRF and 0.005 percent of the dispersal quality habitat would be reduced at the entire sub-unit scales. These changes are immeasurable at the sub-unit scale and therefore, would not affect the dispersal of owls between sub-units.

Alternative B

Effects to Spotted Owl Habitat

Under Alternative B, vegetation treatments would not remove or downgrade nesting-roosting or foraging habitat and would not remove dispersal-only habitat. Nesting-roosting, foraging, and dispersal-only habitat would be removed from road and landing construction. This would result in an estimated 0.04 percent reduction of nesting-roosting habitat, 0.05 percent of foraging habitat, and 0.2 percent of dispersal-only habitat within the NSO Analysis Area. Approximately, 114,986 acres (99.9 percent) of nesting-roosting habitat, 221,107 acres (99.9 percent) of foraging habitat, and 157,841 acres (99.8 percent) dispersal-only habitat would be retained within the NSO Analysis Area. The PRMP/FEIS accounted for habitat loss within the Western Oregon Planning Area and these percentages are immeasurable at the Western Oregon Planning Area and NSO Analysis Area scales.

The majority of the Alternative B treatments would treat, but maintain nesting-roosting, foraging, and dispersal-only habitat function (commercial in reserve LUAs and non-commercial in all LUAs). Approximately 7 percent of NR, 8 percent of foraging, and 16 percent of dispersal-only would be impacted. However, since habitat modification would not impact the function of the habitat, the overall habitat baseline within the NSO Analysis Area would not change.

Commercial treatments in the reserve LUAs and small diameter thinning in HLB would reduce the potential acres of spotted owl habitat lost from wildfire effects. These acres of treatment would also provide potential protection to adjacent spotted owl habitat, as well as making spotted owl habitat more resistant in some areas. Alternative B would reduce the wildfire potential in 10 percent of the spotted owl habitat within the NSO Analysis Area by proposing 20,000 acres of commercial and 30,000 acres of non-commercial treatments over a 10-year period.

Effects to Nesting-Roosting Habitat Development

Overall, under Alternative B, the level of potential NR habitat development is medium (Table 54) because the potential acres of treatment in non-NR habitat would retain more canopy, which would limit the ability for some stands to maximize regeneration, layering, and stand complexity. Alternative B would commercially treat up to 17,000 acres in a 10-year period in the LSR (7 percent of the LSR in the NSO Analysis Area).

Effects to Spotted Owl Critical Habitat

The proposed treatments would result in a reduction of 0.02 percent of nesting-roosting and foraging (NRF) and 0.06 percent decrease of dispersal quality habitat (NRF + dispersal-only) within critical habitat in the NSO Analysis Area. However, as described above, the proposed removal of nesting-roosting and foraging habitat and removal of dispersal-only habitat would not alter the intended function of providing connectivity within and between subunits because only 0.01 percent of the nesting-roosting and foraging and only 0.02 percent of dispersal quality habitat would be reduced at the entire sub-unit scales. These changes are immeasurable at the sub-unit scale and would not affect the dispersal of owls between sub-units.

Alternative C

Effects to Spotted Owl Habitat

Under Alternative C, the proposed action would remove and downgrade nesting-roosting and foraging habitat and remove dispersal-only habitat within the NSO Analysis Area. Nesting-roosting habitat removal in LSR would only occur from road and landing construction. The proposed action under Alternative C would result in a reduction of 0.4 percent of nesting-roosting, 2.9 percent of foraging habitat, and 2.5 percent increase of dispersal-only habitat within the NSO Analysis Area. Approximately, 114,537 acres (99.6 percent) of nesting-roosting habitat, 214,897 acres (97.1 percent) of foraging habitat, and 158,941 acres (102.5 percent) dispersal-only habitat would be retained within the NSO Analysis Area.

Alternative C would also modify, but maintain nesting-roosting, foraging, and dispersal-only habitat function. Approximately 9 percent of NR, 11 percent of foraging, and 35 percent of dispersal-only would be impacted. However, since habitat modification would not impact the function of the habitat, the overall habitat baseline within the NSO Analysis Area would not change. Additionally, approximately 23,595 acres of nesting-roosting habitat within the NSO Analysis Area would not be treated in late-closed stands and in high relative habitat suitability. These areas represent the best currently functioning nesting-roosting habitat on the landscape.

A long-term benefit of Alternative C would be creating resilient and resistant stands, especially in treatments in the Fuels Emphasis and Ecosystem Resilience-Open Themes, which would help protect spotted owl habitat. These acres of treatment would also provide potential protection to adjacent spotted owl habitat, as well as making spotted owl habitat more resistant in some areas. Alternative C would reduce the wildfire potential in 18 percent of the spotted owl habitat within the NSO Analysis Area by proposing 20,000 acres of commercial and 70,000 acres of non-commercial treatments over a 10-year period. As described in Section 3.3, proposed commercial thinning treatments in LSR and other reserve LUAs and small diameter thinning in all LUAs would increase resistance by reducing canopy fuels adjacent to large trees, reduce canopy bulk density, raise CBH, and reduce surface fuels. The proposed prescriptions would retain and promote a cohort of large diameter trees and reduce the threat and competition from adjacent fuels and vegetation to legacy trees. This would improve resistance to stand-replacing crown fire, as large trees are an important component of fire-resistant stand structure (Martinson and Omi 2013, USDI BLM 2016a, pp. 243, 252). The proposed treatments would provide greater influence to modify fire behavior and slow fire spread (Finney 2001) and provide greater protection to resources, such as spotted owl habitat (Ager et al. 2007). However, the effectiveness would vary by project because the exact placement of the treatments would vary by the project level site specific conditions. The ability of PRMP/FEIS alternatives to reduce the loss of spotted owl habitat from wildfires was incorporated into PRMP/FEIS analysis of the spotted owl issues and have already been analyzed in the PRMP/FEIS, to which this EA is tiered (USDI BLM 2016a, pp. 947, 928-973). All treatments would result in more vigorous trees and treated stands are likely to be more ecologically sustainable because residual stands would be less susceptible to suppression mortality, as well as mortality from insects and disease (see Section 3.2 and Appendix 4).

<u>Effects to Nesting-Roosting Habitat Development</u>

Even with the reduction of spotted owl habitat within the NSO Analysis Area, the proposed commercial treatments in the LSR would result in short-term adverse effects for long-term benefits. These benefits include accelerating the growth of non-nesting-roosting habitat to developing into nesting-roosting habitat (see Sections 3.2 and 3.6). Under Alternative C, the overall level of potential NR habitat development is high (Table 54) because the potential acres of treatment in non-NR habitat is higher and more stands would be treated at a lower RDI target, which would increase the ability for stands to maximize regeneration, layering, and stand complexity. Alternative C would commercially treat up to 17,000 acres in a 10-year period in the LSR (seven percent of the LSR in the NSO Analysis Area).

<u>Effects to Spotted Owl Critical Habitat</u>

The proposed treatments would result in a 2 percent reduction of nesting-roosting and foraging (NRF) habitat and a 1.3 percent decrease of dispersal quality habitat (NRF + dispersal-only) within critical habitat in the NSO Analysis Area. However, as described above, the proposed removal and downgrade of nesting-roosting and foraging habitat and removal of dispersal-only habitat would not alter the intended function of providing connectivity within and between subunits because only 1 percent of the nesting-roosting and foraging and only 0.45 percent of the dispersal quality habitat would be reduced at the entire sub-unit scales. These changes are immeasurable at the sub-unit scale and therefore, would not affect the dispersal of owls between sub-units.

Conclusion and Cumulative Effects

The potential loss of spotted owl habitat from the action alternatives would not preclude spotted owls from nesting-roosting, foraging, or dispersing within the NSO Analysis Area. Treatments would be dispersed across the NSO Analysis Area and overall amounts would be limited per year so as to temporally and spatially distribute the impacts. The PRMP/FEIS, to which this EA tiers, analyzed the effect of harvest on

NSO habitat together with the effects of other RMP decisions and concluded that implementation of the SWO ROD/RMP as a whole would contribute to a landscape that supports large blocks of NSO habitat that are capable of supporting clusters of reproducing owls, distributed across a variety of ecological conditions and spaced to facilitate owl movement between the blocks (USDI BLM 2016a, pp. 932-941). The FWS confirmed in their Biological Opinion on the RODs/RMPs that these analyses are a reasonable approach to assessing NSO habitat change in the Planning Area resulting from timber harvest, ingrowth, and wildfire because it reflects the application of best available science and the acreages of land that will be subject to the range of management activities in the LUAs in the RODs/RMPs (USDI FWS 2016, p. 603). The PRMP/FEIS Biological Opinion, also concluded that because the majority of the reserve LUAs are within designated NSO critical habitat, there would be substantial ingrowth of nesting-roosting habitat in critical habitat over the long-term. Of the three action alternatives, Alternative C would provide the greatest ability to increase NR habitat over the long-term by commercially treating more foraging, dispersal-only, and capable habitats.

When the estimated acres of spotted owl habitat reduction from the action alternatives are added to the potential effects from foreseeable actions as described in the No Action Alternative section above, the overall habitat loss within the NSO Analysis Area is not expected to exceed the increase of mature and structurally-complex habitat treatment (comparable to nesting-roosting, foraging, and dispersal-only habitat) considered in the PRMP/FEIS through 2033 (USDI BLM 2016a, pp. 841-843). Additionally, the PRMP/FEIS modeling assumed that 50 percent of the LSR LUA acres in Medford and Klamath Falls districts would be treated in the first 5 decades (USDI BLM 2016a, p. 1215; additional relevant modeling assumptions on p 1196). The Medford District has completed 2,690 acres of commercial harvest projects within the LSR LUA since 2016 (including projects planned under the 1995 RMP that are now located in the 2016 LSR LUA). The acres harvested were completed consistent with transition planning per the SWO ROD/RMP, pp. 9-13). Even when the maximum acres of commercial treatment proposed in LSR LUAs under Alternatives B and C (up to 17,000 in 10-years) are added to the previous LSR treatments and future foreseeable treatments (estimated less than 5,000), the cumulative total treatment in the LSR would be estimated to treat approximately 9.4 percent of the LSR LUA on the Medford District in the next 10-years. Additionally, when considering the completed actions, the planned actions, the actions proposed under the EA, and the 2016 RMP decadal target, approximately 42 percent of the LSR LUA on the Medford District would be treated in the next 45 years (currently 5 years into the 2016 RMP). This would be below the modeled assumption of treating 50 percent of the LSR on the Medford District by 2063 (USDI BLM 2016a, p. 1215; additional relevant modeling assumptions on p. 1196). The alternatives proposed in the EA are consistent within the PRMP/FEIS and are within the effects analyzed in the PRMP/FEIS Biological Opinion, which concluded that the PRMP/FEIS was not likely to jeopardize the continued existence of the spotted owl, and was not likely to adversely modify spotted owl critical habitat (USDI FWS 2016, p. 703). This conclusion was based on several factors, including the protection and development of spotted habitat in the LSR and RR LUAs is expected to offset the effects of delaying or precluding the development of habitat in the HLB (USDI FWS 2016, pp. 703-706).

3.6 Would Forest Management Treatments in the Late-Successional Reserves Speed the Development and not Preclude or Delay by 20 Years or More the Development of Northern Spotted Owl Nesting/Roosting Habitat?

3.6.1 Methodology

The analysis for this issue will assess how each alternative, specifically the commercial treatments in LSR (including thinning canopy to 40 percent or less and up to 4-acre group selection openings), meets the following LSR LUA management direction (listed as one of the Needs for action in Section 1.4). "In stands that are not NSO nesting-roosting habitat, apply silvicultural treatments to speed the development of NSO nesting-roosting habitat or improve the quality of NSO nesting-roosting habitat in the stand or in 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 NSO nesting-roosting habitat in the stand and in 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." (USDI BLM 2016b, p. 72).

This analysis used the three types of NSO habitat: Nesting-Roosting (NR), Foraging (F), and Dispersal-Only (DO) habitat (see Appendix 6 for detailed definitions) to address the current and future conditions of modeled stands. Because treatment locations are unknown at the programmatic scale, three stands categorized as either foraging or dispersal-only habitat were selected across the Medford District for analytical purposes to represent examples of dry forest stands that would receive treatment under each alternative. These three stands were selected because habitat field evaluation and stand plot data were available. The BLM selected stands located in *high* RHS for modeling (Appendix 7) because these were used to represent areas with better site productivity and are in a location on the landscape (slope and aspect positions) where spotted owls would likely use for nesting in the future, once nesting-roosting habitat develops.

Stand-level inventory plot data for these three selected stands were processed and modeled in ORGANON, a tree growth and yield simulator. Growth for each representative stand was modeled through time under a no treatment scenario and three treatment scenarios based on the proposed action: RD targets of 30 percent, 40 percent, and 45 percent (Long-Term Spotted Owl Theme, Ecosystem Resilience-Intermediate Theme, Alternatives A and B thinning prescriptions, Ecosystem Resilience-Intermediate Theme, and Ecosystem Resilience-Closed Theme, and the Spotted Owl Near-Term Theme). See Table 15 for details on how the modeled treatment scenarios correspond to the various prescriptions in the action alternatives. The models used proportional thinning, which removed a range of tree sizes during the simulated treatments.

The metrics for nesting-roosting habitat (see Appendix 6 for definitions) were used to determine when these stands reached nesting-roosting conditions when modeled into the future because this specific management direction is about achieving nesting-roosting habitat (USDI BLM 2016b, p. 72). The treated stands were then modeled for additional 20 years of growth to determine if there was a delay beyond 20 additional years in the treated stands.

The Ecosystem-Open and Fuels Emphasis themes were not modeled to determine if they would delay development of spotted owl nesting-roosting habitat by 20 years because these treatments are not designed to speed the development of spotted owl nesting-roosting habitat. The objectives of these treatments are to increase resilience of forest stands to wildfire, drought, and insects. These areas are typically in dry forest types, south facing, on ridges, upper thirds of the slopes, or in strategic areas for reduction of fuels, which also coincide with areas of low relative spotted owl habitat suitability and are in a location that would not support spotted owl nesting over the long-term.

The analysis of indirect, direct, and cumulative effects for this issue will be at the stand level. See the analysis in Section 3.5 to see the effects from the proposed actions on spotted owl habitat within the LSR LUA.

3.6.2 Assumptions

The stand modeling applied several assumptions to the treated and untreated stands:

- Outside influences that could occur in the future (i.e., mortality from insects/disease, fire, windthrow, or new land management policies) are not included because these were unknown and difficult to predict.

  Only one single entry of commercial thinning was modeled during the timeframes (50 years in the foraging stands and 70 years in the dispersal-only stand). The PRMP/FEIS “modeling team modeled the application of a combination of group selection (patch cut) harvests and thinning to various stand components at intervals of 40-50 years, depending on site productivity" (USDI BLM 2016a, p. 1196). The dispersal-only stand was modeled to 70 years because it had taken 50 years under the No Action Alternative to qualify as nesting roosting. This is likely due to the stand having low site productivity and was likely stagnated due to competition. No additional understory small diameter thinning, or prescribed fire treatments were applied to the stand modeling.

- ORGANON does not generate artificial or natural regeneration. It is assumed that post-treatment as new growing space is created, a new cohort would grow in through time and provide bottom and middle layers which would contribute towards canopy cover. Treatments would include portions of the stand in skips and portions of the stand in group selection openings (gaps). Nabel (2013) describes the important role that gaps play in development of structurally-complex stands which include not only "perpetuating shade intolerant species, but also in promoting the rapid growth of climax species into positions in the midstory, leading to greater structural diversity" (Nabel et al 2013, p. 107). Based on Bailey and Tappeiner (1997) and empirical evidence on the Medford District, the BLM assumes a range of at least 10-20 percent additive canopy cover with natural regeneration post-harvest (specifically for the treatment to 30 percent RD) grown 50 years and at least 10 square feet of additive basal area. See Appendix 7 for more information about regeneration assumptions applied to the modeling results.

- Skips and group selection openings would be factored into the overall residual RD at the stand scale. At least 10 percent of the stand would be in skips and no more than 25 percent of the stand would be in group selection openings (USDI BLM 2016b, p. 72), in stands that are 10 acres or greater in size.
- As indicated in Table 1 the commercial harvest acres proposed in the alternatives would occur in reserve LUAs. The majority of these commercial harvest acres would occur within the LSR (Table 2).

3.6.3 Measurement Indicators

As described above, stand metrics such as canopy cover, basal area, tree size, trees per acre, and canopy layering are used to describe and define spotted owl habitat. Certain metrics such as snags and coarse woody debris cannot be predicted using the ORGANON and other models available to the BLM. However, the remaining habitat elements, such as tree DBH, canopy cover, basal area, and large tree DBH metrics are available in ORGANON and will be used to analyze this issue because they are important habitat elements to predict spotted owl use. As noted in Appendix 6, in southwestern Oregon nesting-roosting habitat are conifer stands with a multi-layered, multispecies canopy dominated by large conifer overstory trees, canopy cover ≥ 60 percent, overstory tree diameter of ≥21 inches DBH, ≥12 trees with 20 inches or greater DBH trees/acre, QMD ≥ 15 DBH, basal area from 180 to 240 feet^2/acre (most often greater than 240 feet^2/acre), and a basal area from larger trees of ≥ 30 feet^2 for trees ≥ 26 inches DBH. These metrics will be used to determine when the three representative stands would develop into nesting-roosting habitat after treatment, compared to no treatment. These conditions will also be measured overtime for comparison. The effects descriptions below summarize the ability of the treatments to improve the development of nesting-roosting habitat, while ensuring the development would not be delayed by 20 years, as directed in the SWO ROD/RMP, based on these measurement indicators.

3.6.4 Affected Environment

There are approximately 238,664 acres of LSR LUA acres on BLM-administered lands within the NSO Analysis Area, which is 30 percent of the total BLM-administered lands within the NSO Analysis Area. Of these LSR acres, 55,402 are NR habitat and 183,262 are non-NR habitat (foraging, dispersal-only, capable, and non-habitat) (Table 20).

Table 20. Spotted Owl Habitat Conditions within the LSR LUA on the Medford District.

LSR	Nesting-Roosting	Foraging	Dispersal	Capable	Non-habitat	Total
Medford District	55,402	74,939	43,396	55,432	9,494	238,664

Foraging, dispersal-only, and capable habitat are generally simple stands and lack the diversity, structure, layering, large trees, higher canopy cover, and other important habitat elements required to function as nesting-roosting habitat. These stands have the potential for eventually developing into nesting-roosting habitat. However, as described in Appendix 3, the current forest conditions limit the extent of nesting-roosting habitat, increase the risk of their loss to wildfire, and delay and hinder the development of new nesting-roosting habitat.

3.6.5 Environmental Effects

No Action Alternative

As described in Section 2.1 the No Action Alternative would not implement any aspect of the action alternatives in the Treatment Area. Therefore, vegetation growth rates, stand densities, fuel conditions, the ratio of open and closed forest, would continue to change based on current existing forces and disturbance, or lack thereof. See the No Action Alternative analysis in Sections 3.2, 3.3, and 3.4 for the effects to landscape resilience and the changes to seral conditions, stand level fire resistance, and wildfire risk. Since the analysis of this issue is at the stand scale, the No Action Alternative describes the results of the three modeled stands under a no treatment scenario, which includes no commercial harvest, small diameter thinning, or hand pile/understory burning. Under the No Action Alternative, the modeled foraging stands would take 30 years to develop into nesting-roosting habitat without treatment and it would take 70 years for the modeled dispersal-only (Table 21). Modeling showed that over time, these stands exhibited growth in canopy cover, overstory tree DBH, basal area, and number of large trees per acre similar to nesting-roosting habitat metrics.

Table 21. Stand Metrics for the Sample Stands Modeled No Treatment.

Stand Metrics for the Sample Stands Modeled No Treatment						
	Canopy Cover (%)	**Basal Area (feet^2)**	**Mean Diameter**	**Quadratic Mean Diameter**	**Trees > 20" DBH / Acre**	**Basal Area Trees ≥ 26" DBH**
Nesting Roosting Target Conditions	**≥ 60 %**	**180-240 feet^2**	**≥ 21"**	**≥15"**	**≥ 12**	**≥ 30 feet^2**
Sample Foraging Stand A – Current Condition	65	195	13.1	15.2	24.2	33
Sample Foraging Stand A No Treatment in 30 Years	69	254	16.5	18.3	42.2	64
Sample Foraging Stand B – Current Condition	65	226	16.7	18.8	40.6	110
Sample Foraging stand B No Treatment in 30 years	68	275	19.2	21.3	47.6	163
Sample Dispersal-Only Stand – Current Condition	68	196	10.5	12	6.9	13
Sample Dispersal-Only – No Treatment in 70 Years	72	269	14.9	16.2	30.2	43

Action Alternatives

The modeling results of the treated stands are summarized below, but the detailed results can be found in Appendix 7.

Effects from 30 Percent RD Retention Levels

The modeling of the post-harvest RD retention target of 30 percent is designed to represent prescriptions in the Long-Term Spotted Owl Theme and lower end of the Ecosystem Resilience-Intermediate Theme. Even though the Ecosystem Resilience-Intermediate prescription includes a range of post-harvests RD, for analysis purposes, the low end of the range was analyzed to ensure the worst-case scenario is considered.

The 30 percent RD retention level in foraging and dispersal-only habitat would reduce habitat quality in the short-term but would not delay or preclude the development of nesting-roosting habitat by more than 20 years. When the treated stands are grown 20 years after reaching nesting-roosting without treatment, the stands would meet or exceed the minimum habitat elements to function as NR habitat (Table 22), except for canopy cover and basal area (Stand B and in the dispersal-only stand). As mentioned above, based on Bailey and Tappeiner (1997) and empirical evidence on the Medford District, the BLM assumes a range of at least 10-20 percent additive canopy cover with natural regeneration post-harvest grown 50 years and at least 10 square feet of additive basal area, which would contribute to attaining nesting roosting standards for canopy cover and basal area. Additionally, dry forest, stands with less than 60 percent canopy cover (but greater than 40 percent), can function as nesting-roosting habitat if there are 6 or more trees 30 inches DBH per acre (Zabel 2003). The modeled foraging stand A has approximately 7 trees greater than 30 inches DBH per acre and stand B has approximately 15.8 trees greater than 30 inches DBH per acre. It is also important to note that effects to nesting-roosting habitat function does not rely on how only one habitat element is affected (i.e., canopy cover), but rather how all interrelated habitat elements are impacted, so one element is not more important than the other. Even though the canopy cover may not be at the minimum target (without factoring in regeneration), other important habitat elements would be met in the treated stands. The treated modeled foraging stands show the development of multilayered stands with a wide range of diameters displayed in the diameter distribution graph (Appendix 7, Figures 17 and 18). This modeling only represents one sample Dispersal-only stand is in a drier site with a current condition limited in structural habitat elements, such as trees > 40 inches DBH. It is likely stands in a location with higher site productivities and existing structural elements would be able to achieve the minimum NR thresholds within the 20-year timeframe, without relying on natural regeneration.

Table 22. Stand Metrics for the Sample Stand Modeled for a Treatment of 30% RDI.

Stand Metrics for the Sample Stand Modeled for a Treatment of 30% RDI						
	Canopy Cover (%)	**Basal Area (feet^2)**	**Mean Diameter**	**Quadratic Mean Diameter**	**Trees > 20" DBH / Acre**	**Basal Area Trees ≥ 26" DBH**
Nesting Roosting Target Conditions	**≥ 60 %**	**180-240 feet^2**	**≥ 21"**	**≥15"**	**≥ 12**	**≥ 30 feet^2**
Sample Foraging stand A – Current Condition	65	195	13.1	15.2	24.2	33
Sample Foraging stand A No Treatment in 30 years	69	254	16.5	18.3	42.2	64
Sample Foraging A– Treatment in 50 years	50	174	20.5	22.3	35	78
Sample Foraging stand B – Current Condition	65	226	16.7	18.8	40.6	110
Sample Foraging stand B No Treatment in 30 years	68	275	19.2	21.3	47.6	163
Sample Foraging B – Treatment in 50 years	44	180	29.1	30.3	28.6	139
Sample Dispersal-Only stand – Current Condition	68	196	10.5	12	6.9	13
Sample Dispersal-Only – No Treatment in 70 years	72	269	14.9	16.2	30.2	43
Sample Dispersal-Only – Treatment in 90 years	52	181	16.9	18.5	27.2	55

Effects from 40 Percent RD Retention Levels

The modeling of the post-harvest RD retention target of 40 percent represents the upper end of Alternative A thinning prescription, upper end of Ecosystem Resilience-Intermediate Theme, and lower end of Ecosystem Resilience-Closed. Even though the Ecosystem Resilience-Closed prescription includes a range of post-harvests RD, for analysis purposes, the low end of the range was analyzed to ensure the worst-case scenario is considered.

The 40 percent RD retention level in foraging and dispersal-only habitat would reduce habitat quality in the short term but would not delay or preclude the development of nesting-roosting. When the treated stands are grown to 20 years after the stands would reach nesting-roosting without treatment, most habitat elements would still remain (Table 23). The modeling data indicate all necessary NR habitat elements would be achieved, except canopy cover in the treated foraging stand B. As described above, based on Bailey and Tappeiner (1997) and empirical evidence on the Medford District, at least 10-20 percent additive canopy cover from natural regeneration post-harvest would contribute to attaining functioning nesting-roosting habitat. Even though the treated and untreated stands do not meet the minimum mean diameter in 30 or 50 years, all stands meet or exceed the quadratic mean targets and trends show an increase in diameters with treatment (Table 25). The diameter distributions of the untreated stands in comparison to the treated stands display a consistent pattern with a wide range of diameter classes, which indicate the stands are achieving the desired multi-layering structure to support nesting-roosting function (Appendix 7, Figures 20-22).

Table 23. Stand Metrics for the Sample Stand Modeled for a Treatment of 40% RDI.

Stand Metrics for the Sample Stand Modeled for a Treatment of 40% RDI						
	Canopy Cover (%)	Basal Area (feet^2)	Mean Diameter	Quadratic Mean Diameter	Trees > 20" DBH / Acre	Basal Area Trees $\geq$ 26" DBH
Nesting Roosting Target Conditions	**$\geq$ 60 %**	**180-240 feet^2**	**$\geq$ 21"**	**$\geq$15"**	**$\geq$ 12**	**$\geq$ 30 feet^2**
Sample Foraging stand A – Current Condition	65	195	13.1	15.2	24.2	33
Sample Foraging stand A No Treatment in 30 years	69	254	16.5	18.3	42.2	64
Sample Foraging A– Treatment in 50 years	59	218	19.1	21	40.3	88
Sample Foraging stand B – Current Condition	65	226	16.7	18.8	40.6	110
Sample Foraging stand B No Treatment in 30 years	68	275	19.2	21.3	47.6	163
Sample Foraging B – Treatment in 50 years	54	222	24	26	34.1	152
Sample Dispersal-Only stand – Current Condition	68	196	10.5	12	6.9	13
Sample Dispersal-Only – No Treatment in 70 years	72	269	14.9	16.2	30.2	43
Sample Dispersal-Only – Treatment in 90 years	62	223	16.2	17.6	28.9	54

Effects from 45 Percent RD Retention Levels

The modeling of the post-harvest RD retention target of 45 percent represents the Alternative B thinning prescription to maintain nesting-roosting and foraging habitat, the upper end of the Ecosystem Resilience-Closed prescription Theme, and the Spotted Owl Near-Term prescription theme. Even though the Spotted Owl Near-Term and Alternative B thinning prescriptions may include post-harvests RD above 45 percent, for analysis purposes, the low end of the range was analyzed to ensure the worst-case scenario is considered.

The 45 percent RD retention level in foraging and dispersal-only habitat would reduce habitat quality in the short term, but would not delay or preclude the development of nesting-roosting by 20 years. When the treated stands are grown to 20 years after the stands would reach nesting-roosting without treatment, most habitat elements would still remain. The data displayed in Table 24 indicate all necessary NR habitat elements would be achieved, except canopy cover in the treated foraging Stand B. However, as mentioned above, based on Bailey and Tappeiner (1997) and empirical evidence on the Medford District, the BLM assumes a range of at least 10-20 percent additive canopy cover with natural regeneration post-harvest, which would make up the deficit canopy.

Table 24. Stand Metrics for the Sample Stand Modeled for a Treatment of 45% RDI.

Stand Metrics for the Sample Stand Modeled for a Treatment of 45% RDI						
	Canopy Cover (%)	Basal Area (ft^2)	Mean Diameter	Quadratic Mean Diameter	Trees > 20" DBH / Acre	Basal Area Trees ≥ 26" DBH
Nesting Roosting Target Conditions	≥ 60 %	180-240 $feet^2$	≥ 21"	≥15"	≥ 12	≥ 30 $feet^2$
Sample Foraging stand A – Current Condition	65	195	13.1	15.2	24.2	33
Sample Foraging stand A- No Treatment in 30 years	69	254	16.5	18.3	42.2	64
Sample Foraging A– Treatment in 50 years	63	242	19.8	21.3	42.3	85
Sample Foraging stand B – Current Condition	65	226	16.7	18.8	40.6	110
Sample Foraging stand B- No Treatment in 30 years	68	275	19.2	21.3	47.6	163
Sample Foraging B – Treatment in 50 years	59	244	22.9	25	37.8	134
Sample Dispersal-Only stand – Current Condition	68	196	10.5	12	6.9	13
Sample Dispersal-Only – No Treatment in 70 years	72	269	14.9	16.2	30.2	43
Sample Dispersal-Only – Treatment in 90 years	65	242	17	18.2	30.4	55

Summary of Effects from the Proposed Prescriptions

The modeling demonstrates that habitat elements (layering, large trees, moderate canopy cover, higher basal area, etc.) would still be present in the stands under all treatment prescriptions (at varying levels) and the proposed treatments would not eliminate these habitat features from the stand. Additionally, based on the diameter distribution the stands are developing multi-layering conditions, which would be consistent with treatment recommendations that may accelerate the development of spotted owl nesting habitat in the 2011 Revised Recover Plan for the Northern Spotted Owl (Wimberly et al. 2004; Andrews et al 2005, as cited in USDI FWS 2011).

The prescriptions would also improve habitat conditions for spotted owls in the long-term (30 or more years) by accelerating the development of structural complexity, biological diversity, and nesting-roosting habitat. For example, the modeling results show that all prescriptions in foraging stands would increase tree diameter sizes faster than when compared to the no treatment scenarios (Table 25).

The increased tree growth would help develop other suitable wildlife habitat characteristics, such as large limbs and crowns. All LSR commercial prescriptions would promote and retain large trees, increase or maintain species diversity, create and maintain hardwoods, retain coarse woody material, and retain and create snags, which would prevent the delay of nesting-roosting habitat development by more than 20 years. Bailey and Tappeiner (1997, p. 111) found that treatments designed to purposely favor legacy structures (large remnant trees, snags, and downed wood) and/or overstory hardwoods, would further hasten development of old-growth forest characteristics. This is evident in the stand modeling, especially with stands that have existing large tree structure prior to treatment. Additionally, the Medford District has several stands where past vegetation management treatments had short term negative effects to spotted owl habitat but are now starting to show a trend towards long-term benefits to spotted owl habitat. Based on their professional judgment and field collected stand data, the Medford District silviculture group has identified examples of stands where the past treatment put the stands on a trajectory towards improving spotted owl habitat in the future. These stands showed an improvement in multiple habitat elements, such as improved tree growth, increased canopy layering, increased basal area, and greater species and structural diversity. The supporting empirical evidence on the Medford District also demonstrates the ability for these prescriptions to improve non-NR habitat (see Summary in Appendix 7).

This is also consistent with the Biological Opinion for the Western Oregon RMP, which predicted that thinning in the LSR and other reserve LUAs would benefit spotted owls by increasing the speed of development of spotted owl habitat compared to not managing these types of stands (USDI FWS 2016, p. 605).

Table 25. Diameter Growth for the Sample Stands – All Treatments.

Diameter Growth for the Sample Stands – All Treatments						
	Foraging Stand A		Foraging Stand B		Dispersal-Only Stand	
	Mean Diameter	Quadratic Mean Diameter	Mean Diameter	Quadratic Mean Diameter	Mean Diameter	Quadratic Mean Diameter
Current Condition	13.1	15.2	13.1	15.2	10.5	12
No Treatment in 30 years (F)/70 years (DO)	16.5	18.3	19.2	21.3	14.9	16.2
No Treatment in 50 years (F)/ 90 years (DO)	18.5	20.5	27.4	28.6	13.1	14.8
RD 0.30 Treatment in 50 years (F)/ 90 years (DO)	20.5	22.3	29.1	30.3	16.9	18.5
Increased Diameter Growth in Treated Stands	**+2**	**+ 1.8**	**+ 1.7**	**+ 1.7**	**+ 3.8**	**+3.7**
No Treatment in 50 years (F)/ 90 years (DO)	17	19.1	22.4	24.4	12.7	14.2
RD 0.40 Treatment in 50 years (F)/ 90 years (DO)	19.1	21	24	26	16.2	17.6
Increased Diameter Growth in Treated Stands	**+ 2.1**	**+ 1.9**	**+ 1.6**	**+ 1.6**	**+ 3.5**	**+ 3.4**
No Treatment in 50 years (F)/ 90 years (DO)	17.8	19.5	21.4	23.4	13.5	14.7
Sample RD 0.45 Treatment in 50 years (F)/ 90 years (DO)	19.8	21.3	22.9	25	17	18.2
Increased Diameter Growth in Treated Stands	**+ 2**	**+ 1.8**	**+ 1.5**	**+ 1.6**	**+ 3.5**	**+ 3.5**

Alternative A

Effects to 20 Year Impact to Nesting-Roosting Habitat Development

Under Alternative A, treatments in operationally strategic areas for wildlife containment or within ¼ mile of Communities at Risk may impact the development of nesting-roosting habitat. These treatments may improve stand and habitat structure, but the treatments are in a location that would not support spotted owl occupancy and nesting over the long-term (generally warmer upper third of the slope, ridges, or south facing). Alternative A would also treat plantations under 60 years old. These plantations are typically dispersal-only habitat or capable habitat.

As shown above, the proposed RD target under Alternative A may reduce dispersal-only habitat quality in the short term, but the proposed actions would improve habitat conditions in the long-term and would not delay or preclude the development of nesting-roosting by 20 years.

Alternative B

Effects to 20 Year Impact to Nesting-Roosting Habitat Development

Under Alternative B, the proposed actions would treat, but maintain the function of foraging and dispersal-only habitat. Therefore, the proposed treatments would not set back or preclude the development into nesting-roosting habitat by more than 20 years when compared to no treatment. However, under these prescriptions the stands would have a greater risk of approaching the RDI stand density of 55 percent in the future and be at a higher risk for suppression competition related mortality (Drew and Flewelling, 1979). For example, for the treated foraging stands modeled at 45 percent RDI, the RDI at 50 years was 62 percent at stand A and 59 percent at stand B.

Alternative C

Effects to 20 Year Impact to Nesting-Roosting Habitat Development

Under Alternative C, the proposed action would thin non-nesting-roosting stands to a RD between 30-45 percent. As described above, under all prescriptions used in Alternative C, would reduce habitat quality in the short term. However, the likelihood of setting the stand back in the development of nesting-roosting habitat function by 20 years is low because the important habitat elements (layering, large trees, moderate canopy cover [not to NR targets yet], higher basal area, etc.) would still be present in the stands and would not be completely removed. These elements would provide the important structure for the future development of nesting-roosting habitat function. The analysis relied on only three examples of representative stands and the ability of a stand to develop into nesting-roosting habitat really depends on the site-specific starting elements of a stand. Additionally, individual projects would adjust prescriptions as needed (within the RD range in the appropriate treatment theme location) to reach the desired outcome and not delay the development of nesting-roosting by 20 years when compared with not treating the stand.

Conclusion and Cumulative Effects

At the stand level, there would be no cumulative effects because no additional treatments under the IVM-RL are proposed in areas designed to develop nesting-roosting habitat. Additional small diameter thinning or burning would not occur because those treatments would affect the lower canopy layers and multi-layered structure intended to develop under the commercial harvest entry.

The action alternatives would increase acres of nesting-roosting habitat in the LSR within the Medford District up to 18 percent, by commercially treating foraging and dispersal-only habitat (see analysis in Section 3.5) within the LSR LUA in the Treatment Area. As described above, the prescriptions would put non-nesting-roosting habitat on the trajectory of developing nesting-roosting habitat in the future. BLM's PRMP/FEIS considered the overall effects to NSO habitat of implementing the PRMP/FEIS, which also includes commercial harvest in the HLB for providing for a sustained supply of timber (USDI BLM 2016a, pp. 928-998). When added to the present and future foreseeable actions, including commercial timber harvest on HLB, the BLM concludes in the PRMP/FEIS, to which this EA is tiered, that implementation of the SWO ROD/RMP as a whole would contribute to a landscape that supports large blocks of NSO habitat that are capable of supporting clusters of reproducing owls, distributed across a variety of ecological conditions and spaced to facilitate owl movement between the blocks (USDI BLM 2016a, pp. 932-941). Those analyses are incorporated here by reference. The proposed actions described above would develop nesting-roosting habitat, which would contribute to the large block development across the NSO Analysis Area. Additionally, existing nesting-roosting habitat would be retained (both treated stands that maintain habitat function and untreated stands) within the Treatment Area under all action alternatives, which would continue to provide nesting-roosting habitat across the landscape as the treated areas are developing into nesting-roosting habitat (99.8 percent in Alternative A, 99.9 percent in Alternative B, and 99.9 percent in Alternative C). All actions on the Medford District in the LSR would follow SWO ROD/RMP management direction and therefore the overall effect of implementing the SWO ROD/RMP has been analyzed in the PRMP/FEIS cumulative effects and as described above at the landscape level (see No Action Alternative and cumulative effects analysis in Section 3.5).

3.7 How Would the Proposed Forest Vegetation Treatments and Road Building Affect the Pacific Marten (also Known as "Coastal" Marten)?

3.7.1 Methodology

The coastal marten **(**the coastal sub-species of the Distinct Population Segment [DPS] of Pacific marten) was federally-listed as threatened under the ESA by the FWS on October 8, 2020 (effective November 9, 2020) (USDI FWS 2020c) Critical habitat was proposed for the coastal marten by the FWS on October 25, 2021 (USDI FWS 2021f) (see Appendix 6 for a summary analysis of the proposed critical habitat). The analysis for this issue evaluates changes to the coastal marten habitat baseline from the proposed actions in the No Action Alternative and three action alternatives. This methodology will describe the categories of coastal marten habitat, the factors in determining effects to coastal marten habitat, and the scales of analysis used to compare the changes between alternatives.

Coastal martens are associated with two vegetation types within the Treatment Area: mature mesic complex forests and mesic forests with serpentine habitats with dense shrub cover. Mixed conifer/mesic habitats consist of mature and older conifer–dominated forests containing dense, evergreen shrub layers, and an abundance of large, downed logs, and large, decadent live trees and snags (Slauson 2003, p. 62). Within serpentine habitats, consist of stands with sparse tree cover and those characterized as 'shrub' and 'old seral stages. Marten areas have been found to contain tree canopy closures ranging from 20-70 percent and include shrubs of any seral stage (Slauson et al 2019, pp. 51-53). Serpentine habitats contained fewer large logs but included more boulder piles and rocky outcrops (Slauson et al. 2007, p. 465; Slauson and Zielinski 2009, pp. 40-42).

For the purpose of this analysis, the Medford District used a habitat suitability model developed by Keith Slauson that divides the marten analysis area into a late-successional mesic forest type and a serpentine forest type within the marine influence zone (Slauson et al. 2018). This model contains an old growth structural index at the one km scale, serpentine habitat at the three km scale, and an annual precipitation index (more or less rain) at the one km scale. It correctly classified 91 percent of all marten detections, and correctly classified non-detections at 82 percent; however, this model (using the one km old growth variable) may overestimate the amount of suitable habitats at the stand level as it cannot detect the understory/brush layer within stands. This is a very coarse scale model used to analyze habitat within the extant population areas (EPAs) and for the portion of the marten analysis area. It does not identify key habitat elements at the stand scale, such as a dense understory brush layer, and large snags and logs. These habitat features support coastal marten denning and resting habitat. Denning habitat includes large diameter woody structures with natal and maternal dens found in snags, live trees, and downed logs. Resting habitat includes large diameter live trees with large horizontal limbs, standing snags with cavities, and downed hollow logs.

In the proposed and final rules, the FWS identified four EPAs within coastal Oregon and northern coastal California based on the distributions of current verifiable marten detections and adjacent suitable. Portions of two of these EPAs are within the Treatment Area: the Southern Coastal Oregon (SCO) and the California Oregon (CAOR) (USDI FWS 2018a). The CAOR is within a portion of the Coos Bay District that is managed by the Medford District. The analysis area for evaluating impacts to coastal marten includes all of the BLM-administered lands within the SCO and CAOR EPAs buffered by 0.54 miles (0.874 km), which represents a buffer of the mean area of female home ranges (Moriarty and Delheimer, unpublished report 2019, Table 3). This marten analysis area is used to represent areas of potential marten occupancy where direct, indirect, and cumulative effects could occur to martens from the proposed actions (Map 12).

The effects of the proposed vegetation treatment to coastal marten habitat depends on the residual overstory, the residual decadence of standing and down wood, the canopy complexity, and amount of understory or brush layer impacted. For this analysis, the effects to marten will be assessed by the amount of acres of treatment in each modeled habitat type (mesic, serpentine, and low suitability) within each EPA by alternative.

3.7.2 Assumptions

- The EA sets a 10-year period for proposed treatment acres by alternative (Table 2). However, this analysis uses a 50-year time frame to assess direct effects to the coastal marten from the proposed actions, as well as to account for both the duration of habitat loss and the development of new habitat.
- Unlike spotted owls, there are limited studies available so thresholds describing habitat removal, downgrading, or maintaining habitat function have not been established. Therefore, this analysis will assume that all treatments will remove habitat function because the least impactful treatments to the spotted owl, such as small diameter thinning, understory burning and light thinning (Near-Term NSO prescription), could simplify stands in particular, the brush and understory which could cause marten to avoid those areas. However, this likely overestimates the effects to coastal marten.
- As indicated in Table 2, the commercial harvest acres proposed in the alternatives would occur in reserve LUAs. The majority of these commercial harvest acres would occur within the LSR LUA.

3.7.3 Measurement Indicators

The changes to the total coastal marten habitat within the analysis area will be used to compare the effects to coastal marten by alternative. These effects will be measured by acres and the percent change to the affected environment conditions from the proposed actions will be used to compare the differences between the proposed alternatives.

3.7.4 Affected Environment

Baseline habitat acres based on the Slauson 2018 model within the coastal marten analysis area are displayed in Table 26 below.

Table 26. Coastal Marten Habitat Baseline (Slauson 2018 model) for the Marten Analysis Area.

	Total Acres	Serpentine Habitat		Mesic Habitat		Low Suitability Habitat	
		Acres	%	Acres	%	Acres[1]	%
Southern Coastal Oregon EPA							
BLM	89,082	0	0	7,615	9 %	81,468	91 %
California Oregon EPA							
BLM	1,518	0	0	1,301	86 %	217	14 %
TOTAL BLM Acres	**90,600**	**0**	**0**	**8,916**	**10%**	**81,685**	**90%**

As described in the proposed rule, the range-wide population was estimated to be less than 400 (USDI FWS 2018a, Table 1). Estimates of potential population numbers have not been determined for the revised EPA but could be higher as the boundary was expanded. Most of the known detections occur within Forest Service managed land boundaries (Moriarty et al. 2016, p. 76, as cited in USDI FWS 2018b, p. 85). Surveys have been conducted in and adjacent to the Treatment Area as part of the first large-scale survey exploration for marten distribution in coastal Oregon, which began in 2014 (Moriarty et al. 2016). Marten detections were located west of the Medford District on Forest Service-managed lands. The Medford District has conducted camera surveys within and near the EPAs and in other locations on the Medford District, most occurring between 2008 and 2014. In the last 10-years, only two martens were observed as a result of these surveys.

3.7.5 Environmental Effects

No Action Alternative

As described in Section 2.1, the No Action Alternative would not implement any aspect of the action alternatives in the Treatment Area. Because the BLM would not implement action alternatives, vegetation growth rates, stand densities, fuel conditions, the ratio of open and closed forest, and continue to change based on current existing forces and disturbance, or lack thereof. See the No Action Alternative analysis in Sections 3.2 and 3.3, for the effects to landscape resilience and the changes to seral conditions, stand level fire resistance, and wildfire risk. Under the No Action Alternative, the present and reasonably foreseeable would still occur within the marten analysis area and actions occurring within the marten mesic and serpentine habitats within the EPAs could impact marten.

Based on the No Action Alternative analyses in Sections 3.2, 3.3, 3.4 and predicted changes to the forested conditions in the next 10-years, under the No Action Alternative, habitat for the coastal marten would likely decrease in the marten analysis area from the loss of habitat from commercial harvest in the HLB, hazardous reduction treatments, and wildfire. Marten habitat would increase within the marten analysis area where understory and brush densities increase over the next 50 years and treatments do not occur to reduce these densities. These acres of loss and increase and impacts to the habitat baseline in the marten analysis area due to on-going implementation of the SWO ROD/RMP outside of IVM-RL and other natural disturbances over a 50-year period are not known at this time and effects would vary due to location, size, and intensities. However, the PRMP/FEIS predicted an increase of mature and structurally-complex forest habitat on the BLM-administered lands within the Western Oregon PRMP/FEIS Decision Area (USDI BLM 2016a, pp. 1655, 1656) within the next 50 years. At the PRMP/FEIS decision scale, mature forest habitat would increase by 392,605 acres and structurally-complex forest habitat would increase by 143,789 acres by 2063. These structural stages are not a direct correlation with coastal marten habitat; however, the mature and structurally-complex forest attributes are similar to denning habitat. The increase in habitat is attributed to an increased development of mature and structurally-complex habitat in the reserves that contain snag and down woody material legacy structures (USDI BLM 2016a, p. 844), as well as an increased amount of LSR LUA within the PRMP/FEIS Decision Area.

Common to All Action Alternatives

Effects to the marten habitat from all of proposed actions (small diameter thinning, underburning, commercial thinning, riparian thinning, and road/landing construction) would include removal of protective cover, denning and resting structures, potential impacts to dispersal, and disturbance impacts, especially when occurring in mesic habitat. Proposed actions occurring in low-suitability marten habitat or in younger stands that do not provide denning structure, would have reduced impacts to marten.

Small diameter thinning, understory burning and thinning would temporarily simplify stands immediately post-treatment, particularly, the brush and understory, which would cause marten to avoid those areas (Slauson et al, 2018) until the dense shrub layer regrow (five to 20 years). Significant loss of the shrub layer would reduce habitat suitability due to reduction in prey abundance or improved access by competitors or predators. Removal of key structural features that are valuable to martens (e.g., shrub layer, downed wood, snags) degrades or removes suitable habitat as well as change or reduce prey species for marten (USDI FWS 2018b). Martens would also be more vulnerable to predation and increased competition in habitats that have been subject to intensive treatments because these treatments would remove the structural characteristics of the landscape that provide escape cover and are important to marten viability (canopy cover, shrub cover, etc.) (USDI FWS 2018b). Denning and resting features, such as large snags and logs would be affected by the treatments. However, these habitat elements are not slated for cutting and would be maintained on the landscape as much as is possible. Treatments designed to lower fire risks in the short-and long-term, such as prescribed burning and mechanical treatments may (ultimately) improve the suitability of habitat for the coastal marten and may be essential to reducing the potential for catastrophic wildfire.

Depending on the size and scope of an individual project using the EA, the removal and reduction in the quality of habitat would impact individual martens. As project sizes increase and more of the home ranges are impacted, then it is more likely the proposed actions would affect normal life behaviors of martens. The loss of denning structure and brush conditions within a home range would limit the ability to den and would likely increase their risk to predation due to the lack of cover within the harvest units. However, the number of martens directly impacted would be low because the marten analysis area is near the edges of the SCO and CAOR EPAs and the potential marten population is low in these areas based on low detection rates from camera surveys on the Medford District. Additionally, even with potential effects to individuals, the activities proposed in this EA are consistent with management activities proposed for exemption from incidental take in the final rule for the coastal marten. The exceptions related include: 1) forestry management activities for the purposes of reducing the risk or severity of wildfire such as fuels reduction projects, fire breaks, and wildfire firefighting activities; and 2) State- and federal-approved forestry management activities which are consistent with the conservation needs of the coastal marten and are consistent with approved conservation plans or strategies (USDI FWS 2018a, pp. 50580-50581).

Summary of Action Alternatives

Table 27 below, provides a summary of estimated effects by alternatives to marten habitat. These estimated effects are based on the IVM-RL specific modeling proposed action assumptions that included parameters such as potential vegetation type, seral stage, and RD. These proposed action modeling assumptions were then applied to the assumptions of effects of each prescription type on marten habitat and the estimated acres of proposed action treatment in Table 2. These estimated acres are only used for comparison purposes for the alternatives in this analysis.

Table 27. Estimated Impacts to Marten Habitat over a 10-Year Period by Alternative (all LUA).

EPA	No Action Alternative	Alternative A			Alternative B			Alternative C		
		Serp.[1]	Mesic	Low	Serp.[1]	Mesic	Low	Serp.[1]	Mesic	Low
SCO										
Commercial[2]	0	50	550	2,900	50	1,400	7,550	50	1,000	5,450
Non-Commercial[3]	0	100	1,300	7,100	100	2,800	15,100	200	6,000	32,300
CAOR										
Commercial[2]	0	0	400	100	0	900	100	0	1,300	200
Non-Commercial[3]	0	0	1,300	200	0	1,800	200	0	1,300	200
TOTAL ALL EPAs	0	**150**	**3,550**	**10,300**	**150**	**6,900**	**22,950**	**0**	**9,600**	**38,150**

[1]= Serpentine Habitat; [2] = Commercial Harvest would only occur on Reserve LUA, and primarily within LSR; [3]= Non-Commercial includes double counting of potential mechanical and burning fuels treatments in the same footprint.

Summary Conclusion and Cumulative Effects

Even with the potential loss of habitat and reduced habitat function, the alternatives would not preclude the marten from denning and dispersing within the marten analysis area because acres of mesic and serpentine habitat would remain untreated within the marten analysis area. Of the two high suitability habitat types, the mesic habitat type is the most abundant on the BLM-administered lands within the marten analysis area (17.5 percent). Approximately 85 percent of the mesic and serpentine habitat within the marten analysis area would not be impacted under Alternative A, 70 percent would not be impacted under Alternative B, and 63 percent would not be impacted under Alternative C. When considering the habitat within the entire EPAs, approximately 99.5 percent would not be impacted under Alternative A, 99 percent would not be impacted under Alternative B, and 98.8 percent would not be impacted under Alternative C. Additionally, the majority of the treatments (78 percent) would occur in low habitat subtility for martens, which would minimize the direct impacts to marten because there is low probability of marten use in these areas.

Treatments would be dispersed across the marten analysis area and overall amounts would be limited per year, which would spatially and temporally distribute the impacts to marten habitat. This would also reduce potential impacts to dispersal. Additionally, project design criteria would minimize potential effects by retaining denning habitat elements, such as down wood and snags, as well as creating snags in LSRs (see PDFs, #82). Seasonal restrictions would reduce the potential of disturbance during the natal and maternal denning season in the Treatment Area (see Appendix 2 PDF #78).

The PRMP/FEIS analyzed effects to Bureau Sensitive species, including the coastal marten. The effects analysis was based on the impacts to seral stages from the PRMP/FEIS alternatives (USDI BLM 2016a, pp. 833-844). The PRMP/FEIS acknowledged that marten habitat would increase over the next 50 years (USDI BLM 2016a, p. 1674). Therefore, when the marten habitat reduction from the EA alternatives is added to the potential effects from foreseeable actions (No Action Alternative), the overall habitat loss within the marten analysis area is not expected to exceed effects to marten habitat considered in the PRMP/FEIS. Additionally, as described above, habitat would remain untreated throughout the marten analysis area and the EPAs under all alternatives, which would reduce substantial effects to marten.

3.8 How Would the Proposed Actions Develop and Promote Special Status Plant Habitat?

3.8.1 Methodology

See Appendix 8 for additional background and supporting information for all sections of this issue.

The BLM considered the biological, environmental, and ecological requirements of the Medford District Special Status plant species to analyze how the proposed treatments could alter the habitats for those species. Information about the species' habitat requirements come from recovery plans, Medford District programmatic consultation, conservation agreements, species management plans, research and monitoring studies, and professional experience and knowledge. These documents, along with the SWO ROD/RMP (USDI BLM 2016b), provide direction and guidance for managing the species and their habitats to further their conservation and recovery.

Management actions may make habitats and their associated environmental conditions more or less suitable for Special Status plants and these vary by species and site. Impacts to Special Status plants are ultimately manifested in their ability to persist by surviving and reproducing. Monitoring individual populations, and species across their ranges, measures the impacts of management actions and other factors by documenting increases or decreases in individual numbers and expansions or contractions of their populations. These results from management actions may be manifested in a short-time frame, one to two years, or may not be evident for many years.

Studies have not been conducted to correlate the percentage of increase or decrease in population numbers or population growth or contraction of many of Medford District's Special Status plant species with specific management prescriptions. Results will also vary by species and site. Therefore, it is not possible to quantifiably predict and compare the effects of the proposed actions based on these factors. Instead, the BLM analyzed and compared how the proposed actions of each alternative would promote and develop habitat for Special Status plants, the tools available, the amount and locations of habitat that could be treated (Table 28) and the annual and 10-year limits of treatments each alternative proposes (Table 2 in Chapter 2). The BLM also compared the number of sites of the two endangered plants and the acres of Cook's lomatium critical habitat and Fritillaria Management Areas (FMAs) that could be treated (Table 28) based on their locations within the Eligible Footprint of each alternative.

Meadows provide habitat for a number of special status plants, including the two endangered species. The locations and number of unauthorized uses – vehicles, OHVs, horses, bicycles, hikers, camping, and garbage dumping – and the area of disturbance from those unauthorized uses cannot be predicted in advance. The type of barriers needed to prevent additional resource damage would depend on specific sites and cannot be predicted in advance. Therefore, the BLM analyzed the effectiveness of the alternatives on improving Special Status plant meadow habitat through the installation of barriers and rehabilitation of damage by the amount of meadow habitat where protective measures could be implemented within each alternative (Table 28).

Potential impacts to individual special status plants and fungi from the proposed actions and potential introduction and spread of nonnative invasive plants in the Planning Area during project implementation are addressed in Appendix 10.

3.8.2 Assumptions

The BLM assumes the proposed actions would promote and develop habitat for Special Status plants to further their persistence and recovery based on analysis in the PRMP/FEIS (USDI BLM 2016a), past studies and monitoring, and knowledge about the species' habitat requirements and life histories, as described in detail in Appendix 8. The PRMP/FEIS analysis, incorporated here by reference, concluded that rare plants, especially vascular species in the non-conifer habitat group, would benefit from thinning, fuel reduction treatments, and removing encroaching vegetation because those actions would reduce competition and shade and increase light, moisture, and nutrients that would support increased growth, flowering, and fruiting of Special Status plants (USDI BLM 2016a, pp. 520, 526, 533).

Examples of past studies and monitoring of a limited number of Special Status plants in the Medford District found that fire (prescribed or wildfire) and vegetation removal can improve habitat conditions for Cook's lomatium, Gentner's fritillary, Neil Rock checkerbloom (*Sidalcea hickmanii* ssp. *Petraea*), Greene's popcorn flower, Austin's popcorn flower (*Plagiobothrys austiniae*), Bellinger's meadowfoam, slender nemacladus, slender-flowering evening primrose (*Oenothera rhombipetala*), Baker cypress (*Hesperocyparis bakeri*), and Parish's nightshade (*Solanum parishii*). The studies have shown that treatments need to be adapted to the habitat requirements of the target species, take into consideration existing and desired conditions at the site, treat nonnative invasive plants, and seed or plant native species as necessary for treatments to be effective for the long-term.

The BLM assumes that the installation of barriers (gates, fences, boulders, berms, and trenches) or boardwalks would be effective at stopping damage to Special Status plant habitat from unauthorized uses by redirecting traffic onto authorized routes and to rehabilitating damage caused by unauthorized uses based on past similar projects within the Medford District, described in detail in Appendix 8.

The BLM assumes that surveys for Special Status plants would be conducted in all project areas, according to appropriate protocols and by qualified botanists, prior to implementation of the proposed actions in this EA. The BLM assumes that projects would implement all applicable Project Design Criteria from Medford's Biological Assessment (BA) and consultation with FWS, *Assessment of activities that may affect the federally listed plant species, Gentner's Fritillary and Cook's Lomatium* (USDI BLM 2020a); Management Direction in the SWO ROD/RMP (USDI BLM 2016b, pp. 106-107) and NCO ROD/RMP (USDI BLM 2016c, pp. 87-88); Recommended BMPs within Fritillaria Management Areas on the Medford District (USDI FWS, USDI BLM 2016, pp. 39-42); or from the most current versions of these documents and other conservation documents aimed at protecting Special Status plants and furthering their recovery or conservation.

3.8.3 Measurement Indicators

The number and locations of Cook's lomatium and Gentner's fritillary sites came from the BLM's GeoBob (Geographic Biotic Observations) geodatabase of rare plant sites and data, intersected with ArcGIS Eligible Footprints for each alternative. The acres of Cook's lomatium critical habitat and FMAs were also calculated by intersecting their boundaries with the Eligible Footprints of the alternatives in ArcGIS. Acres of chaparral and meadows/grasslands are from the BLM FOI GIS layer and acres of the four oak plant communities came from Klamath Siskiyou Oak Network (KSON) data.

The percent of special native plant communities that could be treated annually and over a 10-year period was calculated based on the total acres of the oak woodland, oak savanna, oak chaparral, oak conifer, chaparral, and meadows/grasslands plant communities (104,258 acres) within the Treatment Area, divided by the combined acres of small diameter thinning and prescribed fire annual and 10-year limits of each alternative. The percent of conifer stands that could be treated annually and over a 10-year period was calculated based on the acres of conifer stands within the Treatment Area identified as needing treatment (153,437 acres), divided by the acres of commercial harvest annual and 10-year limits of each alternative. These percentages are included in the cumulative effects section of each alternative.

Table 28. Comparison of Special Status Plant Sites Potentially Treated by Alternative.

Site Type	Alternative A	Alternative B	Alternative C	All Sites/Areas
Gentner's fritillary (sites)	107	142	193	217*
Cook's lomatium (sites)	12	29	31	33
Cook's lomatium Designated Critical Habitat (acres)	868	1,713	1,822	1,822
Fritillaria Management Areas (acres)	2,024	5,970	6,680	8,622*
Oak Woodland	11,697	28,807	30,106	30,106
Oak Savanna	4,720	11,845	12,864	12,864
Oak Chaparral	303	11	967	967
Oak Conifer	18,713	46,720	48,539	48,539
Chaparral	1,347	1,347	5,315	5,315
Meadows/Grasslands	1,008	6,341	6,467	6,467

*These numbers exclude sites and FMAs in the Cascade-Siskiyou National Monument because they would not be t treated under this EA.

3.8.4 Affected Environment

The current Medford District Special Status plant list (USDI BLM 2021a) contains 144 species, of which 108 have been documented on BLM lands, including two federally-listed endangered plants documented in the Medford District: Cook's lomatium and Gentner's fritillary. Critical habitat designated for Cook's lomatium in 2010 (USDI FWS 2010) includes 1,822 acres on BLM-administered lands in the Illinois Valley. Critical habitat has not been designated for Gentner's fritillary, but FMAs (USDI FWS 2003; USDI FWS, USDI BLM 2016) were created to protect Gentner's fritillary populations and are areas where recovery actions can take place to contribute to its eventual down-listing and delisting. Eleven FMAs have been established in the Medford District. Both endangered plants occur in predominantly non-conifer plant communities.

The Medford District Special Status plant list also contains 140 Bureau Sensitive species (106 documented) that occur in and are associated with a variety of habitats, including forested stands and non-forested plant communities. Roughly one-third of the documented species grow in forested stands with varying levels of canopy cover, although some of them occur in gaps or at the edges of the stands. The remaining documented species are associated with more open non-conifer or mixed hardwood-conifer woodland habitats.

Many of the Special Status plants occur in plant communities that have been lost, altered, or degraded from their historical conditions from fire exclusion, fire suppression activities, urban and rural development, timber harvest, mining, quarry development, road building, grazing, agriculture, OHV use, recreational development and use, competition from nonnative invasive plants, and altered hydrological conditions. Conifers and shrubs are encroaching into plant communities that were historically more open, leaving them less suitable as habitat for Special Status species that evolved in more open canopy conditions. Habitat loss, alteration, or degradation of habitats have been identified as major causes of the extirpation or decline of many Special Status plants and continue to be a threat to their persistence. See Appendix 3 for additional descriptions of conditions in Medford District plant communities.

3.8.5 Environmental Effects

No Action Alternative

No thinning, prescribed fire, or meadow protection would occur in the No Action Alternative to promote, protect, or develop Special Status plant habitat. In the absence of thinning, some conifer stands would continue to be overstocked and be susceptible to stand replacement from high severity fire and/or tree mortality from drought, disease, and insects. Stands that experience complete mortality would no longer provide suitable habitat for later seral forest associated Special Status plant species (e.g., fungi, lichens, bryophytes, and clustered lady-slipper [*Cypripedium fasciculatum*]) because host trees would no longer provide substrate or nutrient resources through mycorrhizal connections. Trees would no longer provide shade and cooler, moister microclimate conditions that some forest-associated species require to survive and persist. If duff is burned at high intensity, it could kill mycorrhizae, plant roots, or other plant parts located below ground level. Wildfire could create favorable conditions for some Special Status plants that require more open canopy but could also result in mortality of all vegetation and impact Special Status plants or fungi if fuels loads were high and burned at high severity and intensity. In the absence of thinning, canopy cover of overly dense stands may not provide adequate light space, and resources for some species to survive and thrive (e.g., California globe mallow [*Illiamna latibracteata*], Parish's nightshade, three-toothed horkelia [*Horkelia tridentata* var. *tridentata*], and Baker's cypress).

Under the No Action Alternative, no thinning or prescribed burning would occur in non-conifer plant communities to reduce stand densities, reestablish more open structure, and increase fire resistance. In the absence of frequent low to mixed severity wildfire that historically burned in these plant communities, they would continue to be encroached by conifers, hardwood saplings, and shrubs, and would accumulate high levels of ladder and surface fuels. Their closed structure and high canopy cover would make them vulnerable to the loss of legacy trees in the event of high severity wildfire. Burning would not be conducted that would clear small trees and shrubs and remove heavy thatch or duff that suppresses plant germination and growth. Special Status plant habitats that evolved under open canopy conditions but are currently densely vegetated and closed canopy would not provide the light, space, water, and nutrients required by these species. Approximately two-thirds of Medford's Special Status plants, including the two endangered species, Gentner's fritillary and Cook's lomatium, grow in non-conifer habitats and require open to semi-open canopies to germinate, grow, and reproduce. Under the No Action Alternative, the BLM would not conduct treatments to promote or develop suitable habitat for the recovery and conservation of Special Status plants, including in Cook's lomatium critical habitat or FMAs. Habitats would not be improved or increased where existing populations could expand or where new populations could be established.

Under the No Action Alternative, the BLM would not install protective barriers or boardwalks in Special Status plant meadow habitat or other open habitats to stop resource damage from unauthorized uses. The BLM would not repair soil disturbance and compaction or restore hydrological flow where it has been altered. Unauthorized access and use of Special Status plant meadow habitats would continue at random sites throughout the Medford District and would impact vegetation, soil, hydrology, and increase nonnative invasive plants. Suitable habitat for Special Status plants would be removed or degraded.

Cumulative Effects

Past activities in the Treatment Area, as listed above under Affected Environment and in Appendix 8 have removed or degraded Special Status plant habitats. These same activities continue on public and/or private lands and will likely continue in the future. The BLM protects designated critical habitat and Special Status plant sites from direct and indirect effects, but some impacts occur to native plant communities on BLM lands and plant communities on private lands have no legal protections. Added to past, present, and reasonably foreseeable future actions, the No Action Alternative would not stop or mitigate existing trends of vegetation succession and degradation of Special Status plant habitat, which affect plant vigor and viability of some Special Status plant species on BLM-administered lands and could result in eventual extirpation at sites or of species. Some recovery efforts that are covered under separate NEPA documents would continue for Cook's lomatium, Gentner's fritillary, and a few Sensitive species, such as outplanting, population augmentation, and weed control, but habitat improvements would not be implemented that would increase or restore suitable habitat. Down-listing and delisting ESA-listed plants would be less likely to occur because habitat would not be improved where needed. Habitat improvement conservation efforts for Sensitive species would also not occur and some species, especially those with few populations and/or individuals where habitat loss or degradation is occurring, could decline to the point of being federally-listed. Vegetation structure and density would not change in plant communities to prepare them to adapt to increasing drought, insects, disease, and wildfire during climate change, leaving Special Status plant habitats and populations more vulnerable to decline.

Effects Common to All Action Alternatives

Special Status plant habitats include conifer and non-conifer plant communities. See Section 3.9 for an analysis of the effects of the proposed actions on non-conifer and pine PVT plant communities and Section 3.3 for an analysis of the effects of the proposed actions on conifer stand resistance.

The PRMP/FEIS analyzed potential benefits to Special Status plants that rely on more open habitats from thinning, fuels reduction, and prescribed fire (USDI BLM 2016a, pp. 520, 526, 533), incorporated here by reference. "...fuel reduction treatments may provide beneficial effects on some rare plants, such as by reducing competition and shade. Vascular plant species not in the conifer habitat group are generally shade-intolerant and respond to increased light and reduction in plant competition with increased growth, flowering and fruiting (p. 520)." The actions proposed in this EA to develop and promote Special Status plant habitats would accomplish these habitat-focused approaches.

Thinning to reduce tree densities and surface and ladder fuels, burning slash piles, and underburning would reduce the risk of stand replacement events from wildfire, which would improve habitat for Special Status plants that grow in conifer stands. It would reduce the risk of loss of host trees and damage to above or below ground plant parts, mycorrhizae, roots, or seeds during high severity wildfire. Thinning stands would reduce canopy cover and create openings for species that require more light.

Thinning trees and shrubs and applying prescribed fire in non-conifer habitats, where wildfire exclusion has led to encroachment of woody vegetation and succession to closed canopy communities, would restore these habitats to more open canopy conditions in which many Special Status species evolved. Reducing tree and shrub densities would remove competing vegetation and improve habitat by creating space and light and freeing up water and nutrients for Special Status vascular plants and other native understory vegetation. Prescribed burning would remove the buildup of thatch and fine fuels and kill smaller conifers that have encroached into Special Status plant habitat. Burning would benefit fire-adapted species (e.g., Baker cypress, Neil Rock checkerbloom) that regenerate more abundantly after fire has removed competing vegetation.

The exact location where barriers or boardwalks would need to be installed is unknown because unauthorized uses occur in random places. They have historically occurred in meadows or other open habitats where vehicles, OHVs, bicycles, pedestrians, horses, trash dumping, or camping are not permitted. Those activities cause damage to vegetation and degrade habitat by killing or wearing away vegetation, compacting soil and causing ruts that result in erosion, altered hydrological flow, and the introduction or spread of nonnative invasive plants that compete with native species. Installing gates, fences, trenches, boulders, or berms prevents unauthorized access into meadows and stops additional damage to Special Status plant meadow habitats. Installing boardwalks or rocks along trails directs foot traffic onto designated routes to prevent damage described above. Rehabilitating ruts and tracks by ripping, blading, or raking and seeding or planting native species would restore hydrological flow where necessary and reestablish native vegetation that can compete with nonnative invasive species.

Thinning overly dense conifer and non-conifer stands and reintroducing fire would create conditions in Special Status plant habitats that would make vegetation better able to adapt to changing environmental conditions during climate change. Reducing competition for resources among trees and shrubs would help the remaining vegetation be more resistant and able to persist during increased drought, wildfire and insect and disease infestations that occur as a result of increased temperatures. Improving resistance in plant communities to these environmental changes would increase the likelihood they would continue to provide suitable habitat for Special Status plants.

Alternative A

Treatments in Alternative A that would promote or develop habitats for Special Status plants would only occur in limited areas. It proposes the fewest annual and 10-year treatment acres (Table 2) and includes the fewest Gentner's fritillary sites (49 percent), Cook's lomatium sites (36 percent) and critical habitat (48 percent), acres of FMAs (26 percent), and acres of Sensitive species habitat for treatment. Acres of oak woodland habitat where treatments could occur represent 39 percent of the total acres within the Treatment Area, oak savanna 37 percent, oak chaparral 31 percent, oak conifer 39 percent, chaparral 25 percent, and meadows or grasslands 16 percent. Treatments could include prescribed fire and small diameter thinning in all plant communities, but would be restricted to PODs, within ¼ mile of Communities at Risk, and plantations < 60 years old, which may not intersect the habitats most needing improvement. Thinning prescriptions would not include gaps, which could be used to create more light for forest and woodland Special Status plant species that require open canopy conditions. The BLM could only protect Special Status plant meadow habitat with fences, boulders, gates, berms, trenches, or boardwalks and rehabilitate damaged areas if they fell within PODs or within ¼ miles of Communities at Risk. Because treatments within those areas are focused on reducing hazardous fuels where dense trees and shrubs occur, the chances are small that they will coincide with locations where resource damage is occurring in meadow or grassland habitats. Therefore, Alternative A would provide very limited opportunities for protecting or repairing damaged Special Status plant meadow and grassland habitats.

Cumulative Effects

Added to past, present, and reasonably foreseeable future activities within the Treatment Area, as described above in Affected Environment and in Appendix 8, Alternative A would improve Special Status plant habitat in very limited locations. Outside the alternative footprint, Special Status habitat would continue to decline and be less suitable for Special Status plants. Under Alternative A, a maximum of 1 percent of conifer stands within the Treatment Area could be treated annually and 11 percent over a 10-year period. A maximum of 4 percent of non-conifer plant communities could be treated annually and 33 percent over a 10-year period under Alternative A. Woody vegetation encroachment and succession from open to closed canopy conditions would continue in plant communities that were historically maintained as open canopy by frequent, low to moderate intensity wildfire. Overly dense stands would continue to be vulnerable to high or total vegetation mortality from high severity wildfire, drought, insects, and disease. Habitat improvement recovery efforts for Cook's lomatium and Gentner's fritillary could not occur across the species' ranges, which would limit the possibility of down-listing and delisting. Habitat improvement conservation efforts for Sensitive species would also be limited to populations falling within the Eligible Footprint, which may not coincide with habitats most needing treatment. Declining habitats for these species could result in extirpation of populations at some sites and cause them to be considered for federal listing. Alternative A would limit proactive actions that would prepare Special Status plant habitat to adapt to changing environmental conditions during climate change.

Alternative B

Alternative B proposes a larger area for treatments and therefore greater flexibility for the locations than Alternative A and similar to Alternative C, but a medium amount of annual and 10-year acre limits for treatment, more than Alternative A and less than Alternative C. More Gentner's fritillary sites (65 percent,) Cook's lomatium sites (88 percent) and critical habitat (94 percent), and FMAs (69 percent) fall within the Eligible Footprint of the alternative. Considerably more Sensitive plant habitat falls within the alternative (96 percent of oak woodland, 92 percent oak savanna, 96 percent oak conifer, and 98 percent meadow/grasslands) except for chaparral habitat (1 percent oak chaparral and 25 percent chaparral). Thinning and applying prescribed fire in conifer and non-conifer stands (except 120-plus year-old stands, some ponderosa pine stands, chaparral, oak/chaparral, and meadows/grasslands) would increase fire resistance and create more open habitat for Special Status plant species that require open or semi-open canopies. Under Alternative B, the BLM would not thin or burn chaparral or oak chaparral plant communities except along PODs and within ¼ mile of Communities at Risk. Chaparral in these stands would remain dense, monopolize water and nutrients, shade out understory vegetation, and occupy areas where Special Status plants could expand from existing populations (e.g., Cook's lomatium, Greene's popcorn flower, Austin's popcorn flower, Neil Rock checkerbloom, and Oregon fairy poppy). Some, but not all ponderosa pine stands would be thinned or prescribed burned. Stands not thinned would remain dense with shade-tolerant trees and would not provide suitable habitat conditions for Special Status plants that require more open canopies. Trees and shrubs would not be thinned from meadows and grasslands, but prescribed fire could be used to remove woody vegetation and thatch that compete with Special Status plants and suppress plant germination and growth. However, meadows and grasslands could not be burned if trees and shrubs were too dense to achieve a low to moderate intensity fire, which would limit areas where treatments could be applied. If meadows were burned without reducing woody vegetation, the fire could burn at high intensity and damage plants' above or below ground parts, causing mortality or affecting plant viability. The BLM could promote and develop Special Status meadow or other open habitats within the Eligible Footprint by installing barriers or boardwalks and repairing damage where unauthorized uses create ruts or soil disturbance or disrupt hydrological flow.

Cumulative Effects

Added to past, present, and reasonably foreseeable future activities, as described above in Affected Environment and in Appendix 8, Alternative B would promote, develop, and improve habitats for Special Status plants where treatments occur within the Eligible Footprint. A maximum of 2 percent of conifer stands within the Treatment Area could be treated annually and 13 percent over a 10-year period. A maximum of 8 percent of the non-conifer Special Status plant communities in the Treatment Area could be treated annually and 58 percent over a 10-year period. Special Status plant habitats outside the Eligible Footprint would continue to decline and be less suitable for the persistence of Special Status plant populations, especially in conifer stands over 120 years of age, some ponderosa pine stands, chaparral communities, and meadows. Alternative B would allow for a moderate amount of annual and 10-year proactive actions in Special Status plant habitats to make them more fire resistant and able to adapt to changing environmental conditions from climate change.

Alternative C

Alternative C would provide the most flexibility for promoting, developing, and improving Special Status plant habitats because it includes the most acres of all plant communities, proposes the most annual and 10-year treatments, and includes the most tools in all plant communities that could be used. The most Gentner's fritillary sites (89 percent), Cook's lomatium sites (94 percent) and critical habitat (100 percent), FMAs (77 percent), and Sensitive plant species' non-conifer habitats (100 percent) fall within the Eligible Footprint. Both thinning and prescribed fire could be conducted in conifer stands over 120 years old, in all ponderosa pine stands, and in chaparral and oak chaparral communities. Trees and shrubs could be thinned in meadows and grasslands prior to prescribed burning. Alternative C proposes larger gap and modified openings than Alternative B, which would provide opportunities to create openings in forested stands to improve habitat for forest-associated Special Status plant species that require more open canopies. Special Status plant meadow habitat could be protected from damage from unauthorized uses and existing resource damage could be repaired at the most locations.

Cumulative Effects

Added to past, present, and reasonably foreseeable future actions, as described in the Affected Environment above and in Appendix 8, Alternative C would promote, develop, and improve the most Special Status plant habitat in conifer and non-conifer plant communities. A maximum of 3 percent of conifer stands within the Treatment Area could be treated annually and 13 percent over a 10-year period. Approximately 13 percent of the Special Status non-conifer plant communities could be treated annually and 100 percent could be treated over the 10-year period. Thinning and applying prescribed fire would increase stand resistance to damage from high intensity wildfire; create more open canopies with increased light and resources to support Special Status plant species; and reduce stress on vegetation from drought, insect, and disease to enable better adaptation to environmental changes during climate change. Increasing stand resistance would help prevent further loss of habitat from wildfire or other stressors. Habitat improvements would help maintain genetic diversity, maintain or restore suitable habitat for the continued persistence of existing populations, and create areas for expansion or introduction of new populations. Alternative C provides the greatest opportunity to contribute to recovery and conservation of ESA-listed and Sensitive plant species by conducting habitat improvement projects.

3.9 How Would the Proposed Actions Promote and Develop Habitat in Special Plant Communities or Native Plant Communities, Including Those in Areas of Critical Environmental Concern?

3.9.1 Methodology

See Appendix 8 for additional background and supporting information for all sections of this issue.

The BLM considered RMP management direction for maintaining and restoring oak woodlands, oak savannas, oak chaparral, chaparral, meadows/grasslands, and pine PVT stands (USDI BLM 2016a, pp. 106-107; USDI BLM 2016a, p. 87) and maintaining, enhancing, or restoring relevant and important values in ACECs (USDI BLM 2016a, p. 55; USDI BLM 2016a, p. 57) to compare the effects of the alternatives on special native plant communities.

Although the proposed treatments would result in changes in vegetation structure, canopy cover, RD of trees and shrubs, surface and ladder fuels, and the quantity and diversity of understory herbaceous plants, because sites differ in their existing conditions and treatment needs, it is not possible to quantify percentages of changes in these factors across the Treatment Area by alternative. Instead, the BLM analyzed how effectively the proposed actions would promote and develop habitat in native plant communities, including those in ACECs, by describing and comparing the prescriptions or tools that could be used, the qualitative effects of the treatments on the plant communities, the acres and plant communities available for treatment (Table 29), and the annual and 10-year limits to treatment acres (Table 2).

The analysis compares how the alternatives would stop resource damage, repair existing damage, and prevent additional damage in meadows and open plant communities where unauthorized uses have occurred. The locations and number of unauthorized uses – vehicles, OHVs, horses, bicycles, hikers, camping, and garbage dumping – and the area of disturbance from those unauthorized uses cannot be predicted in advance. The type of barriers needed to prevent additional resource damage would depend on the specific site and cannot be predicted in advance. Therefore, the alternatives are compared by the number of acres of meadow habitat and the areas in each where protection and restoration could occur.

3.9.2 Assumptions

The BLM assumes the proposed actions in this EA will promote and develop habitat in special plant communities based on the PRMP/FEIS analysis and on past studies of similar treatments and monitoring results, as described in detail in Appendix 8. The PRMP/FEIS analyzed the effects of timber harvest and other vegetation management on oak communities (USDI BLM 2016a, pp. 549-551), incorporated here by reference, and concluded that implementing the PRMP/FEIS would improve the quality and quantity of existing oak habitat across all LUAs (p. 551). It also stated that "…the BLM would use integrated vegetation management to increase or maintain vegetation species diversity and to create and maintain areas of hardwood dominance." (p. 550). Regarding management of ACECs, the PRMP/FEIS assumed that "…the relevant and important values associated with an ACEC…would be adequately protected by the special management direction" in the PRMP/FEIS (USDI BLM 2016a, p. 132).

Past studies of thinning and prescribed fire in non-conifer plant communities found those treatments were effective at meeting fuel management and fire fighter safety goals; restoring open canopy conditions; and increasing growth, vigor, and regeneration of the remaining trees. Some studies, however, questioned whether ecological goals were also met because treatments sometimes resulted in increases in nonnative plants. Data has also evolved about the optimum patch retention size in chaparral stands for the benefit of chaparral associated birds, pollinators, and other wildlife. In spite of past treatments not meeting all objectives, there are still compelling reasons to conduct thinning and prescribed fire treatments in non-conifer plant communities, in addition to creating more fire-resistant stands. These include restoring structural diversity, removing ladder fuels next to legacy trees to protect them from fire damage, creating stand age and structural heterogeneity in chaparral stands absent recent wildfire, creating space for understory native herbaceous plants to germinate and increase in diversity, and creating space for regeneration of new shrubs which provide forage for deer and elk. This EA incorporates lessons learned from past studies which have highlighted the need for treatments to be tailored to site-specific conditions (Appendix 8, Section 2.2) and to incorporate weed treatments and seeding or planting native species where restoration goals are to increase native plant abundance and diversity (EA, pp. 71, 77, 79, 90, 94, 98, 101, 103, 108, 110, 112, 203, 209-211, 234). Section 3.3 also provides support for the assumption that the proposed treatments will improve fire resistance in native plant communities.

As discussed in the issues considered but not analyzed in detail (NAID) (Appendix 10), the BLM assumes that implementing preventative measures, continuing to treat weeds throughout the Medford District under the integrated invasive plant management program, and seeding or planting native species where needed would minimize potential increases in nonnative invasive plant infestations during implementation of the proposed actions.

The BLM assumes that the installation of protective barriers in meadows/grasslands and restoration of existing damage would occur at sites where resource damage from unauthorized uses is discovered, reported, or anticipated and would be effective based on previous similar projects in the Medford District, as described in detail in Appendix 8. The BLM has constructed and or installed gates, fences, boulders, trenches, berms, and boardwalks in a number of ACECs, Special Status plant sites, and other areas containing meadows where human activities created ruts and caused the removal of native vegetation, which resulted in erosion, disruption of hydrology, and increases in nonnative invasive plants. The barriers and boardwalks were successful at redirecting traffic back onto authorized routes and stopping habitat degradation. Restoration of the damaged sites through reestablishing natural contours and hydrological flow and seeding or planting native vegetation was successful at stopping erosion and reestablishing native vegetation to compete with nonnative invasive infestations.

The RODs/RMPs give direction to manage for the persistence and structure of sugar pine, ponderosa pine, and Jeffrey pine (USDI BLM 2016b, p. 107; USDI BLM 2016c, p. 87); however, sugar pine does not occur as a dominant tree species in southwestern Oregon, either under current conditions or as a PVT plant association, but rather as a component of mixed conifer or mixed hardwood-conifer associations. Therefore, the BLM assumes that sugar pines would benefit from stand-level treatments for ponderosa or Jeffrey pine PVTs and from group selection openings and legacy tree retention that remove competing trees and reduce ladder fuels around individual sugar pine trees.

3.9.3 Measurement Indicators

Acres of ACECs, chaparral, meadows/grasslands, and pine PVTs are from the BLM FOI GIS layer. Acres for the four oak plant communities are from KSON data. Acres of annual and 10-year treatment limits are from Table 2, Comparison of Action Alternatives included in Section 2.5. The percent of special native plant communities that could be treated annually and over a 10-year period was calculated based on the total acres of the oak woodland, oak savanna, oak chaparral, oak conifer, chaparral, and meadows/grasslands plant communities and pine stands (125,339 acres) within the Treatment Area, divided by the combined total acres of commercial timber harvest, small diameter thinning, and prescribed fire annual and 10-year limits of each alternative. This percentage is included in the cumulative effects section of each alternative.

Table 29. Acres of ACECs and Native Plant Communities Available for Potential Treatment, by Alternative.

Native Plant Communities	Alternative A	Alternative B	Alternative C
ACECs	4935	17,178	20,621
Oak Woodland	11,697	28,807	30,106
Oak Savanna	4,720	11,845	12,864
Oak Chaparral	303	11	967
Oak Conifer	18,713	46,720	48,539
Chaparral	1,347	1,347	5,315
Meadows/Grasslands	1,008	6,341	6,467
Ponderosa and/or Jeffrey Pine Stands	7,111	9,913	21,081

3.9.4 Affected Environment

Many of the special native plant communities in the Medford District are recognized as needing protection and restoration because their extent has declined or been altered over the last 100 to 150 years through development, fire exclusion, invasive nonnative plants, and other human activities. This EA tiers to, and incorporates by reference, the discussion in the PRMP/FEIS regarding the current conditions in these plant communities, including their fire history (USDI BLM 2016a, pp. 223-228, 517-550). See also Appendix 3 and Appendix 8 for additional descriptions of the current conditions of these plant communities and their treatment needs.

Representative areas of the special native plant communities have been protected through designation by the BLM as ACECs, which also include Research Natural Areas (RNAs). Twenty of the 29 ACECs in the Medford District contain oak, chaparral, meadow/grassland, and pine PVT plant communities where vegetation management is needed to maintain, enhance, or restore the relevant and important values the ACECs were designated to protect.

Climate Change
Climate change scenarios differ about which species and plant communities will increase and which will decrease, but are consistent in predicting hotter temperatures, drier summers, and increased large wildfires for southwestern Oregon. Recommendations for management actions to prepare plant communities to adapt to changing environmental conditions during climate change include reducing stand densities and introducing fire to reduce drought stress, damage from insects or diseases, and to increase resistance to high severity wildfire; creating gaps to provide for understory shrub and herbaceous species establishment and thinning around legacy trees (Halofsky et al. 2016; Halofsky et. al 2018; Halofsky et al 2020).

3.9.5 Environmental Effects

No Action Alternative
No thinning or prescribed fire would be implemented in the No Action Alternative and habitat conditions would continue to decline in ACECs, non-conifer communities, or pine PVTs within the Treatment Area. Shade tolerant trees and shrubs would remain or continue encroaching into these plant communities, resulting in stress to trees and shrubs from crowding and shortages of light, water, and nutrients, leaving stands more susceptible to damage from drought, insects, and disease. Fuel loads would create conditions susceptible to damage from high severity wildfire, including stand replacement, loss of legacy trees, loss or reduced suitability of stands for native plants and wildlife, soil damage, and damage to above and below ground plant parts. In dense stands, understory herbaceous species would decline in cover and diversity. The No Action Alternative would not contribute to landscape level resiliency by maintaining the persistence and structure of open grown pine and oak stands and would not create or support conditions that would help these plant communities adapt to changing environmental conditions from climate change, including treatments that prepare them to better persist during drought; increase diversity of species, structure, and age classes at stand and landscape scales; or increase resistance to fire, insects, and pathogens (USDI BLM 2016a, p. 199). Relevant and important values of native plant communities in ACECs would not be maintained or enhanced. Habitat conditions would continue to decline and would not support the full suite of plant and wildlife diversity the ACECs were designated to protect.

Meadows and grasslands would continue to be subject to damage from unauthorized uses where they occur. Unauthorized uses would continue to create ruts, compact soil, disrupt hydrology, and release toxic substances into the soil, which would result in erosion, removal of native vegetation, introduction and spread of nonnative invasive plants, and degradation of habitat.

<u>Cumulative Effects</u>
Fire suppression and fire suppression activities, agriculture, grazing, road building, timber harvest, rural and urban development, mining, utilities development, recreation, and the establishment of nonnative invasive plants have reduced and altered native plant communities in the past and continue on private and federal lands, as described in the Affected Environment in Appendix 8. Added to these past, present, and reasonably foreseeable future actions, the trend of succession to more closed canopy conditions in the absence of fire would continue under the No Action Alternative in oak, chaparral, meadow, and pine PVT plant communities on BLM-administered lands. Damage to vegetation and hydrology in meadows and other open plant communities from unauthorized uses would continue to degrade habitat and reduce the availability of native plant seed sources. Climate change would also continue to cause changes in native plant communities. These trends would result in: 1) loss of representative open plant communities across the landscape; 2) loss of diversity and cover of herbaceous understory plants; 3) continued vulnerability of plant communities to the loss of legacy trees and shrubs from high intensity and severity wildfire; 4)

increased stress to vegetation from crowding, leaving species susceptible to damage and decline from drought, insects, and disease; and 5) loss of relevant and important values in ACECs.

Effects Common to All Action Alternatives

Thinning and prescribed fire treatments would reduce tree and shrub densities in pine PVT stands, oak woodlands, oak savannas, chaparral, and meadows/grasslands, creating more space, light, water, and nutrients for the remaining vegetation. The amount of open habitat would increase, resulting in an increase in species diversity and richness of understory herbaceous vegetation. Thinning would reduce ladder and surface fuels which would increase stand resistance and reduce the risk that legacy trees and shrubs would be lost during wildfire events. The remaining vegetation would experience increased growth and less stress from drought, insects, and disease. These treatments would prepare stands to better withstand drought, increased wildfire, and other environmental changes from climate change. Annual and 10-year limits and locations available for treatments vary by alternative.

Thinning and/or prescribed burning could occur in plantations under 60 years of age in all alternatives, which would benefit pines in the pine PVTs. The remaining trees would respond to thinning with an increase in growth and vigor. Reducing surface and ladder fuels would make the stands more resistant to loss of trees from wildfire, drought, insects, or disease. The same number of plantation acres would be available for thinning in all alternatives, but the limit on the number of acres treated annually and over a 10-year period varies by alternative.

The timelines for response to the treatments would vary by species and plant community. Fire resistance and residual tree growth would begin immediately after treatments and continue until the next cohort of conifer and brush again created dense conditions and surface and ladder fuels, generally in 10 to 15 years. Understory herbaceous forbs and grasses in all plant communities would respond positively in the first one to three years after treatment and would gradually be shaded out and decline as conifer saplings and brush increased in five to fifteen years. Thinning and prescribed burning in chaparral would increase the heterogeneity of shrub ages. Shrubs would begin regeneration within one to two years after treatments. As new shrubs germinate and increase in cover 10-plus years after treatment, understory vegetation would gradually decline, including nonnative species.

Studies have shown that reducing canopy cover has resulted in an increase in nonnative plants one to three years after treatment, especially at sites with existing nonnative invasive plant populations. The responses of vegetation will vary, depending on the existing conditions and plant species at the site. Sites with existing infestations of nonnative invasive plants or with populations of nonnative invasive plants in the vicinity will be more likely to have increases in those nonnative species when vegetation is removed through thinning and/or prescribed fire. Sites with intact native plant ecosystems are less likely to have increases in nonnative invasive plants (Safford and Harrison 2008). The BLM acknowledges this risk and would apply weed preventative PDFs to projects and would continue ongoing Medford District-wide weed treatments to minimize potential introductions or spread of nonnative invasive plants. The proposed actions for non-conifer plant communities in all action alternatives also includes restoring native species to disturbed sites through seeding or planting, using appropriate site-specific species, including culturally significant native plants.

Installing protective barriers in meadows and open plant communities where damage is occurring from unauthorized uses would prevent additional damage to vegetation in native plant communities, relevant and important values in ACECs, and valuable native plant resources used for BLM's native seed program and by pollinators and other wildlife. Protective barriers could include gates, fences, boulders, trenches, berms, and boardwalks. These structures have been effective in the past (see Appendix 8) in reducing or eliminating damage to resources (see also Section 3.8.5, pp. 71-73). The acres and locations of meadows where protective barriers and rehabilitation could occur vary by alternative.

Implementing the proposed actions would meet SWO ROD/RMP direction for ACECs to maintain, protect, enhance, or restore the relevant and important values of the plant communities they were designated to protect. Potential benefits vary by alternative, depending on the acres and locations of ACECs within the Eligible Footprint and the tools available for treatments.

Alternative A
Alternative A would provide the fewest opportunities of the three action alternatives to improve conditions in native plant communities because it proposes the fewest acres of management actions (Table 2) and the fewest acres of plant communities fall within the Eligible Footprint (Table 29). Within the Treatment Area, 24 percent of ACEC acres, 39 percent of oak woodland, 37 percent of oak savanna, 31 percent of oak chaparral, 39 percent of oak conifer, 25 percent of chaparral, 16 percent of meadows/grasslands, and 35 percent of ponderosa and Jeffrey pine stands could be treated. The treatments would occur only in limited areas along operationally strategic areas for wildfire containment (PODs), within ¼ mile of Communities at Risk, and in plantations less than 60 years old. The focus would be on limiting future wildfire growth rather than on ecological treatments of whole stands to transition them from closed to more open canopies. Treatments and meadow protection and rehabilitation may not occur where they are most needed. There would be no benefits to plant communities located away from PODs or further than ¼ mile away from Communities at Risk.

Thinning in conifer stands would be limited to RDI levels of 35 percent to 40 percent which would not reduce canopy cover enough to favor fire tolerant pines and oaks versus shade tolerant species, such as Douglas fir and white fir. Prescriptions would not include gaps to create openings for pines and oaks. Large tree culturing would offer some opportunity to protect pines and oaks from encroachment by competing conifers, but it would be limited to PODs and within ¼ mile of Communities at Risk and would only extend two times the dripline of the trees. Hood et al (2018) concluded that merely treating around trees but not also thinning the entire stand resulted in less benefit to the growth of the remaining trees. Group selection openings could not be used to create openings that would favor pine and oak retention.

Treatments in non-conifer plant communities would also be limited to PODs and within ¼ mile of Communities at Risk, which may not coincide with the areas that most needing thinning. Gaps would not be available as a tool to create openings for species that require open to semi-open canopy cover. Only trees or shrubs eight inches or less in diameter could be cut, which could leave the remaining trees and shrubs in oak communities and meadows too dense to achieve the greatest fire resistance and the greatest benefit to understory herbaceous species.

<u>Cumulative Effects</u>
Added to the past, present, and reasonably foreseeable future activities described in the No Action Alternative Cumulative Effects, Alternative A would promote and develop habitat in non-conifer and pine PVT plant communities on a maximum of 5 percent of the total acres within the Treatment Area per year and 41 percent over 10-years. Conditions would only improve within the Eligible Footprint of the alternative; outside these areas fuel loads would continue to increase and plant communities would lack resistance to wildfire and continue to be susceptible to damage from high severity fire. Trees would continue to be stressed from high levels of competition and would be susceptible to mortality from drought, insects, and disease. Canopy cover would remain high in plant communities that were historically more open, resulting in a decline in understory species diversity, especially native herbaceous species. Maintenance and enhancement of relevant and important values of native plant communities and special habitats in ACECs would only occur in limited areas. Developing conditions in plant communities to prepare them to adapt to changing environmental conditions during climate change would occur in very limited areas. Meadow plant communities would continue to be degraded outside the Eligible Footprint where unauthorized uses continue to impact vegetation and hydrology.

Alternative B
Alternative B proposes a medium amount of annual and 10-year limits for thinning and prescribed fire in native plant communities compared to Alternatives A and C. A high percentage of the total special plant communities acres within the Treatment Area fall within the Eligible Footprint of Alternative B (Table 29) – 83 percent of ACECs, 96 percent of oak woodlands, 92 percent of oak savanna, 96 percent of oak conifer, 98 percent of meadows/grasslands, and 48 percent of pine stands (mostly Jeffrey pine stands). Treatments would not be limited to PODs and Communities at Risk, which would provide flexibility to conduct treatments where they are most needed. However, there are some limitations in the alternative. No commercial harvest could occur in stands older than 120 years, which would limit opportunities to

transition pine stands from Douglas fir to pine. Thinning to 20 percent to 35 percent RDI, group selection, and modified openings could occur in stands to benefit Jeffrey pine and Oregon white oak, but in limited ponderosa pine PVTs. With a diameter limit for conifers of 25 inches DBH, fewer shade tolerant species could be thinned within conifer stands. The prescription may not remove enough trees to create open canopies that pines and oaks require to persist.

Thinning and prescribed fire could occur in oak woodlands and savannas, which would contribute to their persistence and resilience, but could not occur in chaparral or oak chaparral plant communities, except along PODs and Communities at Risk. Only 1 percent of oak chaparral and 16 percent of chaparral stands fall within the Eligible Footprint of Alternative B. Conifer encroachment would continue in oak chaparral stands, shading out oaks and shrubs and transitioning stands to closed canopy communities. Many chaparral stands are outside the natural range of fire return intervals due to fire suppression. Not removing portions through thinning and prescribed fire would miss an opportunity to create heterogeneity in them where a new cohort of shrubs could regenerate. Native understory vegetation in chaparral and oak/chaparral stands would also continue to be suppressed, would not contribute seed to the soil seed bank, and therefore would be less likely to persist.

Trees or shrubs could not be thinned in meadows, although prescribed fire could be used to kill conifer seedlings and saplings and some shrubs. However, prescribed fire could not be used in meadows if vegetation is dense because conducting a burn at low intensity with flame lengths below four feet may not be operationally possible without thinning first to reduce fuel levels. Burning would remove dead grass thatch, which would promote the regeneration of grasses and herbaceous plants, resulting in more plant species diversity (Kaye et al. 2019).

Alternative B would allow construction of temporary roads in connection with timber harvest activities. They would be decommissioned after use. The application of preventative measures, PDFs, and ongoing Medford District integrated invasive plant management program would reduce the risk that road and landing construction or reconstruction would introduce or spread nonnative invasive plants within project areas and cause degradation of native plant communities during implementation of Alternative B.

Meadow habitats could be protected from unauthorized uses by installing barriers or boardwalks and damage could be repaired within the Eligible Footprint, which includes 98 percent of meadows and grasslands within the Treatment Area.

<u>Cumulative Effects</u>
Added to the past, present, and reasonably foreseeable activities described in the No Action Alternative Cumulative Effects, Alternative B would promote and develop more habitat in non-conifer and pine plantations than in Alternative A, but less than in Alternative C. On a yearly basis, a maximum of 9 percent of the total special plant community acres could be treated and 64 percent over 10-years. Treatments would create more open canopy conditions, promote the growth of understory native herbaceous plants, maintain and enhance relevant and important values of plant communities in ACECs, increase fire and disturbance resistance, and promote conditions that would assist plant communities in adapting to changing environmental conditions during climate change. These benefits would not occur where treatments are not conducted, especially in chaparral and oak chaparral stands, in meadows, in ponderosa pine stands, and in stands over 120 years of age.

Alternative C
Alternative C would provide the most opportunities, tools, and flexibility of the action alternatives to promote and develop habitat in native plant communities. The most acres of habitat could be treated per year and over 10-years, 100 percent of the special plant communities and ACECs fall within the Eligible Footprint, and all tools could be used in all plant communities.

Alternative C's prescriptions would maximize benefits to ponderosa pines, as well as Jeffrey and sugar pines, with larger group selection openings or gaps over a greater proportion of the landscape and with 20 percent to 30 percent RDI levels, which would allow thinning throughout stands and create enough light to favor pine growth and persistence. Trees up to 36 inches DBH could be thinned, which would allow more trees to be cut around pines and oaks, providing them more space, light, water, and nutrients to increase growth and vigor.

Both thinning and prescribed fire could be used in Alternative C to improve conditions in non-conifer plant communities. Shrubs and trees could be thinned in chaparral and oak chaparral communities, as well as in other plant communities, to allow regeneration of understory herbaceous native plants, regeneration of shrubs, and development of a mosaic of uneven age shrubs. Trees and shrubs could be thinned in meadows so burning at low to moderate intensity levels could be accomplished to remove encroaching conifers, shrubs, and herbaceous plant thatch. Trees and shrubs up to 12 inches DBH could be thinned in conifer and non-conifer plant communities, including in ACECs, which would allow more flexibility to reduce densities to increase fire resistance, develop understory herbaceous species, and promote plant growth and vigor of the remaining vegetation.

Meadow habitat could be protected from unauthorized uses through the installation of barriers or boardwalks and damage could be repaired anywhere within the Eligible Footprint of this alternative, which includes 100 percent of meadows and grasslands within the Treatment Area.

The most miles of roads and acres of landings could be constructed or renovated in Alternative C, including permanent road construction. Permanent roads continue to act as vectors for weed spread after project completion (nonnative invasive plant issue addressed in Appendix 10). Road decommissioning would create short-term risks of spreading nonnative invasive plants from ground disturbance, vehicles, and equipment until vegetation is reestablished in two to three years.

<u>Cumulative Effects</u>

Added to the past, present, and reasonably foreseeable activities described in the No Action Alternative Cumulative Effects and in Appendix 8, Alternative C would create the most changes in vegetation in non-conifer and pine PVT plant communities to be more in line with historical conditions. A maximum of 15 percent of the non-conifer and pine stands in the Treatment Area could be treated annually and up to 100 percent could be treated over the 10-year period. The proposed actions would make these plant communities more persistent and resilient across the Medford District and less susceptible to damage from high intensity, stand replacing wildfires and the effects of climate change. They would increase the acres of open plant communities that would support greater plant species diversity, especially understory herbaceous species. The proposed actions would enhance or restore important and relevant values in ACECs by contributing to the persistence and resilience of the plant communities they were designated to protect. Of the three action alternatives, Alternative C would promote and develop the most acres of native plant habitat, including protecting and restoring meadows habitat. Alternative C would add up to 90 miles of new or temporary roads over a 10-year period. The Medford District currently has approximately 5,000 miles of maintained roads in its inventory. If completely implemented, an additional 90 miles of roads would increase the road system on BLM-administered lands in the Medford District by 1.8 percent over 10-years.

4.1 Public Involvement

The BLM completed three different public participation periods. They included the following:

- Public scoping from July 3, 2019 until August 2, 2019;
- Public review preliminary Chapters 1 and 2 of the EA from October 29, 2019 until November 18, 2019; and
- Public review of the complete EA from August 19, 2020 until October 19, 2020.

Detail on each is included in Appendix 15.

4.2 Tribal Consultation

In compliance with 36 CFR 800 (regulations implementing the National Historic Preservation Act (NHPA), the BLM 1730 Tribal Relations Manual, various executive orders and other laws governing Tribal consultation, the BLM consulted with six Tribes who ascribe significance to the Planning Area (The Confederated Tribes of the Grand Ronde, The Confederated Tribes of Siletz Indians of Oregon, The Klamath Tribes, the Karuk Tribe, the Quartz Valley Indian Reservation and the Cow Creek Band of Umpqua Tribe of Indians).

The Tribes were notified of the preparation of the EA by mail and email on July 3, 2019. This notification was followed by emails and/or phone calls to individual Tribes to solicit information and determine if formal consultation was requested. A second letter was mailed and emailed in November of 2019 with the preliminary versions of Chapter 1 and 2 sent as attachments. Only the Klamath and Cow Creek Tribes provided comments. The Klamath comments were related to the necessity for archaeological surveys, protection of archaeological sites and culturally significant plants, and a consideration of negative effects to the cultural viewshed for any projects proposed under this EA. The Cow Creek Tribe's comments were related to ensuring that the appropriate resource specialists reviewed any project related actions proposed subsequent to this EA. The Tribe was also concerned with the use of PDF's and asked that BLM use staff members trained in the appropriate resources to determine which PDFs would be used in individual projects. The Cow Creek's comments have been addressed in Appendix 10 Issues not Analyzed in Detail (USDI BLM 2022, pp. 238-241). The Klamath's comments have been addressed through the cultural PDF's listed in Cultural/Tribal/Paleontological PDFs (Appendix 2, pp. 113-114). The Klamath Tribe noted that these recommendations apply only to any projects completed within the Cascade-Siskiyou National Monument (CSNM). While initial scoping did include actions in the Cascade-Siskiyou National Monument (CSNM), the BLM has since excluded actions in the CSNM from consideration in this EA. Because specific projects are not proposed in this EA, consultation with the SHPO is not required for the purposes of this EA. All projects proposed in the future under this EA will be reviewed by a qualified cultural resource specialist who will determine consultation needs, based on the Protocol's requirements, on a project-by-project basis.

4.3 Endangered Species Act (ESA) Consultation

Section 7 of the ESA requires the BLM to work with the FWS (T&E plant and wildlife species) and the NMFS (T&E fish species) for actions the BLM funds, authorizes, or proposes to ensure the project is not likely to jeopardize the continued existence of listed plant, wildlife, or fish species, or destroy or adversely modify their designated critical habitat. See Appendix 14 for additional detail on consultation covering this EA. In summary:

- Consultation for federally-listed plants is documented in the *Biological Assessment: Assessment of Activities that May Affect the Federally-Listed Plant Species, Gentner's Fritillary and Cook's Lomatium on the Medford District BLM* (USDI BLM 2020a).
- The vernal pool fairy shrimp (*Branchinecta lynchi*) is federally-listed as threatened. Activities affecting vernal pool fairy shrimp are covered in the Medford District *FY2017-FY2022*

Programmatic Activities That May Affect the Northern Spotted Owl, Marbled Murrelet, Vernal Pool Fairy Shrimp, and Oregon Spotted Frog Consultation (USDI BLM and USDI FWS 2017).

- Northern spotted owl, marbled murrelet (*Brachyramphus marmoratus*), and the coastal marten (Pacific marten) are federally-listed as threatened. The Franklin's bumble bee (*Bombus franklini*) is federally-listed as endangered (USDI FWS 2021e). The Medford District completed formal consultation with the FWS for all four of these species in *The Resilient Lands Biological Assessment (covering the Medford District and the South River Field Office of the Roseburg District).* This consultation covers the proposed actions considered in this EA.
- The gray wolf (*Canis lupus*), was federally-listed as endangered in Oregon west of highways 395 and 78 when the EA was released for public comment in August 2020. The FWS removed the gray wolf in the lower 48 states from the federal ESA Threatened and Endangered list on November 3, 2020 (effective January 4, 2021) (USDI FWS 2020d). However, a court order vacated the FWS delisting decision on February 10, 2022 (*Defenders of Wildlife et al.* v. *U.S. Fish and Wildlife Service et al.; WildEarth Guardians, et. al.* v. *U.S. Department of the Interior, et al.; Natural Resources Defense Council, Inc.* v. *U.S. Department of the Interior*). Consultation for the gray wolf on the Medford District was completed prior to the delisting and is covered in the *Biological Assessment and Letter of Concurrence for Medford Bureau of Land Management and Rogue River-Siskiyou National Forest activities affecting the Gray Wolf* (USDA Forest Service /USDI BLM 2016 and USDI FWS 2017, and amendment).
- The fisher was proposed for federal-listing (USDI FWS 2019b). On May 15, 2020, the FWS determined that the Northern California/Southern Oregon (NCSO) DPS, which includes the SOC subpopulation, did not warrant listing under the ESA (USDI FWS, 2020a).
- Consultation between the BLM and the NMFS has already occurred programmatically in the Forest Management Program for Western Oregon (NMFS 2019) for both the Oregon Coast (OC) and Southern Oregon/Northern California Coasts (SONCC) Evolutionary Significant Units (ESU) of Coho salmon; the NMFS issued a Biological Opinion (NMFS consultation # WCR-2017-7574) to the BLM in March of 2019. This consultation covers the proposed actions considered in this EA. All activities proposed under IVM-RL with potential to affect Coho or their critical habitat would be reported the NMFS, as required in the Biological Opinion, prior to implementation to ensure projects are within the scope of the programmatic consultation. Spring chinook salmon in the SONCC ESU were recently petitioned to be listed; however, no decision has been made yet regarding if listing is warranting, and as habitat for spring chinook overlaps with Coho, it would not change the analysis of effect to salmon habitat in this EA.

5.1 Interdisciplinary Team

Table 30. BLM's Interdisciplinary Team That Participated in the Development of this EA.

Resource Specialty	Team Member	Resource Specialty	Team Member
Botany	Marcia Wineteer; Fletcher Linton	NEPA	Jared Nichol; Kristi Mastrofini (IDT Leads)
Silviculture	Lisa Meredith	Hydrology	Tim Montfort
Cultural	Cheryl Foster-Curley	Public Outreach	Christina Beslin
Engineering	Ben Sutter	Range	Jason Tarrant
Fisheries	AJ Donnell; Chris Volpe	Recreation	Jeanne Klein
Forestry	Scott Loos	Soils	Matthew McClintock
Fuels	Jena Volpe (Project Manager)	Wildlife	Robin Snider
Geographic Information Systems (GIS)	John Guetterman; Shawn Thornton	Wildlife Support	Zia Fukuda; Kimberly Thompson; Stephanie Sabin; Colleen Holland
		Document Editors	Brian Buttazoni, Ryan Jackson

Integrated Vegetation Management

In the following action alternatives, the BLM would implement a suite of management actions that can broadly be referred to as "Integrated Vegetation Management" (IVM) to meet the three purposes identified in this EA (see Sections 1.3 and 1.4). Integrated vegetation management includes the use of a combination of silvicultural or other vegetation treatments, fire and fuels management activities, harvest methods, and restoration activities (USDI BLM 2016b, pp. 72, 306). Actions under each alternative could include a combination of activities as described below, such as small diameter thinning, commercial thinning, group selection harvest, individual tree selection harvest, pile burning, understory burning, broadcast burning, jackpot burning, pruning, or thinning of shrubs.

Actions Common to All Action Alternatives

For project implementation: the actions described in this section would be available in combination or as stand-alone actions, as safety and operational feasibility allow for and as desired ecologic condition indicates.

The actions listed here apply across LUAs within the Treatment Area as described in EA (Section 1.1, Table 1, p. 1), unless otherwise indicated in the action alternatives. Action alternatives vary in the extent of utilizing the following tools.

In addition, the PDFs in Appendix 2 apply to all alternatives, except where noted otherwise.

Creating Heterogeneity: Implementation Tools

Projects would be designed to create heterogeneity at multiple scales, using the following tools in combination or independently and except where noted otherwise in the action alternatives:

ALL-1.1 Skips

Skips are portions of a stand generally left untreated after a commercial thinning or selection harvest. Skips would be used to increase variability of forest conditions in the post-harvest stand, maintain nesting-roosting habitat in LSR, and to create desirable ecological conditions (USDI BLM 2016b, p. 313).

A portion of the treated stand area would be left in variable sized skips (see alternatives for size ranges. Alternative A would have no skips), generally placed in or near (as safety and operational feasibility allows, in no particular order of priority, and determined by the decision maker in their discretion):

- Clumps of overstory trees and/or of a variety of tree sizes and ages (conifers and/or hardwoods) with interlocking or adjacent crowns.
- Unique features such as springs, wet areas, talus, or rocky outcrops.
- Areas of structural complexity or with legacy nurse logs for wildlife habitat.
- Patches of preferred hardwood trees or native shrubs or vigorous conifer seedlings/saplings.
- Unstable areas.
- Operationally difficult to reach areas.
- Wildlife or plant locations.

ALL-1.2 Group Selection Openings or Modified Openings with Large Tree Retention

Group selection openings (USDI BLM 2016b, p. 72) are areas in a commercial thinning or selection harvest entry where trees are harvested to create openings of varying sizes.

A portion of the treated stand would be in variable sized group selection openings (see alternatives for size ranges). Alternative A would have no group selection openings, generally placed in or near as safety and operational feasibility allows, in no particular order of priority, and determined by the decision-maker in their discretion:

- Dense patches of low vigor trees, or less desirable tree species.
- Insect or disease patches.
- Around legacy trees or healthy fire-tolerant species.
- Homogenous areas.
- Upper slopes and ridge tops.
- Productive sites conducive to regenerating a new cohort.

ALL-1.3 Large Tree Culturing

- Competing trees adjacent to legacy trees (i.e., conifer and hardwood species) would be removed.
- Clumps of fire tolerant legacy/relic trees with interlocking crowns would be retained.
- Adjacent fuels would be removed to reduce risk of fire related mortality.

ALL-1.4 Implementation of Tree Selection

Tree selection could be conducted by a variety of tools. Including but not limited to: tree marking leave trees or cut trees, designation by description, designation by prescription, and the individual clumps and openings (ICO) approach.

ALL-1.4.1 Individual Clumps and Openings Approach

Marking could be conducted through the implementation of a spatial patterning approach known as the cluster method or ICO developed by Derek Churchill et al (2013 and 2016). In summary, the method involves using reference conditions developed from stem map plots of the area to guide how many individual trees, and groups of various numbers of trees to retain. The end result would have various sized and irregularly shaped openings, and retention of individual trees, and a variety of small, medium and large sized clumps of trees.

ALL-2 Conifer Forest

In forest plant communities, thinning of commercial trees would occur within all LUAs in the Treatment Area *except* for the HLB, DDR-Area of Critical Environmental Concern (ACEC), and DDR-Non-Suitable Withdrawn TPCC Classification (Table 1, EA p. 1). Treatments would include a combination of commercial thinning, selection harvest, group selection openings and/or skips, and small diameter thinning. A preference for individual tree retention would be given to the best-formed trees that are insect/disease/damage free, with full crowns (≥ 30 percent crown ratio). LUA specific conifer thinning prescriptions vary across specific alternatives.

ALL-2.1 Commercial Thinning and Selection Harvest, and Group Selection Openings

- No commercial thinning or selection harvest would occur within the HLB, DDR-ACEC, DDR-TPCC Non-Suitable Withdrawn.
- Timber harvest that would cause the incidental take of NSO territorial pairs or resident singles would not occur (USDI BLM 2016b, p. 30).
- Commercial thinning and selection harvest would be conducted to result in a stand average RD between 20 and 45 percent after harvest, (with variation by alternatives).

- Action alternatives would fall within the RD range of the RMP but differ in the flexibility of utilizing the full RD range. For example, Alternative C treats to a range of 20-45 RD based on prescription type, whereas Alternative A has a range of 35-45 RD. Skips and group selection openings would contribute toward RD average.
- Site specific variables (e.g., insect/disease issues), field validation of PVT mapping, stand objectives (e.g., maintain NSO habitat function), landscape context (e.g., RHS), safety and operational feasibility will be considered and validated in depth by specialists at the project level.

- Conifer and hardwood species preference for retention would be dependent on the site and seral species, but should generally favor the most drought-tolerant, fire-resilient species.
- Individual conifers with full crowns (crown ratios ≥ 30 percent) would be preferred for retention over poorly formed crowns.
- Stand level variability would be increased by clustering leave trees.
- Trees competing with legacy trees and healthy shade-intolerant trees would be thinned.
- The development and retention of legacy trees would be emphasized.
- A proportion of the dominant (largest) cohort in the stand would be retained.
- Fuels generated from thinning would be reduced and prescribed fire would be applied as needed (Sections ALL-4 and ALL-5).

ALL-2.1.1 Late-Successional Reserve (LSR) and Late-Successional Reserve – Dry

- NSO nesting-roosting habitat function (including key elements) would be maintained[13] at the stand-level (USDI BLM 2016b, p. 71). Key elements include large trees, high canopy cover, high basal area, larger overstory tree size, and multiple layers, etc. (see the nesting-roosting habitat and effects definitions in Appendix 6.
- Older, structurally-complex forest (field verified[14]) would be protected (USDI BLM 2016b, p. 71) and no commercial harvest would occur within these areas.
- In LSR and LSR-Dry, silvicultural treatments (other than forest pathogen treatments) may occur, unless treatments "…would 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" in the LSR (USDI BLM 2016b, p. 72).

ALL-2.1.2 SWO ROD/RMP Riparian Reserve – Dry and Moist

- No thinning in inner zones (as defined in the SWO ROD/RMP).

ALL-2.1.3 Relative Density

Various scientific methods have been developed that can predict or identify a threshold level of density at which a forest stand will decline in production and health due to the impacts of excessive competition. RD is one such measure and the SWO ROD/RMP (p. 311) defines RD 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. RD percent is calculated by expressing Stand Density Index (SDI)

[13] Maintain northern spotted owl nesting-roosting habitat refers to a silvicultural activity that changes a conifer forest stand but maintains structural characteristics such that the stand continues to support the same northern spotted owl life history requirements post-treatment. SWO ROD/RMP p. 70.

[14] The Medford District process for identifying older, structurally-complex forest in the field is based on the current Interagency SW Oregon process for determining structurally-complex forest (USDA USDI 2010, is the most current at the time of this EA).

(Reineke 1933) as a percentage of the theoretical maximum SDI, which varies by tree species and range. Curtis's RD (Curtis 1982) is determined mathematically by dividing the stand basal area by the square root of the quadratic mean diameter." The maximum stand density or carrying capacity used in these equations is the density at which self-thinning (mortality) will occur. RD measures help determine if resources are being optimally utilized in stands and at which point density-dependent mortality will occur. Drew and Flewelling (1979) concluded that the RD index rating of 0.55 and greater for any given stand marks the initial point of imminent mortality and suppression.

ALL-2.2 Small Diameter Thinning

Small diameter thinning treatments would generally target removal of trees and shrubs ≤ 8 inches DBH, via thinning (including ladder fuel reduction), but may treat up to ≤ 12 inches DBH, as indicated in some action alternatives, in forest plant communities within all LUAs in the Treatment Area. Action alternatives vary in the extent of small diameter thinning.

- Spacing and species preference would depend on site conditions. Generally, lower productive sites (dry/shallow soils, ridges/warm midslopes, south and west aspects, and/or high proportion of fire-tolerant species) call for a wider tree spacing, and higher productive sites (less dry/deeper soils, cool bottoms, north and east aspects, and/or vigorous conifer growth) call for a narrower tree spacing.
- Fuels generated from thinning would be reduced and prescribed fire would be applied as needed (Sections ALL-4 and ALL-5).

ALL-2.2.1 SWO ROD/RMP Riparian Reserve

- Riparian Reserves – Dry
    - Actions within the Inner zone would retain at least 50 percent canopy cover per acre.
    - No thinning would occur within 60 feet of fish-bearing streams and perennial streams.
- Riparian Reserves – Moist
    - No thinning would occur in inner zones (as defined in the SWO ROD/RMP).

ALL-2.3 Pruning

Pruning treatments would remove lower limbs on selected trees up to a height of about 18 feet for the purposes of improving wood quality, disease mitigation, or fuels management (Section ALL-4, Treatment of Activity Fuels; USDI BLM 2016a, p. 1193).

- When pruning re-sprouting hardwoods (i.e., Pacific madrone), one to three dominant and vigorous widely spaced stems would be left. Pruning of black oak and white oak would be avoided.

ALL-3 Non-Conifer – Common to All Non-Conifer Treatments[15]

Treatments in non-conifer (typically <10 percent conifer cover [GTR WO-67]) plant communities (e.g., oak woodlands, oak savannas, oak chaparral, chaparral and meadows and grasslands) would include removing competing conifers and shrubs, via thinning, and application of prescribed fire.

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[15] Non-conifer community treatments have been adapted from Altman, B. and J. L. Stephens. 2012. *Land Managers Guide to Bird Habitat and Populations in Oak Ecosystems of the Pacific Northwest.* American Bird Conservancy and Klamath Bird Observatory. 82 pp. Klamath Bird Observatory and Lomakatsi Restoration Project. 2014. Restoring oak habitats in southern Oregon and northern California: a guide for private landowners. Rep. No. KBO-2014-0005. Klamath Bird Observatory, Ashland, Oregon; IVM EA 2011; District Stewardship Conservation Agreement Lomakatsi Restoration Implementation guidelines (Table Rock); FWS and BLM. 2015. Conservation Agreement for Gentner's Fritillary (Fritillaria gentneri) in Southwestern Oregon.

Predominant silvicultural tools applied to disrupt vertical and horizontal fuel continuity would include mosaic or variable thinning, and radial release ("dripline thinning"). Specific non-conifer thinning prescriptions and extent vary as described in the action alternatives (below).

- BLM would implement prescribed fire as needed as described in the prescribed fire sections (e.g., Section ALL-5 – Prescribed Fire).
- Following treatments, BLM would restore native species to disturbed sites through seeding or planting, using appropriate site-specific species, including culturally significant native plants.

ALL-4Treatment of Activity Fuels

- Following thinning actions, an assessment would be conducted within each unit to determine the need for reduction of residual activity fuels generated from thinning. This assessment would determine the fuel hazard and fire risk based on surface fuel loading, aspect, slope, access, and location of each unit.
  - Generally, when the slash (live and dead material 8 inches or less in diameter) remaining in the units after thinning (commercial or small-diameter) would support low intensity surface fire (e.g., flame lengths <4 feet) under typical fire weather conditions, all stems and branches would be cut from the tree trunk and scattered (lop & scatter) or chipped. Trunks 3-8 inches in diameter would be cut to 3-foot lengths and left on the ground. The depth of the slash would not exceed 18 inches.
  - Generally, when the slash remaining in the units after thinning (commercial or small-diameter) would result in flame lengths >4 feet under typical fire weather conditions, activity fuels would be treated, via, prescribed fire (Section ALL-5) removal (e.g., as biomass or made available for firewood sale), or pyrolyzed and redistributed throughout the unit at the discretion of the decision maker (except as otherwise required by PDFs).
- Landing slash would either be chipped, burned (Section ALL-5) or moved off site, except as otherwise required by PDFs.

ALL-5 Prescribed Fire

- Prescribed fire would be used to modify fuel profiles (reduce surface, ladder, and activity fuels and raise CBHs) to reduce potential wildfire severity and behavior, emulate natural processes, stimulate native fire-dependent species (including native deciduous riparian associate tree species), and enhance culturally significant plant populations.
- Prescribed fire would be applied in compliance with Fire Management Plans and National and State policy requirements.
- Prescribed fire would be implemented consistent with wildlife and botanical objectives and PDFs.
- The BLM would implement interim fuels treatments (e.g., thinning [see non-conifer ALL-3 and small-diameter thinning Section ALL-2.2] and handpile burning) in areas that are highly departed from natural conditions, in order to facilitate the application of lower intensity prescribed fire (i.e., underburning).
- Pile Burning –
  - Hand pile burning – woody material such as limbs, stems, cut boles and other slash one to six inches in diameter and greater than two feet in length would be placed in piles and then covered with polyethylene sheeting (consistent with Oregon Department of Forestry (ODF)/Oregon Department of Environmental Quality (ODEQ) smoke management rules) or alternate material.

        - Pile size would be a maximum of eight feet in diameter by eight feet in height. Piles would be placed outside the drip lines of leave trees and away from large logs or stumps, except when using fire to create snags in LSRs and RRs[16].
        - As operational feasibility allows, piles would be burned during the first wet season, after the piles have cured or dried. Weather conditions during the wet season minimize risk of fire spread and reduce the likelihood of scorch or mortality to nearby residual trees and shrubs.
    - Swamper Burning – A modified form of pile burning where personnel feed woody material (a.k.a." swamped" material), as it is cut (e.g., no curing time), into small, ignited burn piles.
    - Mechanical pile burning –
        - Construction of piles that contain soil or contain material greater than 12 inches in diameter would be avoided to improve consumption and reduce smoldering time (i.e., smoke emissions).
        - The piles would be a minimum of eight feet high and ten feet in diameter. Piles would be burned in the fall to winter and would occur within one year or less of being piled.
- Underburning/broadcast burning –
    - Prescribed fire would be applied when weather and fuel conditions allow for lower fire intensities (typically late fall through spring).
    - Prescribed fire would emulate historic fire function and processes (i.e., high frequency low to moderate burn severity). Flame heights will vary based on fuel loading but would generally be <4 feet.
    - Underburning would be implemented as a maintenance tool in areas previously treated for fuels reduction to maintain low-severity fuel profiles.

ALL-5.1 Riparian Reserve (in all Subwatershed Classes)

ALL-5.1.1 Riparian Reserves – Dry

- Moderate severity prescribed burns would be limited to no more than 20 percent of area of RR subwatershed (HUC 12) each year (USDI BLM 2016b, p. 82).
- Hand piles would be located in accordance with the PDFs.

ALL-5.1.2 Riparian Reserves – Moist

- No prescribed fire would be implemented within the inner zones (as defined in the SWO ROD/RMP).

ALL-6 Removal of Forest Products

Where forest products (saw logs, biomass, etc.) are extracted as part of the vegetation treatments above, one or more of the harvestings and/or yarding systems below would be used. On all slopes, saw log material created from thinning operations would be yarded to landings along a haul road.

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[16] Pile placement against tree boles can be an effective way to create snags.

ALL-6.1 Ground Based Yarding

Generally, on slopes < 35 percent, saw logs and/or woody biomass created from thinning operations would be cut, skidded, hauled or chipped to landings or roadsides using non-specialized skidders or tracked equipment, or specialized equipment. On slopes ranging from 35 percent to 50 percent, specialized ground-based equipment (machines specifically designed to operate on slopes >35 percent) could be used. Specialized equipment includes, but is not limited to; feller bunchers, harvesters, shovels, cut to length systems, and tethered logging equipment. During skidding, the lead end of the log will be suspended.

Skid trail locations would vary depending on the site-specific terrain and would be pre-approved by the BLM contract administrator. Designated skid trails would be limited to 15 percent of the harvest unit area. Following treatment, subsoil skid trails, landings, or temporary roads where needed to achieve no more than 20 percent detrimental soil conditions including previous disturbance as defined by the Forest Soil Disturbance monitoring protocol (Page-Dumroese et al. 2009a, 2009b) or similar updated protocols. BMPs from the SWO ROD/ RMP or soil scientists would be applied as needed to ensure compaction and disturbance effects are within the levels allowed in the SWO ROD/RMP.

Ground-based equipment used for harvesting operations off designated roads would be restricted to periods of low soil moisture. Soil moisture limits vary by texture and site-specific conditions and would be evaluated by a qualified specialist.

Tractor swing routes enable yarders to “walk” up designated skid trails in which the yarder is set up along the skid trail where corridors would be needed to facilitate cable yarding operations. From the location of the yarder along the tractor swing route, a skidder would skid logs to a landing on an existing road in which logs are loaded onto a log truck and hauled to the mill. Tractor swing routes provide for access to cable yarding areas where building a road would be infeasible. Tractor swing routes would generally be located on ridgetops with slopes less than 35 percent or mid-slope through units on slopes less than 35 percent to access steeper slopes for cable yarding operations

Skid trails and tractor swing routes would be blocked to prevent public motorized vehicle and other unauthorized use at the end of seasonal use.

ALL-6.2 Cable (Skyline) Yarding

Generally, on slopes ≥35 percent, saw logs and/or woody biomass created from thinning operations would be yarded to landings or roadsides, unless specialized ground-based equipment (machines specifically designed to operate on slopes ranging from 35 percent to 50 percent) could be used. Cable yarding utilizes cables in an aerial position with a carriage moving along the cable to transport material from the woods to the landing. Cable yarding drags trees with one end suspended and one end on the ground. Corridors would be generally less than 15 feet wide, depending on the size of trees to be removed and the terrain; locations would be pre-approved by the BLM contract administrator.

Cable corridors crossing streams would have a maximum clearing width of 12-15 feet. Full suspension would be required over streams and jurisdictional wetlands (TH 03). TPCC guidance would be followed for all cable corridors crossing withdrawn, non-treatment areas. Cable corridors crossing other non-treatment areas would be designed to minimize disturbance.

ALL-6.3 Helicopter Yarding

Helicopter yarding would utilize a helicopter to transport logs from the woods to the landings. Trees would be cut and limbed within the unit prior to being yarded. Workers attach cables or grapples to groups of cut trees which would then lifted and transported to a nearby landing. Specialized pieces of equipment, such as mechanized harvesters, could be used on slope less than 50 percent to cut, process, and pre-bunch logs prior to yarding.

ALL-7 Access

The action alternatives allow varied degrees of roadwork to access treatment areas. Road location, construction, improvement, renovation, and maintenance would be as described below, in addition to applying the PDF's and BMPs identified in Appendix 2 and the SWO ROD/RMP. Additional details and restrictions are included in the respective action alternative descriptions.

ALL-7.1 Timber Haul

Timber haul may occur on roads outside of the Treatment Area. Necessary renovation, maintenance, and improvement (ALL-7.3) would occur on roads prior to haul.

ALL-7.2 Road and Landing Construction

Where extraction of forest products is a project component, road construction for accessing units and landing construction in treatment units may be needed. Road construction includes road work to build a road where a designated BLM system road does not currently exist. Re-opening of a previously obliterated or fully decommissioned road would be considered road construction, as would road work on a "jeep road" that does not have a designated design standard. Road construction activities typically involve building cut and fill slopes, compacting the road surface, potential surfacing with rock, installing drainage structures, and clearing and grubbing of vegetation. Road location, construction, renovation and maintenance would follow the PDFs in this document.

- No new temporary or permanent roads or landings would be constructed in Cook's lomatium critical habitat, and ACECs, and those SRMA/ERMAs listed in Appendix 11.

ALL-7.2.1 Temporary Road & Landing Construction

Temporary roads (as defined in USDI BLM 2016b, p. 315) are proposed to allow operators temporary access to treatment units where no previous roads exist. Where topography allows, roads would be located on stable areas such as ridges, stable benches, and gentle to moderate slopes. Temporary roads would be designed and constructed to minimum BLM design standards that would facilitate safe and efficient operations. Construction would include clearing, grubbing, removing, and disposing of vegetation and debris from within established clearing limits. Work could also include the construction of a minimum-width subgrade by excavating, leveling, grading, and outsloping. After harvest is complete, roads would be decommissioned (depending on the Alternative, either full decommission or long- term decommission, as defined in ALL-7.4 below).

ALL-7.2.2 New Permanent Road Construction

Permanent roads are proposed in Alternative C only, but the general description is provided here for continuity of context. Additional information and limitations can be found in C.7 below. Permanent roads allow for permanent access to previously inaccessible areas for treatment in a specific project as well as for future forest management. New permanent roads would be constructed to of a width of approximately 40-60-foot-wide area by excavation, embankment placement, leveling, grading, and outsloping. Roads would be designed per the BLM Manual 9113-1 Roads Design Handbook (Release 9-388) (incorporated here by reference) and would be added to the BLM road system. Where topography allows, roads would be located on stable areas such as ridges, stable benches, and gentle to moderate slopes. Construction on slopes greater than 60 percent side slopes would be minimized. On slopes greater than 60 percent, end hauling of material would occur and would be disposed of on stable areas outside of RR that would minimize risk of sediment delivery to streams and other waterways.

ALL-7.3 Road Renovation, Maintenance, and Improvement

Prior to using existing roads for forest management activities (e.g., timber haul) under any action alternative, road renovation or maintenance could occur to ensure roads meet their previous design standards. Where previous design standards would be inadequate to allow for the intended forest management activities, roads would be improved to BLM design standard.

Renovation and maintenance could include removing encroaching vegetation (including trees) along and within roads to improve sight distance, removing brush growing near culvert inlets or outlets, cleaning ditches where needed, cleaning or enlarging catch basins, repairing and/or widening narrow sections, correcting drainage patterns, blading the road surface, and surfacing or spot rocking, or in some cases re-paving or chipsealing, the road surface. It could include installation of cross-drain or draw culverts or replacing culverts that are undersized or have met or exceeded their lifespan. Minor road realignment could also be included (for example, to repair slumps).

Road surfacing would involve placing rock the full width and desired length of the road. Surfacing would involve grading and reshaping the road subgrade, then hauling, placing, and compacting the new surfacing material on the prepared subgrade.

Spot rocking would involve placing rock on the road in areas as needed to help control erosion and maintain the road surface. This would restore the road surface and road condition making it suitable for driving and hauling. Crushed aggregate material would be placed on sections of inadequately surfaced roads that would be used for hauling timber.

Trees and vegetation would be removed up to eight feet horizontally from the centerline of ditches and up to eight feet horizontally from the outside shoulder of the road prism. Trees and vegetation would be cut rather than uprooted, unless otherwise approved. Remaining brush and stumps that would interfere with road grading and maintenance operations would be removed or ground down to a depth of six inches below the road surface or ditch line. Debris and trees that are not merchantable or desired for firewood cutting would be assessed by a BLM fuels specialist and would be hand piled and burned, clipped, or lopped and scattered, depending on the location.

Road improvement could also include widening road prisms to allow for adequate space for vehicles and safe transport of forest products, upgrading road surface to a more durable surface (e.g., from a natural road surface to an aggregate surface).

ALL-7.4 Road Decommissioning

Road decommissioning would vary by action alternative. Road decommissioning (fully decommission or long-term-decommission, as defined in the SWO ROD/RMP pp. 311-312) would be accomplished by subsoiling (or some other form of decompaction), seeding, mulching, and planting to reestablish vegetation along the selected routes. Cross drains, fills in stream channels, and potentially unstable fills areas would be removed to restore natural hydrologic flow. The roads would be closed with a device similar to an earthen barrier or equivalent. The roads would not require future maintenance and would not be included as a BLM system road.

ALL-8 Meadow Protection and Rehabilitation

Installation of barriers or boardwalks and rehabilitation of tracks and other soil disturbance in meadows and other open vegetation communities would occur within the Eligible Footprint of each alternative (Maps 3, 4, and 6). In locations where resource damage is occurring or has occurred from OHVs, other motorized vehicles, bicycles, equestrians, or pedestrians traveling off authorized routes or illegal trash dumping or camping, install or construct barriers to redirect traffic back onto authorized routes and stop resource damage.

Barriers may include gates, fences, boulders, berms, trenches, or boardwalks. Locations would include meadows or other open habitats, particularly at Special Status plant sites, in critical habitat, in ACECs, in FMAs, at sites containing quality sources of native plant seed including culturally important plants, and in pollinator habitat.

In areas with ruts or other soil disturbance, especially where hydrology has been disturbed, rehabilitate by ripping, blading, or raking disturbed areas and seeding or planting native species.

Alternative A

Actions (commercial thinning, small-diameter thinning, prescribed fire, and barrier and boardwalk installation) in Alternative A would only be allowed in areas within ¼ mile of Communities at Risk, plantations less than 60 years old, or areas determined to be operationally strategic wildland fire management features, such as major topographical breaks (ridgelines), road systems, major rivers, previous treatments, and major fuel changes[17] (Map 3).

The annual maximum for commercial thinning would be 2,000 acres, to provide a range of flexibility in timing of treatments. The 10-year maximum for commercial thinning would be 17,000 acres. The 10-year maximum for small-diameter thinning would also be 17,000 acres and 17,000 acres for prescribed fire. To provide a range of flexibility in timing of treatments, the annual maximum acres of small-diameter thinning and prescribed fire would be 2,000 acres and prescribed fire would also be 2,000.

A.1 Creating Heterogeneity: Implementation Tools

Projects would be designed to create heterogeneity at multiple scales, using the following tools in combination or independently and except where noted otherwise in the action alternatives:

A.1.1 Skips

- No skips.

A.1.2 Group selection openings

- No group selection openings.

A.1.3 Large Tree Culturing or Modified Openings with Large Tree Retention

May culture around large trees >30 inches DBH (thin up to two times dripline of the tree) as a stand-alone treatment (Section ALL-1.3).

- Competing trees adjacent to legacy trees (i.e., conifer and hardwood species) would be removed.
- Clumps of fire tolerant legacy/relic trees with interlocking crowns would be retained.
- Adjacent fuels would be removed to reduce risk of fire related mortality.

A.2 Conifer Forest

A.2.1 Commercial Thinning and Selection Harvest

- The BLM would apply Actions Common to all Alternatives.
- Commercial thinning treatment would only occur along operationally strategic fire management features (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3), within ¼ mile of Communities at Risk (CWPP, 2019), or in plantations less than 60 years old.
- Commercial thinning would be conducted to result in a stand average RD of 35-40 percent.
    - Cutting of dead trees would only be allowed for operational safety and feasibility.
    - A minimum stand average canopy cover of greater than 40 percent would be maintained.
- All conifer trees >30 inches DBH and hardwoods > 24 inches DBH would be retained in all LUA (exceptions made for logging systems, safety and other operational feasibility issues based on OSHA standards).

[17] For example, one way of identifying these features is Potential wildland fire Operational Delineations (PODs) (e.g., Thompson et al. 2016).

- Reduce activity fuels generated from thinning and apply prescribed fire as needed (Section A.5).

A.2.1.1 SWO ROD/RMP Riparian Reserve – Dry and Moist

- In RRs, thin stands to RD above as consistent with SWO ROD/RMP management direction (USDI BLM 2016b, p. 78-87) by stream class retain at least 60 trees per acre.
- No treatments in inner zones (as defined in the SWO ROD/RMP).

A.2.2 Small Diameter Thinning

- Small diameter thinning would occur only along operationally strategic fire management features, within ¼ mile of Communities at Risk, or (<12 inches) in plantations <60 years in all LUA in Treatment Area.
- Treatments allowed only along operationally strategic fire management features or within ¼ mile of Communities at Risk:
  - Small diameter thinning ≤ 8 inches DBH of trees and shrubs in natural conifer and non-conifer communities (oak woodlands, savannas, and chaparral, chaparral and forest).
- Spacing and species preference depends on site conditions. Generally, lower productive sites (dry/shallow soils, ridges/warm midslopes, south and west aspects, and/or high proportion of fire-tolerant species) call for a wider tree spacing, and higher productive sites (less dry/deeper soils, cool bottoms, north and east aspects, and/or vigorous conifer growth) call for a narrower tree spacing.
- Reduce fuels generated from thinning and apply prescribed fire as needed (Section A.5).

A.2.3 Pruning

Pruning could occur only along operationally strategic fire management features or within ¼ mile of Communities at Risk, or in plantations <60 years in all LUA in Treatment Area.

Pruning treatments would remove lower limbs on selected trees up to a height of about 18 feet for the purposes of improving wood quality, disease mitigation, or fuels management (Section ALL-4 Treatment of Activity Fuels, USDI BLM 2016a, p. 1193).

- Treatments allowed only along operationally strategic fire management features or within ¼ mile of Communities at Risk.
- If pruning re-sprouting hardwoods, leave one to three dominant and vigorous widely spaced stems. Avoid pruning of black and white oak.

A.3 Non-Conifer Treatments

Treatments allowed only along operationally strategic fire management features or within ¼ mile of Communities at Risk or along operationally strategic fire management features (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3) in all LUAs in Treatment Area.

- Apply Actions Common to All Alternatives.
- Implement prescribed fire as needed (Section A.5).
- Restore native species to disturbed sites through seeding or planting, using appropriate site-specific species, including culturally significant native plants.

A.3.1 Oak Woodlands and Savanna

- As safety and operational feasibility allow, retain healthy and vigorous oaks with the broadest crowns, oaks with cavities, and large oaks and other large hardwoods.
  - Remove shrubs, conifers, and competing hardwoods within up to two times the dripline of large or vigorous oaks (dominant and co-dominant oaks). Occasionally this includes removal of larger conifers on more productive sites (except in HLB).
  - Fell and remove or girdle (to minimize damage to oaks or for safety reasons) conifers that have grown into or through older, large-crowned oaks.
  - Retain low, large branch (generally greater than 3 inches in diameter) structure on single-stem oaks, or within oak clusters.
- Maintain multiple age classes of oaks of both single- and multi-stems and foster regeneration; thinning of oaks may be considered in unique situations (i.e., where they encroach legacy oaks).
- Remove shrubs and smaller diameter conifers from the stand to mimic a low severity fire regime fuel profile.
  - Treat multi-stemmed oak clusters as single stems, when removing encroaching vegetation.
- Retain large conifers
  - Retain majority of pine in the oldest cohort.
  - If large conifers (generally > 24 inches DBH) are desired but missing from the stand, retain some smaller trees for legacy tree recruitment.
  - In areas where conifers are natural associates within oak woodlands, leave a wide spacing (< 10 trees/acre) of recruitment age conifers with special consideration for pine species.
  - Retain the largest, most vigorous conifers along woodland edges (ecotones between savanna, meadow or chaparral borders), especially those that provide cavities, notches, and horizontal or arching branches.
- Create structural diversity in stands of young (typically 5-15 years old) uniform multi-stemmed trees (oak clusters), by thinning, as needed.
  - If thinning/pruning hardwoods, retain one to three dominant and vigorous widely spaced stems. Avoid pruning of black or white oak.

A.3.2 Chaparral Shrublands & Oak Chaparral

- Thin shrubs to reduce continuous horizontal fuel profile in areas that pose a fire hazard to homes or communities, from adjacent to larger oaks and pine.
- Retain live shrubs >12 inches diameter at base.

A.3.3 Meadow & Grassland Restoration

- Thin to remove young conifers (seedlings to 60 years) in and around grasslands. Treatments could transition into adjacent forested stands (see Section A.2 for conifer treatments).
- Remove a portion of decadent shrubs when present, to allow regeneration of browse species.

A.4 Treatment of Activity Fuel

Treatments allowed only along operationally strategic fire management features or within ¼ mile of Communities at Risk (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3), or plantations >60 years old.

- Apply Actions Common to all Alternatives (ALL-4).

A.5 Prescribed Fire

Treatments would occur only along operationally strategic fire management features or within ¼ mile of Communities at Risk (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3), or plantations >60 years old.

- Apply Actions Common to all Alternatives (ALL-5).

A.6 Removal of Forest Products

Treatments allowed only along operationally strategic fire management features, within ¼ mile of Communities at Risk (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3), or plantations >60 years old.

- Apply Actions Common to all Alternatives (ALL-6).

A.7 Access

Treatments allowed only along operationally strategic fire management features, within ¼ mile of Communities at Risk (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3), or plantations >60 years old. No new road construction (as defined in ALL-7.2.2).

- New landing construction allowed for all commercial treatments, except in LWC, LOCO8 CH, ACECs, and those SRMA/ERMAs listed in Appendix 11.
- Road renovation, maintenance, and improvement allowed for all commercial treatments.

A.8 Meadow Barriers and Rehabilitation

- Rehabilitate tire tracks or resource damage created by unauthorized use by ripping or blading and seeding with native species.
- Block or protect areas with structures (i.e., fences, boulders, boardwalks etc.) to protect vegetation as needed from damage by vehicles, OHV, equestrian use, etc.

Alternative B

Alternative B attempts a close approximation of the Ecological Forestry Alternative submitted by Klamath-Siskiyou Wildlands Center during the draft Chapter1 and 2 public comment period. Alternative B proposes commercial and small-diameter treatments only in dry forest types (*moist* and *dry* forest as defined in PRMP/FEIS Table C-11, pp. 181-183), except in plantations where thinning could include moist forest. Prescribed fire and small diameter thinning in oak chaparral or chaparral would only in strategic fuels locations for wildfire containment and there would be no prescribed fire in moist forest, except plantations. Prescribed fire would be allowed in all other dry forest conifer and non-conifer plant communities (forest, oak woodlands, savannas, and meadows).

The annual maximum for commercial thinning would be 3,000 acres, to provide a range of flexibility in timing of treatments. The 10-year maximum for commercial thinning would be 20,000 acres (17,000 acres in the LSR). The 10-year maximum for small-diameter thinning would be 30,000 acres and prescribed fire treatments would be 30,000 acres. To provide a range of flexibility in timing of treatments, the annual maximum acres of each small-diameter thinning and prescribed fire would be 4,000. Installation of barriers or boardwalks and rehabilitation of tracks and other soil disturbance in meadows and other open vegetation communities would occur within the Eligible Footprint of this alternative (Maps 3 and 4).

B.1 Creating Heterogeneity: Implementation Tools

Projects would be designed to create heterogeneity at multiple scales, using the following tools in combination or independently and except where noted otherwise in the action alternatives:

B.1.1 Skips

Skips are portions of a stand generally left untreated after a commercial thinning or selection harvest. Skips are used to increase variability of forest conditions in the post-harvest stand, and to create desirable ecological conditions (USDI BLM 2016b, p. 313).

A portion (at least 20 percent) of treated stands would be left in variable sized skips, generally placed in or near (as safety and operational feasibility allows, in no particular order of priority, and determined by the decision maker in their discretion):

- Clumps of overstory trees and/or of a variety of tree sizes and ages (conifers and/or hardwoods) with interlocking or adjacent crowns.
- Unique features such as springs, wet areas, talus, or rocky outcrops.
- Areas of structural complexity or with legacy nurse logs for wildlife habitat.
- Patches of preferred hardwood trees or native shrubs or vigorous conifer seedlings/saplings.
- Unstable areas.
- Operationally difficult to reach areas.
- Wildlife or plant locations.

B.1.2 Group Selection Openings

Group selection openings are areas in a commercial thinning or selection harvest entry where trees are harvested to create openings of varying sizes (USDI BLM 2016b, p. 72).

A portion (up to10 percent) of treated stands would be in variable sized (up to 1 acre in stands ≥10 acres and up to 0.5 acres in stands <10 acres) group selection openings, generally placed in or near (as safety and operational feasibility allows, in no particular order of priority, and determined by the decision maker in their discretion):

- Dense patches of low vigor trees, or less desirable tree species.
- Insect or disease patches.
- Around legacy trees or healthy fire-tolerant species.
- Homogenous areas.
- Upper slopes and ridge tops.
- Productive sites conducive to regenerating a new cohort.

B.1.3 Large Tree Culturing or Modified Openings with Large Tree Retention

- Competing trees adjacent to legacy trees (i.e., conifer and hardwood species) would be removed.
- Clumps of fire tolerant legacy/relic trees with interlocking crowns would be retained.
- Adjacent fuels would be removed to reduce risk of fire related mortality.

B.2 Conifer Forest

B.2.1 Commercial Thinning and Selection Harvest:

- The BLM would apply Actions Common to All Alternatives.
- No treatment would occur in stands > 120 years.
- Stands 80-120 years would be <25 percent of planned annual treatment acres.

- Moist forest – no commercial thinning or selection harvest would occur, except in plantations, which would be thinned to an average RD between 35 and 45 percent.
- In Dry Forest – Commercial thinning and selection harvest would be conducted to result in a stand average RD between 35 and 45 percent after harvest, using a combination of RDI targets, except:
    - Jeffery pine and Oregon white oak PVTs would be thinned to an average RDI of 20-35 percent;
    - In NRF (nesting-roosting and foraging) habitat function and >60 percent canopy cover would be retained;
    - In dispersal-only habitat, retain habitat function and at least 40 percent canopy cover would be retained;
    - Everywhere else, a minimum stand average canopy cover of greater than 40 percent would be maintained
        - *Except* in Jeffery pine and Oregon white oak Potential Vegetation Types where canopy cover would be ≥30 percent.
- All conifers > 25 inches DBH and hardwoods > 16 inches DBH would be retained (exceptions made for logging systems, safety and other operational feasibility issues based on OSHA standards).
    - Trees 25-36 inches DBH (20-32 inches in RR) that need to be cut for operational feasibility or safety would be retained as down wood, unless they would pose a safety risk.
- All dead trees (snags) would be retained.
    - Snags that need to be cut for operational feasibility or safety would be retained as down wood, unless they would pose a safety risk.
- Follow NSO habitat criteria to maintain[18] habitat function would be followed (in PDFs).
- Reduce fuels generated from thinning and apply prescribed fire as needed (Section B.5).

B.2.1.1 SWO ROD/RMP Riparian Reserve – Dry and Moist

- No treatment in stands > 120 years.
- RR – Moist: No treatments.
- RR – Dry:
    - Stands 80-120 years would be <25 percent of planned annual treatment acres.
    - Thin stands to retain at least 40 percent canopy cover and 60 trees per acre would be maintained.
    - No treatments in inner zones (as defined in SWO ROD/RMP).
    - All trees >20 inches DBH would be retained.
    - Killed or cut trees 25-36 inches (20-32 inches DBH in RR) would be retained as snags, or as down wood when adjacent to roads.

[18] **Maintain northern spotted owl nesting-roosting habitat** refers to a silvicultural activity that changes a conifer forest stand but maintains structural characteristics such that the stand continues to support the same northern spotted owl life history requirements post-treatment. ROD/RMP p. 70.

B.2.2 Small Diameter Thinning

Small diameter thinning treatments would generally target removing trees and shrubs ≤ 8 inches DBH, via thinning (including ladder fuel reduction), but may treat up to ≤ 12 inches DBH in plantations <60 years in all LUAs.

- No treatments in stands > 120 years.
- No treatments in moist forest, except in plantations and strategic areas for wildfire containment (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3).
- No thinning in meadows.
- Spacing and species preference depends on site conditions. Generally, lower productive sites (dry/shallow soils, ridges/warm midslopes, south and west aspects, and/or high proportion of fire-tolerant species) call for a wider tree spacing, and higher productive sites (less dry/deeper soils, cool bottoms, north and east aspects, and/or vigorous conifer growth) call for a narrower tree spacing.
    - In plantations trees thin trees <12 inches DBH.
- Apply Creating Heterogeneity Implementation tools (Section B.1) Reduce fuels generated from thinning and apply prescribed fire as needed (Section B.5).

B.2.3 Pruning

Pruning treatments would remove lower limbs on selected trees up to a height of about 18 feet for the purposes of improving wood quality, disease mitigation, or fuels management (Section ALL-4 Treatment of Activity Fuels; USDI BLM 2016a, p. 1193) in all LUAs in the Treatment Area.

- No pruning would occur in moist forest, except plantations and natural stands < 60 years, or in strategic areas for wildfire containment.

B.3 Non-Conifer Treatments

- Apply Actions Common to All Alternatives would be applied and could occur in all LUAs in the Treatment Area, unless otherwise indicated.
- Implement prescribed fire as needed (Section B.5 – Prescribed Fire), *except* in oak chaparral and chaparral.
- Restore native species to disturbed sites through seeding or planting, using appropriate site-specific species, including culturally significant native plants.
- Retain a portion (20-35 percent of area) of dense native vegetation in variable-sized “skips” (see Section B.1.1 Skips), if present and it does not pose a fire hazard to homes or communities.
- Retain smaller 1/10th to ¼ acre skips around special features (i.e., snags or large downed wood, relic structures, nests and other wildlife structures).

B.3.1 Oak Woodlands and Savanna

- As safety and operational feasibility allow, retain healthy and vigorous oaks with the broadest crowns, oaks with cavities, and large oaks.
    - Remove shrubs, conifers, and competing hardwoods within up to two times the dripline of large or vigorous oaks (dominant and co-dominant oaks). Occasionally this includes removal of larger conifers (up to 25 inches DBH) on more productive sites (except in HLB).

- Fell and remove or girdle (to minimize damage to oaks or for safety reasons) conifers that have grown into or through older, large-crowned oaks. Conifers 25-32 inches DBH would be retained as snags of down wood. No trees >32 inches DBH would be killed or removed.
- Retain low, large branch structure (generally >3 inches in diameter) on single-stem oaks, within oak clusters.

- Maintain multiple age classes of oaks of both single- and multi-stems.
  - Retain recruitment-age oaks for future replacement of the overstory, for example, smaller oak replacement trees between large or vigorous oaks.
  - In areas with continuous young or suppressed oaks that are competing, thin in a mosaic of open and leave patches.
- Create structural diversity in stands of uniform multi-stemmed trees (oak clusters), as needed:
  - Thin oak clusters to one to three dominant and vigorous widely spaced stems.
  - Remove sprouting suckers that are <3 inches DBH and are significantly shorter than the main stem.
  - Thin when sprouts are relatively young and respond well to release (typically 5-15 years old).
- Remove shrubs and smaller diameter conifers from the stand to mimic a low severity fire regime fuel profile.
  - Manually or mechanically thin trees and shrubs to maintain natural gaps, grassland openings, and vegetation community edges.
  - Treat multi-stemmed oak clusters as single stems with regard to removing encroaching vegetation.
- Retain all conifers > 25 inches DBH and hardwoods > 16 inches DBH.
  - Retain majority of pine in the oldest cohort.
  - If large conifers (generally > 24 inches DBH) are desired but missing from the stand, retain some smaller trees for legacy tree recruitment.
  - In areas where conifers are natural associates within oak woodlands, leave a wide spacing (< 10 trees/acre) of recruitment age conifers with special consideration for pine species.
  - Retain the largest, most vigorous conifers along woodland edges (ecotones between savanna, meadow or chaparral borders), especially those that provide cavities, notches, and horizontal or arching branches.

B.3.2 Chaparral Shrublands & Oak Chaparral

- No thinning or prescribed fire actions allowed, except along strategic areas for wildfire containment or adjacent to larger oaks and pine (radial thinning of shrubs).
  - Apply Creating Heterogeneity Implementation tools as appropriate and use varied spacing.
  - Trim decadent ceanothus to encourage sprouting.

B.3.3 Meadow & Grassland Restoration

- No thinning, only application of prescribed fire.

B.4 Treatment of Activity Fuels

- Apply Actions Common to all Alternatives (Section ALL-4).

B.5 Prescribed fire

- Apply Actions Common to all Alternatives (Section ALL-5).
- Prescribed fire in oak chaparral and chaparral only along strategic areas for wildfire containment (e.g., landscape features, such as ridgetops, roads, and previously treated as described in Alternative A – Section 2.3) or adjacent to larger oaks and pine.
- No prescribed fire in moist forest, except plantations.

B.6 Removal of Forest Products

- Apply Actions Common to all Alternatives (Section ALL-6).

B.7 Access

  - Up to 5 miles of temporary road construction (except in LWC, LOCO8 CH, ACECs, and those SRMA/ERMAs listed in Appendix 11.
  - No new permanent road construction.

B.8 Meadow Barriers and Rehabilitation

- Rehabilitate tire tracks or resource damage created by unauthorized use by ripping or blading and seeding with native species.
- Block or protect areas with structures (i.e., fences, boulders, boardwalks etc.) to protect vegetation as needed from damage by vehicles, OHV, equestrian use, etc.

Alternative C

The annual maximum for commercial thinning would be 4,000 acres, to provide a range of flexibility in timing of treatments. The 10-year maximum for commercial thinning would be 20,000 acres (17,000 acres in the LSR). The 10-year maximum for small-diameter thinning would be 60,000 acres, while prescribed fire maximum 10-year acreage would be 70,000 acres. To provide a range of flexibility in timing of treatments, the annual maximum acres of small-diameter thinning would be 6,500 acres, while prescribed fire would be 7,500. Installation of barriers or boardwalks and rehabilitation of tracks and other soil disturbance in meadows and other open vegetation communities would occur within the Eligible Footprint (Maps 6 and 7).

C.1 Creating Heterogeneity: Implementation Tools

Projects would be designed to create heterogeneity at multiple scales, using the following tools in combination or independently and except where noted otherwise in the action alternatives:

C.1.1 Skips

Skips are portions of a stand generally left untreated after a commercial thinning or selection harvest. Skips are used to increase variability of forest conditions in the post-harvest stand, and to create desirable ecological conditions (USDI BLM 2016b, p. 313).

A portion (at least 10 percent) of treated stands would be left in variable sized skips, generally placed in or near (as safety and operational feasibility allows, in no particular order of priority, and determined by the decision maker in their discretion):

- Clumps of overstory trees and/or of a variety of tree sizes and ages (conifers and/or hardwoods) with interlocking or adjacent crowns.
- Unique features such as springs, wet areas, talus, or rocky outcrops.

- Areas of structural complexity or with legacy nurse logs for wildlife habitat.
- Patches of preferred hardwood trees or native shrubs or vigorous conifer seedlings/saplings.
- Unstable areas.
- Operationally difficult to reach areas.
- Wildlife or plant locations.

C.1.2 Group Selection Openings or Modified Openings with Large Tree Retention

Group selection openings would be created for a variety of purposes (i.e., regeneration of fire adapted species, heterogeneity/layering, variety of closed canopy and openings, disruption in fuel profiles which may inhibit the spread of crown fires, variability in litter fall and surface fuel accumulations, insect and disease patches, low vigor areas, etc.), therefore a variety of sizes in openings would be created. The majority of group selection openings would be a variety of sizes up to 2 acres. In circumstances where the objective is to regenerate pine (i.e., a stand with a high proportion of vigorous/dominate pine) opening sizes could be up to 2.5 acres in size. These openings would be modified openings because the most vigorous/dominant pine trees would remain to aid in regeneration. In circumstances where insect and disease infestations are occurring, or the trees are of such low vigor where residual trees after a thinning would not release in diameter growth (≤ 20 percent live crown ratio), group selection openings could be up to 4 acres in size in up to 25 percent of the treated stand (in stands ≥ 10 acres). These openings would be modified openings with scattered remaining trees. It is assumed that these circumstances would be an infrequent occurrence.

Table 31. Gap Size Descriptions and Purposes.

Gap Size (Acres)	Description of Gap Type/Purpose
0-2	Majority of group selection openings, can be modified group openings (see Heterogeneity, All 1.2)
2-2.5	Modified pine regeneration opening
2.5-4	Insect/disease infestation or very low vigor area, modified group selection opening

A portion of treated stands would be in variable sized group selection openings, generally placed in or near (as safety and operational feasibility allows, in no particular order of priority, and determined by the decision maker in their discretion):

- Dense patches of low vigor trees, or less desirable tree species.
- Insect or disease patches.
- Around legacy trees or healthy fire-tolerant species.
- Homogenous areas.
- Upper slopes and ridge tops.
- Productive sites conducive to regenerating a new cohort.

C.1.2.1 Late-Successional Reserve (LSR) and Late-Successional Reserve – Dry and DDR (Table 1).

- Variable sized (up to 4 acres in size; Table 31, group selection openings in up to 25 percent of the treated stand.
- In stands < 10 acres, group selection openings up to 2.5 acres in size.

C.1.3 Large Tree Culturing

- Competing trees adjacent to legacy trees (i.e., conifer and hardwood species) would be removed.
- Clumps of fire tolerant legacy/relic trees with interlocking crowns would be retained.
- Adjacent fuels would be removed to reduce risk of fire related mortality.

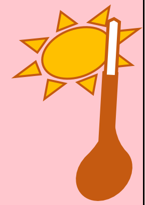
C.2 Conifer Forest

Proposed thinning actions would use terrain and site productivity as a successional and environmental template to fit vegetation patterns characteristic of low-mixed fire severity regime to the landscape: re-balance open and closed seral stages and create and retain structurally-complex T&E species habitat in places on the landscape where it has a high probability of persisting (i.e., areas of NSO habitat in High Relative Habitat Suitability) (Hessburg et al. 2015). In order to identify appropriate places on the landscape to apply restoration treatments and recouple vegetation patterns with topographic and abiotic features (Hessburg et al. 2015), the RBS, developed restoration RDI targets for the following four treatment themes: *Fuels emphasis* area within ¼ mile of Communities at Risk to suppress understory re-growth, *NSO near-term* habitat (i.e., maintain or promote habitat), *NSO long-term* habitat development, and *Ecosystem Resilience*. In this strategy "the vegetation data were intersected with solar insolation and topographic position creating two facets: bottoms and cool midslopes as appropriate locations to maintain more closed forests and ridges and warm midslopes as locations to more actively promote open forest. Thus, strata facets were the intersection of biophysical setting, s-class, topographic position, solar insolation, and landscape scale analytical unit" (Metlen et al. 2017 pp. 27-31; Appendix 5).

For Alternative C, the BLM adapted various components of the RBS treatment theme restoration RDI targets for the IVM-RL project (Table 32) to fit within the wider confines of the SWO ROD/RMP RDI ranges for LSR-Dry. The Ecosystem Resilience RDI targets have been broadly grouped into three categories: open, intermediate, and closed (Table 32).

The RBS restoration RDI targets were derived in terms of tree densities appropriate to a given site, based on the tree species adapted to grow at the site (i.e., the PVT), the amount of sun/heating exposure (e.g., south vs. north aspect), and topographic position (e.g., ridge top, valley bottom). For example, in the Ecosystem Resilience theme, a ponderosa pine site on a ridge top or south (warm) aspect would fall into a low-density category (Ecosystem Resilience – open Table 32). Conversely, a moist Douglas fir site on a north (cool) aspect or bottom slope would fall into the RDI higher density category (Ecosystem Resilience – closed Table 32).

Table 32. Relative Density Index (RDI) Table with RDI Category Description, Corresponding RDI Target Range.

RDI Category Description				**RDI Target Range**	**Stand Conditions**
Near-term NSO				Maintain NR(F)	Closed
Long-term NSO				≥30%	Intermediate
Fuels Emphasis				35-40%	
Ecosystem Resilience					
Potential Vegetation Type	**Seral**	**Insolation**		**RDI Target Range**	**Stand Conditions**
Douglas-fir - Dry	PIPO	Warm		20-30%	Open
Jeffrey pine	PIJE	Warm			
Oregon white oak	QUGA	Warm			
Ponderosa pine - Dry	PIPO	Warm			
Tanoak - Douglas-fir - Dry	PSME	Warm			
Tanoak - Douglas-fir - Moist	PSME	Warm			
Western hemlock - Hyperdry	PSME	Warm			
Western hemlock - Moist	PSME	Warm			
White fir - Intermediate	PSME	Warm			
Douglas-fir - Dry	PIPO	Cool		30-40%	Intermediate
Douglas-fir - Moist	PIPO	Warm			
Jeffrey pine	PIJE	Cool			
Oregon white oak	QUGA	Cool			
Tanoak - Douglas-fir - Dry	PSME	Cool			
Tanoak - Douglas-fir - Moist	PSME	Cool			
Western hemlock - Hyperdry	PSME	Cool			
Western hemlock - Moist	PSME	Cool			
White fir - Cool	ABMAS	Warm			
White fir - Intermediate	PSME	Cool			
Douglas-fir - Moist	PIPO	Cool		40-45%	Closed
Western hemlock - Intermediate	PSME	Cool			
Wesrtern hemlock - Intermediate	PSME	Warm			
White fir - Cool	ABMAS	Cool			

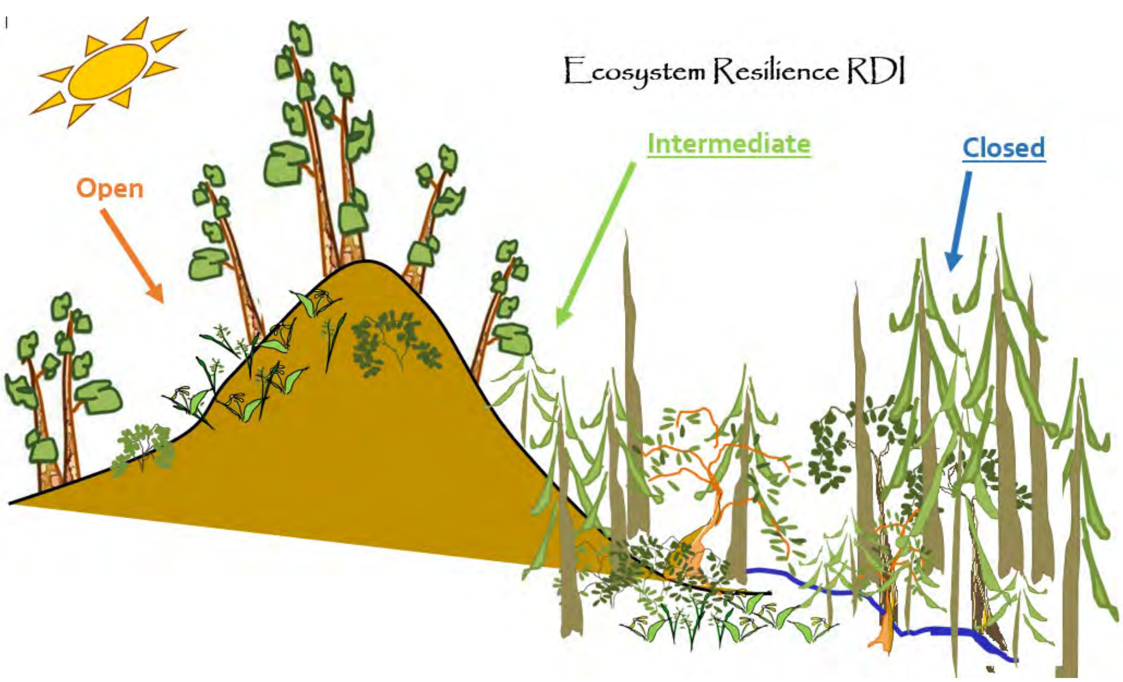


Figure 7. The Graphic Above Illustrates Concepts of Potential Vegetation Type, Insolation and Stand Conditions Outlined in the RDI Table 32.

C.2.1 Commercial Thinning and Selection Harvest:

- The BLM would apply Actions Common to All Alternatives

Conduct commercial thinning and selection harvest to result in a stand average RD between 20 and 45 percent after harvest, using a combination of RDI targets in the RDI Target (Table 32 above).

- No treatment would occur within NSO nesting-roosting (NR) Late-closed seral stands in *high* RHS these are existing NR stands and in landscape locations (e.g., drainage bottoms, lower slopes, and cool midslopes) that support habitat persistence.
  - In the following locations or for the following reasons, NSO NR habitat may be treated, using *the Near Term* NSO RDI range, provided that NR habitat function (including key elements) is maintained at the stand level, even if some portions of the stand are treated at higher intensity, including gap creation (see Section Common to all ALL-2.1.1).
    - In NSO NR habitat located in strategic areas for wildfire containment, and within ¼ mile of Communities at Risk to "Create fuel beds or fuel breaks that reduce the potential for high-intensity/high-severity fire spread within the wildland urban interface or in close proximity to highly valued resources." (USDI BLM 2016b, p. 91).
    - In NSO NR habitat with prominent oak and pine components, to "Create growing space for hardwood and pine persistence and regeneration." (USDI BLM 2016b p. 72); "Reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation." (USDI BLM 2016b, p. 72); "Manage mixed hardwood/conifer communities to maintain and enhance [Oregon white oak and California black oak] persistence and structure by removing competing conifers, thinning, and prescribed fire, to the extent consistent with management direction for the land use allocation." (USDI BLM 2016b, p. 107 (see Section 1.4).
    - In NSO NR areas susceptible to insect attack such as areas prone to flatheaded fir borer infestations (i.e., oak and pine PVTs, ridges (shallow soils), south and west aspects, transition areas from forest to non-forest), to "Reduce stand susceptibility to disturbances such as a fire, windstorm, disease, or insect infestation." (USDI BLM 2016b, p. 72).
  - Where mid-closed NSO NR habitat is simple in structure, function would be maintained (including key elements – see Section Common to all ALL-2.1.1). The *Near-Term* NSO RDI range would be applied (Table 32) to "Promote or enhance the development of structural complexity and heterogeneity or promote the development and retention of large, open grown trees, and multi-cohort stands." (USDI BLM 2016b, p. 72).
- Outside of NR Habitat:
  - In areas within ¼ mile of Communities at Risk, thin to *Fuels Management* RDI range.
  - Within non-NSO NR habitat, mid-seral closed stands in areas of *high* RHS landscape locations (e.g., drainage bottoms, lower slopes, and cool midslopes) that support habitat persistence), thin to *Long-Term NSO* RDI range (Table 32) "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. 72).

- Everywhere else, stands would be thinned to the *Ecosystem Resilience* RDI range (Table 32) to meet management direction identified in the need (Section 1.4).
    - A minimum average stand canopy cover of greater than 30 percent would be maintained.
- All conifer trees (pine and Douglas fir > 36 inches DBH that were established prior to 1850) and hardwoods >24 inches DBH would be retained in all LUA (exceptions made for logging systems, safety and other operational feasibility issues based on OSHA standards).
- Reduce fuels generated from thinning and apply prescribed fire as needed (Section ALL-5 and C.5).

C.2.1.1 SWO ROD/RMP Riparian Reserve – Dry and Moist

- Outer Zone and Middle Zone: Thin stands to RDI above as consistent with RMP management direction (RMP p. 78-87) by stream class.
    - Retain at least 30 percent canopy cover and 60 trees per acre.

C.2.2 Small Diameter Thinning

Small diameter thinning treatments would generally target removing trees and shrubs ≤ 8 inches DBH, via thinning (including ladder fuel reduction), but may treat up to ≤ 12 inches DBH and could occur in all LUAs in the Treatment Area (including in plantations <60 years).

- Spacing and species preference depends on site conditions. Generally, lower productive sites (dry/shallow soils, ridges/warm midslopes, south and west aspects, and/or high proportion of fire-tolerant species) call for a wider tree spacing, and higher productive sites (less dry/deeper soils, cool bottoms, north and east aspects, and/or vigorous conifer growth) call for a narrower tree spacing.
- Apply Creating Heterogeneity Implementation tools (Section (C.1) as appropriate and use varied spacing.
- Reduce fuels generated from thinning and apply prescribed fire as needed (Section ALL-5 and C.5).

C.2.3 Pruning

Pruning treatments would remove lower limbs on selected trees up to a height of about 18 feet for the purposes of improving wood quality, disease mitigation, or fuels management and could occur in all LUAs in the Treatment Area (Section ALL-4 Treatment of Activity Fuels; USDI BLM 2016a, p. 1193).

- If pruning re-sprouting hardwoods, leave one to three dominant and vigorous widely spaced stems. Avoid pruning of black and white oak.

C.3 Non-Conifer Treatments

- The BLM would apply Actions Common to All Alternatives and could occur in all LUAs in the treatment areas.
- Implement prescribed fire as needed (Section C.5– Prescribed Fire).
- Restore native species to disturbed sites through seeding or planting, using appropriate site-specific species, including culturally significant native plants.
- Retain a portion (10-30 percent of area) of dense native vegetation in variable-sized “skips” (see Section C.1.1 Skips), if present and it does not pose a fire hazard to homes or communities.
- Retain smaller 1/10th to ¼ acre skips around special features (i.e., snags or large downed wood, relic structures, nests and other wildlife structures).

C.3.1 Oak Woodlands and Savanna

- As safety and operational feasibility allow, retain and promote healthy and vigorous oaks with the broadest crowns, oaks with cavities, and large oaks.
    - Remove shrubs, conifers, and competing hardwoods within up to two times the dripline of large or vigorous oaks (dominant and co-dominant oaks). Occasionally this includes removal of larger conifers on more productive sites (except in HLB).
    - Fell and remove or girdle (to minimize damage to oaks or for safety reasons) conifers that have grown into or through older, large-crowned oaks.
    - Retain low, large branch (generally >3 inches in diameter) structure on single-stem oaks, within oak clusters.
- Maintain multiple age classes of oaks of both single- and multi-stems and foster regeneration; thinning of oaks may be considered in unique situations (i.e., where they encroach legacy oaks)
- Remove shrubs and smaller diameter conifers from the stand to mimic a low severity fire regime fuel profile.
    - Manually or mechanically thin trees and shrubs to maintain natural gaps, grassland openings, and vegetation community edges.
- Treat multi-stemmed oak clusters as single stems when removing encroaching vegetation.
- Retain large conifers and hardwoods (often >24 inches DBH).
    - Retain majority of pine in the oldest cohort.
    - If large conifers (generally > 24 inches DBH) are desired but missing from the stand, retain some smaller trees for legacy tree recruitment.
    - In areas where conifers are natural associates within oak woodlands, leave a wide spacing (< 10 trees/acre) of recruitment age conifers with special consideration for pine species.
    - Retain the largest, most vigorous conifers along woodland edges (ecotones between savanna, meadow or chaparral borders), especially those that provide cavities, notches, and horizontal or arching branches.
- Create structural diversity in stands of young (typically 5-15 years old) uniform multi-stemmed trees (oak clusters), by thinning clusters, as needed.
    - If thinning/pruning hardwoods, leave one to three dominant and vigorous widely spaced stems. Avoid pruning of black or white oak.

C.3.2 Chaparral Shrublands & Oak Chaparral

- Thin shrubs to reduce continuous horizontal fuel profile in areas that pose a fire hazard to homes, communities, or large oaks and pine, and to promote varied age structure and reclaim/maintain grassy patches and openings in order to promote habitat for special status plants and native plant habitats.
- Retain a portion of chaparral in variable sized (up to eight acres) skips (Section C.1.1 Skips) toward the interior of units as untreated. Some oaks and decadent shrubs may be included in retention patches, either in dense chaparral patches and/ or where existing shrub and tree layers exhibit a patchy horizontal and/or vertical distribution.
    - Aggregate smaller untreated chaparral patches (skips) within close proximity to one another.
- Retain live shrubs >12 inches diameter at base.

C.3.3 Meadow & Grassland Restoration

- Thin to remove young conifers (seedlings to 60 years) in and around grasslands. Treatments could transition into adjacent forested stands (see Section C.2 for forest treatments).
- Remove a portion of decadent shrubs when present, to allow regeneration of browse species.

C.4 Treatment of Activity Fuels

- Apply Actions Common to all Alternatives (Section ALL-4).

C.5 Prescribed Fire

- Apply Actions Common to all Alternatives (Section ALL-5).

C.6 Removal of Forest Products

- Apply Actions Common to all Alternatives (Section ALL-6).

C.7 Access

- No new roads in SRMAs/ERMAs listed in Appendix 11, ACECs, LOCO8 CH, or LWC.
- New road construction (permanent or temporary): Up to 10 miles constructed annually and up to 90 miles per decade.
    - No net increase in permanent road density (i.e., all new permanent roads must be offset by priority roads for decommissioning and would include those located in RRs, Coho critical habitat, or with chronic erosion features and/or hydrologic connectivity).
    - No new permanent stream crossings or fords on perennial and/or fish-bearing streams.
    - No new permanent road construction within 200 feet of a water feature (USDI BLM 2016b Table 6, p. 77).
- Temporary Roads would be decommissioned after use (minimum long-term decommission, see ALL-7.4).
- New landing construction allowed for all commercial treatments, except in LOCO8 CH, ACECs, and those SRMA/ERMAs listed in Appendix 11.
- Road renovation, maintenance, and improvement allowed for all commercial treatments.

C.8 Meadow Barriers and Rehabilitation

- Rehabilitate tire tracks or resource damage created by unauthorized use by ripping or blading and seeding with native species.
- Block or protect areas with structures (i.e., fences, boulders, boardwalks etc.) to protect vegetation as needed from damage by vehicles, OHV, equestrian use, etc.

APPENDIX 2 PROJECT DESIGN FEATURES

Project Design Features (PDFs) listed in the tables below apply to all action alternatives.

In addition to the specific PDFs identified below, each project that would be implemented under this programmatic EA would comply with SWO and NCO ROD/RMP management direction applicable to the LUA and resources affected by the project, including applicable BMPs, survey requirements, and so forth. In addition, relevant conservation agreements and ESA consultation document requirements would be followed.

Botanical Project Design Features

PDF #	Source (RMP BMP or Other)	Description
140	SWO ROD/RMP (p. 106), Botany (Botany BA) Appendix A	Conduct surveys to locate Special Status plants in all project areas where proposed actions could result in habitat modification or species' disturbance, following all applicable protocols and conducted by qualified botanists.
142	Botany BA. Gentner's Fritillary Conservation Agreement (FRGE CA), p. 39	Follow all Project Design Criteria prescribed in the *Biological Assessment of Activities that May Affect the Federally Listed Plant Species, Gentner's Fritillary, Cook's Lomatium, and Large-flowered Woolly Meadowfoam, on Bureau of Land Management, Medford District and Cascade Siskiyou National Monument* (BLM 2020a).
145	FRGE CA, p. 39; Botany BA.	Conduct soil-disturbing vegetation treatments in Gentner's fritillary and Cook's lomatium populations when plants are dormant, generally between July 1 and February 15. Thinning and scattering slash within populations or piling slash outside buffers is permitted outside those dates under the direction of the project botanist.
146	SWO ROD/RMP (p. 106), Botany BA, 6840 policy direction, Standard Practice	Implement protection measures for Special Status plant sites on a site-by-site basis, taking into consideration the species and its habitat requirements, the proposed treatment, management recommendations if available, and current environmental conditions at the site.
154	Botany BA, PDC-E; Standard Practice	Restrict broadcast burning within T&E and Sensitive plant sites to the dormant season (generally July 1 - February 15).
159	Botany BA, PDC-E	For manual treatment, maintain 25-foot no-treatment buffers around (T&E) plant sites during the growing season. Treatment inside of buffers is allowed in the dormant season (July 1 - February 15), but remove cut material within buffer to at least 25 feet away from plant site boundary.

PDF #	Source (RMP BMP or Other)	Description
163	SWO ROD/RMP, p. 106; IIPM EA, pp. 271-273	When re-vegetating degraded or disturbed areas, utilize locally adapted seeds and native plant materials appropriate to the location and site-specific conditions, and meeting management objectives for vegetation management and restoration activities. Use seeds and plant materials that are genetically appropriate and native to the plant community or region, to the extent practicable.
164	FRGE CA, p. 40. SWO ROD/RMP, p. 93, BLM Manual 9015, .34B; IIPM EA, pp. 272-273	Clean soil and plant parts from equipment prior to entering treatment areas to reduce the risk of introducing or spreading non-native invasive plants.
172	Botany BA, PDC-Heavy Equipment	No heavy equipment within 100 feet of Gentner's fritillary or Cook's lomatium plant sites.
173	Botany BA, PDC-L	No new roads within 100 feet of Gentner's fritillary or Cook's lomatium plants. No new roads within Cook's lomatium critical habitat.
179	Botany BA, PDC-Q	Do not burn landing slash within 100 feet of (T&E) plant sites.
180	To protect the integrity of Climate Change Monitoring plots or other long-term monitoring.	No treatments in long-term monitoring plots in RNAs unless part of the monitoring plan.
181	Botany BA, PDC-L	Construct landings at least 100 feet from (T&E) plant sites. Permit use of previously existing landings when more than 100 feet away from plant sites.
182	Botany BA, PDC-L	Realign new proposed logging road corridors, truck turn arounds, and staging areas to maintain 100-foot buffers. Permit use of existing roads, even when located less than 100 feet from (T&E) plant sites.
183	Standard practice; SWO ROD/RMP, p. 93; IIPM EA, pp. 271-273	All rock, gravel, rip-rap, and other material utilized in the building, reconstruction, or maintenance of roads (temp, permanent, etc.) must be free of noxious weed seeds and either originate from an accredited, weed-free quarry approved by the project botanist or be crushed between the November 1 and June 15 immediately prior to application. Aggregate stockpiled between June 16 and October 31 of the previous year would not be accepted unless inspected by the project botanist.
280	IIPM EA, pp. 271-273	Seed decommissioned roads at risk of invasion by nonnative invasive plants with native species for at least 30 feet from the intersection with a main route.

Cultural/Tribal/Paleontological Project Design Features

PDF #	Source (RMP BMP or Other)	Description
19	BLM/SHPO Protocol	Consultation with Tribes and/or SHPO will be completed prior to the signing of any DR's completed under this EA.
20	BLM/SHPO Protocol	Archaeologists will conduct pre-field examinations of existing site, survey and other relevant information to determine what areas of proposed projects (if any) will need to be surveyed.
21	Regulations	Cultural resource surveys may need to be conducted prior to the signing of any DRs produced under this EA. These surveys will also search for paleontological resources. Previously recorded sites will be re-visited to complete records updates as needed.
22	PRMP/FEIS, p. 1132	All cultural sites within project areas may be evaluated for the NRHP.
23	Standard practice	Prior to any project decision that entails new road, landing, or skid trail construction, the field office archaeologist will evaluate whether new road and landing locations require cultural surveys, and any needed surveys will be completed.
24	BLM/SHPO Protocol	All surveys will be conducted or led by qualified cultural resource specialists familiar with the BLM Protocol and Section 106 of the NHPA.
25	BLM/SHPO Protocol	Cultural or paleontological sites occurring within activity areas may be flagged for avoidance, unless evaluated and treated or discharged from management. Sites that need to be protected will be identified to the project proponent/implementor on a map.
26	Standard practice	Cultural sites that are located within prescribed fire units will have hand lines constructed around them as necessary to protect the resource from fire.
27	Standard practice	Cultural Sites that are within treatment units may be hand-treated to reduce fuel loading, and to lessen their visibility on the landscape. These sites will be identified prior to project implementation by Medford District archaeological staff.
28	Standard practice	Large diameter trees (commercially viable) within archaeological sites will not be removed. All trees near cultural sites will be felled away from the site, rather than into them.
29	Standard practice	All materials cut from cultural sites, and any other cut materials will be piled off-sites for burning purposes. The Medford District archaeological staff will work with other BLM staff to identify suitable areas for pile burning. No trees or other vegetation shall be dragged through a cultural site.
30	Standard practice	Sensitive areas (such as flagged sites or areas identified by Tribes) will be discussed with the contractor to ensure that they understand the need to avoid those areas. The contractor will also be informed that they cannot collect artifacts or disturb cultural resource sites in any way.
31	Standard practice	Any fire lines leading to or near cultural or paleontological sites that originate from roads shall be blocked after project implementation to prevent unauthorized all-terrain vehicle use.

PDF #	Source (RMP BMP or Other)	Description
32	BLM/SHPO Protocol	Only existing breaches or areas along ditch systems designated by Medford District archaeological staff shall be used for the removal of vegetation. If new crossings are needed to facilitate access, these areas will be developed with the archaeological staff and in consultation with SHPO.
33	BLM/SHPO Protocol, Standard Practice	Brush and tree removal within historic ditch systems will be discussed with archaeological staff prior to removal. Any wooden features (such as trellises, flumes and other wooden items of historical significance) within ditches must remain in place and will be protected. All brush and other woody materials will be piled away from the ditches for burning.
34	Standard Practice	Prior to any underburning activities, all ditches or ditch segments will be examined by the archaeologists to identify any wooden features. Any wooden features (such as trellises, flumes and other wooden items of historical significance) identified will be flagged for avoidance. Appropriate mitigation for such features will be developed by archaeological staff.
36	1780 Manual	Large patches of culturally significant plants (as identified by Tribes) will be protected from all treatment activities unless such activity will benefit the patch.
37	Standard Practice	All areas designated for personal use firewood collection will be discussed with BLM archaeological staff and developed in cooperation with them in order to protect any cultural resources.
38	BLM Policy	Tribes shall have access to project areas to collect Special Forest Products before treatment if culturally significant products are identified within treatment areas. Such products include bear grass, pine cones, acorns, several species of root plants, fir boughs, mushrooms, etc.).
283	BLM H-8270-1	Follow BLM Handbook H-8270-1 to determine known Condition 1 and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or remove adverse impacts.

Road Project Design Features

PDF #	Source (RMP BMP or Other)	Description
188	R01/p. 167	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).
189	R02/p. 167	Where an EA alternative allows stream crossings, locate temporary road construction or improvement to minimize the number of stream crossings.
190	R03/p. 167	Locate roads and landings away from wetlands, RR, floodplains, and waters of the State, unless there is no practicable alternative. Avoid locating landings in areas that contribute runoff to channels.

PDF #	Source (RMP BMP or Other)	Description
191	R04/p. 167	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.
192	R07/p. 168	Design road cut and fill slopes with stable angles, to reduce erosion and prevent slope failure.
194	R11/p. 168	Locate waste disposal areas outside wetlands, RR, floodplains, and unstable areas to minimize 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.
195	R13/p. 168	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.
196	R15/p. 169	Minimize fill volumes at 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.
197	R16/p. 169	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.
198	R18/p.169	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.
199	R19/p. 169	Design stream crossings to prevent diversion of water from streams into downgrade road ditches or down road surfaces.
200	R30/p. 172	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.
202	R35/p. 172	Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow down gradient in ditchlines.
203	R36/p. 172	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.
204	R61/p. 176	During roadside brushing, remove vegetation by cutting rather than uprooting.

PDF #	Source (RMP BMP or Other)	Description
206	R63/p. 177	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, RR, 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.
207	R64/p. 177	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.
208	R66/p. 177	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.
209	R68/p. 178	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 gallon/yard^2 of road surface, assuming a 50:50 (lignin sulfonate to water) solution.
210	R79/p. 179	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.
211	R80/p. 179	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.
212	R81/p. 179	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.
215	R84/p. 180	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.
216	R91/p. 181	Implement tillage measures, including ripping or subsoiling to an effective depth. Treat compacted areas including the roadbed, landings, construction areas, and spoils sites.

PDF #	Source (RMP BMP or Other)	Description
217	R93/p. 182	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.

Fish Project Design Features

PDF #	Source (RMP BMP or Other)	Description
219	SWO ROD/RMP p. 76	Do no operate ground-based machinery for timber harvest within 50 feet of stream (slope distance), except where machinery is on improved roads, designated stream crossings identified in consultation with watershed specialists, or where equipment entry into the 50-foot zone would not increase the potential for sediment delivery into the stream.
220	SWO ROD/RMP p. 76	Do not operate ground-based machinery for timber harvest on slopes > 35 percent in RRs. 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).
228	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 RR using at least one-end suspension.
230	R 93, R 94	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. 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.
236	R 62	Limit new permanent roads, temporary routes, and landing construction and road maintenance to the dry season (generally May 15 to October 15), or when soil moisture does not exceed 25 percent. Keep erosion control measures concurrent with ground disturbance to allow immediate storm-proofing.
237	R 66	Suspend ground-disturbing activity if forecasted rain would saturate soils to the extent that there would be 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, and slash placement.
241	N/A	Do not allow culvert removal and replacement from October 15 to May 15. Variations in these dates would be permitted dependent upon weather and soil moisture conditions and with a specific erosion control plan (e.g., rocking, waterbarring, seeding, mulching, barricading) as determined by the Authorized Officer in consultation with aquatic and/or soils scientists.

PDF #	Source (RMP BMP or Other)	Description
242	N/A	When permanently removing culverts, pull slopes back to the natural slope, or at least 2:1, to minimize sloughing and erosion and minimize the potential for the stream to undercut stream banks during periods of high stream flows.
243	R 48, R 49	Perform instream work during the instream work period as defined by ODFW; June 15 to September 15 for all areas except the Applegate and tributaries to the South Umpqua, July 1-September 15, and July 1-January 31 in the Klamath Basin (Jenny Creek).
244	R 23	De-water streams during culvert installation and replacement to maintain optimum bedding material moisture content and minimize the movement of sediment downstream.
245	R 70	Retain ground cover in ditch lines, except where sediment deposition or obstructions require maintenance.
246	R 47, R 77	Remove all possible excess sediment from stream channels during culvert removal, replacement, and installation in the same operational season the work is completed.

Fuels Project Design Features

PDF #	Source (RMP BMP or Other)	Description
252	Scoping Comment	When conducting prescribed fire in utility ROW, notify the ROW Holder/utility company of planned operations prior to burning.
286	2020 IVM	Identify commercial units in conjunction with fuels specialists to facilitate the application of prescribed fire (i.e., underburning), as needed, particularly in strategic areas for wildfire containment.
287	F 02	Reduce fuel loads by whole tree yarding, and piling material, as necessary, prior to under burning in dry forest types where fuel loads are elevated.
288	2012 IVM	As operationally feasible, avoid damage to trees established prior to 1850 and greater than 40 inches DBH (LITA, MITA, RR, and LSR) and Douglas fir and pine greater than 36 inches DBH and madrone, big leaf maple, and oak greater than 24 inches DBH (UTA and LSR-Dry) during prescribed fire application (e.g., prior to underburning pull duff and slash back from the base, or adjust firing patterns as needed).

Hydrology Project Design Features

PDF #	Source (RMP BMP or Other)	Description
258	TH 06	Prior to the wet season, construct water bars by hand in cable yarding corridors or in special yarding areas where substantial gouging occurs that could lead to the capture and conveyance of water and/or contribute to soil erosion, as determined by the soil scientist and directed by the Authorized Officer. Pull available slash on skyline-cable yarding corridors or special yarding areas if gouging of mineral soil occurs for a continuous distance of 20 feet or more that could lead to the capture and conveyance of water and/or contribute to soil erosion.
259	TH 17	Construct water bars on skid trails using guidelines in Table C-6 (USDI BLM 2016c, p. 191) where potential for soil erosion or delivery to waterbodies, floodplains, and wetlands exist.
262	TH 06, TH16	Apply erosion-control techniques (e.g., water bar, seed, mulch, scatter chipped material, or scatter limbs and other fine material) on skid trails, forwarder trails, yarding corridors, landings, and other disturbed areas where potential for soil erosion or delivery to waterbodies, floodplains, and wetlands exist, or as identified by the Authorized Officer.
263	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.
264	TH 03	Use full or partial suspension when skyline-cable yarding. Require full suspension overflowing streams, non-flowing streams with highly erodible beds and banks, and jurisdictional wetlands.
265	R69	Prior to the wet season, provide effective road surface maintenance. Clear ditch lines in sections where there is lowered capacity or obstructed by dry ravel, 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, outsloping or insloping 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).
285	N/A	For RRs adjacent to fish bearing and perennial streams where commercial thinning is proposed in the outer zone, a resource specialist will evaluate the existing condition of the inner zone of the RR to ensure that greater than 40 percent canopy cover exists; if canopy cover is found to be less than 40 percent in the inner zone, thinning in the outer zone will not be allowed. The intent is to ensure that shade to the stream is not reduced in those rare instances where inner zones may be open canopy, while outer zones are more closed (i.e., a meadow reach adjacent to a stream surrounded by forested stands within the SPTH buffer width).

Range Project Design Features

PDF #	Source (RMP BMP or Other)	Description
9	N/A	During vegetative treatment activities, protect rangeland developments and improvements by using techniques such as directional falling to prevent damage to fences, cattle guards, livestock watering troughs and other improvements.
10	N/A	If damage to range improvements does occur, contractors/operators would be required to notify the BLM immediately and proper repair or replacement would occur within two weeks. Proper repair of fences and gates includes keeping wire properly attached to posts, splicing or replacing broken wire in kind, repairing structures such as corners, stress panels or gates, and any other work necessary to keep improvements functional. Repair of structures such as stress or corner panels and gates requires pre-approval by BLM staff. Repair or cleaning of cattle guards damaged or filled with sediment by logging activities would require approval of BLM road engineering staff for structural integrity and public safety compliance.
11	N/A	During vegetative treatment activities, contractors/operators would keep all gates closed and all livestock containment systems functional to keep livestock in authorized areas.

Recreation Project Design Features

PDF #	Source (RMP BMP or Other)	Description
12	BLM Manual 6400, Section 7.5	Actions outside of the river corridor that have the potential to impact outstandingly remarkable values (ORVs) must also meet the protect and enhance standard set forth in Section 10 of the WSR Act.
282	SWO ROD/RMP p. 114; Dingell Act	Conduct Visual Contrast Rating sheets at the project level to determine effects on WSRs to the scenery from actions outside of the corridors.
289	BLM Handbook 8320-1	Monitoring for naturalness would be completed through field observations and GIS analysis to determine if projects, activities, or modifications have altered the landform, vegetation, water, color, or character of the landscape.
15	SWO ROD/RMP p. 107	Manage activities in accordance with the planning frameworks for SRMAs and ERMAs. Frameworks are available at: https://www.blm.gov/or/plans/rmpswesternoregon/recreation.php.
16	SWO ROD/RMP p. 107	Protect recreation setting characteristics within SRMAs to prohibit activities that would degrade identified characteristics and allow activities that would enhance characteristics.
18	SWO ROD/RMP p. 114	Utilize Visual Contrast Rating Sheets for projects; follow VRM Class objectives; adjust prescriptions as necessary to meet VRM Class objectives.

Silviculture Project Design Features

PDF #	Source (RMP BMP or Other)	Description
138	2012 IVM EA	Conduct prescribed underburning to minimize mortality to the residual stand to <15 percent on average. Limit mortality in trees 8-16 inches in diameter to <20 percent. Limit mortality in trees >16 inches DBH to <10 percent.
218	Port-Orford cedar EIS	Where Port-Orford-Cedar is present, treatments must be consistent with management direction in the Port-Orford-cedar EIS.
	2016 T.S. Handbook H-5420	Avoid damage to white fir and residual trees in general along haul routes, planned skid roads, or adjacent to major landings where heavy mechanical injury can occur during harvest operations to reduce tree susceptibility to fungal attacks and root rots.

Soils Project Design Features

PDF #	Source (RMP BMP or Other)	Description
6	SWO ROD/RMP Monitoring Plan p. 151	As determined by a BLM soil scientist, no more than 20 percent of the treatment units to have detrimental soil disturbance including legacy disturbance as defined by the Forest Soil Disturbance monitoring protocol (Page-Dumroese et al. 2009a, 2009b) or similar updated protocols. Where the combined detrimental disturbance from implementation of current forest management operations and detrimental soil disturbance from past management operations exceeds 20 percent of the unit area, apply mitigation or amelioration to reduce the total detrimental soil disturbance to <20 percent of the treatment unit.
42	SWO ROD/RMP TH 11 p. 183	Restrict non-road, in unit, ground-based equipment used for harvesting operations to periods of low soil moisture; generally from May 15 to October 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. The Authorized Officer may issue a waiver, based on site conditions, ensuring operations would not cause detrimental soil disturbance such as rutting, erosion, or compaction.
44	SWO ROD/RMP TH 13 p. 184	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.
45	SWO ROD/RMP TH 14 p. 184	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.
49	SWO ROD/RMP p. 54-56	DDR-TPCC: Maintain the values and resources for which the BLM has reserved these areas from sustained-yield timber production.

PDF #	Source (RMP BMP or Other)	Description
257	DF01	Use full log suspension whenever practicable on TPCC soils identified as prone to surface erosion, category FM. Use one-end suspension on these soils if full suspension is not practicable.
267	TPCC Handbook 5251-1	No commercial timber harvest (commercial thinning, selection harvest, or group selection thinning) in lands classified under the BLM DDR-TPCC system as "fragile non-suitable woodlands." Harvest allowed if the TPCC designation for the land is reclassified as discussed in the SWO ROD/RMP, pp. 4-5.
268	SWO ROD/RMP pp. 205-206	When conducting commercial timber harvest in lands classified under the TPCC system as "fragile suitable forest lands," follow the BMP's described in the SWO ROD/RMP (pp. 205-206) and any applicable recommendations or BMPs in the most current TPCC manual or handbook.

Wildlife Project Design Features

PDF #	Source (RMP BMP or Other)	Description
78	Wildlife Consultations	Follow Project Design Criteria (PDCs) and site and project specific reporting and monitoring requirements in wildlife consultation documents for T&E species. PDCs include seasonal restrictions to minimize disturbance effects.
284	SWO ROD/RMP p. 72	For treatments in non-NSO nesting-roosting habitat where the objective is to speed the development of NSO nesting-roosting habitat or improve the quality of NSO nesting-roosting habitat in the stand or in the adjacent stand in the long-term, adjust site-specific treatment prescriptions as necessary to ensure they do "not preclude or delay by 20 years or more the development of NSO nesting-roosting habitat in the stand and in adjacent stands, as compared to development without treatment."
	N/A	No commercial treatment of spotted owl NR (regardless of RHS or seral stand condition) in the 0.5-mile core-use area of active spotted owl sites. Small portions of stands proposed for treatment outside of the 0.5-mile core-use area that extend within the core-use area may be permitted as long as adverse effects to the site can be avoided. Yarding corridors are permitted if NR function can still be maintained post-harvest. Small diameter fuels reduction treatments and prescribed burning may be permitted depending on the proximity to the active area within the 0.5-mile core-use area and if NR components and function can still be maintained post-treatment (i.e., layering, coarse woody material, etc.).
52	SWO ROD/RMP p. 121	Follow management direction for Siskiyou Mountains salamander consistent with the Conservation Agreement (August 17, 2007), or successor agreements.
61	SWO ROD/RMP p. 115	Manage naturally occurring special habitats to maintain their ecological function, such as seeps, springs, rock outcrops, caves, cliffs, and talus slopes.
292	SWO ROD/RMP p. 114	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.

PDF #	Source (RMP BMP or Other)	Description
62	SWO ROD/RMP p. 115	Prior to implementing actions that could result in habitat modification or species disturbance in habitat for the vernal pool fairy shrimp, conduct surveys to determine species presence.
63	Medford 2017 Programmatic Consultation	Vernal pools would be assumed occupied unless surveys indicate otherwise. Treatments in or adjacent to vernal pools will only occur during the dry season, which is when fairy shrimp have not hatched and are non-reproductive. This period generally occurs between April and November. The seasonal restriction and buffer distance may be waived if surveys determine the specific pool or pools are unoccupied by vernal pool fairy shrimp and the project is done in coordination with the FWS.
290	SWO ROD/RMP p. 116	Prohibit activities that will disrupt bald eagles or golden eagles that are actively nesting. Depending on the site, this may include restricting chainsaw operations, heavy equipment use, and prescribed burning up to ¼ mile no line of site and ½ mile line of site around active bald or golden eagle nest sites
64	SWO ROD/RMP p. 116	Do not remove overstory trees within 330 feet of bald eagle or golden eagle nests, except for removal of hazard trees.
65	SWO ROD/RMP p. 116	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.
66	SWO ROD/RMP p. 116	Prohibit operation of off-highway vehicles within 330 feet of bald eagle or golden eagle nests during the breeding season. In areas without forest cover or topographic relief to provide visual and auditory screening, prohibit operation of off-highway vehicles within 660 feet of bald eagle or golden eagle nests during the breeding season.
70	SWO ROD/RMP p. 116	Restrict motor vehicle use within designated deer or elk management areas between November 1 and April 15 by techniques such as gating or signing to impose the restrictions.
71	SWO ROD/RMP p. 117	Where forage for deer or elk is limited within designated deer or elk management areas, revegetate areas disturbed by IVM implementation actions including skid trails, burn piles, etc., as needed, with site appropriate native forage species.
73	SWO ROD/RMP p. 117	Maintain ≥ 80 percent canopy cover within at least 50 feet of documented fisher natal and maternal dens. Maintain sufficient canopy cover on the remainder of the stand to support fisher denning post-project.
74	SWO ROD/RMP p. 117	In stands with known natal or maternal denning sites, protect fisher denning structures ≥ 24 inches diameter (snags, down woody material, and live trees with cavities) within the stand. In this context, protect fisher denning structures means to retain the ≥ 24 inches diameter structures (i.e., snags, down woody material, and live trees with cavities) in the stand and if, for safety concerns, it is necessary to fall such snags or live trees with cavities, retain those cut trees or snags in the stand as additional down woody material. Do not apply vegetation treatments to all portions of the stand.

PDF #	Source (RMP BMP or Other)	Description
75	SWO ROD/RMP p. 118	Within 5th field-watersheds (HUC 10) where fisher are documented by the BLM to occur, favor retaining trees that have structures (e.g., cavities, mistletoe, and rust brooms) that are typically used as denning or resting sites by fisher.
77	SWO ROD/RMP pp. 118-121	Before modifying marbled murrelet nesting habitat or removing nesting structure in (1) all LUAs within 35 miles of the Pacific Coast, and (2) Late-Successional Reserve and RR between 35–50 miles from the Pacific Coast and outside of exclusion Areas C and D (shown in Figure 2, p. 52, SWO ROD/RMP), assess for marbled murrelet nesting structure as required in the SWO ROD/RMP pp. 118-121 and follow all applicable RMP management direction, including survey or exclusion options.
82	SWO ROD/RMP p. 71	Protect marbled murrelet occupied stands in LSR. In this context, protect marbled murrelet occupied stands means to prohibit activities in the occupied stand except for the following: felling of live or dead hazard trees, felling and removal of trees for habitat restoration, and the construction or maintenance of linear and nonlinear ROWs, spur roads, yarding corridors or other facilities, as long as the occupied stand continues to support marbled murrelet nesting. Implement wildfire response actions and activities needed to protect the overall health of the stand or adjacent stands, such as fuels reduction and insect and disease control, as long as the occupied stand continues to support marbled murrelet nesting.
83	SWO ROD/RMP pp. 71, 76	In LSR and RR, during silvicultural treatment of stands, retain existing—Snags ≥ 6 inches DBH and Down woody material ≥ 6 inches in diameter at the large end and > 20 feet in length. Except for safety, operational, or fuels reduction reasons. Retain snags ≥ 6 inches DBH cut for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material. A snag is “any standing dead, partially dead, or defective (cull) tree at least 6 feet tall.” (USDI BLM 2016b, p. 313).
84	SWO ROD/RMP p. 71	In LSR, where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement, any trees that are both ≥ 40 inches DBH and that the BLM identifies were established prior to 1850, retain cut trees in the adjacent stand as down woody material.
85	SWO ROD/RMP p. 73 and NCO ROD/RMP p. 67	In LSR, when conducting commercial harvest, in stands with less than 64 snags per acre > 10 inches DBH and less than 19 snags per acre > 20 inches DBH on average across the harvest unit, create one new snag > 10 inches DBH and one new snag > 20 inches DBH within 1 year of completion of yarding the timber in the timber sale (five in each category on the Coos Bay District portion of the Treatment Area). 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. Create snags in a variety of spatial patterns, including aggregated groups and individual trees. Do not create snags within falling distance of power lines, structures, or roads that will 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 will 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 will occur within 20 years.

PDF #	Source (RMP BMP or Other)	Description
86	SWO ROD/RMP pp. 73-74, 82 and NCO ROD/RMP p. 67	When conducting fuels reduction or prescribed fire treatments, in the RR-Dry or LSR-Dry, retain 2 percent cover of down wood greater than >4 inches diameter (6 percent or greater on the Coos Bay District portion of the Treatment Area). Meet down wood levels as an average at the scale of the Treatment Area following the treatment; down wood levels need not be attained on every acre.
90	SWO ROD/RMP, p. 115	Restrict the use of motorized equipment and vehicles to existing roads within the following naturally occurring special habitats to maintain their ecological function: seeps, springs, wetlands, natural ponds, and natural meadows.
99	2012 IVM EA	To retain suitable microclimatic and substrate conditions in talus habitat, restrict ground disturbing activities (e.g., heavy equipment or yarding of trees) that displace or compact the substrate to 12 percent or less of the talus area.
105	SWO ROD/RMP, p. 131.	No treatment in spotted owl nest patches in LSR except for strategic fuels reduction, insect and disease control, wildfire response or habitat development.
106	Medford 2017 Programmatic Consultation and Resilient Lands Consultation	No burning will occur within the nest patch of occupied or sites that are assumed to be occupied by spotted owl territorial pairs or resident singles, even outside of the critical breeding season.
107	Medford 2017 Programmatic Consultation	Fire lines for prescribed fire will not be constructed through vernal pools.
108	Medford 2017 Programmatic Consultation	In vernal pools on the top of Table Rocks, prescribed fire will occur in the fall when vernal pools are dry and outside of the reproductive season for fairy shrimp.
109	RMP p.115; Created from data from Ashland/Klamath Falls Fisher study.	In watersheds with known fisher activity, debris piles associated with logging activity (slash and/or cull material piles) adjacent to roads or on landings would not be burned, chipped or made available for firewood cutting between February 1 and September 30 when the pile is mixed with various sized logs (multiple diameters) and there is some open space within the piled logs (not compact). Spring burning, chipping or firewood cutting could take place if a BLM wildlife biologist reviews the pile and determines it is not compatible with fisher denning/resting use.
269	SWO ROD/RMP, pp. 71, 313	Prescriptions designed to maintain nesting-roosting habitat (NR) habitat function in LSR at the stand scale post-treatment would retain key habitat elements important to owls, such as high canopy cover, large overstory trees, high basal area, multiple canopy layers, large snags, large down wood, and large hardwoods. Wildlife biologists would assess the ability of the stand to maintain NR habitat at the stand scale based on the amount of edge created, the proportion of the treated area compared to the untreated stand area, and the placement and size of skips and gaps within the stand. In commercial harvest treatments in spotted owl NR, F, or dispersal habitat, place skips within similar habitat within the treated area to create desirable habitats and ecological conditions post-harvest. If the treatment unit and stand are the same or similar, then standard consultation PDCs to maintain habitat would apply.

PDF #	Source (RMP BMP or Other)	Description
272	Resilient Lands Consultation	Commercial harvest units with prescriptions designed to maintain NR or F habitat function in LSR would apply additional post-harvest fuels treatments, understory reduction, or pre-commercial thinning only if the existing post-harvest layering (especially the lower canopy layers) would not be removed as a result of the activity fuels treatments. The post-harvest layering conditions and need for additional understory treatments would be assessed by the project wildlife biologist, fuels specialist, and prescription writer.
279	PRMP/FEIS BO, p. 294	No treatment in structurally-complex forest in LSR within Marbled Murrelet Management Unit Zone 2.
291	Pollinator BMPs for Federal Lands	Restrict burning to fall and winter (generally October to March) in meadow plant communities within the range of sensitive species pollinators Coronis fritillary, Mardon skipper, gray-blue butterfly, Oregon branded skipper, western bumblebee, and Franklin's bumble bee.
	Resilient Lands Consultation	No habitat modifying actions in suitable Franklin's bumble bee habitat between May 15 and September 30 within the range of Franklin's bumble bee.

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APPENDIX 3 GENERAL CURRENT CONDITION OF FOREST VEGETATION

The current vegetation conditions within the Planning Area are a product of abiotic and biotic factors impacting the productivity of a given site, as well as the history of natural disturbance events and past management actions. The following summarizes the vegetation conditions generally.

The Planning Area is comprised of a variety of vegetation types, indicative of the historic low-mixed-severity fire regime attributed to the Klamath region (Taylor and Skinner 1998; Knapp and Keeley 2006; Taylor and Skinner 2003; Frost and Sweeney 2000), including both conifer and non-conifer plant communities, representing approximately 740, 110 and 66, 565 acres, respectively (USDI BLM 2016a, Table H-5 p. 1319).

1 Forest Cover

Forested lands in the Planning Area fall within the two broad categories: moist and dry. The majority of forest lands within the Planning Area are in the dry category (94 percent). Appendix C of the PRMP/FEIS (pp. 1163-1227), to which this EA tiers, describes the assumptions applied to the vegetation modelling for use in the SWO ROD/RMP. That analysis is incorporated here by reference. The PRMP/FEIS vegetation modeling goes into further detail of the process to categorize how forested areas are delineated into as moist or versus dry categories and how forested areas are based on delineated into PVTs. These moist versus dry delineations are based on Plant Association Groups (PAGs) that the BLM and Forest Service have collected and compiled. The PAG's are a product of biotic and abiotic features creating conditions favorable for certain forest types. The modeling team used the Integrated Landscape Assessment Project to derive the PVT using underlying PAG information to help delineate moist versus dry categories and to provide complete coverage of forest vegetation cover across the Planning Area. This EA used the same PVTs and moist and dry forest designations as in the PRMP/FEIS. PVTs produced from the PRMP/FEIS modeling were used to derive the PVTs in the EA. As shown in Table 33 the forests in the Treatment Area are made up primarily of the Douglas fir dry (54 percent) PVT.

Table 33. Potential Vegetation Type for the Planning Area.

Potential Vegetation Type	Acres	% of Acres
Douglas fir – Dry	415,394	54
Douglas fir – Moist	41,785	5
Jeffrey pine	10,054	1
Not Modeled	30,014	4
Oregon white oak	33,905	4
Ponderosa pine – Dry	10,370	1
Tan oak – Douglas fir – Dry	81,850	11
Tan oak – Douglas fir – Moist	19,770	3
Western hemlock – Hyperdry	4,788	1
Western hemlock – Intermediate	9,606	1
White fir – Cool	10,250	1
White fir – Intermediate	95,569	12
Grand Total	774,348	98
PVTs < 1% are not represented		

The predominate Douglas fir PVT in the Treatment Area support diverse stand compositions of conifers such as Douglas fir, ponderosa pine, sugar pine, western hemlock, white fir and incense cedar, as well as hardwoods such as California black oak and pacific madrone, canyon live oak, and tan oak. These PVT exhibit a wide variety of conditions, differing by slope, aspect, elevation and soil transitions. South and west aspects exhibit relatively more cover in sugar pine, ponderosa pine, California black oak, and Oregon white oak, while northern and eastern slopes, as well as more productive soil types and drainages display more tanoak, white fir, hemlock and chinquapin (Atzet 1996).

2 Non-Conifer Ecosystems

The Treatment Area contains southwestern Oregon, oak woodlands and other non-conifer ecosystems that include a gradient of habitats and express a broad range of unique stand structures (Table 33). These systems are composed of hardwood species, typically white and/or black oak, shrubs (such as buckbrush (*Ceanothus cuneatus)* and manzanita (*Arctostaphylos sp.*) and forbs. Include a gradient of habitats and express a broad range of unique stand structures. These non-conifer systems occur from the deep clay soils of the lowland valleys, the drought-prone foothills, areas dominated by serpentine soils, to higher precipitation montane environments. Among these are widely spaced, single stemmed, broad canopy trees (savanna), densely spaced trees, forming continuous canopies of single- and multiple-stemmed oaks (woodland), areas where shrub cover dominates (oak chaparral) and areas where oak trees often occur as short form trees or a multi-stemmed growth form that functions like chaparral (Altman and Stephens 2012). These plant communities provide habitat for wildlife, pollinators and rare and special status plants and add landscape complexity. In many ACECs/RNAs these non-conifer plant communities are identified as one of the values that the special area was designated to protect.

The Klamath Mountains ecoregion provides an important convergence of California and Pacific Northwest oak communities. These oak plant communities in southwestern Oregon are the most ecologically diverse and imperiled oak habitats in the Pacific Northwest (Stephens and Gillespi 2016). Oak savanna and oak woodlands historically maintained by frequent fire were once the prominent features of the valley floor and foothills of the Rogue River Basin in southern Oregon. However, the extent and integrity of these ecosystems have diminished by conversion, development, and altered fire regimes. Since Euro-American settlement, losses (by ecoregion) across the Pacific Northwest range from 50 percent to 99 percent (Altman 2011). Beyond conversion, a major threat to Oregon white oak habitat is the encroachment of conifer trees and occasionally shrubs. Oregon white oak habitat often includes Douglas fir, ponderosa pine, black oak and madrone, and chaparral species (e.g., manzanita and buckbrush). Oregon white oak habitat typically represents the edge of the Douglas- fir climactic envelope and during drought years, the Douglas fir and occasionally pine begin dying from cumulative insect and disease pathogens, heat, and moisture stress (Clark et. Al 2016).

Southwestern Oregon chaparral is a drought-tolerant plant community composed of dense, evergreen, highly flammable, hard-leaved (*sclerophyllous*) woody drought-tolerant shrubs found at low to mid-elevations in the interior valleys. Flora and fauna supported by this vegetation type are fairly uncommon and unique. Species of concern are also documented in this habitat type (Hosten et al 2006).

In general, chaparral shrublands burn at high severity. For Mediterranean climate obligate-seeding populations, the high heat stimulates seed germination, creates even age stands, and clears encroaching trees. Chaparral is slow growing and requires enough time between fires for new shrubs to reach maturity and build up replacement-level seed banks. In southwestern Oregon, however, robust chaparral has been found to be *uniquely* uneven-aged, as recruitment continues over time, even during fire free periods (Duren and Muir 2010). In southwestern Oregon, chaparral is also a natural part of oak habitat community gradients. Oak/chaparral is a shrub-dominated habitat type (often >50 percent shrub cover) that includes an open canopy of oak trees with scattered grassy openings amid dense patches of shrub, which can be partially comprised of relatively short stature shrub-form oaks (Stephens and Altman 2012).

Grassland communities are dominated by grasses and forbs. In southwestern Oregon they include forest openings created and maintained by wildfire and areas where woody plant growth is limited by soil type or depth, water table levels, and aspect. These meadows provide important habitat for a variety of native plants and wildlife, but over the last 150 years, fire exclusion, conversion to agricultural fields, overgrazing, invasion of non-native grasses and noxious weeds, and OHV and vehicular use have significantly reduced or degraded the extent of these grasslands.

3 Fire History

Before the fire suppression and intensive management practices of the twentieth century, the Planning Area was characterized by high frequency, low to mixed severity fires that would have reduced fuel loadings and maintained a mosaic of open and closed stand conditions different from what is seen today. Evidence of fire occurrence in the Klamath Mountains (charcoal traces in lake sediment) dates to the Holocene period (Mohr et al. 2000; Whitlock et al. 2003; Colombarolli and Gavin 2010). "Historically, frequent low- to mixed- severity fire interacted with the complex landscape, vegetation, and climate to create and maintain patchy, mixed seral stages of shrubland, woodland, and mixed conifer/hardwood forests, in both open and closed conditions" (USDI BLM 2016a, p. 225). The majority (91 percent) of the Medford District is in Fire Regime Group 1, characterized by a fire return interval of less than 35 years, and the mean fire return interval of less than 15 years (USDI BLM2016a, pp. 223-225). Historically more than 90 percent of the landscape would have experienced frequent low-mixed severity fire, while less than 10 percent would have been longer fire return intervals or replacement (high) severity (USDI BLM 2016a, p. 225, Table 3-29). In recent years (2012-2019) wildfire burn severity on Medford District BLM-administered lands has not reflected this historic pattern (Table 34).

Table 34. Large Wildfire Burn Severity on Medford District BLM-Administered Lands between 2012 – 2019.

Wildfire Burn Severity	Acres	Percent of Total Area
High	62,601	39%
Low	50,758	31%
Moderate	33,643	21%
Unburned or very low	15,206	9%

Landscape patterns of wildfire size distribution and occurrence have shifted overtime within the Medford District (Figure 8) with frequent fire effectively ending around 1850 (Metlen et al. 2018). Metlen and others (2018) found 90 percent of historic fire return intervals to be between 3 and 30 years, with median return intervals of 8 years. This is aligned with other fire history research in the region (USDI BLM 2016a, p. 225)

Despite frequent fire activity ending in 1850, fire records from 1900 to 1939 still display considerable fire activity relative to more recent time periods. The total number of large fires between 1900 and 1939, was nearly five times greater than the period between 1940 to 1979 and approximately 2.5 times more than between 1980 to 2018 (Figure 8, Table 35). The average annual average number of large fires was also greater between 1900 and 1939, than the other two decades. The total wildfire acres between 1940 and 1979 was about 5 percent of acres burned between 1900 and 1939. Total wildfire acres between 1980 and 2018 are approximately double the acres between 1900 and 1939.

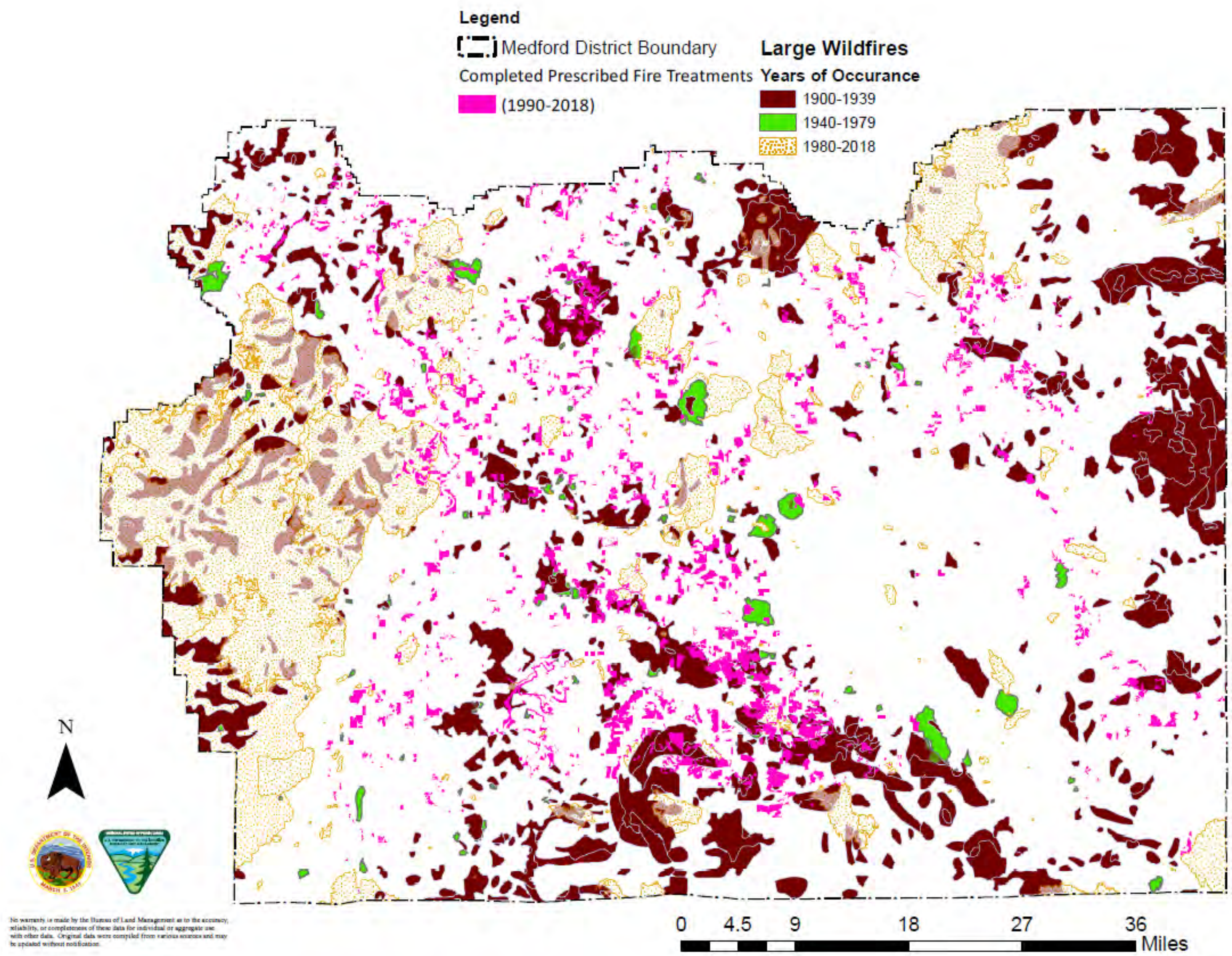

Figure 8. Medford District Large Fire History (1900 -2018). Fires occurring from 1900-1939 (dark brown) were prior to widespread use of mechanized equipment and establishment of Cave Junction Smoke Jumper Base in 1940 (Atzet 1996). Fires between 1940 – 1979 (green) occurred under fuel conditions conducive to effective fire suppression and during a relatively cooler climatic period than in recent years. Fires between 1980 – 2018 (yellow polka dot) have occurred in fuels accumulated from years of missed fire cycles, intensely managed landscapes, and under warming climatic conditions (Westerling et al. 2006). Prescribed burning (pink) implemented on the Medford District between (1990-2018). Fire perimeters from 1900 – 1939 were derived from compiled historic vegetation maps (BLM and USFS) attributed as "burned over, recent burn not restocked" or similar and are based on best-available historic data.

Table 35. Wildland Fire Patterns Across the Medford District from 1900-2018. Total Wildfire Acres, Number of Fires, Average Annual Number of Fires, Average Size, and Median Fire Size by Era.

Eras	Total Wildfire Acres	Total Number of Fires	Average Annual Number of Fires	Average Fire Size	Median Fire Size
1900-1939	679,887	655	16	1,038	376
1940-1979	39,189	137	3	286	61
1980-2018	956,931	253	9	2,786*	58
*Does not include 251,958 acres of the 500,000-acre Biscuit fire (2002), visible on western extent of Figure 2.					

Under the frequent disturbance regime described, stands would have been dominated by a mixture of drought-tolerant Douglas fir, pines, and oaks that develop fire resistant, complex forms in open growing conditions following these frequent low to mixed severity fires. After missing several fire return cycles, the likelihood of uncharacteristic fire behavior and high severity fire increases due to the buildup of fuels (Brown et al. 2004, Hessburg et al. 2005, Kauffman 2004).

The Medford District has implemented several thousands of acres of hazardous surface and ladder fuel reduction treatments (handpile burning and underburning) in the recent past (Figure 8, Table 36) actions have included initial entry and maintenance treatments (for example, nearly half of Medford District acres treated in 2015 were maintenance burning of previous treatments). Many of these areas are in need of follow-up maintenance actions, but do not have NEPA coverage to implement those actions. Wildfires can also provide maintenance of treated areas. Typically, most wildfire acreage represents less than one percent of fires that occur. These large fires tend to burn under more extreme fire weather, resulting in larger areas of high severity (citation). However, fuel treatments have been found to be effective, even during extreme fire weather, in some instances (USDI BLM 2016a, Appendix 4, p. 228).

Table 36. Acres of Previous Prescribed Fire Implemented on Medford District (1990-2018) and Years Since Prescribed Fire Entry.

	Years Since Last Prescribe Fire Entry		
Prescribed Fire Type	**Less than 10-years**	**10 to 20 years**	**Grand Total**
Underburn/Broadcast burn	6,037	15,938	21,975
Handpile Burn	27,821	51,908	79,729

4 Departure

Forest and non-forest areas in western North America are significantly departed from historic conditions (Haugo et. Al 2015; Demeo et al. 2018; Hagmann et al. 2021). “Currently, many of the dry forest stands are overly dense, are missing large fire-resistant trees, or are at risk from tree encroachment, or fire-induced mortality” (North et al. 2009, Jain et al. 2012, Comfort et al. in press). Dry forest species composition has shifted, resulting in significant reductions in the proportion and diversity of fire-adapted conifers, hardwoods, shrubs, and herbaceous species (Taylor and Skinner 1998 and 2003, Franklin and Johnson 2012, Duren et al. 2012)” (USDI BLM 2016a, p. 226). “The proportion of shade-tolerant species to fire-tolerant species has increased along with the proportion of small trees to large trees (Comfort et al. in press). The abundance of densely forested conditions has compromised individual tree vigor, resulting in extremely slow growth, which can delay or hinder the development of structurally-complex forest (Sensenig 2002, Sensenig et al. 2013). Open areas, such as forest gaps, shrublands, savannahs, grasslands, and hardwood woodlands, have been converting to closed areas via the recruitment of conifers (Taylor and Skinner 1998, Hosten et al. 2007, Comfort et al. in press). Surface, ladder, and canopy fuels have increased in loading and continuity, increasing the potential for larger scale crown and stand-replacing fires (Agee 1998, Sensenig 2002, Graham et al. 2004, Hessburg et al. 2005)” (USDI BLM 2016a, p. 226). Additionally, previous studies in the Klamath Mountains have shown that certain riparian and upland forests historically burned with comparable frequencies (Taylor and Skinner 2003).

In the absence of disturbance (e.g., wildfire), densely stocked stands have developed in the Planning Area, which has also increased the overall abundance of Douglas fir in all stand layers (top, middle, and bottom). Douglas fir tends to produce conditions that favor fire because it is self-pruning, often sheds its needles, and tends to increase the rate of fuel buildup and drying (Atzet and Wheeler 1982, pp. 8-9). Subsequently, this substantial shift in species composition has heightened the competitive advantage of shade tolerant trees, increasing absolute cover and RD, thereby increasing the overall fire hazard. The now minor conifer species, such as ponderosa and sugar pine, appear most frequently in the top layer, making up a very small legacy component of stands. The conversion and simplification of stands into closed canopy, shade grown, mid-seral conditions are an undesirable shift in terms of stand-level tree species diversity.

The PRMP/FEIS to which this EA tiers, describes the assumptions and techniques applied to modeling the NRV reference condition, and how the current condition has departed from this reference condition (USDI BLM 2016a, Ch 3 – Fire and Fuels pp. 228-223, Appendix H: Fire and Fuels pp. 1305-1319). The PRMP/FEIS acknowledged that several fire regime classifications exist along with uncertainty around measures and models of departure from the natural range of variability (USDI BLM 2016a, p. 223, Appendix W, pp. 1899-1900) and a variety of perspectives exist regarding historic vegetation reference conditions and natural range of variability (USDI BLM 2016a, p. 229) the assumptions regarding historic fire regimes and departure in the PRMP/FEIS were based on the LANDFIRE (Barrett et al. 2010) fire regime classification (USDI BLM 2016a, pp. 223, 229, Appendix H pp. 1305-1319).

There are five successional classes which are based on vegetation condition, such as tree size and canopy cover: Early, Mid-Open, Mid-Closed, Late-Open, and Late-Closed (Table 37). The early successional class includes establishment vegetation comprised of grass, herbs, shrubs, and tree seedlings to saplings and poles with a canopy cover < 30 percent. The mid successional class includes stands with quadratic mean diameter (QMD) of pole (8 inches DBH) to large (20 inches DBH) sized conifers, while the late successional class includes stands with large sized (QMD > 20 inches DBH) conifers. The open category represents overstory canopy cover that is < 40 percent and the closed canopy cover represents overstory canopy cover ≥ 40 percent.

Table 37. Successional Class Categories.

S-Class	Age (years)	QMD (inches)	Canopy Cover (%)
Early	≤ 50	< 8	< 30
Mid Open	60-150	< 20	< 40
Mid Closed	60-150	< 20	≥ 40
Late Open	> 150	≥ 20	< 40
Late Closed	> 150	≥ 20	≥ 40

These metrics are approximate and vary based on PVT (USDI BLM 2016a, Appendix H p. 1309)

As shown in Table 38, the forest successional conditions in the Planning Area display similar patterns of departure from the historical range of variation as seen in the PRMP/FEIS (USDI BLM 2016a, p. 1314) with a prominent excess of mid-seral closed canopy forest, and a deficiency of late seral open canopy forest as discussed in the purpose and need (Section 1.3 above).

Table 38. NRV and Current Successional Condition/Structural Stage in the Treatment Area.

Successional Condition/Structural Stage	Natural Range of Variability (NRV) for Douglas Fir-Dry and Moist: SW Oregon[19]	Current Approximate BLM Only Acres (Percent of Total BLM)
Early Seral	7-17%	6%
Mid Seral Closed Canopy	2-8%	70%
Mid Seral Open Canopy	11-22%	10%
Late Seral Open Canopy	40-55%	1%
Late Seral Closed Canopy	16-25%	13%

5 Pacific Northwest Quantitative Wildfire Risk Assessment

The shift in species composition, structure and wildfire patterns has resulted in increased risk from wildfires that do occur within southwestern Oregon. The Pacific Northwest (PNW) all-lands, Quantitative

[19] The upper and lower limits for NRV were combined for Douglas fir Dry and Douglas fir Moist Associations to provide concise results and are only intended to provide general context. The dataset used to calculate current seral classification and NRV was derived based on the rules established by Haugo and others (2015) in Appendix A.

Wildfire Risk Assessment (QWRA) provides a robust analysis of wildfire risk of large fires to collaboratively identified HVRAs[20], incorporating best available science. This assessment, led by the Forest Service, brought together many cooperators[21] to regionally refine nationally developed LANDFIRE surface fuel models, collectively identify HVRAs, assign relative importance to HVRAs, and develop response functions for those HVRAs to varying fire intensity levels. Then, tens of thousands of fire seasons were simulated to derive expected (probable) negative impacts and positive effects from wildfire (Gilbertson-Day et al. 2018).

The results of expected change to all HVRAs as summarized by watershed indicate that much of the Rogue Valley is at high risk from negative wildfire effects (Figure 9).

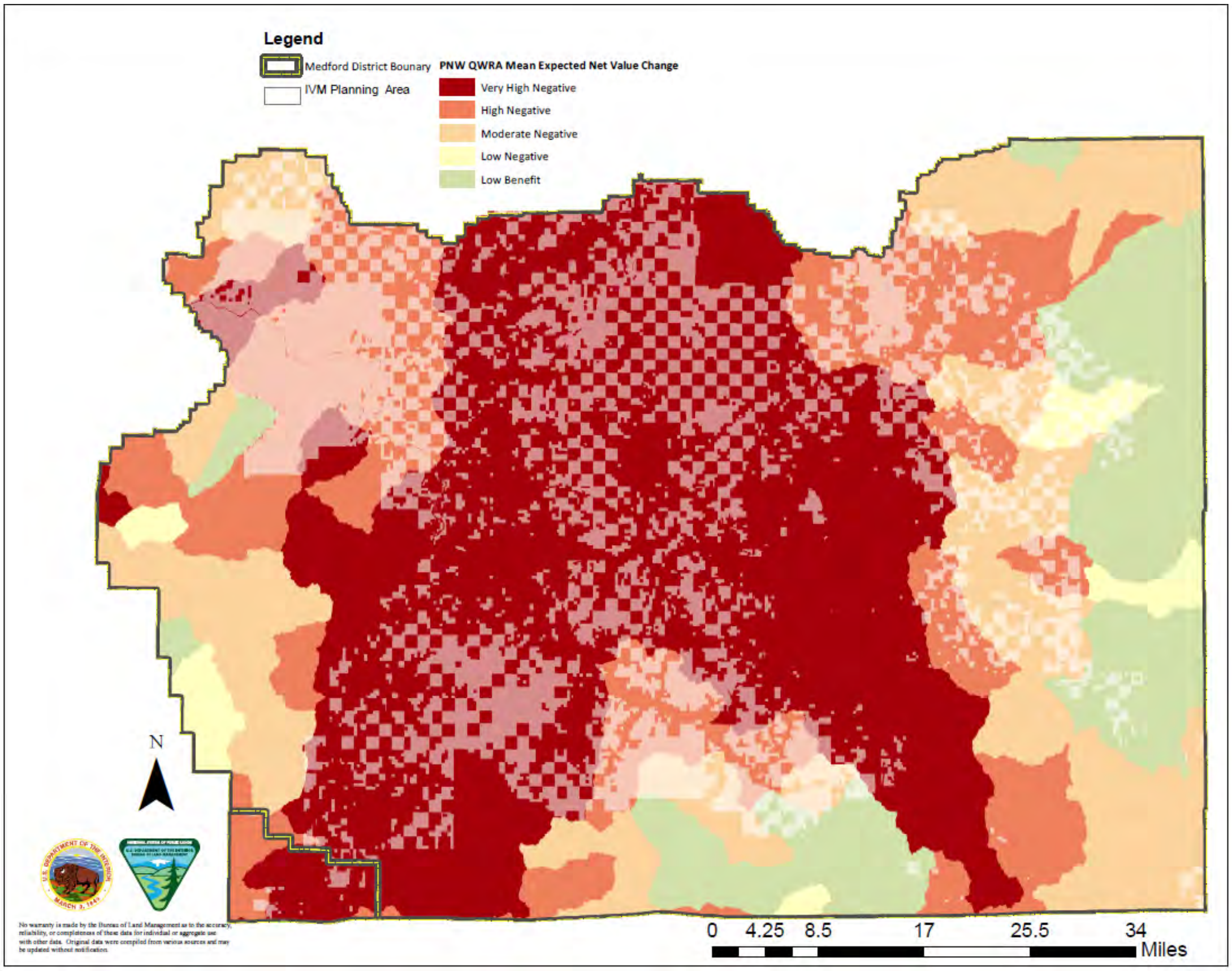

Figure 9. PNW Quantitative Wildfire Risk Assessment Mean Expected Net Value Change (eNVC) to all HVRAs summarized by watersheds (12 code Hydrologic Units (HUC)) across the Medford District. Colors range from red (probability of high negative effect from wildfire) to green (probably small benefit from wildfire). The Treatment Area is represented by transparent white shading. Many Medford District BLM-administered lands fall into the very high negative and high negative risk categories (Figure 9, Table 39).

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[20] Resources are natural features, such as wildlife habitat, federally threatened and endangered plant or animal species, etc. Assets are human-made features, such as commercial structures, critical facilities, housing, etc., that have a specific importance or value. Generally, the term "values at risk" has previously been used to describe both assets and resources.

[21] E.g., Oregon Dept. of Forestry, Washington Dept. of Natural Resources, The Nature Conservancy, National Park Service, BLM, etc.

Table 39. Medford District LUA acres within Watersheds (12 code Hydrologic Units (HUC)) classified by PNW Quantitative Wildfire Risk Assessment Mean Expected Net Value Change (eNVC) Categories for all HVRAs. The mean eNVC categories range from Very High negative effect to Neutral effect from wildfire.

Land Use Allocations	Acres of Mean Expected Net Value Change (eNVC) Categories for all HVRAs			
	Very High Negative	High Negative	Moderate Negative	Low Negative
Congressionally Reserved Lands	1,610	1,018	17,045	33,867
District-Designated Reserve	70,994	49,575	36,300	25,091
DDR	9,078	4,914	3,029	1,017
LWC	2,661	8,137	15,007	19,576
ACEC	8,833	4,025	4,390	1,908
TPCC	50,422	32,498	13,874	2,590
Late-Successional Reserve	82,249	59,548	72,414	33,516
LSR	449	961	1,610	5,905
LSR-Dry	81,800	58,587	70,804	27,611
Riparian Reserve	59,581	42,677	29,851	15,853
RR-Moist	402	1,077	991	2,909
RR-Dry	59,179	41,600	28,860	12,945
Harvest Land Base	75,486	58,606	33,806	18,389
HLB – UTA	73,292	47,599	27,114	9,341
HLB – LITA	1,946	9,907	6,116	7,956
HLB – MITA	248	1,100	576	1,092
Grand Total	**289,920**	**211,425**	**189,416**	**126,716**

6 Climate Change

Ongoing changes to climate in southwestern Oregon include increasing temperatures, increasing drought frequency and severity, reduced snowpack, as well as fewer but more extreme precipitation events. The Climate Change section of the PRMP/FEIS (USDI BLM 2016a, pp. 165-211), to which this EA tiers, analyzes issues associated with climate change. Issue 3 in the PRMP/FEIS, "How would climate interact with BLM management actions to alter the potential outcomes for key natural resources" (USDI BLM 2016a, p. 180), describes potential impacts to tree species (including adaptive genetic variation) and insects and pathogens, and describes the assumptions applied to the climate modelling for use in the ROD/RMP. Issue 3 of the PRMP/FEIS describes the complications and unknowns in predicting the effects of climate change. Douglas fir is anticipated to decline, particularly in lower elevations. Tree mortality will increase due to the interactions of changing climate with disturbance events such as drought, fire, insects, and diseases. Species composition will likely shift, and growth rates and overall site productivity will decline (USDI BLM 2016a, pp. 193-196). "Not only does drought reduce tree growth and increase the likelihood and severity of fire, but prolonged or severe moisture stress can also increase the susceptibility of trees to insects and pathogens" (Bennett 2018, p. 7). Tree species differ in their vulnerability ratings to climate-induced stress (USDI BLM 2016a, p. 187). Insects and pathogen outbreaks may increase with hotter temperatures and more frequent periods of drought. Some pathogens, such as *Armillaria* root disease and various canker species which infect water-stressed hosts may become more problematic. Insect development and survival is also impacted by increased temperature. The response of pathogens that depend on insects for spread will likely be complex, depending on how the particular insect vector responds to changing climate (USDI BLM 2016a, pp. 178-188).

In reviewing the U.S. Drought Monitor Categories for Jackson and Josephine Oregon counties, the trend over the past two decades indicates that projections of increased drought are on track (Figure 10). A recent USDA forest health report for Oregon finds that aerial survey and site visit trends “indicate that drought stress is one of the main causes of tree dieback and decline” (USDA 2020, p. 5).

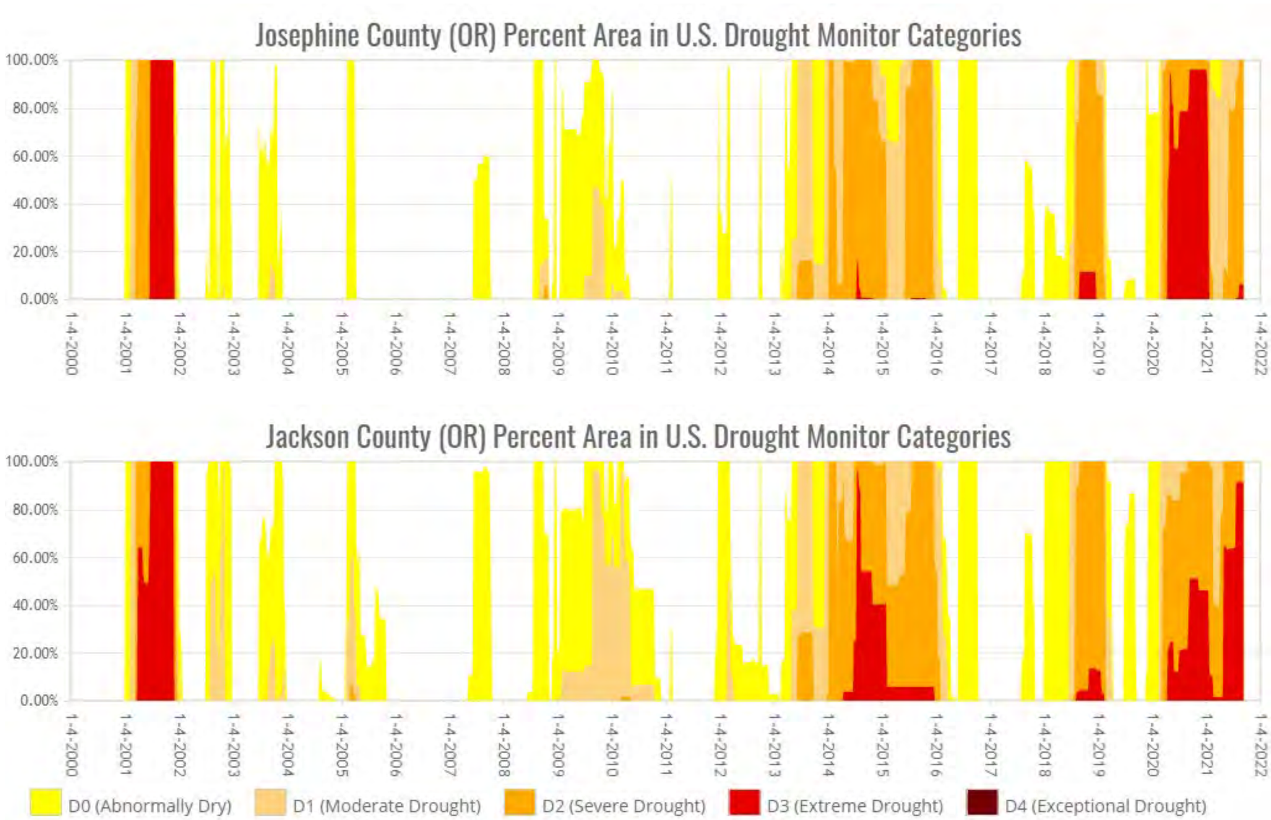


Figure 10. U.S. Drought Monitor Category Graphs Displaying Percent Area in Various Drought Categories for Josephine and Jackson Counties from January 2000 to September 2021. Data acquired from https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx

Based on trends in the last 30 years, humans and lightning will continue to provide wildfire ignition sources (USDI BLM 2016a, Table 3-22 p. 227), and future trends suggest the suitability for large wildfire growth will increase (USDI BLM 2016a, Appendix D, Figure D-8 p. 1241; Davis et al. 2017). Fire suppression efforts are expected to continue; however, these efforts are not 100 percent successful. In fact, less than 1 percent of fires in the recent past account for the majority of acres burned by wildfire (USDI BLM 2016a, p. 227). These large fires tend to burn during more extreme fire weather conditions, potentially resulting in high fire severity (Long et al. 2017), when fire behavior and growth potential exceed or challenge suppression resource availability and capabilities. However, successful suppression efforts will continue to exclude fire and disturbance regimes will continue to be altered; these aspects, coupled with other expected climatological changes, such as increased background tree mortality, due to longer periods of hot drought (USDI BLM 2016a, p. 185), increase the likelihood for larger proportions of high severity fire (Mote et al. 2019).

APPENDIX 4 SILVICULTURE: SUPPORTING ANALYSIS AND INFORMATION

1 Modeling, Background, and ORGANON

For this EA, the BLM used the SWO version of ORGANON. For additional information on the ORGANON growth model, refer to the project webpage at http://cips.forestry.oregonstate.edu/organon (accessed March 16, 2021), which is incorporated here by reference.

> ORGANON has had more referenced publications written about its equations and architecture than any growth and yield model (public or private) available in the western United States. The refereed publication process is a critical element in the scientific process, which involves review by anonymous experts in the topic that examine and, if accepted for publication, approve of the data collection procedures, the statistical modeling procedures, and the equation forms used by the modeler/author. The resulting certification/verification of the model(s) is a substantial benefit that one gains by using ideas/models that have survived the crucible of that process.

Methods for this treatment comparison included using stand exams in representative example units, the sample stand trajectories were modeled using ORGANON (Southwest Oregon variant) over a 50-year time horizon to model anticipated treatment outcomes. Stand Visualization System (SVS), developed by the USDA Forest Service, was used to create visuals and graphs of stand treatments using ORGANON output tree lists. ORGANON is an individual tree growth model used for predicting future conditions for forested stands. ORGANON does not generate tree regeneration. Natural and/or artificial regeneration is not reflected in the stand modeling, and not reflected in canopy cover estimates grown through time. Natural regeneration is positively correlated with reductions in density (Bailey and Tappeiner, 1997 p. 105). The greater the reduction in density, the more light and growing space available for a new cohort of trees, this is relevant to discussions of creating layering and new cohorts of trees for uneven-aged structure.

Data Sources

Data sources for this analysis included stand exams in representative example units from the BLM EcoSurvey (stand exam database), and multiple GIS datasets including: Forest Service Region 6 insect and disease aerial surveys, aerial photos, Medford District FOI and BLM Micro*Storms (activity tracking databases), BLM's Timber Production Capability Classification (TPCC), LiDAR data products, as well as the analyses, direction, and conclusions found in the SWO ROD/RMP and the supporting PRMP/FEIS.

The key metrics used for comparing the modeled prescriptions are:

- **Open forest condition at the landscape scale (percent):** The amount of open forest condition created across the Treatment Area by alternative, which is a compilation of the treatment types that would create open forest conditions based on residual percent canopy cover.
- **Canopy cover at the stand scale (percent):** residual canopy cover is used to determine if the forest condition is open or closed, and is a common metric used for NSO habitat criteria.
- **Basal Area (square feet per acre) at the stand scale:** basal area is often used as an implementation metric within prescriptions because it is easy to measure in the field while implementing tree marking. It is also used in NSO habitat criteria.
- **Relative Density (percent) at the stand scale:** RD is a metric used in the SWO ROD/RMP management direction and is the primary metric used in comparing the different action alternatives in this EA.
- **Heterogeneity (i.e., group selection opening and skips and diameter class distribution) at the stand scale:** the amount and size of group selection openings and skips are used to determine diversity of structure, age classes, sizes, and patch size. This structure is important for NSO habitat structure, as well as resilience/resistance to disturbances (i.e., wildfire, drought, insects).
- **Quadratic Mean Diameter- QMD (inches) at the stand scale:** QMD is a metric used for comparing tree sizes and can be used to compare tree growth (vigor) through time between the

different treatments and the No Action Alternative. Larger tree sizes are important for fire resistance (thick bark), and NSO habitat function.

PRMP/FEIS Vegetation Modeling

Appendix C of the PRMP/FEIS (pp. 1163-1228), to which this EA tiers, describes the assumptions applied to vegetation modeling for use in the SWO ROD/RMP. These modeling assumptions are helpful to inform potential treatment themes for uneven-aged systems within dry forest. The team modeled uneven-aged management in the 'dry forest' portions of the Late-Successional Reserve in the PRMP/FEIS (USDI BLM 2016a, pp. 1189, 1196, 1215). The modeled treatment return interval for the uneven-aged system is 40-50 years (USDI BLM 2016a, pp. 1196). While this was not a required interval, and agency discretion allows for considerable variation depending on site specific considerations and a project's Purpose and Need, there was no assumption that subsequent commercial re-treatment occur within 20 years or less in a given stand. The modeling team assumed 80 percent of the LSR-Dry would be eligible for uneven-aged management regardless of age (USDI BLM 2016a, p. 1215). The modeling team also assumed that 50 percent of the eligible acres in the Medford District would be treated in the first 5 decades (USDI BLM 2016a, p. 1215). Uneven-aged management systems must consider regeneration or else the system cannot be sustained over time (O'Hara, 2014, pp. 84-97). Turning over portions of stands through group selection would allow for a vigorous, young cohort to establish, while thinning other portions would allow for enhanced growth of residual trees. The PRMP/FEIS analyzed under Fire and Fuels Issue 1: *How would the alternatives affect fire resiliency in the fire-adapted forests at the landscape scale*, of which this EA tiers to (USDI BLM 2016a, pp. 228, 242). The BLM assumed that the future distribution of forest structure conditions on non-BLM-administered lands would continue to reflect the current distribution of forest structure conditions (USDI BLM 2016a, p. 232). The BLM found that within the action alternatives and the PRMP/FEIS, there would be little change in the departure from reference conditions for several reasons mentioned in the PRMP/FEIS (p. 242). The landscape would remain departed from reference conditions, with a continued overabundance of mid-seral closed forest and a deficit of late-seral open forest. "Changes in seral stage distribution on BLM-administered lands would account for only small shifts in the landscape departure under any alternative or the Proposed RMP" (USDI BLM 2016a, p. 242).

The Role of Relative Density

The ROD/RMP (USDI BLM 2016b, p. 311) 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. RD percent is calculated by expressing SDI (Reineke 1933) as a percentage of the theoretical maximum SDI, which varies by tree species and range. Curtis's RD (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 55-60 percent is associated with the lower limit of self-thinning, which is tree mortality (Long and Daniel 1990, Davis and Johnson 1987). For the purposes of this analysis, a RD range of 20-45 percent (USDI BLM 2016b, p. 68) is considered desirable by the BLM in that trees would occupy the site, and because self-thinning would not yet have occurred at the stand level.

"Low Thinning" versus "Selection/Free Thinning" Methods

Classical thinning regimes are intermediate operations that are usually associated with even-aged systems, but are also applicable to uneven aged management. Two classical thinning methods and their effects on stand development are of particular interest in this analysis: 1) low thinning/thinning from below which cuts mostly smaller trees to reduce densities while retaining a higher proportion of large trees; and 2) selection harvest/free thinning which allows for tree removal of various sizes to reduce densities. The former removes entire cohorts of trees and simplifies stand structure, while the latter allows for greater structural diversity, and adjustments of species composition over time. In addition to the stand tending operations such as thinning, uneven aged management systems must consider regeneration or else the system cannot be sustained over time (O'Hara 2014, pp. 84-97).

Gap Dynamics and Regeneration in Uneven Aged Systems

York et al. (2004) and York and Battles (2008) studied the effect of various created gap sizes on the residual stand growth and the new cohorts of pine trees that were established post-harvest. The results indicated that group selection needed to be at least about 1.5 acres (0.6 hectares) to avoid severe height suppression in the newly established seedlings, and that about 2.5 acres (1 hectare) and larger maximized growth potential of seedlings. They also suggest that in order 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 ½ an acre (0.2 hectare) is associated with stunted growth, particularly in pine species; such a management approach would inhibit tree regeneration and is unlikely to promote the development of multi-cohort stands, open grown trees or allow for pine persistence.

Hood et al (2018) preformed a 15-year study on the effect radial and stand-level thinning has on growth responses of legacy ponderosa and Jeffrey pine trees. Hood et al (2018) concluded that thinning had a larger increase in annual tree growth than radial thinning alone, and that a combination of stand thinning and radial thinning would be most beneficial. The results found that "large, old trees can respond to restoration thinning treatments, but that the level of thinning impacts this response. Stand thinning must be sufficiently intensive to improve old tree growth and health, in part due to increasing available soil moisture. Importantly, focusing stand density reductions around the immediate neighborhood of legacy trees was insufficient to elicit a growth response, calling into question treatments attempting to increase vigor of legacy trees while still maintaining closed canopies in dry, coniferous forest types" (Hood et al, 2018 p. 1).

Managing for Resilience to Insect Infestations and Drought

Insect and disease outbreaks are often irregular or episodic in nature and predicting the exact time they would occur is inherently difficult (USDI BLM 2016a, p. 1203). The risk of insect and disease outbreaks is positively associated with increased stand densities; as stands increase in density, competition increases among trees for growing space (Reineke 1933), thereby increasing susceptibility to bark beetles and other forest insects and disease. "In dense frequent fire forests, tree vigor is reduced as a result of competitive stress, and the potential for native bark beetles to mass attack is greater because of the closer proximity to host trees and other factors. These combined effected increase susceptibility to bark-beetle-caused tree mortality, but the trigger that leads to actual widespread mortality is often a multiyear drought" (Stephens et al 2018, pp. 77-78). Although we cannot predict where the next outbreak would occur, a common theme in literature for managing insect and disease issues is prevention. "Indirect control is preventative in nature, and designed to reduce the probability and severity of future infestations by reducing the number of susceptible hosts through manipulating stand, forest, and landscape conditions with thinning, managed fire, prescribed burning, and/or altering age classes and tree species composition. Thinning to reduce stand density increases host tree vigor and reduces the vulnerability of forests to mortality from bark beetles" (Stephens 2018 p. 85, Fettig et al 2007). Research shows thinning helps reduce the incidence of pest damage to a stand (Cochran and Barrett 1995). Within treated stands, growth rates would increase for residual trees, while tree mortality would decrease, leading to decreased dead fuel loading. Studies indicate that thinning to 100 to 140 feet^2/acre of basal area within forested stands reduced tree mortality 86 percent to 95 percent, while growth increased as compared to non-thinned stands (Fiddler et al, 1989). Other studies indicate that a reduction of basal area to 120 feet^2/acre lowers risk from bark beetles to nominal levels (Cochran and Barrett 1999).

Bradford and Bell studied the impact of climate change on tree mortality and the correlation to stand basal area and found "that unusually warm and dry conditions are related to high tree mortality rates and that mortality is positively related to basal area. Those relationships suggest that while increasing high temperature extremes forecasted by climate models may lead to elevated tree mortality during the 21st century, future tree mortality might be partly ameliorated by reducing stand basal area. This adaptive forest management strategy may provide a window of opportunity for forest managers and policy makers to guide forest transitions to species and/or genotypes more suited to future climates" (2017 p. 11). Knapp et al studied variable thinning treatments, prescribed burning and unthinned controls in the dry forests of central California, and how areas fared in the face of severe drought. The article suggests "with predictions of warmer droughts and greater weather variability, reducing forest density (basal area) and keeping surface fuel loads low will be important for building greater resilience to future drought stress and wildfire" (2021 p. 1). Max Bennet and Marty Main, local to the Rogue Valley, conducted a 17- year study within the Planning Area on the effects of thinning on tree growth. A heavy thin was implemented within Douglas fir sites on ridges and midslope positions within the Applegate, and unthinned stands served as the control stands. The thinned stands and unthinned control stands were monitored over a 17-year period. It was found that "almost all of the trees released following thinning and sustained faster growth during the 17-year measurement period. In effect, the thinning reduced competition and redistributed the growth potential of the site on fewer trees, so faster individual tree growth might be expected" (Bennett 2018, p. 4), whereas unthinned stands declined in growth. It was also found that thinned stands were more resilient to droughty conditions, "tree growth in the thinned stands was less negatively affected by drought, rebounded more quickly following dry periods, and showed little evidence of drought or insect-related mortality. As summer droughts become more pronounced with climate change, thinning may serve as an important tool to buffer stands from the effects of drought stress" (Bennett 2018, p. 9). Implementing heavy thinning treatments accelerated the "development of large Douglas firs, potentially extending tree longevity, reducing the risk of loss to drought and other stressors, and encouraging development of older forest habitat" (Bennett 2018, p. 10).

Halofsky et al (2016) studied adaptation to climate change and found that "in a drought-prone and fire-prone region such as southwestern Oregon, reducing stand density and reintroducing characteristic low and mixed severity fire are primary actions for increasing forest resilience to climate change. Reducing stand density with thinning can increase water availability and tree growth and vigor by reducing competition. Decreases in forest stand density, coupled with hazardous fuels treatment, can also increase forest resilience to wildfire" (Halofsky et. al 2016, pp. 7-8). Thinning and prescribed fire treatments "can both reduce the risk of high-severity fire and mitigate the effects of drought" (Halofsky et. al 2016, p. 10). Hood et al performed a 15-year study on the growth responses to legacy ponderosa pine and Jeffrey pine from radial and stand-level thinning. They suggest that residual trees within stand thinning treatments have higher growth rates and have higher resilience to drought compared to trees in unthinned stands, and that thinning treatments can reduce drought-induced mortality (Hood et al 2018, pp. 5-6). Additionally, the Medford District's Ecological Dry Forest Pilot project had similar prescriptive elements as the EA, resulting in an average post-treatment RDI of 0.32, and included combined treatments of surface fuels, ladder fuel and canopy fuels. Monitoring data from Phase I Pilot Joe showed the average 10 year radial growth rate among sampled co-dominant and dominant trees (average 18 inches DBH, ranging from 10-35.5 inches) increased from 0.41 inches (pre-harvest) to 0.56 inches (5 years after harvest), from 2012 – 2017, even amidst a moderate to severe drought in the Applegate (USDI BLM 2021b, http://droughtmonitor.unl.edu/) and significant mortality from insect infestations, as noted in USDA 2017 report. Additionally, snags (dead trees) did not increase during this drought period within plots.

2 Comparing Treatment Types: Stand Metrics, Stand Visualization System, Diameter Class Distribution, and Species Composition

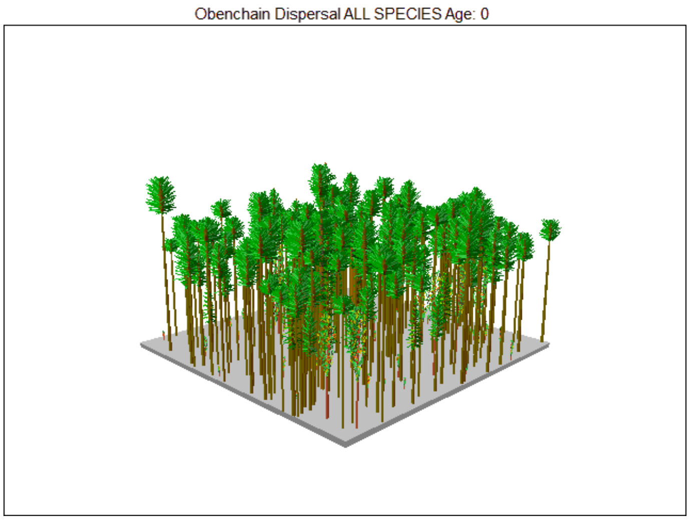
Alternative A:

A dry Douglas fir stand was selected to model for Alternative A because it is the most prominent PVT in the Planning Area. This treatment would thin to an RD range of 35-45 percent along operationally strategic areas for wildfire containment, within ¼ mile of Communities at Risk, or in plantations <60 years old. It is assumed that maintenance treatments would occur in these treatments (see Section 3.4).

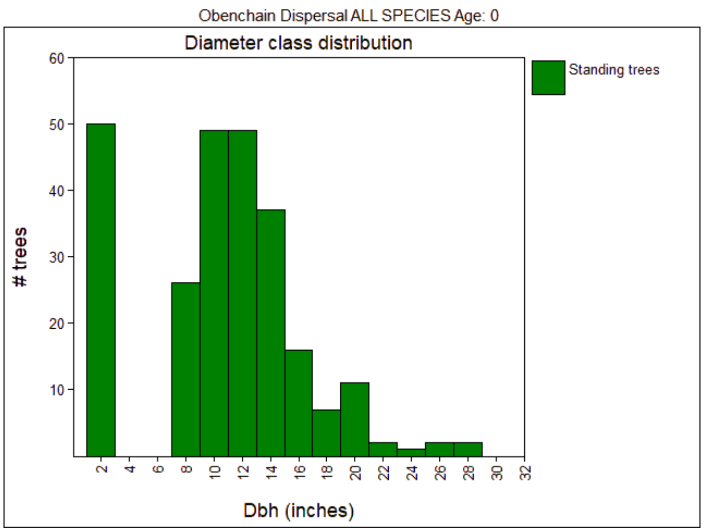
No Action Alternative

The stand under the No Action Alternative would remain in the current condition, which is overly dense with a high proportion of trees in lower size classes. The No Action Alternative would not reduce ladder fuels and would not provide conditions favorable for shade-intolerant species or create opportunities for regeneration or stand layering.

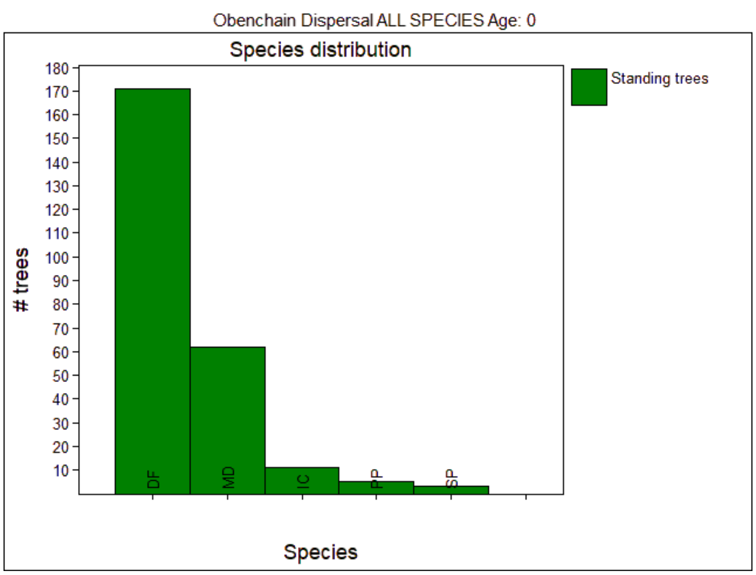
Alternative A: Current Condition/No Action Alternative Visual



Alternative A: Current Condition/No Action Alternative Diameter Distribution

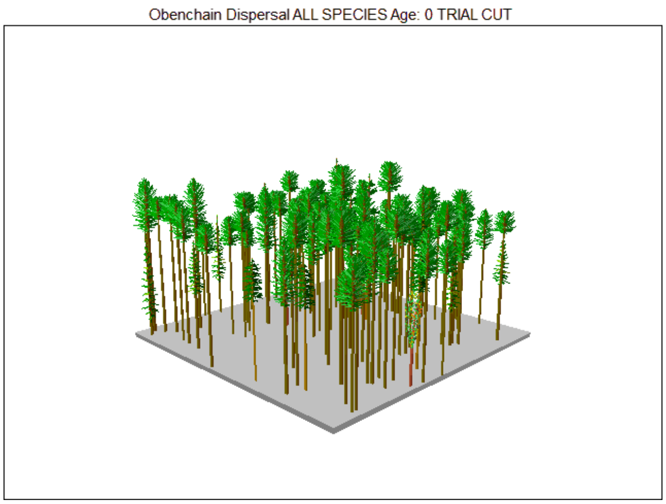


Alternative A: Current Condition/No Action Alternative Tree Species Distribution



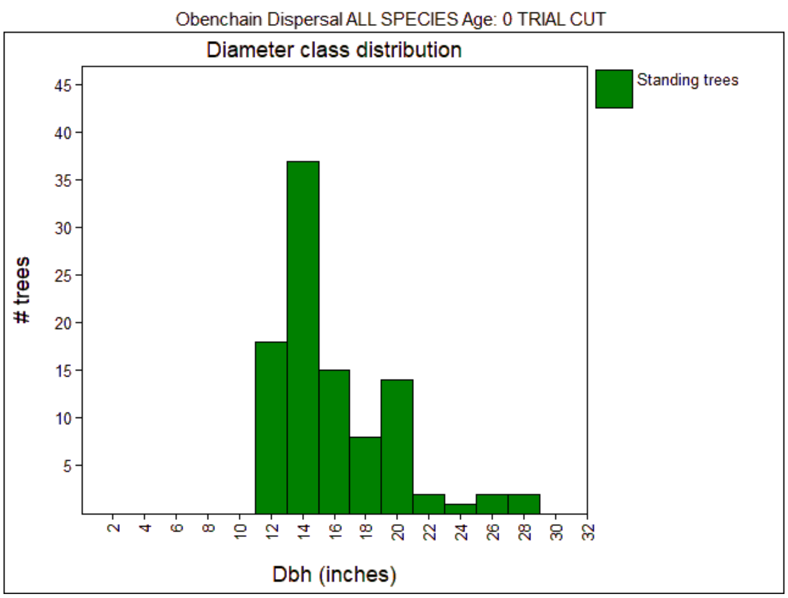
IC = Incense Cedar, DF = Douglas fir, PP = Ponderosa Pine, MD = Pacific Madrone, SP = Sugar Pine

Alternative A: Treated Stand Visual



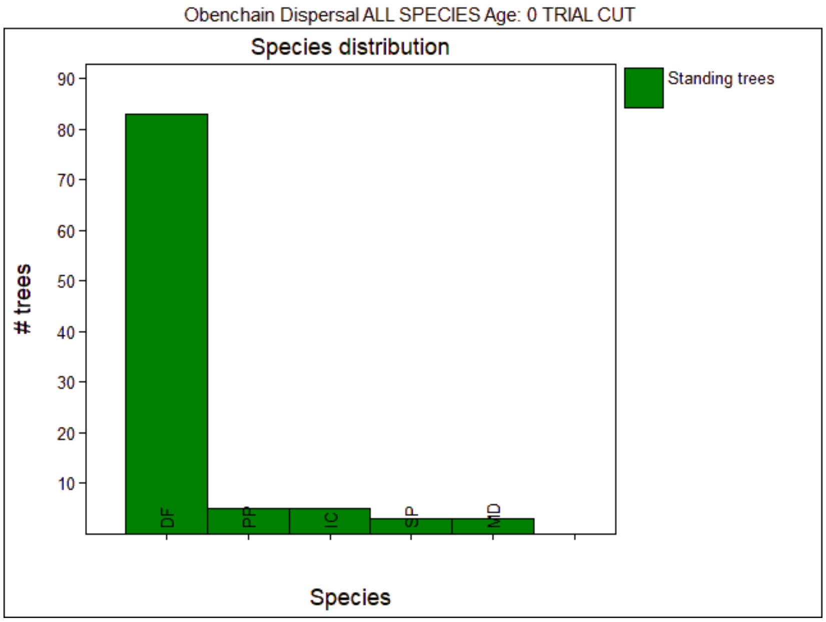
Alternative A would primarily utilize thinning from below to a diameter limit of 30-inch DBH. This treatment would increase the distance from the ground to the live canopy, which would reduce the complexity and stand layering by focusing on removing the lowest size classes. There would be no group selection openings or skips proposed in Alternative A, which would create little opportunity for creating structural complexity. Treatments could thin around large trees (>30 inches DBH), up to 2 times the dripline of the tree as a stand-alone treatment, which would aid in the survival of the large trees but not the growth of the tree or regeneration under it (see *Gap Dynamics*).

Alternative A: Treated Stand Diameter Distribution



Alternative A: Treated Stand Species Distribution

The tree species composition in this Douglas fir dominated stand would change slightly to favor pine species. Pacific madrone in the lower size classes would be reduced due to the emphasis in removing the lower size classes to increase the distance from the ground to the live canopy for fire resistance.



IC = Incense Cedar, DF = Douglas fir, PP = Ponderosa Pine, MD = Pacific Madrone, SP = Sugar Pine

Alternative A would reduce the RD to a range of 35-40 percent. The untreated stand would remain above the zone of imminent competition mortality (RD >55 percent). The QMD would increase from 12 inches DBH to 16.2 inches post treatment (Table 40). The QMD would continue to increase in the treated stand through a 50-year time horizon to 19.3 inches, which would be larger in comparison to the untreated stand at 14.9 inches (Table 40). The residual canopy cover of the treated stand would be ≥40 percent (Table 40), and therefore would remain in a closed forest condition post-treatment.

Table 40. Alternative A Treatment and No Action Alternative Comparison.

Prescription Types	Relative Density %	Basal Area ft^2	Canopy Cover %	Number of trees ≥ 40”	Number of trees ≥ 20”	Mean Live Crown Ratio %	Quadratic Mean Diameter
Current Condition	63	196	68	0	6.9	35	12
50 Years No Treatment	74	250	71	0	23.2	27	14.9
ALT C/A*: Fuels Emphasis	39	135	50	0	6.9	29	16.2
50 Years Post Treatment	48	180	55	0	23.3	25	19.3

RD above the zone of imminent competition mortality (>55 percent RD).
*Used same prescriptive modeling approach as ALT C: Fuels Emphasis.

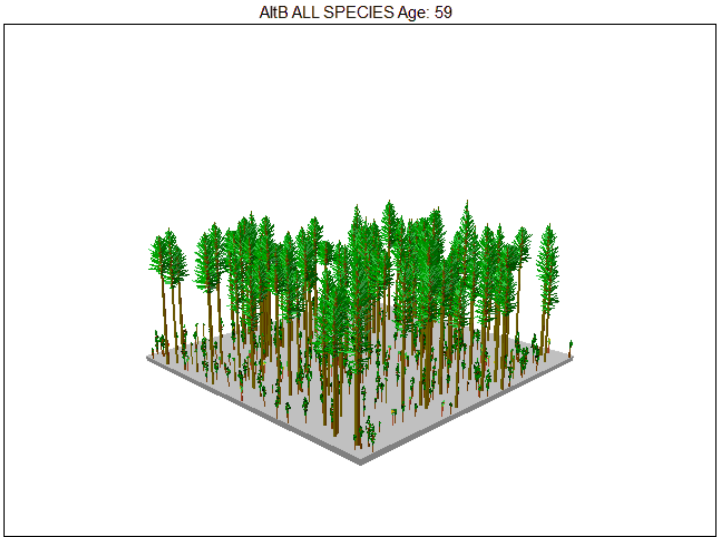
Alternative B

Treatments in Alternative B would thin dry forests stands less than 120 years old to an RD range of 35-45 percent, and Jeffrey pine and Oregon white oak PVTs would be thinned to an RD between 20-35 percent. All treatments under Alternative B would maintain NSO habitat function. A young, Douglas-Fir dry plantation was selected to model for Alternative B, which is dispersal habitat. The treatment would maintain dispersal habitat function. In treatments maintaining NRF habitat function, see Alternative C: Near Term for an example.

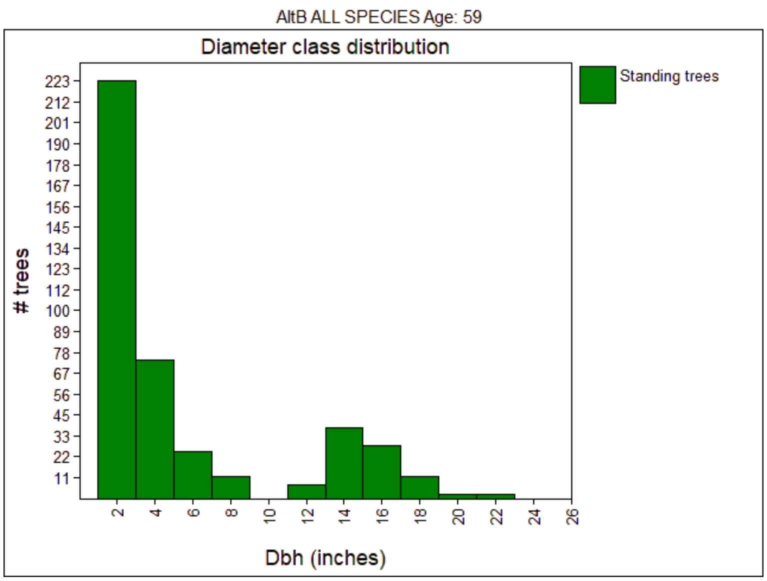
No Action Alternative

The stand under the No Action Alternative would remain in the current condition, which is overly dense with a high proportion of trees in lower size classes. The No Action Alternative would not provide conditions favorable for shade-intolerant species or create opportunities for regeneration or stand layering.

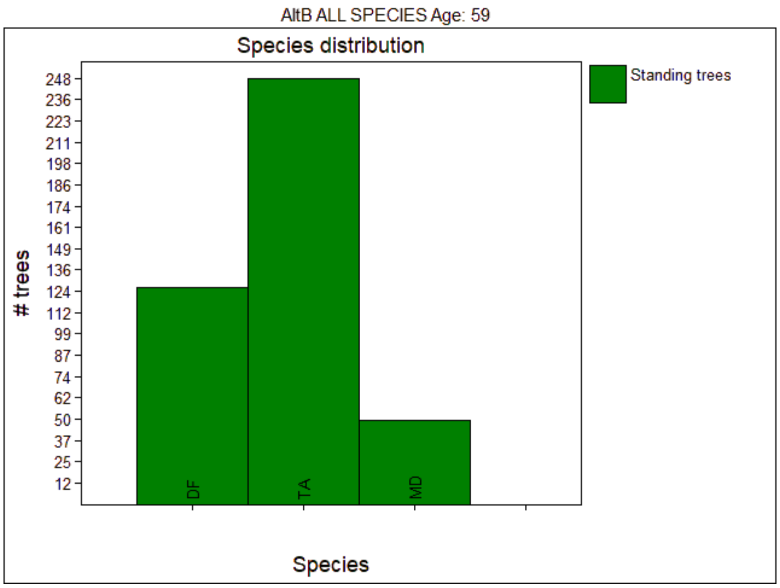
Alternative B: Current Condition/No Action Alternative Visual



Alternative B: Current Condition/No Action Alternative Diameter Distribution

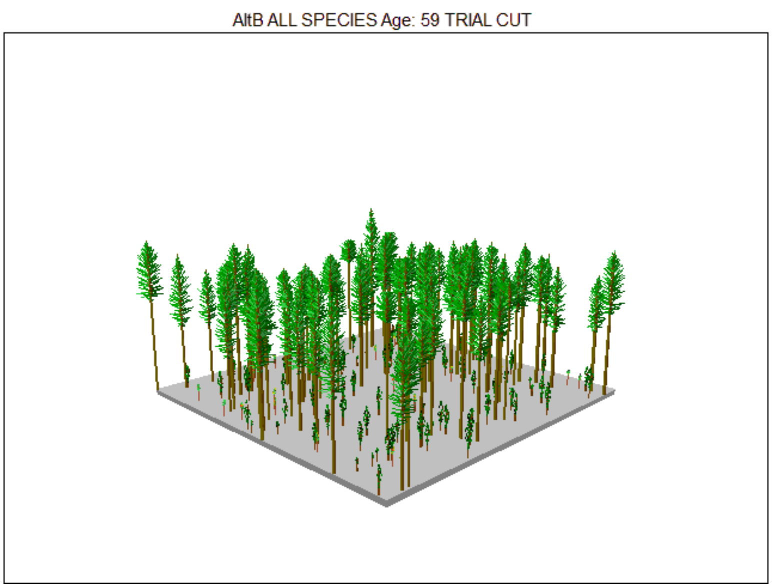


Alternative B: Current Condition/No Action Alternative Tree Species Distribution



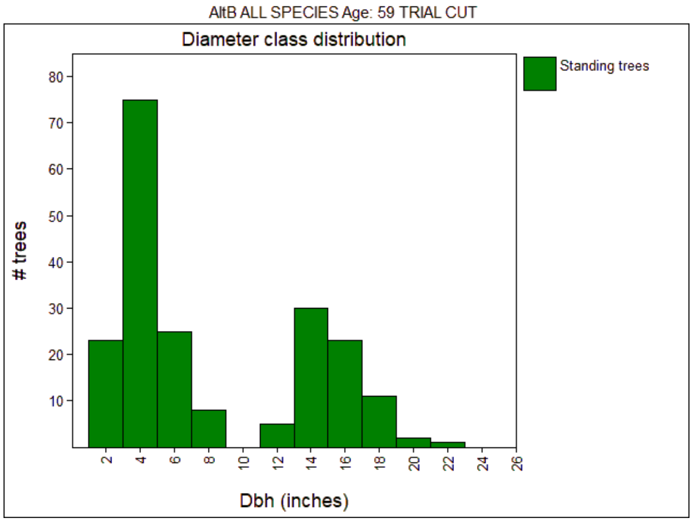
DF = Douglas-fir, MD = Pacific Madrone, TA = Pacific Yew

Alternative B: Treated Stand Visual



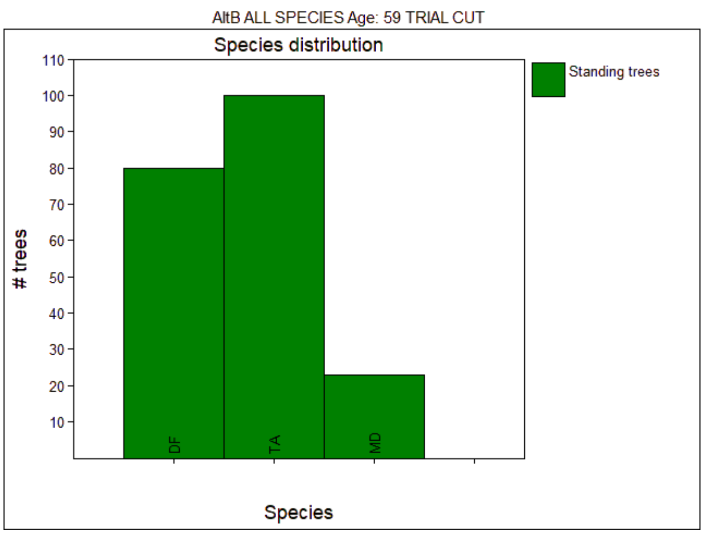
Alternative B would selectively thin up to a diameter limit of 25-inch DBH for conifers and 16-inch DBH for hardwood species. This treatment would create a bi-modal distribution of diameter classes, with two main canopy layers (overstory and bottom layer). The lower size classes would be reduced, which would increase the proportion of overstory size classes. Variable sized skips would be retained in >20 percent of stand, and variable sized group selection openings and modified openings (large tree retention) could be created up to 1 acre in size (0.5 acres in stands < 10 acres) in up to 10 percent of stand. Group selection openings and skips would create opportunities for structural complexity, as well as increase the likelihood of large tree survival (see *Gap Dynamics*). Thinning, group selection openings, and skips would be averaged across the stand to meet the overall RD target.

Alternative B: Treated Stand Diameter Distribution



Alternative B: Treated Stand Tree Species Distribution

The tree species composition would remain similar to the current conditions.



DF = Douglas-fir, MD = Pacific Madrone, TA = Pacific Yew

Alternative B would reduce the RD to a range of 35-45 percent. The QMD would increase from 7.5 inches in DBH to 9.8 inches post treatment (Table 41). The QMD would continue to increase in the treated stand through a 50-year time horizon to 16.8 inches, which would be larger in comparison to the untreated stand at 13.7 inches (Table 41). The residual canopy cover of the treated stand would be ≥40 percent (Table 41), and therefore would remain in a closed forest condition post-treatment.

Table 41. Alternative B Treatment and No Action Alternative Comparison.

Prescription Types	Relative Density %	Basal Area ft^2	Canopy Cover %	Number of trees ≥ 40”	Number of trees ≥ 20”	Mean Live Crown Ratio %	Quadratic Mean Diameter
Current Condition	51	132	68	0	1.8	49	7.5
50 Years No Treatment	71	231	72	0	43.8	39	13.7
ALT B- Dispersal Habitat	37	105	57	0	1.7	56	9.8
50 Years Post Treatment	56	200	63	0	43.7	38	16.8

RD above the zone of imminent competition mortality (>55 percent RD).

Alternative C

Alternative C uses the target RDI table (Table 32, Appendix 1, Section ALL-2), which contains six different treatment types: Ecosystem Resiliency (Open, Intermediate, Closed), Near Term NSO, Long Term NSO, and Fuels emphasis. Treatments differ based on location on the landscape, potential vegetation type, NSO habitat type, and proximity to active NSO sites. All treatments under Alternative C would have the same tools available for creating heterogeneity. Variable sized skips would be retained in >10 percent of stand, and variable sized group selection openings and modified openings (large tree retention) could be created up to 4 acres in size (2.5 acres in stands < 10 acres) in up to 25 percent of stand. The majority of group selection openings would be in a variety of sizes up to 2 acres. In circumstances where the objective is to regenerate pine (i.e., a stand with a high proportion of vigorous/dominate pine) opening sizes could be up to 2.5 acres in size. These openings would be modified openings because the most vigorous/dominant pine trees would remain to aid in regeneration. In circumstances where insect and disease infestations are occurring, or the trees are of such low vigor where residual trees after a thinning would not release in diameter growth (≤ 20 percent live crown ratio), group selection openings could be up to 4 acres in size. These openings would be modified openings with scattered remaining trees. Group selection openings and skips would create opportunities for structural complexity, as well as increase the likelihood of large tree survival (see Gap Dynamics). Thinning, group selection openings, and skips would be averaged across the stand to meet the overall RD target. Different treatment types within Alternative C would have differing flexibility in utilizing this range of group selection openings based on whether treatments would require NSO habitat to be maintained or not (nesting habitat or roosting/foraging habitat in active owl sites). For example, within the Near-Term treatment, higher levels of canopy cover retention would be required, so there would be less ability to create larger group selection openings as well as thinning, while maintaining habitat function. See each treatment type for more detailed descriptions. All treatments under Alternative C would have a diameter limit of 36-inch DBH for Douglas-fir and pine, and a 24-inch DBH limit in hardwood species.

Alternative C: Near Term NSO and Long Term NSO

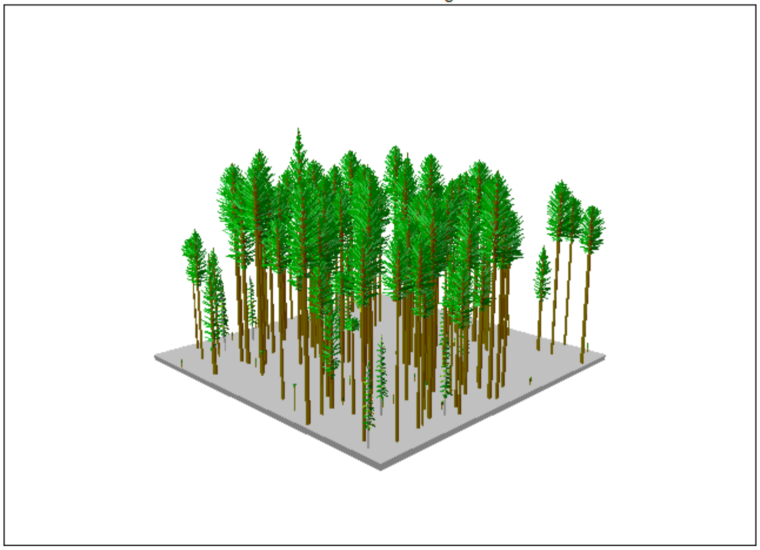
For Alternative C: Near Term NSO and Long Term NSO treatments, the same example dry Douglas-fir PVT stand was used for modeling. This stand was classified as roosting foraging NSO habitat by field evaluations.

No Action Alternative

The stand under the No Action Alternative would remain in the current condition, which is overly dense with a high proportion of trees in lower size classes. The No Action Alternative would not provide conditions favorable for shade-intolerant species or create opportunities for regeneration or stand layering.

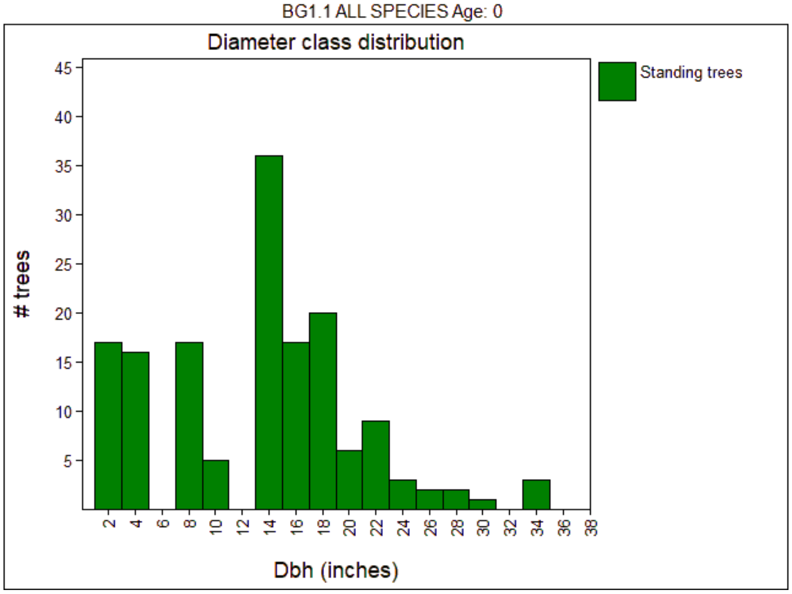
Near and Long Term NSO Current Condition/No Action Alternative: Visual

BG1.1 ALL SPECIES Age: 0

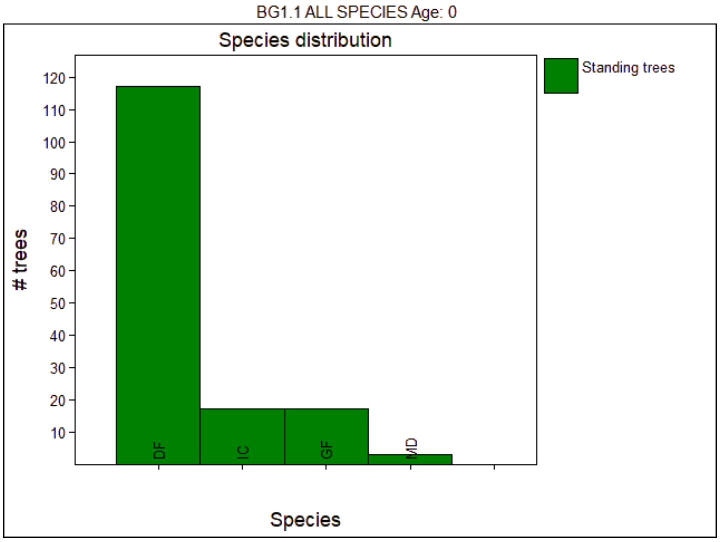


Near and Long Term NSO Current Condition/No Action Alternative: Diameter Distribution

BG1.1 ALL SPECIES Age: 0



Near and Long Term NSO Current Condition/No Action Alternative: Tree Species Distribution

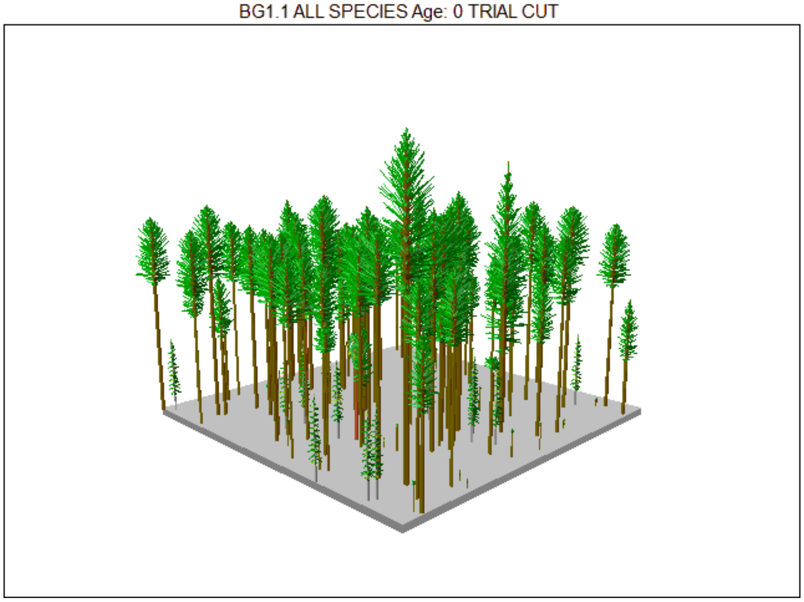


IC = Incense Cedar, DF = Douglas-fir, MD = Pacific Madrone, GF = White Fir

Alternative C: Near Term NSO

In areas where the objective is to maintain NSO habitat function, specifically nesting/roosting or foraging where canopy cover retention would be ≥ 60 percent, thinning treatments would differ from ecosystem resilience treatments (resilience to disturbances such as fire, drought, and insects/disease). By retaining greater canopy cover and stand density, there is less opportunity for a combination of thinning and group selection openings. As a result, the treatment would meet the conservation objectives for retaining NSO habitat function on these acres but would not fully meet ecosystem resiliency objectives to improve a stands ability to be resilient to adverse disturbance events or provide ideal structure and composition over time. As noted above, stand thinning must be sufficiently intensive to improve old tree growth and health (see *Gap Dynamics*). However, the slight reduction in stand density and slight shifts in species composition and stand structure would benefit the health of these forest stands in the near term.

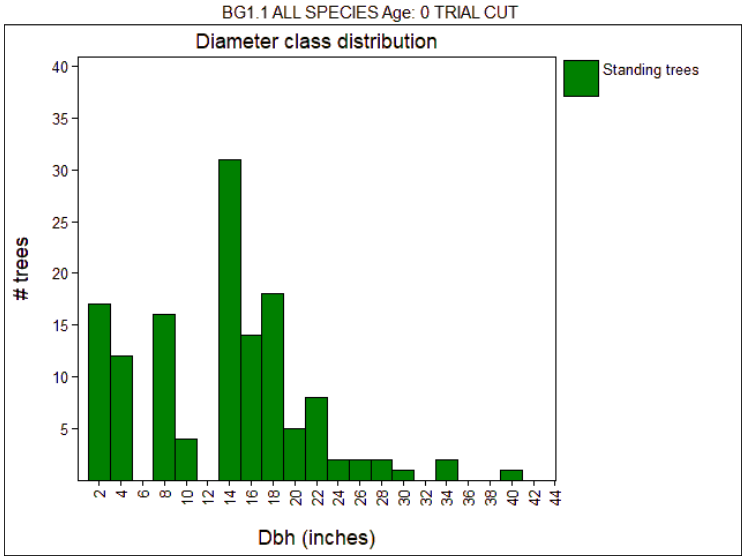
Near Term NSO: Treated Stand Visual



The Alternative C: Near Term NSO treatment would selectively thin, targeting removal of white fir and Douglas-fir to increase tree species diversity. These treatments retain higher density and canopy cover.

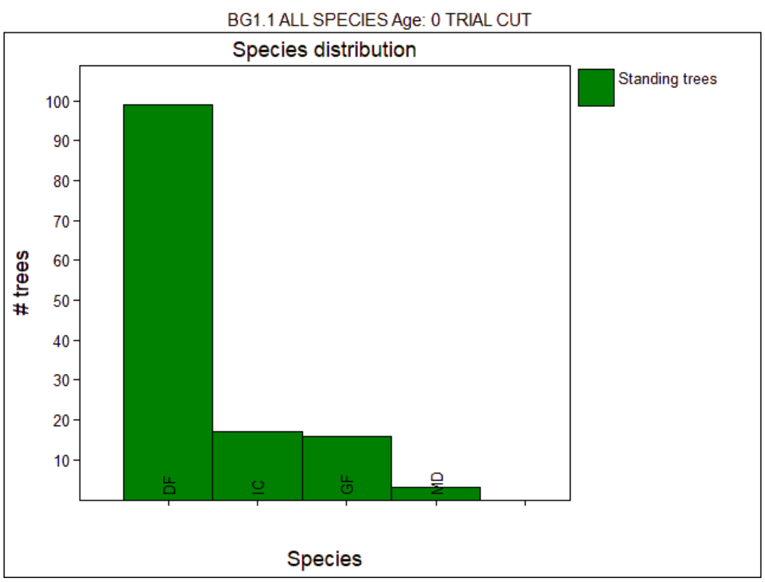
With higher retention levels there is less of an impact on the diameter and height distributions in comparison to the other prescriptions. These treatments primarily utilized a thin from below to maintain the most canopy cover compared to the other prescriptions

Near Term NSO: Treated Stand Diameter Distribution



Near Term NSO: Treated Stand Tree Species Distribution

The tree species composition in this Douglas-fir dominated stand shifted towards increasing representation of minor species, but to a lesser degree in comparison with the ecosystem resiliency treatment types due to the emphasis of retaining higher canopy cover and basal area.



IC = Incense Cedar, DF = Douglas-fir, MD = Pacific Madrone, GF = White Fir

The Alternative C: Near Term NSO treatments would reduce the RD to 40-45 percent. The untreated stand would remain above the zone of imminent competition mortality (RD >55 percent). The QMD would increase from 15.2 inches in DBH to 16.4 inches post treatment. The QMD would continue to increase in the treated stand through a 50-year time horizon to 21.3 inches, which would be larger in comparison to the untreated stand at 20.3 inches. The residual canopy cover of the treated stand would be ≥40 percent, and therefore would remain in a closed forest condition post-treatment.

Table 42. Alternative C Near Term Treatment and No Action Alternative Comparison.

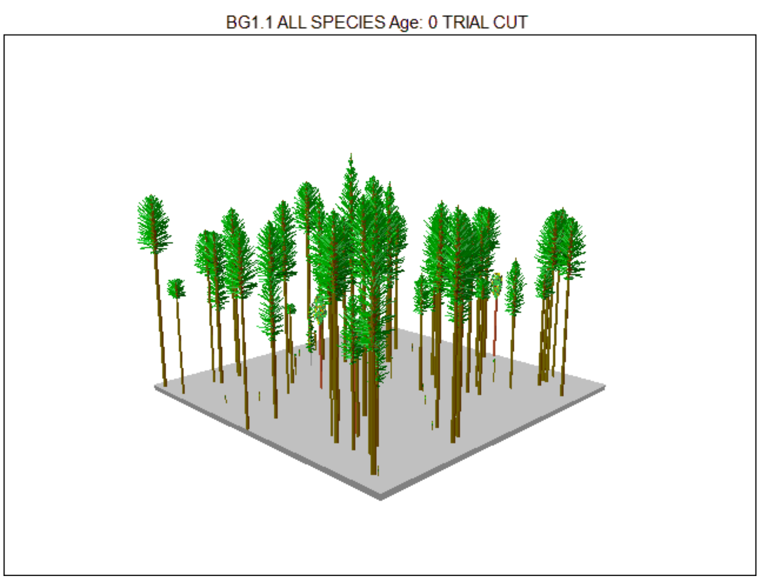
Prescription Types	Relative Density %	Basal Area feet^2	Canopy Cover %	Number of trees ≥ 40”	Number of trees ≥ 20”	Mean Live Crown Ratio %	Quadratic Mean Diameter
Current Condition	57	195	65	0.7	24.2	39	15.2
50 Years No Treatment	76	289	71	1.7	50.8	31	20.3
Near Term NSO	45	161	57	0.7	21.3	37	16.4
50 Years Post Treatment	62	242	63	2.8	42.3	30	21.3

RD above the zone of imminent competition mortality (>55 percent RD)

Alternative C: Long Term NSO

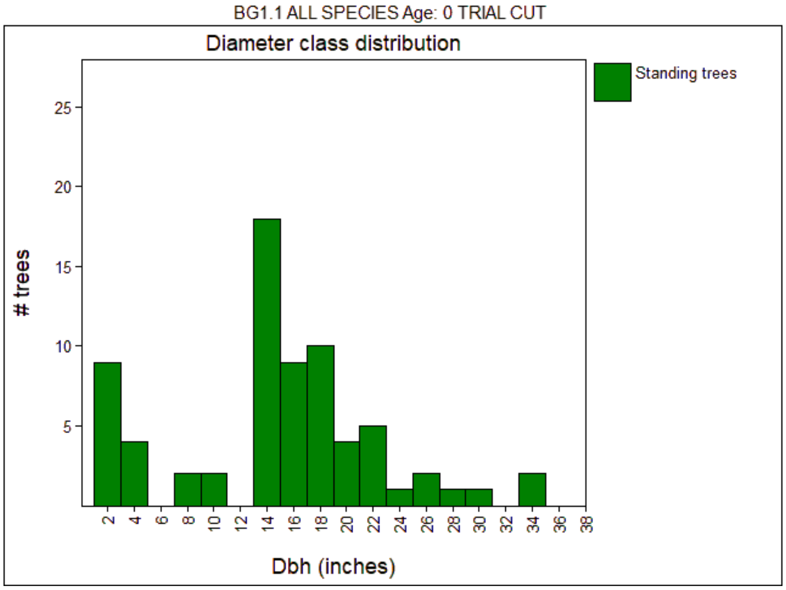
In areas where the objective is to accelerate and/or improve the trajectory of non-nesting-roosting habitat towards NSO nesting- roosting habitat, thinning treatments under Alternative C: Long Term NSO would benefit both the trajectory towards nesting- roosting habitat as well as meet ecosystem resiliency objectives to improve a stands ability to be resilient to adverse disturbance events and provide ideal structure and composition over time (see Issue 3.5). By reducing competition and increasing the amount of light and growing space there would be increased diameter growth (QMD), increased regeneration (layering), increased resilience to disturbances (such as drought, insects and disease), increased likelihood of survival of legacy trees, and an increase in shade intolerant species diversity. This treatment would thin to an RD of ≥30 percent, with a minimum residual canopy cover of ≥40 percent.

Long Term NSO: Treated Stand Visual



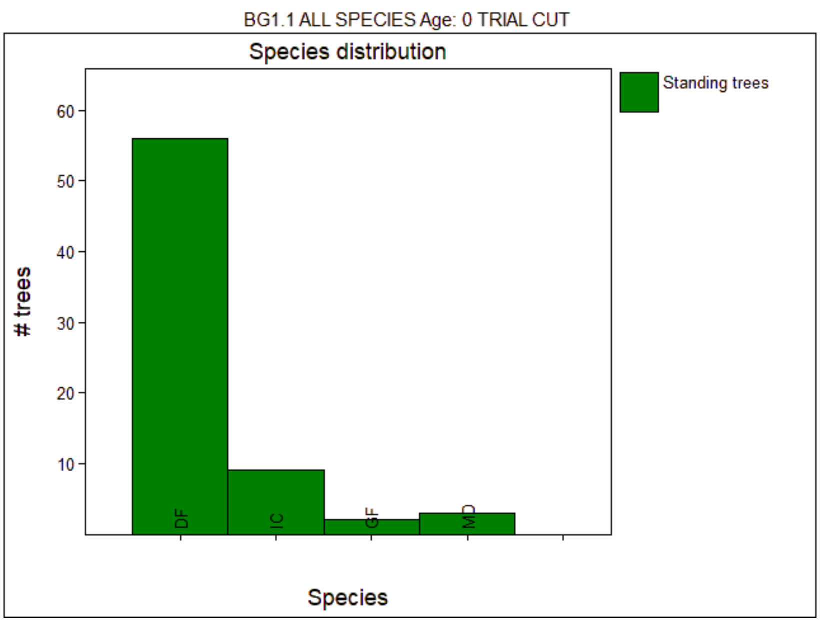
The Alternative C: Long Term NSO would selectively thin, shade tolerant species (Douglas-fir and white fir) would be targeted for removal to increase shade intolerant species diversity. This treatment would have a similar diameter distribution pattern as the current condition changed, with a decrease is the proportion of smaller size classes.

Long Term NSO: Treated Stand Diameter Distribution



Long Term NSO: Treated Stand Tree Species Distribution

The tree species composition in this Douglas-fir dominated stand would shift slightly to a decrease in Douglas-fir and white fir species and a slight increase in incense cedar.



IC = Incense Cedar, DF = Douglas-fir, MD = Pacific Madrone, GF = White Fir

The Alternative C: Long Term NSO treatment would reduce the RD to ≥30 percent. The untreated stand would remain above the zone of imminent competition mortality (RD >55 percent). The QMD would increase from 15.2 inches in DBH to 17.3 inches post treatment. The QMD would continue to increase in the treated stand through a 50-year time horizon to 22.3 inches, which would be larger in comparison to the untreated stand at 20.3 inches. The residual canopy cover of the treated stand would be ≥40 percent, and therefore would remain in a closed forest condition post-treatment.

Table 43. Alternative C Long Term Treatment and No Action Alternative Comparison.

Prescription Types	Relative Density %	Basal Area ft^2	Canopy Cover %	Number of trees ≥ 40”	Number of trees ≥ 20”	Mean Crown Ratio %	Quadratic Mean Diameter
Current Condition	57	195	65	0.7	24.2	39	15.2
50 Years No Treatment	76	289	71	1.7	50.8	31	20.3
Long Term NSO	31	112	42	0.7	16.8	41	17.3
50 Years Post Treatment	44	174	50	2.7	35	32	22.3

RD above the zone of imminent competition mortality (>55 percent RD)

Alternative C: Fuels Emphasis

The Alternative C: Fuels Emphasis treatment would treat to an RD range of 35-40 percent within ¼ mile of Communities at Risk, with an objective of increasing fire resistance in those locations. This treatment is comparable to the treatments within ¼ mile of Communities at Risk in Alternative A. The RD range is the same within the two treatments. The diameter limits differ between the alternatives. Alternative C has a diameter limit of 36-inch DBH for Douglas-fir and pine, and 24-inch DBH for hardwoods. Alternative A has a diameter limit of 30-inch DBH. The stand modeling completed for Alternative A is in line with the Fuels Emphasis treatment and can be referred to for the Fuels Emphasis treatment. The residual canopy cover of this treatment would be ≥40 percent, and therefore would remain in a closed forest condition post-treatment.

Alt C: Ecosystem Resilience- Open- Dry Douglas-fir PVT

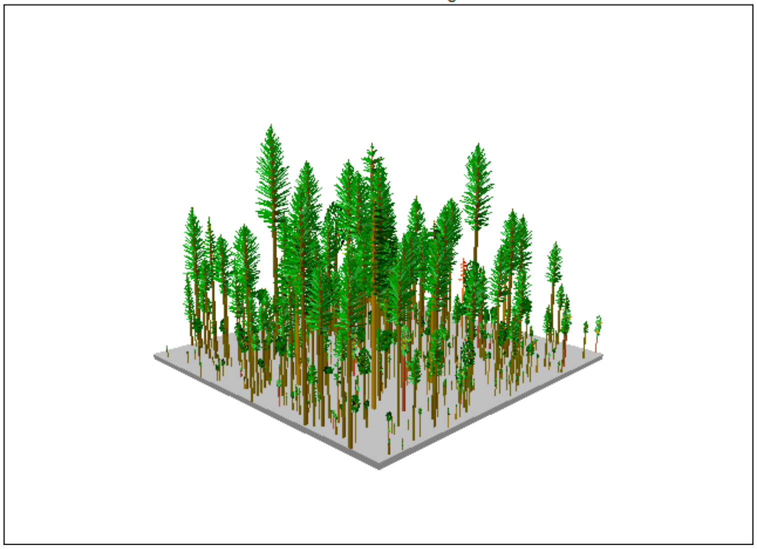
A dry Douglas-fir stand was selected to model for the Alternative C: Open treatment. Dry Douglas-fir is one of the most prominent PVTs in the Planning Area and is within the open category of the RDI table. This treatment would thin to an RD range of 20-30 percent. In comparison to the other treatments modeled, this treatment reduces the most density and creates the most open forest conditions.

No Action Alternative

The stand under the No Action Alternative would remain in the current condition, which is overly dense with a high proportion of trees in lower size classes. The No Action Alternative would not provide conditions favorable for shade-intolerant species or create opportunities for regeneration or stand layering.

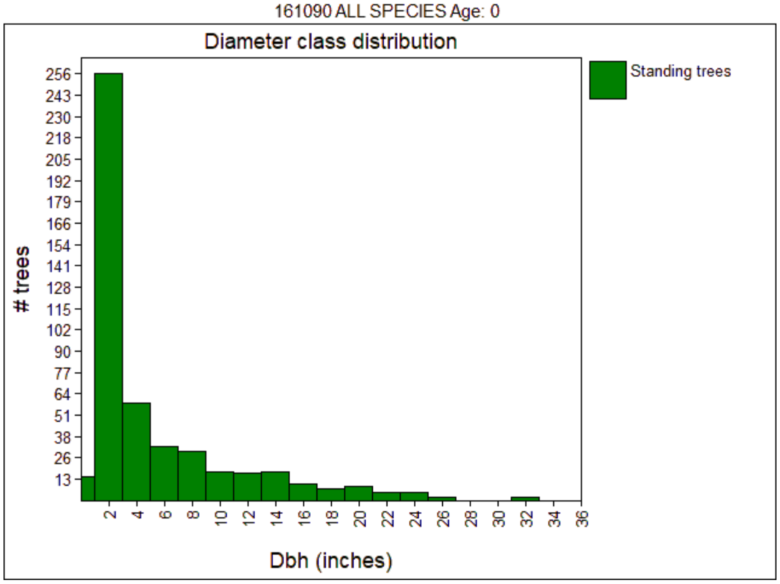
Ecosystem Resilience- Open: Current Condition/No Action Alternative Visual

161090 ALL SPECIES Age: 0

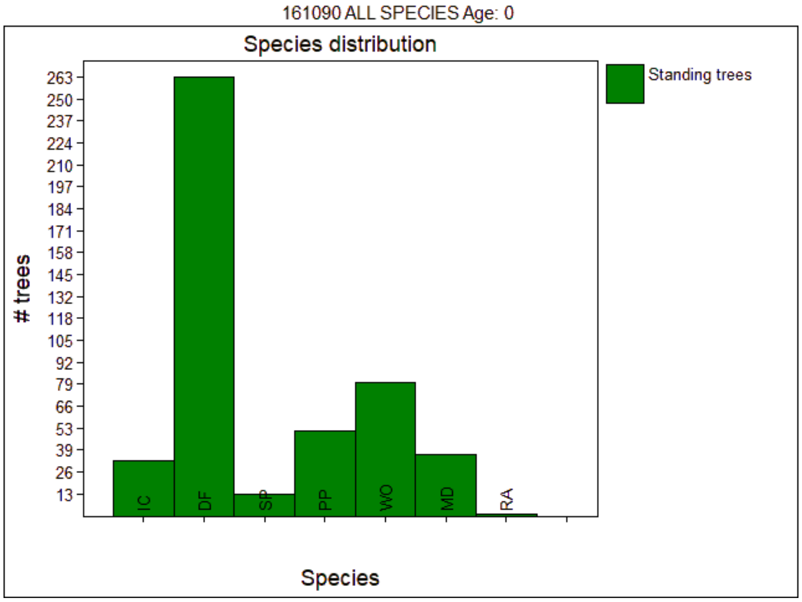


Ecosystem Resilience- Open: Current Condition/No Action Alternative Diameter Distribution

161090 ALL SPECIES Age: 0

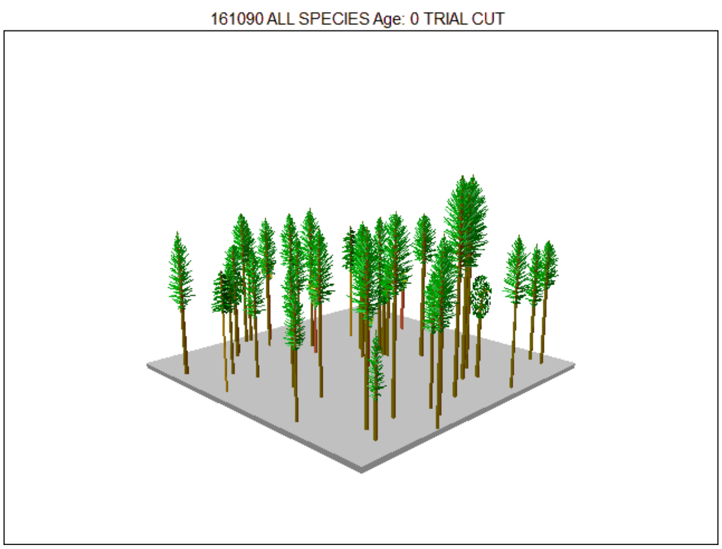


Ecosystem Resilience- Open: Current Condition/No Action Alternative Tree Species Distribution



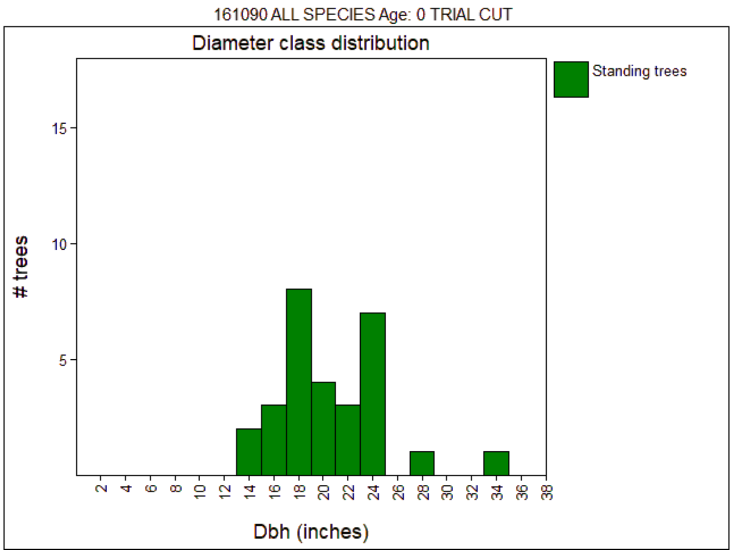
IC = Incense Cedar, DF = Douglas-fir, PP = Ponderosa Pine, MD = Pacific Madrone, SP = Sugar Pine, WO = Oregon White Oak, RA = Red Alder

Ecosystem Resilience- Open: Treated Stand Visual



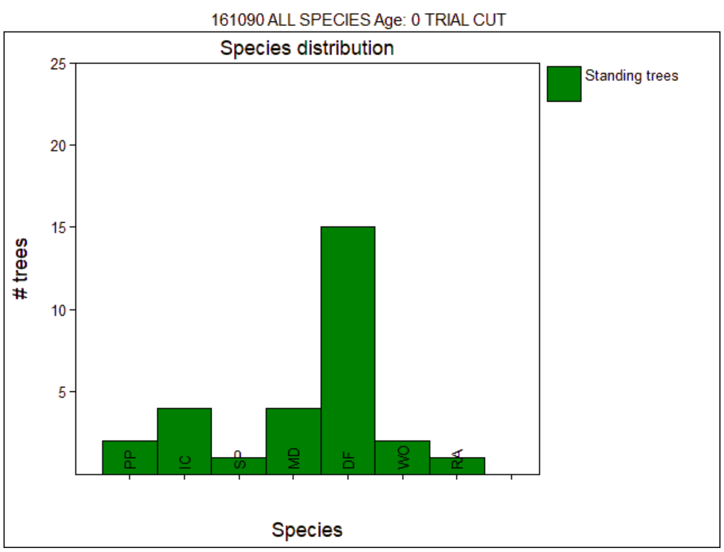
The Alternative C: Open treatment would selectively thin, shade tolerant species (Douglas-fir and white fir) would be targeted for removal to increase shade intolerant species diversity. This treatment would shift the diameter class distribution from a higher proportion of lower diameter classes to a higher proportion of middle and large size classes.

Ecosystem Resilience- Open: Treated Diameter Distribution



Ecosystem Resilience- Open: Treated Stand Tree Species Distribution

The tree species composition in this Douglas-fir dominated stand would change after treatment by increasing the proportion of minor species, such as pine and hardwood species. This treatment would create conditions favorable to shade-intolerant species requiring high levels of light.



IC = Incense Cedar, DF = Douglas-fir, PP = Ponderosa Pine, MD = Pacific Madrone, SP = Sugar Pine, WO = Oregon White Oak, RA = Red Alder

Alternative C: Open treatments would reduce the RD to a range of 20-30 percent. The untreated stand would remain above the zone of imminent competition mortality (RD >55 percent). The QMD would increase from 8 inches in DBH to 22 inches post treatment. The QMD would continue to increase in the treated stand through a 50-year time horizon to 26 inches, which would be larger in comparison to the untreated stand at 12.6 inches. Residual canopy cover of these treatments would be <40 percent, which would create open forest conditions post-treatment.

Table 44. Alternative C Open Treatment and No Action Alternative Comparison.

Prescription Types	Relative Density %	Basal Area ft^2	Canopy Cover %	Number of trees ≥ 40”	Number of trees ≥ 20”	Mean Live Crown Ratio %	Quadratic Mean Diameter
Current Condition	64	168	68	0	18	38	8
50 Years No Treatment	71	226	70	0.2	33.9	35	12.6
ALT C: Open	23	90	34	0	15.9	43	22
50 Years Post Treatment	29	122	38	0.2	29.7	40	26

RD above the zone of imminent competition mortality (>55 percent RD)

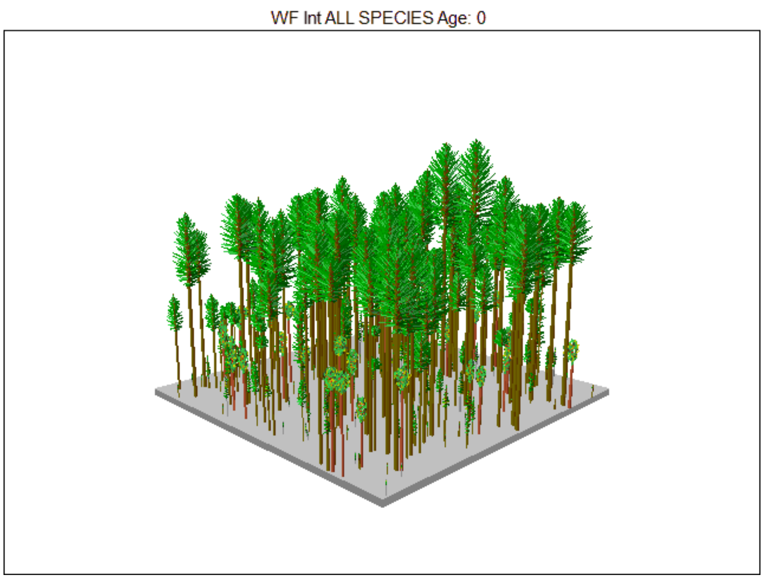
Alt C: Intermediate- White Fir Intermediate PVT

A white fir intermediate PVT stand was selected to model for the Alternative C: Intermediate treatment because it is a PVT within the intermediate category on the RDI table. This treatment would thin to an RD range of 30-40 percent.

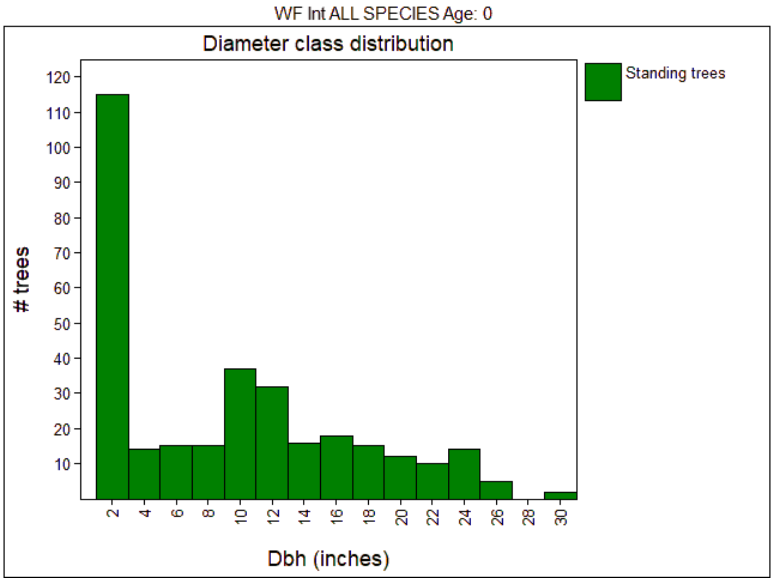
No Action Alternative

The stand under the No Action Alternative would remain in the current condition, which is overly dense with a high proportion of trees in lower size classes. The No Action Alternative would not provide conditions favorable for shade-intolerant species or create opportunities for regeneration or stand layering.

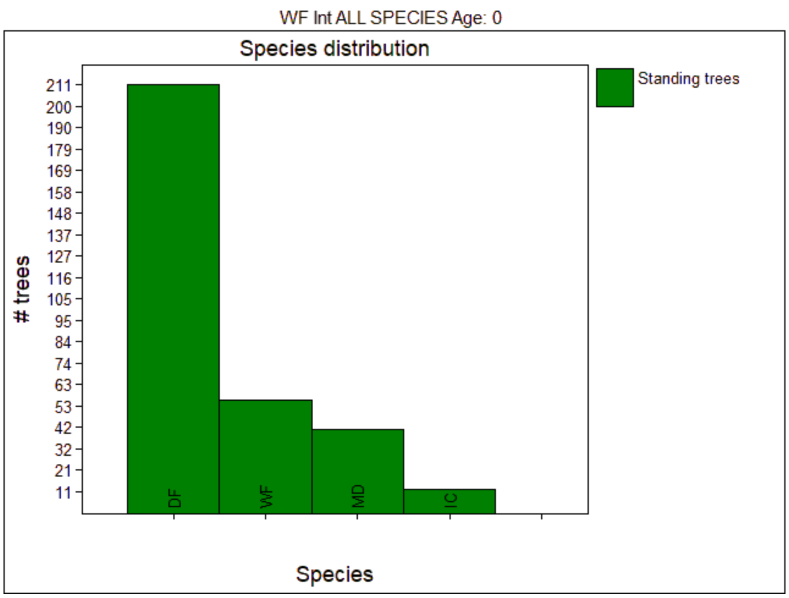
Ecosystem Resilience- Intermediate: No Action Alternative Visual



Ecosystem Resilience- Intermediate: No Action Alternative Diameter Distribution

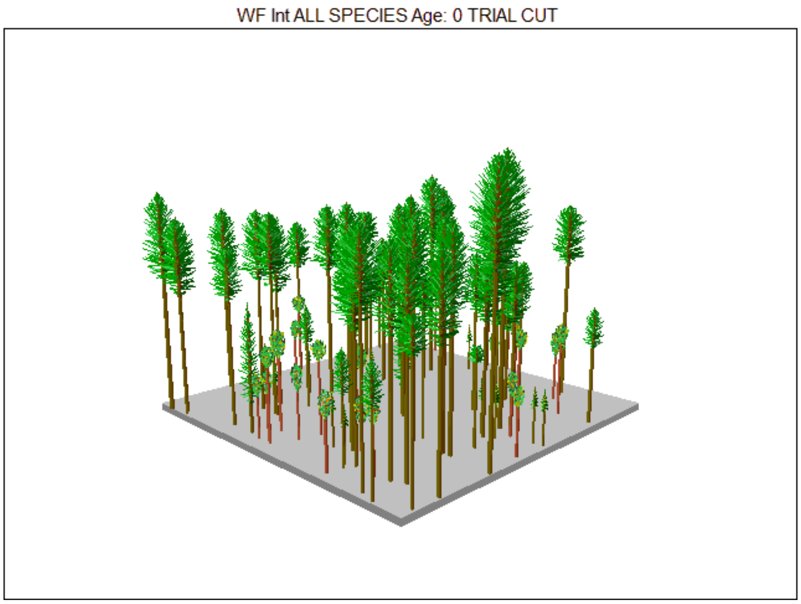


Ecosystem Resilience- Intermediate: No Action Alternative Tree Species Distribution



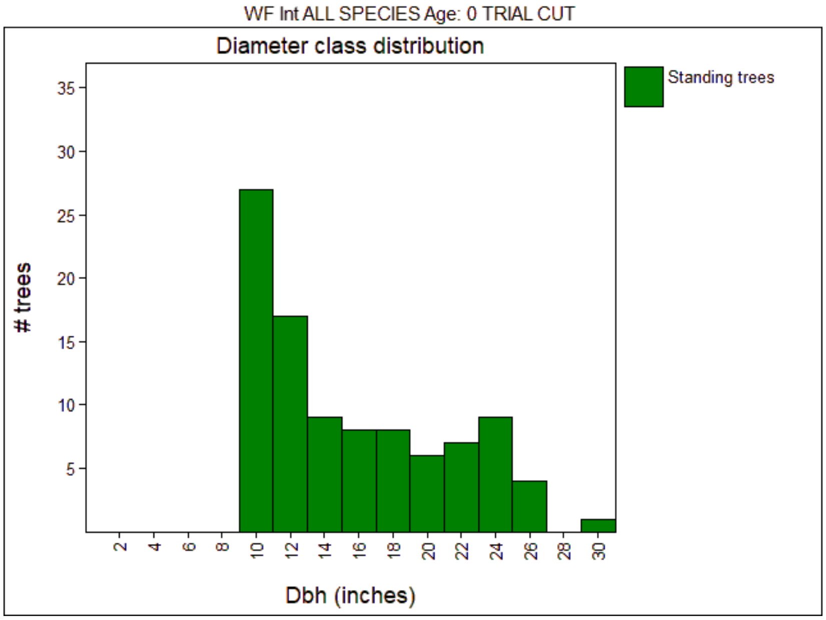
IC = Incense Cedar, DF = Douglas-fir, PP = Ponderosa Pine, MD = Pacific Madrone, WF = White Fir

Ecosystem Resilience- Intermediate: Treated Stand Visual



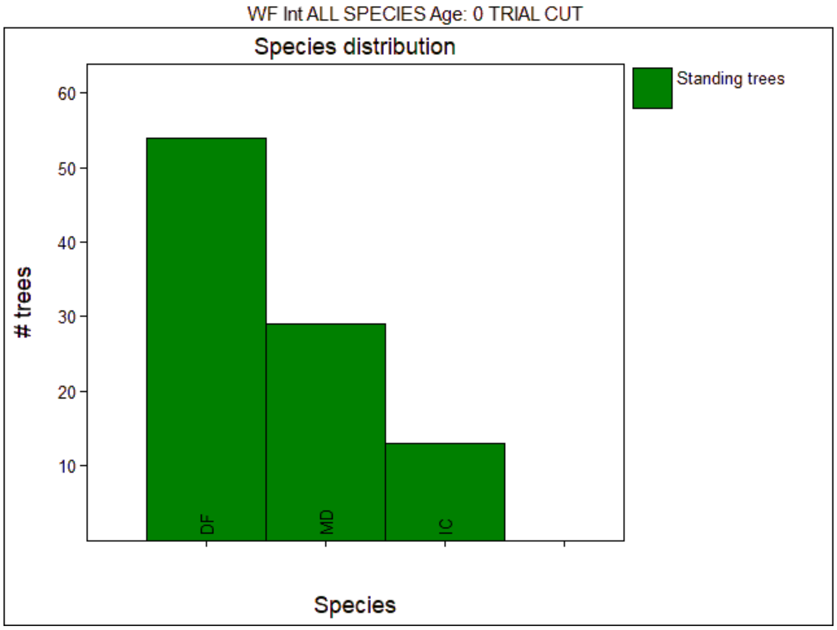
The Alternative C: Intermediate treatment would selectively thin, shade tolerant species (Douglas-fir and white fir) would be targeted for removal to increase shade intolerant species diversity. This treatment would shift the diameter class distribution from a higher proportion of lower diameter classes to a higher proportion of middle and large size classes.

Ecosystem Resilience- Intermediate: Treated Stand Diameter Distribution



Ecosystem Resilience- Intermediate: Treated Stand Tree Species Distribution

The tree species composition in this Douglas-fir dominated stand would shift slightly after treatment by increasing the proportion of minor species, such as incense cedar and madrone by targeting Douglas-fir and white fir for removal.



IC = Incense Cedar, DF = Douglas-fir, MD = Pacific Madrone

The Alternative C: Intermediate treatment would reduce the RD to a range of 30-40 percent. The untreated stand would remain above the zone of imminent competition mortality (RD >55 percent). The QMD would increase from 11.8 inches in DBH to 15.4 inches post treatment. The QMD would continue to increase in the treated stand through a 50-year time horizon to 19.6 inches, which would be larger in comparison to the untreated stand at 16.7 inches. The residual canopy cover of the treated stand would be ≥40 percent, and therefore would remain in a closed forest condition post-treatment.

The intermediate category is considered to be closed forest (see BLM Structural Stage Crosswalk). Within the dry forest, the break from open forest to closed forest is at 40 percent canopy cover. A gradient of conditions exist within the closed forest classification and the intermediate category is used as a subset of closed forest.

Table 45. Alternative C Intermediate Treatment and No Action Alternative Comparison.

Prescription Types	Relative Density %	Basal Area feet^2	Canopy Cover %	Number of trees ≥ 40"	Number of trees ≥ 20"	Mean Live Crown Ratio %	Quadratic Mean Diameter
Current Condition	79	244	75	0	38.9	40	11.8
50 Years No Treatment	92	327	77	0	63.1	29	16.7
ALT C: Intermediate	36	125	47	0	21.1	33	15.4
50 Years Post Treatment	51	190	55	0	32.5	28	19.6

RD above the zone of imminent competition mortality (>55 percent RD)

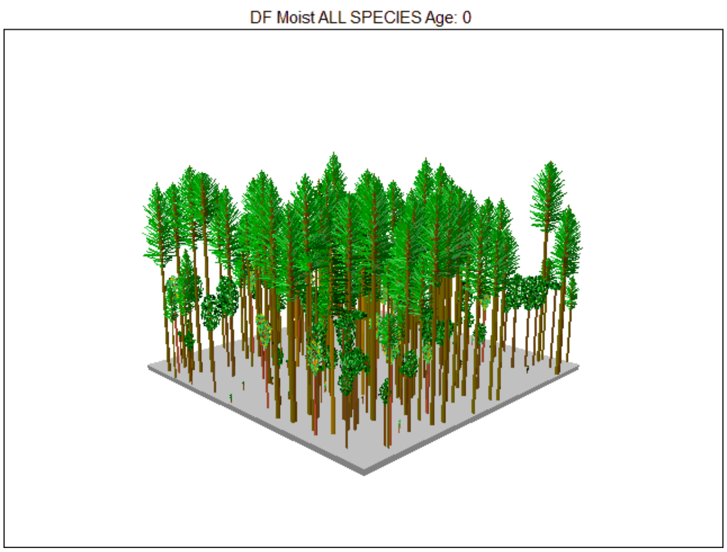
Alternative C: Closed- Douglas-Fir Moist PVT

A Douglas-moist stand was selected to model for the Alternative C: Closed treatment because Douglas-fir Moist is one of the PVTs in the closed category of the RDI table. This treatment would thin to an RD range of 40-45 percent.

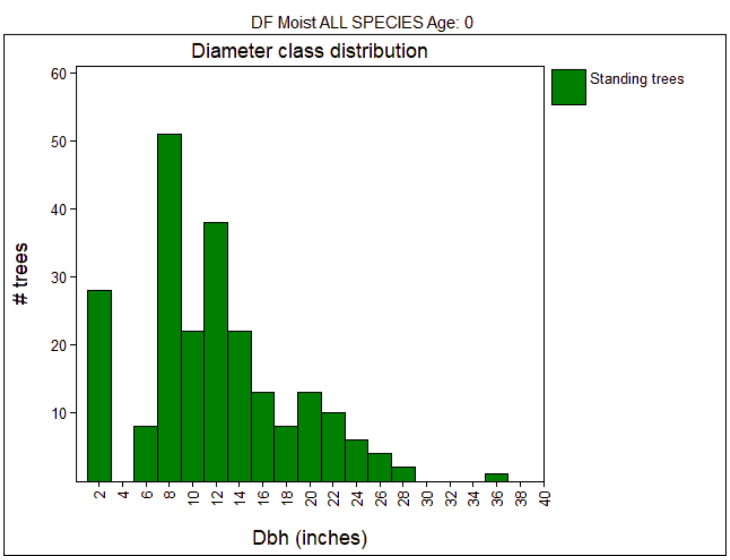
No Action Alternative

The stand under the No Action Alternative would remain in the current condition, which is overly dense with a high proportion of trees in lower size classes. The No Action Alternative would not provide conditions favorable for shade-intolerant species or create opportunities for regeneration or stand layering.

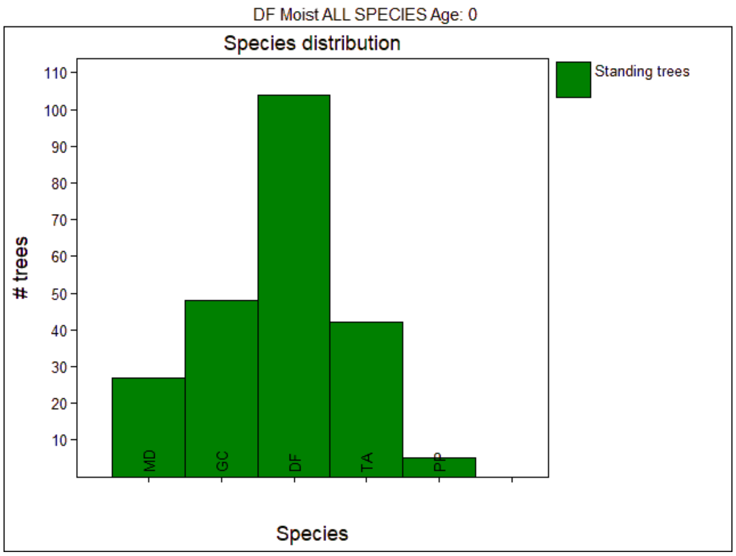
Ecosystem Resilience- Closed: No Action Alternative Visual



Ecosystem Resilience- Closed: No Action Alternative Diameter Distribution

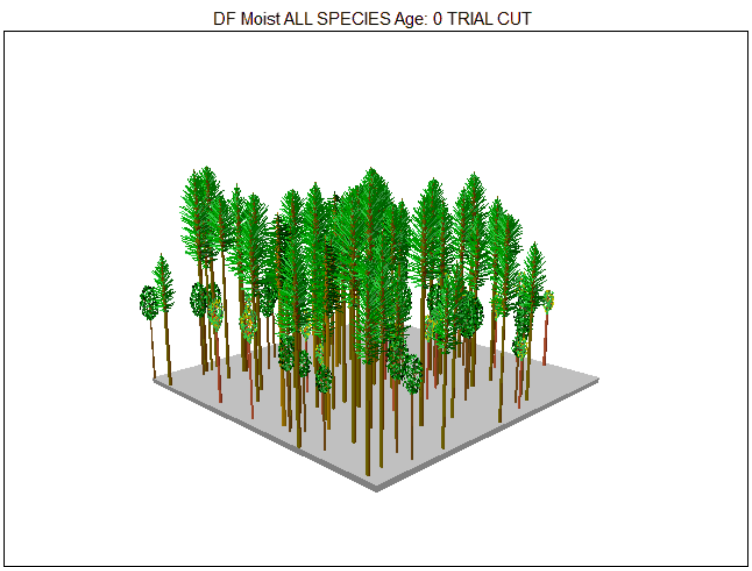


Ecosystem Resilience- Closed: No Action Alternative Tree Species Distribution



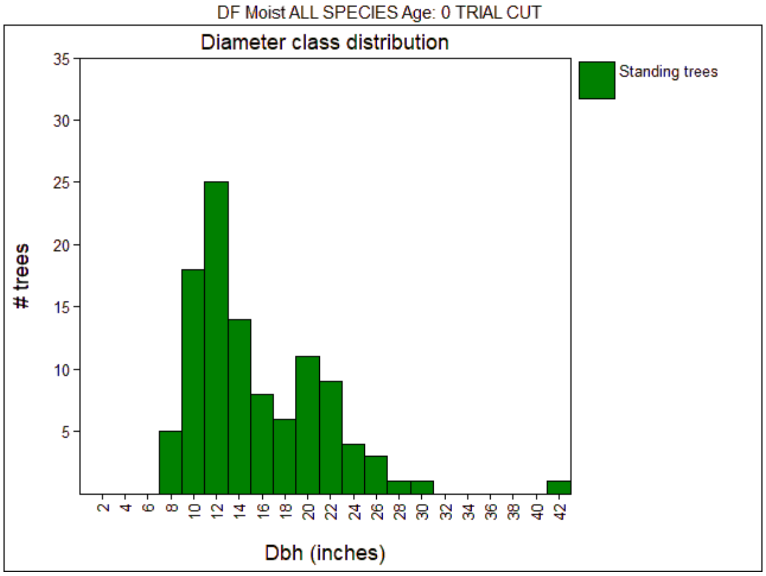
DF = Douglas-fir, PP = Ponderosa Pine, MD = Pacific Madrone, GC= Golden Chinquapin, TA = Pacific Yew

Ecosystem Resilience- Closed: Treated Stand Visual



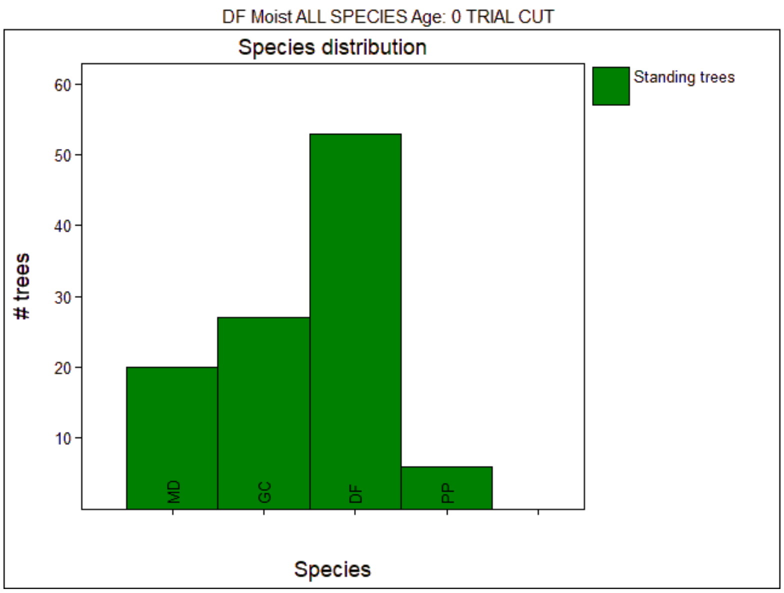
The Alternative C: Closed treatment would selectively thin and would retain higher density and canopy cover in comparison to the other Ecosystem Resiliency treatment categories. With higher retention levels there would be less of an impact on the diameter distribution and species composition. Reductions in the smaller size classes would be the most apparent difference.

Ecosystem Resilience- Closed: Treated Stand Diameter Distribution



Ecosystem Resilience- Closed: Treated Stand Tree Species Distribution

The tree species composition in this Douglas-fir dominated stand would shift towards increasing representation of minor species, but to a lesser degree in comparison with the Alternative C: Open treatment.



DF = Douglas-fir, PP = Ponderosa Pine, MD = Pacific Madrone, GC= Golden Chinquapin

The Alternative C: Closed treatment would reduce the RD to a range of 40-45 percent. The untreated stand would remain above the zone of imminent competition mortality (RD >55 percent). The QMD would increase from 13.6 inches in DBH to 16.6 inches post treatment. The QMD would continue to increase in the treated stand through a 50-year time horizon to 21.9 inches, which would be larger in comparison to the untreated stand at 19.9 inches. The residual canopy cover of the treated stand would be ≥40 percent, and therefore would remain in a closed forest condition post-treatment.

Table 46. Alternative C Closed Treatment and No Action Alternative Comparison.

Prescription Types	Relative Density %	Basal Area ft^2	Canopy Cover %	Number of trees ≥ 40”	Number of trees ≥ 20”	Mean Live Crown Ratio %	Quadratic Mean Diameter
Current Condition	71	233	72	0.8	26.7	37	13.6
50 Years No Treatment	82	310	72	1.4	49.5	30	19.9
ALT C: Closed	45	160	53	0.8	21.4	36	16.6
50 Years Post Treatment	59	231	58	1.4	40.7	30	21.9

RD above the zone of imminent competition mortality (>55 percent RD)

Summary of Treatment Comparison

No Action Alternative

The cumulative effect of past management practices including timber harvest and fire suppression has led to an over-representation of closed canopy, mid seral stand conditions. The No Action Alternative would not create open forest conditions and therefore would not deviate from an over-representation of closed canopy. Because trees growing in dense conditions grow in height, but very little in diameter (Oliver and Larson 1996, p. 75), non-treated stands would remain stagnant in growth with declining individual tree and stand vigor (Tappeiner et al. 2007, p. 124). Overly dense stands (RD >55 percent) would remain within the zone of imminent competition mortality and if allowed to grow for many years within this zone, mortality would occur (Drew and Flewelling 1979). Currently, 75 percent of the Treatment Area is within the zone of competition mortality (RD >55 percent), based on a GIS query of an RD of 55 percent or greater within the Treatment Area. These metrics were derived from Gradient Nearest Neighbor (GNN) imputation (Ohmann and Gregory, 2002) 2012 datasets produced by the US Forest Service Pacific Northwest Research Station and Oregon State University Landscape Ecology, Modeling, Mapping, and Analysis research group (see Appendix 16). As a result of the limited resources for tree growth in the stand, 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 live crown ratios decrease. 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 from Douglas-fir and white fir as shade intolerant pine and oak species continue to decline. Under the No Action Alternative, stands would remain overstocked and more susceptible to insect and disease infestation.

Common to All Action Alternatives

The effects of active management in action alternatives are:

- Increased resistance to stand replacing fire within areas treated (see Issue 3.4).
- A reduction in stand densities that promote growth and vigor; living vegetation must expand in size and a tree cannot grow larger unless its growing space is increased; residual trees are expected to 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 which is displayed in the stand modeling and an objective in the SWO ROD/RMP (p. 68). This diversity in tree species and sizes is important for ecosystem function (Franklin et al. 2002).

- Opportunities for new regeneration and tree layering would be created (differs by treatments and action alternatives) with group selection openings (see *Gap Dynamics).*
- Improving the trajectory towards NSO habitat, and protecting existing nesting habitat by treating around it (see Section 3.5, NSO Habitat Delay).

Alternative A

Stand Scale

At the stand scale, Alternative A proposes treatments that would reduce stand densities and increase tree diameter growth (QMD), increase the proportion of shade intolerant species (pine and oak), and increase tree vigor. Without group selection openings, Alternative A would create little opportunity for a new cohort of trees to create structural complexity. Alternative A would clear around large trees as a stand-alone treatment and benefit the survival of large trees but would not promote the growth of the large trees or regeneration around it (see *Gap Dynamics*). In comparison to the other action alternatives, Alternative A would have the least flexibility in creating heterogeneity due to the lack of group selection openings and skips.

Alternative B

Stand Scale

At the stand scale, Alternative B proposes treatments that would reduce densities and increase tree diameter growth (QMD), increase the proportion of shade intolerant species (pine and oak), and increase tree vigor. Alternative B proposes group selection openings which would create opportunities for a new cohort of trees for tree layering and structural complexity. Group selection openings an acre or less in size is beneficial for regeneration but could stunt height development in pine regeneration with the size constraint. Thinning and group selection openings around large trees would reduce competition to the large trees and increase the likelihood of survival (see *Gap Dynamics*). Because all NSO habitat function would be maintained, canopy cover retention requirements could limit the amount of thinning as well as the amount of group selection openings, specifically for maintaining nesting/roosting or foraging. In comparison to the other action alternatives, Alternative B has the lightest thinning levels due to maintaining all NSO habitat function and retaining higher levels of canopy cover depending on the habitat type. Alternative B has more flexibility (amount and sizes of group selection openings) than Alternative A in creating heterogeneity, but less flexibility in comparison to Alternative C. Alternative B would have the highest percentage of skips compared to the other action alternatives.

Alternative C

Stand Scale

At the stand scale, Alternative C proposes treatments that would reduce stand densities to increase tree diameter growth (QMD), increase the proportion of shade intolerant species (pine and oak), and increase tree vigor. Alternative C proposes the most group selection openings of the largest sizes in comparison to the other action alternatives. These treatments would create the most opportunity for a new cohort of trees, which would lead to increased tree layering and structural complexity. Alternative C would provide stand thinning as well as group selection openings, which would promote the survival and the growth of large trees, as well provide for pine persistence and regeneration (see *Gap Dynamics*). Near Term NSO treatments would be maintained, in these locations canopy cover retention requirements could limit the amount of thinning as well as the amount of group selection openings, specifically for maintaining nesting/roosting or foraging habitat. In comparison to the other action alternatives, Alternative C has a wider range of RD targets based on location/PVT/NSO habitat and has the most flexibility (amount and sizes of group selection openings) in creating heterogeneity.

APPENDIX 5 FIRE AND FUELS SUPPORTING INFORMATION

1 Fire Resistance

Analytical Assumptions Fire Behavior Inputs

The Nexus 2.1 crown fire assessment software developed by Scott and Reinhardt (2014) and available from Pyrologix http://pyrologix.com/downloads/, is a useful tool to compare crown fire potential for different forest stands, and was used to compare the effects of alternative proposed actions for combined commercial, small-diameter, and prescribed fire actions on crown fire potential. Nexus links separate models of surface and crown fire behavior, to calculate indices of relative crown fire potential (e.g., CI and TI). The BLM used a standard approach to derive a relative resistance to stand-replacement fire for Mixed relative resistance to stand-replacing fire categories, based on review of typical wind speeds (see weather discussion below) and CI and TI. The rating was as follows: CI <20 mph = Low; CI 20-30 mph = Moderate; CI >30 mph = High, unless TI<30 mph, then = Moderate. A CI greater than a TI, indicates that the stand would support a crown fire entering from adjacent areas at the given CI, however crown fire initiation within the stand is not likely, until TI wind speed occurs.

CI (mph): "The open (20 foot) wind speed at which active crown fire is possible for the specified fire environment" (Scott and Reinhardt 2001). Crowning index can be used to compare relative susceptibility of stands to crown fire. An increase in the CI corresponds to a decreased likelihood of an active crown fire moving through a stand, particularly one impacting a given stand from an adjacent area. Crowning index provides an index for relative comparison-Fule et al. (2004) note, "…it would be unrealistic to expect that CI values are precise estimates of the exact windspeed at which any real crownfire will be sustained. However, it is reasonable to compare CI values across space and time to assess crown fire susceptibility in relative terms."

Torching index (mph): "The open (20-foot) wind speed at which crown fire activity can initiate for the specified fire environment" (Scott and Reinhardt 2001). An increased torching index would result in a decreased likelihood of torching initiating within the stand. Torching events within a stand can lead to an active crown fire depending on weather, surface, and canopy fuel conditions. As with CI, torching index may be interpreted as the relative susceptibility forests may have to tree torching also called "passive crown fire".

Wildland Fuel Profile Continuity

Canopy base height and surface fire intensity are key variables (along with the moisture content of leaves and branches) in determining the transition between surface fire to torching or passive crown fire. Canopy bulk density (or connectivity) then differentiates between passive and active crown fire (VanWagner 1977).

Canopy Fuels (Canopy Connectivity [Canopy Cover and Canopy Bulk Density] and Large Trees)

Canopy fuels consist of live and dead tree branches and crowns. Tree crowns can be separated or interlocking (i.e., canopy connectivity) and dense or sparse. Large trees, particularly of fire-resistant species, are an important component of fire-resistant stand structure (Martinson and Omi 2013; USDI BLM 2016a, pp. 243, 252).

A necessary input into NEXUS is available canopy fuel. The BLM used a value of 6 tons/acre for all model runs, based on estimates for Douglas-fir and Sierra Nevada mixed conifer, as presented by Scott and Reinhard (2002).

Ladder Fuels (Canopy Base Height)

Ladder fuels typically consist of small trees and tall shrubs that span from the forest floor to the overstory canopy. The vertical arrangement of fuels refers to the continuity of fuels from the ground up through the overstory canopy, termed as CBH. Low vertical separation between surface and canopy fuels, or low CBH, is the most common vector for surface fire to transition into crown fire and is commonly identified as the ladder fuel component of the Wildland fuel profile. Canopy base height supplies information used in fire behavior models, to determine the point at which a surface fire will transition to a crown fire. This CBH describes the lowest point in a stand where there is sufficient available fuel (>0.25 in diameter) to propagate fire vertically through the canopy. Specifically, CBH is defined as the lowest point at which the canopy bulk density is 0.012 kg m-3.

Removal of ladder fuels increases vertical and horizontal separation or discontinuity in the fuel profile and reduces the probability of surface fire flames ascending into and igniting tree crowns and subsequently decrease the likelihood of tree torching and crown fire initiation (Scott and Reinhard 2001; Van Wagner 1977). Application of prescribed fire, via underburning, can further raise CBH and reduce ladder fuels.

Surface Fuels (Surface Fire Behavior Fuel Models)

Surface fuels consist of grasses, shrubs, small trees, litter, and woody material on the forest floor and up to six feet from the surface (Scott and Burgan 2005) and are usually measured in tons per acre. Fine surface fuels consist of small diameter surface fuels (<3 inches), litter, grass, and shrubs and will ignite easily and burn rapidly at times producing high rates of spread and high flame lengths. Wildfires in light surface fuels react quickly to diurnal changes in relative humidity and wind. Large surface fuels consist of larger (>3 inches in diameter) limbs, down woody debris, logs, and stumps that ignite and burn more slowly. Large surface fuels are more influenced by seasonal weather patterns and less influenced by changes in daily wind and moisture. Fire Behavior Fuel Models (FBFM) (Scott and Burgan 2005) are used to represent surface fuels and estimate potential surface fire behavior flame lengths and rates of spread under various environmental conditions (fuel moisture and wind scenarios). Surface fire behavior has a direct effect on fire severity, mortality, suppression tactics, and the initiation of crown fire. Rates of spread and flame lengths are key components affecting fire size and resistance to control. Surface fire behavior has a direct effect on fire severity, mortality, suppression tactics, and the initiation of crown fire, lower surface fuel loading produces lower flame lengths.

Handpile burning primarily reduces ladder fuels and does not reduce surface fuel loading as much as underburning (Figure 11) thus changes to surface fuels are not pronounced. Prescribed underburning is the most effective treatment at reducing surface fuels (Prichard et al. 2010, Figure 11). In areas with high crown fire potential, or low resistance to replacement fire and high fuel loading, it is necessary to reduce ladder fuels, prior to introducing prescribed fire (i.e., underburning), in order to minimize mortality to the residual stand (Martinson and Omi 2013). Reducing ladder fuels would make it possible to use prescribed fire as a tool to reduce surface fuels (underburning) and increase CBH in these stands.

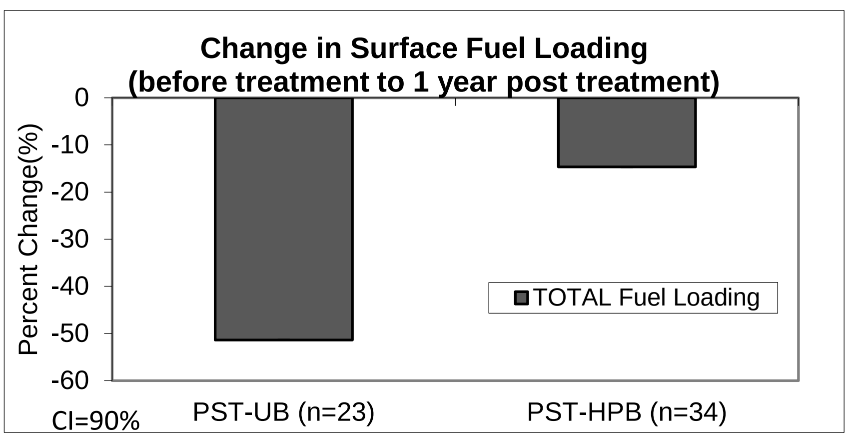


Figure 11. Average Percent Change in Total Surface Fuel Loading from Pre-Treatment to one year After Underburning (PST-UB) and One Year After Handpile Burning (PST-HPB). Error bars indicate confidence interval of 90 percent and n indicates number of plots sampled. Data was collected on Medford District BLM-administered lands.

Figures 12 and 13 below illustrate predicted flame length and rate of spread for common standard fire behavior fuel models (see Table 50 for fuel model descriptions).

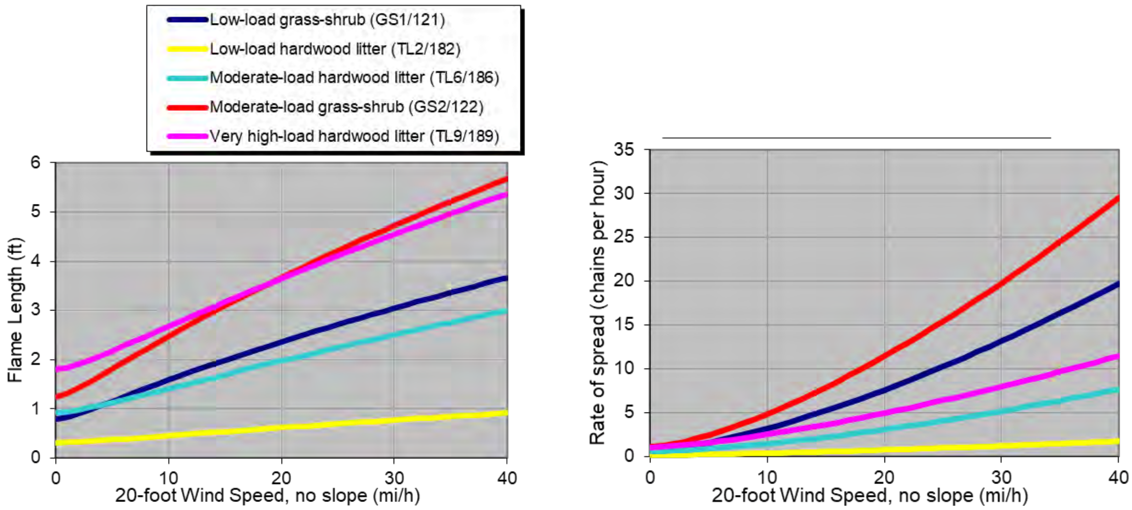


Figure 12. Comparison of Flame Length (FL) and Rate of Spread Under Dry Fuel Moisture Scenario. (Fine fuels – 1hr@6%, 10hr@7%, and 100hr@8%; herbaceous@60%; and woody @90%) for common mixed-conifer woodland and non-conifer fuel models from low to high load with 30-50% canopy cover using CompareModel495 spreadsheet available from http://pyrologix.com/.

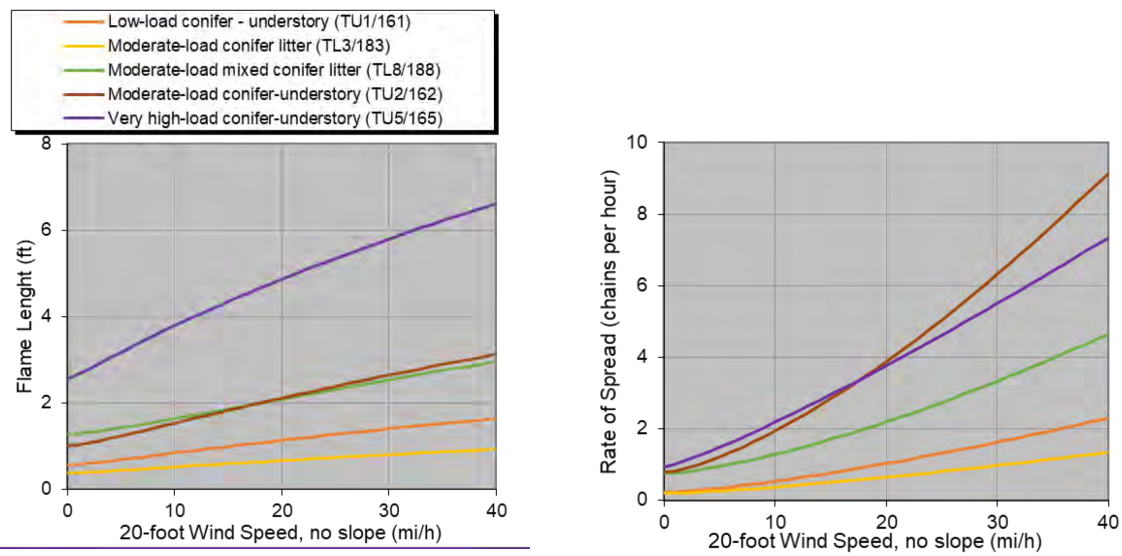


Figure 13. Comparison of Flame Length (FL) and Rate of Spread Under Dry Fuel Moisture Scenario. (Fine fuels – 1hr@6%, 10hr@7%, and 100hr@8%; herbaceous@60%; and woody @90%) for common conifer forested fuel models from low to high loading. With 30-50% canopy cover using CompareModel495 spreadsheet available from http://pyrologix.com/.

Fuel Heterogeneity

There is considerable evidence that many historic frequent-fire dry forests were comprised of a fine-scale patchy composition of openings and clumps (Churchill et al. 2013; Hessburg et al. 2015; Larson and Churchill 2008; Taylor 2010; Larson and Churchill 2012; Lydersen et al. 2013; Churchill et al. 2017; Pawlikowski et al. 2019), creating vegetation or fuel patterns representative of frequent-fire dry forest low-mixed fire regime fuel loading (USDI BLM 2016a, pp. 225-226). Among the many ways that variable and complex fine-scale heterogeneous patterning contributes toward stand resistance to replacement fire are heterogenous fuel profiles which may inhibit the spread of crown fires, patchy regeneration of diverse species to respond to disturbance, and variability in litter fall and surface fuel accumulations.

Reference conditions provide a robust guide for management targets related to fine-scale spatial pattering attributed to frequent low-mixed severity fire dry forest. As Churchill and other (2017) eloquently explained "the rationale for using reference conditions to guide management targets in dry forests is that historical forest conditions persisted through centuries of frequent disturbances and significant climatic fluctuation while sustaining native biodiversity and other ecosystem services."

Reference conditions from western sites with low-mixed severity fire regimes provide valuable context for southwestern Oregon to inform ecological relevant fine-scale patterning of forests functioning under a frequent low- mixed severity wildfire disturbance regime. At a mixed ponderosa pine-California black oak (*Quercus kelloggii*) forest in southern Cascades, California, akin to the drier gradients of southwestern Oregon, Pawlikowski and others (2019) found that gaps comprised less than 30 percent of the approximately 2.5 acres (1-hectare) plots, in other words the maximum area in gaps was approximately 0.75 acres. Gaps were identified using an inter-tree distance algorithm for empty space greater than approximately 30 feet (9 meters). Taylor (2010) quantified spatial patterning at the same site and found average gap size to be 0.14 acres ($585m^2$), with a range in sizes from 0.02 – 0.6 acres (100 to 2400 m^2), similar to results from other ponderosa pine forests 0.05 – 1.6 acres (0.02-0.64 hectare) (Cooper 1960; White 1985; Moore et al. 1993; Harrod et al. 1999; Taylor 2004; Youngblood et al. 2004). Gaps were defined as areas with contiguous canopy cover less than 33 percent.

An examination of historic (1929) stand structure by Lydersen and others (2013) at a mixed-conifer site in central Sierra Nevada, California, representing the more productive end of gradients in southwestern Oregon, found that at the 4-hectare plot scale (approximately 10 acres) gaps occupied approximately 35 percent of plot areas. In the 1929 forest, gaps were commonly smaller than 0.12 acres (0.05 hectares) and ranged from 0.02 – 1 acre (0.01 – 0.4 hectare). Canopy cover averaged 45 percent for trees greater than (4-inch DBH) (10 cm) and 36 percent for trees greater than 10-inch DBH (25 cm).

Skinner (1995) examined aerial photos from 1944 three north -western Siskiyou County, California mixed evergreen forested watersheds, representing similar climate and vegetation as southwestern Oregon. In 1944, these watersheds had had minimal human disturbance, except for fire exclusion, which became effective on a large scale in the region around 1941 (Atzet 1996). Taylor estimated that in 1944 openings occupied approximately 26 percent of the area. The openings were defined as 0.1 hectares or larger occupied by vegetation no greater than 1/3 of the surrounding stand and the mean size was approximately 1.2 acres (0.48 hectare), while the median was 1.75 acres (0.71 hectare).

In a report to OWEB Metlen and others (2013) found that gaps capable of regenerating pine have disappeared, based on four 3-ha stem maps in the Ashland watershed. In the stand reconstructions (to 1865), they found that regenerating patch sizes averaged between 0.1-0.3 acres. In the four plots in the Ashland watershed, Metlen and others (2013) found the distribution of tree cluster sizes to be very similar as compared to patterns found throughout the pacific northwest by Churchill and others (2017, Appendix 3a.2), and markedly different from contemporary cluster size distributions. In summary, gap sizes from reference conditions reflective of low to mixed severity fire regimes were less than 2 acres and generally less than 1 acre.

Recent characterization of fine-scale spatial patterning for reference conditions has focused on characterizing tree clusters, rather than delineating and identifying gaps, which can be challenging, especially in open forest stands. In stem-maps of reference conditions, canopy gaps are typically in complex ameba-like shapes (Pawlikowski et al. 2019; Churchill et al. 2013; Lydersen et al. 2013; Metlen et al. 2013) and work still needs to be done to quantify openings in reference patterns to provide more explicit guidelines for creating relevant functional openings in implementation.

Maintenance

Maintenance would not be needed in the short-term (up to 10-years after initial treatments). This is supported by local plot data and locally conducted FTEM of recent wildfire and treatment interactions on nearly 6,000 acres of previously treated areas burned in a wildfire between 2008-2020. Treatments were found to be effective in some areas for up to 14 years (USDI BLM 2021b, Figure 14). Additionally, between 2008 to 2020, 219 previously treated units on the Medford District, were intersected by wildfire. Surface fire was the predominant fire type in 68 percent of all previously treated units, and less than 30 percent of treatments were not found to moderate fire behavior. In a sub-set of these treatments intersected by recent large wildfires (2013-2018), it took multiple days for fire to travel through 58 percent of treated units, average unit size was 35 acres (USDI BLM 2021b). This slowed rate of fire spread illustrates moderated fire behavior (i.e., no stand replacement fire) which presents favorable conditions for wildfire containment (Finney et al. 2009). Local monitoring of fuel treatment wildfire intersections shows that 60 percent of units treated contribute toward wildfire control. Fuel reduction has also been found to be effective in some cases for up to 22 years as found by Lydersen and others (2014).

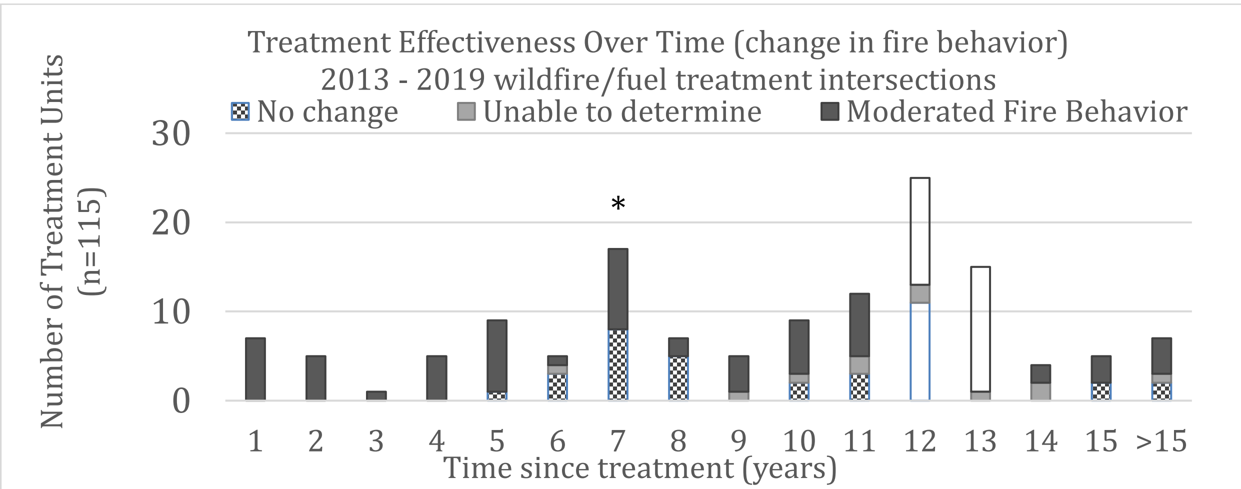


Figure 14. Fuel Treatment and Wildfire Intersections on the Medford District (2013-2019), Time Since Treatment, and Influence on Fire Behavior. Dark gray indicates number of treatments intersected by wildfires that effectively moderated fire behavior. Crosshatched bars indicate those treatments intersected by wildfires that did not moderate fire behavior, while light gray bars represent treatments where effect was unable to be determined. *Five of the "no change" treatments burned in the Douglas Complex (2013) between 7/26-7/29 under extreme fire weather conditions exceeding 97th percentile fire danger indices with average wind gusts of 17mph. Data are from local monitoring conducted according to U.S. Department of the Interior policy ((*https://iftdss.firenet.gov/firenetHelp/help/pageHelp/content/resources/pdfs/policies/blm_ftem_policy.pdf*) *and* consistent with the SWO ROD/RMP.

Vegetation growth is dependent on a variety of factors and variables (EA Section 3.3.6)

In areas thinned to open canopy conditions (e.g., <40 percent canopy cover), regeneration of a diverse understory is expected (Wayman and North 2007) and could contribute toward more rapid live fuel loading accumulation or shift fuel models from moderate timber litter to moderate timber understory or grass-shrub in the moderate-term (10-30 years) (local BLM monitoring data, Agee et al. 2000). While this shift in surface fuel type could increase rates of surface fire spread from low-load surface fuel types (Figures 11 and 12), these rates of spread would be approximately 5.75 times less than those presented by crown fires in stands with greater than 50 percent cover under 10 mph 20-foot windspeeds (Figure 15).

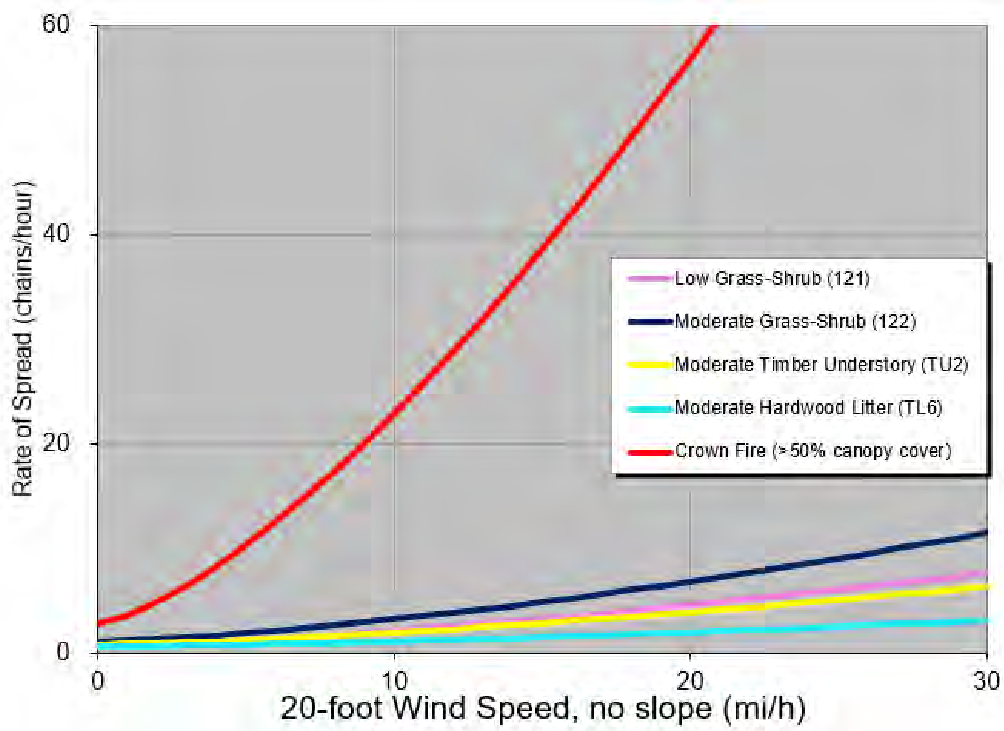


Figure 15. Comparison of Fire Rate of Spread Under Dry Fuel Moisture Scenarios (Fine fuels – 1hr@6%, 10hr@7%, and 100hr@8%; herbaceous@60%; and woody @90%) for low load timber litter surface fuel model (turquoise), low load grass-shrub (pink), moderate load surface fuel models (grass-shrub (dark blue) and timber-understory (yellow)) and crown fire (red) in stands with greater than 50% canopy cover using CompareModel495 spreadsheet available from http://pyrologix.com/.

Weather

Fire behavior was modeled under 90th percentile fire weather fuel moisture conditions (Table 47) fuel moisture and other weather values were determined from analysis SQUAW Remote Automated Weather Station (RAWS) data representing eight fire seasons (July to October 2000-2008). Based on analysis of the RAWS data, approximately 90 percent of the recorded 10-minute average 20-foot winds and wind gusts are less than 15 mph. SQUAW RAWS is notorious for capturing high wind speeds in the Applegate and in the Rogue Basin, in general. During this analysis period, approximately 10 percent of average windspeeds and gusts exceeded 20 mph, reaching up to 36 mph and 53 mph, respectively. For this analysis, a 20 foot windspeed of 15 mph was used for modeling. Per NEXUS recommendations and guidance for estimating wind speeds in the Fire Behavior Field Reference Guide (NWCG 2021), the BLM applied a standard wind adjustment factor of 0.1 to canopy cover greater than 50 percent, 0.15 for canopy cover of 30-50 percent, and 0.2 for canopy cover 20-30 percent. For canopy cover >50 percent fine dead fuel (or 1 hour fuel) moisture was adjusted to 7 percent to reflect sheltering effect on fine dead fuel moisture (Rothermel 1983; NWCG 2021, Nexus).

Table 47. Dry (90th Percentile) Fuel Moisture Scenario Inputs for Dead and Live Fuels. These Values are Consistent with an 80 ⁰F Day.

Fuel Type	Dead fuel Size class/ Live Fuel Type	Percent Moisture
Dead Fuels	0 – 0.25 inch (1 hr.)	5
	0.25 – 1.0 inch (10 hr.)	6
	1.0 – 3.0 inch (100 hr.)	8
Live Fuels	Live Woody	75
	Live Herbaceous	35

Topography

Slope is an important input for fire behavior predictions. Slope is variable across the Treatment Area. The mean slope of 50 percent was used in model predictions.

Resistance to Other Disturbance

Halofsky et al (2016) studied adaptation to climate change and found that "in a drought-prone and fire-prone region, such as southwestern Oregon, reducing stand density and reintroducing characteristic low and mixed severity fire are primary actions for increasing forest resilience to climate change. Reducing stand density with thinning can increase water availability and tree growth and vigor by reducing competition. Decreases in forest stand density, coupled with hazardous fuels treatment, can also increase forest resilience to wildfire" (Halofsky et. al 2016, pp. 7-8). Thinning and prescribed fire treatments can also "both reduce the risk of high-severity fire and mitigate the effects of drought" (Halofsky et. al 2016, p. 10).

Hood et al performed a 15-year study on the growth responses to legacy ponderosa pine and Jeffrey pine from radial and stand-level thinning. They suggest that residual trees within stand thinning treatments have higher growth rates and have higher resilience to drought compared to trees in unthinned stands, and that thinning treatments can reduce drought-induced mortality (Hood et al 2017, pp. 5-6).

Trees that are less vigorous and slower growing are more susceptible to attack because stressed trees lack a sufficient amount of tree resin to eject attacking beetles (Fettig 2007; USDA FIDL 1982, p. 5). Hood and others (2015) found that non-lethal, low-severity fire, induced resin duct production in ponderosa pine, while trees not exposed to low-severity fire exhibited decreased resin duct production. "In dense frequent fire forests, tree vigor is reduced as a result of competitive stress, and the potential for native bark beetles to mass attack is greater because of the closer proximity to host trees and other factors. These combined effects increase susceptibility to bark-beetle-caused tree mortality, but the trigger that leads to actual widespread mortality is often a multiyear drought" (Stephens et al 2018, pp. 77-78; Young et al. 2017; Fettig et al. 2007).

2 Affected Environment

Canopy fuels (Canopy Connectivity [Canopy Cover and Canopy Bulk Density] and Large Trees)

Within the Treatment Area, 47 percent of all acres have a canopy bulk density greater than 0.12 kg/m^3 (e.g., greater than 60 percent canopy cover), while 28 percent of the acreage is between 0.05-0.11 kg/m^3 (approximately 40-60 percent canopy cover), and seven percent is less than (Table 49). Canopy bulk density data was acquired from LANDFIRE (USDI GS 2014). The deficit of late seral forest and abundance of mid-seral forest (USDI BLM 2016a, p. 235, Figure 3-24) and current condition quadratic mean diameter of between 8 and 15 inches DBH (Appendix 3) indicates the lack of large trees within the Treatment Area.

Table 48. Estimated Canopy Bulk Density (kgm3) and Approximate Canopy Cover and Acres and Percent Distribution across the Treatment Area.

Canopy Bulk Density (kgm3)	Approximate Canopy Cover (%)	Acres	Percent Distribution (%)
0	Non-forested	106,002	16%
0.01-0.05	10<40	61,086	9%
0.05-0.11	40-60	188,257	28%
>0.12	>60	317,702	47%

Ladder Fuels (Canopy Base Height)

Within the Treatment Area, 47 percent of acres have a CBH of less than 2 feet and 32 percent of the area has a CBH of 2 to 5 feet (Table 49).

Table 49. Current Distribution of Canopy Base Height Across Treatment Area. Canopy Base Height Data Acquired from LANDFIRE (USDI GS 2014).

	Treatment Area	
Canopy Base Height (feet)	Acres	Percent Distribution
0 to <2	331,214	47%
2 to <5	228,251	32%
5 to <8	77,530	11%
8 to <12	4,018	1%
(non-conifer/broadleaf)	66,547	9%

Surface Fuels (Fire Behavior Fuel Model)

The majority (56 percent) of the Treatment Area is best represented by *very high* and *high* load forested surface fuel models, and *high* and *moderate* load shrub types (Table 50), with varied distribution across the landscape. The fuelbed characteristics of these surface fuel models exhibit potentially more extreme fire behavior, simply due to the greater amount of available fuel, and present a higher resistance to control as they burn longer and with greater fire line intensity, potentially slowing suppression production rates. Fuelbed characteristics represented by *low* load surface fuel models, which comprise a relatively smaller portion of the Medford District, are the desired outcome of proposed actions to reduce fuels. For example, surface fuel treatments designed to change surface fuel loading from a *very high* load mixed conifer-hardwood fire behavior fuel model to a *low* load mixed conifer-hardwood fire behavior fuel model can dramatically reduce wildfire predicted rates of spread and resistance to control.

Table 50. Approximate Acres of Surface Fuel Fire Behavior Models Grouped by Loading Category Descriptions and Corresponding Standard Fire Behavior Fuel Models Numbers (Scott & Burgan 2005) across the Treatment Area (bold Fire Behavior Fuel Models Represent the Majority).

Fuel Loading Descriptions (Fire Behavior Fuel Models)	Treatment Area	
	Acres	Percent Distribution (%)
Non-burnable (**91**,92,93,98,99)	8,952	1%
Low load grass (**101**,102)	18,942	3%
Low load grass-shrub (**121**,141)	15,194	2%
Low load mixed conifer – hardwood (181,182,**161**)	2,256	0.3%
Moderate load grass-shrub (**122**,123,142)	112,303	16%
Moderate load mixed conifer – hardwood (162,183, 186, **188**)	109,555	16%
High load shrub (**145**,147)	212	0.03%
High load conifer (184,**185**,187)	43,617	6%
Very High load mixed conifer-hardwood (**165**,189)	373,430	55%

Data is from the PNW QWRA (2019) surface fire behavior fuel model calibration effort. Acreages have not been modified to reflect the approximately 19,000 acres of wildfire on Medford District-administered lands between 2019 - 2021.

Direct Short-Term Effects to the fuel profile of Action Alternatives in conifer forest, woodland, and non-conifer plant communities

Common to all Alternatives

Canopy Fuels (canopy connectivity (canopy cover and canopy bulk density) and large trees) –

Under all action alternatives, the proposed commercial thinning actions would reduce canopy fuels (i.e., canopy bulk density and canopy connectivity). The reduction of canopy fuels (i.e., canopy bulk density and canopy connectivity) would decrease the likelihood of tree-to-tree crown fire spread under typical fire weather indices (Scott and Reinhardt 2001), over the No Action Alternative. Thinning will also increase stand diameter (Appendix 4), thus improving resistance to stand-replacing fire, as thinned stands with remaining large trees have been shown to have less severe fire effects when intersected by wildfires (USDI BLM 2016a, p. 228; Martinson and Omi 2013, Lydersen et al. 2014). Proposed commercial thinning actions and prescriptions will retain and promote a cohort of large diameter trees. This will improve resistance to stand-replacing crown fire, as large trees are an important component of fire-resistant stand structure (Martinson and Omi 2013; USDI BLM 2016a, pp. 243, 252). Hood and others (2017) found that a combination of thinning and radial thinning around large trees was most beneficial for increasing diameter growth in large old ponderosa pine, these actions also reduce threat from adjacent fuels. Martinson and Omi (2013) found that treatments resulting in a combined effect of increasing average tree diameter and height to canopy, along with reducing canopy bulk density were most effective at moderating fire behavior and severity. The alternatives vary in intensity and amount of commercial thinning and effects on stand resistance, discussed in Chapter 3 – Fire Resistance Issue.

2 Wildfire Risk

Background

Wildland fire risk describes the likelihood of wildfire, intensity of wildfire (aka hazard), and susceptibility of human values (e.g., communities, homes, infrastructure, resources, etc.) to adverse wildfire effects (Figure 16). Wildfire risk assessments provide a general framework with which to assess wildfire risk and inform wildfire management decisions and proactive planning of prescribed fire and mechanical fuel treatments to modify landscape-level fire growth and behavior. "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). Fire behavior has a direct effect on fire severity, mortality, suppression tactics, and the initiation of crown fire, which presents the greatest resistance to control and the largest potential to threaten wildland urban interfaces (Graham et al. 2004)" (USDI BLM 2016a, p. 254). "Stand-replacement fire (e.g., crown fire) presents the greatest fire hazard or resistance to control and poses the greatest risk to human constructed assets and has the largest immediate and long-term ecological effects (Graham et al. 2004)" (USDI BLM 2016a, p. 243)." The primary fuel characteristics associated with potential fire behavior and crown fire potential are CBH, canopy bulk density, and surface fuel loading (Scott and Reinhardt 2001, Jain and Graham 2007)" (USDI BLM 2016a, Appendix H p. 1332).

Figure 16. Wildfire risk Triangle (Scott et al. 2013).

In recent years, the Medford District and southwestern Oregon have had several wildfire risk assessments conducted at local, regional, and national levels, which the BLM has used in recent analyses. For example, in analyzing potential treatment need for residual activity fuel loading post-harvest, particularly near areas where people live (USDI BLM 2016a, pp. 264-270), the BLM used the National Wildland Fire Potential (USDA FS FMI 2013) to describe fire hazard (i.e., the intensity or resistance to control) and likelihood for wildfire. The BLM assumed in the PRMP/FEIS that a one-mile buffer around the West Wide Wildfire Risk Assessment Wildland Development Areas (WDAs) data layer (WWRA 2013) represents the geographic scope of possible immediate risks to the public and firefighter safety close to communities located within the greater WUI (CWPP 2019; USDI BLM 2016a, p. 266). This area is also relevant, because Between 1984 and 2013, 91 percent of all fire ignitions occurring on the Medford District were within 1 mile of WDAs or where people live (USDI BLM 2016a, Figure 3-34 p. 254). The Wildland Fire Potential represents the intensity side and to some extent the likelihood side of the risk triangle, while the areas where people live are the susceptible values. Since the time of the PRMP/FEIS, robust national, regional, and local wildfire risk assessments have been conducted, following the framework outlined by Scott and others (2013).

While the national wildland fire potential was assessed across all lands, the National Wildfire Risk Assessment for Forest Service Lands (2017) was limited to forest service lands. Locally, an "all-lands" wildfire risk assessment was conducted as an element of the Rogue Basin Strategy (Metlen et al. 2017), which was also adopted by the Rogue Valley Integrated Fire Community Wildfire Protection Plan (CWPP) (2019). On the heels of that wildfire risk assessment, the PNW USFS Region 6 led an "all-lands" QWRA for Oregon and Washington (Gilbertson-Day et al. 2018)

The PNW QWRA brought together multiple cooperators (e.g., BLM, ODF, WA DNR, TNC, NPS, etc.) to regionally refine nationally developed LANDFIRE surface fuel models, identify Highly Valued Resources and Assets and assign a relative importance to those HVRAs, and determine how they would respond to varying fire intensity levels. Then tens of thousands of fire seasons were simulated to derive expected (probable) negative impacts and positive effects from wildfire (PNW Methods and Results 2018). The PNW QWRA incorporated elements of the local risk assessment and generated outputs at a finer resolution. There is concurrence among all recent risk assessment outputs that wildfire risk in southwestern Oregon is high.

In recent years, the national and international communities have endured devastating impacts from wildfire. As such, addressing wildfire risk is a key component of the National Cohesive Wildland Fire Management Strategy (https://www.fs.fed.us/restoration/cohesivestrategy.shtml), the southwestern Oregon Resource Management Plan, and the mission of the Rogue Valley Integrated Fire Plan. Additionally, a recent secretarial order (No. 3372) directed active management to reduce wildfire risks on U.S. Department of the Interior lands by incorporating land management techniques appropriate for the landscape and result in desired fuel loads and maximize benefits of physical features within landscapes, applying the best available science. Executive Order (E.O. 13855) centered around working with adjacent landowners to manage fire risk across landscapes to reduce hazardous fuels through active management to protect communities and other HVRAs.

APPENDIX 6 WILDLIFE SUPPORTING INFORMATION

1. SPOTTED OWL SUPPORTING INFORMATION

DEFINITIONS

Spotted Owl Habitat Definitions

- **Older, Structurally-Complex Conifer (OSC) Forests-** The PRMP/FEIS describes "older, more structurally-complex forests" as stands meeting the definition high-quality northern spotted owl habitat as described in the Spotted Owl Recovery Action 32: "These high-quality spotted owl habitat stands are characterized as having large diameter trees, high amounts of canopy cover, and decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees" (USDI FWS 2011, p. III-67; USDI BLM 2016a, p. 314). The Medford District process for identifying older structurally-complex habitat in the field is based on the interagency SW Oregon process for determining structurally-complex forest (USDA USDI 2010).

- **Nesting-Roosting** – conifer stands with a multi-layered, multispecies canopy dominated by large conifer overstory trees, an understory of shade-tolerant conifers or hardwoods, ≥ 60 percent canopy cover, substantial decadence in the form of large, live conifer trees with deformities (such as cavities, broken tops, and dwarf mistletoe infections; numerous large snags), ground cover characterized by large accumulations of logs and other woody debris, and a canopy that is open enough to allow NSOs to fly within and beneath it (USDI BLM 2016a). In southwestern Oregon, additional NR metrics include overstory tree diameter of ≥21 inches DBH, ≥12 trees with 20 inches or greater DBH trees/acre, QMD ≥ 15 inches DBH, basal area from 180 to 240 feet^2/acre (most often greater than 240 feet^2/acre), and a basal area from larger trees of ≥ 30 feet^2 for trees ≥ 26 inches DBH (USDI FWS 2008a; Irwin et al. 2007; Irwin et al. 2000; Solis & Gutierrez 1990; North et al. 2000). Additionally, in the dry forest, stands with less than 60 percent canopy cover (but greater than 40 percent), can function as nesting-roosting habitat if there are 6 or more trees 30 inches DBH per acre (Zabel 2003).

- **Foraging-** conifer stands with similar stand attributes to nesting-roosting, such as having canopy cover ≥ 60 percent. However, foraging stands are often single storied (especially lacking middle layer), lack decadent features (snags and coarse woody material), have an overstory tree diameter of 16 inches DBH, QMD ≥ 14.2 DBH, have ≥ 7 trees 26 inches per acre, and usually have at least 150 feet^2/acre basal area and could range from 150 -240 feet^2/ acre basal area (USDI FWS 2008a; Irwin et al. 2007; Irwin et al. 2000; Solis & Gutierrez 1990; North et al. 2000).

- **Dispersal-Only-** a minimum consists of stands with adequate tree size and canopy cover to provide protection from avian predators and at least minimal foraging opportunities. Dispersal habitat may include younger and less diverse forest stands than foraging habitat, such as even-aged, pole-sized stands, but such stands should contain some roosting structures and foraging habitat to allow for temporary resting and feeding for dispersing juveniles (USDI FWS 1992a). Dispersal habitat is forest stands with an average stand canopy cover of 40 percent or greater and an average DBH of 11 inches or greater.

- **Capable-** for the NSO is forestland that is currently not habitat but can become NR, F, or dispersal-only habitat in the future, as trees mature, the canopy closes, and additional structural diversity elements develop such as canopy layering, snags, and coarse woody debris.

- **Non-Habitat-** does not provide habitat for NSOs and will not develop into NR, F, or dispersal-only habitat in the future.

- **Relative Habitat Suitability (FWS) –** The RHS map was developed by the FWS during preparation of the *Revised Recovery Plan for the Northern Spotted Owl*, June 28, 2011. The RHS map encompasses multiple topographic, environmental and habitat variables that are known to correspond to presence of NSO nest sites. The RHS map can help to identify those areas with the assemblage of characteristics that are more favorable or less favorable in the long-term for NSOs. The variables include habitat structure, habitat pattern (core and edge), forest species composition, topographic position, elevation and climate. It is not a map of current suitable habitat but instead a map based on a set of variables that contribute to identification of suitable conditions. The RHS map looks at a roving window of approximately 500 acres. An individual pixel may not be suitable habitat but the combination of variables around that pixel could contribute to a *high* RHS value. The threshold map was used for this analysis. There are two values to represent the Relative Habitat Suitability Index. The higher numbers = higher quality habitat (*high* RHS) and the lower number = lower quality habitat (*low* RHS). For southwestern Oregon, an RHS index value above 35 indicates a molded preference for suitable NSO habitat conditions (*high* RHS), values < 35 indicate negative selection criteria (*low* RHS).

Spotted Owl Home Range, 0.5 Mile Core-use Area, and Nest Patch Definitions

- **Home Range Circle** is an approximation of the median home range size used by spotted owls. The Medford District uses the median home range estimated for southwestern Oregon of 2,895 acres or a circle with a radius of 1.2 for the West Cascades Province and 3,400 acres or a circle with a radius of 1.3 miles for the Klamath Province (Thomas et al., 1990; Courtney et al., 2004). The Home Range Circle provides a coarse but useful analogue of the median home range for NSO (Lehmkuhl and Raphael 1993; Raphael et al. 1996). Although it provides an imprecise estimate of actual home ranges, the home range circle approach has been used to show that stand age/structure, patch size, and configuration within the circle influences the likelihood of occupancy. The provincial home ranges of several owl pairs may overlap.

- **Core Area Circle** has a radius that captures the approximate core use area, defined as the area around the nest tree that receives disproportionate use (Bingham and Noon 1997). The Medford District uses a 0.5-mile radius (approximately 500 acre) circle to approximate the core area. Core areas represent the areas that are defended by territorial owls and generally do not overlap the core areas of other owl pairs (Wagner and Anthony 1998; Dugger et al., 2005; Zabel et al., 2003; Bingham and Noon 1997).

- **Nest Patch** is the 70 acres (300-meter) radius around a known or likely nest site and is included in the core and home range areas. Nest area arrangement and nest patch size have been shown to be an important attribute for site selection by spotted owls (Swindle et al., 1997; Perkins 2000; Miller et al., 1989; Meyer et al., 1998). Models developed by Swindle et al. (1997) and Perkins, (2000) showed that the amount of older forest within the 200- to 300-meter radius (and sometimes greater), is positively associated with likelihood of nesting by spotted owls. The nest patch size also represents key areas used by juveniles prior to dispersal. Miller et al. (1989) found that the extent of forested area used by juvenile owls prior to dispersal averaged approximately 70 acres.

Spotted Owl Critical Habitat Definitions

Essential Physical or Biological Features (PBFs) of Critical Habitat

The PBFs are the specific elements considered essential to the conservation of the spotted owl and are those elements that make areas suitable as nesting, roosting, foraging, and dispersal habitat. The PBFs should be arranged spatially such that it is favorable to the persistence of populations, survival, and reproductive success of resident pairs, and survival of dispersing individuals until they are able to recruit into a breeding population (USDI FWS 2012b, p. 71904). Within areas essential for the conservation and recovery of the spotted owl, the FWS has determined that the PBFs are:

1) **Forest types** that may be in early, mid-, or late-seral states and support the NSO across its geographical range.

2) Habitat that provides for **nesting and roosting**. This habitat must provide:

   a) Sufficient foraging habitat to meet the home range needs of territorial pairs of NSOs throughout the year.
   b) Stands for nesting and roosting that are generally characterized by:
      (i) Moderate to high canopy cover (60 to over 80 percent);
      (ii) Multilayered, multispecies canopies with large (20–30 inches [51-76 cm] or greater DBH) overstory trees;
      (iii) High basal area (greater than 240 $feet^2$/acre [55 m^2/ha]);
      (iv) High diversity of different diameters of trees;
      (v) High incidence of large live trees with various deformities (e.g., large cavities, broken tops, mistletoe infections, and other evidence of decadence);
      (vi) Large snags and large accumulations of fallen trees and other woody debris on the ground, and
      (vii) Sufficient open space below the canopy for NSOs to fly.

3) Habitat that provides for **foraging**, which varies widely across the NSO's range, in accordance with ecological conditions and disturbance regimes that influence vegetation structure and prey species distributions.

4) Habitat to support the **transience and colonization phases of dispersal**, which in all cases would optimally be composed of nesting, roosting, or foraging habitat (PBFs (2) or (3)), but which may also be composed of other forest types that occur between larger blocks of nesting, roosting, and foraging habitat. In cases where nesting, roosting, or foraging habitats are insufficient to provide for dispersing or nonbreeding owls, the specific dispersal habitat PBFs for the NSO may be provided by the following:

   a) Habitat supporting the transience phase of dispersal, which includes:

   Stands with adequate tree size and canopy cover to provide protection from avian predators and minimal foraging opportunities; in general this may include, but is not limited to, trees with at least 11 inches (28 cm) DBH and a minimum 40 percent canopy cover; and
      (ii) Younger and less diverse forest stands than foraging habitat, such as even-aged, pole-sized stands, if such stands contain some roosting structures and foraging habitat to allow for temporary resting and feeding during the transience phase.
   b) Habitat supporting the colonization phase of dispersal, which is generally equivalent to nesting, roosting, and foraging habitat as described in PBFs (2) and (3), but may be smaller in area than that needed to support nesting pairs.

Affected Environment

Land Use Allocations within in the NSO Analysis Area

Table 51. Land Use Allocations within the NSO Analysis Area (USDI BLM 2016b).

Project Area	Land Use Allocation[1,2] Acres (Percent)					
	HLB	DDR[3]	LSR[4]	RR	Congressionally Reserved[5]	Total Acres
Medford District	189,196 (24%)	169,108 (21%)	238,664 (30%)	142,936 (18%)	53,582 (7%)	793,485

HLB= Harvest Land Base; LSR = Late Successional Reserve; RR – Riparian Reserve (see definitions); [2] – LUA acres also include the portion of the Coos Bay District under the NCO ROD/RMP, but managed by the Medford District – The DDR acres include TPCC lands, ACECs, LWCs, roads, and water [4]- the LSR includes Large Block LSR and stand level LSR (mapped structurally-complex stands) [5] – Congressionally Reserved acres include only Wild & Scenic River corridors and National Trail Corridors; it does not include Designated Wilderness or Wilderness Study Areas.

Spotted Owl Critical Habitat within the NSO Analysis Area

In December 2012, the FWS released the *Designation of Revised Critical Habitat for the Northern Spotted Owl, Final Rule* (USDI FWS 2012, pp. 71876-72068), which designated NSO critical habitat on federal lands. This designation identified geographic areas that contain primary biological features essential for the conservation of the spotted owl and may require special management considerations. The PBFs are the specific elements considered essential to the conservation of the spotted owl and are those elements that make areas suitable as nesting, roosting, foraging, and dispersal habitat.

Spotted Owl Critical Habitat Affected Environment

Table 52. Spotted Owl Critical Habitat (2012) Baseline Habitat Acres within the NSO Analysis Area.

CHU/ Subunit	NRF	Dispersal-Only	Dispersal (NRF + Dispersal-Only)	Capable or Non-Habitat	Total (Dispersal + Capable + Non-Habitat)
9-KLW-1	53,171	17,480	70,651	24,377	95,028
9-KLW-2	39,864	10,001	49,865	19,810	69,675
9-KLW-4	30,758	13,886	44,645	21,555	66,200
10-KLE-1	46	6	52	14	66
10-KLE-2	25,205	8,453	33,658	10,231	43,889
10-KLE-3	48,478	28,641	77,119	35,041	112,160
10-KLE-4	5	3	8	14	22
10-KLE-5	14,138	9,117	23,254	13,484	36,739
10-KLE-6	10,556	5,730	16,286	9,034	25,320
TOTAL	**222,221**	**93,317**	**315,538**	**133,560**	**449,099**

There have been many iterations and publications of the spotted owl critical habitat designation since the August 2020 publication of the EA. The FWS published proposed revisions to the critical habitat designation in the *Federal Register* on August 11, 2020, proposing to exclude certain areas for the current designation, including all of the areas designated as HLB managed by the BLM in southwestern Oregon (USDI FWS 2020b, pp. 48487 and 48494). The Final Rule was published on January 15, 2021, with an effective date of March 16, 2021 (USDI FWS 2021a, p. 4820-4860). The effective date was delayed to April 30, 2021 (USDI FWS 2021b) and later delayed until December 15, 2021 (USDI FWS 2021c). Specific to the BLM, the Final Rule excluded all O&C lands and lands managed under the RMPs as HLB, though not under the O&C Act (USDI FWS 2021a, pp. 4831-4833). On July 20, 2021, the FWS proposed withdrawing the January 2021 rule and replacing it with exclusions similar to those proposed on August 11, 2020 (USDI FWS 2021d). The FWS published the final Rule for the spotted owl Critical Habitat on November 10, 2021, with an effective date of December 10, 2021 (USDI FWS 2021g). The analysis in the EA is based on the 2012 Critical Habitat because the December 2021 version includes a reduction of acres from the 2012 version. However, a preliminary analysis of the December 2021 Revised Critical Habitat within the Resilient Lands Action Area is provided below. Table 53 below summarizes the December 2021 Critical Habitat acres by NRF and Dispersal Habitat categories within the NSO Analysis Area.

Table 53. Spotted Owl Critical Habitat Baseline Habitat Acres within the NSO Analysis Area (December 2021).

CHU/ Subunit	NRF	Dispersal-Only	Dispersal (NRF + Dispersal-Only)	Capable or Non-Habitat	Total (Dispersal + Capable + Non-Habitat)
9-KLW-1	46,468	14,962	61,430	19,570	81,000
9-KLW-2	39,819	9,986	49,804	19,794	69,598
9-KLW-4	2,400	1,129	3,529	2,589	6,118
10-KLE-1	0	0	0	0	0
10-KLE-2	13,726	4,018	17,744	3,616	21,360
10-KLE-3	31,015	13,657	44,671	19,042	63,713
10-KLE-4	0	0	0	0	0
10-KLE-5	9,969	5,252	15,221	9,579	24,800
10-KLE-6	6,156	2,402	8,558	5,365	13,923
TOTAL	**177,176**	**64,326**	**241,502**	**98,282**	**339,784**

EFFECTS

Detailed Spotted Owl Habitat Effects Determination Descriptions

Remove Nesting-Roosting and Foraging Habitat

Remove NR or F alters known spotted owl NR or F habitat, so the stand no longer functions as nesting, roosting, or foraging habitat. Removal generally reduces canopy cover to less than 40 percent (treatment unit average), alters the structural diversity and dead wood in the stand or otherwise changes the unit so it no longer provides nesting, roosting, or foraging, or even dispersal habitat for owls. The removal of these key habitat features would reduce the roosting, foraging, and dispersal opportunities for owls in the action area, and lead to increased predation risk. These treatment acres would not be expected to provide functioning NR or F habitat for decades post-treatment.

- In general, the Ecosystem Resilience Open prescriptions (Alternative C) would remove spotted owl NR, F, and dispersal-only habitat because the post-harvest canopy cover is expected to be below 40 percent. In addition, existing multi-canopy, uneven age tree structure, and key habitat features would not remain post-treatment. These treatment acres would not be expected to provide suitable NR or F habitat for many years post-treatment. However, these treatments are intended to target stands that occur in areas of low relative spotted owl habitat suitability, where the ecological needs of the stand outweighed the owl habitat needs (i.e., pine restoration on a ridge or upper third of the slope). The objective of the majority of these treatments are to increase resilience of forest stands to wildfire, drought, insects, by reducing stand density and ladder fuels; and increase growing space and decrease competition for large and/or legacy pine, oak, and cedar.
- The proposed action for riparian commercial thinning in the outer zone and middle zones of the RR would remove nesting-roosting and foraging habitat because the canopy cover would be reduced below 40 percent (as low as 30 percent). In general, riparian commercial thinning would follow the same treatment metrics proposed for the adjacent upland. Therefore, some riparian area treatments would retain higher canopy cover when they are near occupied spotted owl sites or adjacent to functioning nesting-roosting habitat.
- The proposed new road and landing construction associated with the proposed action would remove trees, shrubs, and down woody material and would cause the removal of nesting and roosting and foraging habitats. Permanent habitat loss would only occur as a result of permanent road construction.

Downgrade Nesting-Roosting and Foraging Habitat

Downgrade NR or F alters the condition of spotted owl NR or F habitat, so the habitat no longer contains the variables associated with nesting, roosting, and foraging. Downgraded units would contain trees > 11 inches in diameter and enough tree canopy cover to support spotted owl dispersal. Downgrade is defined when the canopy cover in a NR or F stand is reduced to 40-60 percent (treatment unit average) and other key habitat elements are removed, such as hunting perches. Conditions are altered such that an owl would be unlikely to continue to use that unit for nesting, roosting, or foraging. The removal of these key habitat features would reduce the roosting and foraging opportunities for owls and may lead to increased predation risk by exposing owls to other raptors. Downgraded NR and F continues to provide habitat for dispersal, and potentially limited foraging opportunities.

- Ecosystem Resilience Closed, Ecosystem Resilience Intermediate, Long-Term Spotted Owl, and Fuels Emphasis prescriptions (Alternative C) and Thinning for Strategic Fuels and Near Communities at Risk Boundaries (Alternative A) would downgrade spotted owl NR and F habitat because the post-harvest canopy cover is expected to drop below 60 percent, but maintain at least 40 percent canopy cover. In addition, existing multi-canopy and key habitat features would not remain post-treatment. The removal of these key habitat features would reduce the roosting and foraging opportunities for spotted owls within the action area, and may lead to increased predation risk by exposing owls to other raptors. However, in the LSR LUA, foraging and dispersal-only habitat would be targeted for these prescriptions in areas to provide long-term habitat improvement. Downgrade proposed in *high* RHS would create more stand structure and diversity and promote the development of nesting habitat conditions in the future. The Ecosystem Resilience Closed prescriptions include a range of RD retention levels. NR and F habitat function would be maintained when RD is retained at the higher levels (45 percent). However, for this Assessment, Ecosystem Resilience Closed will be analyzed as NR and F downgrade because it is unknown at this time how many units (acres) would be designed to maintain habitat function.

Modify, but Maintain Nesting-Roosting and Foraging Habitat

Modifying, but maintaining NR or F habitat function occurs when an action or activity in NR or F habitat removes some trees or reduces the availability of other habitat components, but does not change the current function of the habitat because the conditions that would classify the stand as NR or F habitat would remain post-treatment. The treated stand is expected to still function as NR or F habitat because it will continue to provide key habitat elements at the metrics described above in the definitions for nesting-roosting and foraging habitat. This includes least 60 percent canopy cover (treatment unit average), large trees, multistoried canopy, standing and down dead wood, diverse understory adequate to support prey, and may have some mistletoe or other decay, and other stand metrics as described above. In order to maintain function, habitat variables should be distributed within that defined area. For example, the stand or unit would not function as NR or F, or dispersal-only habitat if all of the canopy retention was concentrated on the side or middle of the unit, leaving large gaps not that do not provide spotted owl habitat/function.

- In the LSR LUA, nesting-roosting and older, structurally-complex conifer forests, will be analyzed at the stand scale. The SWO ROD/RMP defines a stand as "An aggregation of trees occupying a specific area managed as discrete operational or management unit." (USDI BLM 2016b, p. 314). On the Medford District, the FOI units are used as the initial stand boundary. However, when planning projects, these are often updated to represent areas of more ecological or similar vegetation types. Due to the variety of conditions on the landscape, the acre sizes vary for each FOI. The ability of a stand to maintain spotted owl nesting-roosting habitat function would be based on the proportion of the treated and open areas (downgrade or removal) in relation to the entire stand of nesting-roosting habitat, the distribution of the retained key habitat elements, and the amount of edge created. This would be accomplished by avoiding large areas of lower canopy within the stand in relation to the overall stand size and increasing and distributing the RD target as needed to ensure enough of the desired habitat elements are retained. Additionally, if necessary to maintain the proportion of nesting-roosting habitat in the stand, the stand may need to be subdivided into smaller components. Strategic placement of skips would also help maintain nesting-roosting habitat (especially in smaller stands), by adding more skips within the interior of the treated area in locations beneficial to owls. The following strategies would be used for skip placement 1) skips and gaps would be distributed throughout the stand in the same LUA and all skips would not be placed on the exterior edges of the stand, 2) thinning intensity would factor into the final gap and skip size distribution, 3) skips would be placed in nesting-roosting habitat, in order to maintain key habitat elements, 4) skid roads, landings, and yarding corridors would be factored into the total openings created within a stand, and 5) Large gaps would not be placed near new road construction or skid roads that would increase the size of the opening created in one location. As stands decrease in size, no more than 20 percent of the existing basal area would be removed in NR habitat (based on Wagner and Anthony, 1998). In prescriptions that include the creation of small openings and the objective is to maintain habitat function, the openings would be limited in size (approximately 0.25 acre to 1 acre) and distributed throughout the unit in a manner to retain sufficient canopy cover, basal area, and key habitat features as described above. The total acres of openings would not exceed 20 percent of the Treatment Area to maintain NR quality and canopy cover. Fewer openings would considered in units with additional thinning in order retain sufficient basal area and canopy cover.

- The Near-Term Spotted Owl prescriptions (Alternative C) and Maintaining Spotted Owl Nesting-Roosting and Foraging prescriptions (Alternative B) would maintain spotted owl NR and F habitat function post-treatment because canopy cover would be retained at 60 percent or greater. Additional quantities of habitat elements, such as multiple canopy layers, snags, coarse woody debris, and hardwoods, would also be retained in order to maintain habitat function post-treatment. Projects under this EA would follow consultation PDCs for maintaining habitat function to ensure the appropriate site-specific habitat elements are retained at appropriate levels.
- Small diameter thinning and prescribed burning would reduce within stand ladder fuels by reducing understory vegetation and would likely simplify the understory. This lower-level vegetation provides horizontal and vertical structure, and understory hardwood components benefiting spotted owl small mammal prey species and in some case security cover and microclimate conditions for foraging and roosting by spotted owls. Treatments that reduce the understory could negatively impact spotted owls because they have been found to select forests with greater understory densities. Jenkins et. Al (2019, p. 4) found barred owls (*Strix varia*) select for forests with more open understories, so the selection of forests with more dense understories by spotted owls could be to avoid competitive interactions with barred owls. However, primary stand features such as overstory trees and large remnant trees and dominant and co-dominant hardwoods would be retained, and snags and coarse wood would be protected to the extent practicable. This includes a high retention of the stand's basal area which provides a diameter distribution range maintaining vertical structure for roosting and foraging. Further, treated stands are expected to maintain on average 60 percent overstory canopy cover in NR and F. Overall, retaining these features is expected to maintain habitat function for spotted owl occupancy and use.

Remove Dispersal-Only Habitat

Removing spotted owl dispersal-only habitat occurs when the existing habitat no longer functions as dispersal habitat. Removal generally drops canopy cover to less than 40 percent (treatment unit average) and otherwise changes the stand, so it no longer provides dispersal habitat for owls. The post-harvest stand would be too open to provide protection from predators. Dispersal function for the spotted owl consists of an assemblage of conifer-dominated forest stands that the owls can use for dispersal movements across the landscape. Spotted owl Nesting-Roosting, Foraging, and dispersal-only habitat contribute to dispersal function across the landscape. Effects to dispersal function from the EA alternatives are discussed in Appendix 10.

- In general, the Ecosystem Resilience Open prescriptions (Alternative C) would remove spotted owl dispersal-only habitat because the post-harvest canopy cover is expected to be below 40 percent. In addition, existing multi-canopy, uneven age tree structure, and key habitat features would not remain post-treatment. These treatment acres would not be expected to provide suitable dispersal-only habitat for many years post-treatment. However, these treatments are intended to target stands that occur in areas of low relative spotted owl habitat suitability, where the ecological needs of the stand outweighed the owl habitat needs (i.e., pine restoration on a ridge). The objective of the majority of these treatments are to increase resilience of forest stands to wildfire, drought, insects, by reducing stand density and ladder fuels; and increase growing space and decrease competition for large and/or legacy pine, oak, and cedar.

- The proposed action for riparian commercial thinning in the outer zone and middle zones of the RR would remove dispersal-only habitat because the canopy cover would be reduced below 40 percent (as low as 30 percent). In general, riparian commercial thinning would follow the same treatment metrics proposed for the adjacent upland. Therefore, some riparian area treatments would retain higher canopy cover when they are near occupied spotted owl sites or adjacent to functioning nesting-roosting habitat.
- The proposed new road and landing construction associated with the proposed action would remove trees, shrubs, and down woody material and would cause the removal of dispersal-only habitat. Permanent habitat loss would only occur as a result of permanent road construction.

Modify, but Maintain Dispersal-Only Habitat

Modifying, but maintaining dispersal-only habitat function occurs when an action or activity in dispersal-only habitat removes some trees or reduces the availability of other habitat components, but does not change the current function of the habitat because the conditions that would classify the stand as dispersal-only habitat would remain post-treatment. The treated stand will still function as dispersal habitat because it will continue to provide key habitat elements at the metrics described above in the definitions for dispersal-only habitat. This includes at least 40 percent canopy cover (treatment unit average), flying space, and an average of trees 11 inches DBH or greater. In order to maintain function, habitat variables should be distributed within that defined area. For example, the stand or unit would not function as dispersal-only habitat if all of the canopy retention was concentrated on the side or middle of the unit, leaving large gaps not that do not provide spotted owl habitat/function.

- Ecosystem Resilience Closed, Ecosystem Resilience Intermediate, Long-Term Spotted Owl, and Fuels Emphasis prescriptions (Alternative C) and Thinning for Strategic Fuels and Near Communities at Risk Boundaries (Alternative A) would modify, but maintain dispersal-only habitat function because the post-harvest canopy cover is expected to maintain at least 40 percent canopy cover.
- The Near-Term Spotted Owl prescriptions (Alternative C) and Maintaining Spotted Owl Nesting-Roosting and Foraging prescriptions (Alternative B) would modify, but maintain dispersal-only habitat function post-treatment because at least 60 percent canopy cover would be retained. Additional quantities of habitat elements, such as multiple canopy layers, snags, coarse woody debris, and hardwoods, must be retained in order to maintain habitat function post-treatment.
- Small diameter thinning and prescribed burning would reduce within stand ladder fuels by reducing understory vegetation, and would likely simplify the understory. This lower-level vegetation provides horizontal and vertical structure, and understory hardwood components benefiting spotted owl small mammal prey species and in some case security cover and microclimate conditions for foraging and roosting by spotted owls. Treatments that reduce the understory could negatively impact spotted owls because they have been found to select forests with greater understory densities. Jenkins et. al (2019, p. 4) found barred owls select for forests with more open understories, so the selection of forests with more dense understories by spotted owls could be to avoid competitive interactions with barred owls. However, primary stand features such as overstory trees and large remnant trees and dominant and co-dominant hardwoods would be retained, and snags and coarse wood would be protected to the extent practicable. This includes a high retention of the stand's basal area which provides a diameter distribution range maintaining vertical structure for roosting and foraging. Further, treated stands are expected to maintain overstory canopy cover

in NR and F and Dispersal-only habitats. Overall, retaining these features is expected to maintain habitat function for spotted owl occupancy and use.

Effects from Skips:

- The proposed skips (no treatment) and gaps element of the prescriptions would create retention aggregates interspersed with varying levels of thinning retention. Retained habitat components in skips will contribute to future development of nesting habitat at the treatment unit scale by providing the necessary habitat diversity such as multi-layered canopy, large trees and snags. In the short-term, habitat would be removed or downgraded in the gaps where canopy cover is reduced and sufficient habitat elements are not retained in adjacent areas. Where habitat is removed (especially NR and F removal) the location and proximity to spotted owls is an important consideration. Effects of habitat manipulation (especially NR and F removal or downgrade) also consider if treatments divide larger patches of nesting habitat into smaller, more fragmented patches of habitat with greater amounts of edge. Where NR or F habitat is fragmented, the effects to spotted owls may be disproportionately greater than the acreage of removal would indicate (e.g., a relatively small amount of removal may fragment a large patch of habitat). However, NR would be maintained at the stand level in LSR (Table 2). Areas that are left unharvested would provide pockets of habitat that may contribute to the dispersal of spotted owls across the landscape. However, the quality of dispersal habitat and potential foraging opportunities for spotted owls would be reduced (USDI FWS 2016, p. 604).

Spotted Owl Habitat Improvement

Table 54, below, summarizes the level of nesting-roosting development that could occur based on the prescriptions and the effects analyzed in Section 3.5.

Table 54. Estimated Ability of the Alternatives to Promote or Develop Spotted Owl Nesting-Roosting Habitat.

Alternative	Foraging	Dispersal-Only	Capable Habitat
No Action Alternative	Low	Low	Low
Alternative A	Low	Low	Medium
Alternative B	Low	Medium	Medium
Alternative C	High	Medium	High

Spotted Owl Critical Habitat Effects Summary

Table 55 summarizes the estimated effects to spotted owl critical habitat by project type.

Table 55. Estimated Direct Effects to Spotted Owl Critical Habitat (2012) over a 10-year Period.

Alternative/ Activity Type	NRF[2] Removed		NRF Downgrade		NRF Modify		Dispersal -only Removal	Dispersal -only Modify	Dispersal Quality Removed *(NRF+ Dispersal-only)[4]*	TOTAL Acres
	NR	F[3]	NR	F	NR	F				
Alternative A	5	15	100	2,500	7,500	8,000	25	10,500	45	28,645
Small Diameter Thinning	0	0	0	0	2,500	3,000	0	4,000	0	9,500
Understory/Hand pile Burning	0	0	0	0	2,500	3,000	0	4,000	0	9,500
Commercial Thinning[5]	0	0	100	2,500	2,500	2,000	0	2,500	0	9,600
LSR	*0*	*0*	*0*	*2,000*	*2,000*	*1,500*	*0*	*2,000*	*0*	*7,500*
OTHER	*0*	*0*	*100*	*500*	*500*	*500*	*0*	*500*	*0*	*2,100*
Landing Construction[6]	5	15	0	0	0	0	25	0	45	45

Alternative/ Activity Type	NRF[2] Removed		NRF Downgrade		NRF Modify		Dispersal -only Removal	Dispersal -only Modify	Dispersal Quality Removed *(NRF+ Dispersal-only)*[4]	TOTAL Acres
	NR	F[3]	NR	F	NR	F				
LSR	*0*	*10*	*0*	*0*	*0*	*0*	*20*	*0*	*30*	*30*
OTHER	*5*	*5*	*0*	*0*	*0*	*0*	*5*	*0*	*10*	*10*
Alternative B	25	25	0	0	5,500	11,500	150	16,000	200	33,200
Small Diameter Thinning	0	0	0	0	2,000	4,500	0	5,500	0	12,000
Understory/Hand pile Burning	0	0	0	0	2,000	4,500	0	5,500	0	12,000
Commercial Thinning[5]	0	0	0	0	1,500	2,500	0	5,000	0	9,000
LSR	*0*	*0*	*0*	*0*	*1,000*	*2,000*	*0*	*4,000*	*0*	*7,000*
OTHER	*0*	*0*	*0*	*0*	*500*	*500*	*0*	*1,000*	*0*	*2,000*
Road/Landing Construction[6]	25	25	0	0	0	0	150	0	200	200
LSR	5	15	0	0	0	0	100	0	120	120
OTHER	20	10					50	0	80	80
Alternative C	200	1,650	100	2,500	6,000	15,500	2,250	34,000	4,100	62,200
Small Diameter Thinning	0	0	0	0	2,500	6,500	0	15,000	0	24,000
Understory/Hand pile Burning	0	0	0	0	2,500	7,500	0	16,000	0	26,000
Commercial Thinning[5]	100	1,500	100	2,500	1,000	1,500	2,000	3,000	3,600	11,700
LSR	*0*	*1,300*	*0*	*2,200*	*800*	*1,150*	*1,800*	*2,500*	*3,100*	*9,750*
OTHER	*100*	*200*	*100*	*300*	*200*	*350*	*200*	*500*	*500*	*1,950*
Road/Landing Construction[6]	100	150	0	0	0	0	250	0	500	500
LSR	*15*	*100*	*0*	*0*	*0*	*0*	*175*	*0*	*290*	*290*
OTHER	*85*	*50*	*0*	*0*	*0*	*0*	*75*	*0*	*210*	*210*

1=These acres represent an estimated of individual project effects, which are based on the impacted footprint of the action. 2=NRF = Nesting/Roosting/Foraging – PBF #2; 3= Roosting /Foraging – PBF #3; 4=All Dispersal Baseline (Dispersal-only + NRF). 5= Commercial Harvest would only occur on Reserve Land LUA, and primarily within LSR; 6=The road and landing construction acres account for actions that would remove vegetation and trees and could affect spotted owl habitat. These can be permanent or temporary road construction, as well as road renovation and reconstruction.

The PRMP/FEIS Biological Opinion made these conclusions that are relevant to the EA:

"Timber activities in LSRs are designed to speed the development of older forest structure, such as spotted owl nesting/roosting habitat (PBF 2), retain species and compositional heterogeneity, retain and promote species diversity, treat insect infestations and reduce the threat from wildfires. These activities may target non-Douglas fir species but are designed to retain these species that are being crowded out in areas where they currently occur and are adapted for persistence (p. 639).

The reduction of fuels is designed to help protect LSRs from high-intensity wildfires and, therefore, retain greater quantities of older forest on the landscape. In the dry LSRs, stand-replacing wildfire can remove spotted owl habitat (PBFs 2, 3, and 4) across vast areas. The intent of treating these acres is to preclude these effects which would result in the development of forest stands starting in the stand initiation phase, which can take 80 years or more. Treatments for insect infestations are similarly designed to stop or slow the spread of insects that can stress or kill conifer and alter the function of stands. These activities are expected to address specific situations within the LSRs when they occur, but are not expected to alter the function of the LSR network or individual LSRs. Spotted owl habitat (PBFs 2, 3, and 4) can be fairly heterogeneous and can withstand such operations at the landscape scale. Overall, we expect these treatments to provide a more diverse landscape and protect against losses of critical habitat and, so, are expected to result in a net habitat improvement for the spotted owl critical habitat (p. 639).

Overall, the aggregate effects of these activities to critical habitat is expected to be small compared to the overall size and distribution of critical habitat in the action area, and these effects are not expected to preclude the conservation function of the critical habitat network in the LSRs. Although short-term impacts to spotted owl critical habitat are expected, these projects will be spread out spatially across the LSR critical habitat landscape and temporally over the 50 years of the PRMP/FEIS. Those actions that may preclude the development of habitat in the LSR critical habitat network are not expected to be of a scale that will impact the function of any particular critical habitat unit. All actions will be subject to a more specific section 7 consultation at the time the project is proposed (p. 642)

This expected overall increase in spotted owl habitat within spotted owl critical habitat in reserved LUAs is likely to support population growth and increases in successful breeding that will improve the spotted owl population trajectory over time. On balance they exceed the adverse impacts associated with the timber harvest in critical habitat that will be occurring during the life of the plan. The protection, in-growth and development of PBFs within spotted owl critical habitat within reserved LUAs is expected to improve the function of all CHUs within the action area, and has the additional advantage of improving critical habitat conditions in areas where we expect to conduct barred owl management (p. 695)."

Table 56 below summarizes the estimated effects to the December 2021 designated critical habitat (USDI FWS 2021g) from the proposed actions. This is similar to Table 55 above but is based on the December 2021 designated critical habitat (USDI FWS 2021g) layer. These estimated acres are based on the percentage of the December 2021 designated critical habitat (USDI FWS 2021g) in the LSR and RR LUAs in the NSO Analysis Area. These percentages were then applied to the total treatment estimates in Table 19 and then rounded up. To determine the final effects described in Table 56, these estimates were applied to each project type by LUA and the acres were spread out to the various effects categories in a similar proportion to those in Table 55. Based on the estimates in Table 56, approximately 6 percent of the December 2021 designated critical habitat acres within the NSO Analysis Area (20,195 acres, not counting duplicative fuels thinning and underburning acres) could be treated over a 10-year period in Alternative A. Approximately 7 percent (22,660 acres) and 12 percent (39,950 acres) could be treated over a 10-year period in Alternative B and C, respectively. The proposed treatments in NSO December 2021 designated critical habitat would result in a maximum (Alternative C) of 2.7 percent reduction of nesting-roosting and foraging (NRF) and 1.8 percent reduction of dispersal quality habitat within critical habitat in the NSO Analysis Area.

Table 56. Estimated Direct Effects to Spotted Owl December 2021 Critical Habitat (USDI FWS 2021g) over a 10-Year Period.

Alternative/ Activity Type	**NRF[2] Removed**		**NRF Downgrade**		**NRF Modify**		**Dispersal-only Removal**	**Dispersal-only Modify**	**Dispersal Quality Removed *(NRF+ Dispersal-only)*[4]**	**TOTAL Acres**
	NR	**F[3]**	**NR**	**F**	**NR**	**F**				
Alternative A	5	15	150	2,700	7,800	8,600	25	10,800	45	30,095
Small Diameter Thinning	0	0	0	0	2,600	3,200	0	4,100	0	9,900
Understory/Hand pile Burning	0	0	0	0	2,600	3,200	0	4,100	0	9,900
Commercial Thinning[5]	0	0	150	2,700	2,600	2,200	0	2,600	0	10,250
LSR	*0*	*0*	*150*	*2,100*	*2,100*	*1,600*	*0*	*2,100*	*0*	8,050
OTHER	*0*	*0*	*0*	*600*	*500*	*600*	*0*	*500*	*0*	*2,200*
Landing Construction[6]	5	15	0	0	0	0	25	0	45	45
LSR	*0*	*10*	*0*	*0*	*0*	*0*	*20*	*0*	*30*	*30*

Alternative/ Activity Type	NRF[2] Removed		NRF Downgrade		NRF Modify		Dispersal-only Removal	Dispersal-only Modify	Dispersal Quality Removed *(NRF+ Dispersal-only)[4]*	TOTAL Acres
	NR	F[3]	NR	F	NR	F				
OTHER	*5*	5	*0*	*0*	*0*	*0*	5	*0*	*15*	*15*
Alternative B	30	30	0	0	5,800	12,100	200	17,100	260	35,260
Small Diameter Thinning	0	0	0	0	2,100	4,700	0	5,800	0	12,600
Understory/Hand pile Burning	0	0	0	0	2,100	4,700	0	5,800	0	12,600
Commercial Thinning[5]	0	0	0	0	1,600	2,700	0	5,500	0	9,800
LSR	*0*	*0*	*0*	*0*	*1,100*	*2,100*	*0*	*4,300*	*0*	*7,500*
OTHER	*0*	*0*	*0*	*0*	*500*	*600*	*0*	*1,200*	*0*	*2,300*
Road/Landing Construction[6]	35	30	0	0	0	0	200	0	265	265
LSR	10	20	0	0	0	0	125	0	155	155
OTHER	25	10	0	0	0	0	75	0	110	110
Alternative C	200	1,800	150	2,700	6,600	15,900	2,300	35,100	4,300	64,750
Small Diameter Thinning	0	0	0	0	2,700	6,600	0	15,500	0	24,800
Understory/Hand pile Burning	0	0	0	0	2,700	7,600	0	16,500	0	26,800
Commercial Thinning[5]	130	1,600	150	2,700	1,200	1,700	2,000	3,100	3,730	12,580
LSR	*0*	*1,350*	*0*	*2,300*	*1,000*	*1,300*	*1,900*	*2,700*	*3,250*	*10,550*
OTHER	*130*	*250*	*150*	*400*	200	*300*	*200*	*500*	*580*	*2,130*
Road/Landing Construction[6]	70	200	0	0	0	0	300	0	570	570
LSR	*20*	*125*	*0*	*0*	*0*	*0*	*200*	*0*	*345*	*345*
OTHER	*50*	*75*	*0*	*0*	*0*	*0*	*100*	*0*	*225*	*225*

1=These acres represent an estimated of individual project effects, which are based on the impacted footprint of the action. 2=NRF = Nesting/Roosting/Foraging – PBF #2; 3= Roosting /Foraging – PBF #3; 4=All Dispersal Baseline (Dispersal-only + NRF). 5= Commercial Harvest would only occur on Reserve Land LUA, and primarily within LSR; 6=The road and landing construction acres account for actions that would remove vegetation and trees and could affect spotted owl habitat. These can be permanent or temporary road construction, as well as road renovation and reconstruction.

2. COASTAL MARTEN SUPPORTING INFORMATION

On October 9, 2018, the FWS proposed to list the coastal distinct population segment (DPS) of the Pacific marten, as federally threatened (USDI FWS 2018a). The coastal marten (also referred to as coastal marten, the coastal sub-species of the Distinct Population Segment [DPS] of Pacific marten) was federally-listed as threatened under the ESA by the FWS on October 8, 2020 (effective November 9, 2020) (USDI FWS 2020c). Habitat loss and associated changes in habitat quality and distribution are current threats to the species. Habitat loss has resulted in decreased connectivity between populations and increased predation as habitat is converted to habitat more suitable to predators than to that of martens (USDI FWS 2018a, p. 50577).

The coastal marten is a medium-sized mustelid (a family including weasel, mink, otter, and fisher) with a brown coat and distinctive coloration on the throat and upper chest varying from orange to yellow to cream. They have triangular ears, and a bushy tail approximately 75 percent as long as the head and body length combined (USDI FWS 2018b). Martens are generalists, eating primarily mammals, although they also eat birds, insects, and fruits (USDI FWS 2018b). Their diet changes seasonally, presumably to maximize energetic returns (Slauson and Zielinski 2017; USDI FWS 2018b). Marten habitat use varies depending on area and soil type. Rest and den sites could include large snags and logs. While they use older forest, they may use younger forest areas with a dense understory (USDI FWS 2018b).

The historic coastal marten range extends along an approximately 50 mile stretch from the coast inland extending from Clatsop County Oregon south to the northern part of Sonoma County, California (USDI FWS 2018). However, there are currently thought to be only four extant populations: Central Coastal Oregon (CCO), Southern Coastal Oregon (SCO), California-Oregon Border (CAOR), and Northern Coastal California (NCC) (Map 12). Individuals have been detected outside of these areas, but these detections have been scattered with few individuals and are not thought to represent viable populations (USDI FWS 2018b).

Additional Marten Habitat Information

Martens select forest stands that provide habitat structure supporting life history needs that include foraging, resting, or denning. In addition, stands that provide sufficient structure to reduce the risk of predation, such as dense overhead vegetation and vertical tree boles, are also important (Slauson et al. 2018).

Denning Habitat

The most common denning structures are large diameter live and dead trees with cavities (USDI FWS 2018b). Of the 56 reproductive structures identified, 95 percent (n = 53) were in woody structures with natal and maternal dens found exclusively in snags, live trees, and downed logs. While there was no significant difference in size between marten reproductive structures and rest structures, reproductive structures were significantly larger than available structures within randomly located plots (USDI FWS 2018b).

All natal dens were located in snags and live trees within cavity microsites; cavities appear to be particularly important for marten reproductive activities (Ruggiero et al. 1998). Microsites such as cavities may provide optimal thermal buffering for altricial young, and cavities within large diameter woody structures should offer relatively dry and well-insulated locations. Elevated cavities in snags and trees may also improve protection from predators for non-mobile kits, compared to ground-based structures such as logs and stumps. In northern California, Slauson found that 66 percent of all natal dens, were in hardwoods with an average DBH of 40 inches (Slauson et al., 2019).

Resting Habitat

Rest structures are used daily by martens between foraging bouts to provide thermoregulatory benefits and protection from predators. Resting habitat includes large–diameter live trees with large horizontal limbs, standing snags with cavities, and downed hollow logs provide the main types of resting structures for martens in California and southern Oregon (USDI FWS 2018b). Rest structures used by coastal martens in California averaged 37 inches (95 cm) DBH for snags, 35 inches (88 cm) maximum diameter for downed logs, and 37 inches (94 cm) DBH for live trees. These woody structures were found in the oldest forest development stages. The actual place in the structure the marten used for resting occurred in tree cavities (33 percent), on platforms (33 percent) created by broken top snags or large live branches, or in chambers (28 percent) created by log piles or rock outcrops. In coastal Oregon and northern coastal California, rest structures providing cavities or chambers likely become seasonally important during the rainy period of the year: late fall through late spring (USDI FWS 2018b).

Older Forest Habitat

Coastal martens in California were found to most strongly select stands of older, conifer–dominated forests with dense, ericaceous shrub layers and an abundance of large, downed logs, and large, decadent live trees and snags. Other than the older forests, which are used in proportion to their availability, stands in earlier developmental stages are selected against. These older forests occur on areas of highly productive soils that are most often dominated by Douglas–fir overstories, but also have mature hardwood understories composed of either tanoak or golden chinquapin (Slauson et al. 2018). Shrub layers were dense (greater than 70 percent cover), spatially extensive, and dominated by evergreen huckleberry, salal, and

Rhododendron sp. (Moriarty et al. 2019). The majority of stands with detections of coastal martens in southern coastal Oregon share these same characteristics (USDI FWS 2018b).

Similarly, in Oregon, coastal martens are strongly associated with areas of expansive and dense shrub cover that comprised of primarily salal and evergreen huckleberry. Dominant overstory on non-serpentine soils includes Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*), and Douglas fir. Marten sites were also in close proximity to large snags and logs. While martens used older forests, they may be found in forests with smaller diameter trees as long as combined overstory and understory cover remained high (USDI FWS 2018b). However, Moriarty et al., (2019) also found that in the Southern Oregon coast population, percent understory brush ranged from thirty to sixty percent within occupied stands.

Serpentine Habitat

These serpentine habitats include areas with conifer–dominated tree overstories, with dominants including lodgepole pine (*Pinus contorta* ssp. *Murrayana*), western white pine (*Pinus monticola*), and Douglas–fir, but also including dense (greater than 70 percent cover) shrub layers dominated by tan oak (*Notholithocarpus densiflorus*), huckleberry oak (*Quercus vacciniifolia*), dwarf tanbark (*Notholithocarpus densiflorus* var. *echinoides*), and California red huckleberry (*Vaccinium parvifolium*). In contrast to the dense older forests used by martens on productive soils, stands used in serpentine soils can include any seral stage and exhibit a variable tree overstory canopy closure ranging from sparse to dense. Serpentine habitats used by martens contain dense shrub layers and abundant rocky outcrops, providing habitat that martens use as resting structures because large woody structures are rare in serpentine habitat. While the distribution of serpentine soils is extensive in southwestern Oregon and northwestern California, martens have only been found in serpentine habitats in the fog influenced parts of their distribution near (less than 18.6 miles (30 km) of the coast, where the increased moisture may promote shrub composition and densities sufficient to meet marten needs (USDI FWS 2018b).

Dispersal

Juvenile dispersal of American martens is generally thought to occur as early as August, although fall, winter, and spring (the year after birth) dispersal periods have been reported. Juvenile dispersal in coastal martens has been observed to occur as early as August and continue at least until the following summer season. No information is available regarding the timing of juvenile dispersal for coastal martens in Oregon, although there is no reason to believe it would be different than that of coastal martens in northern coastal California. While some adult male and female martens leave their home ranges during periods of low prey densities, overall the prevalence of adults leaving their established home ranges is low.

While dispersal distances of more than 43 miles (70 km) have been reported for martens, this is rare and most studies find that the majority of juvenile martens dispersed about 9.3 miles (<15 km) (USDI FWS 2018b). The limited data we have for dispersal events of coastal marten may suggest that dispersal distances are similar in Oregon (K. Slauson 2018, Pers. Comm. as cited in USDI FWS 2018b). Habitat conditions greatly influence dispersal. Juvenile martens in logged versus unlogged landscapes in Canada traveled slower, shorter distances and suffered twice the mortality risk (Andruskiw et al. 2008, Johnson 2008, USDI FWS 2018b). Another study from Canada demonstrated that the unlogged landscape offered increased foraging efficiency, presumably resulting in improved physical condition and thus facilitating longer dispersal distances and twice the success rate (25 percent in logged versus 49 percent in unlogged landscapes) of surviving to adulthood (USDI FWS 2018b). Therefore, the best available information suggests that landscape condition (e.g., the spatial distribution of unlogged and logged stands) may have important effects on dispersal dynamics, affecting both the distance dispersers can travel and the success rate they have in establishing home ranges and surviving to adulthood (USDI FWS 2018b).

Table 57. Coastal Marten Habitat Baseline (Slauson 2018 model) within the SCO and CAOR EPA.

	Total Acres	Serpentine Habitat		Mesic Habitat		Low Suitability Habitat	
		Acres	%	Acres	%	Acres	%
Southern Coastal Oregon EPA							
All Ownership	720,313	34,556	5 %	412,078	57 %	273,678	38 %
Non-Federal	105,883	340	< 0.5 %	21,537	20 %	84,007	80%
Federal – BLM	91,089	296	< 0.5 %	14,648	16 %	76,145	84 %
Federal – RRSNF[1]	523,341	33,291	6 %	375,894	72 %	113,526	22 %
California Oregon EPA							
All Ownership	109,421	4,877	4 %	49,872	46 %	54,672	50 %
Non-Federal	16,261	312	2 %	5,192	32 %	10,757	66 %
Federal – BLM	1,433	0	0 %	1,268	88 %	165	12 %
Federal – Forest Service[2]	91,727	4,565	5 %	43,412	47 %	43,750	48 %

Additional Marten Population Information

As described in the proposed rule, the range-wide population was estimated to be less than 400 (USDI FWS 2018a, Table1). The number and distribution of martens within the SCO EPA are currently unknown. However, recent work by Moriarty et al. (2016), where they conducted a more stratified random sample still found marten to be rather patchily distributed in southwestern Oregon. Marten were detected in 70 sample units (43 percent) within the south coast portion of the extant range; however, one sample unit accounted for 16 percent of those photos during its 21-day sample period. These animals are not distributed evenly across habitat within the range; therefore it is extremely difficult to estimate a population size. Slauson and Moriarty also estimated up to 100 individuals within the South Coast population (Slauson and Moriarty, 2018 Pers. Comm., as cited in USDI FWS 2018b, p. 85). Estimates of potential population numbers have not been determined for the revised EPA but could be higher as the boundary was expanded. Most of the known detections occur within Forest Service-managed land boundaries (Moriarty et al. 2016, p. 76, as cited in USDI FWS 2018b, p. 85).

Coastal Marten Proposed Critical Habitat Information

Critical habitat was proposed for the coastal marten by the FWS on October 25, 2021 (USDI FWS 2021f). There are five coastal marten proposed critical habitat units, but only Unit 5 (Oregon/California Klamath Mountains) is within the IVM coastal marten analysis area. There are 70,689 acres of proposed critical habitat within the marten analysis area (67,377 acres in the SCO portion and 3,352 in the California/Oregon portion). 57,702 of these 70,689 acres are on BLM-administered lands (56,428 acres in the SCO portion and 1,274 acres in the California/Oregon portion). These acres of proposed marten are located in the northwest and far southwest portions of the Treatment Area, and are summarized in Table 58.

Table 58. Coastal Marten Habitat Baseline (Slauson 2018 model) within the Proposed Critical Habitat in the Marten Analysis Area.

	Total Acres	Serpentine Habitat		Mesic Habitat		Low Suitability Habitat	
		Acres	%	Acres	%	Acres	%
Southern Coastal Oregon EPA							
BLM	56,428	0	0	7,613	13%	48,815	87%
California/ Oregon EPA							
BLM	1,274	0	0	1,210	95%	64	5%
TOTAL BLM Acres	**57,702**	**0**	**0**	**8,823**	**15%**	**48,879**	**86%**

The PBFs are the specific elements considered essential to the conservation of the marten. Within areas essential for the conservation of the coastal marten, the FWS has determined that the PBFs are (USDI FWS 2021f):

1) **Habitat that supports a coastal marten home range by providing for breeding, denning, resting, or foraging.** This habitat provides cover and shelter to facilitate thermoregulation and reduce predation risk, foraging sources for marten prey, and structures that provide resting and denning sites. Stands meeting the condition for PBF 1 contain each of the following three components: *Mature, conifer-dominated forest overstory; dense, spatially extensive shrub layer; and stands with structural features.*

2) **Habitat that allows for movement within home ranges among stands that meet PBF 1, or supports individuals dispersing between home ranges.** Habitat within PBF 2 includes: Stands that meet all three conditions of PBF1; forest stands that only meet the first two components of PBF 1 (mature, conifer-dominated forest overstory and a dense, spatially extensive shrub layer); or habitats with some lesser amounts of shrub, canopy, forest cover, or lesser amounts of smaller structural features as described in PBF 1, and while not meeting the definition of PBF 1, would still provide forage and cover from predators that would allow coastal martens to traverse the landscape.

The effects to marten proposed critical habitat from the proposed action are the same as the effects to marten habitat as described in section 3.7. Table 59 summarizes the estimated effects to the proposed critical habitat. These acres are based on the percentage of proposed critical habitat within the marten analysis area in Table 27.

Table 59. Estimated Impacts to Marten Habitat over a 10-year Period by Alternative (all LUA).

EPA	No Action	Alternative A			Alternative B			Alternative C		
		Serp.[1]	Mesic	Low	Serp.[1]	Mesic	Low	Serp.[1]	Mesic	Low
SCO										
Commercial[2]	0	0	550	1,740	0	1,400	4,530	0	1,000	3,270
Non-Commercial[3]	0	0	1,300	4,260	0	2,800	9,160	0	6,000	19,280
CAOR										
Commercial[2]	0	0	380	30	0	840	30	0	1,210	60
Non-Commercial[3]	0	0	1,210	60	0	1,680	60	0	1,210	60
TOTAL ALL EPAs	0	**0**	**3,440**	**6,090**	**0**	**6,720**	**13,780**	**0**	**9,420**	**22,670**

[1]=Serpentine Habitat; [2] =Commercial Harvest would only occur on Reserve Land LUA, and primarily within LSR; [3]=Non-Commercial includes double counting of potential mechanical and burning fuels treatments in the same footprint.

APPENDIX 7 LSR NESTING ROOSTING DEVELOPMENT– SUPPORTING MATERIALS

1 Modeling Methodology and Assumptions

Three different relative density index (RDI) values were modeled to display differences in habitat development based on the proposed action treatment types within the action alternatives (Table 15) in the Spotted Owl Issue Section). The modeled RDI targets included 30 percent (lower end of Long-Term Spotted Owl and Ecosystem Resilience-Intermediate Themes), 40 percent (upper end of Alternative A thinning, upper end of Ecosystem Resilience-Intermediate Theme, and lower end of Ecosystem Resilience-Closed Theme), and 45 percent (Alternative B thinning to maintain nesting-roosting and foraging habitat, lower end of the Spotted Owl Near-Term Theme, and the upper end of Ecosystem Resilience-Closed Theme).

The Ecosystem-Open and Fuels Emphasis themes were not modeled to determine if they would delay development of spotted owl nesting-roosting habitat by 20 years because these treatments are not designed to speed the development of spotted owl nesting-roosting habitat. The objective of these treatments is to increase resilience of forest stands to wildfire, drought, insects, by reducing stand density and ladder fuels; and increase growing space and decrease competition for large and/or legacy pine, oak, and cedar, which is allowed in the SWO ROD/RMP (USDI BLM 2016b, pp. 70, 72). The analysis of the effects to spotted owl habitat from these treatment themes are described in Section 3.5.

The effects to spotted owl habitat as a result of the proposed treatments are described in Section 3.5 (Table 15). The method correlates proposed RD in commercial treatment prescription targets with an estimated post-harvest canopy cover. However, as described above, the issue in Section 3.6 analyzes the long-term effects to spotted owl habitat and the ability of the proposed actions to develop nesting-roosting habitat.

Capable stands were not modeled because none were available with current stand exam data with adequate plot coverage. Additionally, it is assumed that young stands that typically represent capable habitat would be early enough in the stand development, that treatments would not result in a potential 20-year set back would not occur. Treatments in young stands would still retain an adequate amount of existing trees and structure. Bailey and Tappeiner (1997, p. 111) found that thinning in young stands provides a trajectory toward achieving overstory and understory attributes similar to those in old-growth stands. The proposed actions designed to purposely favor legacy structures (large remnant trees, snags, and downed wood) and/or overstory hardwoods, would further hasten development of old-growth forest characteristics (Bailey and Tappeiner 1997, p. 111).

Regeneration is not generated in the modeling within Organon. However, for this analysis, enough regeneration would be expected to occur that would contribute to the overall canopy cover Based on Bailey and Tappeiner (1997) and empirical evidence on the Medford District, the BLM assumes a range of at least 10-20 percent additive canopy cover with natural regeneration post-harvest (specifically for the treatment to 30 percent RD) grown 50 years and at least 10 square feet of additive basal area. This would help stands reach the 60 percent or greater even though the modeling results indicate lower canopy covers. In a study of thinned versus unthinned stands it was found that "understory tree density was greater in thinned stands than in unthinned stands or old-growth stands. This was because the larger understory trees 4.7-7.8 inches (12-20 cm DBH) responded well to overstory thinnings that reduced stand densities to RDI values of below 0.55, the point at which suppression-related mortality is likely to occur (Drew and Flewelling, 1979). In addition, where conditions were very good for rapid height growth (older, more intense thinnings and larger gaps), new saplings emerged from the seedling class. RDI values greater than 55 percent, the density of most unthinned stands, the percentage of live understory trees is much smaller" (Bailey and Tappeiner 1997 pp. 110-111). A stand treated to an RDI of 30 percent will have an increased level of understory regeneration in comparison to a treatment to 45 percent RDI (Bailey and Tappeiner 1997 p. 105). Additionally, through time, this new cohort of trees would grow into increased size classes and contribute to the bottom and middle canopy layers. In the study Bailey and Tappeiner performed, they found "the consistent responses seen in this study are strong evidence that thinning initiates and promotes tree regeneration, shrub growth, and the development of multi-storied stands even when the treatments focused mainly on the management of overstory/crop tree density and spacing" (1997 p. 111).

2 Modeling Results and Data

Modeling showed that over time, these stands exhibited growth in canopy cover, overstory tree DBH, basal area, and number of large trees per acre. However, as RDI targets increase without treatment or disturbance intervention, regeneration and potentially layering would not develop in these stands. At RDI values greater than 55 percent, the density of most unthinned stands, the percentage of live understory trees is much smaller (Bailey and Tappeiner 1997 pp. 110-111). Seedling density is negatively correlated with RD, meaning that the higher the RD, the lower the seedling density and vice versa. This is due to the positive correlation of increased light through the canopy on the density of tree regeneration. An unthinned stand above 55 percent RDI will have little to no regeneration (Bailey, Tappeiner 1997 p. 105).

These proposed RD prescriptions in foraging and dispersal-only habitat also follow recommendations in the 2012 NSO Final Critical Habitat Rule and the Revised Recovery Plan for the Norther Spotted Owl (2011) by treating single-story, uniform forest stands to promote the development of multistory structure and nest trees. While the treatment may result in short-term adverse impacts to the habitat's current capability, the prescriptions are expected to have long-term benefits by creating higher quality habitat that would better support territorial pairs of NSOs (USDI FWS 2012, p. 71939). The prescriptions in these stands are also designed to follow recommendations in the Revised Recovery Plan for the Northern Spotted Owl (2011) by treating stands like these that have decreased age-class diversity and altered the structure of forest patches. The prescription would increase canopy and age-class diversity and increase fire resiliency by reducing short-term fuel loading and increasing tree health, fire resiliency, and species diversity, as recommended in the recovery plan.

<u>**Diameter Distribution Graphs**</u>

These graphs do not account for natural regeneration, which would show a greater representation in the smaller size classes and more layering.

Foraging and Dispersal-Only Habitat at a 30 Percent RD Retention Target

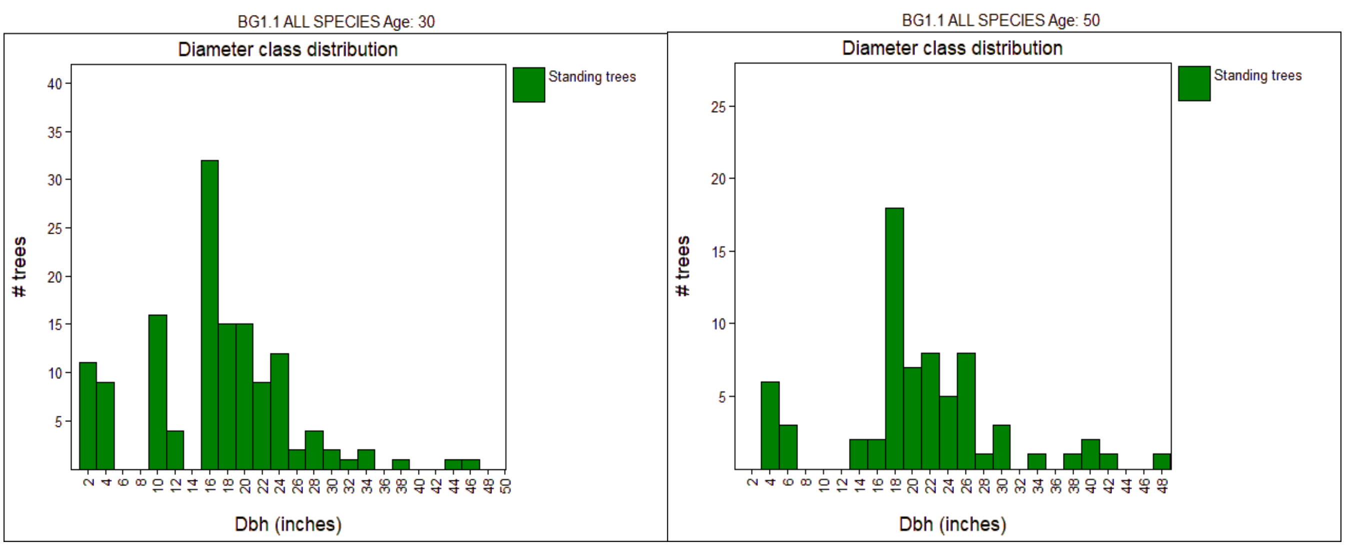


Figure 17. Untreated Foraging Stand A reaching NR at 30 years (left) vs. Treated to 30 percent RDI and Grown 50 Years (right).

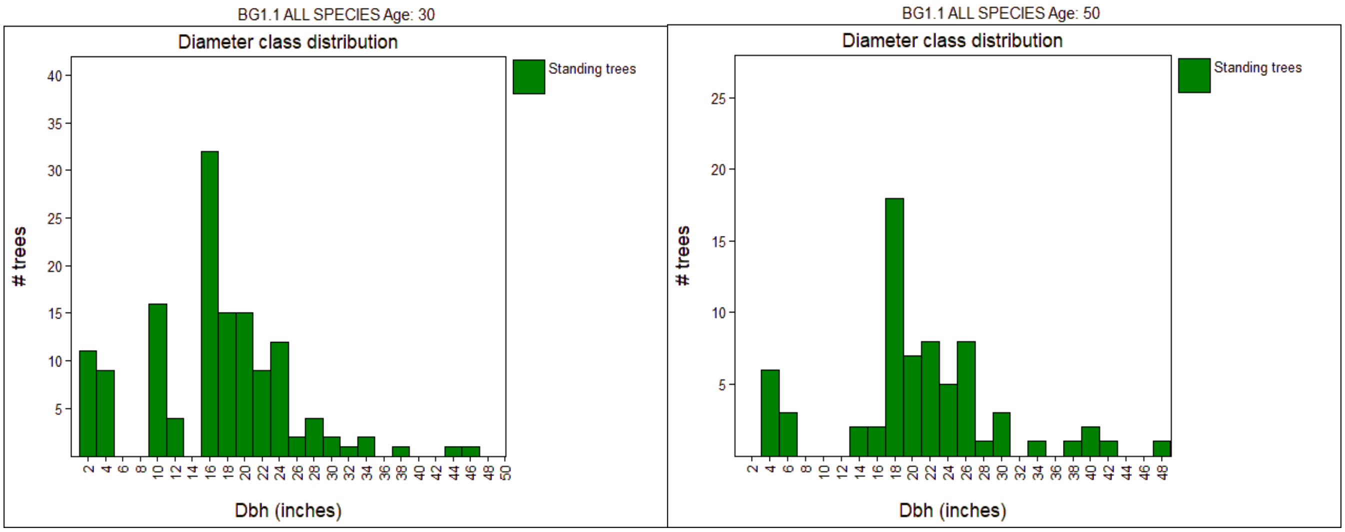


Figure 18. Untreated Foraging Stand B reaching NR at 30 years (left) vs. Treated to 30 percent RDI and Grown 50 Years (right).

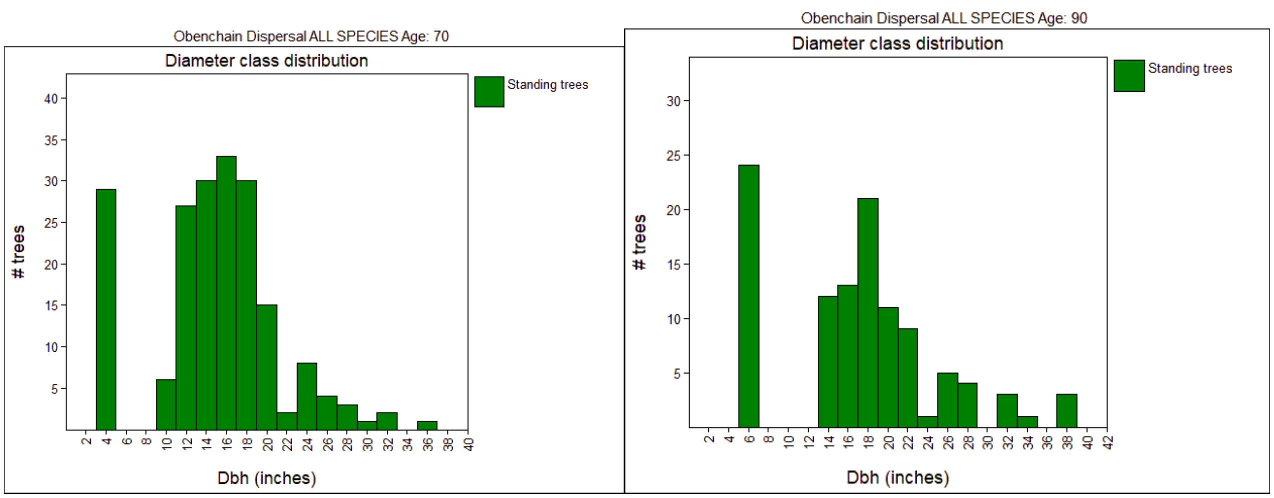


Figure 19. Untreated Dispersal reaching NR at 70 years (left) vs. Treated to 30 percent RDI and Grown 90 Years (right).

Foraging and Dispersal-Only Habitat at a 40 Percent RD Retention Target

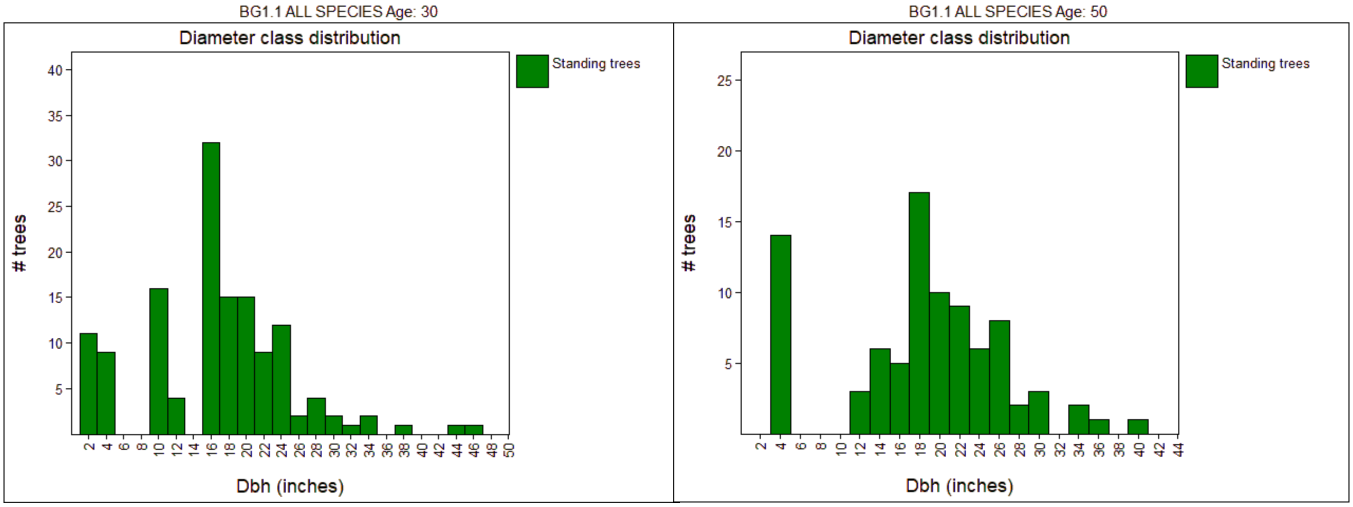


Figure 20. Untreated Foraging Stand A reaching NR at 30 years (left) vs. Treated to 40 percent RDI and Grown 50 Years (right).

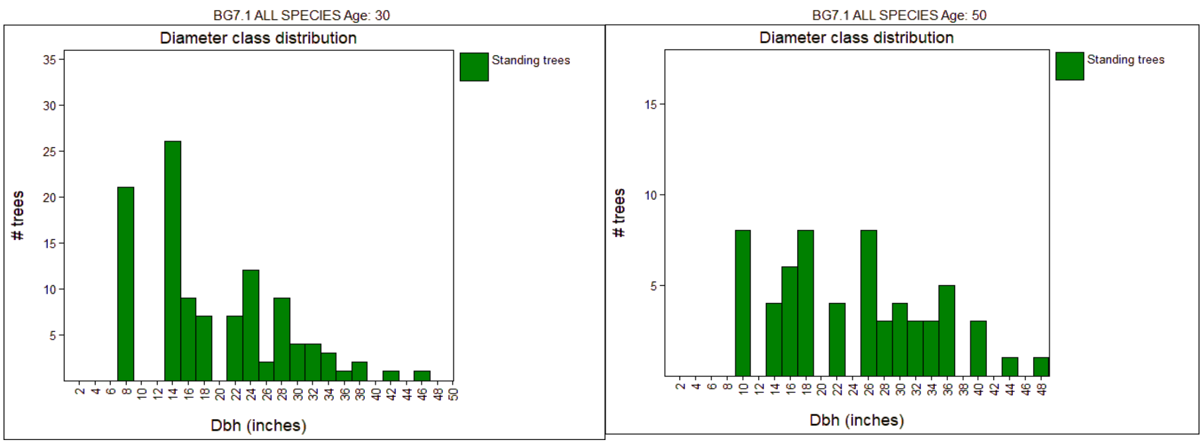


Figure 21. Untreated Foraging Stand B reaching NR at 30 years (left) vs. Treated to 40 percent RDI and Grown 50 Years (right).

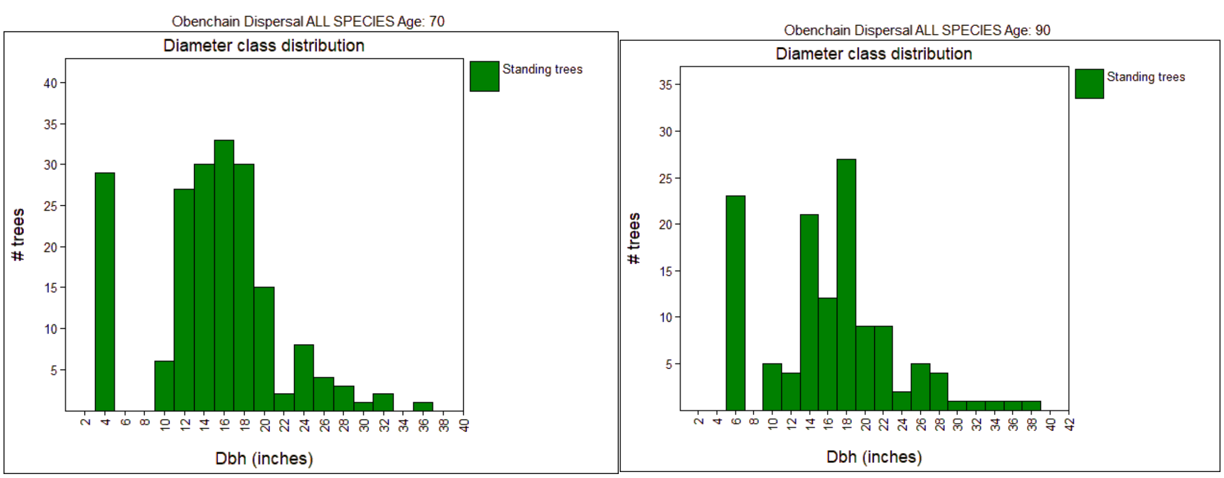


Figure 22. Untreated Dispersal reaching NR at 70 years (left) vs. Treated to 40 percent RDI and Grown 90 Years (right).

Foraging and Dispersal-Only Habitat at a 45 Percent RD Retention Target

The diameter distributions of the untreated stands in comparison to the treated stands display a consistent pattern with a wide range of diameter classes, which indicate the stands are achieving the desired multi-layering structure to support nesting-roosting function (Appendix 7, Figures 23-25).

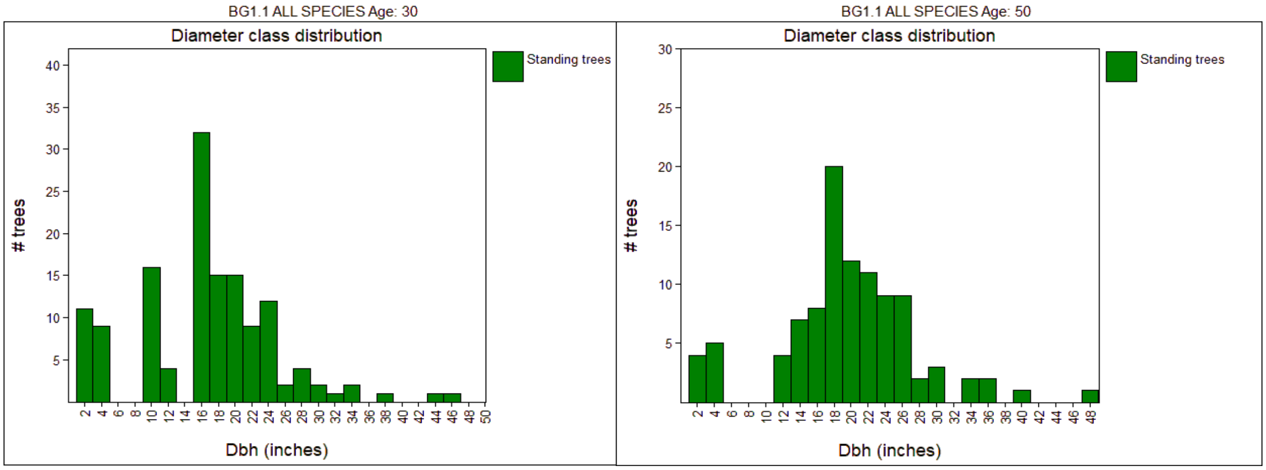


Figure 23. Untreated Foraging Stand A reaching NR at 30 years (left) vs. Treated to 45 percent RDI and Grown 50 Years (right).

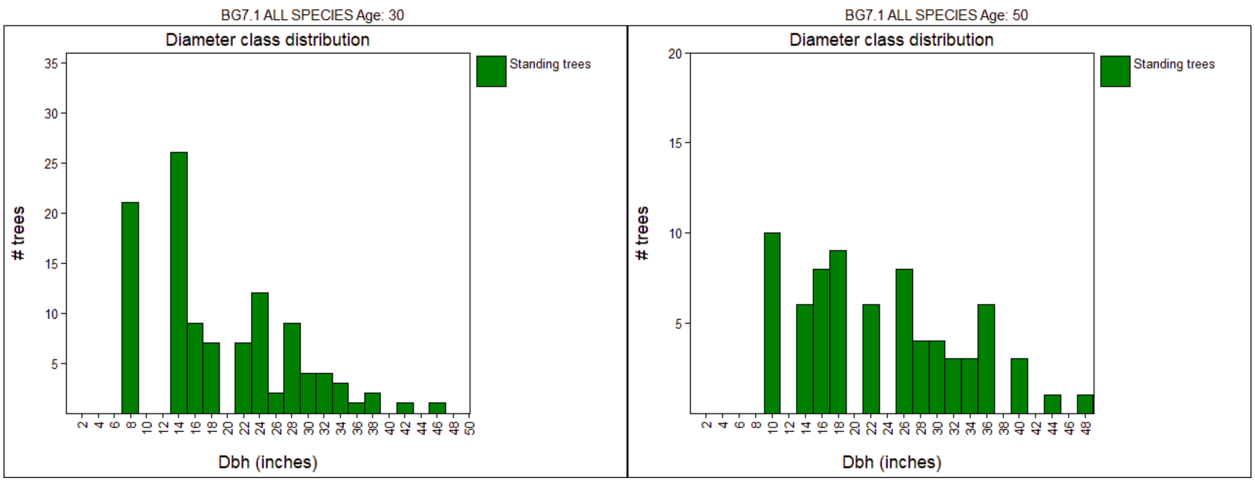


Figure 24. Untreated Foraging Stand B reaching NR at 30 years (left) vs. Treated to 45 percent RDI and Grown 50 Years (right).

Foraging and Dispersal-Only Habitat at a 45 Percent RD Retention Target (cont.)

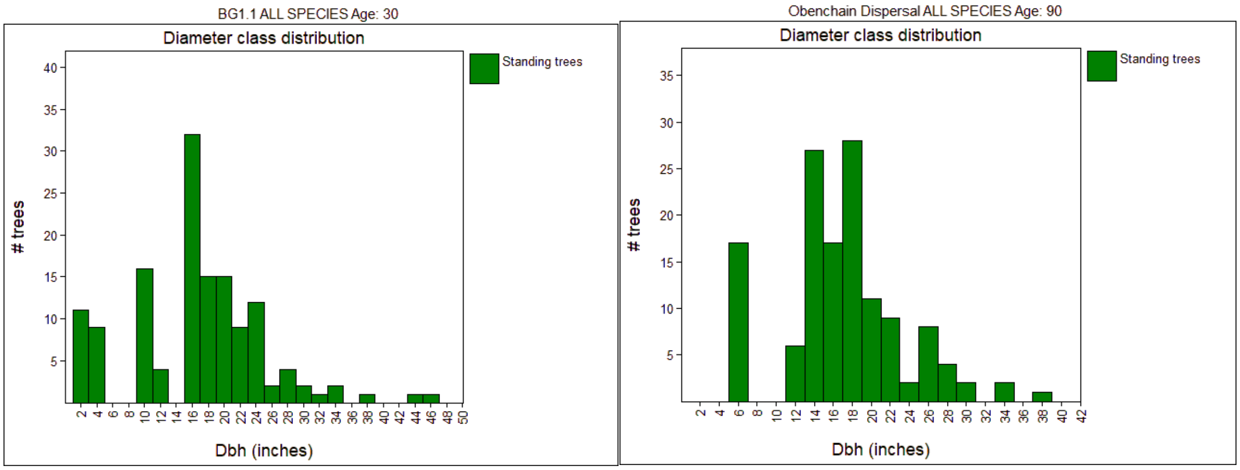


Figure 25. Untreated Dispersal reaching NR at 70 years (left) vs. Treated to 45 percent RDI and Grown 90 Years (right).

3 Supporting Empirical Evidence

As mentioned above, the modeling was only done for 3-4 stands. However, the above modeling results are also supported by empirical evidence of the development of nesting-roosting habitat on past similar dry forest treatments on the Medford District. Based on professional judgement and field collected stand data, Medford District silviculturists have documented where similar treatments occurring approximately 20 years ago in similar dry stand types, put the stands on a trajectory towards improving spotted owl habitat in the future. These stands showed an improvement in multiple habitat elements, such as improved tree growth, increased canopy layering, increased basal area, and greater species and structural diversity (Figure 26, Table 60).

The Medford District has several stands where past vegetation management treatments had short-term negative effects to spotted owl habitat but are now starting to show a trend towards long-term benefits to spotted owl habitat. Based on their professional judgment and field collected stand data, the Medford District silviculture group identified examples of stands where the past treatment put the stands on a trajectory towards improving spotted owl habitat in the future. Current conditions either show the spotted owl habitat conditions are improving and are on the trajectory for nesting-roosting habitat or are currently functioning as nesting-roosting habitat (Table 60). These stands demonstrated the following improvements: increased layering, increased canopy cover, increased DBH, over minimum basal area numbers, and large overstory trees. Additionally, the current condition includes structure left during previous treatments, such as snags, coarse woody debris, and mistletoe.

Table 60. Supporting Empirical Information for Habitat Development.

Field Office	Unit#	Pre-Treatment Data					Post-Treatment Data (2016)	
		Habitat	Basal Area	DBH	Rx	Harvest Date	Habitat	Stand Notes
Ashland	R&R 13-13	Dispersal or Foraging	180-206 BA /acre	14”-19”	Thin to 80-100 BA/acre	1991	Foraging and NR	2-3 layers, 60% canopy cover, 164 BA/acre, overstory tree DBH is >21” trees greater than 30” DBH present
Ashland	LT #1H	Dispersal or Foraging	Not Available		Thin to 120-180 BA/acre	1995/1996	Foraging, NR, and RA32	BA range was 120-260 (2008), canopy cover > 60%, overstory tree DBH is >21”, 4-6 trees > 30” DBH in NR and RA32

Grants Pass	BJT #6	Not Available	Commercial Thin to reduce stand density	1984	NR/RA32	Currently functioning as structurally-complex in 1995 RMP LSR LUA

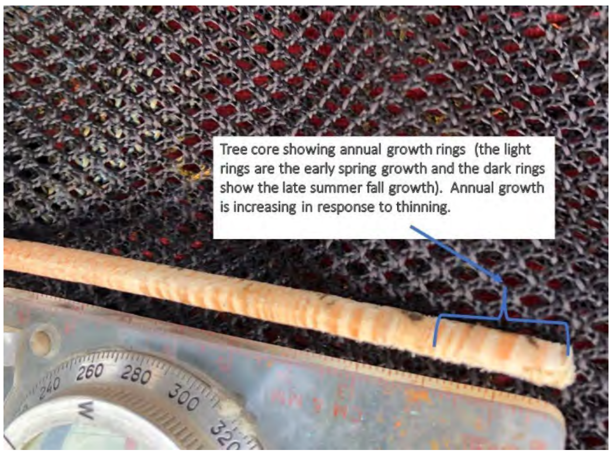


Figure 26. (Left) In-Growth of Young Conifers and Shrubs in a Group Select Opening Creating Structural Complexity within Stand. (Right) Tree Core Showing Annual Growth Rings with Increased Annual Growth in Response to Thinning.

4 Additional Spotted Owl Habitat Development Information

The proposed Long-Term NSO RD prescriptions in *high* RHS in foraging, dispersal-only, and capable habitat also follow recommendations in the 2012 NSO Final Critical Habitat Rule and the 2011 NSO Revised Recovery Plan by treating single-story, uniform forest stands to promote the development of multistory structure and nest trees. While the treatment may result in short-term adverse impacts to the habitat's current capability as described above, the prescriptions are expected to have long-term benefits by creating higher quality habitat that would better support territorial pairs of NSOs (USDI 2012, p. 71939). The prescriptions in these stands are also designed to follow recommendations in the 2011 Revised Recovery Plan by treating stands like these that have decreased age-class diversity and altered the structure of forest patches. The prescriptions would increase canopy and age-class diversity and increase fire resiliency by reducing short-term fuel loading and increasing tree health, fire resiliency, and species diversity, as recommended in the recovery plan.

APPENDIX 8 BOTANICAL RESOURCES SUPPORTING INFORMATION

1 Special Status Plants Supporting Information

Background

The BLM manages rare plants in compliance with the ESA, which provides direction for federally T&E species, and with the BLM Special Status species 6840 policy, which provides direction for managing Sensitive plants and fungi. All Special Status plants are rare but not all rare plants have protection under the ESA or BLM's Special Status species policy. The FWS reviews petitions to list species as threatened or endangered and makes determinations if listing is warranted. Each state's Natural Heritage Program (Oregon Biodiversity Information Center in Oregon) evaluates the conservation status of species based on an international ranking system (https://inr.oregonstate.edu/orbic/rare-species/ranking-species). Criteria include the abundance and extent of populations and individuals and the kinds and immediacy of threats. Species may have global, national, and/or state rankings. The BLM State Director places species on the Bureau Sensitive list if they meet set criteria (https://www.fs.fed.us/r6/sfpnw/issssp/agency-policy), including the heritage ranking.

The Medford District contains the most Bureau Special Status plant species of the four western Oregon BLM districts (USDI BLM 2016a, pp. 523-524) and is recognized as one of the most botanically diverse areas in the west because of its location at the intersection of several mountain ranges and physiographic provinces. The SWO and NCO ROD/RMPs provide direction to manage ESA-listed plants to recover populations and species, conserve populations of Sensitive species, and protect and restore habitat and manage it to maintain populations for all Special Status plants (USDI BLM SWO 2016b, p. 106; USDI BLM 2016c, p. 87).

The Medford District manages T&E and Sensitive species on the Oregon/Washington State Director's Special Status Species List (USDI BLM 2021a). The list is located on the Interagency Special Status Species Program website, hosted by the Forest Service – https://www.fs.fed.us/r6/sfpnw/issssp/agency-policy/. The most current list, signed August 3, 2021, contains 144 species for the Medford District, including four federally-listed endangered plants – Cook's lomatium (*Lomatium cookii*), Gentner's fritillary (*Fritillaria gentneri*), large-flowered meadowfoam (*Limnanthes pumila* ssp. *Grandiflora*), and MacDonald's rock-cress (*Arabis macdonaldiana*). Cook's lomatium and Gentner's fritillary have documented sites in the Medford District. Large-flowered meadowfoam occurs in vernal pools in the White City area of Jackson County with no BLM sites. MacDonald's rock-cress does not have documented sites in Jackson or Josephine counties or on BLM-administered lands in Curry County. The Special Status plant list is revised periodically to add or remove rare species, as new information becomes available about rare species in the Medford District. The BLM will manage new species added to the list the same way existing species are managed, which includes surveying for and documenting them, protecting them from direct and indirect effects of BLM management actions or from other sources of impacts, and conducting habitat improvement and other conservation actions for them.

Critical habitat was designated for Cook's lomatium in 2010 (USDI FWS 2010). Critical habitat units were designated in both Jackson and Josephine counties, but none of the Jackson County units contain BLM-administered lands. The critical habitat designated in Josephine County includes 4,007 acres within 13 core areas, all located within an 18½ by 6½ square mile area north and south of Cave Junction and on both sides of Highway 199. A total of 1,822 acres of critical habitat in the Illinois Valley units are located on BLM-administered lands. Critical habitat is chosen to contain the PBFs that are essential to the conservation of the species and that are sufficient to support one or more of its life-history functions. Habitat considered essential for Cook's lomatium in the Illinois Valley are vernally wet alluvial meadows within oak-pine and shrub plant communities and in mixed-conifer forest openings on slopes that are not seasonally inundated but receive sufficient rainfall and overland flow to support this species. Soils are silt, loam, and clay of ultramafic and non-ultramafic origin.

The recovery plan for Cook's lomatium provides recommendations for federal agencies to preserve the geographic, topographic, and edaphic features that support the seasonally wet meadow systems, sloped mixed-conifer forest openings, and shrub dominated plant communities in the Illinois Valley. Priority core areas, based on designated critical habitat units, have been identified for management actions, which include promoting natural ecosystem processes, including natural disturbance cycles such as fire; protecting against off-road vehicle damage; and removing vegetation to counter woody plant encroachment into wet meadow habitat (USDI FWS 2012c, pp. ix, IV-5-6; Kaye et al. 2019, pp. 15-17).

Gentner's fritillary is endemic to Jackson and Josephine counties plus one population cluster in Siskiyou County about two miles south of the Oregon border and Cascade-Siskiyou National Monument. Critical habitat has not been designated for this species because it occurs sporadically in a wide variety of habitats across its range, especially in oak woodlands and savannas, chaparral, meadows, and mixed conifer-hardwood woodlands. In general, it prefers sites where it receives at least partial light (Brock and Callagan 2002) and is often found at the interface between plant communities, such as between oak woodlands or chaparral and mixed hardwood-conifer woodlands. It is rarely found under dense conifer canopy, although a few populations along riparian ecotones currently have canopy cover of conifer and deciduous trees and shrubs.

FMAs are special areas that have been established within the Medford District, specifically to protect and conserve Gentner's fritillary populations and habitat. Their delineation and management were described in the 2003 recovery plan as the core of recovery efforts that would lead to the eventual downlisting and delisting of this species. They are located on public lands where Gentner's fritillary populations are secure from most of the threats that led to the species' listing. They contain existing populations, as well as suitable unoccupied habitat for expansion of existing populations or introduction of new populations. The FMAs are actively managed to support long-term persistence of populations and natural population recruitment. Active management can include reducing successional encroachment and shading by means of prescribed fire, mowing, pruning, and selective removal of trees and shrubs (USDI FWS 2003, p. 52). FMAs are not a specific LUA and are not designated in the RMP but overlay existing LUAs. The overarching management in FMAs follows the direction for each applicable LUA, which includes SWO ROD/RMP direction to manage habitats to maintain populations of ESA-listed plant species (USDI BLM 2016b, p. 106). Eight FMAs were identified in a conservation agreement between the FWS and BLM (2016). Three additional FMAs were identified in 2019 that will be added to the agreement with the next revision. Appendix D of the agreement (USDI FWS, BLM 2016, pp. 36-38) outlines proposed treatments by vegetation community (mixed conifer-hardwood forest, oak woodlands, grasslands, chaparral shrublands) to reach desired habitat conditions. Appendix E (USDI FWS, USDI BLM 2016, pp. 39-42) of the conservation agreement describes recommended BMPs within FMAs which will be integrated into projects under this EA.

In addition to T&E plants, the Medford District Special Status plant list also contains 140 Bureau Sensitive species (Table 61) that are associated with a variety of habitats, including forested stands, oak woodlands and savannas, chaparral, grasslands, and meadows. Documented species have known sites on BLM-administered lands; suspected species do not have known sites on BLM lands but are known to occur on adjacent lands.

Table 61. Special Status Plant and Fungi Species in the Medford District.

	Documented	Suspected
Federally-Listed Vascular Plants	2	2
Sensitive Vascular Plants	81	25
Sensitive Lichens	1	1
Sensitive Mosses	7	2
Sensitive Liverworts	4	3
Sensitive Fungi	13	3
Totals	108	36

Roughly one-third of the documented species grow in forested stands with varying levels of canopy cover, although some of them occur in gaps or at the edges of the stands. The remaining two-thirds of documented species are associated with more open non-conifer or mixed hardwood-conifer woodland habitats. See Rare Plants of Southwest Oregon (Mullens et al. 2018) for descriptions of the habitats of all BLM's Special Status vascular plants. Pages xvii-xxi also contain lists of the species by habitat.

Methodology

The BLM considered the biological, environmental, and ecological requirements of the Medford District Special Status plant species to analyze how the proposed treatments would alter their habitats and directly or indirectly impact plants, populations, or habitats. Habitats for Special Status plants are considered suitable if they provide the elements necessary to support them – e.g., space, light, shade, soil type, air and soil temperatures, relative humidity, water, nutrients, and pollinators. The amount and arrangement of necessary habitat elements differ for each species and is often based on observations of current conditions at documented plant sites. Habitat descriptions are often generic rather than specific in nature. For example, the exact canopy cover requirements for a species may not be known, but it is found only in mature conifer stands. For the analysis in this EA, information about species' requirements came from recovery plans, Medford District programmatic consultation (being developed in tandem with this EA), conservation agreements, species management plans, research and monitoring studies, and professional experience and knowledge. These documents, along with the SWO ROD/RMP (USDI BLM 2016b), provide direction and guidelines for managing the species and their habitats to further their conservation and recovery.

Effects of management actions on Special Status plants and fungi are ultimately manifested in their ability or inability to persist by surviving and reproducing. Monitoring individual populations, and species across their ranges, measures the impacts of management actions and other factors by documenting increases or decreases in individual numbers and expansions or contractions in the perimeters of their populations. Management actions may make habitats and their associated environmental conditions more or less suitable for Special Status plants and fungi and these vary by species and site. The results from management actions may be manifest in a short-time frame, one to two years, or may not be evident for many years. While recovery plans and other conservation documents make habitat management recommendations for specific Special Status plants, they acknowledge that effects of treatments should be monitored and adapted as necessary to ensure effectiveness (USDI FWS 2003, p. 55; USDI FWS 2012c, p. IV-5).

Studies have not been conducted for many of BLM's Special Status plants or fungi to correlate the percentage of increase or decrease in population numbers or population growth or contraction with specific management prescriptions. Results will also vary by species and site. Consequently, it is not possible to quantifiably predict effects of the proposed actions on those factors of Special Status plants and fungi. Instead, the BLM analyzed and compared how the proposed actions of each alternative would promote and develop habitat for Special Status plants and fungi, the amount and locations of habitat that could be treated in each alternative (Table 28 *in* Issue 3.8), the tools available for treatments, and the annual and 10-year limits of treatments each alternative proposes (Table 2 in Section 2). The BLM also compared the number of sites of the two endangered plants and the number of acres of Cook's lomatium critical habitat and Fritillaria Management Areas that could be treated in each alternative (Table 28 in Section 3.8).

Assumptions

Treatment Effectiveness

The PRMP/FEIS (USDI BLM 2016a) analysis of the proposed alternatives on Special Status plants, incorporated here by reference, concluded that the BLM would "Maintain or restore natural processes, native species composition, and vegetation structure in natural communities outside of the HLB through conducting prescribed fires, thinning, removal of encroaching vegetation, retention of legacy components (e.g. large trees, snags, and down logs), and planting and seeding native species (p. 533, ROD/RMP)." Also as analyzed in the PRMP/FEIS (USDI BLM 2016a, p. 526) and incorporated here by reference, "Some rare plant species are adapted to frequent, low-intensity fires and respond positively in most cases (e.g., Bradshaw's desert-parsley; Kaye et al. 2001). Species such as Gentner's fritillary and Kincaid's lupine can respond positively to the increased light and moisture from the loss of overtopping and competing vegetation and the increase in nutrients available after a fire. ...Alternatively, fire consumes many rare lichens, bryophytes, and fungi, along with some vascular plants without fire-adapted mechanisms (p. 526, ROD/RMP)." Also, "Site preparation and fuel reduction treatments may provide beneficial effects on some rare plants and fungi, such as by reducing competition and shade. Vascular plant species not in the conifer habitat group are generally shade-intolerant and respond to increased light and reduction in plant competition with increased growth, flowering, and fruiting (USDI BLM, USDA FS, USDI FWS 2006 and USDI FWS 2010, Giles-Johnson et al. 2010). However, any such potential effects, either adverse or beneficial, are highly dependent on site-specific and project-specific factors that cannot be identified at this scale of analysis (USDI BLM 2016a, p. 520)."

Although there have not been many past studies in southwestern Oregon of the effects of thinning and prescribed fire treatments on Special Status plants, a few studies have monitored and reported results. Studies of the effects of vegetation treatments on native plant communities in general can also be applied to management of Special Status plants. See also Treatment Effectiveness under Assumptions in the Native Plant Community section below for descriptions of treatment effectiveness on southwestern Oregon plant communities.

In fall 2015 the BLM conducted a prescribed burn in seasonally wet, serpentine meadows at French Flat ACEC occupied by Cook's lomatium where population numbers have declined. They also removed or girdled some trees and shrubbery that were encroaching the edges of the meadows. The goals were to remove thatch that may be suppressing germination of Cook's lomatium plants, to see if burning reduced the extent of nonnative plants, and to create more space for populations to expand into. The Institute for Applied Ecology monitored pre- and post-treatment plots for three years to measure the effects of burning on the plants. They found that density of Cook's lomatium did not differ between burned and unburned plots and that one population expanded into the cleared areas three years after burning (Giles et al. 2018, p. 21). The cover of invasive grasses was low in burned and unburned plots and introduced forbs were only documented in the burned plots but with less than 1 percent cover (Giles et al. 2018, p. 17). The BLM seeded burn piles with native grasses which were observed growing and producing seed in spring 2019. Institute for Applied Ecology (IAE) concluded the study by recommending that because the prescribed fie had a mostly neutral effect on Cook's lomatium plants, BLM could clear encroaching woody vegetation in Cook's lomatium habitat to increase suitability for expansion of populations and could address the risk of an increase in nonnative grasses by treating the few patches.

Prescribed fire has also been a successful tool for reducing woody plants and thatch for other *Lomatium* species as well, including Bradshaw's lomatium (*Lomatium bradshawii*), which saw increased individual plant size and reproduction (Pendergrass et al. 1999), population growth, and long-term viability (Kaye et al. 2001, Caswell and Kaye 2001) after prescribed burning.

Gentner's fritillary populations have shown positive responses to wildfire, which burn in late summer or early fall when plants have finished flowering and have begun dormancy. The Pickett Creek Gentner's fritillary population was monitored from 2002 to 2014 and again in 2019 after the 2018 Taylor Creek Fire (Gray et al. 2019). The number of individual flowering plants declined from 424 in 2002 to 46 in 2012 and was 51 in 2014. Botanists counted 129 flowering individuals in 2019 after the fire. At one North River Road population three flowering plants were observed in 2011. Following a fire in 2012, 122 flowering plants were documented, although counts have dropped off as dense grass cover has grown back in years since the fire. The annual monitoring of 56 Gentner's fritillary populations has documented spikes in flowering plants after both wildfire and fuels thinning and pile burning (Pacific Crest Consulting LLC 2020, pp. 74-79). Three populations showed significant spikes in flowering after fuels treatments and six populations showed significant flowering after wildfire. The increased counts gradually declined after one to three years. These responses are consistent with observations in southwestern Oregon of other species in the Lily family and other bulb species after wildfire or prescribed fire. Plants respond for a year or two with increased growth and flowering when there is an increase in light, nutrient flush, reduced competition, and cues from changes in soil chemistry or smoke (Horton and Kraebel 1955; Keeley 1991; Tyler and

Borchert 2003). Even though these flowering events are short lived, they allow populations to experience increased growth and reproduction, increasing the likelihood they will persist, and increased plant vigor that will enable them to survive future harsh conditions.

Neil Rock checkerbloom was discovered in 1995 one year after the Hull Mountain fire burned across an area that had no plants a couple of years prior to the fire. Hundreds of plants were scattered across an approximately 40-acre area after the fire but declined to a couple dozen plants over a 25-year period as wedgeleaf ceanothus and annual grasses gradually dominated the site. This species and the other six closely related California subspecies are fire-dependent for germination.

Several studies in southwestern Oregon chaparral have found that native annual species increased after thinning and prescribed fire treatments, especially in fire rings (Perchemlides et al. 2008, Sikes and Muir 2009). Several special status plants that grow among chaparral shrubs are annuals, including Greene's popcorn flower (*Plagiobothry greenei*), Austin's popcorn flower, fragrant popcorn flower (*Plagiobothrys figuratus* var. *corallicarpus*), white fairy poppy (*Meconella oregana*), Bolander's monkey flower (*Diplacus bolanderi*), Congdon's monkey flower (*Diplacus congdoni*), Bellinger's meadowfoam, slender nemacladus (*Nemacladus capillaris)*, and slender-flowered evening-primrose (*Tetrapteron graciliflorum*). These species become less abundant as shrubs increase, although their seeds often remain dormant in the seed bank and germinate when light and space again become available after thinning or wildfire. Even if they are eventually shaded out again by regenerating shrubs, they have germinated, flowered and set seed, and replenished the seed source for future germination opportunities and perpetuation of the species.

In efforts to promote regeneration of Baker cypress trees in the Flounce Rock stand, the BLM thinned Baker cypress trees within the stand, piled and burned the slash, and seeded burn piles with seed collected from Flounce Rock cones. Preliminary results showed seedlings germinating within the burned fire rings.

The BLM conducted a prescribed fire in Parish's nightshade (*Solanum parishii*) habitat to measure the effects on plants (Gray and Kaye 2012). Parish's nightshade plants were larger the first year after burning, but by the second year, there was no difference in plant size, reproductive effort, or plant survival. The data suggested because prescribed fire had a neutral or positive effect on Parish nightshade plants, it could be an effective tool in habitat management for this species by removing competing vegetation. The researcher had concerns, however, that nonnative invasive species would increase after fire and compete with the nightshade plants.

These studies have shown that thinning and prescribed fire can have beneficial effects in promoting or developing habitat for Special Status plant species, but treatments need to be adapted to the species, take into consideration existing and desired conditions at the site, treat nonnative invasive plants, and seed or plant native species as necessary for the treatments to be more effective for the long-term. It should be noted that many Special Status plant species currently co-exist with nonnative species, although it is not known if they may eventually be crowded out. Although removing trees and shrubs and burning the understory may create conditions where nonnative species can establish, maintaining or restoring open areas for Special Status species to exist is necessary for their persistence. Nonnative invasive plant management and restoration of native species through collecting and increasing native seeds are ongoing programs in the Medford District that will further the effectiveness and success of habitat restoration.

Affected Environment

See also the Affected Environment section in the Plant Community section below and Appendix 3 for additional descriptions of the current conditions, departure from historical conditions, and treatment needs of plant communities in the Planning Area.

Many Special Status plants occur in plant communities that over time have been lost, altered, or degraded from their historical conditions from fire exclusion, residential and commercial development, timber harvest, road building, grazing, agriculture, mining, OHVs and other vehicles, recreational development and use, competition from nonnative invasive plants, and altered hydrological conditions. Plant communities that were historically more open are undergoing succession to closed plant communities from conifer and shrub encroachment, leaving them less suitable as habitat for Special Status species due to increased shade and competition for space, light, and resources. The loss, alteration, or degradation of habitats have been identified as one of the major causes of the extirpation or decline of Special Status plants and continues to be a threat to their persistence.

ESA-listed and Sensitive Species plants are now protected from impacts from management actions on federal lands. State-listed plants, which are also BLM Special Status, receive protection on state and county lands, but rare plants are not protected on private lands. While Special Status plants are protected on federal lands from impacts from management actions, they and their habitats are also affected by ongoing succession during fire free periods and from fire suppression. Because plant communities are outside their natural fire regimes, they are transitioning to more closed communities, which affects Special Status plant species that evolved with frequent, low to mixed severity fires and that grow in earlier seral state conditions. There is less habitat for them to expand into and they have less genetic diversity that would provide resilience to environmental changes. Special Status plants located in plant communities that are stressed from high tree and shrub densities and from drought, insects, and disease are less able to adjust to climate change because they are at risk from damage during high severity wildfire and also have reduced vigor and reproductive capacity in marginally suitable habitats. It is likely there will be wildfires in the Medford District in the future. They could improve habitat conditions and increase suitable habitat for some species, but high severity fire could also damage plants and remove suitable habitat.

Endangered Species

The 144 species on the Medford District Special Status plant list occur in a variety of plant communities. The two ESA-listed endangered plants occur in mostly non-conifer plant communities that have been altered over time. One of the major reasons both species were listed was because of loss and degradation of their habitats (USDI FWS 2002; USDI FWS 1999) and habitat improvement is a primary recovery goal for both species (USDI FWS 2012; USDI FWS 2003).

Habitat for Cook's lomatium is limited because it has narrow and specific environmental requirements. It has been found only in vernal pool habitat in the White City area and on seasonally wet serpentine-derived grassland meadows in the Illinois Valley, with one population on a shallow slope in a forest opening where spring runoff creates suitable hydrological conditions to support this species. The PRMP/FEIS analysis stated that "Since the BLM would manage Cook's lomatium critical habitat for the primary constituent elements under the alternatives and the PRMP/FEIS, there would be no management impacts to critical habitat (USDI BLM 2016a, p. 533)." The 2019 five-year review on the status of Cook's lomatium found that the threat of habitat or population loss, destruction, modification, or curtailment from development, encroachment of woody species, impacts from ORV use, indirect effects of mining operations, and incompatible grazing practices continues at some sites and threats have not changed since listing in 2002 (USDI FWS 2019). The BLM and IAE are implementing recovery actions at Illinois Valley populations by seeding and planting Cook's lomatium to increase population numbers. The 2019 Cook's lomatium reintroduction plan (USDI FWS 2019) recommends reducing woody vegetation by removing trees and shrubs and burning to create more available habitat for expansion of populations before seeding and planting. Burning would also reduce thatch and create bare soil where the Cook's lomatium seeds could more easily germinate. These actions would contribute to recovery of the species by increasing habitat and supporting other conservation efforts.

Gentner's fritillary is found in a wide range of habitats – grasslands, oak savanna, chaparral, oak woodlands, and conifer hardwood woodlands (in openings or at the edges). As described in the Affected Environment in the Plant Community section below, these habitats have undergone changes from open to more closed canopy conditions, which has impacted Gentner's fritillary populations. Even though populations are found in many plant communities, there are few populations spread across its range and many populations have only one or a few plants. The 2016 five-year review of the status of this species reported that the threat of habitat loss and fragmentation on public lands continues from agricultural, municipal, residential, and road development (USDI FWS 2016). ESA-listed plants are not protected on private lands, so the majority of protection occurs on federal lands, although suitable habitat and populations have also been protected on private lands, including the Table Rocks (The Nature Conservancy) and the Beekman Woods (City of Jacksonville).

Gentner's fritillary, along with other rare plants in southwestern Oregon, evolved with frequent and low to mixed severity fires. The lack of frequent fire over the last 100-plus years in Gentner's fritillary habitat has led to an accumulation of leaves and needles, an increase in surface and ladder fuels, and more closed canopies, all conditions that would result in higher intensity fires when they do occur. Higher intensity fires could impact Gentner's fritillary by sterilizing the soil and killing bulbs (Siskiyou BioSurvey LLC 2004 and 2012). The thick accumulation of litter also suppresses growth of Gentner's fritillary leaves, which affects plant viability. Regular low intensity fires create more hospitable conditions for Gentner's fritillary by maintaining open plant community structure and removing leaf litter (USDI FWS 2016). The 2019 monitoring report of the 56 Gentner's fritillary sites commented on the need to use prescribed fire in the absence of natural fire regimes to manage this species, "The commonly implemented 'hands-off' management option may instead be interpreted as artificially negatively affecting FRGE (*Fritillaria gentneri*) populations by removing natural forces that were once at work greatly influencing and shaping these sites. Human wildfire supression has greatly altered the natural cycles of wildfires in FRGE (*Fritillaria gentneri*) habitats. The prescription of fire at FRGE (*Fritillaria gentneri*) sites could be interpreted as replicating these natural fire cycles. Native Americans were aware of potential benefits of fire, using fire as a management tool for the enhancement of geophyte (bulb) food sources (Sinclair et al. 2006; Anderson 2005) (Pacific Crest Consulting LLC 2020, p. 77)."

Sensitive Species

Sensitive plants associated with conifer stands have been harmed in the past by logging, tree planting, road construction, wildfire, and wildfire suppression. Some species, such as clustered lady-slipper (*Cypripedium fasciulatum*) are associated with later seral conifer stands and require higher levels of canopy cover, and in the case of this species, conifers that provide mycorrhizal connections with plant roots that contribute nutrients to the plant (Vance 2005). Other species, such as California globemallow (*Iliamna latibracteata*) (Osbrack 2020), Baker cypress (*Hesperocyparis bakeri*) (Merriam and Rentz 2010), and Parish's nightshade (*Solanum parishii*) (Gray and Kaye 2012) are early seral, fire-adapted, and disturbance-dependent and survive best in disturbance created forest openings and edges.

Species associated with non-conifer plant communities have been impacted by development, conversion to agriculture, grazing, mining activities, invasive plant species, road construction, woody plant encroachment, accumulation of leaf and needle litter and grass thatch, conversion from open plant communities to closed plant communities, and recreational development and use. There are a number of Sensitive plant species in the Medford District that grow in oak savannas and woodlands, chaparral, meadows or grasslands, and mixed hardwood-conifer stands that have been impacted by these activities and by a loss or degradation of their habitats. They require habitat improvements to prevent further declines in their populations. These plant communities have been altered over time from fire suppression and the invasion of nonnative plants that compete with them for resources. They are undergoing succession from open to closed canopies from conifer encroachment, leaving them as less suitable habitat for Special Status species. These include both annual species – white fairy poppy, slender meadowfoam (*Limnanthes gracilis* var. *gracilis*), Bellinger's meadowfoam (*Limnanthes flocossa* ssp. *Bellingeriana*), dwarf wooly meadowfoam, Austin's popcornflower, fragrant popcorn flower, Greene's popcorn flower, Josephine jewel flower (*Streptanthus glandulosus* ssp. *Josephinensis*) – and perennial species – Howell's jewel flower *(Streptanthus howellii*), Neil Rock checkerbloom, Howell's mariposa lily (*Calochortus howellii*), southern Oregon buttercup (*Ranunculus austrooreganus*), and Klamath sedge (*Carex klamathensis*), to name just a few.

Meadows and open habitats at some Special Status Species sites have also been degraded and plants damaged from unauthorized uses. OHVs, other vehicles, bicycles, hikers, and horses traveling off authorized road or trail systems, or trash dumping and unauthorized camping have caused damage, including the creation of ruts, erosion, removal of native vegetation, damage or mortality of Special Status plants, degradation of designated critical habitat, exposure of bare soil that is then invaded by nonnative plants, and altered hydrological conditions that support plant survival. Some of the species affected by these activities include Cook's lomatium (USDI FWS 2019, p. 2; Kaye et al. 2019, p. 2, 23, Johnson 2019), Gentner's fritillary (Pacific Crest Consulting 2020, pp. 73-74), winged water starwort (*Callitriche*), dwarf wooly meadowfoam (Schomaker and Bahm 2018, p. 2, 12), Bellinger's meadowfoam (Brown 2017, p. 53), redroot yampah (*Perideridia erythrorhiza)* (Malaby 2005, p. 12), and serpentine wetland species – Oregon willow-herb (*Epilobium oreganum*), Waldo gentian (*Gentiana setigera*), purple-flowered rush-lily (*Hastingsia bracteosa* var. *atropurpurea*), large-flowered rush-lily (*Hastingsia bracteosa* var. *bracteosa*), western bog-lily (*Viola primulifolia* ssp. *Occidentalis*) (USDA FS, USDI BLM 2018, pp. 6, 30).

Climate Change

Studies and models for climate change in the Medford District offer varying scenarios, but in general suggest that temperatures will continue to increase in the Pacific Northwest (Littell et al. 2009, p. 1); precipitation patterns will become more variable (McLaughlin et al. 2002, Littell et al. 2009), and fires will be more frequent and severe (Littell et al. 2009, p. 2; Field et al. 1999; Steel et al. 2011; Halofsky et al. 2020, p. 6). Some models predict wetter falls and winters, drier summers, and less snowpack in the Cascade Mountains (Littell et al. 2009, p. 1), while others predict more extreme rain and drought periods (McLaughlin et al. 2002, p. 6072). Two results of a drier climate are greater evaporation and drying of soils, which can adversely affect the ability of plants to grow and reproduce (Field et al. 1999, p. 20). Under this scenario drought tolerant species would be more competitive and forests would be composed of younger age classes due to increased wildfire and burn severity (Halofsky et al. 2020, p. 6).

The 5-Year review for Gentner's fritillary suggested that the increased temperature and decreased growing season would create an inhospitable environment for this species (FWS 2016, pp. 25-26). Based on monitoring studies, increased winter temperatures and spring precipitation could result in greater flowering (Giles-Johnson et al. 2014); however, large fluctuations in temperature and precipitation may prevent species from adapting to change. The 5-Year Review also expressed concern that because the majority of Gentner's fritillary populations are mostly very small and plants are products of asexual reproduction and therefore genetically identical, the species may lack the genetic diversity needed to adapt to changing environmental conditions (USDI FWS 2016, p. 25). Drought and higher temperatures could also cause reductions in water quantity and seasonality which could negatively affect rare plants that have specific hydrological requirements (Halofsky et al. 2020).

Between 2015 and 2020 the Oregon Biodiversity Information Center (ORBIC) conducted climate change vulnerability assessments for some of the BLM and Forest Service's Special Status plant species. They completed evaluations on 31 percent of Medford's 137 species. Of those evaluated, one (dwarf wooly meadowfoam) fell in the Extremely Vulnerable category, three in the Highly Vulnerable category, twenty-one in the Moderately Vulnerable category, and eighteen in the Low Vulnerability category. It is likely that the species that rely on specific hydrological conditions that they did not evaluate would fall in the higher vulnerability categories, including Cook's lomatium and Medford District's Sensitive species that grow in seasonal or serpentine wetlands and vernal pools.

Steel et al. (2011, pp. 41-44) lists a number of potential management approaches to help Willamette Valley rare plants survive climate change, which could also be applied to Special Status plants in southwestern Oregon. These management actions include manual translocation, maintaining genetic diversity, preserving or creating small-scale temperature and precipitation "refuges," using seeds instead of plants in restoration, using prescribed fire to mimic natural fire regime, maintaining open areas in woodlands through fire or cattle grazing, and maintaining habitat connectivity. Other studies suggest management actions that would prepare plant communities to adapt to climate change, including reducing stand densities and introducing fire to reduce drought stress and damage from insects or diseases and to increase resilience to high severity wildfire; creating gaps to provide for understory shrub and herbaceous species establishment; and thinning around legacy trees (Halofsky et al. 2016, pp. 7-11; Halofsky et al. 2020, p. 7).

2 Native Plant Communities Background and Supporting Information

Background and Methodology

The special native plant communities addressed in this issue are oak woodlands, oak savannas, oak chaparral, chaparral, meadows/grasslands, and pine PVT stands. The NSO and SWO RODs/RMPs give direction to:

- "Maintain or restore natural processes, native species composition, and vegetation structure in natural communities through actions such as applying prescribed fire, thinning, removing encroaching vegetation, treating non-native invasive species, retaining legacy components (e.g., large trees, snags, and down logs), maintaining water flow to wetlands, and planting or seeding native species." (USDI BLM 2016b, p. 106; USDI BLM 2016c, p. 87).
- "Manage mixed hardwood/conifer communities to maintain and enhance oak (*Quercus spp*.) persistence and structure by removing competing conifers, thinning, and prescribed fire, to the extent consistent with management direction for the land use allocation." (USDI BLM 2016b, p. 107; USDI BLM 2016c, p. 87).
- "Manage mixed conifer communities to maintain and enhance ponderosa, Jeffrey, and sugar pine persistence and structure by removing competing conifers, thinning, and applying prescribed fire, to the extent consistent with management direction for the land use allocation." (USDI BLM 2016b, p. 107; USDI BLM 2016c, p. 87).

The RMPs also give management direction for ACECs, including Research Natural Areas (RNAs), to:

- "Implement activities as necessary to maintain, enhance, or restore relevant and important values (USDI BLM 2016b, p. 55; USDI BLM 2016c, p. 57)".

The proposed treatments would change vegetation in plant communities where encroachment of woody vegetation has occurred by thinning and/or using prescribed fire to remove trees and shrubs to reduce hazardous fuels, create open canopy communities, and remove ladder fuels, surface fuels, and thatch. Changes would be to structure, canopy cover, RD of trees and shrubs, surface and ladder fuels, and eventually to understory herbaceous plants. Because sites differ in their existing conditions and treatment needs, it is not possible to quantify the percentages of change in the factors listed above by alternative. It is possible, however, to compare the acres and locations of plant communities available for improvement within the Eligible Footprint of each alternative (listed in Table 29 in Section 3.9.3), the number of annual and 10-year acres proposed for treatment in each alternative (Table 2 in Section 2 of the EA), the tools or prescriptions available in each alternative, and the qualitative effects they would have on promoting and developing habitat in each plant community.

The locations in meadows and other open plant communities where unauthorized uses will occur are not currently known, although they would likely be in similar areas where unauthorized uses have occurred in the past (see Affected Environment). The actions to protect resources within these areas, including Special Status plant sites and habitat, important and relevant values in ACECs, native plant resources, and habitat for pollinators and other wildlife, would be the same under all three action alternatives. Tools would include installing gates, fences, boulders, trenches, or boardwalks to prevent continued access from unauthorized uses or to redirect traffic back onto authorized routes. Rehabilitation of tracks to reclaim quality habitat could also occur. The Eligible Footprint varies by alternative, therefore, the BLM analyzed how effective each alternative would be at stopping resource damage in meadows and other open plant communities by comparing the locations and acres of meadow habitat that could be protected in each alternative if unauthorized uses occur (Table 29 in Section 3.9.3).

Assumptions

Treatment Effectiveness

See Affected Environment and Appendix 3 for a description of special plant communities, their current conditions, and treatment needs. Treatments in oak communities, chaparral, meadows and grasslands, and pine PVTs are considered effective if they increase resistance to disturbance events, including wildfire, drought, insects, disease, and climate change, which would decrease the risk of loss of legacy trees and shrubs and permanent damage to understory native species. They would restore vegetation structure and diverse species composition that existed with more open canopy conditions under a more frequent and less severe fire regime than has existed in the last 100 to 150 years.

The PRMP/FEIS analyzed the effects of timber harvest and other vegetation management on oak communities (USDI BLM 2016a, pp. 549-551), incorporated here by reference. It concluded that implementing the PRMP/FEIS would result in the maintenance of oaks "...within forest and woodland communities across all land use allocations. The quality and quantity of existing oak habitat would improve under the proposed RMP (p. 551)." It also stated that "...the BLM would use integrated vegetation management to increase or maintain vegetation species diversity and to create and maintain areas of hardwood dominance (p. 550)."

Vegetation responses to thinning and prescribed fire vary, depending on existing conditions at sites, including aspect, precipitation, soil type, plant association, the proportion of native versus nonnative species, the prescriptions and tools used, timing of treatments, amount and type of vegetation removed, and length of time after treatment. This variability is reflected in the results of different studies of treatments similar to those proposed in this EA. Projects would implement the proposed actions as outlined under the alternatives in Chapter 2 and Appendix 1 to meet restoration goals for each site treated under this EA.

Studies found that thinning and prescribed fire in all plant communities have been effective at meeting fuel management goals related to fire control and fire fighter safety and restoring open canopy conditions (Perchemlides et al. 2008; Perchemlides et al. 2018), both objectives of the proposed actions in this EA. See also the analysis in Section 3.3 in the EA on fire resistance. A climate adaptation project at the Table Rocks in the Medford District involving thinning and handpile burning in Oregon white oak and chaparral habitats on 404 acres was effective at restoring open habitat, reducing tree and shrub densities, releasing over 60 percent of old legacy trees and shrubs, reducing competitive stress and risk of fire mortality, and reducing fire intensity for wildfire by 51 percent and prescribed fire by 43 percent (Perchemlides et al. 2018).

Studies that removed shade-tolerant conifers from oak and pine stands resulted in increased growth, vigor, and regeneration of suppressed shade intolerant trees (Devine et al 2007; Devine and Harrington 2006, Hood et al. 2018). In a southwestern Washington Oregon white oak stand where oaks had been overtopped by Douglas fir, researchers found that oaks experienced significantly greater growth at both three and five years after removing competing Douglas fir. The treatment that removed conifers within one tree length (full release) from the oaks resulted in 194 percent greater stem diameter growth of oaks compared with the control and was greater than the treatment that removed conifers from only one-half the tree length (partial release) from oaks (Devine et al 2007; Devine and Harrington 2006). Another study in Washington that looked at the effects of prescribed fire on Oregon white oak survival in oak woodlands (Nemens et al. 2019) found that the oaks were highly resistant to mortality from the prescribed fire, even following long fire-free intervals.

A study in northeastern California in a ponderosa and Jeffrey pine stand with a dense white fir mid-story looked at the response of old pine trees fifteen years after two levels of thinning; one removing all white fir (stand level thinning) and one that thinned all trees less than 10 inches (25.4 cm) DBH within 29.8 feet (9.1 m) of selected trees (radial thinning) (Hood et al. 2018). The stand level thinning resulted in an immediate increase in pine growth, which continued for 15-years and was attributed to an increase in soil moisture from the removal of competing conifers. The radial thinning did not increase growth, but slowed the decline compared to the control trees.

Studies of fuels reduction treatments in southwestern Oregon chaparral have found they have been successful at meeting fire control, fire fighter safety, and fire-resistant stand goals (Perchemlides et al. 2008; Perchemlides et al. 2018), but there have been concerns about those treatments meeting ecological objectives, especially for restoration of native vegetation (Sikes and Muir 2009, Durren and Muir 2010, Perchemlides et al. 2008) and retaining sufficient patches to benefit chaparral associated birds, pollinators, and other wildlife (Stephens and Gillespie 2016; Gillespie et al. 2017; Gillespie and Stephens 2020). BLM's approach to treatment of chaparral has changed over the last 25-plus years. In the past, large areas of chaparral shrubs were removed using chains or machine masticators (slashbusters). The BLM does not propose chaining or machine mastication in this EA. Thinning trees and shrubs by hand and piling and burning slash has replaced mechanical mastication to reduce soil compaction, decrease surface fuels, limit introduction or spread of nonnative plants, and maneuver within stands during treatment to limit damage to desired leave vegetation.

Recent studies have indicated that thinning shrubs to protect legacy trees (oaks and pines) while retaining patches of shrubs will meet both fuels reduction goals and maintain adequate chaparral patches for associated bird use (Perchemlides et al. 2018; Gillespie et al. 2017; Stephens and Gillespie 2016, Perchemlides et al. 2008; Gillespie and Stephens 2020). The most recent data suggest leaving patch sizes of five to twelve acres and locating smaller patches close to larger patches is the most effective approach to support multiple bird species with varying requirements in chaparral (Gillespie and Stephens 2020).

Studies of past treatments in southwestern Oregon chaparral have found post-treatment increases in nonnative species (Perchemlides et. Al. 2008; Sikes and Muir 2009; Coulter et al. 2010). They also found increases in native species two years after handpile and burn (Sikes and Muir 2009) and increases in native re-sprouters, fire-dependent seedbank-generated shrubs, bulb plants, and reappearance of shrubs and forbs not previously documented in plots before wildfire (Hosten and Pfaff, date unknown).

In spite of the increase in nonnative plants from past chaparral treatments in southwestern Oregon, compelling reasons remain to conduct thinning and prescribed fire in this plant community, in addition to lowering the risk of high severity wildfire around Communities at Risk. These include: 1) treatments to remove ladder fuels next to legacy trees; 2) create more habitat for special status plants associated with chaparral habitat; 3) create stand age and structural heterogeneity in chaparral lacking recent wildfire; 4) create space to allow germination of annual native plants and increase native species diversity; and 5) create space for regeneration of new cohorts of shrubs, which will provide palatable browse for deer and elk. Concerns over negative impacts of past treatments in southwestern Oregon chaparral underscore the need to identify goals and implement treatments adapted to site specific conditions. Therefore, prescriptions proposed in this EA for chaparral treatments have been informed by previous studies and specialists' experience to reduce potential negative effects from past treatments, including restoring native species to disturbed sites through seeding or planting using appropriate site-specific species, thinning by hand instead of mechanical mastication, implementing prescribed fire consistent with wildlife and botany objectives and PDFs, retaining live shrubs >12 inches at the base, removing only portions of decadent shrubs, using gaps and skips (up to 5 acres) in the interior of units, and leaving smaller skips near larger patches to increase stand heterogeneity.

The restoration of understory vegetation has not always been a primary goal of thinning and prescribed fire treatments and responses of herbaceous native species to these treatments have not always been positive or well-studied. Studies that have measured understory response were of treatments that were focused on removing conifers or hazardous fuels, not on restoration of understory native species. The results of these studies have been varied; some have reported increases in native species abundance and/or richness, some have had neutral effects, and some have resulted in decreases in natives and increases in nonnatives. A review of scientific literature of the effects on understory vegetation from forest thinning in different countries throughout the world (Agra et al. 2016, pp. 40-49) found that in 17 of 25 studies, the density and cover of understory plants increased, 7 studies found no effect or mixed effects, and 1 study found a decrease in the abundance of herbaceous species. Thirteen of 19 studies found that thinning trees in forests increased species richness and diversity of understory plants, while seven studies found no effect.

A study in Bald Hills in the Redwood National Park (Livingston et al. 2016), where Douglas fir were removed from an Oregon white oak woodland, found that there was a transition in understory plants from forest to woodland species. Species richness, diversity, and cover increased from both prescribed fire alone and thinning with prescribed fire, with a smaller increase from thinning alone. A study in southwestern Washington in an Oregon white oak woodland where Douglas fir was removed found little change in the cover of native understory species after five years, but an increase in nonnative grass and Scotch broom cover (Devine et al. 2007). In southwestern Oregon several studies of handpile and burn and machine mastication treatments in low to mid-elevation xeric hillslopes in the Applegate have been conducted in chaparral and oak communities. One showed that cover increased on thinned sites, but species richness did not change; the greatest increases were in annual native forbs and nonnative annual grasses (Perchemlides et al. 2008). Another study (Coulter et al. 2010) found that prescribed burning of machine masticated slash at the site level resulted in a decrease in native species cover but an increase in species richness. Nonnative annual grasses and forbs increased in cover and richness. Native annuals declined in cover while perennial natives increased slightly and both increased in richness. A study of handpile and burn and machine mastication of ceanothus shrubs (Sikes and Muir 2009) saw little effect of either treatment one to two years later, on native or nonnative species; however, the site contained a high level of nonnative species before treatment.

A comparison of the effects of wildfire on serpentine and non-serpentine vegetation in chaparral and grasslands in northwestern California (Safford and Harrison 2008) found that the positive effects lasted longer in serpentine than in non-serpentine communities; species richness, diversity, cover, and biomass took longer to return to pre-fire conditions. Exotic species richness increased more on non-serpentine soils and remained higher after the fire than before, whereas there was no increase in exotics on serpentine soils after the fire. Perennial grass frequency increased in serpentine grasslands after the fire and only declined gradually after fire. They found that removing thatch from serpentine plant communities was beneficial because they are already dominated by native perennials and therefore the treatments resulted in an increase in native versus nonnative plants.

These studies show the variability in responses of understory vegetation to thinning and prescribed fire treatments. Different factors influence treatment effects on understory vegetation, including the type of treatment, existing site conditions, species composition prior to treatment, and time since treatment. Sites with intact native vegetation, on serpentine soils, or with higher canopy cover retention are less likely to see an increase in nonnative species after treatment, although retaining higher canopy cover may not meet the vegetation management objectives. Suggestions from previous studies to minimize increases in nonnative species after thinning and prescribed burning include retaining more trees and shrubs, using prescribed fire to increase the germination of fire adapted native herbaceous species, reducing the size of thinning units, implementing nonnative invasive plant management before and after treatments, and seeding or planting natives (Perchemlides et al 2008; Sikes and Muir 2009; Duren and Muir 2010).

Two studies looked at the effectiveness of seeding and planting native species after fuels reduction treatments to increase the abundance and diversity of native species and to compete with nonnatives. One study was conducted in the Applegate three to four years after mechanical mastication and prescribed fire in oak woodland and chaparral (Coulter et al. 2010). Seeded native bunchgrasses successfully established after fall burns, but not after spring burns, and successfully outcompeted nonnative species. A study in the Coast Range foothills of western Oregon experimented with the ability of seeded grasses and outplanted forbs to compete with nonnative grasses and forbs (Vance et al. 2006). Seeded grasses were successful at establishing, with some species establishing early and others taking a couple of years to establish and produce seeds. Native grasses outcompeted nonnative species where their cover was high. Planted forbs survived and set seeds but declined over three years. Over the three years the balance between grasses and forbs and natives and nonnatives created new equilibriums, but overall species diversity increased.

The BLM has been successfully seeding native grasses and forb species for the last 25 years after disturbance events, including wildfire; decommissioned landings, roads, and dozer lines; in burn piles; and after recreational development. Planting native trees, shrubs, and forbs has also been successful in riparian and other habitat restoration areas. Each site requires evaluation to determine the species that should be seeded or planted and the composition of grasses and/or forbs in the mixes. Native species are the preferred restoration goal, but there may be situations when the use of sterile nonnative grass or other noninvasive nonnative species may be used as a short-term ground cover to compete with nonnative invasive plants while natives become established. The use of nonnatives would have to be carefully considered, however, and not result in additional degradation to a site. Their use at Special Status plant sites and in ACECs should be a last resort and uncommon occurrence.

Studies in different plant communities have shown that incorporating prescribed fire into plant community restoration increases native species diversity by allowing native fire adapted species to germinate and reproduce. Removing grass thatch or fine surface fuels removes barriers to seed germination and burning releases nitrogen that increases plant growth. This includes germination of chaparral shrubs, ceanothus and manzanita. Regeneration of shrubs in thinned chaparral stands was higher in and around burn piles and in stands burned by wildfire (Duren and Muir 2010; Perchemlides et al. 2008; Sikes and Muir 2009; Bartuszevige and Kennedy 2009). Increases in plant diversity and cover were greater in burned only and thinned plus burned treatments versus thinned only (Livingston et al. 2016). A literature review of thinning and prescribed fire effects on understory vegetation (Bartuszevige and Kennedy 2009) found that understory vegetation responded with the highest increases in cover and production of native species from fire plus thinning treatments, whereas thinning only or burning only treatments resulted in moderate responses of understory vegetation. They also recorded that increases in nonnative invasive species was greater with more intense disturbance.

The take-away message of these studies is that ongoing weed treatments and seeding or planting native species are needed where restoration goals are to increase native plant abundance and diversity. These studies also show that treatment prescriptions have to take into consideration a number of factors and be tailored to conditions at the site and to restoration objectives.

Meadow Barriers Effectiveness

Previous projects in the Medford District that have been implemented to protect against resource damage in meadows and open plant communities where unauthorized uses have occurred include fencing at French Flat ACEC (Johnson 2019), Round Top RNA, Table Rocks ACEC; gates at French Flat ACEC, Waldo-Takilma ACEC, and Obenchain and Worthington Roads in Eagle Point; placement of boulders and trenches at Waldo-Takilma ACEC, boulders and fencing at the Right Fork Salt Creek in the Butte Falls Field Office, boulders placed around meadows at Obenchain and Worthington Roads in Eagle Point; fence construction around streams and ponds in the Butte Falls area, and construction of boardwalks at Table Rock ACEC and Eight Dollar Mountain ACEC. All of these projects have been effective at redirecting motorized, bicycle, horse, or pedestrian traffic back onto authorized routes and stopping damage to resources. Restoration and repair have included ripping, blading, or raking ruts and disturbed soil to stop erosion and reestablish natural contours and hydrological flow. Native plants have been seeded or planted to reduce erosion and reestablish native vegetation to compete with nonnative species that were introduced or spread during unauthorized uses. The areas where protective structures are most likely to be installed are at Special Status plant sites to protect against impacts to plants and habitat, in ACECs to protect relevant and important values, and in meadows that provide natural plant resources for pollinators, other wildlife, and seed sources for the Medford District native plant program.

Affected Environment

The special native plant communities targeted for treatment in this EA include oak savannas, oak woodlands, oak conifer stands, oak chaparral, chaparral, meadows, grasslands, and pine PVT stands. Oak woodlands represent approximately 4 percent of BLM lands in the Medford District, ponderosa pine stands 1 percent, Jeffrey pine stands 1 percent, chaparral 0.5 percent, and grasslands 0.9 percent. These special plant communities in the Medford District are recognized as needing protection or restoration because their extent has declined over the last 100 to 150 years through residential and commercial development, conversion to conifer forest, high intensity wildfire, conversion to agricultural or grazing lands, and road building. They have undergone degradation and loss of species diversity from the invasion of nonnative plants and changes in structure and species composition from fire exclusion. (USDI BLM 2016a, p. 549; Altman and Stephens 2012, pp. 5-7; Hosten et. Al. 2007, pp. 31-32; Livingston et al. 2016, pp. 1604-1605). Timber harvest and mining activities and recreational development and use have also impacted these plant communities, especially as vectors for nonnative invasive plants. These actions will continue in the future, resulting in further declines in the extent and quality of non-conifer and pine-dominated plant communities on private lands in the Medford District, especially around the valley floor and foothills. The loses of these habitats have been offset at small scales by conservation organizations, including The Nature Conservancy and the Southern Oregon Land Conservancy, who have purchased, preserved, and are managing lands with these plant communities to ensure their persistence.

Plant communities in southwestern Oregon were historically maintained by frequent, low intensity fire, either naturally occurring or intentionally set by indigenous peoples (Hosten et al. 2006, Klamath Bird Observatory and Lomakatsi Restoration Project, 2014). With fire exclusion, fire intolerant and shade tolerant species, such as Douglas fir and white fir, began to encroach into what was historically more open plant communities. Shrubs and trees moved into meadows, grasslands, and open savannas and there has been a gradual conversion in some areas to more closed canopy woodlands. Shade intolerant species, such as ponderosa, Jeffrey, and sugar pine, Oregon white oak, and some understory herbaceous species have been shaded out (Livingston et al. 2016, p. 1608), resulting in a loss of species diversity, including some of the BLM's rarest plant species. Plant communities at lower elevations, especially prairies and oak woodlands, have also been displaced or altered where communities have become established and other human endeavors have occurred. One study showed a 75 percent decrease in species richness of prairie plant species in an oak woodland after 27 years of Douglas fir encroachment (Foster and Schaff 2003).

A study conducted in 2013 by TNC estimated that 45 percent of the white oak habitats in the Rogue Basin have been lost over the last 100 – 150 years, with agricultural conversion and conifer encroachment being the largest contributors to the losses (Schindel et al. 2013, p. 4). Approximately 14.7 percent of oak savannas, woodlands, and prairies have been lost to succession or conifer encroachment, 20.5 percent to agriculture and grazing, and 9.4 percent to development (Schindel et al. 2013, p. 29). In the Medford District, the BLM manages only 26.21 percent of lands containing oak plant communities (USDI BLM 2016a, p. 550). This highlights BLM's role and responsibility for managing these plant communities to ensure their unique characteristics and associated plant and wildlife species persist.

A 2012 study (Duren, Muir, and Hosten) that compared 1850s vegetation to current vegetation by comparing section corner data from the General Land Office surveys with 2005 aerial color orthoimagery, found that there was a 4.2 percent decline in closed type plant communities, a 5.2 percent decline in open types, and a 9.5 percent increase in human dominated landscapes. The biggest changes were a 38.1 percent loss of mixed conifer-hardwood stands, a 16.2 percent increase in conifer stands (although there was no comparison of stand ages between times), and a 17.2 percent increase in hardwood stands. Although overall percentages of closed versus open vegetation did not change significantly, they noted that vegetation transitioned from one type to another at 56.2 percent of the section corners. They found that "...27.1 percent of the transitions were consistent with the expected effects of fire suppression. (p. 323)." They also noted that the majority of transitions from open to closed habitat occurred on federal ownership, likely as the result of successful fire suppression efforts.

The fire history, historical extent, and status of chaparral stands in southwestern Oregon has been unclear, but recent studies have shed some light on them. Durren, Muir, and Hosten's study (2012) show that the percentage of shrublands, approximately 1 percent of the landscape, is the same today as it was in the 1850s. However, the study also found that most of the shrublands at the 1850s section corners are now conifer stands (p. 319), which suggests there has been succession in some stands, while historically open grasslands may have transitioned to shrublands. Some chaparral stands have remained in a shrub state due to xeric conditions and poor soils that limit tree growth.

Southwestern Oregon chaparral appears to have a longer fire return interval than surrounding conifer stands and to burn at higher severity during wildfire than other wooded plant communities (Durren and Muir 2010). Contrary to chaparral species in other areas, sticky manzanita (*Arctostaphylos viscida*) and wedgeleaf ceanothus (*Ceanothus cuneatus*), the two main chaparral species here, do not require fire to germinate (Sikes and Muir 2009, p. 18). In California, chaparral stands are even-aged and entirely replaced by wildfire, whereas Oregon stands represent uneven-age shrubs, including shrubs that survived the last fire event (sticky manzanita 93 percent of the time) and shrubs that germinated over time (wedgeleaf ceanothus 64 percent of the time) (Durren and Muir 2010). This study and others noted, however, that wedgeleaf ceanothus regenerates faster after fire. Studies have concluded that chaparral has not experienced the structural changes or shifts in fire severity that other southwestern Oregon plant communities have (Durren and Muir 2010) because they historically experienced infrequent and higher severity wildfire.

Chaparral is a unique plant community that supports a variety of wildlife and plant species, some of them unique to this plant community. Chaparral provides structural heterogeneity and species diversity and is an important component in the matrix of plant communities and habitats across the Medford District. It is often an intermediate community between mixed hardwood-conifer stands and meadows, grasslands, oak savannas, or oak woodlands. In the absence of a natural wildfire regime, thinning and prescribed fire treatments are appropriate in southwestern Oregon chaparral to develop new cohorts of shrubs to maintain stand heterogeneity (Sikes and Muir 2009, p. 21) and reduce ladder fuels next to legacy oaks (Perchemlides et al. 2018). Removing a portion of shrubs in chaparral would also allow for regeneration of native herbaceous species, especially annuals and Special Status species, so they can germinate, flower, and produce seed to contribute to the seed bank and ensure their persistence. Thinning would also increase areas of suitable habitat for chaparral-associated Special Status plant species to expand their populations, which would contribute to their conservation.

Special meadow or grassland communities in southwestern Oregon include dry and wet prairies, vernal pool mounded prairie, vernally wet meadows, mountain meadows, and serpentine wetlands. In species composition and structure, they merge into savannas which have varying levels of oak, pine, and shrub canopy. Historically the majority of grasslands and prairies occupied the valley bottoms and low hillsides, the same locations where the most residential, urban, and commercial development, agriculture, grazing, road building, and dominance by invasive plants has occurred. These activities have replaced or degraded these plant communities in the last 100-150 years. For example, vernal pool mounded prairie habitat in the Rogue River plains has been reduced by approximately 60 percent (USDI FWS 2010, p. 42491). Durren, Muir, and Hosten's vegetation study (2012) documented that one-third of the section corners that were prairie during the settlement era are still prairie with the rest now either savanna or closed vegetation types. The study did not document the current condition of the prairies and it is likely some have been or are being encroached by conifers, as is the case in the Illinois Valley serpentine meadows and in meadows at Round Top RNA in the foothills of the Cascade Mountains, to name just two areas. Although tree establishment may currently be limited in some meadows and grasslands because of shallow soils, they may gradually transition over time to woodlands as encroaching vegetation adds organic matter and nutrients to the soils, making them more suitable for tree growth. Grasslands and meadows have also been degraded by the invasion of nonnative grasses, which outcompete native species and contribute to the accumulation of thatch, further suppressing the germination and survival of native species.

In addition to conifer encroachment, development, conversion to grazing and agriculture, and invasion of nonnative invasive plants, grassland communities in southwestern Oregon have also been damaged by unauthorized uses. Damage has occurred at federally-listed plant sites (USDI FWS 2019, p. 2; Kaye et al. 2019, p. 2, 23; Pacific Crest Consulting 2020, pp. 73-74), Sensitive plant sites (Brown 2017, p. 53; Malaby 2005, p. 12; USDA FS, USDI BLM 2018, p. 30), ACECs (Schomaker and Bahm 2018, p. 2, 12; Johnson 2019), and in other meadows and open habitats in the Medford District. OHVs, other vehicles, bicycles, hikers, and horses traveling off authorized road or trail systems, or trash dumping and unauthorized camping have caused damage, including the creation of ruts, erosion, removal of native vegetation, damage or mortality of special status plants, degradation of designated critical habitat, disruption of natural hydrological flow patterns, and exposure of bare soil that is then invaded by nonnative plants. These situations and conditions have interfered with the recovery of listed plants, the conservation of Sensitive plants, protection of relevant and important values in ACECs, protection of cultural sites, protection of intact native plant communities, and collection of native plant seed as part of the Medford District native plant program.

The increase in shade tolerant conifers – Douglas fir, white fir, and incense cedar – within conifer stands in southwestern Oregon have filled in historically more open ponderosa, Jeffrey, and sugar pine stands, overtopping and outcompeting pine saplings, shading out understory grasses and forbs, and converting stands to Douglas fir dominated. Ponderosa and Jeffrey pine stands are in the drier range of conifer stands in southwestern Oregon and usually occur on south or west-facing slopes. In the Planning Area, ponderosa pine and Jeffrey pine stands represent approximately one percent of forested areas each. Sugar pine does not occur as a dominant species in forested stands but occurs as a component in the other conifer PVTs, including moister site series. See Appendices 3 (General Current Condition of Forest Vegetation) and 5 (Fire and Fuels) for additional background on the current conditions and restoration needs of pine PVTs.

Representative areas of all these native plant communities have been protected through designation by the BLM as ACECs, which include Research Natural Areas (RNAs). ACECs are designated by the BLM to protect specific important and relevant historical, cultural, scenic, fish, or wildlife values, other natural resources, or to protect human life and safety from natural hazards. RNAs are designated "…to preserve examples of significant ecosystems and provide opportunities for education, research, and collection of baseline data in relatively unaltered natural communities (USDI BLM 2020b)." Table F-4 in the SWO ROD/RMP (pp. 253-254) identifies 28 ACECs within the Medford District and describes the specific relevant and important values they were designated to protect. Table F-3 (pp. 251-252) describes the vegetation management needed to maintain, enhance, or restore those values. Table F-2 in the NCO ROD/RMP lists one additional ACEC and its relevant and important values – West Fork Illinois River RNA – that is managed by the Medford District but located within the Coos Bay District (p. 227); Table F-1 lists the vegetation management direction for the ACEC (p. 226). The PRMP/FEIS assumed that "...the relevant and important values associated with an ACEC...would be adequately protected by the special management direction" under the PRMP/FEIS (USDI BLM 2016b, p. 132). These tables and their associated management direction are incorporated here by reference. Management actions described in these tables to protect relevant and important values in ACECs include thinning vegetation; burning piles, broadcast burning, conducting prescribed burns; managing vegetation for fire resiliency, to maintain natural communities, and to improve and maintain habitat for rare plants; and using uneven-aged management to improve forest structure and fire resistance and resiliency across the landscape while retaining legacy trees. Seventeen of the ACECs contain Special Status plants and seven contain Cook's lomatium designated critical habitat. Twenty of the ACECs contain mixed conifer-hardwood plant communities, oak woodlands and/or savannas, chaparral, grasslands, or meadows where vegetation management is needed to maintain, enhance, or restore the relevant and important values.

Table 39 in Appendix 3 lists acres at risk of negative effects from wildfire on the HVRAs in the Medford District, based on the Pacific Northwest all-lands, Quantitative Wildfire Risk Assessment. The risk to highly valued resources in ACECs, based on the total acres of ACECs in the table, is 46 percent in the very high negative category, 21 percent in the high negative, 23 percent in the moderate negative, and only 10 percent in the low negative category. This risk is of damage or destruction of Special Status plant sites or their habitats and to plant communities with high surface and ladder fuels that would undergo stand replacement from wildfire.

Climate Change

Several studies have been conducted recently of the potential effects to vegetation in southwestern Oregon from climate change and of management options that would enable persistence of plant communities (Halofsky et al. 2016; Halofsky et al. 2020; Olson et al. 2012; Schindel et al. 2013; McKenzie et al. 2004; Rabins et al. 2016). Climate change scenarios differ but seem consistent in predicting hotter temperatures, drier summers, and increased wildfire events for southwestern Oregon. Halofsky et al.'s (2020) climate change vulnerability assessment determined grasslands and chaparral in the Rogue Basin have low vulnerability to impacts from climate change, oak woodlands have moderate vulnerability, and dry forests, which would include pine dominated forests, have high vulnerability. All areas are at higher risk of increased area burned and burn severity. Open plant communities will be at a higher risk of invasive plants, which will result in declines in plant diversity, especially native species, both in species and at population level genetics (Halofsky et al. 2016, pp. 6-7). Predictions for oak woodlands' scenario under climate change were conflicting. Some studies concluded oak species would benefit and increase in currently closed canopy stands (Halofsky et al. 2016, p. 6) if conifer species decline from drought stress, insect infestations, and increased fuels loads and vulnerability to stand replacing fire (McKenzie et al. 2004, p. 898). Others suggested the current territory occupied by Oregon white oak would become significantly less hospitable for this species (Rabins et al. 2016, p. 10). Both Rabin's and Schendel's models showed the range of Oregon white oak has already and would likely continue to shift to the east

(Rabins et al. 2016, p. 10; Schindel et al. 2013, p. 27). Herbaceous species, especially those associated with unique habitats with narrow ecological amplitude, such as serpentine associated species, or those associated with late seral habitat, may be at risk of extirpation from climate change (Halofsky et al. 2016, pp. 6, 8; McKenzie et al. 2004, pp. 898-899).

These studies suggested management actions that would prepare plant communities to adapt to climate change, including reducing stand densities and introducing fire to reduce drought stress, damage from insects or diseases, and to increase resilience to high severity wildfire; creating gaps to provide for understory shrub and herbaceous species establishment; and thinning around legacy trees (Halofsky et al. 2016, pp. 7-11).

APPENDIX 9 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

In developing alternatives, the BLM considered numerous ways to meet the Purpose and Need, including alternatives proposed or suggested by the public. The alternatives selected for detailed analysis reflect a reasonable range of alternatives that respond to the Purpose and Need for action identified in Chapter 1. The BLM did not analyze in detail all proposals for the public. The BLM eliminated potential alternatives (or elements of alternatives) from detailed analysis if the alternative or element would:

- Be ineffective (it would not respond to the purpose and need).
- Be technically or economically infeasible (considering whether implementation of the alternative is likely given past and current practice and technology).
- Be inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the LUP).
- Have remote or speculative implementation.
- Be substantially similar in design to an alternative that is analyzed.
- Have substantially similar effects to an alternative that is analyzed.

(*see* BLM NEPA Handbook H-1790-1 [USDI BLM 2008b], Section 6.6.3).

The following alternatives were considered but eliminated from detailed analysis for the reasons stated below.

1 Natural Selection Alternative

Public comments submitted or supported the "Natural Selection Alternative" for consideration during the scoping period for the EA. The Natural Selection Alternative has been previously submitted for consideration under previous EA's produced in the Medford District. The Natural Selection Alternative removes only dead trees based on "natural selection extraction," defined as "the process of extracting dead trees in a way that retains natural community-ecosystem photosynthesis and species trait-environment compatibility." (Deer Creek Valley Natural Resource Association, Appendix 1, p. 28). Living trees are not extracted under the Natural Selection Alternative; dead trees are only removed, as characterized in the submitted alternative, at a "sustainable level" so that sufficient snags and woody material remain "to serve other species needs." Deer Creek Valley Natural Resource Association, p. 5). Additionally, prescribed fire is not used in the Natural Selection Alternative (Deer Creek Valley Natural Resource Association, Appendix 1, p. 13).

The BLM eliminated this alternative from detailed analysis because it does not conform to SWO ROD/RMP management direction, and it does not meet the purpose and need defined in Sections 1.3 and 1.4. Of this EA. Furthermore, the BLM considered the natural selection alternative in its PRMP/FEIS and eliminated it from detailed analysis as it would not meet the purpose and need described for the development of action alternatives (USDI BLM 2016a, p. 103).

The SWO ROD/RMP prohibits removal of snags (i.e., dead trees) greater than 6 inches DBH in the LSR or the RR during silvicultural treatments. Additionally, the SWO ROD/RMP directs that in stands ≥ 10 acres in the LSR, silvicultural treatments should result in RD percent between 20 percent and 45 percent after harvest. The Natural Selection Alternative would require removal of dead trees over 6 inches DBH and would not achieve the required RD percentages.

The Natural Selection Alternative is very similar, if not the same, as the No Action Alternative (since the RMP prohibits removal of snags >6 inches DBH) therefore, the effects to vegetation would be the same as those described for the No Action Alternative.

Because effects to vegetation are the same as those described in the No Action Alternative, the Natural Selection Alternative would not alter stand structure sufficiently to adjust successional classes, and therefore would not affect the imbalance of open and closed forest stages or improve forest resilience as defined Chapter 1. Nor would it address conifer encroachment in native plant habitat or promote or develop wildlife habitat.

Additionally, the Natural Selection Alternative would prohibit prescribed fire, contrary to the purpose and need of this EA to apply prescribed fire, and the SWO ROD/RMP management direction for LSR-Dry to "apply prescribed fire in low/mixed severity or high-frequency fire regimes to emulate historic fire function and processes"; "apply prescribed fire across the landscape to create a mosaic of spatial and temporal stand conditions and patterning (appropriate to the fire regime)," and "apply prescribed fire and mechanical or hand fuels treatments to reduce the potential for uncharacteristic wildfires" (USDI BLM 2016a, p. 75).

In summary, the Natural Selection Alternative embodies a forest management philosophy that directly contravenes the approach set forth and the decisions made in the SWO ROD/RMP, and does meet the purpose and need of the IVM-RL program of work, and therefore was eliminated from detailed analysis.

2 Plantation Stand Alternative

Public scoping comments submitted or supported an alternative that only thinned in plantations under 60 years old (no natural or un-even aged stands). The alternative would use a thin from below prescription with a twelve-inch tree diameter limit and without creating openings (i.e., "gaps"). Treatments would maintain all NSO habitat function (no downgrade or removal of habitat) and would not reduce canopy cover below 60 percent. Non-forest (i.e., non-conifer) plant communities would be thinned only within ¼ mile of human communities. No treatments in LSR, RRs, District Designated Reserves, or located in NSO home ranges, in areas supporting sensitive species, or on geologically unstable terrain.

Only thinning plantations under 60 years old and excluding treatments in LSRs, RRs, District Designated Reserves, or located in NSO home ranges, in areas supporting sensitive species, or on geologically unstable terrain would exclude a large amount of the Treatment Area and it would not be possible to meet the purpose and need for action (Sections 1.3 and 1.4) with treatments only on the areas remaining.

The purpose for action also included promoting fire and disturbance resilient lands in response to the need for a balance of open and closed forest stands that more closely resemble the natural range of variability. The current imbalance has an over-abundance of mid-closed successional stage stands in the Planning Area and a deficit of late-open successional stage stands. An open stand condition generally has a canopy cover of 40 percent or less. A thin from below prescription that does not reduce canopy cover below 60 percent by definition does not adjust stands from a closed to open stand condition, and therefore does not achieve the purpose of shifting the balance between open and closed stands.

The purpose and need also includes promoting and developing habitat for Special Status Species and unique native plant communities in all LUAs in the Treatment Area, including pine and oak and other non-conifer plant communities. This Alternative would only treat in conifer plantations, which would not be able to address promoting and developing unique native plant community habitat.

Because this Plantation Stand Alternative as submitted does not meet the purpose and need for action, it was considered but eliminated from detailed analysis. However, the action alternatives in this EA incorporate many of the elements proposed in this publicly proposed alternative, which the BLM intentionally did to be as responsive as possible to public input and to analyze a reasonable range of alternatives. For example, Alternative B maintains all spotted owl habitat function. Alternative A treats only within plantations < 60 years old and areas within ¼ mile of Communities at Risk (in addition to operationally strategic areas for wildfire containment). Alternative C also includes treatment of plantations. While these alternatives treat more broadly than the Plantation Stand Alternative, they do adopt some of the concepts to varying degrees.

3 "Amended Alternative A"

Multiple public comments submitted or supported an alternative termed an "Amended Alternative A" which modified several components of Alternative A. Comments submitted several slight variations of an

Amended Alternative A, however the central and consistent modifications to Alternative A were to include only non-commercial, prescribed fire, and fuel reduction treatments, and exclude commercial harvest. Treatments would only be within ¼ mile of Communities-at-Risk and in plantations <60 years of age, but not along strategic areas. Some variations also limited treatments cutting trees ≤ 12 inches DBH, maintaining all NSO habitat, maintaining canopy cover at ≥60 percent, or limiting community-at-risk treatments or chaparral thinning to only those locations in proximity (e.g., 500 feet) to homes, structures, or infrastructure. Additionally, some variations also eliminated new landings construction and road renovation.

This Amended Alternative A does not meet the purpose and need for action. Because the alternative excludes commercial treatments, it cannot address the need to contribute towards applying selection harvest or commercial thinning treatments to at least 17,000 acres per decade in the LSR-Dry LUA, as required by the SWO ROD/RMP. Additionally, this alternative would not meet the need to promote fire and disturbance resilient lands by adjusting the balance of open and closed successional classes. A reduction of canopies below 60 percent, is necessary to adjust stands from a closed to open stand condition as the landscape is deficient of open forest (see purpose and need section; USDI BLM 2016a, p. 226), and therefore is necessary to reduce the overabundance of mid-closed stands and address the deficit of mid-open and late-open successional class stands. Because this amended version of Alternative A did not meet the purpose and need for action, it was eliminated from detailed analysis.

4 Klamath-Siskiyou Wildlands Center Proposed Alternative

Public comments submitted by Klamath-Siskiyou Wildlands Center included an alternative they termed "Ecological Forestry." Alternative B of this EA, which was analyzed in detail, is based on this publicly submitted alternative, and incorporates nearly all elements of this publicly submitted alternative. However, some elements did not conform to RMP management direction, did not meet the purpose and need, or were not operationally feasible. Those elements were not included in Alternative B. The elements from this alternative that were not included in Alternative B, and the rationale for excluding each, are as follows:

- *When treating the inner zone of Riparian Reserves, create small <0.1 acre openings on low gradient coho streams to increase primary production or larger openings to encourage beaver dams and in conjunction with beaver dam analogs.* This was not included, because aquatic restoration (beaver activity and habitat) is outside the scope of the proposed action and is not part of the Purpose and Need for action in this EA. The Medford District has a comprehensive aquatic restoration program that is documented in a separate EA, DOI-BLM-ORWA-M000-2018-0001-EA (2019).
- *…Up to 15 miles temporary road on existing road prisms, up to 2 miles temp roads on new prisms. Each temp road on new prism would be limited to 500 ft. Road construction in RR would be limited to temporary roads on existing prisms.* The intent or meaning of this suggested element was not clear to the BLM; new roads cannot be built on existing road prisms. If we interpret the commenter's suggestion to mean building temporary roads on the prism of previous temporary roads or decommissioned roads, then this element does not meet the Purpose and Need for Action. The Need for action requires the ability to access and commercially treat a wide diversity of areas across the Treatment Area, many of which do not have road prisms for previous temporary roads or decommissioned roads. Additionally, not all previous roads were previously situated in locations (e.g., steep slopes, connectivity to waterways, unstable areas) that were conducive to reducing environmental effects from roads. For example, BMP R01 encourages locating temporary and permanent roads on "stable locations, e.g., ridge tops, stable benches, or flats, and gentle-to-moderate side slopes" (USDI BLM 2016a, p. 167). In these situations, BLM would opt to not re-use old road prisms that could have greater environmental effects on resources, further limiting access options. Limiting temporary roads to only such locations, or to new prisms no more than 500 feet each, would unduly constrain BLM's ability to access areas in need of management and the projects' purpose and need.

- *Up to 10 miles of new system roads per year allowed if they replace an existing system road with high erosion/sedimentation. No net increase of system roads.* This element was not included in Alternative B because it was substantially similar to Alternative C. This element is included in Alternative C, and could be selected by the decision maker as part of modified Alternative B. Alternative B included a lesser road mileage (5 miles maximum per year) and no new road construction. By including this lesser road mileage in Alternative B, and the higher mileage (with no net increase of permanent roads) in Alternative C, it allowed the BLM to analyzed for a wider range of alternatives.
- *Decommission at least 10 miles of public/private ghost roads/year that are producing high amounts of sediment to coho streams or have failing culverts, (e.g., ghost roads in N. Fork Deer Creek). Hydrologically obliterate abandoned roads within and adjacent to units.* This element is outside the scope of the proposed action and was not included because it is not part of the Purpose and Need for action. Road decommissioning and hydrologic obliteration as independent actions are not part of the Purpose for action in the EA. Road decommissioning in this EA is included merely as a necessary part of temporary road building, or as an offset to new permanent road building to ensure no net increase, and is not a purpose independent of vegetation management actions. The Medford District has a comprehensive aquatic restoration program, documented in an EA, DOI-BLM-ORWA-M000-2018-0001-EA (2019), that includes road decommissioning and obliteration as independent actions.
- *Implement road closures with existing gates or new barriers where risk of vandalism (e.g., trash dumping, OHV use, shooting ranges) or escaped campfires is high.* This element is outside the scope of the proposed action and was not included because it does not meet the Purpose and Need for action. Closing roads is not a purpose for action in this EA. While placing boulders and fences to prevent unauthorized use is part of the Purpose for action, closing roads as an independent action is not part of the Purpose. Road closures as independent actions are generally more appropriate in the context of more comprehensive travel management planning, which is not part of the Purpose for action.
- *All culverts within project area will be prioritized for replacement if they block or impede coho salmon migration. Culverts on log haul routes that are barriers to coho salmon would be replaced, regardless of ownership.* This element is outside the scope of the proposed action and was not included because it does not meet the Purpose and Need for action. While culverts replaced as part of road maintenance, renovation, or upgrade connected to vegetation management actions would be replaced with fish-passage friendly culverts, replacing culverts as an independent action is not part of the Purpose for action. The Medford District has a comprehensive aquatic restoration program, documented in a separate EA, DOI-BLM-ORWA-M000-2018-0001-EA (2019), that includes culvert replacement for fish passage purposes as an independent action.
- *Adaptive Management*. The submitted alternative had numerous references to using an adaptive management approach. However, comments contained only general and broad references to adaptive management as a principle. Comments were not specific as to what results or conditions should be monitored, what results or conditions might trigger adapting current or future management actions in the program of work, or how those adapted management actions would differ. Because the BLM did not have more specific information, it could not develop an alternative that included these general adaptive management suggestions.

5 **Modify the Action Alternatives to Exclude Treatments in Late Successional Areas**, in NSO Nesting-Roosting-Foraging habitat, or that would downgrade or remove any NSO habitat within conservation-based LUAs.

Public scoping comments from Deer Creek Valley Natural Resources Conservation Association proposed modifying the EA alternatives to eliminate late successional areas and NRF habitat from the Treatment Area, and to exclude treatments in conservation-based LUAs that would downgrade or remove any NSO habitat. As an initial matter, the BLM interpreted NRF habitat to mean habitat that supports all of the functions of nesting, roosting, and foraging. The BLM separates NRF into nesting-roosting and foraging, as consistent with the SWO ROD/RMP definitions.

This alternative was considered but eliminated from analysis because the alternative is substantially similar in design or effects as other action alternatives.

Regarding excluding treatments in late successional areas, this is substantially similar in design and effects to Alternative A. The Treatment Area contains 89,704 acres of late successional (both open and closed) areas. The actions proposed in Alternative A include an Eligible Footprint in late successional areas for commercial treatments of only 2,986 acres (3.3 percent of the late successional areas in Treatment Area) and for small-diameter and non-conifer treatment of 17,680 acres (19.7 percent of the late successional areas in the Treatment Area). While dropping small-diameter and non-conifer treatments in late successional areas would affect nearly 20 percent less of the overall successional areas in the Treatment Area in the short-term, one third of those acres are located in the HLB, where under the No Action Alternative, those acres would eventually be commercially harvested (per SWO ROD/RMP management direction) and converted to a different successional class. Dropping the late successional areas from Alternative A would have only a marginal difference in design or effects.

Regarding excluding treatments in NSO NR habitat, this is substantially similar in design and effects to Alternative A. The Treatment Area contains 86,752 acres of NSO Nesting-Roosting habitat. The actions proposed in Alternative A include an Eligible Footprint for commercial treatment of only 1,911 acres of Nesting-Roosting habitat (2.2 percent of the NR habitat in the Treatment Area) and for small-diameter and non-conifer treatment of 8,039 acres (9.3 percent of the NR habitat in the Treatment Area). Dropping the NSO NR habitat from Alternative A would have only a marginal difference in design or effects, especially for commercial treatments, which are the primary source of impacts to NR habitat. Furthermore, all action alternatives would maintain NR function at the stand level, further suggesting that impacts to owl habitat would be substantially similar to the proposed alternative.

Regarding excluding treatments that would downgrade or remove any NSO habitat in reserve LUAs, Alternative B already includes this element. There is no downgrade or removal of NSO habitat function in any LUA in Alternative B, which is in fact a more restrictive approach with lesser effects to NSO habitat than the submitted alternative.

Because the submitted public alternative is already included in, or is substantially similar in design and effects, to other action alternatives in the EA, this alternative was considered but not analyzed in detail. BLM chose to limit the sideboards for road construction to limit the complexity of analysis that would be required to estimate effects of increased road densities over a 10-year program of work.

6 Salvage in Mile Post 97 Fire Area

An alternative submitted in public scoping comments suggested salvaging in the Mile Post 97 fire area. The BLM eliminated this alternative from detailed analysis because it is not needed to meet the purpose and need defined in Chapter 1 of this EA.

Salvage harvest in the SWO ROD/RMP is defined as “removal of dead trees or of trees damaged or dying because of injurious agents other than competition, to recover their economic value” (USDI BLM 2016a, p. 312). Under the SWO ROD/RMP, salvage harvest is allowed in the HLB. The purpose and need in Chapter need and excludes commercial actions in the HLB, including salvage, and therefore does not meet the purpose and need of the program. Commercial actions in the HLB, including salvage harvest when appropriate, will be addressed in separate NEPA documents and efforts.

7 Maximum Treatment Alternative

Public comment from the American Forest Resource Council proposed variations on the alternatives. Many of those variations were incorporated into or already reflected in Alternative C as proposed in this EA (Alternative C in the current EA is a blend of Alternatives C and D as presented to the public during public scoping). However certain elements of the maximum treatment alternative were considered but were not included in Alternative C or analyzed in detail. Those elements include:

- Commercial treatment in NSO NR habitat within late-closed successional classes in *high* RHS areas.
- Allow an RDI range for treating NSO NR habitat that extends lower than 45 percent RDI.
- 10,000 acres per year maximum for small diameter thinning and non-conifer treatment.
- New permanent road construction that would increase permanent road density for sustainable forest timber management.

In the case of the above elements, the BLM opted not to analyzed them in detail for multiple reasons.

Treating late-closed NSO NR habitat within late-closed, *high* RHS areas would not contribute to the Purpose and Need to promote and develop habitat for special status species. These stands represent well developed, high functioning NSO habitat that would generally benefit very little from silvicultural treatment.

Vegetation treatments in NR would not occur if they would not maintain NR at the stand-scale in LSR when thinned using RDI requirements (20-45 percent RD) prescribed by SWO ROD/RMP management direction (USDI BLM 2016b, p. 72; USDI BLM 2016c, p. 66).

Although the BLM initially presented an alternative during scoping that included a maximum acreage limit of 10,000 acres/year of small diameter thinning and non-conifer treatment, this acreage limit was not carried forward into detail analysis. The BLM, after further review, determined that given current agency capacity and trends, this acreage limit was unlikely to be operationally feasible.

BLM considered but did not analyze in detail, an alternative that would increase road density for the purpose of sustainable timber management and firefighter ingress and egress, because it was not needed to meet the purpose and need identified for the IVM program of work. The BLM did consider permanent and temporary road construction (Table 2) to meet the purposes identified in Section 1.3 of the EA, which are [t]o remove vegetation…to apply prescribed fire, and to install protective structures in the Treatment Area to promote and develop: Safe and effective wildfire response and reduce wildland fire risk to HVRAs (specifically, Communities at Risk, NSO habitat and sites, marbled murrelet habitat and sites, special status plants, and special plant communities); Fire and disturbance resilient lands and fire-resistant stands; Habitat for Special Status Species and unique native plant communities.

8 Commercial Treatments Without Upper Diameter Limits

This Alternative was considered but eliminated from detailed analysis because it does not comply with the SWO and NCO ROD/RMPs. The RMPs place an upper diameter limit in certain LUAs on certain trees established before 1850 (for example, in the LSR-Dry LUAs, Douglas fir and pine trees ≥36 inches DBH and established before 1850 must be retained). However, in the spirit of this comment, Alternative C does not place any diameter limits beyond those required in the SWO and NCO ROD/RMPs.

9 Selectively Log all Forests (Public and Private Holdings) and Keep Milling of logs Local and Promote Small Scale, Small Business Logging in Oregon.

This alternative was proposed during the EA comment period. Other than proposing to selectively harvest all public and private lands, this comment lacked specificity to determine if this proposal would differ from existing alternatives to an extent that could warrant a separate analysis, or whether it would meet the SWO and NCO RODs/RMPs, policy, and regulation. The BLM has developed three action alternatives to respond to the purpose and need and selection harvest is common to all action alternatives analyzed in detail in EA. Each alternative includes varying levels of selection harvest among the alternatives and variations on how selection harvest would be applied under each alternative to meet the identified purpose and need. Furthermore, the EA only involves BLM-administered lands, and the BLM does not have jurisdiction or authority to propose selective harvest actions on private or other public lands. Therefore, an alternative that would in general selectively harvest all public and private lands is not analyzed in detail in this EA.

No contractual mechanism exists for the BLM to promote small-scale, small business logging or to keep the milling of logs local. Therefore, an alternative that would only “keep milling of logs local and promote small scale, small business logging in Oregon” is outside the BLM’s jurisdiction to determine and outside the scope of the EA. However, none of the action alternatives preclude opportunities for small businesses or small-scale operations during its implementation.

APPENDIX 10 ISSUES CONSIDERED BUT NOT ANALYZED IN DETAIL

The BLM considered issues raised during scoping, either by the BLM or by the public. However, the BLM did not analyze in detail all issues it considered. BLM did not analyze in detail issues that did not relate to how an alternative responded to the purpose and need and did not point to a potentially significant environmental effect or effects that would not exceed those analyzed in the PRMP/FEIS.

This Appendix discusses analytical issues that were considered but not analyzed in further detail, including the rationale for not analyzing them further. Many of these issues were submitted by the public during scoping, which is noted in some (but not all) issue discussions.

A. Hydrology & Water Quality

General Hydrology Background

The Planning Area lies within two major river basins: 95 percent of the area is in the Southern Oregon Coastal Basin, which includes the Umpqua and Rogue, and 5 percent in the Klamath Basin. These large river basins are comprised of smaller watersheds linked by stream, riparian, and subsurface networks.

The Planning Area has a climate characterized by moderate temperatures, wet winters, and dry summers. About 80 percent of the precipitation occurs between October and March. Elevation bands for precipitation zones vary depending on the location within the Planning Area. Rain predominates in the lower elevations. Winter precipitation in the higher elevations usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. A mixture of snow and rain occurs between the rain and snow zones. This area is referred to as the transient snow zone. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. Shallow snow packs often build-up in this elevation range, and then are quickly melted by rain and warm winds.

In general, streamflow characteristics are similar throughout the Planning Area, with most of the runoff and flooding on both large and small streams being caused by winter rains. Major floods have occurred when winter rains combine with melting snow.

Surface water in the Planning Area includes streams, springs, wetlands, natural lakes and ponds, and constructed ponds and reservoirs. Streams in the Planning Area are classified as perennial, intermittent, and dry draws with ephemeral flow. Stream types on BLM-administered lands will be identified through site visits during project planning, as required by the SWO ROD/RMP (USDI BLM 2016b, pp. 3-4). The inventories assess stream location, stream duration, and document the location of wetland and unstable areas to assure that sensitive areas are excluded from commercial treatment units and would successfully filter sediment from transporting off-site. Streams categorized as perennial or intermittent on BLM-administered lands are required to have RRs, as are springs, wetlands, natural lakes and ponds, and constructed ponds and reservoirs. RR distances by water feature are summarized in Table 6 of the SWO ROD/RMP (p. 77) management direction for the inner, middle, and outer zones of streams in sub-watershed classes 1, 2, and 3 is specified for moist and dry forest types in the SWO ROD/RMP (pp. 78-87).

Groundwater supplies in the Planning Area are limited (USDI BLM 1994, pp. 3-13). The Oregon Water Resources Department has not identified any critical groundwater areas within the Planning Area https://www.oregon.gov/owrd/programs/GWWL/GW/Documents/GWAdminAreasMap.pdf.

1. *What are the effects of the proposed project activities (i.e., creation and use of skid trails/yarding corridors, roadwork, and log haul) on sediment delivery to streams?*

Background

Potential impacts to water quality are possible through project activities that cause erosion and sediment transport, when these activities have hydrologic connectivity to streams. Hydrologic connectivity is used in this discussion to describe activities or disturbances that convey or have the ability to convey sediment to water features, either seasonally or chronically. The proposed activities with potential to cause sediment delivery to streams are the creation and use of skid trails and skyline yarding corridors for logging, roadwork (road maintenance, road and landing construction, renovation, and decommissioning), and road use (primarily from timber haul).

The PRMP/FEIS identified that roads can deliver up to 90 percent of the total sediment production from forestry activities (p. 402). The distance that sediment travels along roadways depends upon a number of factors, including underlying geology, age of road since construction, road gradient, road drainage, and ground cover (USDI BLM 2016a, p. 402). Roads have three primary effects on hydrologic processes: (1) they intercept rainfall directly on the road surface and road cutbanks and affect subsurface water moving down the hill slope; (2) they concentrate flow, either on the surface or in an adjacent ditch or channel; and (3) they divert or reroute water from paths it otherwise would take were the road not present (Gucinski, et al. 2001).

Impacts include both short-term and ongoing (chronic) impacts. Short-term impacts stem from ground-disturbing activities, such as construction or road maintenance. These activities increase potential for erosion and transport of sediment to stream channels. Sediment contribution to stream channels from these activities generally diminishes after 1 to 3 years (Luce and Black 2001) (Megahan 1974).

Weathering of road surfaces can lead to chronic sediment and turbidity contributions to aquatic habitats, and maintenance and use of roads (such as for timber hauling) can accelerate rates of erosion, particularly during the wet season (Luce and Black 1999; Reid and Dunne 1984). Intercepted runoff that becomes concentrated over erodible road surfaces mobilizes and transports sediment with it. Surfaces armored by pavement do not experience this type of chronic weathering, while rocked roads are more resistant than natural-surface roads. For these reasons, natural-surface (or depleted rocked surface) roads with a high degree of hydrological connectivity are generally more likely than surfaced roads (rocked or paved) to contribute sediment to streams.

The creation and use of skid trails during timber harvest act similarly to roads for sediment production while being used, but recover to pre-harvest levels of sediment shortly (within one year) after use if they are closed to vehicle access.

Climate change projections for the future suggest increased erosion as a result of higher peak flows, as well as increased intensity and frequency of wildfires. Sediment loads are thus expected to increase, affecting water quality (Furniss, et. al. 2010, p. 21). High severity fire could expose large areas of bare soil to the erosive forces of rainfall, potentially increasing soil erosion and sedimentation. This project proposes fuels reduction treatments which will reduce the probability that severe, stand-replacement wildfire will burn within the Planning Area. In addition, improvements to road infrastructure such as disconnecting road ditchlines from streams and upsizing culverts to pass higher streamflows, will reduce sediment delivery anticipated from climate change projections.

Rationale

This issue was considered but not analyzed in further detailed as the project was designed to maintain water quality, or would reduce impacts to the point that they would be minor and undetectable beyond background levels, and there would be no potential for effects on water quality beyond those analyzed in the PRMP/FEIS for Western Oregon (USDI BLM 2016b, pp. 401-408), to which this EA tiers.

Proposed project activities that could be hydrologically connected to the stream network include roadwork (road and landing construction, renovation, and decommissioning) and timber haul. These hydrologically connected actions could result in small levels of sediment input during timber operations (1 to 5 years), but it would be undetectable above background levels in the Planning Area. The PRMP/FEIS for Western Oregon described the effects of new temporary and permanent roads (including construction, maintenance, and use) on sediment delivery to streams and concluded that increases in sediment would be less than 1.0 percent above current levels of fine sediment delivery over the next 10-years (USDI BLM 2016b, pp. 401-408). Under any alternative selected in this EA, roadwork and use would occur at levels similar too or less than levels described in the PRMP/FEIS, and therefore affects to sediment would fall within the range analyzed in the PRMP/FEIS, and result in less than a 1 percent increase in sediment delivery to aquatic habitat. This amount does not represent a substantial difference in comparison to the existing sediment delivery (USDI BLM 2016b, pp. 405-406). That discussion is incorporated here by reference.

Sediment delivery to streams would be limited by PDFs when completing roadwork for access and timber haul. The action alternatives propose various levels of road renovation and maintenance, temporary road construction, and permanent road construction (as defined in EA, Chapter 2, ALL-7). Road renovation is allowed for commercial treatments under all action alternatives. However, depending on alternative, renovated roads and temporary roads will either be fully decommissioned or long-term decommissioned (USDI BLM 2016b, pp. 311-312) after use, and thus hydrologically restored after project activities. Temporary roads that cross intermittent and perennial streams (under Alternative C) will have temporary hydrologic connectivity, which will be disconnected after project activities. Intermittent streams would be dry when temporary crossings were installed and removed, and perennial streams would be routed around the work site for installation and removal (Appendix 2, PDFs No. 219, 264, 241, 243, 244). A variety of crossing structures may be used, depending on site conditions. Temporary bridges and cattleguards have been used frequently by the BLM to span small streams; these structures are often installed with washed river rock as supports and require very little work to be done to the stream bed and adjacent banks. These types of installations would result in very little sediment input into the stream; past experience (Antelope Creek cattleguard, Butcherknife Creek temporary bridge) suggests that less than ¼ cubic yard of fine sediment is likely to be input into streams using these types of structures. In areas that necessitate culverts, more ground disturbing work is typically required, including the addition of fill in the de-watered channel. Because the stream would either be dry or routed around the work site (Appendix 2, PDFs No. 241, 244), most of the sediment input to streams from temporary culverts would result from pulling them. Fill would be removed and blended into the banks at stable angles (Appendix 2, PDFs No. 242, 246), but some fine sediment would remain to be available for transport to the stream once flow was returned through the site. Past experience with numerous road decommissioning projects which included culverts with deep fills suggest around a cubic yard of sediment or less is likely to result from these types of crossing structures. All disturbed ground within the RR would be seeded, mulched, and covered with coarse organic material to help stabilize exposed soils and reduce movement of displaced soils prior to the onset of wet weather. The addition of less than a cubic yard of sediment at future proposed crossings would result in short-term site-level (i.e. a single pool below the crossing structure) measurable increases in sediment. As streamflows rise during the wet season, the additions would either be transported downstream, sorted, and deposited in natural deposition areas (flood plains, vegetated bars, above log jams, etc.) or pulse through the system as a brief flush of elevated turbidity, where the sediment/turbidity would quickly become undetectable beyond background levels.

The PRMP/FEIS (and 2008 FEIS, to which the PRMP/FEIS tiers) identified an average sediment travel distance of 40 feet from roads, using seven studies in different geologies, including highly relevant studies in western Oregon (USDI BLM 2016a, p. 402). Of particular note, the range of sediment delivery distances in the western Oregon studies was 0 to 132 feet (2008 FEIS, p. 345). Additionally, the Washington Road Surface Erosion Model (WARSEM) used by the PRMP/FEIS (and 2008 FEIS) to model sediment delivery to stream channels from new road construction, was built on the assumption that roads outside the 200-foot distance do not deliver sediment (WARSEM, p. 25). Under all alternatives in the EA, there would be no new permanent road construction within 200 feet of any water feature as defined in the SWO ROD/RMP (p. 77). Under Alternative C, the only alternative with permanent road construction, there will be no net increase in permanent road density. Thus, an equal distance of permanent roads will be fully decommissioned if new permanent road construction is implemented. A hydrologic benefit of new permanent road construction could be the removal of permanent roads with chronic erosion features and hydrologic connectivity. Full decommissioning of these roads would de-compact roadbeds, increasing infiltration, resulting in a stable, well-drained, maintenance-free condition that would produce little road-related sediment.

Examples of PDFs to maintain water quality during roadwork include restricting the work to be completed during the dry season, suspending work during forecasted rain events, routing live streams around the work site for installation and removal of crossing structures, and stabilizing disturbed areas during work suspension or upon completion over stream crossing structures (Appendix 2, PDF No. 236, 244, 237).

Grading of road surfaces has potential to increase sediment production, because grading can break up armor layers on the road surface, temporarily increasing road surface erosion. However, Luce and Black (1999) noted that blading of only the travel-way yielded no increase in sediment production whereas blading of ditches, which often occurs during grading operations, substantially increased sediment yield. BLM is proposing only spot treatments in ditchlines as necessary to improve drainage, and ditch approaches to stream crossings would not be treated unless absolutely necessary (Appendix 2, PDF no 245). Furthermore, this work would occur prior to the wet season, and disturbed ground would be stabilized prior to the onset of the wet season (Appendix 2, PDF No. 236, 265). Any sediment that was transported down ditchlines would do so during the first few high precipitation events following the ditch work. During these conditions stream flows and sediment and turbidity levels in streams would be elevated as well. Inputs from the ditchlines could increase turbidity briefly, but it would not likely be detectable beyond background levels during these high flow events.

For similar reasons, there is little probability that repairing drainage of existing roads would contribute detectable sediment to streams. Although reshaping the road surfaces (i.e., installation of water bars or rolling dips, or creating outslopes or crowns) would involve disturbance to the road surface, the intent of these activities is to disconnect the road from the stream system, yielding an overall reduction in sediment transport to streams. Sediment routed off the roads following repair activities would do so during precipitations events in the fall/winter after work was completed. Repairing drainage of the road would increase the ability to shed water and route fine sediment into downslope vegetation, rather than allowing for concentrated flow to become established and deliver it to channels for the majority of the treated road length. Only the portion of the road between the last drainage structure and stream crossing would remain hydrologically connected. Sediment transported from these short, connected segments would likely be input into the stream. However, similar to sediment from ditchlines, the inputs would only occur during precipitation events, would be short-term in nature, and unlikely to be detectable in streams during these conditions. These short-term small contributions would be offset by long-term reductions in sediment by the increased disconnection of additional road length from the aquatic system.

For these reasons, road maintenance activities as proposed are not likely to result in detectable inputs of sediment to aquatic habitats. These activities should, as indicated, result in less sediment input to streams as the roads are improved, with increased armoring and capacity to shed water and transported fine sediment into downslope vegetation. Sediment delivery to streams would be limited by PDFs when creating and using skid trails for ground-based timber harvest. PDFs would restrict the location of these trails to at least 50 feet away from streams, except on improved roads or designated stream crossings, and on slopes less than 35 percent (Appendix 2, PDF No. 219 and 220). Most skid trails in the Project Area would be located outside of RRs and away from streams. All pre-designated stream crossings would maintain water quality by using the crossings during the dry season when intermittent streams are dry or on perennial streams under low flow conditions (Appendix 2, PDF No. 219 and 264). The proposed skid trails would be used during the dry season when soil moistures are low and the chance for runoff and erosion are low (PDF No. 42). Other PDFs that would help to limit sediment delivery to streams while creating and using skid trails include using designated skid trails, installing water bars, and using other erosion control techniques such as scattering tree limbs and other fine material on skid trails (Appendix 2, PDF No. 259, 262, and 263). Pre-designated skid trails will be located away from streams in stable locations near ridge tops where possible. Stream crossings would be located on gentle slopes to minimize potential for erosion and sedimentation.

Sediment delivery to streams would be limited by PDFs when creating and using skid trails for ground-based timber harvest. PDFs would restrict the location of these trails to at least 50 feet away from streams, except on improved roads or designated stream crossings, and on slopes less than 35 percent (Appendix 2, PDF No. 219 and 220). Because no thinning would be allowed in inner zones of RRs, most skid trails in the Treatment Area would be located away from streams. Only in very limited circumstances would a trail cross a stream (e.g., a cable yarding corridor may cross a stream if it is the only feasible means to yard felled timber to a landing), and in these instances full suspension would be applied whenever possible. All pre-designated stream crossings would maintain water quality by using the crossings during the dry season when intermittent streams are dry or on perennial streams under low flow conditions (Appendix 2, PDF No. 219 and 264). The proposed skid trails would be used during the dry season when soil moistures are low and the chance for runoff and erosion are low (Appendix 2, PDF No. 42). Other PDFs that would help to limit sediment delivery to streams while creating and using skid trails include using designated skid trails, installing water bars, and using other erosion control techniques such as scattering tree limbs and other fine material on skid trails (Appendix 2, PDF No. 259, 262, and 263). Pre-designated skid trails will be located away from streams in stable locations near ridge tops where possible. Stream crossings would be located on gentle slopes to minimize potential for erosion and sedimentation.

Sediment would not be delivered to streams during the creation and use of skyline yarding corridors because they would have no hydrologic connection to streams. PDFs, such as requiring full suspension over perennial streams and unstable ground, constructing waterbars where gouging occurs, and pulling available slash on corridors if gouging occurs for a distance of 20 feet or more (Appendix 2, PDF No. 258), would ensure no hydrologic connectivity and therefore eliminate the potential for sediment to be transported off-site. Additionally, the use of full or partial suspension would reduce the potential for gouging and subsequent erosion (Appendix 2, PDF No. 264, 228, and 264).

Given the dry season haul restriction on roads without adequate surfacing (Appendix 2, PDF No. 230), sediment inputs would occur only during a precipitation event following a season of hauling and would be spatially spread over many input locations. Therefore, by following BMPs, it is extremely unlikely that sediment input from these activities would be detectable above background levels, and there would be no potential for effects on water quality beyond those analyzed in the PRMP/FEIS (USDI BLM 2016b, pp. 401-408). Over the long-term, road maintenance on haul routes would reduce road-related sediment inputs where the BLM adds rock to depleted areas and natural surface roads. Improving drainage would also reduce sediment inputs by reducing erosion to the road surface and ditchlines.

2. *What are the effects of the commercial thinning, group selection harvest, and non-commercial vegetative treatments in the Alternatives on stream temperature?*

Background

Thinning riparian vegetation can affect stream temperature if shade trees are removed. The amount of shade lost depends on stream width, stream orientation, and height and number of trees removed. Most daily solar radiation occurs between 10 a.m. and 2 p.m. Vegetation that intercepts solar radiation during this time is critical for providing stream shade and maintaining stream temperature. This vegetation constitutes the primary shade zone (USDA and USDI 2005).

Proposed commercial thinning and surface and ladder fuel reduction treatments (i.e., small diameter thinning, non-conifer treatments and prescribed burning) in the RR have the potential reduce stream shade and increase stream temperatures. A range of commercial thinning and surface and ladder fuels reduction treatments are proposed within RRs in the action alternatives. Under alternative A and C, commercial thinning is proposed in both moist and dry RRs. In Alternative B, commercial thinning is only proposed in dry RRs. Fuels reduction treatments in dry RRs are proposed under all the action alternatives.

No commercial treatment is proposed for the Inner Zone of RRs in any of the action alternatives.

Rationale

The effects of commercial thinning and non-commercial thinning in the Outer and Middle Zones of the RR under the action alternatives on effective shade and stream temperature is not analyzed in detail, because, regardless of project-specific or site-specific information, there would be no reasonably foreseeable effects beyond those disclosed in the PRMP/FEIS. The PRMP/FEIS concluded that a limited number of perennial and fish-bearing stream reaches would be susceptible to shade reductions that could affect stream temperature if the BLM were to apply thinning treatments in the Outer and Middle Zones of the RR in areas with less than 40 percent canopy cover in the Inner Zone. PDFS (Hydrology PDF #285, Appendix 2) require resource specialists to evaluate all Inner Zones of fish bearing and perennial streams of RRs proposed for commercial thinning to ensure that > 40 percent canopy cover exists; if canopy cover is less than 40 percent, commercial thinning would be prohibited in the Outer Zone. For these reasons there will be no detectable effect to shade or stream temperatures.

3. *What are the effects of commercial thinning and group selection harvest (including associated road and landing construction) on water quantity (low flows and peak flows)?*

Background

Water quantity in the Planning Area is a function of natural and human-caused factors. Natural site factors include climate, geology, and geographic location. Natural processes that have influenced water quantity include floods, wildfires, and drought. Past human activities that have altered water quantity in the Planning Area include land clearing (for agricultural and residential use), timber harvest, road construction, water withdrawals, and fire suppression.

The historic canopy cover for the Planning Area varies across the nine ecoregions in the Medford District. These ecoregions and historic canopy cover estimates are identified in the Watershed Professionals Network Manual (WPN) (WPN 2001, pp. A-25 to A-227).

A substantial reduction in vegetation canopy below historic levels has the potential to cause the following hydrologic process changes: reduced interception, evaporation, and transpiration (i.e., more precipitation reaches the soil surface and less water consumption by plants); increased snow accumulation in the transient snow zone; increased snow melt rate in transient snow zone; and increased soil water content (Moore and Wondzell 2005). Possible effects on the streamflow regime from these hydrologic process changes include reduced time to hydrograph peak; increased frequency of peak flows; and increased magnitude of peak flows. Altered peak flows may affect stream channel condition by eroding streambanks, scouring streambeds, and transporting and depositing sediments if the magnitude of flow reaches the level required for sediment transport. These are normal occurrences in a dynamic, properly functioning stream system; however, increases in the magnitude and frequency of peak flows due to forest management activities, particularly road construction and timber harvest, can intensify the effects. The risk of peak flow enhancement from forestry-related impacts can be estimated from methods in the Oregon Watershed Assessment Manual (OWAM) (WPN1999: IV-11). Using the methodology in OWAM, the risk of peak flow enhancement is low when canopy cover is greater than 30 percent within the analyzed drainages. All alternatives in the EA would maintain canopy cover greater than 30 percent; therefore, the risk for any peak flow enhancement is low.

Hydroregions are a classification of landscapes based on the precipitation type and longevity. Within the Planning Area there are three hydroregions: rain, rain-on-snow, and snow. In the rain-on-snow region, greater snow accumulation can occur in clearings, producing the potential for higher peak flows during rain-on-snow events. The PRMP/FEIS, to which this EA is tiered, analyzed for the potential effect of timber harvest and road construction on peak stream flows within the rain-on-snow dominated hydroregion. In the analysis, the BLM addressed effects of peak flows in the transient snow zone hydroregion only, because there is little evidence that timber harvest activities can elevate peak flows in the rain or snow hydroregions. The PRMP/FEIS identified 7 subwatersheds in western Oregon that would be susceptible to detectable change in peak flow response. Two of those subwatersheds are on the Medford District. While Grant et al. 2008 found that there is little evidence that peak flows are affected by timber harvest in the rain or snow hydro-regions (USDI BLM 2016b, p. 386), the 2008 FEIS for Western Oregon Plan Revision found that nine sub-watersheds in the rain hydro-region in the Western Oregon Decision Area were susceptible for a reported change in peak flows. The 2008 FEIS includes a more detailed discussion of the effects of timber harvest in the rain dominated watersheds (USDI BLM 2008, pp. 352-354). The PRMP/FEIS and 2008 FEIS analyses are incorporated here by reference.

Streamflows are naturally low during the summer due to low precipitation, reduced soil drainage, and sustained high evapotranspiration. Water withdrawals across the Decision Area exacerbate the low flow condition. Fire suppression has resulted in overly dense forest stands with high evapotranspiration rates that likely contribute to decreasing the amount of water available for summer streamflows.

Paired watershed studies analyzed by Perry and Jones (2017) provide a frame of reference for interpreting the potential effects of BLM's forestry activities on low flow. In thinning treatments in the South Umpqua Experimental Forest Catchments, Perry and Jones (2017) found that initial summer streamflow surpluses were lowest and disappeared most quickly relative to other more intense harvest treatments, and summer deficits did not emerge over time. Low flow hydrologic recovery is partially influenced by harvest treatment, and these thinning results demonstrate quick hydrologic recovery following a period of low flow surplus that was potentially beneficial to aquatic organisms. Coble et al. (2020) reviewed catchment studies (in the greater Pacific Northwest including those used by Perry and Jones 2017) on the long-term effects (>10years) to low flows from harvest activities. Few studies in their review included riparian buffers in their treatments, but they observed that a range of low flow responses occurred in the studies that retained riparian buffers, under varying upland harvest intensities. Coble et al. (2020) also concluded that the magnitude of low flow responses attenuates downstream as a broader mosaic of stand ages occurs and multiple hydrological periods are represented. The seven large catchments in the study did not demonstrate a decline in low flows.

Climate change projections for the future indicate that the Pacific Northwest is likely to experience much greater average warming than other regions in the United States with increased precipitation in the winter and the same or decreased precipitation in the summer (Furniss et al. 2010, p. 17). As a result, projected hydrologic changes, particularly the changes in snowpacks and runoff patterns are among the most prominent and important consequences. Declines in snow water equivalent occurring in low and mid-elevation sites may result in earlier spring flows and lower late season flows. Changes in average annual streamflows are also expected to decrease. Flood severity is expected to increase because increased interannual precipitation variability will cause increased runoff in wet years and increased rain-on-snow probability in low elevation snowpacks (Furniss et al. 2010, p. 20).

Rationale

Under any of the action alternatives, no changes in peak flows are expected to result from the proposed vegetation treatment or road construction activities.

Commercial and non-commercial vegetative treatments under the action alternatives would not reduce the current canopy cover below the historic levels identified in the WPN. Canopy cover would be maintained at 30 percent or greater under all the action alternatives in all the hydroregions of the project area.

Under any of the action alternatives, there would be no new permanent road construction within 200 feet of any water feature. Keeping new roads hydrologically disconnected from streams is beneficial because roads can influence peak flows and low flows, potentially to a greater degree than harvest. Roads may influence low flows in small headwater catchments by diverting subsurface flow laterally across hillslopes with the net effect being an increase in flows in some streams at the expense of others (Moore and Wondzell 2005).

All temporary roads would be decommissioned after use and de-compacted to the pre-existing condition. In Alternatives B and C, temporary roads and landings would reduce canopy cover very slightly during their construction and use, but would recover to pre-existing condition in a short time period. The reduction of canopy cover in the footprint of these roads and landings would be too small to have any influence on peak flow enhancement. Under Alternative C, in addition to the temporary roads, permanent road construction would occur. To balance the new construction, an equal length of permanent road will be decommissioned. While the fully decommissioned permanent roads hydrologically recover, there will be a temporary reduction in canopy cover. Like the temporary road openings, the amount of temporary canopy cover reduction will be immeasurable on the drainage or subwatershed scale and will have no influence on peak flow enhancement.

The BLM expects upland thinning to produce relatively small and short-lived summer streamflow surpluses with no deficits. The BLM infers from the literature that tree retention, including the RR, the spatial arrangement of commercial harvest both within unit and on the landscape, and the intensity and timing of thinning would all serve to moderate summer streamflow surpluses and deficits. Any harvest related low flow changes would be immeasurable in absolute terms at the drainage scale, indistinguishable at the subwatershed scale given patterns of land ownership/management and interannual streamflow variability.

Management actions that improve and sustain watershed resilience can moderate future impacts caused by climate change (Furniss et al. 2010). Vegetation treatments under all the alternatives may decrease the likelihood that a high intensity wildfire would occur within the treated areas. This would maintain or slightly improve watershed resiliency for those areas, potentially reducing effects of increased peak flows. In addition, road maintenance activities such as improving surfacing, installation of rolling dips, upsizing culverts to pass 100-year flow events, and other storm-proofing activities will increase the resilience of portions of the permanent roads that provide access for project activities, potentially reducing road failures and sediment delivery from peak flow events.

B Fish and Aquatic Habitat

1. *How would sediment, and resultant turbidity from forest management (timber haul, skid trails, and yarding) and roadwork activities (renovation, construction, and decommissioning) affect federally listed and native fish species and their habitats?*

Background

The BLM evaluated the effects of sediment delivery to fish species in the PRMP/FEIS (USDI BLM 2016a, pp. 297-300), to which this EA tiers. That analysis is incorporated here by reference. For this EA, the BLM considered the impacts of the action alternatives only, because they have potential for the greatest impact to fish and aquatic habitat. As described below, the action alternatives are consistent with the assumptions and analysis in the PRMP/FEIS concerning these effects and, as such, this Issue was not analyzed in further detail.

<u>Fish Species Considered</u>

The Planning Area contains two fish species listed under the ESA, both of which are Evolutionary Significant Units of Coho Salmon:

- Southern Oregon/Northern California Coast (SONCC) Coho Salmon.
- Oregon Coast (OC) Coho Salmon.

Both species are listed as threatened. The NMFS has designated critical habitat for both SONCC and OC coho salmon. SONCC critical habitat includes “all waterways, substrate, and adjacent riparian zones below longstanding, naturally impassable barriers.” It further includes “those physical or biological features essential to the conservation of the species and which may require special management considerations or protection...”, including all historically accessible waters (*Federal Register* Vol. 64, No. 86, 24049). Unlike OC coho salmon, SONCC coho salmon does not have mapped critical habitat; however, steelhead distribution provides a surrogate. And unlike SONCC Critical Habitat, OC critical habitat does not include the adjacent RRs. The NMFS has published recovery plans for both ESA-listed anadromous salmonid species (USDC NMFS 2014 and 2016). Recovery plans for ESA-listed fish include the identification of limiting factors for each recovery unit and include recommendations for recovery actions. Limiting factors for the two species in the Planning Area include temperature, sediment, spawning and rearing habitat, and off-channel habitat.

Under section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act, the BLM must analyze the effects to essential fish habitat (EFH). As defined by NMFS, EFH includes “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” This definition includes all waters historically used by anadromous salmonids of commercial value (in this instance, chinook and coho). EFH within the Planning Area is identical to critical habitat.

In addition to the two fish species listed under the ESA, the Planning Area has four Bureau Sensitive fish species:

- Pacific lamprey (*Entosphenus tridentatus*).
- Steelhead trout (*Oncorhyncus mykiss*) (Klamath Mountain Province; winter and summer run).
- Chinook salmon *(O. tshawytscha*) (Southern Oregon/Northern California Coast).
- Umpqua chub (*Oregonichthys kalawatseti*).

The life history and habitat usage of these Bureau Sensitive fish species are sufficiently similar to the two ESA-listed fish species to allow them to be analyzed together.

<u>Aquatic Habitat</u>

Aquatic habitat character and quality are directly related to sediment. Sediment occurs naturally in stream systems and can affect fish directly by increasing turbidity and inhibiting foraging and breathing functions, or indirectly by embedding in stream substrates, thereby reducing macroinvertebrate productivity, or smothering eggs and fry. These effects reduce spawning and rearing habitat quality and quantity. In suspension, fine sediment reduces visibility, reduces foraging ability, and impairs oxygen uptake in gill membranes (Meehan 1991). This analysis focuses on increased sediment production and delivery to stream channels as the primary mechanism that may have potential impacts to aquatic habitats.

Rationale

This issue was considered but not analyzed in further detail because the potential effects from this project would fall within the range of those analyzed in the PRMP/FEIS, to which this EA tiers, and because sediment increases from any action alternative would have no potential to result in significant effects to fish or their habitat. The potential impacts to aquatic habitats from these activities would be minimized or eliminated through the required implementation of BMPs.

The delivery of sediment to fish-bearing and non-fish-bearing streams is presented in (*What are the effects of the proposed project activities (i.e., creation and use of skid trails/yarding corridors, roadwork, and log haul) on sediment delivery to streams?*). As explained in that section, and consistent with the PRMP/FEIS analysis, sediment delivery to streams from road construction and use would increase by less than 1.0 percent above current levels of fine sediment delivery over the next 10-years (USDI BLM 2016a, pp. 401-408).

As explained in the PRMP/FEIS, when sediment increases are less than 1 percent, there are no “measurable or meaningful effects on fish survival” (USDI BLM 2016a, p. 297). The PMRP/FEIS further explained (p. 298) that:

> There would be no detectable effect to fish or stream channels from additional sediment. At the site scale, small accumulations of fine sediment could begin to fill pool-tails, or these fines could become embedded in gravel substrates used for spawning. These sediments would be flushed during subsequent high flows and dispersed downstream, where no discernable effect would be detected.

The EA action alternatives comply with the management direction of the SWO ROD/RMP and projects would incorporate relevant BMPs which would reduce the likelihood and magnitude of sediment production and delivery to streams. The increase in fine sediment delivery to streams would not increase more than 1 percent above current conditions and would therefore be below the threshold for measurable effects on fish survival at any scale of analysis.

Fish passage would be maintained or improved by any future roadwork that involved crossings over fish bearing streams that could occur under this project. Alternative C would allow temporary stream crossings; if these crossings were over fish bearing streams, they would be required to be designed to meet Aquatic Organism Passage criteria, which would allow for up and downstream passage of all life stages of fish and other aquatic organisms at all stream flows. Passage improvements could occur under Alternative C if existing roads selected for decommission included culverts over fish streams, as these culverts would be permanently removed resulting in a natural stream channel at the crossing site. Fish and other aquatic organism salvage (capture and re-location) would be implemented prior to de-watering any stream channels to allow for removal or installation of crossing structures. Salvage efforts would adhere to all state and federal regulations and guidelines for conducting salvage and would include specialized capture equipment for juvenile lamprey if they are known or suspected to be present at the site. Therefore, future actions implemented under IVM would not reduce fish movement or distribution and would to the extent possible minimize direct mortality to aquatic organisms from construction activities related to installation/removal of crossing structures.

C. Botanical Resources

1. *How will the alternatives affect photosynthesis, natural selection, species trait-environment testing and compatibility, and topsoil energy transformation functions?*

Background

This issue was submitted by members of the public during scoping.

Rationale

Photosynthesis is the process by which plants and other organisms convert light energy, carbon dioxide, and water into carbohydrates that fuel plant growth and reproduction. Plants converting sunlight into biomass eventually die and become the organic matter component of soil. Some of the proposed actions (timber harvest, small diameter thinning, fuels reduction, road or landing construction) would alter light exposure by removing canopy cover and could increase subsurface water by removing vegetation. Each special status and native or nonnative plant would respond differently to an increase in light, but exactly how this would impact photosynthesis is not known. It is beyond the scope of this EA to attempt to catalogue impacts from the proposed actions on the chemical pathway of photosynthesis for every plant species. It is also beyond the scope of this EA and beyond the requirements of the SWO ROD/RMP to analyze for impacts of proposed actions on how energy is converted into soil organic matter. It is more reasonable to analyze effects to plants' persistence based on what is known about their biology and habitat needs, which also reflects how the proposed actions meet the management direction for special status plants, native plant communities, and invasive plants. The relevant elements of this topic are addressed in the NAID issue C.2 – How would vegetation treatments affect the persistence and recovery of Special Status plants and fungi? And in detailed analysis (Section 3.9) – How would the proposed actions improve habitat for Special Status plants?

Natural selection refers to the survival and reproduction of species based on their particular genetic makeup that makes them best adapted to current environmental conditions. It is beyond the scope of this EA to analyze how the proposed actions would affect every plant species' genetic response to environmental changes that will occur under each alternative. Apart from research for specific species, there are not methods to measure the effects of the proposed actions on natural selection. The more relevant questions are: 1) will the proposed actions contribute to special status species' persistence, conservation, and recovery as directed under the ESA and BLM policy, and 2) will the proposed actions maintain or enhance native plant communities, native species, and special areas as directed under the BLM policy and in the SWO ROD/RMP. These two issues are analyzed in the EA in Appendix 10 and Sections 3.8 and 3.9. Natural selection is a factor of a species' resilience and ability to persist under changing environmental scenarios. The objectives of the proposed actions are to conduct treatments that will improve habitat for special status plants and for native plant communities or that will protect them against potential impacts that would inhibit their persistence. Protecting and improving habitat for native plants would also preserve their genetic diversity, allowing them to adapt to changing environmental conditions over time.

Species trait-environment testing and compatibility refers to a research methodology aimed at discovering relationships between species' traits and environmental variables and to testing their responses to environmental variation. The BLM has not analyzed this because the proposed actions would have no impacts on this methodology.

2. *How would vegetation treatments and other proposed actions affect the introduction or spread of non-native invasive plants?*

Background

The PRMP/FEIS analyzed the risk of invasive nonnative plant introduction or spread during implementation of the SWO ROD/RMP management actions (USDI BLM 2016a, pp. 419-450), which is incorporated here by reference. It compared the relative risk and susceptibility of management actions on introduction and spread of invasive plants rather than the potential increase in acres or number of infestations because it is not possible to quantify those actual amounts. The effects of timber harvest, road construction, public vehicle access, and livestock grazing were analyzed and although the risk for different activities and project areas varies, the overall risk from these actions of introducing or spreading invasive plants under the PRMP/FEIS was determined to be moderate for the western Oregon BLM districts (pp. 436, 438). The analysis determined the effects from fuels reduction actions and other actions not included in this EA would continue to contribute to invasive plant species introduction and spread at current levels (p. 420). The risk of invasive aquatic species introduction and spread from new road construction, RMA designations, and livestock grazing were determined to be overall moderately high under the PRMP/FEIS.

The PRMP/FEIS analyzed 5th-field watersheds for their distribution of nonnative invasive species, putting each watershed in one of three categories – low, limited, or abundant. Table 3-70 (USDI BLM 2016a, Volume 1, p. 427), incorporated here by reference, lists 6 watersheds in the Medford District in the limited category, 35 in the abundant category, and none in the low category. The 2018 Medford District *Integrated Invasive Plant Management (IIPM)* Revised EA listed 69 species of noxious weeds and nonnative invasive plants documented on approximately 13,211 acres on 16,796 sites in the Medford District (USDI BLM 2018, p. 27, Table D-1, pp. 336-337). This indicates most areas in the Medford District have moderate to high levels of existing infestations of nonnative invasive plants, which makes them moderately to highly susceptibility to the introduction and spread of nonnative invasive plants due to management actions.

Rationale

The actions proposed in the EA known to create conditions susceptible to invasive plant invasion or to introducing or spreading invasive weeds include creating canopy openings or causing ground disturbance from timber harvest, fuels reduction, prescribed burning, and road work. Vehicle and equipment traffic into and within the project areas and the importation of gravel and mulch which could contain invasive plant seeds or other plant parts also create risks of introducing or spreading invasive plant species. These risks can be compared among the three action alternatives based on the acres of timber harvest and prescribed burning and the miles of road and landing construction or renovation proposed in each alternative. The No Action Alternative would pose no risks of introducing or spreading nonnative invasive plants because no actions would be implemented under this EA. The PRMP/FEIS determined the risk from timber harvest and road construction would be moderate, based on estimated acres of timber harvest that could potentially occur on all LUAs (USDI BLM 2016a, p. 422) and miles of new temporary or permanent road construction (USDI BLM 2016a, p. 424). The analysis was based on the assumption that timber harvest would include regeneration harvest. The scope of this EA is within what was analyzed in the PRMP/FEIS proposing timber harvest on LSR lands according to LSR management direction and PMRP/FEIS analysis assumptions; therefore, the risk of the three action alternatives introducing or spreading nonnative invasive plants would be within the actions analyzed in the PRMP/FEIS. Alternative A would pose the least amount of risk of the three action alternatives because it proposes the fewest acres of timber harvest and prescribed burning, retains the highest canopy cover, does not propose openings, does not propose new road construction, and would occur in the most limited areas. Alternative B creates more risk because it proposes more timber harvest and prescribed burning, lower canopy cover and gaps that would allow more light exposure, temporary road construction, and treatments could occur across more area of the Medford District. Because Alternative C proposes the most acres of timber harvest and prescribed fire, lower canopy cover and larger gaps on more acres, temporary and permanent road construction, and treatments would occur in the most areas across the Medford District, it would create the greatest risk of the three action alternatives, but would not exceed the moderate risk analyzed in the PRMP/FEIS. The BLM does not propose regeneration harvest in this EA; therefore, all treatments would retain some level of canopy cover. Treatments would thin stands to reduce ladder and surface fuels, which would reduce the risk that wildfire would cause mortality of all trees in a stand. The retention of trees during treatments and the likelihood that there would be surviving trees in treated stands after wildfire create conditions unfavorable for the survival or establishment of nonnative invasive plants.

All risk would remain within that analyzed in the PRMP/FEIS, as described above because BLM's preventative measures to restrict the introduction and spread of noxious weeds and other nonnative invasive plants will be effective at minimizing the risk to the extent possible (USDI BLM 2016a, pp. 436-437), given the limited span of control BLM has over the movement of plant seeds across the landscape.

The BLM would continue to implement other actions in the Medford District, as authorized under separate NEPA documents, that can potentially introduce or spread nonnative invasive plants, such as timber harvest on HLB, livestock grazing, and recreation. The spread and increase of noxious weeds and nonnative invasive plants within the Medford District will continue due to their ability to rapidly spread and become established, their competitive nature against native plants, on-going ground disturbance on private lands adjacent to BLM-administered lands, and vehicular travel on BLM-managed roads. This background level of weed introduction and spread will occur even without BLM's actions.

The Medford District has an on-going invasive plant management program, operating under the 2018 IIPM Revised Environmental Assessment. Under this EA, botanists document noxious weeds and invasive plant species infestations during pre-project surveys for vascular plants, as well as from incidental sightings. The Medford District completes an annual treatment plan which is published on ePlanning under a Determination of NEPA Adequacy (DNA). The Medford District utilizes preventative measures and treatments (manual, mechanical, herbicide, competitive planting and seeding, and biological control) to manage invasive plants within the Medford District. The BLM expects that these efforts, in addition to the application of PDFs during project implementation, will minimize the introduction and spread of nonnative invasive plants as a result of the actions proposed in this EA.

This issue was considered but not analyzed in detail because the proposed actions would not exceed the level of risk of introduction and spread of invasive plant species analyzed in the PRMP/FEIS (USDI BLM 2016a, pp. 419-456, specifically pp. 422-438), to which this EA tiers. The alternatives in this EA conform to the management direction in the SWO ROD/RMP and the assumptions in the analysis of this issue in the PRMP/FEIS, including applying preventative measures and PDFs at the project level and continuing to implement the Medford District integrated invasive plant management program across the Medford District, which would eliminate or minimize the potential for nonnative invasive plants to be introduced or spread during implementation of the action alternatives.

3. *How would the vegetation treatments impact Special Status plants and fungi?*

Background

The BLM manages rare plants in compliance with the ESA, which provides direction for federally T&E, and proposed species, and with the BLM Special Status species 6840 policy, which provides direction for managing Sensitive plants and fungi. The BLM 2021 Special Status plant list contains 144 species, 108 documented on BLM lands and 36 suspected of occurring on BLM lands. The list includes four federally endangered species; two, Cook's lomatium and Gentner's fritillary, have documented sites on the Medford District, and two, large flowered meadowfoam (*Limnanthes pumila* ssp. *Grandiflora*) and MacDonald's rock-cress (*Arabis macdonaldiana*) do not occur on BLM-administered lands in the Medford District. The 140 Sensitive plants on the Medford District Special Status list include vascular plants, lichens, mosses, liverworts, and fungi. Roughly one-third of the documented species grow in forested stands with varying levels of canopy cover, although some of them occur in gaps or at the edges of the stands. The remaining two-thirds of documented species are associated with more open non-conifer or mixed hardwood-conifer woodland habitats. The Sensitive species list is reviewed every year or so and is revised to add or remove species as new information becomes available about their status and threats. The BLM will manage new species added to the list in the same way existing species are managed, by conducting surveys for them prior to management actions, protecting sites from impacts from management actions, and conducting habitat improvements or other conservation actions as needed to recover the species. See Appendix 8 for additional information on Special Status plants and fungi.

Rationale

The BLM considers biological, environmental, and ecological requirements of Special Status plants and their habitats when analyzing how different management actions may impact them. The PRMP/FEIS described potential effects, in the absence of protection measures, to Special Status plants and fungi and their habitats from timber harvest, fuel reduction, prescribed fire, road construction, and nonnative invasive plants (USDI BLM 2016a, pp. 517-548), which are incorporated here by reference. These potential effects include direct impacts to plants resulting in damage, mortality, or reduced reproductive capacity, removal of host species or substrates; indirect effects from modification of microenvironmental conditions that could result in reduced vigor or reproductive capacity; removal, fragmentation, or modification of habitat; and competition from nonnative invasive plants.

Under this EA, the BLM would survey for Special Status vascular and nonvascular plants prior to project implementation under all alternatives and would apply PDFs (protection measures) to eliminate or minimize potential impacts from management actions. Project botanists would apply protection measures under all action alternatives on a species and site-specific basis, taking into consideration the species' habitat requirements, the proposed treatment, management recommendations if available, and current environmental conditions at the site. Examples of protection measures include no-treatment buffers, seasonal restrictions, limiting the annual percentage of habitat treated, and applying preventative measures for the introduction or spread of noxious weeds. Conservation measures would be effective at avoiding adverse impacts to listed and Sensitive plants based on past implementation of these measures (USDI BLM 2016a, p. 534). With the application of protection measures, there would be no significant impacts to Special Status plants or fungi and no discernible differences in impacts to Special Status plants among the three action alternatives.

The BLM would not survey for Sensitive fungi but would document them if encountered during surveys for other Special Status plants and would protect all known sites from impacts from management actions. As analyzed in the PMRP/FEIS (USDI BLM 2016a, p. 534) and incorporated here by reference, some unknown Sensitive fungi sites could be impacted by timber harvest, road or landing construction or renovation, or prescribed fire. There are differences in this risk among the action alternatives because they propose different levels of timber harvest, gaps, retainment of canopy cover, diameter and stand age limits, road and landing construction, slash piles that would be burned, and prescribed fire. However, as analyzed in the PRMP/FEIS (USDI BLM 2016a, p. 526), and incorporated here by reference, "...green tree retention and smaller clear-cuts allow fungi to persist in the harvested area and allow for early recolonization of mycorrhizal species post-harvest [Miller et al. 1998, Wienscyzk et al. 2002, Kranabetter and Kroeger 2001, Luoma and Eberhart 2005]." The BLM concluded in the PRMP/FEIS that the amount of older and more structurally-complex multi-layered conifer forest habitat for Sensitive fungi would increase under the PRMP/FEIS (USDI BLM 2016a, pp. 537-538). No regeneration harvest would occur under any of the alternatives in this EA; therefore, Bureau Sensitive fungi would persist in conifer stands under all alternatives and there would be no significant impacts to them.

The BLM did not analyze this issue in detail because it concerns how the proposed actions could potentially impact individual Special Status plants and fungi and site protection, which was not a direct purpose of the proposed actions. The BLM did analyze in detail how the proposed actions would promote or develop Special Status plant habitat (Section 3.8), which is one of the purposes and needs of the EA. Some of the proposed actions were designed to improve, protect, and develop habitat for Special Status plant species. The BLM also did not analyze in detail the effects of the proposed vegetation management on Special Status plants and fungi because the alternatives in this EA conform to the management direction in the SWO ROD/RMP and the assumptions in the analysis of this issue in the PRMP/FEIS. Project botanists would review the locations of proposed treatments and apply appropriate PDFs and conservation measures to prevent adverse impacts to Special Status plants and fungi to ensure treatments do not hinder the conservation or recovery of Special Status plant species. Therefore, there would be no significant impacts to Special Status plants or fungi from any of the alternatives. The protection measures would prevent Bureau Sensitive species from trending toward listing, would be categorized under the ESA consultation as "no effect" or "not likely to adversely affect" federally-listed plants, and would not adversely modify Cook's lomatium designated critical habitat.

D. Climate

1. *How will the alternatives affect net CO_2 emissions and net carbon sequestration through time, taking into consideration the use of substitute materials and the impacts of fire?*

Background

The analysis in the PRMP/FEIS, to which this EA tiers, addressed the effects on carbon storage and greenhouse gas emissions of implementing the entire program of work in the timber and fuels program based on high quality and detailed information (USDI BLM 2016a, pp. 165-180; 1295-1304). That analysis is incorporated here by reference. The information available on project-specific and site-specific conditions, while more specific, is not fundamentally different from the information used in the PRMP/FEIS analysis of effects on carbon storage and greenhouse gas emissions, and thus cannot reveal any fundamentally different effects than that broader analysis.

The PRMP/FEIS upon which the SWO ROD/RMP was based examined the most recent science regarding climate change, carbon storage, and greenhouse gas emissions (USDI BLM 2016a, pp. 165-211).

The key points from PMRP/FEIS analyses include (USDI BLM 2016a, p. 165):

- 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 will 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 PMRP/FEIS concluded that the approved NCO and SWO RMPs/RODs 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).

Table 62. Estimated Effects of Implementing Actions (USDI BLM 2016a).

	Current	2033	2063
Carbon Storage	336 Tg C	404 Tg C	482 Tg C
Greenhouse Gas Emissions	123,032 Mg CO2e/yr	256,643 Mg CO2e/yr	230,759 Mg CO2e/yr

The carbon storage and greenhouse gas emissions analysis were based on assumptions concerning the level of management activity including grazing, prescribed burning, and harvest operations (USDI BLM 2016a, p. 174). The PMRP/FEIS assumed an average annual harvest level of 278 MMbf per year (205 MMbf from the HLB and 73 MMbf from non-ASQ related harvest) over the entire decision area (USDI BLM

2016a, p. 307). The expected annual harvest for the Medford District is 51 MMbf (37 MMbf from the HLB and 14 MMbf from non-ASQ related harvest).

The PRMP/FEIS derived estimates of the proportion of future activity fuels treatment needs from historical experience in individual BLM offices and the specifics of the PRMP/FEIS (USDI BLM 2016a, p. 1190). Predicted levels of activity fuels treatments were included in Woodstock model assumptions and Woodstock model outputs provided estimated acres of prescribed fire treatments associated with harvest (USDI BLM 2016a, p. 1300). The decadal average of activity fuels prescribed burning for the first 20 years of the SWO ROD/RMP would be an estimated 64,806 acres over the entire decision area (USDI BLM 2016a, p. 362). For the Medford District, the models in support of the PMRP/FEIS estimated the activity fuels prescribed burning program to cover an average of 23,526 acres per decade.

The PMRP/FEIS 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 Planning Area and within any one district (USDI BLM 2016a, p. 270). Approximately 81,880 acres of mechanical natural fuels treatment is expected to occur on average each decade on the Medford District (USDI BLM 2016a, p. 270). An additional 84,500 acres per decade, on average (USDI BLM 2016a, p. 270), of pile burning, underburning, and broadcast burning, is also anticipated for the Medford District natural fuels program.

The PRMP/FEIS modeling thus estimated the total prescribed burning program (natural and activity fuel combined) for the Medford District to be approximately 108,000 acres per decade. The acres of proposed prescribed burning (up to 70,000 acres/decade) under Alternative C would represent only a portion of the prescribed fire activity estimated in the FEIS. Proposed actions could represent 0-20,000 acres of prescribed burning of activity fuels or 0–70,000 acres of prescribed burning of natural hazardous fuels, but together they would not exceed 70,000 acres total. The other EA action alternatives would contribute less toward PRMP/FEIS prescribed fire estimates than Alternative C.

The PRMP/FEIS assumed 22,396 permitted Animal Unit Months (AUMs) of livestock grazing per year across the entire decision area (USDI BLM 2016a, p. 479). The Medford District expects to have 11,886 AUMs allocated for livestock grazing (including 11 allotments removed from reporting requirements due to inactivity; or that have had no grazing since before the 1995 Medford District RMP (USDI BLM 2016a, p. 476); average use over the past 3 years has been approximately 9,000 AUMs.[22]

The amount of prescribed burning of activity fuels 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 PMRP/FEIS assumed no change in the natural fuels prescribed burning program from the recent past.

There is no new information or changed circumstances that would substantially change the effects anticipated in the PMRP/FEIS. The Medford District is in the process of completing or has completed a total of approximately 152 MMbf of commercial timber harvest under the SWO ROD/RMP (2016 to 2020) and completed approximately 8,240 acres of prescribed burning from 2016 to 2020; therefore, implementation actions are well within the range of expected treatment effects described in the PRMP/FEIS for the decade. Additionally, the BLM will track progress under this EA and with others, via RMP monitoring.

Rationale

The effects of the EA action alternatives on greenhouse gas emissions, carbon storage, and climate change were not analyzed in detail because regardless of project-specific or site-specific information, there would be no potential for reasonably foreseeable effects of the any of the alternatives beyond those disclosed in

[22] While there is grazing in the Treatment Area, the alternatives are not proposing grazing or changes to grazing. Discussion of grazing is included here merely for purposes of placing cumulative effects within the context of the FEIS analysis.

the PRMP/FEIS. The activities in the EA alternatives that would affect carbon storage and greenhouse gas emissions, such as commercial thinning, small-diameter thinning, and prescribed burning are consistent in scale, intensity, and type with the SWO ROD/RMP and the PRMP/FEIS, and there are no new circumstances or information that would change anticipated effects for this EA.

2. *What are the effects of the alternatives on climate refugia in the context of climate change and resilience?*

Background

This issue was submitted by the public. Climate refugia, or "microrefugia are areas that support locally favorable climates, in which populations of species can survive outside their main distribution, protected from regionally limiting climatic factors (Dobrowski 2011)." In other words, microrefugia are novel, relative to the general climate. For example, in a hot and dry climate, microrefugia are cool and moist areas. Temperature and climatic water balance are critical factors in determining species distribution, particularly of plants. Physiographic factors (e.g., elevation, slope, aspect, and topography) combine to influence local meteorological elements, such as diurnal and local wind patterns, solar insolation, inversions, cool air pooling, etc. Climate refugia are more likely to occur in complex terrain, particularly in bottom slope positions (Downing et al. 2021). "Buttrick et al. (2015) identified much of western Oregon as having moderate to high terrestrial resilience to climate change (defined as likely to retain and support higher biodiversity as climate changes), although much of the lower elevations, where most BLM-administered lands occur in the Planning Area, range from below average to above average resilience" (USDI BLM 2016a, p. 202). Recently Downing and others (2021) looked at the ability of refugia to persist through multiple burn events in the Klamath Mountains. The authors found that the probability of refugia persistence declines dramatically with time since fire, where reburn intervals of <20 years largely maintained refugia, while those greater than 20 years, were more likely to result in a loss of refugia.

To varying degrees the action alternatives account for topo climate diversity and site productivity, elements that define micro refugia (Dobrowski 2011 and Buttrick et. Al 2015). For example, Alternative C proposes no actions in areas of high relative habitat suitability for NSOs that are currently NR habitat, these areas often align with lower slope positions (i.e., valley bottom) on cooler aspects (i.e., north, east) and Alternative B proposes no actions in moist forest types. All alternatives propose actions attempting to limit area burned by severe fire as discussed in Fire and Fuels Issue Section 3.4, which would limit severe fire spread into microrefugia.

Rationale

Effects of proposed actions to landscape resilience have been analyzed in detail. As discussed in Silviculture Issue 3.2 (Resilience), the alternatives improve resilience to varying degrees, and also reduce the risk of loss to stand-replacement wildfire to varying degrees, as discussed in Fire and Fuels Issue 3.3 [Stand Resistance] and thus potentially the area burned by severe wildfire, as discussed in Fire and Fuels Issue 3.4 [Risk]. While these landscape effects generally include microrefugia areas and given that future trends suggest the suitability for large wildfire growth will increase (USDI BLM 2016a, Appendix D. Figure D-8 p. 1241; Davis et al. 2017), severe wildfire may be one of the main future threats to persistence of climate refugia. This issue lacks specificity to analyze in further detail.

E. Cultural, Tribal, Historic, Paleontological, and Environmental Justice

1. *How would the Alternatives Affect Cultural Resources?*

Background

Southwestern Oregon has been occupied for at least 10,000 years as evidenced by archaeological investigations in the region (Gray, 1987; Lalande 1990; Tveskov and Cohen 2006, etc.). Several indigenous groups lived in the area including the Shasta, various Athabascan groups and the Takelma. The Klamath Tribe also claimed portions of the province for hunting, gathering and spiritual activities, although their territory primarily lies east of the Cascades. The Karuk Tribe occupied areas in the western portion of the Illinois Valley but had familial and trade ties to other southern Oregon Tribes. The Umpqua occupied areas to the north but were tied to the area through marriage as well as through trade networks. Ethnographic research gathered in the late 19th and early 20th century from informants living at the Siletz and Grand Ronde reservations provide invaluable information, but the small number of informants, the number of years away from their traditional lands, and the influence of white culture most likely had a direct effect on the accuracy of the information gained (Tveskov et al. 2002; Pullen 1996; LaLande 1990; Gray 1987).

Incursions into the North Pacific region by Euro-Americans began in the early part of the 16th century and continued to increase well into the late 18th century when maritime exploration along the southwestern Oregon coast began. However, the interior remained relatively unknown to European explorers until the early part of the 19th century (Lalande 1990). The first Euro-Americans to venture into southwestern Oregon's interior valleys were fur trappers working for the British Hudson's Bay Company. For the next decade or so, subsequent "fur brigades" passed through the area, as did other explorers and entrepreneurs. By 1833 the Oregon-California trail was well-established, and it became more heavily used as supplies were transported from California up to American settlements in the Willamette Valley (Atwood and Gray 1995:6; Tveskov et al. 2001:6).

The discovery of gold on Jackson Creek in 1851 attracted miners from California to the area (Atwood and Gray 1995:61) who spent their time panning along the rivers and creeks picking up the "easy" gold and then moving on to new locations. In 1860 hard rock gold deposits were discovered at Gold Hill, but it soon became apparent that these deposits were largely of shallow, quickly depleted pockets (Ericson 2012). Mercury (cinnabar) was also discovered and mined, but again, extraction occurred on a relatively small scale. Small-scale chromite mining took place during World War I and World War II.

To date, over 1,700 previously recorded archaeological sites are located within the Medford District area. The majority of these sites are historic in nature and are often associated with mining, farming, ranching and other Euro-American use of the region. Typically, historic sites on the Medford District contain structural, household, or mining materials that are susceptible to damage from various management activities. There are also a number of prehistoric sites located within the Medford District. These sites are associated with Native American use of the region and range in size from small, task-specific locales (such as hunting or gathering) to major village sites.

Rationale

This issue is not analyzed in detail, as effects are not expected to occur because of existing protection measures as well as PDFs included in all alternatives.

Section 106 of the NHPA requires agencies to take into consideration the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places (NRHP). In Oregon, the BLM is required to abide by the State Protocol between BLM and the State Historic Preservation Office, which outlines how the BLM will comply with Section 106. The Protocol delineates procedures for the identification and evaluation for the NRHP of cultural sites that are found across the Medford District. All proposed actions under this EA will comply with the Protocol. In addition to required procedures, all alternatives include PDFs to ensure that cultural resources are not affected by vegetation management activities. Because all appropriate cultural resource surveys, site recordation, and protections will be completed prior to any ground disturbing activities, effects are not expected under any of the alternatives.

2. *How would the proposed actions affect Native American Traditional Uses, including the gathering of culturally significant plants?*

Background

The descendants of the Takelma and Shasta are included in the Confederated Tribes of Grand Ronde and the Confederated Tribes of the Siletz, both headquartered in northwestern Oregon. The Cow Creek Tribe has maintained ties to their ancestral lands and now has a Tribal headquarters in Roseburg. The Karuk still occupy much of their traditional territory along the Klamath River in northern California, with their Tribal headquarters in Happy Camp, California. The Klamath Tribe still occupies much of their traditional territory near Chiloquin, Oregon. All of these tribes take an active role in the management of their ancestral territories, much of which is comprised of lands managed by the Medford District.

Many areas within the Medford District are locales for culturally significant plants. Tribal members gather plants for edible, medicinal, ceremonial, and utilitarian purposes. The Karuk Tribe has an interest in the management of gathering areas to maintain and enhance the quality of these plant communities to best meet the needs of current and future generations. The Siletz Tribe has expressed an interest in the management of culturally significant plant communities; in particular, patches of camas and other geophytes (e.g., roots, tubers, and bulbs) are of considerable importance as food items. They are also concerned about plants used for basketry such as beargrass and hazel, and conservation and protection of traditional huckleberry patches. The Siletz have provided the BLM with a list of culturally significant plants that are found on the Medford District and have identified the area around Table Rocks as containing patches of several culturally important species. The Siletz have an interest in maintaining and improving plant populations in that area. The Klamath Tribe has indicated a particular interest in concentrations of willow, camas, yampa (*Perideridia* spp.), and all types of berries. The Cow Creek Tribe has a great interest in maintaining populations of sucker fish and other freshwater fish for subsistence practices. All Tribes are extremely concerned with the management of waterways, various species of large and small fauna and maintaining healthy ecosystems.

In addition to collecting plant materials, Tribal people also hunt, conduct spiritual quests and ceremonies and gather together to make field visits to several prominent features on the landscape (such as Table Rocks). These activities are part of the culture of Native people, and as such are afforded great reverence and respect.

Rationale

Although Tribes have indicated that they continue to gather plants from public lands for a variety of uses, they have not identified any areas of regular use or particular significance on the Medford District, with the exception of plant patches located near Table Rocks. Culturally significant plants and other tribally important resources in the Table Rocks area are currently managed through a Memorandum of Understanding with the Tribes. Because culturally significant plant populations are scattered across the Medford District, often as small, isolated patches, actions proposed under this EA are not expected to affect the distribution of or access to such locales, therefore this issue was not analyzed in detail. Further, none of the proposed actions would preclude Native American use of an area for other cultural pursuits, including hunting, fishing, and spiritual activities.

However, some positive effects to culturally significant plant communities may occur as a result of actions proposed under this EA. For example, certain plant species like beargrass thrive best when they are regularly burned over. Therefore, any vegetation treatments involving controlled fire may assist in promoting the health and vigor of such plants. Some plants such as camas and other geophytes thrive best when soil is directly disturbed. Actions such as hand-grubbing and pre-commercial thin/release may disturb the soil in culturally significant plant populations enough to aerate the soil and improve the propagation of new plants. Any areas with high concentrations of culturally significant plant populations would be identified through a combination of field inspection and consultation with Tribes and either be avoided or treated if such treatment will improve the patch. There may be some short-term negative effects to individual plants, as a result of extended periods of burning or higher burning temperatures, as well as other project actions described in this EA. However, these potential adverse events would be extremely limited and are not expected to cause a significant loss of this resource. As stated above, areas identified as having significant plant populations would be identified and avoided, or treated if the treatment would improve the patch.

Any site-specific project under this EA would require consultation with Tribes prior to implementation. Further, the BLM abides by a number of Executive Orders, Proclamations, laws, regulations and policy that guides BLM's Tribal consultation efforts. Tribes have been and will continue to be invited to participate in the review process, provide input on any proposed actions and raise questions or concerns. The BLM will address any issues raised by Tribes and work to resolve them. Because Tribal consultation is an on-going process, any future concerns that may be raised by Tribes will also be addressed as they arise. As a result of past and on-going consultation with Tribes, and the PDFs and protections to plant and animal species outlined elsewhere in this EA, significant and measurable effects to Native American uses are not expected to occur, therefore this issue was not analyzed in detail.

3. *How would the Alternatives Affect Paleontological Resources?*

Background

Several relatively important paleontological finds have been recorded in the region. Most of these fossils have been found in discontinuous exposures of the Hornbrook formation which forms a northwest-trending band that essentially begins near Yreka, California, along the valleys of Cottonwood and Bear Creeks to Grave Creek, Oregon (Peck 1956). The Hornbrook Formation includes fossils of cephalopods, gastropods, and other marine fauna in an extremely hard sandstone matrix (Nilsen 1984). While the majority of fossils appear to be plants dating to the Tertiary period, invertebrates and mammalian fossils have also been located in Jackson County. Ammonites (marine mollusks) have been found in the Ashland area, while a mammalian fossil of the family Equidae was recovered in Applegate Creek near Jacksonville.

Rationale

This issue is not analyzed in detail, as effects are not expected to occur because of existing protection measures as well as PDFs included in all alternatives.

PDFs (#20, 21) under all alternatives require pre-field examinations, and if necessary, surveys and any required authorizations prior to ground disturbing actions. Known paleontological sites within a project area would be flagged and avoided. (PDF #25). Given the relatively low distribution of suitable paleontological locales on the Medford District, adverse effects to paleontological resources would be unlikely. Ground disturbing activities such as skidding, road construction, and similar actions could break up or disperse fossils, but the potential of this occurring is minimized by the PDFs listed in Appendix 2. Further, the BLM is required to comply with policy as outlined in the Paleontological Handbook:

> Follow BLM Handbook H-8270-1 to determine known Condition 1 and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or remove adverse impacts.

BLM handbook H-8270-1 describes Condition 1 areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils and Condition 2 areas as areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils (USDI 1998). Because no effects to paleontological resources are anticipated, this issue was not analyzed in further detail.

4. *How would the alternatives impact low income, minority or tribal communities within the Planning Area, including cultural values and traditions, connection to place or land, and would those impacts be disproportionate?*

Background

E.O. 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* provides that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.”

Environmental Justice refers to the “fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies.”

The Planning Area has minority and low-income populations that like upper income and non-minority populations, utilize certain goods and services that are derived from public lands. The Planning Area also encompasses the ceded territories or “ancestral” and ‘usual and accustomed’ use areas of five federally recognized Tribes. Tribal organizations are also dependent upon goods and services derived from public lands.

Rationale

The PRMP/FEIS examined socio-economic values across the State in-depth (USDI BLM 2016a, pp. 585 – 797). This discussion tiers to that analysis. The PRMP/FEIS looked at various drivers of local economies across the SWO ROD/RMP Decision Area which included Jackson, Josephine and Douglas counties. The PRMP/FEIS assessed the value of goods and services derived from BLM-administered lands, including timber, recreation, carbon storage, minerals, and source water protection and determined that there would either be no effect or a very small effect to the value of such resources for the people that rely on them (USDI BLM 2016a, p. 657).

For the Planning Area, meaningful data regarding carbon storage, mineral extraction and source water protection are not readily available. Therefore, this analysis examines two economic resources assumed to be most important to low income, minority and Tribal communities in the Planning Area: timber and vegetation, and recreational pursuits (including traditional Native American use). These two resources were chosen because the RMP analysis highlights the fact that timber and recreation remain the two largest sources of income for both the BLM and local economies USDI BLM 2016a, p. 678). BLM lands provide a number of goods and services that may be of importance to local environmental justice populations. These were broken down into two categories: market and non-market values. In general, “market” goods and services are those that have a monetary value (such as that derived from timber or special forest products), while “non-market” goods and services typically have value from use (things like fishing, hunting, birdwatching, Native American plant gathering etc.). These goods and services are available to all citizens regardless of age, race, cultural background or economic status.

In order to determine effects to environmental justice populations, the BLM had to first determine if such populations existed at significant levels within the Planning Area. Therefore, this analysis relied on the CEQ’s direction to assist in identifying these populations. In general, the CEQ suggests comparing percentage levels of minority populations and those communities that are considered low income or living in poverty to the statewide percentages and determining which if any are “meaningfully greater.” The State of Oregon has identified a 15 percent minority level, and a statewide poverty percentage level of 15 percent. This analysis used the PRMP/FEIS (USDI BLM 2016a, p. 724) criteria of 25 percent (or greater) to define what is considered “meaningfully greater” and to determine if there would be substantial impacts to these communities as a result of the alternatives proposed in this EA. To do this, the BLM examined the most recent population data available for the counties in the region.

Table 63. Basic Statistics for Each County as of July 1, 2021.

COUNTY	POPULATION	RACE (%)	MEDIAN HOUSEHOLD INCOME	IN LABOR FORCE	PERSONS IN POVERTY
Douglas	111,201	92% White 0.5% Black 2.1% Native American	$47,267	51%	13%
Jackson	223,259	91.9% White 1.0% Black 1.6% Native American	$53,412	57%	12%
Josephine	88,090	93.0 % White 0.6% Black 1.7% Native American	$45,616	49%	16%

Source: U.S. Census Bureau QuickFacts.

As can be seen from the table, Josephine County has the highest percentage (16 percent) of people living in poverty (defined by the federal government as being less than or equal to $25,750.00 for a family of four). It also contains the highest percentage of white people, when compared to the other two counties. Jackson county has a slightly higher number of minorities (2.6 percent) but a lower amount of economically disadvantaged people, when compared to Josephine and Douglas counties. This may be due in part to the fact that Medford and Ashland possess larger business communities and hence opportunities for employment, when compared to the cities of Grants Pass and Roseburg in Josephine and Douglas counties. When examining this data, it becomes clear that the Planning Area does not meet the 25 percent or higher threshold in either the level of low income/poverty populations, or the level of minority populations when compared to the state. What this essentially means is that these communities are extremely small in the Planning Area, and meaningful statistics cannot be derived from the small sample available.

The first step in effects analysis for environmental justice would be to identify any negative effects that would result from implementation of the alternatives and then assess whether they would fall disproportionately on environmental justice communities (USDI BLM 2016a, p. 725). Views of what constitutes a negative or positive impact vary depending on different perspectives and values, but this analysis assumed that increases in employment, and the increase in earnings that would result, would be positive impacts, and that decreases in employment would be negative (USDI BLM 2016a, p. 725). For the Planning Area, the most important factor in determining disproportionate effects would be the loss or gain of market value jobs. None of the alternatives in this EA would have an adverse effect to the number of market value jobs that will be available at project implementation. Western Oregon is considered to be a national leader in the production of timber and timber related products, arguably the most lucrative of all "market" goods taken from public lands on the Medford District. While it is certain that some members of these communities participate in timber related income generation, the actual amount derived from BLM lands by these communities is unavailable. It is reasonable to assume however, that with increased opportunities to participate in timber and vegetation management related activities (such as those proposed under the alternatives) a concomitant increase in income for minority/low income communities could occur. Projects (and therefore opportunities to earn income) that will be completed under this EA will vary by county but are not expected to substantially change the earning potential of low income or minority populations. There may be some positive gains in jobs, particularly those related to the timber industry, but these gains would be minor. There would be no effect to recreational related positions. In addition, the availability of the various "non-market" goods and services derived from public land use would remain the same under all actions.

Given the low number of economically disadvantaged and/or minority populations in the Planning Area, it is reasonable to assume that there will not be any discernible economic effects to these communities, and in any event, would not exceed the effects analyzed in the PRMP/FEIS. Thus, this issue was not analyzed in detail.

Tribal Communities

As stated before, there are five federally recognized Tribal communities with ties to the Planning Area. Tribes have identified a number of uses of BLM lands that are typically of non-market value. These include places of spiritual retreat or ceremony, medicinal and ceremonial plant gathering areas, resting places of the ancestors, and other culturally significant pursuits.

A discussion of Native American traditional use is provided elsewhere in this EA and will not be discussed here. It is important to note however, that a number of laws, regulations and executive orders direct the manner in which the BLM interacts with Tribes. BLM is required to solicit input from Tribes on all proposed actions and respond to the input received. The BLM considers Tribal involvement in the planning process to be a key component for developing alternatives and any needed protection measures. Because of this, any issues that may affect Tribal sovereignty or sense of place and connection would be raised during the consultation process. Tribes are also actively engaged in the management and protection of culturally important resources on BLM lands. Tribes were invited to consult on this EA and identify any concerns that they might have. As of the writing of this EA, no concerns or comments have been received by consulted Tribes, therefore this issue was not analyzed in detail.

F. Fire/Fuels

1. *How will the alternatives, including prescribed burning activities, affect air quality (taking climate change into consideration)?*

Background

The combination of weather patterns and topography of the Rogue basin contribute to regional air quality problems. The American Lung Association has ranked the Medford / Grants Pass metropolitan area as 5th in their annual State of the Air report, Report Cards of U.S. Cities Most Polluted U.S cities by year-round particle pollution (Annual $PM_{2.5}$; ALA 2021). Poor air quality can develop when a major polluting activity or event combines with temperature inversions and strong high-pressure systems that create stagnant air. Valleys can trap and concentrate pollutants, exacerbating the effects of stagnant air. Sources of pollutants may be chronic, such as from a factory or homes heating with wood during the winter, or transient, such as from prescribed burning or wildfires. Wildfires tend to be the primary contributor to air quality concerns within the Medford District, particularly in July and August (USDI BLM 2016a, pp. 155- 157) and into October in some recent years (Figure 24). The EPA daily air quality index for Jackson and Josephine counties indicates that daily emissions ($PM_{2.5}$) have been increasing during summer months over the past 20 years (Figure 26).

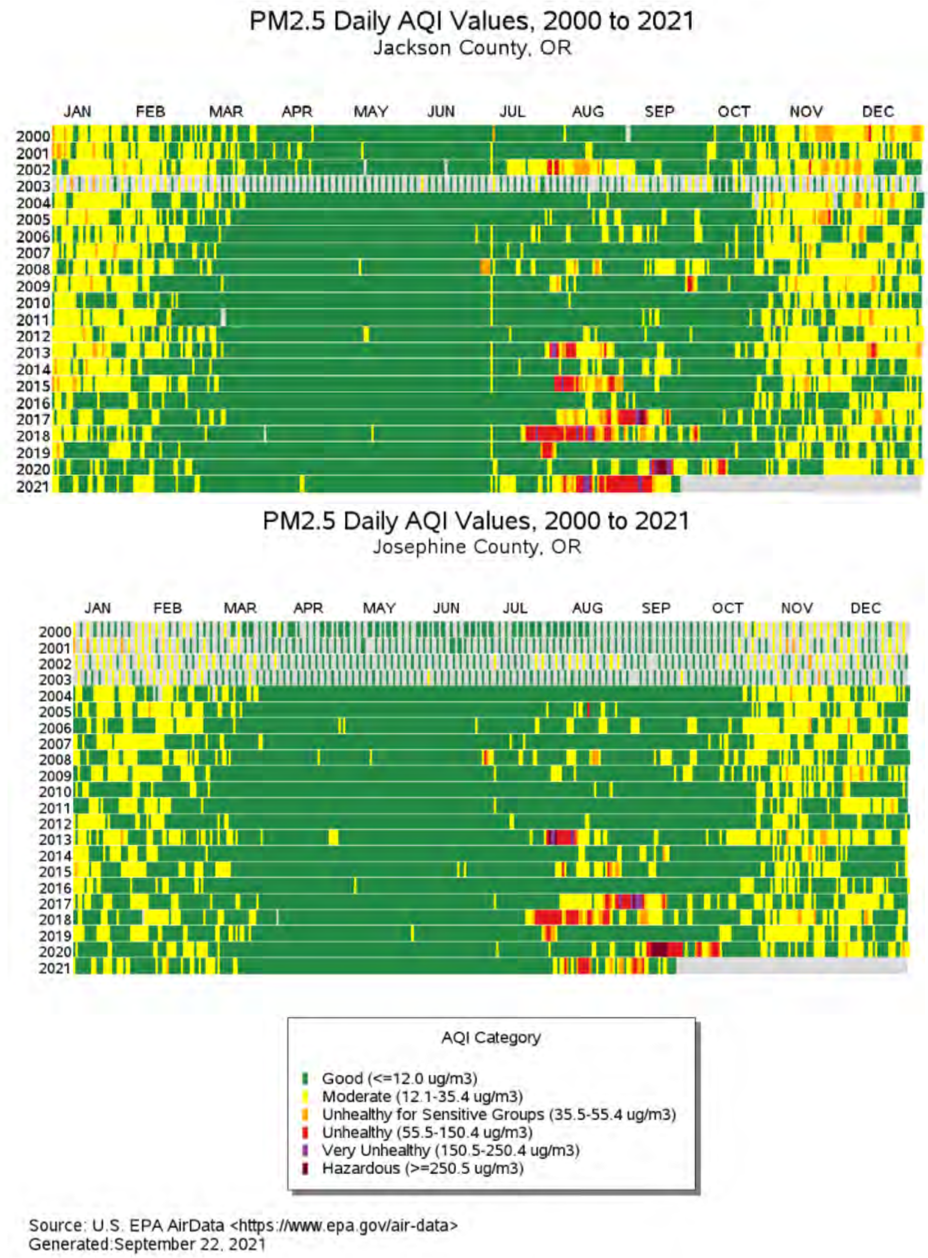


Figure 26. The EPA Daily Air Quality Index in Jackson and Josephine counties (2000-2021). Air quality during the period from November through March is characterized mostly as moderate. Most emissions during this period are attributed to residential heating with wood, which is frequently trapped beneath temperature inversions. Summer month (July – September) air quality has been mixed from good to hazardous, emissions during this period are attributed to wildfire smoke. Notable large wildfire years in southwest Oregon are evident in the record (2002, 2013, 2015, 2018, and 2020). Air quality from April to June is characterized as mostly good. This timeframe typically coincides with favorable conditions for implementation of prescribed under burning.

The ODEQ Air Quality Division implements the U.S. Environmental Protection Agency's air quality regulation standards. The ODEQ has delegated prescribed fire smoke management responsibilities to the ODF. For all prescribed burning activities, the Medford District is required to comply with the Oregon Smoke Management Plan (ODF 2019, OAR 629-048) as outlined in the PMRP/FEIS (USDI BLM 2016a, pp. 146-151).

The Oregon Smoke Management Plan outlines best burn practices in the Emission Reduction Techniques section (629-048-0210). The practices are designed to minimize emissions from prescribed burning, and “ensure the most rapid and complete combustion of forest fuels while nearby, “non-target” fuels are prevented from burning. These best burn practices include, “covering of piles sufficient to facilitate ignition and complete combustion, and then burning them at times of the year when all other fuels are damp, when it is raining or there is snow on the ground.” The section continues, stating that “when piles are covered as a best burn practice and the covers are to be removed before burning, any effective materials may be used, as long as they are removed for re-use or properly disposed of. When covers will not be removed and thus will be burned along with the piled forest fuels,” the covers must consist of approved materials, which includes polyethylene (PE) sheeting (ODF 2019, 629-048-0210).

Removal of PE sheeting from piles in advance of burning increases safety risks, operational cost, particulate emissions, and reduces the pace and scale of hazardous fuel reduction.

Piles are often burned during colder and wetter periods, punctuated by wet, icy, and snowy conditions. Removal of PE sheeting from piles in advance of burning would increase risk and exposure of field personnel to injury and illness from additional hours of driving, hiking steep terrain, rolling debris from deconstructed piles, and inclement weather. As shown in a case study on the Klamath National Forest, the additional time devoted to PE removal (up to 20 minutes per pile) and disposal resulted in a 60 percent reduction of acres burned (Pers. Comm., Klamath National Forest 2021). This reduces production, increases per unit cost, and leaves more acres of handpiles on the landscape, increasing the probability of those piles burning intensely in a wildfire. Piles from which PE sheeting has been removed become vulnerable to wetting rains and wetting of fuels, prior to ignition. Wrobel and Reinhart (2003) examined the use of PE sheeting to enhance combustion efficiency of piles, and found that uncovered piles have increased fuel moisture, reduced combustion efficiency, and require more accelerants (up to three gallons of fuel) to achieve sustained pile ignition, compared with PE covered piles, this finding is consistent with local knowledge and experience. The polyethylene ensures low moisture content of the wood and facilitates rapid and efficient ignition and consumption of fuels to minimize residual smoke (Aurell et al. 2016).

Use of Kraft paper as a substitute for PE sheeting would contribute toward decrease burning efficiency because environmental conditions in the region quickly deteriorate the material. An extensive review by Worbel and Reinhardt (2003) found Kraft paper less effective at minimizing moisture intrusion into piled wood (also consistent with local knowledge and experience), resulting in similar conditions as uncovered piles. The additional weight of Kraft paper also contributes to decreased production and increased per unit cost of covering piles. While combustion studies examining the difference in pyrolysis of polyethylene vs. lignocellulosic materials (kraft paper) have found that emission from kraft paper combustion were lower than polyethylene, both materials produce many of the same substances (Garcia et al. 2003). Additionally, Kraft paper is often coated with paraffin wax (a derivative of petroleum) or polyethylene to improve water resistance properties. Current scientific literature does not disprove that burning PE sheeting would produce unique chemicals or classes of chemicals that are not also found in emissions from burning wood debris (Worbel and Reinhardt, 2003; Aurell et al. 2016).

Ultimately, combustion of wet piles results in more particulate emissions (smoke) than dry piles (NWCG PMS 420-3). Comparisons of post-harvest slash machine pile burning indicate that dry piles covered with polyethylene sheets have significantly lower emissions than uncovered wet piles (Aurell et al. 2016). Additionally, initial entry fuel reduction treatments (i.e., thin and handpile burn) provide the opportunity for follow-up treatment, via maintenance underburning, which eliminates the need for piles and thus PE sheeting.

Medford District is also required to comply with the Oregon Visibility Protection Plan (OAR 340-200-0040, Section 5.2) which mandates that prescribed burning does not affect the visibility of Class I areas. Local Class I areas include Crater Lake National Park, Kalmiopsis Wilderness, and Rogue Wilderness (USDI BLM 2016a, Map 3-1, p. 149). The Planning Area is not within a Class I area.

The Oregon Smoke Management Plan designates SSRA (Smoke Sensitive Receptor Areas), which are areas designated for the highest level of protection under the smoke management plan, as described and listed in OAR 629048-0140. The SSRAs within the Medford District are Grants Pass and the Bear Creek Valley, as described in OAR 629-048-0160 (USDI BLM 2016a, Map 3-1, p. 149). The objective of the Smoke Management Plan is to minimize smoke from prescribed burning from entering the SSRAs.

Prior to conducting prescribed burning activities, the BLM must register prescribed burn locations with Oregon Department of Forestry in compliance with Oregon's administration of the Clean Air Act. The specific location, size of the burn, fuel loadings, ignition source, time, and duration of ignition are reported prior to ignition. The timing of all prescribed burning would be dependent on weather and wind conditions to help reduce the amount of residual smoke to the local communities. The day before each planned burn, ODF meteorologists evaluate this information along with the forecasted weather for the next day to determine whether smoke from a given burn is likely to enter a SSRA. This information is used to determine the appropriate time to conduct the planned prescribed burn, to minimize smoke emissions from prescribed fire. The BLM must follow these instructions in compliance with Oregon's administration of the Clean Air Act, including the Best Burn Practices; Emission Reduction Techniques section (629-048-0210) of the Oregon Smoke Management Plan and the Oregon State Implementation Plan for Air Quality (ODEQ 2021). Additionally, all prescribed burn plans must also comply with the Interagency Prescribed Fire Planning and Implementation Procedures Guide (PMS 484).

Smoke from prescribed fire and wildfire produces carbon monoxide, particulates, and other air toxins. The main criteria pollutant of concern for BLM management activities is particulate matter (PM_{10} and $PM_{2.5}$) (ODEQ 2003, 2009, 2012, 2013); in addition to posing a human health risk due to their small size, particulate matter from wildland fuels are excellent at scattering light, thereby reducing visibility. Carbon monoxide, on the other hand, while a substantial human health risk, dilutes rapidly, making it a hazard to firefighters only. As such the BLM analyzed effects of particulate matter emissions and visibility in the PMRP/FEIS (pp. 145 – 163). That analysis, incorporated here by reference, examined emissions (PM_{10} and $PM_{2.5}$) from prescribed fire treatment of both natural hazardous fuels and activity fuels. The PRMP/FEIS concluded that the SWO ROD/RMP would result in an approximate 7 percent increase, over current conditions, of particulate emissions (PM_{10} and $PM_{2.5}$) created from prescribed fire actions implemented across the Western Oregon Decision Area. On the Medford District, implementation of the SWO ROD/RMP would produce an expected 690 $PM_{2.5}$ tons per year (USDI BLM 2016a, p. 161 Figure 3-12), over the 50-year analytic period. However, adherence to the requirements of the Oregon Smoke Management Plan would continue to limit impacts to human health and visibility from prescribed fires.

Rationale

This issue was considered but not analyzed in detail because this analysis tiers to the PRMP/FEIS analysis, which estimated of the effects on air quality based on the magnitude of treatments on this landscape, and disclosed those activities PRMP/FEIS (USDI BLM 2016a, pp. 4-9). The proposed actions within this EA are within the magnitude of treatments analyzed in the PMRP/FEIS, therefore anticipated effects under any Alternative will not exceed those analyzed in the PRMP/FEIS. Additionally, there are no new circumstances or information at the site-specific level that would change the effects anticipated for this EA.

While the action alternatives differ in the acres of proposed prescribed fire and the amount of treatments under all alternatives would be consistent with the actions analyzed in the PRMP/FEIS. Required measures would apply to all action alternatives to meet the Oregon State Implementation Plan of the Clean Air Act and the EPA's Interim Air Quality Policy on Wildland and Prescribed Fires. Common to all action alternatives are other means of treating fuels, including removal or pyrolysis, that would result in less smoke emissions than prescribed burning. However, prescribed fire may be necessary to meet ecological objectives and complete and maintain proposed actions in most instances.

Proposed actions are expected to reduce the likelihood of stand-replacing fire *(Fire and Fuels Issue #1*, USDI BLM 2016a, p. 271) and could result in reduced smoke production, when interacting with future wildfires (Liu et al. 2017; Long et al. 2017). Treatments and future wildfires could also provide opportunities to limit large fire growth *(Fire and Fuels Issue #2*), which may also reduce wildfire smoke production. The PMRP/FEIS suggests future climate impacts could create more smoke production from wildfires than historic levels (USDI BLM 2016a, p. 163), due to longer fire seasons and more severe burning conditions, which would lead to more acres burned and increased fire severity. However, as wildfires interact with areas treated to result in fire-resistant structure, smoke emissions may be reduced, as less forest fuel (e.g., tree canopy fuel) would be consumed by wildfire (see Fire and Fuels Issue #1 effects common to all surface and ladder fuel reduction). With the available information, it is uncertain how these future cumulative effects may interact in timing and synergy.

For the above reasons, further analysis of this issue is not necessary for making a reasoned choice among alternatives in that it would not inform the decision maker how the alternatives respond to the purpose and need. Additionally, effects among all alternatives would be within those analyzed in the PMRP/FEIS, therefore, was not carried forward for further analysis.

2. *What are the impacts of removing commercial sized trees and opening up forest canopies on cool/moist microclimate buffering (or, does removing trees dry out soils, fuel, and vegetation and increase fire hazard or extend fire season)?*

Background

This issue was submitted during public scoping comments. Discussion of how removing commercial sized trees and opening up forest canopies on fire hazard is addressed in Fire & Fuels issue #1 (Section 3.3). This issue will address whether these activities have an effect on fire season.

The opening of forest canopy, such as through thinning, directly alters microclimate, allowing more wind and solar radiation (Weatherspoon 1996, Wayman and North 2007). Despite numerous examples of treatment effectiveness at moderating fire behavior and reducing the potential for high-intensity crown fire (USDI BLM 2016a, p. 228; Stephens et al. 2009; Martinson and Omi 2013), some public scoping comments expressed concern that altered microclimates will result in drying of forest fuels and thus an increase in fire behavior and perhaps an extension of fire season. However, there is insufficient data to support this concern. The PMRP/FEIS, which this issue tiers to, acknowledges the potential effect that canopy has on increasing or slowing surface winds, drying of fuels, and increasing or moderating potential fire behavior (USDI BLM 2016a, Appendix H p. 1320).

Fuel moisture is an important factor contributing toward fire behavior (Rothermel 1972). Fine fuels (litter and sticks <3 inches in diameter) are responsive to small fluctuations in weather (e.g., temperature and humidity), while large fuels (logs >3 inches diameter) are affected by seasonal weather variations (e.g., drought, snowpack, precipitation, etc.) (Bradshaw et al. 1983; Trouet et al. 2007) making them good indicators of "fire season." Broad climatic weather patterns along with general plant phenology influence live fuel moisture content. Many live fuel moisture predictive models are based on seasonal drought indices and satellite measures of green-up (USFS-WFAS), these seasonal trends are also a component in tracking fire season severity (Bradshaw et al. 1983).

Bigelow and North (2011) did not find that thinned openings resulted in increases to ambient air temperature or reduced humidity or fuel moisture, both important factors influencing fuel moisture. Estes and others (2012) found that fuel moisture of dead surface fuels (all size classes) varied slightly in late spring between thinned and un-thinned stands in the Klamath Mountains, prior to the on-set of "fire season." However, these differences in fuel moisture were not statistically detectible during the summer months (i.e., fire season). Additionally, openings in the canopy may allow more precipitation to reach the forest floor, which can lead to higher fuel moisture following precipitation events, for example lightning events accompanied by rain (Estes et al. 2012) or early fall rains, reducing ignition potential and fire spread. Faiella and Bailey (2007) found variable results in fluctuations of live foliar moisture from before to after thinning treatments. Instead, they found that seasonal trends in moisture content were similar between controls and treatment. The finding provides no evidence that small-scale micro climatic variation in foliar moisture would have greater influence over fire season trends, than broader climatic weather patterns.

Similarly, literature does not support that thinning treatments and the removal of commercial sized trees in forested landscapes decreases soil moisture; rather, soil moisture shows an increase post-treatment. In soils, water content is constantly in flux. Factors that influence water content in soil are numerous and creating an exhaustive list would be difficult. Real world experiments can incorporate all variables while controlling for different treatment types. A literature review reveals that real-world experiments that monitor soil moisture show an increase in soil moisture post-treatment. Zhu et al. (2017) found that thinning in a semi-arid environment (15 inches of precipitation) decreased near surface (10 cm) soil moisture, and a larger increase in sub-surface soil moisture 23.6-31.4 inches (60 – 80 cm) for an overall net gain in water within the soil profile. In Lassen National Forest, Hood et al. (2018) found that soil moisture was elevated relative to a control plot for at least 5 years after stand thinning of ponderosa and Jeffery pine forests. Gray et al. (2002) concludes that soil moisture was more abundant in gaps than controls in a coastal Douglas fir forest. In that same study, Gray et al. discusses a variety of other studies that have found similar results in soil moisture response to treatment:

> Studies in a wide variety of forest types have found increases in soil moisture in response to canopy gaps, including temperate hardwoods (Minckler and Woerhide 1965; Moore and Vankat 1986), pine forests (Ziemer 1964; Brockway and Outcalt 1998), tropical forest (Denslow et al. 1998), and temperate conifer forest (Wright et al. 1998). Despite greater exposure to evaporation, moisture is also initially more abundant in clearcuts than in uncut controls (Adams et al. 1991).

In summary, a combination of decreased water demand from trees and less canopy to intercept precipitation causes soil moisture to increase and seasonal climatic patterns have more influence over drying of fuels, than microclimate.

Rationale

The PMRP/FEIS, which this issue tiers to, acknowledges the potential sheltering effect that canopy has on surface winds, fuel moisture, and potential fire behavior (USDI BLM 2016a, Appendix H p. 1320). The difference in fine dead fuel (<0.25 inches in diameter) moisture between "shaded" and "unshaded" areas (i.e., greater than 50 percent canopy cover vs. less than 50 percent canopy cover) is well established in predictive fire behavior modeling (Rothermel 1983; Nexus2, NWCG PMS 437 – referenced as NWCG 2014 *in* PMRP/FEIS). Additionally, the sheltering effect of canopy on surface wind speeds is also well-established in predictive fire behavior modeling (Nexus2, NWCG PMS 437). The BLM accounted for these differences of fine dead fuel moisture between "exposed" and "shaded" conditions and sheltering effect of canopy on surface wind speeds in the fire behavior modeling inputs in detailed analysis of alternatives on stand-level fire resistance (or fire hazard) which also tiers to the PMRP/FEIS. Thus, effects to proposed action on fuel moisture and windspeed have been accounted for in Issue 3.3. and therefore, alternatives would not result in effects outside of those effects analyzed for in the PMRP/FEIS. Peer-reviewed scientific literature does not support that thinning trees, creating gaps, opening canopies, or removing commercial sized trees would dry out other size classes of fuels, soil, or vegetation in any way that would extend fire season; thus there is no potential for significant effects related to fire season duration, and therefore this portion of the issue was not analyzed in further detail.

3. *How would road building contribute to human caused fire ignitions?*

Background

Road corridors have been found to be correlated with human ignitions (Narayanaraj and Wimberly, 2011, and Syhard et al. 2007), however roads may also contribute toward wildfire containment and limiting fire spread (Price & Bradstock, 2010; Syhard et al. 2007). Studies have shown mixed results, regarding the influence that road density and road proximity to populated areas have on wildfire ignitions. Narayanaraj and Wimberly (2011) did not find a correlation between road proximity to population density and human caused ignitions, while Romero-Calcerrada and others (2008) and Syhard and others (2007) found positive relationships. Arienti and others (2009) even found a positive relationship between road density and lightning caused ignitions.

Between 1984 and 2013, human caused wildfire ignitions within the Medford District accounted for 73 percent of all wildfires. The vast majority (91 percent) of all human caused fire ignitions occurred within one mile of Wildland Developed Areas (or where people live) (USDI BLM 2016a, Figures 3-22 p. 227 and 3-34 p. 254).

Rationale

The local data clearly illustrate human actions have an influence on wildfire ignition patterns, particularly within proximity to populated areas. The action alternatives include a range of temporary and permanent road construction with varying levels of decommissioning for temporary roads, including long-term. Long-term decommissioned roads could be easily opened for use in wildfire containment, particularly those located on ridgetops, landscape locations that would need little infrastructure (e.g., cross drains) to reduce erosion or sediment delivery to streams. Based on studies reviewed, there is mixed evidence road density influence on human caused ignitions, ranging from no detectable evidence to a positive correlation. No action alternatives propose an increase in system road density, which means additional road access would not be created to contribute toward human caused ignitions as indicated in some studies referenced in the background. Additionally, as fire season increases in severity, land management agencies impose restrictions pertaining to public and work-related activities to prevent fire ignitions; in extreme fire weather conditions, restrictions can include public land closures, which is intended to limit access and reduce potential human caused ignitions.

For the reasons above, the alternatives do not present the potential for significant effects from roads to human caused fire ignitions, and further analysis of this issue is not necessary for making a reasoned choice among alternatives.

4. *How will prescribed fires impact electric and other utility holder infrastructure and rights-of-way?*

Background

This issue was raised in public scoping comments. "The BLM does have a national policy requiring specific vegetative maintenance or protection of ROWs…. The BLM may use maintained ROWs to aid in wildland fire operations and protect communities, resource values and infrastructure. Fuels program staff work with realty programs to ensure fuels management issues are addressed during the ROW permitting process. Most of the time, this includes vegetation maintenance requirements. Vegetation treatments in areas adjacent to ROWs reduce wildfire hazard, increase protection of infrastructure, and increase the ability of fire management resources to safely respond to wildfires, and protect communities and resource values." (BLM Handbook Fuels Management and Community Assistance Rel. No. 9-214). However, prescribed fires may impact electric and other utility holder infrastructure with inadvertent damage to their facilities. The BLM Handbook (No. 9-214) has been updated with new direction/guidance on 'Prescribed fire on right-of-ways (ROWs). The BLM Authorized Officer may determine that the prescribed fire is implemented by the entity permitted under the ROW as a regulatory requirement or that BLM will implement the prescribed fire. In this case, the prescribed fire must meet all applicable federal (NEPA), state, and local laws, regulations, policies, and permit requirements, including an approved prescribed fire plan compliant with RX guide requirements.

Rationale

This issue was not analyzed in detail, as implementation of prescribed fire within an electric and other utility holder infrastructure and ROW cannot be predicted with any degree of certainty; therefore any effect of the proposed action on utility infrastructure and ROWs is speculative and there is no issue to analyze. That is, while it is possible there could be some effect (i.e., inadvertent damage), such an effect is not reasonably foreseeable. As per the PDFs (PDF# 251), when conducting prescribed fire in utility ROW, the BLM would notify the ROW Holder/utility company of planned operations prior to burning and coordinate operations with that holder to avoid damage to infrastructure.

G. Range/Grazing

1. *How would the proposed vegetation management treatments and associated activities (including road building) affect forage and livestock for livestock grazing? How would the changes in forage affect livestock grazing, and what would be the indirect effects from changes in livestock grazing.*

Background

Of the 684,185-acre Treatment Area, 139,560 acres (20 percent) of BLM–administered lands are available for grazing. The Treatment Area contains 45 grazing allotments in the Butte Falls and Ashland Field Offices combined, and there are no allotments in the Grants Pass Field Office. The 140,190 acres of BLM-administered lands available for grazing in the Treatment Area is approximately 89 percent of the total BLM allotment acreage (Table 64).

There are 37 lessees who have a total of 48 grazing leases within the Treatment Area for authorizations to graze cattle utilizing a maximum of 8,365 AUMs. The cattle authorized to graze 8,365 AUM's is calculated using entire allotment acreage, which includes use outside of the treatment areas. The authorized AUMs are listed for field offices in Table 60 below, which are calculated for the whole grazing allotment. An AUM is the amount of forage required to sustain a cow/calf pair for one month.

Table 64. Grazing Allotments within Field Offices of the Medford District.

Field Office	Number of Allotments	Total BLM Allotment Acres	Total BLM Treatment Acres	BLM Allotment Acres in Treatment Area	Percent of BLM Allotment Acres in Treatment Area	Number of Grazing Leases	Number of Active AUMs	Number of Lessees
Butte Falls	25	94,554	196,165	93,378	99%	31	4,691	26
Ashland	20	63,710	149,693	46,182	72%	17	3,974	13
Grants Pass	0	0	338,327	0	0	0	0	0
District Total	45	158,264	684,185	139,560	88	48	8,365	37

The forested portions of these grazing allotments are occasionally accessed by livestock resulting in utilization levels that are generally none to slight (0-10 percent) within the forest plant community. The AUM rates/carrying capacities that are approved in a grazing lease account for the 0-10 percent use in forested areas.

The BLM compared the total acreage of BLM allotments available for grazing that overlapped with IVM acreage available for treatment under each alternative (Table 60). Alternatives A, B, and C have potential treatment acreage that could decrease stand canopy cover which in turn could increase forage production and growth by allowing more sunlight to penetrate the forest floor. Timber harvest activities and under-burning in all alternatives may result in the BLM resting disturbance areas from grazing the first year after treatment or until soils and understory vegetation have recovered. These recovery areas would likely see small increases of forage production 2-10-years after treatment. BLM assumes that "moderate severity prescribed burns will be limited to no more than 20 percent of area of a RR sub-watershed (HUC 12) each year" (USDI BLM 2016a, p. 82). Alternative C treatments would have the largest footprint within grazing allotments to yield the highest amount of increased forage production, followed by Alternative B, and then Alternative A (Table 65).

Table 65. Available Treatment Acres by Alternative Within Grazing Allotments.

Alternatives	Eligible Footprint Acres of Commercial Harvest (Commercial Thinning, Selection Harvest, Group Selection Thinning) In Grazing Allotments	Eligible Footprint Acres of Small Diameter Thinning, Non-Conifer Treatments, Prescribed Fire (Handpile Burning and Underburning Acreage) in Grazing Allotments	Total Treatment Area Acreage Including Grazing Allotments	Total BLM Allotment Acres Within the Treatment Area	Percent of Treatment Area Acreage in BLM Allotments
No Action Alternative	0	0	0	139,560	0
Alternative A	1,953	37,196	684,185	139,560	20%
Alternative B	46,668	131,545	684,185	139,560	20%
Alternative C	87,244	139,550	684,185	139,560	20%

In the treatment acreages for the alternatives listed above (Table 65, Table 2, Comparison of Action Alternatives) there are maximum limitations for acres treated annually and over a 10-year period as described in EA Chapter 2. Treatment acres could be distributed across the 684,185 acres of Treatment Area which may or may not be within grazing allotments. Approximately 20 percent of the total Treatment Area is in grazing allotments.

Rationale:

This issue was considered but not analyzed in further detail because there is no potential for significant effects. Proposed treatments under Alternatives A, B, and C would decrease stand density, increasing forage production in small amounts (within 1-10-years of treatment) by allowing more light to reach the forest floor for understory growth of herbaceous vegetation in grazing allotments. Harvest, road construction, and hauling activities could influence known patterns of grazing use and distribution, but is not likely due to the maximum limitation of potential treated acres distributed across the Treatment Area (684,185 acres) in comparison to the number of acres (140,190 acres) that are available for grazing use that could be treated. Also, the treatments evaluated in the action alternatives will produce small amounts of increased forage compared to more intense canopy cover removal treatments such as regeneration harvests. The small amounts of increased available forage produced by the proposed treatments would be almost nonexistent for livestock consumption compared to forage produced by more aggressive vegetation treatments such as regeneration harvests which are not prescribed. The PRMP/FEIS (USDI BLM 2016a, pp. 387, 388) makes correlates regeneration harvest to the greatest improvement in forage production "due to decreased competition between understory and overstory vegetation". Annual compliance and utilization monitoring would occur within the allotments where the prescribed treatments and associated activities are proposed.

H. Recreation and Wilderness

1. *How would proposed forest management and associated roadwork affect recreational opportunities in designated Special Recreation Management Areas and Extensive Recreation Management Areas, and to dispersed recreational activity throughout the Project Area? Would treatments be compatible with potential recreation opportunities?*

Background

Recreation Management Areas

Recreation-related designations in the Treatment Area include administrative units (Recreation Management Areas [RMA]) outside of Wilderness Areas, Wilderness Study Areas, and the Cascade Siskiyou National Monument.

RMAs encompass all existing recreation areas and trails, and potential future recreation areas and trails. There are two types of RMAs: SRMAs and ERMAs. BLM-administered lands that do not meet these policy definitions are not identified for recreation or visitor services management, although they may provide intrinsic recreational values and opportunities (USDI BLM 2016a, p. 555).

SRMAs are units where recreation management is the predominant land use plan focus and where the BLM intends to manage and provide specific recreation opportunities and recreation setting characteristics on a long-term basis. In addition, ERMAs are administrative units that require specific management consideration in order to address recreation use or demand, but where recreation management is commensurate and considered in context with the management of other resources and resource uses. Medford District has 22 units (42,911 acres) of SRMAs and 46 units (184,274 acres) of ERMAs that are within the Treatment Area.

The PRMP/FEIS (USDI BLM 2016a, pp. 556-559) used remoteness and naturalness characteristics to identify and categorize recreation setting characteristics through Recreation Opportunity Spectrum (ROS) classes. These classes range on the spectrum from Primitive to Urban. Within the Treatment Area, ROS classes include Backcountry, Middle Country, Front Country, Rural and Urban. Remoteness characteristics are classified by total amount of roads, including new road construction over the next 10-years. Changes in naturalness is measured by forest structural stage classes.

Table 66. Acres in Treatment Area by RMA and ROS Class.

RMA Type	ROS Class	Acres
ERMA	Back Country	9,897
ERMA	Front Country	36,433
ERMA	Middle Country	71,318
ERMA	Rural	77
ERMA	Urban	4,768
SRMA	Back Country	9,248
SRMA	Front Country	98
SRMA	Middle Country	15,994
SRMA	Rural	841

Background: Forest Management Activities in RMAs

Forest management activities identified in the RMA framework Supporting Management Action section include timber management, vegetation management, hazard tree management, and fuels management. As established in the RMA Frameworks, allowable uses and management actions vary by RMA within the Treatment Area, ranging from “closed to timber harvest” to “allow timber harvest if compatible with meeting recreation objectives, not interfering with recreation opportunities, and maintaining setting characteristics”. Many Frameworks also outline timber harvest BMPs, such as directional falling away from trails, etc. In the majority of the Treatment Area RMAs, the Frameworks allow fuels treatments or other vegetation modifications if compatible with meeting recreation objectives, not interfering with recreation opportunities and maintaining setting characteristics.

Rationale

As such, the BLM's analysis of naturalness uses forest structural stage classes as a proxy to measure changes in recreation opportunity spectrum classes for naturalness. Figure 3-121 of the PRMP/FEIS (USDI BLM 2016a, p. 558), which is incorporated here by reference, shows a visual representation of forest structural stage classifications for naturalness for the five recreation opportunity spectrum classes with forest stand proxies.

Table 67. Level of Human Modification and Forest Structural Stage Class Proxies by Recreation Opportunity Spectrum Class for Naturalness.

Recreation Opportunity Spectrum Class	Level of Human Modification and BLM Forest Structural Stage Class Proxies
Primitive	Undisturbed natural landscape Structurally-complex with Existing Old or Very Old Forest
Backcountry	Natural-appearing landscape having modifications not readily noticeable Mature Single- or Multi-layered Canopy
Middle Country	Natural-appearing landscape having modifications that do not overpower natural features Young High Density with Structural Legacies, or Young Low Density with or without Structural Legacies
Front Country	Partially modified landscape with more noticeable modifications Young High Density without Structural Legacies
Rural	Substantially modified natural landscape Stand Establishment with or without Structural Legacies
Urban	Urbanized developments dominate the landscape

In the RMA frameworks for the Medford District, the supporting management actions and allowable use decisions section identify the proposed recreation setting characteristic and several types of management actions that are allowed. In the forest management section for the RMA frameworks applicable to the proposed actions, allowable actions would have to maintain the recreation setting characteristics. For example, in an RMA within the "middle country" recreation setting characteristic class, commercial and non-commercial treatments would continue to retain structural legacies in the high density stands, therefore retaining the recreation setting characteristics for that RMA. There are no proposed actions that would shift the recreation setting characteristics towards a more developed ROS class, based on analytical assumptions identified in section 3.3.3 and based on the PMRP/FEIS, (USDI BLM 2016a, p. 559) which states that "thinning dense, young stands would shift the naturalness of an area from the Front Country to the Middle Country setting" (shifting to a less developed ROS class). Visual Resource Management classes would also be maintained in the RMAs (see discussion below). Remoteness characteristics are classified by total amount of roads, including new road construction over the next 10-years. No new road construction would occur in backcountry RMAs, thereby preserving the RSCs. Developed recreation sites would also be closed to new road construction. Per the PMRP/FEIS, p. 567, "Timber management actions that require new road construction would affect the recreation opportunity spectrum class for the remoteness of an area. Increasing the amount or improving the type of access into an area can change distance zones, thus changing the recreation opportunity class, and lead to higher levels of certain types of use." There is no potential for effects on recreational opportunities or dispersed recreational activity beyond those analyzed in the PRMP/FEIS to which this EA is tiered. By following the Allowable Use Decisions in the RMA frameworks and following the analytical assumptions in section 3.3.3, effects to recreation would be localized and minor. These effects have been addressed in the PMRP/FEIS. For dispersed recreation opportunities outside of RMAs (SRMAs and ERMAs), recreation activities could still occur along with other uses. However, within the Treatment Area, there are 227,185 acres of land within RMAs that would retain their setting characteristic and provide opportunities for existing and potential future recreation. In the PMRP/FEIS, the effect on lands not designated as RMAs, is the availability of opportunities as described by either acreage restrictions or limiting of recreation-specific activities.

2. *Issue: How would proposed forest management and associated roadwork affect Visual Resources within the Planning Area?*

Background

The Visual Resource Management system (as described in the PRMP/FEIS, p. 813) is designed to manage scenic values on public lands where visual resources are an issue or where high-value visual resources exist. The SWO ROD/RMP assigned a Visual Resource Management (VRM) Class to every BLM-administered acre in the SWO ROD/RMP Decision Area, and established management direction for the degree of change to visual values allowed for the different VRM classes (USDI BLM 2016b, p. 114). There are four VRM classes. The management direction for the areas in each class are described below, in summary.

- VRM Class I: Prohibit activities that would lower the Visual Resources Inventory
- VRM Class II: Manage for low levels of change to the characteristic landscape.
- VRM Class III: Manage for moderate levels of change to the characteristic landscape.
- VRM Class IV: Manage for high levels of change to the characteristic landscape

Table 68. Acres in Treatment Area by VRM Class.

VRM Class	Description of Lands	Acres
VRM Class II	RMAs with primitive and backcountry ROS class	19,679
VRM Class III	RMAs with middlecountry ROS class	22,433
VRM Class IV	All other lands	636,433

The PRMP/FEIS (pp. 813-823), to which this EA is tiered, analyzed the effect of vegetation management and associated activities on visual resources. That analysis is incorporated here by reference. As part of that analysis, the BLM inventoried visual values and assigned Visual Resource Inventory (VRI) classes to BLM lands based on the values existing at the time of inventory. The BLM then evaluated the acres designated for management under each VRM class and analyzed how management would affect existing visual resource values (USDI BLM 2016a, pp. 814-815). The BLM acknowledged that visual values in areas managed for a VRM Class less protective than the inventory (VRI) class could be negatively affected USDI BLM 2016a, p. 815). The analysis identified the number of acres within the SWO ROD/RMP Decision Area that would be managed under a less protective VRM class than the assigned VRI class, and the number of acres could be subjected to moderate or high levels of change on lands with high and moderate inventoried values (USDI BLM 2016a, pp. 819, 821).

Rationale

This issue was not analyzed in further detail because anticipated effects under any Alternative will not exceed those analyzed in the PRMP/FEIS. Anticipated visual impacts could generally include an increase in open areas in the forest, decreased vegetation, increased light and longer distance views, increased browns of soil and leaf litter, views of handpiles and some remnant, short-term burn/black on lower branches of trees. However, PDFs would ensure treatments would meet the respective VRM Class in which they are occurring. To meet VRM objectives, on a site-specific project, a contrast rating sheet is completed prior to project implementation to determine the effects to the visual resources. The contrast rating looks at *form, line color* and *texture* of the characteristic landscape and compares it to how the landscape would look after the proposed action. If the project would not meet the VRM objectives, the project design, layout, or prescriptions would be changed, or site-specific PDFs would be put into place to meet the VRM objectives. Thus, effects would be within those analyzed in the PRMP/FEIS, and no further analysis is necessary for this issue.

3. *How would the alternatives affect the wildland values of un-inventoried roadless areas, lands with wilderness characteristics, and candidate lands with wilderness characteristics*

Background

BLM-administered lands on the Medford District were inventoried for their wilderness characteristic during development of the PRMP/FEIS. The BLM found that 7 units (totaling 85,899 acres) met the requirements for LWCs and 51 units did not meet the criteria for LWCs as part of the inventory process prior to the RMP. All roadless areas and candidate LWCs were included in the inventory prior to the RMP, therefore, there are no un-inventoried roadless areas or candidate LWCs.

Of those seven units that met the requirements for LWCs, five were designated as LWCs within the DDR LUA, specifically the DDR-LWC allocation. The other two units would drop below the 5,000-acre minimum size requirement under the PRMP/FEIS, due to the HLB allocation within those units, and therefore the entire units would not be allocated to the DDR – Lands Managed for their Wilderness Characteristics (USDI BLM 2016a, p. 470).

Rationale

No actions are proposed under the EA within the DDR-LWC, therefore there will be no effect to those lands. LWCs not placed in the DDR, were allocated to HLB or RR. No commercial treatments are being proposed in the HLB. Non-commercial treatments could, over time, degrade wilderness characteristics, due to road construction, landing construction, thinning, burning and other human influences on the landscape. The loss of wilderness characteristics on LWC not placed in the DDRs under the SWO ROD/RMP was already analyzed in the PMRP/FEIS. The BLM determined that on the remaining identified LWCs, "management actions would degrade wilderness characteristics over time, and, eventually, wilderness characteristics would be lost" (USDI BLM 2016a, p. 470). However, that loss would occur only as the BLM would implement management actions over time, and the rate and extent of implementation of management actions that would adversely affect wilderness characteristics would vary by LUA (USDI BLM 2016a, p. 470).

4. *How would the alternatives affect the free-flowing condition, water quality and identified outstandingly remarkable values on suitable, and designated Wild and Scenic Rivers?*

Background

On March 12, 2019, the John D. Dingell, Jr. Conservation, Management, and Recreation Act, (Dingell Act) was signed by the President of the United States and became law. Wild and Scenic Rivers (WSRs) are rivers or river segments designated by Congress for inclusion in the National Wild and Scenic Rivers System (National System) under the authority of the Wild and Scenic Rivers Act of 1968 (WSR Act; 16 U.S.C. 1271 et seq.)[23]. Congress designates WSRs for the purposes of preserving the river or river segment in its free-flowing condition, preserving water quality, and protecting its ORVs. All WSR segments are classified as Wild, Scenic, or Recreational; these classifications indicate the present and allowable level of development along the river segment.

Within the Medford District, 148.8 miles of new WSRs were established under the Dingell Act. All newly designated segments have interim boundaries of ¼ mile except Elk Creek, which has an interim boundary of ½ mile each side of ordinary high-water mark. ORVs were identified for each newly designated segment as part of the congressional record. A comprehensive river management plan will be completed for the new segments; during the development of the comprehensive river management plan the BLM will determine

[23] Under Section 2(a)(ii) of the WSRA, Wild and Scenic Rivers can also be designated by the Secretary of the Interior if the Governor of the respective state petitions for such designation after enactment of state legislation to protect the applicable river. There are no 2(a)(ii) designated rivers administered by the BLM in the Medford District.

final boundaries for the newly designated WSRs and evaluate and potentially modify previously identified ORVs.

In addition to the newly designated rivers, the Rogue River, from the mouth of the Applegate River to Lobster Creek was designated a Wild and Scenic River in the 1968 WSR Act. The 1968 designated segment of the Rogue WSR has a final boundary averaging ¼ mile on each side of the designated river.

There are also two segments of river that the BLM found suitable for wild and scenic river designation in the RMP and that were not designated under the Dingell Act: the West Fork of the Illinois River and the Rogue River from just below Lost Creek Lake to the mouth of the Applegate River. To the extent possible under existing legal authorities (e.g., FLPMA, Clean Water Act, ESA, and Archaeological Resources Protection Act), the BLM manages rivers it has determined are suitable for wild and scenic river designation for their free-flowing condition, water quality, tentative classification, and any outstandingly remarkable values, until Congress designates the river or releases it for other uses.

The Wild and Scenic Rivers Act (WSRA) requires that the responsible official must ensure activities on Federal lands meet the protection and enhancement standard as identified in Section 10 of the act: (a) Each component of the national wild and scenic rivers system shall be administered in such manner as to protect and enhance the values which caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its esthetic, scenic, historic, archaeologic, and scientific features.

In addition, according to section 12 of the WSR act, “The Secretary of the Interior, the Secretary of Agriculture, and the head of any other Federal department or agency having jurisdiction over any lands which include, border upon, or are adjacent to, any river included within the National Wild and Scenic Rivers System or under consideration for such inclusion, in accordance with section 2(a)(ii), 3(a), or 5(a), shall take such action respecting management policies, regulations, contracts, plans, affecting such lands, following the date of enactment of this sentence, as may be necessary to protect such rivers in accordance with the purposes of this Act.”

The SWO ROD/RMP on page 54 states, “Conduct management actions, including but not limited to fuels treatments, invasive species management, riparian or wildlife habitat improvements, forest management, and trail construction, in Wild and Scenic River corridors only if consistent with designated or tentative classifications and if any reductions in outstandingly remarkable values would be temporary and outstandingly remarkable values would be protected or enhanced over the long term.”

BLM Manual 6400 specifies that actions outside of the river corridor that have the potential to impact ORVs must also meet the protect and enhance standard set forth in Section 10 of the WSRA (Section 7.5, BLM Manual 6400-Wild and Scenic Rivers-Policy and Program Direction for Identification, Evaluation, Planning and Management).

Rationale

The BLM has determined that impacts to suitable and designated rivers from the actions analyzed in this EA do not require detailed analysis because such analysis is neither necessary for making a reasoned choice between alternatives nor associated with a potentially significant impact. The primary reason for this determination is that no treatments are proposed within the interim or final boundaries of either suitable or designated WSR corridors in the Planning Area. Treatments that would take place outside of such corridors would have a negligible impact on the free flow, water quality, and ORVs of suitable and designated rivers.

While no treatments are proposed in WSR corridors, road renovation and utilization could occur along designated roads in the corridors. By following the PDFs outlined in Appendix 2 related to minimizing impacts of road renovation and utilization on soils, water quality and fish, impacts to identified and potential ORVs would be negligible and water quality and free flowing condition would not be altered. The PDFs related to water quality tie directly to the BMPs which provide compliance with the Clean Water Act of 1972, as amended, State of Oregon water quality legislation (Chapter 340), and the O&C Act.

- Free-flowing conditions: No actions are being proposed that would affect free flowing condition of WSRs. No work would be done within the bed and banks of the WSRs under the IVM project. No roads would be constructed in wild section designations, which would further protect the WSRs. No other management actions are being proposed that would affect the free-flowing characteristics of the WSR, because no impoundments, diversions, straightening, rip-rapping, or other modifications of the waterways are proposed.
- Water quality: The BMPs from the RMP are designed to protect water quality. By utilizing the PDFs for roads, hydro, fish, soils, as identified in Appendix 2, water quality would be protected in the corridors from actions outside of the corridors.
- Outstandingly remarkable values: Design features will be incorporated into all actions to assure that projects outside of the corridors don't impact river values.

Summary: Because there are no treatments proposed within corridors of suitable and existing WSRs, no actions that would affect free flowing conditions, and by following the BMPs outlined in the RMP, the subsequent PDFs identified to protect water quality and ORVs (i.e. PDFs for fish, wildlife, botanical, historic, ecology, and recreation) there is no potential for more than negligible impacts to WSRs from actions outside of the wild and scenic river corridors. Effects from treatments adjacent to WSR corridors that reduce fire risk and lead to resilience of forest lands would be positive.

I. Silviculture

1. *How would treatments affect the potential for windthrow within and adjacent to harvest units?*

Background

While there is a level of risk for windthrow events, depending on many biotic and abiotic influences, predicting windthrow would be speculative. Risk of windthrow could be increased in the short-term (3-5 years) when opening up a stand (Cremer et al. 1982). However, windthrow occurs in both managed and unmanaged stands and low levels of windthrow may be desirable for wildlife habitat and stand complexity. Silvicultural prescriptions proposed are designed 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 inches DBH tree at 85 feet tall is more likely to fall over than a 12 inches DBH tree at 55 feet tall (Worthington and Staebler, 1962, p. 21; Moore et al. 2003; Wonn and O'Hara, p. 92; Tappeiner et al. 2007, p. 129-130; O'Hara, 2014; Bennett, 2018, p. 5). 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). Two of the main factors that predispose stands to blowdown include high height to diameter ratios and the topographic position (i.e., ridge top more susceptible) (Mitchell 2000). The spatial arrangement and crown condition of the residual trees and where they sit on the landscape location can be incorporated into a prescription to decrease the probability of windthrow from a damaging wind event.

Rationale

This issue was considered but not analyzed in further detail because "this type of mortality is often irregular or episodic in nature, and is inherently difficult to predict the exact time in which it will occur (FEIS p. 1203)". There is a risk of windthrow for both treated and untreated stands and it cannot be predicted where and when a windstorm will occur. Smith et al. 1997 recommends that retaining the largest and most well developed trees because of their "thriftier crowns and stronger stems" can lower the potential for blowdown. Treatments in this EA would focus on these types of treatments. Further analysis would be speculative, would not provide additional predictability, and is not necessary for a reasoned choice among alternatives.

J. Soil

1. *How would the alternatives and management actions affect soil functions (including site productivity)?*

Background

The SWO ROD/RMP directs that the impacts of forest management actions to soil functions and resultant effects on site productivity are monitored using the Forest Soil Disturbance Monitoring Protocol (FSDMP) (USFS 2009; USDI BLM 2016b, p. 151). The FSDMP, which is incorporated here by reference, relies on visual indicators to rapidly assess whether a site's soil is detrimentally impacted or not relative to an undisturbed control. Those visual indictors are forest floor depth, forest floor impact, topsoil displacement, erosion, rutting, burning, compaction, and structure. The following are short descriptions of each indicator and why they are relevant to maintaining the productivity of forest soils in relation to timber harvest impacts.

Forest floor depth/impact: Impacts to a forest litter layer can have wide ranging implications for the long-term productivity of the soil. An intact forest floor of appropriate depth gives mineral soil protection against rain splash impact and runoff due to overland flow. The forest floor also is the primary pool of organic matter that keeps the mineral topsoil productive. While removal or redistribution of biomass above ground also redistributes nutrients, removal as described in the PMRP/FEIS (pp. 748-749) leaves enough fine litter material to preserve soil productivity (Farve and Napper 2009). Changes in the distribution and depth of the forest floor will change the soil disturbance severity rating.

Topsoil displacement: Mineral topsoil displacement and gouging can result in degradation of site quality by altering slope hydrology and causing excessive erosion which in turn causes a loss of nutrients. Changes in the soil disturbance categories are based on mixing of topsoil with subsoil, topsoil removal, and evidence of gouging and piling.

Erosion: Soil erosion is the movement of soil by water and/or wind. While erosion is always happening to soil, human activities accelerate this process to detrimental rates. Accelerated soil erosion causes a shallower, less productive soil onsite, while causing sediment pollution offsite. Visual indicators of accelerated erosion rates are sheet erosion, rills, and pedestals.

Rutting: Wheel tracks or ruts are the impressions left in soil after heavy equipment has made one or more passes. Different types of equipment making a different number of passes effect the size and depth of the ruts. These ruts channel water offsite, making it unavailable for plant growth. Water moving offsite in ruts also carries topsoil offsite. Ruts are also strongly associated with several other indicators of detrimental disturbance. Rutting severity is measured based on their depth on the soil surface and their extension into the mineral soil profile.

Burning: Broadcast burning and pile burning both have potential to alter soil functions to the point of being considered detrimental. Both the intensity of heat and the time under heat effect a soil's ability to function by altering soil structure, burning organic matter, and sterilizing beneficial microbes. The severity of burning is directly correlated to the change in color of the soil, and the depth to which the effects of burning are present.

Compaction: Compaction of soil is the collapse of pore spaces that were previously filled with air or water. A compacted soil has a reduced functionality as both a plant growing medium and a water storage apparatus. Detrimental compaction is caused by ground-based yarding, temporary road building, and landing construction. Soils at higher moisture contents are compacted with less force. Compaction can be partially remediated to the point that it is no longer considered detrimental through subsoiling with or without soil amendments (e.g., biochar, compost, etc.) In order to measure compaction as a visual indicator, the depth to which compaction can be detected determines whether compaction is detrimentally impacting the soil. The deeper compaction can be detected is directly correlated to the severity of the compaction on the surface.

Structure: Soil structure is the naturally occurring arrangement of soil particles into aggregates that results from pedogenic processes. When disturbed, soil structure becomes platy or massive, which indicates a reduction in pore sizes and decreased functionality. While massive and platy structures occur naturally, they are uncommon in undisturbed forest soils. The depth to which the structure change is evident determines the amount of site detrimental disturbance.

Detrimental soil disturbance is limited to no more than 20 percent of the Treatment Area and there are numerous BMPs that can be applied to maintain less than the allowable amount of soil disturbance (Appendix 2). The PRMP/FEIS describes typical amounts of detrimental disturbance caused by each type of yarding system and gives guidelines on which type of yarding system is used under what conditions (USDI BLM 2016a, p. 746).

Table 69. Percent of Detrimental Soil Disturbance.

Yarding System	Typical Areal % of Detrimental Soil Disturbance
Ground Based / Tractor	35%
Cable	12%
Aerial / Helicopter	6%

Finally, the PMRP/FEIS uses the number of acres to be treated, the typical yarding system to be used on those acres, and the typical amount of detrimental disturbance caused by each yarding system, to approximate the amount of detrimental disturbance caused by treatment (USDI BLM 2016a, p. 750). Regardless of estimated disturbance calculated before action implementation, post-action monitoring of at least 10 percent of each unit is required (USDI BLM 2016b, p. 151).

A similar methodology is used for road construction (p. 752) where it is estimated that soil detrimental disturbance from roads extends across a 45-foot width, from the upper cutbank to the lower toe of fill. The acreage of detrimental disturbance is then calculated by multiplying the length of road construction by the 45-foot width.

Because mechanically constructed piles would only be associated with commercial actions, the mechanically constructed piles would be burned on already disturbed soil, such as landings, avoiding additional detrimental soil disturbance. Small diameter thinning is not performed by heavy machinery and would not cause detrimental disturbance. Handpile burning does not typically generate lethal soil temperatures and would not cause detrimental soil disturbance. Underburning or broadcast burning does have the potential to cause detrimental soil disturbance when isolated spots burn longer or hotter than the rest. The PMRP/FEIS assumes broadcast burning causes 5 percent detrimental soil disturbance. Because every fuel treatment acre has the potential to be burned, an across the board 5 percent detrimental soil disturbance will be applied to the treatment footprint.

The graph below describes the estimated amount of detrimental soil disturbance in each alternative under a maximum disturbance scenario. The estimates are calculated using the methodology in the PRMP/FEIS described above, where different yarding methods would result in different amounts of detrimental soil disturbance. For each action alternative, the areas being treated are slightly different, and allow different harvest systems. The total acres of soil detrimental disturbance would be estimated by applying each percentage below with the number of acres to be treated in each alternative. The graph excludes estimated disturbance from broadcast burning, which would add 5 percent across each alternative. This is a maximum disturbance scenario where actions never overlap.

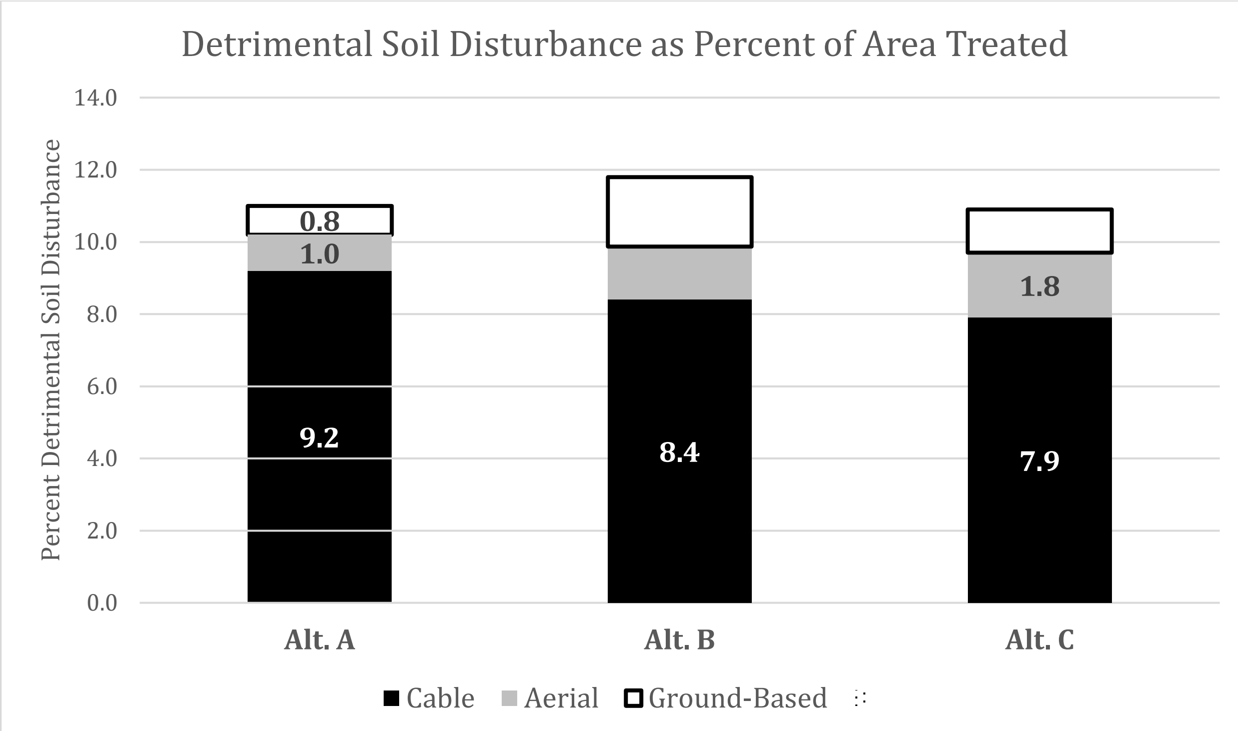


Figure 27. Shows the amount of estimated detrimental soil disturbance as a percentage of the treatment footprint acres. Note: Acres of detrimental soil disturbance caused by road construction expressed as a percentage of Treatment Area in Alt C equal <0.2 percent.

Rationale

For this EA, the methodology for analyzing effects to soil function and site productivity is tiered to the PRMP/FEIS; that analysis is incorporated here by reference. The maximum amount of additional detrimental soil disturbance based on actions listed in the EA are presented in the Figure 27 above. Detrimental disturbance would not exceed 20 percent of the overall Treatment Area upon project completion. Impacts to soil resources are kept below maximum allowable thresholds through PDFs such as #'s 42, 44, 45 described in this document. Soil impacts will be remediated using BMPs described in the RMP, such as subsoiling (USDI BLM 2016b, p. 184).

The BLM will ameliorate detrimental soil disturbance in ground-based units and landings that are the most disturbed using subsoiling and decompaction techniques in line with guidance from the SWO ROD/RMP (p. 184). However, the extent and effectiveness of such amelioration depends heavily on site-specific and project-specific factors. For example, past implementation of sub-soiling and placement of woody debris and organic matter in conjunction with planting or seeding of native soil surfaces has produced ecosystems that resemble the unaltered soil conditions; simple closure to traffic of a rocked surface does not. In conditions that can't be effectively ameliorated, BLM will practice avoidance (PDF # 267). Avoidance areas that are generally greater than an acre and are large enough to be entered into DDR-TPCC mapping and follow TPCC guidelines (TPCC Handbook 5251). Avoidance areas found that are less than an acre will be resolved through site specific PDFs, written based on professional judgement of BLM specialists. Because of the variability driven by site-specific conditions and amelioration systems employed, the BLM cannot quantify those reductions in detrimental soil disturbance in this analysis. (USDI BLM 2016a). BLM specialists will perform post-action project monitoring to evaluate detrimental soil disturbance and therefore the effectiveness of soil remediation practices (USDI BLM 2016a, p. 151).

Existing footprints from past forest management and other activities visible using remote sensing tools, such as LiDAR, have detrimental soil disturbance that will be counted as legacy disturbance. Site visits before project implementation by BLM specialists would be used to confirm assumptions made using remote sensing. Additional detrimental soil disturbance made by management activities will be estimated on a project specific basis using the methodology described in the background section, where detrimental soil disturbance acres are generated by multiplying the areal extent of that yarding method by the percentage listed above.

Specific amelioration measures will be chosen by BLM specialists based on site specific considerations such as but not limited soil depth, rock content, estimated future disturbances, and texture. BLM may implement soil remediation measures regardless of estimated total soil disturbance. Post-monitoring done by BLM specialists using the Forest Soil Detrimental Disturbance Monitoring Protocol (USFS, 2009) will ensure monitoring requirement from the SWO ROD/RMP (USDI BLM 2016a, p. 151) is followed.

This issue was not analyzed in further detail because the effects to soils from actions described in this EA are within the effects analyzed in the PMRP/FEIS for the SWO ROD/RMP through application of PDFs and adherence to management direction (i.e., to limit detrimental soil disturbance from forest management operations to <20 percent of the harvest unit area— USDI BLM 2016a, p. 109).

K. Socioeconomics and Environmental Justice

1. *How would the alternatives affect the socioeconomics of the local communities, specifically considering employment, county receipts, industry viability and infrastructure?*

Background

The economic impacts of the BLM's timber program were extensively analyzed in the PRMP/FEIS (USDI BLM 2016a, pp. 585-744), to which this EA tiers.

As part of the PMRP/FEIS analysis, the BLM assessed the value of goods and services derived from BLM-administered lands, economic activity in the Decision Area, county payments, economic stability, the capacity and resiliency of communities, and environmental justice (USDI BLM 2016a, p. 585) and how the PRMP/FEIS alternatives would affect economic activity in the Decision Area derived from BLM-administered lands (USDI BLM 2016a, p. 658).

The timber modeling program used to analyze the alternatives shows anticipated effects of each alternative and proposed resource management plan included all direct employment and earnings in the forest product industry plus supply chain (indirect) effects in supporting industries and other (induced) effects from industry payrolls (USDI BLM 2016a, p.660).

The BLM also evaluated payments to O&C counties in the PRMP/FEIS (USDI BLM 2016a, pp. 687-697). These analyses are incorporated here by reference.

Rationale

Economics focuses on the management direction to apply selection harvest or commercial thinning treatments to at least 17,000 acres per decade (USDI BLM 2016a, p. 74); thus providing jobs and contributing to community stability.

The action alternatives are consistent with the assumptions and analysis in the PRMP/FEIS concerning the effects on socioeconomics, employment, county receipts, and industry viability and infrastructure. As such, this Issue was considered but not analyzed in further detail.

2. *How would the alternatives affect the local recreation and tourism economy?*

Background

This issue was submitted by the public during scoping. The PRMP/FEIS, to which this analysis tiers, analyzed the effects of BLM forest management and other actions under the SWO and NCO RODs/RMPs on the recreation and tourism economy (USDI BLM 2016a, pp. 590-591, 595-597, 607-613, 642-650, 657, 658-686). The PRMP/FEIS notes that recreation use and non-recreation use, such as timber harvest, are not mutually exclusive market goods and services, and can both occur on the same lands (USDI BLM 2016a, p.

593). The PMRP/FEIS also acknowledged that the BLM does not manage for recreation use outside of RMAs (USDI BLM 2016a, pp. 555, 557). The PRMP/FEIS analysis found that implementation of the SWO and NCO RODs/RMPs would overall increase recreation visits to BLM managed land and total value to participants more than not implementing the SWO and NCO RODs/RMPs, especially in the Medford District (i.e., Planning Area). The PMRP/FEIS also concluded that this increase would be greater than the projected increase attributable to overall outdoor recreation trend increases (USDI BLM 2016a, p. 646). Finally, the PRMP/FEIS concluded that increased visitation and recreation use would result in increased employment and earnings in the Planning Area economy (USDI BLM 2016a, pp. 678-679). That analysis is incorporated here by reference.

Rationale

This issue was considered but not analyzed in further detail because the effects on the recreation economy is not part of the Purpose and Need for action, and regardless of project-specific or site-specific information, there would be no potential for effects beyond those analyzed in the PRMP/FEIS. The vegetation management actions and other activities proposed in the EA alternatives are consistent with the NCO and SWO RODs/RMPs. The PRMP/FEIS indicates that the availability of areas specifically managed for recreation, including consideration of vegetation management action in those areas, will result in an increase in employment and earnings in the Planning Area economy. The BLM is not aware of any information that would suggest the effects of the alternatives on the recreation economy would differ from those acknowledged in the PRMP/FEIS.

3. *How would the alternatives affect quality of life for residents in nearby communities, including property values, costs, noise, recreational opportunities, and human relationship to the forest (i.e., biophilia hypothesis)*

Background

These issues were raised by comments submitted by the public.

The PRMP/FEIS, to which this issue tiers, acknowledged that scenic views of BLM-administered lands can affect private property values, although "the relationship is complicated" and "data is not available that document how the scenic views of BLM-administered lands in [*sic*] directly contributes to the monetary value of private property." (USDI BLM 2016a, p. 626, *see also* p. 590.). The PMRP/FEIS concluded that for properties where scenic views of BLM lands included lands with Visual Resource Inventory value higher than the Visual Resource Management class, there was a greater probability that property values would be negatively affected. The greater the departure, the greater the potential for negative effects (USDI BLM 2016a, p. 655). The PMRP/FEIS also found that "reductions in value likely would diminish over time" (USDI BLM 2016a, p. 655). The analysis on impacts to property values in incorporated here by reference. Additionally, treatments on BLM lands that reduce wildfire risk to adjacent private property and contribute toward safe and effective wildfire response (see Section 3.4) could positively effect property values, although data quantifying these value changes is not available.

Public comments did not provide enough specificity explaining what quality of life costs, other than property values, the BLM should analyze, and therefore the BLM cannot meaningfully analyze this issue.

Communities and residents adjacent to harvest operations or haul routes could experience some impacts from the noise of harvest operations and vehicular traffic, including heavy equipment use, chainsaws, and log trucks. Harvest operations and log haul would follow applicable local noise ordinances. As noted in the PRMP/FEIS, the FLPMA directs that land use plans provide for compliance with applicable State and Federal noise pollution control laws, standards, or implementations plans (USDI BLM 2016a, pp. 9, 1091). The NCO and SWO RODs/RMPs and the EA also includes various seasonal restrictions on noise related to wildlife. Overall, noise from operations would have a limited context. Noise would last only for the duration of operations, which for any given harvest unit generally lasts no more than a few weeks. Seasonally, noise would be ameliorated by wildlife restrictions as well as any applicable wet season haul restrictions. Project locations with activities audible to any given community or residence would also generally occur infrequently, based on the large Treatment Area and Eligible Footprints for commercial operations, and the infrequent re-entry (generally multiple decades) into any given area. Projects would not cause persistent, long-term, or frequent noise disturbances to any community or residence in the Planning Area.

Impacts to recreational opportunities are discussed in Recreation and Wilderness.

Public comments related to impacts of the alternatives on the human relationship to forests are not entirely clear as to what environmental effect should be analyzed. However, public comments generally pointed to spiritual needs or to the biophilia hypothesis. Public comments characterize the biophilia hypothesis as asserting "the existence of a biologically based, innate human need to affiliate with life and lifelike processes…hence, the human need for nature." (Klamath-Siskiyou Wildlands Center Comments, 2019, p. 19). Some comments suggest that central to the issue for analysis is the amount and availability of old-growth forest to which members of the public would have access to satisfy an "innate need to affiliate with life and lifelike processes" or spiritual needs. The PRMP/FEIS, to which this EA tiers, analyzed the changes in amount and proportion of mature, multi-layer canopy and structurally-complex forest conditions, in both the HLB and the LSR, that would occur through implementing the RMPs (USDI BLM 2016a, pp. 307-368, 983-986). Those discussions showed that mature, multiple canopy structurally-complex forest would decline across the PRMP/FEIS Decision Area in the first decade and would increase in the decades following (USDI BLM 2016a, pp. 332, 985-986). Those discussions are incorporated here by reference.

Rationale

These issues considered but not further analyzed in detail because regardless of project-specific or site-specific information, there would be no potential for effects beyond those analyzed in the PRMP/FEIS. The vegetation management actions and other activities proposed in the EA action alternatives are consistent with the SWO and NCO RODs/RMPs.

As noted above, the PRMP/FEIS concluded that actions could potentially negatively affect property values, but acknowledged the analytical uncertainty of this finding; that uncertainty still remains, regardless of project scale.

Noise impacts to communities and residences from activities in the EA action alternatives would be limited in context: short duration, infrequent or unrepeated in any given area, and ameliorated by seasonal restrictions. Noise intensity would likewise be limited by distance to communities and by compliance with applicable local noise ordinances. The limited context and intensity of these impacts prevent them from having any potential for significant effects.

Impacts to the human relationship to the forest, as measured by availability of mature multi-canopy structurally-complex forest, would be within those analyzed by the PRMP/FEIS. Several sections in Chapter 3 of this EA analyzes changes in structural stages from actions proposed in the EA alternatives. Those sections show that the effects to structural stage class are within those analyzed in the PRMP/FEIS – i.e., short-term decline followed by longer-term increase.

Because effects do not have the potential to be significant, or to have effects beyond those analyzed in the PRMP/FEIS, these issues were not analyzed in further detail.

4. *How would the alternatives affect economic viability and costs of timber sale or stewardship contracts (including road building and decommissioning)?*

Background

The action alternatives each include, among other actions, varying degrees of commercial harvest of forest commodities. Factors that affect supplying commercial forest commodities in an economically viable manner include the amount and distribution of material available for harvest, the method of harvest, access to harvest areas, and the associated costs to mitigate the impacts of harvest, such as treatment of activity slash. These factors considered individually or collectively have an effect on the economic feasibility (positive net revenue) and economic efficiency (revenue per unit of harvest) of commercial harvest proposals.

The amount and distribution of forest products existing on the available harvest acres in the Planning Area is interrelated with access and method of harvest. Methods of harvest are primary factors affecting actual harvest costs. Harvest of timber stands with a relatively higher harvest volume per acre in a concentrated area would result in lower access and removal costs compared to stands with relatively lower harvest volumes located in a more dispersed pattern. Appropriate harvest methods vary based on management objectives and site conditions such as access, topography, and available harvest volume. Where more cost-effective harvest methods can be used, economic efficiency is increased. Economic feasibility is affected when relatively lower harvest volumes or values are associated with more costly yarding methods.

Access to harvest areas is a factor with respect to the number of road systems needed and the condition of those roads. Cost factors include the level of road improvement needed for hauling material, road surface condition with respect to the length of the operating season, use restrictions during wet conditions, and move-in/move-out costs of equipment where multiple road systems are used for access. Economic feasibility and efficiency are reduced where road improvement costs and the number of road miles or road systems needed for harvest access increases.

There are also costs associated with the implementation of required PDFs, such as ripping compacted soils, decommissioning or closing roads, treating activity slash, and operating under seasonal restrictions. The cost and level of resource protection needed is situation dependent. Stands are evaluated for economic and operational feasibility. Potential treatment units may be deemed uneconomical when harvest volume per acre is too low to be economically feasible or stands not accessible based on terrain.

Rationale

This issue was considered but not analyzed in detail as there would be no effect to the environment in regard to this issue as a result of implementing any actions under any of the alternatives; therefore, there is no potential for significant effects. Furthermore, this was not identified as a purpose and need for this project and further analysis is not needed to inform the decision maker as to how each alternative meets the purpose and need for action.

5. *How would the alternatives affect the potential cost of follow-up maintenance treatments?*

Background

Table 70. Approximate cost of treatment types based on Medford District Service Indefinite Delivery Indefinite Quantity contract. Planning costs are estimated on a per acre basis for non-programmatic NEPA, project layout, and contract administration.

Treatment Type	Average cost/acre
Project Planning (NEPA, layout, contract administration)	$1,000
Thinning	$420
Pile & burn	$600
Underburn	$350

At approximately 25 percent of initial entry cost (Table 70), maintenance, via underburning, enables dollars to stretch farther and facilitates the needed increase in pace and scale of treatments (Haugo et al. 2018; DeMeo et al. 2018). If time between treatments is delayed too long, vegetation will have re-grown and dead fuels accumulated to an extent that second entry treatments in these areas will require costs on par with the initial entry treatment (combined thinning, pile and burn actions). Wildfires can also provide maintenance of treated areas. Typically, most wildfire acreage represents less than one percent of fires that occur. These large fires tend to burn under more extreme fire weather, resulting in larger areas of high severity (Long et al. 2017). However, fuel treatments have been found to be effective, even during extreme fire weather, in some instances (Appendix 5 - Maintenance, USDI BLM 2016a, p. 228). In recent years, nearly 4,000 acres of hazardous surface and ladder fuel reduction treatments on Medford District lands have been intersected by wildfire. For many of these treated areas (65 percent), the results have been similar to outcomes desired from prescribed underburning, resulting in low-moderate severity fire effects, delaying the need for maintenance.

Rationale

This issue was considered but is not analyzed in detail because it is not related to the purpose and need for action and there is no potential for significant effects. Economic effects only have the potential be significant if they are closely tied to changes in the physical environment, and the cost of the project does not have a sufficiently close causal connection to the physical environment to have significant effects. Economic effects are not intended by themselves to require preparation of an EIS (40 CFR 1508.14 [1978]).

6. *How would the proposed activities allow for a sustainable flow of timber?*

Background

Management actions on LUA are clearly defined in the SWO ROD/RMP. 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 varying objectives as described in the SWO ROD/RMP. One of management objectives on the HLB LUA is to achieve continual timber production that can be sustained through a balance of growth and yield (USDI BLM 2016b, p. 62). The management objectives for the LSR LUA are defined and limited to developing, maintaining or promoting nesting-roosting or foraging habitat of the NSO and marbled murrelet (USDI BLM 2016b, p. 70) and to enable forests to: (1) recover from past management measures, (2) respond positively to climate-driven stresses, wildfire and other disturbances with resilience, (3) ensure positive or neutral ecological impacts from wildfire, and (4) contribute to NSO recovery (USDI BLM 2016b, p.74). The management direction for the LSR – Dry LUA for the Medford District is to apply selection harvest or commercial thinning treatments to at least 17,000 acres per decade (USDI BLM 2016b, p. 74) and does not direct to allow for a sustainable flow of timber. The management objectives of the RR, DDR, and Congressionally reserved lands also do not direct to allow for a sustainable flow of timber.

Rationale

None of the action alternatives include commercial actions in the HLB LUA. All commercial harvest actions proposed in the alternatives are in LUAs that do not direct for sustained flow of timber as an RMP management objective or direction (e.g., LSR, DDR, RR). As no commercial actions on the HLB LUA are proposed in this EA and the management objectives for the other LUAs do not direct to allow for a sustained flow of timber, the proposed actions would not affect a sustainable flow of timber, and does not need to be considered or analyzed in further detail.

7. *How does road building and decommissioning (or lack thereof) affect ability to treat acres proposed in the EA and future treatments?*

Background

Management direction identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions.

Under Alternative A, no new roads would be constructed. Alternative B would allow for only temporary road construction, which would be limited to 5 miles per year. Alternatives C would allow for up to 10 miles of new road construction (temporary or permanent) per year and limited to 90 miles per decade and no net increase in permanent roads.

Temporary roads constructed as part of actions analyzed in this EA could become permanent roads under the reciprocal (ROW) process. The BLM is not able to anticipate when these requests could be made.

Reciprocal right-of-way holders are able to request that a road prism constructed to access BLM land be made permanent as part of the reciprocal ROW program.

Rationale

The action of building or not building roads will not affect future treatments. Road construction will only occur for commercial treatment actions only if necessary for access under Alternatives B and C. Commercial actions would only take place outside the HLB, in stands that are not managed for sustained yield under the current SWO and NCO ROD/RMPs. Access needs for future actions are speculative. Stands accessible through the current permanent road system (or the minor adjustments through no-net increase of permanent roads in Alternative C) would remain accessible post-treatment. For other locations, temporary roads could be built to the specific locations needing future access, or other means of access may be available (e.g., helicopter logging). While changes in SWO and NCO ROD/RMPs or technology may affect the need for and ability to access stands, such changes are speculative. As such, the effect of actions proposed in this EA on future access needs is speculative and would not change the ability to treat the same acres in the future from the current ability, and this Issue is not analyzed in further detail.

8. *How will permanent road decommissioning effect utility right-of-way holder access to their infrastructure and rights-of-way?*

Background

This issue was raised by members of the public during scoping. Under Alternative C, the BLM would decommission permanent roads to offset new permanent road building to ensure no net increase in road density. When decommissioning roads over which a ROW holder has a valid existing ROW (whether a FLPMA or reciprocal ROW), BLM policy, procedures, and agreements require the BLM notify the ROW holders prior to decommissioning the road, with an opportunity to respond. If a ROW holder objects to decommissioning of the road, the BLM will not decommission the road (although maintenance costs for maintaining the road may shift to the ROW holders entirely).

Rationale

Because valid existing ROW holders, including utility ROW holders, could object to and therefore prevent decommissioning of ROW's that provide access to utility infrastructure and associated ROWs, there would be no effect to utility ROW holders. Because there would be no effect, this issue was not analyzed in further detail.

9. *How would permanent road building affect the potential need for (and cost of) ongoing road maintenance.*

Background

This issue was raised by members of the public during scoping. Increasing total permanent road infrastructure within the Medford District increases annual and deferred maintenance funding needs necessary to properly maintain and repair these new roads. With approximately 4,318 miles of BLM roads within the Medford District, there is a significant shortfall of funding available as compared to the funding needed to maintain these roads. Creating new roads will exacerbate this issue.

Permanent road building is proposed only under Alternative C. Alternative A does not propose new road construction. Alternative B proposes only temporary road construction, which would be decommissioned after use and would not require ongoing maintenance. Alternative C proposes new permanent road building without any net increase in road density. For every newly constructed permanent road segment, an equivalent distance of existing permanent roads would be decommissioned. Priority for decommissioning would go to existing roads located in RRs or coho critical habitat, or with chronic erosion features and/or hydrologic connectivity.

Temporary roads could theoretically be converted to reciprocal ROW roads by reciprocal ROW holders. Maintenance and upkeep of reciprocal right of way roads in some cases are the responsibility of the reciprocal right of way holder, depending on reciprocal agreements and circumstances.

Rationale

Because no alternative proposes to increase the total number of permanent road miles or infrastructure within the Medford District, the need for and cost of ongoing road maintenance would be unlikely to be affected. Under Alternative C, roads decommissioned to offset newly built permanent roads would be more likely to have chronic problems that require higher maintenance needs and costs than the newly built permanent roads. Decommissioning these roads could therefore result in a potential net decrease in BLM maintenance needs and costs. While decommissioning up to 10 miles of offsetting permanent roads each year is theoretically possible under Alternative C, that would be an unlikely scenario; the number of decommissioned roads each year would be likely be much less. Yet, even under that scenario, the net decrease in costs would be negligible within the context of the 4,318 miles of permanent roads that would continue to require maintenance, and would be difficult to quantify. If temporary roads are converted to reciprocal right of way roads by reciprocal ROW holders, maintenance needs and costs are in some cases borne by the reciprocal ROW holder; however, predicting where temporary roads would be converted or whether they will increase costs cannot be done with any degree of accuracy. Because there would be no effects, or negligible effects, to BLM needs or costs for road maintenance from permanent road building, this issue is not analyzed in further detail.

L. Wildlife

1. *How would vegetation treatments and new road/landing construction affect barred owl and spotted owl encounters and interactions? Would the proposed actions cause an increase in northern spotted owl and barred competition?*

Background

The Revised Recovery Plan for the Northern Spotted Owl (2011) identified competition from the barred owl as a threat to the spotted owl (USDI FWS 2011). Barred owls are native to eastern North America, but have moved west into spotted owl habitat. Existing evidence suggests that barred owls compete with NSOs for habitat and prey with near total niche overlap and that interference competition (Dugger et al., 2011; Van Lanen et al., 2011; Wiens et al., 2014) is resulting in increased NSO site abandonment, reduced colonization rates, and likely reduction in reproduction (Olson et al., 2005; Dugger et al., 2011; Forsman et al., 2011; Wiens et al., 2014). The recent best available information continues to support the theory that barred owl competition may be the most pressing threat (USDI FWS 2013; Dugger et al., 2016, p. 112; Franklin et al., 2021, p. 13) influencing spotted owls. Additionally, the presence of barred owls has likely affected the occupancy patterns of spotted owls. Annual occupancy rates of NSO territories declined when barred owls were detected within 800 meters of potential site centers (Kelly et al. 2003, p. 51; Sovern et al. 2019, p. 4). Mangan et al. (2019, p. 11) observed a negative relationship between barred owl presence and the probability of detecting spotted owl reproduction accurately at an occupied site if it was, in fact, occurring.

Eleven demographic study areas have been established to represent owl status across the range of the NSO (Forsman, et al., 2011). Metadata analysis evaluates population statistics of the owls in the demographic study areas. Spotted owl populations range-wide are declining at an average annual rate of 3.8 percent. Dugger et al. (2016) found that competition with barred owls is likely the primary cause of spotted owl population declines across their range because: barred owls have a strong negative effect on spotted owl survival on some but not all of the individual study areas; barred owls have a strong positive effect on spotted owl site extinction rates on all areas; and barred owls also have a strong negative effect on spotted owl colonization on some but not all study areas. Similar to Dugger et al. (2016), the most recent metadata analysis found that barred owl occupancy had a dominant negative effect on colonization and positive effect on extinction of spotted owl territories (Franklin et al. 2021, p. 28). There are two spotted owl demographic study areas associated with the Treatment Area: the Klamath Demography Study Area (KSA) (within the Treatment Area), which represents the Klamath province and the South Cascade Demography Study Area (SCS) (adjacent to the Treatment Area), which represents the West Cascades province. The last two years of annual reports supported the overall 2016 and 2021 meta-analysis summaries with a decline in the spotted owl population and an increase in barred owl detections within these study areas (Dugger et al.; 2019; Dugger et al., 2020; Lesmeister et al., 2019; Lesmeister et al., 2020, Franklin et al., 2021).

There is concern that timber harvest and other silvicultural activities may directly or indirectly affect the interaction between barred owls and spotted owls and increase the competitive advantage for barred owls. However, barred owls successfully colonized Olympic National Park in areas that never had timber harvest (Courtney et al 2004, pp. 7-13). Old growth reserves appear to be supporting large populations of barred owls, and in many cases there are more barred owls than spotted owls in the reserves (Pearson and Livezey 2003, p. 271). USDI FWS (2011, pp. 1-8) assumed barred owls now occur at some level in all areas used now or in the past by spotted owls. Recent studies have continued to confirm the high barred owl population expansion rate (Dugger et al., 2019; Dugger et al., 2020; Lesmeister et al., 2019; Lesmeister et al., 2020; Weins 2012; Dugger et al. 2016). Because of the high barred owl population rates, it would be impossible to determine conclusively, and highly speculative to infer, that a barred owl invader at an NSO site was harvest displaced and not simply a disperser from a successful barred owl nest not associated with timber harvest. Therefore, for the reasons described above, the EA analysis concludes there is no scientific support that the silvicultural treatments included in the EA would expand the range of barred owls.

<u>Barred Owl Presence in the Treatment Area</u>

Barred owls have been detected opportunistically within the Treatment Area because the BLM does not conduct barred owl surveys across the Medford District. However, the BLM assumes the trend of barred owl observations across the Medford District is consistent with the trends in the adjacent demography study areas (see above). For example, data from the KSA has shown the percentage of spotted owl sites with barred owl detections is steadily increasing, from less than 10 percent in all years previous to 2003, to greater than 10 percent in all years after 2003 (Hollen et. al. 2015). Additionally, the number of sites where barred owls were detected exceeded the number of sites where spotted owls were detected for the first time in 2014 (Hollen et. al. 2015). A study in the Oregon Coast range suggests that over the course of a season, spotted owl surveys to protocol (> 3 visits) allow approximately 85 percent of the barred owls present in the area to be detected (Wiens et al. 2011). Additionally, the spotted owl survey protocol (USDI FWS 2012a) allows for a reasonable assurance that spotted owls in an area will be detected, even where barred owls are present. Based on known current barred owl occupancy of BLM-administered lands in the Treatment Area and the increasing trend of barred owl occupancy regionally and locally, it is likely many of the spotted owl sites within the Treatment Area could be occupied by barred owls during the life of the IVM-RL project regardless of timber harvest.

Rationale

The effects of the proposed actions on interactions between barred owls and spotted owls are not analyzed in detail because there would be no potential for effects beyond those analyzed already in the PRMP/FEIS, to which this EA is tiered (USDI BLM 2016a, pp. 947-973). The PRMP/FEIS analysis of the effects of management actions on spotted owl populations included simulation of barred owl encounters. The population simulations acknowledged that spotted owl populations in the Western Cascades and Klamath Provinces would continue to decline and the PRMP/FEIS did not show discernable differences among the alternatives when compared to the No Timber Harvest reference analysis (USDI BLM 2016a, p. 961, 962, 969). Additionally, as described above, barred owl invasion, regardless of harvest, is likely to continue to be the driving force behind the decline of NSO occupancy and reproduction in the Treatment Area (USDI BLM 2016a, pp. 947-973; USDI FWS 2012; Dugger et al. 2016). The last two years of annual reports for the KSA and SCS Demography Study Area areas indicated a decline in the spotted owl population and an increase in barred owl detections (Dugger et al., 2019, Dugger et al., 2020, Lesmeister et al., 2019, Lesmeister et al., 2020), which supports the overall spotted owl population decline predicted in the PRMP/FEIS. Therefore, the results of the recent studies do not present new information that would create new effects to spotted owl populations since the PRMP/FEIS. Additionally, there has been no new information to provide evidence to counteract the PRMP/FEIS conclusion that the BLM cannot manage individual forest stands to provide NSOs with a competitive advantage over barred owls (USDI BLM 2016a, pp. 948, 973; Dugger et al. 2011; Wiens et al. 2014). Untreated functioning NRF and dispersal-only habitat within the Treatment Area would help minimize the likelihood that inter-species competition would be exacerbated as a result of the IVM-RL proposed actions. Franklin et al. (2021) confirmed the importance of these untreated areas across the landscape to help with barred owl competition effects by providing areas for spotted owls to re-colonize across the landscape and facilitated connectivity and dispersal between spotted owl occupied areas.

2. *How would the proposed vegetation treatments and road building affect gray wolves in the Planning Area, including denning sites during the reproductive season?*

Background

The gray wolf (*Canis lupus*), was federally-listed as endangered in Oregon west of Highways 395 and 78 when the EA was released for public comment in August 2020. The FWS removed the gray wolf in the lower 48 states from the federal ESA Threatened and Endangered list on November 3, 2020 (effective January 4, 2021) (USDI FWS 2020d). However, a court order vacated the FWS delisting decision on February 10, 2022 (*Defenders of Wildlife et al.* v. *U.S. Fish and Wildlife Service et al.; WildEarth Guardians, et. al.* v. *U.S. Department of the Interior, et al.; Natural Resources Defense Council, Inc.* v. *U.S. Department of the Interior*). Until 2011, gray wolves were only known to occur in Oregon east of highway 395. In September 2011, one radio collared male wolf (OR-7) dispersed from the Imnaha pack in Northeastern Oregon. ODFW initially documented OR-7 in the southwest Cascades in 2013. In 2014 ODFW identified OR-7 with a mate and pups and they became the Rogue pack, and the pack continued to den and produce litter for the next several years. Additional wolves were also observed in the southeast region of the Medford District between 2015 -2016. In January of 2020, a wolf was detected in the Sam's Valley area between Highway 62 and Interstate 5 by a private citizen (https://mailtribune.com/news/top-stories/game-camera-photographs-gray-wolf-in-new-territory-inside-jackson-county). Wolf populations and activity are expected to increase within the Treatment Area over the life of this project, with the potential for wolves to disperse west of Interstate 5.

Wolves are habitat generalists and roam across large areas. Important attributes include wolf habitat include forest cover, public land, high ungulate density, low livestock density (USDI BLM 2016a, p. 892) and human activity is minimal (Oakleaf et al. 2006, Belongie 2008). GPS location data indicated wolves in Oregon primarily use forested habitat with seasonal shifts to more open habitats that reflect seasonal distributions of prey (e.g., lower elevation elk wintering areas) (Oregon Department of Fish and Wildlife, 2015). Important wolf habitat components for reproduction are denning sites and rendezvous sites. Den sites may be in hollow logs, clefts between rocks, deep riverbank hollows, spaces under upturned trees or rock overhangs, or in abandoned dens of other animals.

Scientific evidence of direct or indirect effects of forest management activities on wolves is scarce at best. There are limited studies that address effects of landscape changes (i.e., logging, prescribed fire, or other management activities implemented by resource managers) to wolf survival or reproductive success. Wolves may be temporarily displaced during or after a vegetation project, but it would be difficult to attribute wolf movement, impacts to individual wolves or reproductive success to a specific activity and determine an impact if there was one. Timber harvest activities have been occurring on private lands within the Rogue AWKA and the pack may be acclimated to these types of actions. Light to heavy thinning at the small project level is not significant to their success because of the scale at which they use the landscape (J. Stephenson, FWS, Personal Comm. 2016).

PDFs would minimize potential effects to wolves by retaining potential denning structure on the landscape under each alternative. Additionally, PDFs would also prevent disturbance to known active den sites by avoiding activities within one mile of any known den between March 1 through June 30. Communication with the FWS and ODFW regarding wolf dens and rendezvous sites will continue on an annual basis during the life of any project under this EA. If a den or rendezvous site is identified prior to, or during project activities, consultation Project Design Criteria will be implemented.

Rationale

The effects of the proposed actions on gray wolves and their habitat are not analyzed in detail here because there would be no potential for effects beyond those analyzed already in the PRMP/FEIS, to which this EA is tiered. As explained in that analysis, and discussed above, wolves are highly adaptable habitat generalists with large home ranges and are resilient to disturbance from land use practices. The BLM concluded that land use restrictions were not necessary to ensure the survival of the wolf population and that the amount of habitat available for wolves would not change with implementation of the SWO ROD/RMP (USDI BLM 2016a, pp. 892-893). That rationale is incorporated here by reference. Additionally, as mentioned above, wolves are habitat generalists and negative effects are not anticipated from the treatments evaluated in the action alternatives.

3. *How would the proposed vegetation treatments and road building affect the fisher?*

Background

On November 7, 2019, FWS released a proposed rule to list the West Coast Distinct Population Segment (DPS) of fisher (*Pekania pennanti*) as a threatened species under the ESA (as amended 1973) (USDI FWS 2019b). The 2019 West Coast DPS included two extant historically native subpopulations, Northern California/Southern Oregon (NCSO) and Southern Sierra Nevada (SSN), as well as the Northern Sierra Nevada (NSN) and the Southern Oregon Cascades (SOC) subpopulations. On May 15, 2020, the FWS determined that the Northern California/Southern Oregon (NCSO) DPS, which includes the SOC subpopulation, did not warrant listing under the ESA (USDI FWS 2020a).

The range for the Northern California/Southern Oregon (NCSO) DPS of fisher is within the Medford District and the Treatment Area (Map 9). Fishers are closely associated with low to mid elevation (generally <4,000 feet) forests with a coniferous component, large snags, or decadent live trees and logs for denning and resting, and complex physical structure near the forest floor to support adequate prey populations (Aubry and Lewis 2003). There are two categories of fisher habitat: denning and foraging. The stand habitat metrics for fisher can vary by province. While the Medford District does not have a fisher habitat baseline GIS layer, spotted owl habitat has been determined as a reasonable proxy for fisher habitat because both require similar habitat components. The correlation between spotted owl and fisher habitat are as follows:

- Spotted owl nesting-roosting and foraging habitat is considered fisher denning habitat because they include similar key habitat elements (high canopy cover, multi-storied stands, large snags, and large down trees on the forest floor). There are 274,358 acres of denning habitat within the NSO Analysis Area, which includes 106,774 acres within the LSR LUA.
- Spotted owl dispersal-only habitat is considered fisher foraging habitat because forage habitat for fishers occur in a broader range of forested habitats, which can be similar to spotted owl dispersal-only habitat. In some of the drier watersheds on the Medford District, spotted owl dispersal-only habitat may be utilized as fisher denning habitat if the appropriate denning structure is available. However, for this analysis, because denning structure cannot be measured at the large Treatment Area or NSO Analysis Area scales, all dispersal-only habitat is analyzed as foraging habitat. There are 140,865 acres of foraging habitat within the NSO Analysis Area, which includes 37,583 acres within the LSR LUA.
- Spotted owl capable habitat and non-habitat are not considered habitat for fishers. There are 69,715 acres of non-habitat within the NSO Analysis Area.

Currently, the estimated fisher population within the Northern California Southern Oregon subpopulation of the distinct population segment is estimated to be 3,196 individuals (2,507–4,184; 95 percent Confidence Interval (C.I.)) Furnas et al. 2017, p. 12 as *cited in* FWS 2019b). Fisher home ranges can vary by province.

However, the mean home range for a male fisher is 20.8 square miles (13,329 acres) and the home range for a female fisher is 7.3 square miles (4,692 acres) (USDI BLM 2016a; Lofroth 2010). Surveys for forest carnivores, including the fisher have been conducted on the Medford District with most occurring between 2008 and 2014. These surveys, based on the Zielinski and Kucera protocol (1995), are photographic bait stations designed to detect forest meso-carnivores, including fishers, through photographs and hair collection for DNA sampling. Additional camera surveys and surveys using scat-detection dogs occurred throughout the range of fisher in southwestern Oregon as part of larger studies to determine the range of fishers and habitat use. Approximately 17 of the 5th field watersheds in the NSO Analysis Area have documented fisher detections from these various surveys on the Medford District.

Rationale

The effects of the proposed actions on fisher are not analyzed in detail because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. As described below, the estimated effects from the proposed action are within the range of effects estimated in the PRMP/FEIS. The PRMP/FEIS describes the fisher's range, the habitat it uses, and the effects of vegetation management as described in the SWO ROD/RMP on fisher and their habitat (USDI BLM 2016a, pp. 871-872). The fisher analysis in the PRMP/FEIS (pp. 870-880) is incorporated here by reference.

A preliminary analysis was conducted to determine potential effects to fisher and whether or not this issue warranted detailed analysis. The preliminary analysis evaluated impacts to fisher within all IVM-RL treatment areas of the Medford District BLM-administered lands within the West Coast DPS on the Medford District (fisher analysis area). The proposed actions, but primarily the commercial treatments in the reserve LUAs, would have negative effects to denning and foraging habitat due to the removal of trees and other vegetation. The proposed actions would remove and reduce the quality of suitable fisher habitat because treatments would remove key components, such as large snags, large down wood, large trees, multiple canopy layers, and canopy cover would be reduced. Within the fisher analysis area, the proposed actions would result in a 1.3 percent reduction of denning habitat in Alternative A, a 0.1 percent reduction in Alternative B, and a 2.4 percent reduction in Alternative C. Within the fisher analysis area, the proposed actions would result in a 0.02 percent reduction of foraging habitat in Alternative A, a 0.2 percent reduction in Alternative B, and a 4 percent reduction in Alternative C. The effects to fisher habitat from the proposed actions do not exceed those already analyzed in the PRMP/FEIS. The PRMP/FEIS analysis describes that under the SWO ROD/RMP there would be a 10-15 percent loss in total fisher habitat in the first two decades; however, additional habitat would develop in subsequent decades that would surpass current conditions by 2043 (USDI BLM 2016a, p. 879).

The most direct effects from proposed commercial thinning in the reserve LUAs would be the potential loss of unknown active natal and maternal den sites. Generally, the loss of denning structure within a home range would limit female's ability to den and would likely increase their risk to predation due to the lack of cover within the harvest units. Naney et al (2012, pp. 7–8) found that predation risk may increase due to the reduced cover and the relatively high abundance of predators in fragmented landscapes. While recognizing these generally possible effects to fisher from habitat disturbance, PDFs that retain higher canopy cover and protect denning structures (snags, down woody material and live trees with cavities) in stands with known denning sites, would prevent the proposed actions from causing direct effects to known fisher denning sites.

There may be a loss of individuals from the proposed action due to the removal of denning and foraging habitat within fisher home ranges and the potential to remove unknown active dens during harvest activities. Depending on the size and scope of an individual project using this EA, the removal and reduction in the quality of suitable fisher habitat could impact individual fishers. As described above, the home ranges of males are larger than females. As project sizes increase and more of the home range are impacted, then it is more likely the proposed actions would affect normal life behaviors of fishers. The most direct effects from proposed commercial thinning would be the potential loss of active natal and maternal den sites. The loss of denning structure within a home range would limit female's ability to den, and would likely increase their risk to predation due to the lack of cover within the harvest units. Naney et al (2012, pp. 7–8) found that predation risk may increase due to the reduced cover and the relatively high abundance of predators in fragmented landscapes. Some areas of the Medford District are already fragmented due to the past harvest on public lands and the amount of private industrial forest lands adjacent to the project area. The highest potential for effects to individual fishers from commercial thinning in LSR would be in four 5th field watersheds with large block LSR and multiple fisher detections (Deer Creek, Lower Applegate River, Middle Applegate River, and Williams Creek). However, treatments would be dispersed across the fisher analysis area and overall amounts would be limited per year so as to temporally and spatially distribute the impacts. This would also prevent concentrated habitat loss within more than one potential fisher home range at a time.

The potential loss described above that could occur under this EA would not exceed those already analyzed in the fisher analysis under the PRMP/FEIS (USDI BLM 2016a, pp. 870-880). The PRMP/FEIS found that the PRMP would lead to a decrease of two fishers at the RMP planning scale by 2023, but an increase of 25 by 2033, and an eventual increase of 60 fishers within 50 years across the landscape (USDI BLM 2016a, pp. 879, 1713). The increase in population would be a result of habitat development in the future (USDI BLM 2016a, p. 879), The proposed actions in the EA, specifically the Long-Term NSO prescription theme, would promote development of fisher habitat by accelerating the growth of non-denning habitat to denning habitat (as emphasized for spotted owl nesting-roosting habitat development).

Disturbance from treatment activities could affect fishers within the fisher analysis area. However, fishers are highly mobile, and with large home ranges, they would likely move to another part of their home range while the activity is taking place. Disturbance from project activities would be temporally and geographically limited and would occupy a geographic area smaller than the average fisher home range. Seasonal restrictions listed as PDFs for fisher and other resources would benefit fishers by restricting project activities until young are approximately six weeks old, approximately the age when fisher move young from natal dens and become more mobile.

4. *How would treatments proposed in meadows or grasslands affect special status wildlife species that are dependent on these specific habitats?*

Background

Meadow and grassland habitat exists within the Treatment Area that may support a variety of Special Status wildlife species, which are managed under the BLM Special Status species 6840 policy. The two Special Status wildlife species most closely tied to this habitat include two insects: the Mardon skipper (*Polites mardon*) and the Siskiyou short-horned grasshopper (*Chloealtis aspasma*). The Mardon skipper is a rare butterfly in the Pacific Northwest. Mardon skippers are grassland and open meadow obligates endemic to the states of Washington, Oregon, and California. The subspecies *P. m. klamathensis* only occurs in a small geographic area to the east of the City of Ashland in the Cascades of southern Oregon. The sites on the BLM are only found within the CSNM, which is not included in the EA. Mardon skippers are weak fliers and usually unable to disperse more than a few hundred yards (Black et al. 2010). The Siskiyou short-horned grasshopper is associated with open grassland with an elderberry shrub component. The species has been observed on the Ashland Field Office and is suspected within the Butte Falls Field Office. Additional meadow associated species found within the Treatment Area include western bumblebee, Franklin’s bumblebee, coronis fritillary butterfly, and Oregon vesper sparrow. Vernal pool fairy shrimp are located in wetlands adjacent to meadows and grasslands on top of the Table Rocks.

Over the last 150 years, fire exclusion, conversion to agricultural fields, overgrazing, invasion of non-native grasses and noxious weeds, and OHV and vehicular use have significantly reduced or degraded the extent of these grasslands. The proposed action would improve and restore meadow habitat by thinning encroaching conifers, hardwoods, and shrubs, as well as implementing prescribed fire. The amount and locations of treatments vary by Alternative. When compared to Alternatives A and B, Alternative C has the greatest opportunity for meadow and grassland restoration because more acres and treatments would occur throughout the Treatment Area.

Rationale

The effects of the proposed alternatives on Bureau Sensitive species dependent on meadows and grasslands are not analyzed in detail, because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. The PRMP/FEIS acknowledged that the PRMP would result in no changes to meadow habitats and the species associated with these habitats (USDI BLM 2016a, pp. 1667-1675) because the PRMP/FEIS would not remove or degrade meadow habitat. The EA would improve and restore meadow habitats within the Treatment Area.

The PDFs and SWO ROD/RMP management direction provides additional support for the proposed actions and additional protection during implementation:

- "Manage naturally occurring special habitats to maintain their ecological function, such as seeps, springs, wetlands, natural ponds, vernal pools/ponds, **natural meadows**, rock outcrops, caves, cliffs, talus slopes, mineral licks, oak savannah/woodlands, sand dunes, and marine habitats." (USDI BLM 2016b, p. 115)
- "Maintain or restore natural processes, native species composition, and vegetation structure in natural communities through actions such as applying prescribed fire, thinning, removing encroaching vegetation, treating non-native invasive species, retaining legacy components (e.g., large trees, snags, and down logs), maintaining water flow to wetlands, and planting or seeding native species." (USDI BLM 2016b, p 106; USDI BLM 2016c, p. 87)
- Fire lines for prescribed fire will not be constructed through vernal pools (PDF# 107).
- Prescribed fire will occur in the fall when vernal pools are dry and outside of the reproductive season for fairy shrimp (PDF# 108).

5. *How would non-conifer small diameter treatments affect oak-associated wildlife and other birds?*

Background

Oak woodlands and savannas, composed of hardwood species, typically white and/or black oak, shrubs and forbs include a gradient of habitats and express a broad range of unique stand structures. Southwestern Oregon chaparral is composed of dense, evergreen, drought-tolerant shrubs found at low to mid-elevations in the interior valleys. Oak chaparral is a shrub-dominated habitat type (often >50 percent shrub cover) that includes an open canopy of oak trees with scattered grassy openings amid dense patches of shrubs, in particular evergreen shrub species such as buckbrush (*Ceanothus cuneatus)* and manzanita (*Arctostaphylos sp*.). In many ACECs/RNAs these non-conifer plant communities are identified as one of the values that the special area was designated to protect. There are over 106 bird, mammals, reptile, and amphibian species that use oak woodland/chaparral habitats in southwestern Oregon (Johnson and O'Neil, 2001, pp. 276-277).

The proposed action would improve and restore oak woodland/chaparral habitat by thinning encroaching conifers and reducing hardwood and shrub densities, as well as implementing prescribed fire. The amount and locations of treatments vary by Alternative. When compared to Alternatives A and B, Alternative C has the greatest opportunity for oak woodland/chaparral habitat restoration because more acres and treatments would occur throughout the Treatment Area.

Rationale

The effects of the proposed alternatives on Bureau Sensitive species dependent oak woodland/chaparral habitat are not analyzed in detail, because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. The PRMP/FEIS acknowledged that the BLM PRMP/FEIS would result in either an increase or no change these habitat types (USDI BLM 2016a, pp. 1667-1675) because the PRMP/FEIS would not remove or degrade oak woodland/chaparral habitats. Consistent with the PRMP/FEIS analysis, the EA would improve and restore these habitats within the Treatment Area (see Section 3.9, Special Plant Communities).

The PDFs and ROD/RMP management direction provides additional support for the proposed actions and additional protection during implementation:

- "Manage naturally occurring special habitats to maintain their ecological function, such as seeps, springs, wetlands, natural ponds, vernal pools/ponds, natural meadows, rock outcrops, caves, cliffs, talus slopes, mineral licks, oak savannah/woodlands, sand dunes, and marine habitats." (USDI BLM 2016b, p. 115).
- "Maintain or restore natural processes, native species composition, and vegetation structure in natural communities through actions such as applying prescribed fire, thinning, removing encroaching vegetation, treating non-native invasive species, retaining legacy components (e.g., large trees, snags, and down logs), maintaining water flow to wetlands, and planting or seeding native species." (USDI BLM 2016b, p 106; USDI BLM 2016c, p. 87).

6. *How would non-conifer small diameter treatments affect Oregon Vesper Sparrows?*

Background

The Oregon vesper sparrow (*Pooecetes gramineus affinis*) is currently a Bureau Sensitive species. Historically, it was a relatively common breeding bird throughout the grassland and savannah habitats from southwestern British Columbia, through western Washington and Oregon, and into northwestern California (Altman 2011). It has experienced range wide declines with a current population estimate of < 3,000 birds range-wide as of 2010. It has been petitioned for listing under the federal ESA (Altman 2011; USDI FWS 2018c). There are four ecoregional metapopulations within the Oregon and Washington range of Oregon Vesper Sparrow (the Rogue Basin in the Cascade-Siskiyou Monument, the Umpqua Valley, the Willamette Valley, and the Puget Lowlands). One primary threat to Oregon vesper sparrows in the Klamath Mountains includes the encroachment of woody vegetation from the edges of the meadows that reduces habitat area and suitability (Altman 2017).

Rationale

The effects of the proposed actions on the Oregon Vesper sparrow and their habitat are not analyzed in detail because the Treatment Area does not include the Cascade-Siskiyou National Monument, where the known locations of the Oregon Vesper on the Medford District are. Additionally, the effects of the proposed alternatives on Bureau Sensitive species dependent oak woodland/chaparral habitat have already been analyzed in the PRMP/FEIS, to which this EA is tiered. The PRMP/FEIS acknowledged that the BLM PRMP/FEIS would result an increase of Oregon vesper sparrow habitat over the next 50 years (USDI BLM 2016, p. 1669). Even though there are no known populations in the Treatment Area, all of the proposed alternatives in the EA would improve and restore Oregon vesper sparrow habitat by reducing conifer encroachment on meadows.

7. *How would proposed changes in forest canopy and structure from vegetation treatments and road work activities affect snags and coarse woody debris and the wildlife dependent on these structures (woodpeckers, cavity nesters, NSO, flying squirrel, fisher, marten, and bats)?*

Background

Snags and coarse woody debris are important habitat elements for a variety of wildlife species, including T&E and Bureau Sensitive Species. The BLM's Planning Criteria Document (USDI BLM 2014) summarizes habitat needs for these species, which was the basis of the PRMP/FEIS to which this EA is tiered.

Rationale

The effect of the alternatives on snags and coarse woody debris is not analyzed in detail here because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered.

With PDFs to align the project with SWO ROD/RMP required management direction, the project presents no new or unique facts or circumstances that deviate from the modeling assumptions used in the PRMP/FEIS. The PRMP/FEIS analyzed the effects of timber harvest and other SWO ROD/RMP decisions on the density of snags and coarse woody debris (USDI BLM 2016a, pp. 843-844; 1657-1666). That analysis assumed a magnitude and intensity of timber harvest and vegetation management treatments that include the acreages and treatment types proposed and projected an increase in habitat for species dependent on these legacy structures in stands of all ages. That analysis is incorporated here by reference. The EA also discusses coarse woody debris and snags in the spotted owl and late-successional reserve issues and the fisher issue not analyzed in detail sections.

Additionally, SWO ROD/RMP management direction and the PDFs will ensure all actions retain large snags and coarse woody debris except where necessary to remove for safety, operational, or fuels reduction reasons. New snags will be created in the LSR LUA based on the targets in the SWO ROD/RMP.

8. *How would the proposed vegetation treatments affect the species addressed by the Migratory Bird Treaty Act and their habitat, especially during the nesting season?*

Background

Land birds use a wide variety of habitats, including late-successional forests, riparian areas, brush in recovering clear-cuts, small trees in developing stands, oak-savannahs, grasslands, meadows, and chaparral habitats. An objective of the SWO ROD/RMP is to conserve or create habitat for species addressed by the Migratory Bird Treaty Act (MBTA) and the ecosystems on which migratory birds depend (USDI BLM 2016b, p. 115).

Two lists have been prepared by the FWS to determine which species should receive special attention in land management activities. These lists are *Bird Species of Conservation Concern* found in various Bird Conservation Regions and *Game Birds Below Desired Condition*. In December 2008, the FWS released *The Birds of Conservation Concern 2008* (USDI FWS 2008b). This publication identifies species, subspecies, and populations of migratory and non-migratory birds in need of additional conservation actions, updating the Birds of Conservation Concern List. This list meets FWS mandates for the conservation of migratory game birds and non-game birds.

The following BCCs have been located or are possibly present where treatments could occur within the Treatment Area: bald eagle (Bureau Sensitive), Oregon vesper sparrow *(affinis* ssp.) (Bureau Sensitive), peregrine falcon, olive-sided flycatcher, purple finch, rufous hummingbird, willow flycatcher, and marbled murrelet (federally threatened). The following bird species have been located, or are possibly present, where treatments could occur within the Treatment Area: band-tailed pigeon, mourning dove, and wood duck.

Rationale

The effects of the proposed alternatives to landbirds are not analyzed in detail, because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered (USDI BLM 2016a, pp. 833-851). The PRMP/FEIS acknowledged there would be an increase in habitat in 50 years for a majority of the landbirds modeled (USDI BLM 2016a, pp. 851, 1691-1697). Additionally, the PRMP/FEIS indicated ‘‘The BLM would manage landbird species under the Migratory Bird Treaty Act and following guidance provided by WO IB 2010-110, the Memorandum of Understanding between the BLM and FWS to promote the conservation of migratory birds (August 31, 2010). The BLM would follow migratory bird conservation measures as appropriate and consistent with agency missions” (USDI BLM 2016a, p. 851).

The PRMP/FEIS determined the BLM would implement measures to lessen ‘take’ of migratory birds under the MBTA at the project level by focusing on species of concern as identified by the BLM and FWS (USDI BLM 2016a, p. 851). While some migratory bird individuals may be disturbed or displaced during project activities, seasonal restrictions that were developed to minimize effects to other species (NSOs, marbled murrelets, bald eagles, fisher, etc.) would also benefit migratory birds and minimize the amount of disturbance during their nesting season. Additionally, this issue was considered but was not analyzed in further detail because there would be no perceptible shift in species composition because undisturbed areas within and adjacent to the Treatment Area would maintain habitat for displaced individuals. Overall, populations in the region would be unaffected due to this small amount of habitat and/or reproduction loss at the regional scale.

9. *How would proposed activities affect forage for deer and elk within Deer and Elk Management Areas?*

Background

There are 120,567 acres of Deer Management areas and 123,437 acres of Elk Management areas on BLM-administered lands on the Medford District and within the Treatment Area (USDI BLM 2016a, pp. 867 and 868). Of these 244,044 acres, 216,590 acres (89 percent) are in reserve LUAs. Elk management areas focus primarily on improving forage and cover conditions and decreasing the density of roads that are open to vehicular traffic, particularly in the winter. Winter range areas are within Elk and Deer management areas and include locations where deer and elk migrate to from their summer range in the higher elevations of the Cascade Mountain Range. During the winter months, elk feed on woody plants, including Douglas fir and western red cedar seedlings and elderberry. Currently there are thousands of acres of BLM land in southwest Oregon with wedgeleaf ceanothus (critical for winter browse) in oak woodland/chaparral habitats that are unproductive and poor forage quality.

In the PRMP/FEIS, to which this EA is tiered, the BLM assumed that Early Successional stage forest represents high-quality forage habitat for deer and elk in this analysis (USDI BLM 2016a, p. 863). However, non-conifer stands also provide foraging habitat in southwest Oregon. The proposed action would improve and restore oak woodland/chaparral and meadow habitat by thinning encroaching conifers and reducing hardwood and shrub densities, as well as implementing prescribed fire. This would increase the quality and quantity of the habitat and nutrition for big-game species. Greater availability of high-quality forage would improve deer and elk survival and reproduction (USDI BLM 2016a, p. 866). The amount and locations of treatments vary by alternative. When compared to Alternatives A and B, Alternative C has the greatest opportunity for oak woodland/chaparral habitat and meadow restoration because more acres and treatments would occur throughout the Treatment Area.

Rationale

The effects of the proposed alternatives to deer and elk are not analyzed in detail, because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered (USDI BLM 2016a, pp. 862-868). The PRMP/FEIS acknowledged that the amount of foraging habitat would increase by 22 percent under the SWO ROD/RMP in the next 50 years. However, the PRMP indicated there would be a decrease in habitat in the reserve lands. That analysis is incorporated here by reference. While the analysis of the PRMP/FEIS focused on forage in early seral forest conditions, non-conifer stands also provide forage for deer and elk. The EA will also improve forage conditions by treating non-conifer habitat.

The PDFs and SWO ROD/RMP management direction provides additional support for the proposed actions and additional protection during implementation. These PDFs and management directions would improve forage habitat for deer and elk by planting native forage species in disturbed areas, creating forage plots where forage is limited. For this same reason, these proposed actions in this EA are also consistent with the Dingell Act and Secretarial Order 3374 to enhance game species and the habitat of those species on federal land and IB 2019-005 and IM 2018-062 Secretarial Order 3362 to improve habitat quality in western big-game winter range and migration corridors.

10. *How would road building (in context of current road densities) affect fragmentation of wildlife habitat, T&E species, and wildlife mortality from poaching and vehicle collisions (see Ibisch et al. 2017 for road impacts)?*

Background

Even though Ibisch et al. 2017 analyzes roads on a global scale and ecosystem scale, which is beyond the scope of the EA, the concepts of fragmentation and human interactions with wildlife, can be correlated to the project scale. Some wildlife in the Treatment Area, such as fisher, gray wolves, and elk, are associated with areas of reduced road densities (USDI BLM 2016a, pp. 871, 892, and 863). Specifically, for gray wolves, increased road densities may potentially make some areas less suitable for wolf occupancy (USDI BLM 2016a, p. 892). Road management has also proven to be beneficial for deer and elk by improving habitat quality and reducing human disturbance. As described in the PRMP/FEIS, open road density is a contributing factor to illegal poaching, an increase in elk vulnerability during hunting seasons, and may cause elk to move away from available forage (USDI BLM 2016a, p. 863).

Road construction could cause warmer, drier conditions in adjacent interior forest habitats, because of canopy closure reduction and increased solar and wind exposure (Trombulak and Frissell 2000). This could result in reduced reproduction and survival of species with low dispersal capabilities, such as mollusks and possibly amphibians (Marsh and Beckman 2004). Species with greater dispersal capabilities could likely move to areas with more favorable microclimate conditions if suitable habitat were nearby.

Rationale

This issue was considered but not analyzed in detail because there would be no potential for effects from new road construction beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. The amount and locations of road building varies by Alternative (EA Table 2), which could affect road densities within the Treatment Area. However, these proposed road construction amounts are within the 427 miles of proposed road construction analyzed in the Proposed alternative (USDI BLM 2016a, p. 219), which were considered as part of the total PRMP/FEIS proposed action in the wildlife analyses.

Even with the proposed road building in Alternatives B and C, the road building would be spread throughout the Treatment Area and would not be concentrated in one watershed. Additionally, all action alternatives propose decommissioning of temporary roads and no action alternatives propose an increase in system road density, which would help reduce the potential future disturbance to wildlife.

SWO ROD/RMP management direction would also help reduce potential disturbance to wildlife, including illegal poaching by regulating seasonal road closures for motor vehicle use within deer or elk management areas would be (USDI BLM 2016b, pp. 116, 117). The EA would implement PDFs based on management direction for Bureau Sensitive wildlife species that also reduce potential disturbance effects to wildlife (USDI BLM 2016b, p. 115).

Road construction within the Treatment Area could increase vehicle collisions and potential mortality to wildlife. However, even under Alternative C with the highest amount of road construction, all new roads would be resource roads (typically exist for single use and carry very low traffic volumes) and single lane width (USDI BLM 2016a, p. 788). Since these would have very low traffic volumes, the likelihood for collisions would be low and the potential losses of wildlife from collisions would be immeasurably small in relation to the total population sizes within the Treatment Area.

11. *What are the potential impacts of noise disruption on northern spotted owls and marbled murrelets?*

Background

The Treatment area is located within the range of the NSO and the marbled murrelet. The proposed actions have the potential to cause effects to nesting behavior from noise produced from the proposed activities. A disruption distance is the distance within which the effects to listed species from noise, or mechanical movement associated with an action is expected to exceed the level of discountable or insignificant effects. The BLM will implement PDFs that will seasonally restrict activities that would normally cause disruption to nesting spotted owls or marbled murrelets. These seasonal restrictions are based on known site locations or unsurveyed nesting habitat.

Rationale

This issue was considered but not analyzed in further detail because the potential for spotted owls and marbled murrelets to be impacted by noise associated with proposed project activities is eliminated through the implementation of PDFs. These PDFs would restrict activities to outside of the breeding season and/or occur beyond recommended disturbance distance thresholds. These PDFs are derived from disturbance and disruption distances for marbled murrelets and spotted owls from the PRMP/FEIS Biological Opinion (USDI FWS 2016b; Table 227, pp. 597-600 & Table 50, pp. 230-232). Additionally, the PRMP/FEIS, to which this EA is tiered, determined there would not be any disruption effects to marbled murrelets because the BLM would restrict activities that would disrupt nesting marbled murrelet during the nesting period (USDI BLM 2016a, p. 912).

The SWO ROD/RMP also includes the following management direction: "Do not authorize timber sales that would cause the incidental take of NSO territorial pairs or resident singles from timber harvest until implementation of a barred owl management program consistent with the assumptions contained in the Biological Opinion on the RMP has begun" (USDI BLM 2016b, p. 121). This direction would also apply to incidental take as a result from noise generated from timber harvest activities. Therefore, this project will not cause incidental take from noise disturbance through implementation of PDFs. Because there is no effect to spotted owls and marbled murrelets from noise disturbance, this issue is not analyzed in detail.

12. *How would vegetation treatments and new road and landing construction (including road reconstruction) affect marbled murrelets, marbled murrelet habitat, and their critical habitat?*

Background

The FWS listed the marbled murrelet as a threatened species under the ESA on October 1, 1992 (USDI FWS 1992b). The Northwest Forest Plan (no longer applicable to BLM lands) established two management zones for the marbled murrelet: Zone 1 from the coast to approximately 35 miles inland, and Zone 2 from the eastern boundary of Zone 1 to approximately 50 miles inland from the coast. Systematic surveys in the Medford District have indicated that the marbled murrelet is likely confined to the hemlock-tanoak vegetation zone (USDA FS and USDI BLM 2002; Alegria et al. 2002; USDI FWS 2002). This area is within the far northwest corner of the Treatment Area (Grants Pass Field Office). Marbled murrelets have only recently (2021) been detected within the Treatment Area, including occupied marbled murrelet site detections.

Marbled murrelet nesting habitat includes old-growth and mature forest with trees with multiple layers and multiple platforms containing moss, lichen or mistletoe (McShane et. al. 2004; Hamer and Nelson 1995; Ralph et al., 1995; Nelson 1997). Generally, this habitat is 80 years of age or older (i.e., a stand birthdate prior to 1937) and is within 50 miles of the coast (on the Medford District, within 6.2 miles (10 km) east of the western hemlock zone). Murrelets prefer habitat with high rainfall and humidity and cool weather and prefer nesting in lower to mid slopes below 1,000 meters. Studies summarized for Oregon indicate that the density of trees with platforms and the number of platforms in general were the most important variables in predicting marbled murrelet nesting habitat at the stand level (USDI BLM 2008, pp. 301–302). Marbled murrelet recruitment habitat includes forested stands within 50 miles of the coast containing a residual component of potential nesting structure, as described in the *Management of Potential Marbled Murrelet Nesting Structure in Thinning Stands* guidance of August 4, 2004 (USDI BLM 2004). This habitat type occurs in mid-seral stands when residual or remnant trees were left standing during previous harvest. These remnant trees contain potential nesting platforms as described above. For this analysis, recruitment habitat is generally conifer stands with birthdates of 1937 to 1976 (40-79 years old) and likely contain nesting structure as described above and/or capable of becoming nesting habitat within 50 years.

For this EA, the Medford District used its spotted owl habitat baseline as a surrogate for marbled murrelet habitat. Spotted owl nesting-roosting and foraging (NRF) habitat was used to identify areas that have the potential to provide the forest structure necessary to provide for nesting of marbled murrelets. The NRF habitat in the GIS layer is a broad category that likely overestimates suitable marbled murrelet habitat with high quality nesting habitat because the layer also includes foraging habitat, which may not have suitable marbled murrelet nesting structure. For this analysis, the Medford District used spotted owl dispersal-only habitat to identify potential marbled murrelet recruitment habitat. There are 26,823 acres of nesting habitat and 8,873 acres of recruitment habitat within the Treatment area. Of these acres, 26,326 acres (98 percent) of the nesting habitat and 8,449 acres (95 percent) of recruitment habitat are within reserve LUAs.

There are approximately 16,192 acres designated as murrelet critical habitat within the Treatment Area. Approximately 43 percent (6,965 acres) of murrelet critical habitat within the Treatment Area is classified as nesting habitat and 13 percent (2,032 acres) of that nesting habitat is in a reserved LUA. Approximately 55 percent (8,943 acres) of the marbled murrelet critical habitat in the Treatment Area is within the reserved LUAs (LSR, RR, DDR, CRNLCS).

Rationale

The effects of the proposed actions to marbled murrelets are not analyzed in detail because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered (USDI BLM 2016a, pp. 895-917, 833-851). Even with proposed treatment within the range of marbled murrelets, spotted owl nesting-roosting habitat would be maintained at the stand level within the LSR and older, structurally-complex forests would be protected. These actions would also prevent loss of marbled murrelet nesting habitat within the analysis area. As described in the spotted owl section, commercial harvest treatments in non-nesting habitat would improve nesting conditions in the future. This is consistent with the analysis in the PRMP/FEIS, which indicated there would be a one percent loss of high-quality nesting habitat in the first decade, but the total amount of marbled murrelet nesting habitat would increase incrementally in each decade. Timber harvest would not affect the functionality of marbled murrelet critical habitat above the stand-scale at any time during the next 50 years (USDI BLM 2016a, pp. 901-909). In 2021, marbled murrelets were detected, including occupied site detections, in the Treatment Area. However, SWO ROD/RMP management direction and the PDFs, provide protections for occupied murrelet sites in LSR. Additionally, even with proposed treatments in the analysis area, since nesting habitat would not be reduced at the stand scale, there is no expected loss of murrelet sites from the proposed EA action alternatives. This would be within the range of the analysis in the PRMP/FEIS, which indicated the PRPM/FEIS would result a loss of 19 occupied murrelet sites within the range of the marbled murrelet in the first two decades at the PRMP/FEIS scale. However, there would be a net increase of 84 known, occupied sites in 50 years. The marbled murrelet analysis is incorporated here by reference.

13. *How would the proposed vegetation treatments and road building road construction affect spotted owl reproduction and survival, and the potential to cause incidental take.*

Background

NSO site occupancy is defined as locations with evidence of continued use by spotted owls (including breeding), repeated location of a pair or single birds, presence of young before dispersal, or some other strong indication of continued occupancy. Spotted owl sites in the Treatment Area are based on historic information, survey data from the past two to five years, and incidental observations. There are approximately 459 known spotted owl sites in the NSO Analysis Area. Not all of these sites within the action area have been surveyed on a regular basis. However, sites within the Klamath and South Cascades Demography Study areas (KSA and SCS) have received extensive protocol surveys since the late 1990’s and likely represent the current population and occupancy condition of spotted owls in the Province. The three scales of analysis for spotted owl sites (territories) in the Treatment Area include the home range, 0.5-mile core-use area, and the nest patch. These scales are described in Appendix 6.

Best available information indicates habitat i.e., the quantity and quality of “older forest” provides a valid inference into the likelihood of occupancy (Hunter et al., 1995), survival, and reproduction (Franklin et al., 2000; Zabel et al., 2003; Olson et al., 2004; Dugger et al., 2005; Dugger et al., 2011). For example, when less than 40 to 60 percent of the home range is in habitat, the likelihood of spotted owl occupancy is lower, and survival and reproduction may be reduced (Thomas et al., 1990; Bart and Forsman 1992; Bart 1995; Dugger et al., 2005). Generally, survival and reproduction are supported when there is between 40 and 60 percent older forest within the core-use area (Dugger et al., 2005), but local conditions and possibly pair experience, contribute to large variance in actual amounts for individual owls. The amount of habitat within an approximate 0.5-mile radius provides a reliable predictor of occupancy, and the quantity and configuration have been shown to provide reasonable inferences into survival and reproduction. Approximately 69 percent of the spotted owl sites on the Medford District are below these central tendencies of best available information at both the home range and 0.5-mile core areas, while only 14 percent of the sites on the Medford District are above these central tendencies at both the home range and 0.5-mile core areas. Eleven percent of the sites on the Medford District are low in solely the home range and six percent are low in solely the core-use area only.

Eleven demographic study areas have been established to represent owl status across the range of the NSO (Forsman, et al., 2011). Metadata analysis evaluates population statistics of the owls in the demographic study areas. Spotted owl populations range-wide are declining at an average annual rate of 3.8 percent. Dugger et al. (2016) found that competition with barred owls is likely the primary cause of spotted owl population declines across their range because: barred owls have a strong negative effect on spotted owl survival on some but not all of the individual study areas; barred owls have a strong positive effect on spotted owl site extinction rates on all areas; and barred owls also have a strong negative effect on spotted owl colonization on some but not all study areas. Similar to Dugger et al. (2016), the most recent metadata analysis found that barred owl occupancy had a dominant negative effect on colonization and positive effect on extinction of spotted owl territories (Franklin et al. 2021, p. 28). There are two spotted owl demographic study areas associated with the Treatment Area: the KSA (within the Treatment Area), which represents the Klamath province and the South Cascade Demography Study Area (SCS) (adjacent to the Treatment Area), which represents the West Cascades province. The last two years of annual reports support the overall 2016 and 2021 spotted owl meta-analysis summaries with a decline in the spotted owl population and an increase in barred owl detections within these study areas (Dugger et al., 2019; Dugger et al. 2020; Lesmeister, et al., 2019; Lesmeister et al., 2020). See the barred owl NAID for more information about spotted owl population declines and spotted owl and barred owl interactions.

Rationale

The effects of the proposed actions on spotted owl reproduction, survival, and the potential to cause incidental take, are not analyzed in detail, because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. Even though spotted owl sites may be affected by the proposed action, survival and reproduction would not be affected at occupied owl sites because the BLM will implement the SWO ROD/RMP management direction stating, “No Timber harvest that would cause the incidental take of northern spotted owl territorial pairs or resident singles” (USDI BLM 2016b, p. 30). The PRMP/FEIS acknowledged that the BLM will not “authorize timber sales that would cause the incidental take of northern spotted owl territorial pairs or resident singles from timber harvest until implementation of a barred owl management program consistent with the assumptions contained in the Biological Opinion on the RMP has begun” (USDI BLM 2016a, pp. 346-347). As of March 2022, no barred owl management program meeting that description has begun. One of the proposed actions that is common to all action alternatives is that there will be no incidental take to spotted owls, including from small diameter treatments. Additionally, seasonal restrictions listed as PDFs would also prevent disturbance to nesting spotted owls within the NSO Analysis Area. These PDFs would help reduce potential effects to the reproduction and survival of spotted owl territories.

The incidental take determination by the FWS will be completed during project level consultation compliance reviews under the associated Southwest Oregon Dry Forest Resilient Lands Consultation. As part of the consultation, the BLM will coordinate with the FWS to ensure activities at the project level would not lead to the incidental take of owl sites occupied by a resident single or territorial pair. Additionally, as indicated in the SWO ROD/RMP, the BLM will establish whether the NSO is actually present in the area that will be affected by the timber harvest using the best available science at that time, such as through pre-project NSO surveys consistent with the Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls (USDI FWS 2012). The FWS has updated the NSO survey protocol to account for the influence of barred owl and may update it in the future (USDI BLM 2016b, pp. 30, 31).

The effects of the proposed actions are within the estimated effects to spotted owl populations analyzed in the PRMP/FEIS to which this EA is tiered (USDI BLM 2016a, pp. 947-973). The PRMP/FEIS analysis of the effects of management actions on spotted owl populations included population simulations. The PRMP/FEIS acknowledged that spotted owl populations in the Western Cascades and Klamath Provinces would continue to decline and the PRMP/FEIS did not show discernable differences among the alternatives when compared to the No Timber Harvest reference analysis (USDI BLM 2016a, pp. 961, 962, 969). Since the release of the PRMP/FEIS, studies in spotted owl demographic study areas have demonstrated the population decline predicted in the PRMP/FEIS. There are two spotted owl demographic study areas associated with the Treatment Area: the KSA (within the Treatment Area), which represents the Klamath province and the SCS Demography Study Area (adjacent to the Treatment Area), which represents the West Cascades province. The last two years of annual reports for these study areas indicated a decline in the spotted owl population and an increase in barred owl detections (Dugger et al., 2019, Dugger et al., 2020, Lesmeister et al., 2019, Lesmeister et al., 2020). The findings in the most recent metadata analysis demonstrated continued declines of spotted owl populations across the range of the spotted owl. Franklin et al. (2021) found that the declines in both apparent survival and recruitment have accelerated since 2014, resulting in further losses to NSO populations beyond those reported by Dugger et al. (2016). Estimated population sizes have declined in all study areas in Oregon by over 60 percent since 1995, with Klamath Study Area declining by over 75 percent. These recent documented declines confirm the overall spotted owl population decline predicted in the PRMP/FEIS. Therefore, the results of the recent studies do not present new information that would create new effects to spotted owl populations since the PRMP/FEIS.

14. What are the impacts of shrub mastication (if used) on owl prey and complex, early seral forests?

Background

The composition of the spotted owl's diet varies geographically and by forest type. In southwestern Oregon, dusky-footed woodrats are a primary prey species for spotted owls. They are typically found in high densities in early-seral or edge habitat (Sakai and Noon 1993; Bingham and Noon 1997), but are also abundant in old growth and complex forests (Carey et al., 1997). Northern flying squirrels are another major source of owl prey in southwestern Oregon. Other important prey items include red tree voles, deer mice, red-backed voles, gophers, snowshoe hare, bushy-tailed wood rats, birds, and insects, although these species comprise a small portion of the spotted owl diet (USDI FWS 2011).

Rationale

This issue was considered but not analyzed in further detail because spotted owl prey species would not be impacted by shrub mastication. Shrub mastication is not proposed under the EA.

15. How will proposed vegetation treatments affect spotted owl dispersal at the landscape scale?

The effects of the proposed actions on the connectivity of spotted owl habitat throughout the Treatment Area is not analyzed in detail here because there is no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered.

Background

Dispersal Function for the spotted owl consists of an assemblage of conifer-dominated forest stands that the owls can use for dispersal movements across the landscape. Dispersal habitat for spotted owls includes NRF and dispersal-only habitat.

Fifth field watersheds can provide a landscape-level qualitative evaluation for dispersal function using the concepts of Thomas, et al (1990), as described below, along with more recent analyses of dispersal function per Lint, et al. (2005), Davis, et al. (2011). Thomas, et al. (1990), originally recommended assessing dispersal habitat conditions on the quarter-township scale and managing forested landscape so 50 percent of each quarter-township contain dispersal habitat. These levels were used to describe suitable habitat to support the transient phase of spotted owl dispersal. Since then, the FWS has generally recommended using a 5th field or larger landscapes for assessing dispersal habitat conditions because watersheds or provinces offer a more biologically meaningful way to evaluate dispersal function. More recent information (Davis, et al. 2016), suggests that landscapes having at least 40 percent of dispersal habitat conditions (including both older and younger forests) would be sufficient to support spotted owl dispersal across the landscape. Miller et al. (1997, p. 145) also found that dispersing spotted owls selected for closed-sapling-pole saw timber stands. In general, dispersing spotted owls tend not to select and/or avoid more open forest conditions (Miller et al. 1997). Fragmented forest landscapes are more likely to be used by spotted owls in the transience phase as a means to move rapidly between denser forest areas (Courtney et al. 2004, pp. 5-13; USDI FWS 2012, p. 71875). Movements through closed canopy forests occur during the colonization phase when birds are looking to become established in an area (Miller et al. 1997, p. 144; Courtney et al. 2004, pp. 5-13). Transient dispersers use a wider variety of forest conditions for movements than colonizing dispersers, who require habitats resembling NRF habitats used by breeding birds (USDI FWS, p. 71875). For this analysis, the BLM used the updated 2014 Rogue Basin habitat layer based on GNN imputation (Ohmann and Gregory, 2002) datasets produced by the US Forest Service Pacific Northwest Research Station and Oregon State University Landscape Ecology, Modeling, Mapping, and Analysis research group (www.fsl.or-st.edu/lemma) to characterize nesting-roosting, foraging, dispersal, capable, and non-habitat across the region and across all ownerships.
There are approximately 31 fifth field watersheds that are within or intersect the Treatment Area (Table 70). Of these 31 fifth field watersheds, two (Gold Hill-Rogue River and Shady Cove-Rogue River) currently have less than 40 percent dispersal habitat conditions at the watershed scale.

Table 71. Spotted Owl Dispersal Conditions within the Treatment Area.

5th Field Watershed	Total Watershed Acres	Total NRF Habitat Acres	Total Dispersal-Only Habitat Acres	Total Dispersal Acres (NRF+ Dispersal Only)	% Watershed Dispersal Habitat (NRF +Dispersal-only)
Althouse Creek	30,207	9,453	10,287	19,740	65 %
Bear Creek	231,008	37,126	56,787	93,913	41 %
Big Butte Creek	157,871	41,137	65,061	106,198	67 %
Briggs Creek	43,726	12,106	15,717	27,823	72%
Cottonwood Creek	17,505	12,303	241	12,544	72%
Deer Creek	72,551	26,743	18,767	45,509	63%
East Fork Illinois River	57,682	17,057	22,990	40,047	69%
Elk Creek	139,336	54,531	37,708	92,238	66%
Evans Creek	143,279	46,829	44,671	91,500	64%
Gold Hill-Rogue River	135,947	17,580	27,400	44,980	33%
Grants Pass-Rogue River	53,767	9,695	13,715	23,409	44%
Grave Creek	104,494	41,841	27,928	69,769	67%
Hellgate Canyon-Rogue River	93,333	32,497	28,935	61,432	66%

5th Field Watershed	Total Watershed Acres	Total NRF Habitat Acres	Total Dispersal-Only Habitat Acres	Total Dispersal Acres (NRF+ Dispersal Only)	% Watershed Dispersal Habitat (NRF +Dispersal-only)
Horseshoe Bend-Rogue River	104,076	56,281	15,773	72,054	69%
Jenny Creek	133,991	34,984	30,988	65,972	49%
Josephine Creek-Illinois River	81,687	9,114	25,616	34,730	43%
Jumpoff Joe Creek	69,679	18,340	23,673	42,013	60%
Little Applegate River	72,215	22,245	20,322	42,567	59%
Little Butte Creek	236,017	50,758	73,345	124,104	53%
Lost Creek-Rogue River	32,063	7,576	11,250	18,826	59%
Lower Applegate River	90,535	26,307	30,779	57,086	63%
Middle Applegate River	82,538	20,986	22,739	43,725	53%
Middle Cow Creek	113,079	43,900	30,249	74,149	66%
Shady Cove-Rogue River	74,217	7,296	18,472	25,769	35%
Sucker Creek	61,467	26,992	20,123	47,114	77%
Trail Creek	35,312	10,427	11,436	21,862	62%
Upper Applegate River	52,255	15,121	17,961	33,082	63%
Upper Cow Creek	47,466	26,070	11,674	37,744	80%
West Fork Cow Creek	55,884	21,736	15,730	37,466	67%
West Fork Illinois River	76,900	17,505	21,423	38,928	51%
Williams Creek	52,922	15,862	14,346	30,208	57%

Rationale

The PRMP/FEIS for Western Oregon evaluated landscape dispersal capability across all ownerships and across the entire Western Oregon Decision Area (USDI BLM 2016b, p. 947). For this EA, the BLM assessed potential effects of the project to dispersal function at a more localized watershed scale. As mentioned above, 5th field watersheds can provide a landscape-level qualitative evaluation for dispersal function at a more localized scale.

Some level of dispersal quality habitat removal (NRF and dispersal-only) could occur as a result of the proposed actions, specifically commercial thinning and selection harvest, riparian thinning, and road and landing construction. Currently, two 5th field watersheds have limited dispersal quality habitat (below 40 percent), and these 5th field watersheds could be compromised depending on the amount of dispersal quality habitat and the location within the watersheds. The exact 5th field watersheds that could be impacted are unknown and the total acres of removal for each project for each 5th field watershed is unknown. However, based on total acres of commercial treatment proposed per year for each Alternative (Alternative A- 2,000 acres, Alternative B- 3,000 acres, and Alternative C- 4,000 acres), even if the maximum annual treatment acres were implemented in one of these watersheds, only two watersheds would drop below the 40 percent threshold under Alternative C. No watersheds would drop below 40 percent in Alternative A because of the smaller acres treated. Alternative B would not incur loss of habitat because the proposed action would maintain habitat function. Under a maximum removal assumption in Alternative C, the dispersal percentage within the Bear Creek 5th field watershed would be 38.9 percent and 37.6 percent within the Josephine Creek-Illinois River 5th field watershed. However, it is unlikely that all treatments in a given year would occur within one single watershed and it is unlikely that all proposed treatments would remove spotted owl habitat. Additionally, under all alternatives, nesting-roosting habitat in LSR would be maintained at the stand scale and older, structurally-complex forests would be protected. Implementing these management directions would also help minimize potential impacts to spotted owl dispersal at the landscape scale.

Similar to the two watersheds already below 40 percent, in the Bear Creek and Josephine Creek-Illinois River watersheds, the low amount of dispersal quality habitat is due to past fires, as well as large amounts of non-federal lands in the low-valley bottoms with urban and agricultural areas. These areas do not provide spotted owl habitat. The removal of potential dispersal quality habitat in these 5th field watersheds in Alternative C would not preclude owls from dispersing throughout the watershed because the units would be spread throughout the watersheds. The proposed actions would not create large blocks of non-habitat that would create barriers and preclude owls from dispersing through the watershed. Therefore, the potential loss of habitat percentage would be immeasurable at the landscape scale and owls would still be able to disperse throughout and between the watersheds. Forest landscapes traversed by dispersing owls typically include a fragmented mosaic of roads, clear-cuts, and non-forested areas, and a variety of forest age classes ranging from fragmented forests on cutover areas to old-growth forests (Forsman, et al. 2002).

Large habitat blocks of late-successional reserves would be maintained under all treatments to allow for survival and movement of late-successional dependent species across the landscape, as designated in the SWO ROD/RMP. These reserves were specifically configured to maximize east-west NSO movement between the Oregon Coast and Oregon Western Cascades provinces. In addition, all action alternatives would contribute to the continued existence of spotted owl habitat across the landscape by promoting stand resiliency against wildfires. The PRMP/FEIS analyzed the effect of the proposed timber harvest of NSO habitat together with the effects of other ROD/RMP decisions and concluded that implementation of the RMP as a whole would contribute to a landscape that facilitates NSO movement between and through large blocks of nesting, roosting, and foraging habitat and ensures the survival of dispersing owls (USDI BLM 2016a, pp. 941-947). Those analyses are incorporated here by reference. As described above, the effects to dispersal function at the landscape scale from the proposed EA are within the analysis for spotted owl dispersal within the PRMP/FEIS. Additionally, as noted in Table 71 above, the watersheds support spotted owl dispersal at the landscape scale, even when considering some large fires have occurred in southwestern Oregon since the PRMP/FEIS.

16. *How would the proposed forest vegetation treatments and road building affect Siskiyou mountain salamander?*

Background

The Siskiyou Mountains salamander (*Plethodon stormi*) is a Bureau Sensitive species found within the Applegate Valley watershed on the Medford District that is associated with rocky soils. The BLM is a participant in the Conservation Agreement for the Siskiyou Mountains salamander (*Plethodon stormi*) in Jackson and Josephine Counties of Southwest Oregon; and in Siskiyou County of Northern California (USDI BLM et al. 2007).

Rationale

This issue was considered, but not analyzed in detail because there would be no potential for effects beyond those analyzed in the PRMP/FEIS (USDI BLM 2016a, pp. 1011-1012), to which this analysis is tiered. Per the conservation agreement, all alternatives would manage high priority sites to maintain a stable subpopulation of Siskiyou Mountains salamander for the long-term. The project design feature to follow the SWO ROD/RMP management direction to manage the Siskiyou mountains salamander according to the Conservation Agreement (USDI BLM 2016b, p. 121) would protect high priority Siskiyou Mountains salamander sites by maintaining canopy cover and avoiding ground disturbing activities when salamanders are surface-active. Additionally, maintaining spotted owl nesting-roosting habitat at the stand scale in LSR and protecting older, structurally-complex forests would also provide protection to Siskiyou Mountain sites and their habitat within the LSR. The rationale for not analyzing this issue in detail is further explained in the PRMP/FEIS, to which this EA is tiered. The BLM determined that following guidelines in the conservation agreement would result in no differences between treatment effects on the Siskiyou mountains salamander (USDI BLM 2016a, pp. 1011-1012). This rationale is incorporated here by reference.

17. *How would the proposed vegetation treatments affect the species addressed in the Bald and Golden Eagle Protection Act and their habitat?*

Background

The FWS listed bald eagles as an endangered species under the ESA on March 11, 1967 (USDI FWS 1967), reclassified them as a threatened species July 12, 1995 (USDI FWS 1995), and delisted them due to recovery on July 9, 2007 (USDI FWS 2007). Bald and golden eagles are currently Bureau Sensitive species and are protected under the MBTA and the Bald and Golden Eagle Protection Act. Both bald and golden eagles are present and breeding within the Treatment Area.

On the Medford District, both species primarily nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on humanmade structures such as power poles and communication towers. Golden eagles have also nested on cliffs on the Medford District.

Rationale

The effects of the proposed alternatives to bald and golden eagles are not analyzed in detail because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered (USDI BLM 2016a, pp. 825-828, 883-885). The proposed actions in the IVM-RL would remove trees suitable for bald eagle and golden eagle nests. However, this would likely be infrequent because the BLM would retain large trees that were established prior to 1850). These trees would serve as potential bald eagle nest trees where they occur within 2 miles of large bodies of water (USDI BLM 2016a, p. 828). This is consistent with the PRMP/FEIS that acknowledged there would be a decrease of bald and eagle habitat within the first decade under the SWO ROD/RMP. However, the proposed actions in the IVM-RL would also increase tree diameter growth, which would increase bald and golden eagle nesting habitat in the long-term. This is consistent with the conclusions of the PRMP/FEIS, which determined that additional habitat would develop in subsequent decades, which would lead to an increase in bald and golden eagle habitat (USDI BLM 2016a, pp. 828 and 885). The proposed vegetation management activities would not affect the persistence of bald eagles and golden eagles in the Treatment Area. Additionally, the implementation of PDFs would prevent disturbance to nesting eagles by implementing seasonal restrictions during the breeding season.

18. *What are the effects of the proposed integrated vegetation management on pollinators?*

Background

Pollinators include insects, birds, mammals, reptiles, and amphibians. The Medford District has six sensitive pollinator species – Coronis fritillary, Mardon skipper, gray-blue butterfly, Oregon branded skipper, western bumblebee, and Franklin's bumblebee. The Franklin's bumblebee was proposed to be federally-listed as endangered under the ESA in 2019 (USDI FWS 2019a) and the final rule for federal listing as endangered was effective on November 23, 2021 (USDI FWS 2021e). This species is a narrow endemic, with historical locations recorded in portions of Douglas, Jackson, and Josephine counties in southern Oregon. The last sighting of any Franklin's bumble bee was in 2006 and there are no known current populations distributed across any level of ecological conditions or spatial extent despite numerous survey efforts in high quality habitat where historical locations were reported (USDI FWS 2018d, p. 3, 42).

Information about specific pollinator-plant interactions in the Medford District is limited. In general, however, pollinators depend on a variety of flowering plants for pollen and nectar to survive. The best pollinator habitat is "...open landscapes with good sun exposure and many different types of herbaceous plants. ...Habitats with a variety of native flowering plants that have overlapping blooming times and that are adapted to local soils and climates are usually the best sources of nectar and pollen for pollinators

(Black et al. 2007, p. 2)". The abundance and diversity of flowering plant species can influence the overall abundance, species richness and foraging activity of bumblebees (Carvell 2002, abstract) which in turn appear key to their survival and reproductive success (USDI 2018, Table 1). In the Medford District, the majority of flowering trees, shrubs, and herbaceous species occur in non-conifer native plant communities or in forest and woodland openings.

In 2014 the White House issued a Presidential Memorandum directing the heads of executive departments and agencies to create a federal strategy to promote the health of honeybees and other pollinators. Agency task force members, which includes the BLM, were directed to enhance pollinator habitat, use integrated vegetation and pest management to accomplish this, increase native vegetation, apply pollinator-friendly BMPs and seed mixes, and incorporate pollinator health as a component of all restoration and reclamation projects (Executive Memorandum June 20, 2014, Section 3). The task force issued a National Strategy to Promote the Health of Honey Bees and Other Pollinators on May 19, 2015 and the BLM issued an Instruction Memorandum November 10, 2015, committing the BLM to "Use at least one pollinator friendly native plant species in all vegetation management projects involving the use of seedings or seedlings. Work toward the goal of providing a suite of early blooming to late blooming flowering plants to ensure that floral resources are available for pollinators throughout the growing season (USDI BLM 2015, p. 3)". The Forest Service and BLM developed "Pollinator-Friendly Best Management Practices for Federal Lands" (USDA, USFS, USDI BLM 2015) to assist interdisciplinary teams with incorporating BMPs to benefit pollinators.

The BLM's Plant Conservation and Restoration Program at the national, State, and district levels are working to collect and propagate locally appropriate native plant seed through the Seeds of Success program and the National Seed Strategy to build up seed reserves of pollinator-friendly plants available for restoration projects. The Medford District has the longest-running native plant program in the BLM and has built up stores of grass and forb seed that are used in post-fire rehabilitation and stabilization projects, for site reclamation after timber harvest and fuels management projects, and to increase native plant diversity and abundance in Special Status species habitat enhancement projects. Seed collection, propagation, and storage are on-going in the Medford District to ensure the availability of site-specific appropriate species for projects. Botanists have collected native plant seed from a variety of pollinator friendly forbs, including milkweed for Monarch butterflies.

Protecting, enhancing, and restoring non-conifer native plant communities and creating structural heterogeneity in forested stands to support the most diversity of flowering plant species is the best strategy to meet BLM's commitment to improve pollinator habitat. The pollinator BMPs recommend "...removing woody vegetation from meadows and creating openings in canopies that allow for pollinator friendly plants as a component in understory vegetation (USDA, USFS and USDI BLM, 2015, p. 17)". Previous thinning projects in oak/chaparral (e.g., Table Rocks ACEC) have shown that understory herbaceous species have responded with a noticeable increase in flowering following treatment.

Habitat enhancement or restoration projects would be implemented under the EA to benefit pollinators, including removing woody vegetation from and burning meadows to remove thatch and promote the growth of flowering herbaceous species and seeding pollinator friendly plant species. All three action alternatives would improve pollinator habitat within the Planning Area. Alternative A would improve the least amount of habitat for pollinators because thinning in forested stands, small diameter thinning, and non-conifer treatments would only occur in strategic locations, within ¼ mile of Communities at Risk, or within plantations, and no gaps would be created in forested stands. Alternative B would also improve habitat for pollinators, but on fewer acres and with smaller and fewer openings in forested stands than Alternative C. Chaparral and oak/chaparral stands would remain dense because prescribed fire and small diameter thinning within those plant communities would only occur in strategic fuels locations. Alternative C would improve the most habitat for pollinators such as the Franklin's bumble bee, because the BLM would implement the most acres of non-conifer treatments and would have thinning prescriptions with larger gaps in forested stands to allow optimal conditions for flowering trees, shrubs, and herbaceous species that will benefit pollinator species.

Pollinator habitat would also improve under all action alternatives because PDFs require rehabilitation of degraded or disturbed areas using locally adapted seeds and native plant materials appropriate to the location and site-specific conditions. This would meet BLM's policy to use at least one pollinator friendly native plant species in all vegetation management projects involving seeding or planting.

The only potential negative impact to pollinators from the proposed actions would be prescribed burning in meadows and other open plant communities containing flowering herbaceous species during the growing, flowering, and seed production periods. However, the PDF to restrict burning in these plant communities to fall and winter (generally October to March) would prevent negative impacts to flowering plants and their pollinators (USDA, USFS, USDI 2015, p. 26).

Rationale

The effects of the proposed alternatives on pollinator species are not analyzed in detail, because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. Short-term impacts to the Franklin's bumble bee and other pollinators may occur but have been largely minimized and are not measurable. For the long-term, the combined actions are expected to increase the ecological role of low and mixed-severity fire regimes and resiliency to disturbance in this landscape, so overall, we expect long-term beneficial effects to the Franklin's bumble bee and other pollinators. The PRMP/FEIS acknowledged that the PRMP/FEIS would result in no changes to meadow habitats and the species associated with these habitats (USDI BLM 2016a, pp. 1667-1675) because the PRMP would not remove or degrade meadow habitat. Additionally, the effects of the proposed alternatives on pollinator species dependent on non-conifer habitat are not analyzed in detail, because there would be no potential for effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. The PRMP/FEIS acknowledged that implementation of the PRMP would result in no changes to non-forest and oak habitats (USDI BLM 2016a, pp. 1667-1675) because these habitats would be managed to maintain their ecological function (USDI BLM 2016a, pp. 834, 1154). Additionally, the PRMP/FEIS assumed that non-forested lands would remain constant over time because no management direction would substantively alter the structural characteristics of this habitat (USDI BLM 2016a, pp. 834). The treatments under the EA would improve and restore meadow, oak woodland, and chaparral habitats important to pollinators, which would be within the assumptions and effects estimated in the FEIS for non-forest habitat and associated species.

The PDFs and SWO ROD/RMP management direction provides additional support for habitat improvement and protection to pollinator species during implementation:

- "Manage naturally occurring special habitats to maintain their ecological function, such as seeps, springs, wetlands, natural ponds, vernal pools/ponds, natural meadows, rock outcrops, caves, cliffs, talus slopes, mineral licks, oak savannah/woodlands, sand dunes, and marine habitats." (USDI BLM 2016a, p. 115).
- "Maintain or restore natural processes, native species composition, and vegetation structure in natural communities through actions such as applying prescribed fire, thinning, removing encroaching vegetation, treating non-native invasive species, retaining legacy components (e.g., large trees, snags, and down logs), maintaining water flow to wetlands, and planting or seeding native species." (USDI BLM 2016a, p 106; USDI BLM 2016c, p. 87).
- Restrict burning to fall and winter (generally October to March) in meadow plant communities within the range of sensitive species pollinators - coronis fritillary, mardon skipper, gray-blue butterfly, Oregon branded skipper, western bumblebee, and Franklin's bumblebee. Specifically, for the Franklin's bumble bee, habitat modifying activities in suitable Franklin's bumble bee would not be allowed between May 15 and September 30.

M. Biodiversity

1. *How would the alternatives affect the biodiversity of the Klamath Siskiyou Ecoregion?*

Background

Approximately 588,889 acres (acres calculated in GIS using ecoregion data downloaded from https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states) of the Treatment Area are located within the Klamath-Siskiyou Ecoregion representing about 5 percent of the 11.9 million acre ecoregion. The Klamath ecological province (or Klamath-Siskiyou Ecoregion) is “recognized for floristic diversity, geographic complexity, highly varied climatic gradients, and the prominent historic role of fire (Whittaker, 1960; Atzet and Wheeler 1982)” (USDI BLM 2016a, p. 225; DellaSala 1999).

Additionally, “In mixed-severity fire regimes, the influence of fuels, topography, and weather play out across the landscape to affect fire behavior, resulting in highly variable forest structure, vegetation patterning, successional stages (Perry et al. 2011; Donato et al. 2012), and rich biodiversity (Stephens et al. 2015, DellaSala and Hanson 2015)” (USDI BLM 2016a, p. 224). Historic dry forests persisted and sustained native biodiversity through centuries of frequent disturbances and climatic fluctuation (Churchill et al. 2017).

While regional biodiversity is a broad concept lacking specificity, for the purposes of this issue, the BLM interpreted it as a diversity of forest structure, vegetation communities, and species composition, of which older structurally-complex forest is a key component. As stated in Chapter 1.4 of this EA, current conditions (abundance of overly dense, structurally homogenous forest stands; a lack of large fire-resistant trees and fire-resistant species; and increased surface ladder, and canopy fuels) in southwestern Oregon have hindered the development and extent of structurally-complex forest and the risk of loss to wildfire is high (EA Section 1.4). The BLM found at the Western Oregon PRMP/FEIS Decision Area scale, the current amount of mature and structurally-complex forest (51 percent) is substantially less than the average historical condition (58–80 percent) (USDI BLM 2016a, p. 840). Additionally, although “Buttrick et al. (2015) identified much of western Oregon as having moderate to high terrestrial resilience to climate change (defined as likely to retain and support higher biodiversity as climate changes), [they found that] much of the lower elevations, where most BLM-administered lands occur in the [Western Oregon] Decision Area, range from below average to above average resilience” (USDI BLM 2016a, p. 202).

The PRMP/FEIS considered biodiversity in the context of future climate. Future predictions of wildfire assume that past relationships between climate and fire continue to hold and suggest that annual area burned would increase, and that fire hazard will increase and that increased warm dry conditions and drought will lengthen fire season, the probability of severe fire weather increases, and the combination of drought and heating adversely affect tree vigor (USDI BLM 2016a, p. 196). “If past relationships between climate and fire do hold, then the landscapes of the future are likely to have a higher proportion in homogeneous, early seral patches, lower biodiversity, and lower resilience to other stressors, primarily in drier forests (Cansler and McKenzie 2013, Peterson et al. 2014)” (USDI BLM 2016a, p. 197). Implementation of the SWO and NCO RODs/RMPs would protect existing older, structurally-complex forest (USDI BLM 2016b, p. 72) and promote development of mature and structurally-complex forest (USDI BLM 2016b, p. 72), which support high biodiversity.

The SWO RODs/RMPs also directs active management in LSR-Dry to enable forests “to respond positively to climate-driven stresses, wildfire and other disturbance with resilience…and reduce the risk of loss of key late successional structure through the development of vertical and horizontal heterogeneity.” (USDI BLM 2016b, p. 72). The PRMP/FEIS indicates that active management directed in the SWO RODs/RMP provides opportunities in the dry forest to adapt to climate change stressors and expresses uncertainty around the degree to which minimally managed reserves would be more stable and more resistant (i.e., sustain biodiversity) to climate change effects (USDI BLM 2016a, p. 201).

Additionally, as described in Appendix 8, each state’s Natural Heritage Program, which for Oregon is the Oregon Biodiversity Information Center, evaluates the conservation status of species based on an international ranking system. The BLM State Director places species on the Bureau Sensitive list if they meet set criteria ((https://www.fs.fed.us/r6/sfpnw/issssp/agency-policy), including the heritage ranking. “Thus, in Oregon, the Sensitive and Strategic lists are tied to the Oregon Biodiversity Information Center (ORBIC) rankings” (USDI BLM 2016a, p. 529).

Rationale

The BLM did not analyze this issue in detail because the alternatives analyzed under the EA would not have effects beyond those analyzed in the PRMP/FEIS to which this EA is tiered on biodiversity within the Treatment Area or the greater Klamath-Siskiyou Ecoregion.

The PMRP/FEIS analysis shows that implementation of the SWO ROD/RMP will increase structurally-complex forest types (USDI BLM 2016a, pp. 324, 325). The BLM will also consider biodiversity in managing Bureau Sensitive species as described above, which any alternative under this EA will be responsive to over the life of implementation. The BLM proposes thinning and prescribed fire in conifer and non-conifer plant communities to promote or maintain structurally-complex forests, resilience to wildfire, and native species diversity (EA, Chapter 1) consistent with the SWO and NCO RODs/RMPs. The effects of those treatments on special plant communities were analyzed in detail in Section 3.9 of the EA. The proposed actions would contribute to biodiversity within the Planning Area by increasing the acres of open plant communities that support greater plant species diversity. Additionally, effects of proposed actions to landscape resilience have been analyzed in detail. As discussed in Silviculture Issue 3.2 (Resilience), the alternatives improve resilience to varying degrees, and also reduce the risk of loss to stand-replacement wildfire to varying degrees, as discussed in Fire and Fuels Issue 3.4 (Stand Resistance) and thus potentially the area burned by severe wildfire, as discussed in Fire and Fuels Issue 3.4 (Risk). This EA does not propose actions within the area designated as the Cascade Siskiyou National Monument (CSNM); Congressionally Reserved Lands (CRL), including designated wilderness, wilderness study areas, national trails, national wild and scenic rivers; and DDR—LWCs (DDR-LWC) within the Klamath Siskiyou Ecoregion, which currently support high biodiversity.

The maximum 10-year treatment under any of the alternatives would be approximately 70,000 acres when combining all treatment types (USDI BLM 2022a, pp. 12-13) which would represent about 0.6 percent of the Klamath-Siskiyou ecoregion. This assumes that the prescribed fire acres for each alternative are a reasonable representation of the possible total implementation footprint acres. In many cases, prescribed fire will be applied on the same acreage that commercial thinning and small-diameter thinning actions are implemented.

This issue was not analyzed in detail because the proposed treatments in the three action alternatives would not adversely affect biodiversity in the Planning Area beyond those effects analyzed in the PRMP/FEIS to which this EA is tiered. The actions would contribute to maintaining diversity of vegetation types and habitats and species as described above. Special Status species would be protected by following the ESA and Bureau Special Status policy and through the enhancement or restoration of their habitats by the proposed actions.

N. Great Gray Owl

1. *How would the proposed vegetation treatments and road building affect the great gray owl?*

Background

The great gray owl (*Strix nebulosa*) is a large owl found in parts of northern Europe, Asia, and North America from Alaska throughout much of Canada and into portions of the United States. Great gray owls nest in older forests adjacent to meadows for foraging. Broken top trees, abandoned raptor nests, mistletoe clumps, and other platforms provide suitable nest structures (Huff and Godwin 2016, p. 11-13). Nesting great gray owls have been documented within the EA Planning Area, with the majority of the historic sites occurring within the Ashland and Butte Falls field offices. Approximately 63 percent of the documented great gray owl observations within the Planning Area are within the LSR and Reserve LUAs, compared to 37 percent in the HLB LUA. Approximately 47 percent of the documented great gray owl nest trees within the Planning Area are within the LSR and Reserve LUAs, compared to 53 percent in the HLB LUA (BLM's Geographic Biotic Observations database).

The great gray owl was designated as a Survey and Manage species in the 1994 Northwest Forest Plan (USDA FS USDI BLM 1994). The Northwest Forest Plan adopted the Survey and Manage as mitigation measures for harvest in the matrix land use allocation (predecessor to the HLB). These mitigation measures were a set of protections for species associated with late-successional and old-growth forests. As stated in the PRMP/FEIS, “the Northwest Forest Plan is not a statute or regulation. It was a coordinated, multi-agency amendment to the then-current RMPs of the BLM and forest plans of the U.S. Forest Service” (USDI BLM 2016a, p. 20). The SWO ROD/RMP does not include the Survey and Manage measures of the 1994 Northwest Forest Plan because the program was an artifact of the U.S. Forest Service’s regulations that do not apply to BLM. The BLM determined that it could achieve the purposes of its SWO ROD/RMP without including survey and manage species mitigation (USDI BLM 2016b, p. 27-28).

The PRMP/FEIS analyzed the effects to 13 former Survey and Manage wildlife species in the PRMP/FEIS alternatives within the PRMP/FEIS decision area (USDI BLM 2016a, p. 846), including the great gray owl. Species previously managed by BLM as survey and manage species that are also Bureau Special Status Species (listed as threatened or endangered under ESA or Bureau Sensitive Species) continue to be managed consistent with BLM’s Special Status Species Policy (USDI BLM 2016a, p. 22). A new BLM State Director's Special Status Species list was released on August 31, 2021, which officially updates the list for BLM Oregon/Washington (USDI BLM 2021a). Great gray owls do not have any special status because they are not federally listed under ESA, nor do they have status as BLM Sensitive species (USDI BLM 2021a). They no longer require protection measures under the Survey and Manage survey strategies (USDI BLM 2016b, p. 27), and they do not require other specific management under the SWO ROD/RMP.

Rationale

The effects of the proposed actions on great gray owls are not analyzed in detail because there would be no potential for significant effects beyond those analyzed in the PRMP/FEIS, to which this EA is tiered. As described below, the estimated effects from the proposed action are within the range of effects estimated in the PRMP/FEIS. The Survey and Manage and the great gray owl analysis in the PRMP/FEIS (USDI BLM 2016a, pp. 846-850) are incorporated here by reference.

The PRMP/FEIS used the vegetation modeling of structural stages, specifically the mature and structurally-complex forest structural stages, to represent the late-successional or old-growth forest with which Survey and Manage species are closely associated (USDI BLM 2016, p. 833-834). The PRMP/FEIS predicted an increase of mature and structurally-complex forest habitat on the BLM-administered lands within the Western Oregon PRMP/FEIS Decision Area (USDI BLM 2016a, pp. 1655, 1656) within the next 50 years based on a rate of harvest in the HLB and reserve LUAs. At the PRMP/FEIS Decision Area scale, mature forest habitat would increase by 392,605 acres and structurally-complex forest habitat would increase by 143,789 acres by 2063. The increase in habitat is attributed to an increased development of mature and structurally-complex habitat with legacy structures through vegetation treatments (USDI BLM 2016a, p. 844). Specific to great gray owls, the PRMP/FEIS predicted an increase in habitat for the great gray owl over current conditions by 19,098 acres in 50 years (USDI BLM 2016a, pp. 848, 1682). These acres are based on mature and structurally-complex forest located within foraging habitat > 10 acres in size.

The FEIS predicted effects to great gray owls based upon vegetation modeling of treatments across all land use allocations, including LSRs and riparian reserves (available for commercial thinning under this EA). The PRMP/FEIS modeling assumed that 50 percent of the LSR LUA acres in the Medford District would be treated in the first five decades (USDI BLM 2016a, p. 1215; additional relevant modeling assumptions on p. 1196). The Medford District has completed 2,690 acres of commercial harvest projects within the LSR LUA since 2016 (including projects planned under the 1995 RMP that are now located in the LSR LUA, and completed consistent with transition planning per the SWO ROD/RMP, pp. 9-13). Therefore, since the Medford District’s treatment of LSR acres has been below the acres projected for reserve treatment in the FEIS, the effects to great gray owl habitat across the landscape from the EA proposed action would be less than the effects projected in the FEIS. The long-term benefits from the EA proposed action would be consistent with the PRMP/FEIS estimate of increasing great gray owl habitat over the next 50 years. Commercial thinning treatments in EA, specifically the Long-Term NSO prescription theme in Alternative C, would promote development of great gray owl nesting habitat when planned within ¼ miles of foraging habitat by improving stand growing conditions to allow non-nesting habitat to develop into mature and structurally-complex forest (see EA Sections 3.5 and 3.6 for information about habitat development). Additionally, under the EA, spotted owl nesting-roosting habitat would be maintained at the stand level within the LSR and older, structurally-complex forests would be protected. Because spotted owls and great gray owls share similar habitat, these actions would also help reduce impacts to great gray owl by maintaining nesting habitat within the Planning Area.

The proposed commercial thinning in the EA could result in the potential loss of unknown active great gray owl nest sites because great gray owl surveys are no longer required. However, the PRMP/FEIS analyzed the effects of harvest in HLB and reserves without Survey and Manage protections in the action alternatives, and predicted great gray owl observations (and presumably more nest sites) would increase in the PRMP compared to the No Action Alternative with Survey and Manage protection measures, such as surveying and buffering nest site locations (USDI BLM 2016a, pp. 847, 848). As noted in the Chapter 2, commercial thinning treatments would be limited to the LSR and Riparian Reserve LUAs, and areas of the DDR-TPCC other than Non-Suitable Withdrawn TPCC Classification within the Treatment Area (see Table 1 in Section 1.1), but actions would not occur on every acre identified in Table 1. Limitations to the treatments by LUA management direction and the project design for each alternative, such as maintaining NSO habitat in Alternative B or not treating NSO nesting roosting habitat within late-closed/ high relative habitat suitability locations in Alternative C, would reduce the impacts to great gray owl nesting habitat and associated sites. Additionally, due to the scattered nature of the LUAs, landscape conditions, and treatment priorities within the Medford District, not all great gray owl nesting habitat or sites would be targeted for treatment.

Meadows or grasslands adjacent to older forests provide foraging habitat for great gray owls. The PRMP/FEIS acknowledged that implementation of the PRMP would result in no changes to non-forest and oak habitats (USDI BLM 2016a, pp. 1667-1675) because these habitats would be managed to maintain their ecological function (USDI BLM 2016a, pp. 834, 1154). The treatments under the EA would improve and restore meadow habitats, which would be within the assumptions and effects estimated in the PRMP/FEIS for non-forest and associated species. The proposed actions in the EA Alternatives A and C would thin and remove conifers in and around meadows and grasslands, and remove a portion of the decadent shrubs (Appendix 1 pp. 97, 110), which would benefit great gray owls by providing open areas for foraging within the Planning Area. See Wildlife NAID # 4 for more information on how proposed EA treatments would affect meadow dependent Special Status Species (BLM 2022, pp. 273-274).

APPENDIX 11 RECREATION MANAGEMENT AREAS EXCLUDED FROM ROAD BUILDING

The locations in the tables below would not have new temporary or permanent roads or landings built in them under any action alternative in the EA.

RMA Name[24]	Framework Direction	Rationale
Burma Pond SRMA	timber harvest if compatible	campground, small recreation site (8 acres)
Cathedral Hills SRMA	timber harvest if compatible	many trails, high use, urban interface
Elderberry Flat Campground SRMA	closed to timber harvest	campground
Gold Nugget Wayside SRMA	timber harvest if compatible	small recreation site, near river, developed
Jacksonville Woodlands Trails ERMA	timber harvest if compatible	many trails, high use, urban interface
Kenney Meadows SRMA	timber harvest allowed for catastrophic events	small recreation site, cabin, toilet, near river
King Mountain Trail SRMA	closed to timber harvest	also designated as ACEC
Lake Selmac Trails ERMA	timber harvest if compatible	many trails, moderate use, near county park
Mt. Bolivar Trail Head SRMA	timber harvest if compatible	parking lot (.17 acres)
Mountain of the Rogue SRMA	timber harvest if compatible	many trails, high use
Provolt SRMA	timber harvest if compatible	high public interest- no trees to harvest
Rogue WSR SRMA	wild-closed to timber harvest; recreational-closed to new roads	
Round Top Mountain SRMA	timber harvest catastrophic only	
Silver Creek ERMA	timber harvest if compatible	
Skull Creek Campground SRMA	timber harvest if compatible	campground
Sterling Mine Ditch Trail SRMA	timber harvest if compatible	high recreation use, historic feature
Table Rocks SRMA	closed to timber harvest	high recreation use, ACEC
Tucker Flat Campground SRMA	allows sale of hazard trees	campground
Wild Rogue Canyon ERMA	closed to timber harvest	
Kerby Peak Trail ERMA	RNA closed to timber harvest	
Grayback Mountain Trail ERMA	ACEC closed to timber harvest	
Wellington Mine ERMA	timber harvest if compatible	

[24] This table does not list all RMAs in the Medford District, just those closed to new road construction.

APPENDIX 12 GIS DATA ANALYSIS METHODOLOGY AND ASSUMPTIONS

The over-arching analytic process applied to derive "Eligible Footprints" for proposed actions in each action alternative is described below in General Methods. To summarize, the BLM processed the various geospatial inputs (primary data) according to the parameters described for each action alternative (see Detailed Alternative Descriptions, Appendix 1) to create two footprints for each alternative: 1) non-commercial actions (i.e., small-diameter and prescribed fire proposed actions) and 2) commercial proposed actions. At the time of project development, the BLM will utilize finer scale information and data, including but not limited to, stand exams, Ecosurvey, Micro*Storms, LIDAR, Organon, FVS, stand reconnaissance, and aerial photo interpretation to design projects within selected action alternative prescriptive parameters.

Primary Data and Sources

- Treatment Area: described in Section 1.2.
- Relative Density Index (RDI) Category Strata (Alternative C): unique combinations of PVT, slope position, and solar insolation (Metlen et al 2017; Metlen et al 2021)
- LUA: NCO and SWO RODs/RMPs.
- Forest Operations Inventory: BLM corporate data, snapshot from December 2019, used primarily for stand age and vegetation type.
- Communities At Risk: areas within ¼ mile of Communities at Risk (CWPP 2019; Metlen et al. 2017).
- PODs: draft POD boundaries identified by BLM staff[25] developed through the cooperation of local landowners, most recently in a workshop hosted by SOFRC in April 2019.
- Spotted owl habitat: modified to separate Foraging from Nesting/Roosting habitat by identifying Nesting stands that had relatively simple structure based on 2012 and 2015 LiDAR data.
- Relative Density: calculated from GNN imputation (Ohmann and Gregory, 2002) 2012 datasets produced by the US Forest Service Pacific Northwest Research Station and Oregon State University Landscape Ecology, Modeling, Mapping, and Analysis research group (www.fsl.or-st.edu/lemma) as BA/sq root QMD.
- Yarding method: based on slope and distance and position (above/below) from road.
- Oak habitat types: from Klamath-Siskiyou Oak Network data. (https://klamathbird.org/partnerships/kson/217-klamath-siskiyou-oak-network).
- Chaparral: from BLM Forest Operations and Inventory data.
- Timber Production Capability Class: BLM corporate data, snapshot from May 2020.
- Past prescribed fire treatments: from BLM corporate data (Treatments), snapshot from December 2019.
- Forest Structural Stage: from Rogue Basin Cohesive Strategy Structure Class data (Metlen et al. 2017).

[25] The Southwest OR Potential Wildfire Delineations (POD) DRAFT File Geodatabase Feature Class (2017) dataset was created to represent areas bounded by potential fire management features (roads, rivers, major ridges, barren areas, etc.) which could be used to contain wildfires with the aid of fire management resources. These strategic features accompanied by treatments designed to moderate fire behavior can increase the probability of success on future wildfires and allow for safer firefighter engagement. This dataset was compiled by dividing and lumping 6th level (12-digit) hydrologic unit boundaries from the Watershed Boundary Dataset (WBD) layer for Oregon and Washington by major rivers (5-9 code), hard surface roads (surface types: hard surface, concrete, aggregate, etc.) and major ridges, some previous treatments, historic fire perimeters and containment lines. Further refinement at project scale by local expert knowledge, adjoining state and local partners, additional data delineating previous treatments, historic fire perimeters, and previous containment lines is recommended.

- Wildfire perimeter and severity: Fire perimeter data are BLM corporate data; fire severity data were compiled from the various fire incidents.
- Roads: BLM corporate data.
- RMP Recreation Management Areas: 2016 Southwestern Oregon RMP data.

General Methods

1. The BLM created an IVM analysis area, also referred to the "Treatment Area" described in Section 1.1. (Maps 1 and 2).
2. The BLM processed the various inputs (primary data) according to the parameters described for each action alternative (see Detailed Alternative Descriptions – Appendix 1) to create two Eligible Footprints for each action alternative broadly delineating the following:
    a. Commercial actions (Maps 3, 4, and 5).
    b. Non-commercial actions (i.e., surface and ladder hazardous fuel reduction treatments) (Maps 3, 4, and 6).
3. For each alternative, the BLM removed from the estimated eligible treatment footprint consideration all areas that burned with high or moderately high intensity fire since 2012, as since many primary data sources did not reflect these disturbances. Areas with recent high/moderately high severity intensity fire effects were assumed to be unlikely to require treatment under this EA for the life of the EA in the short-term (<10-years).
4. Within the commercial action Eligible Footprint of each action alternative, the BLM identified stands potentially needing treatment in the short-term (<10-years) by comparing the current RD with the target RD (as specified in Detailed Description of Action Alternatives, Appendix 1). Stands were flagged as potentially needing treatment if current RD > target RD + 10. The +10 buffer was added in recognition that stands that only slightly exceeding target RD were unlikely to prove practical for commercial treatment.
5. The BLM summarized acres of commercial treatment theme by action alternative Eligible Footprints and used this information as foundational data and a reasonable analytic assumption to estimate potential treatment need within the action alternative Eligible Footprints, for several issues analyzed in detail (Chapter 3) and other resource issues not analyzed in detail (Appendix 10).
6. The BLM clipped various inputs and did additional analysis specific to particular disciplines (e.g., Botany- FRGE habitat) and created tables to summarize current conditions.

APPENDIX 13 DETERMINATION OF NEPA ADEQUACY TEMPLATE

DETERMINATION OF NEPA ADEQUACY WORKSHEET

BLM Office:

NEPA No: BLM-OR-ORWA-M0##-20##-00##-CX

Lease/Serial/Case File No.:

Proposed Action Title/Type:

Location of the Proposed Action:

Applicant (if any):

A. Description of the new Proposed Action and any applicable mitigation measures:

B. Land Use Plan Conformance

Name of Land Use Plan (LUP):

Name of Land Use Plan (LUP):

The Proposed Action is in conformance with the applicable LUP because it is specifically provided for in the following LUP decision(s):

The Proposed Action is in conformance with the LUP, even though it is not specifically provided for, because it is clearly consistent with the following LUP decisions (objectives, terms, and conditions:

C. Identify applicable National Environmental Policy Act (NEPA) documents and other related documents that cover the Proposed Action.

D. NEPA Adequacy Criteria

1. Is the new Proposed Action a feature of, or essentially similar to, an alternative analyzed in the existing NEPA document(s)? Is the project within the same analysis area, or if the project location is different, are the geographic and resource conditions sufficiently similar to those analyzed in the existing NEPA document(s)? If there are differences, can you explain why they are not substantial?

2. Is the range of alternatives analyzed in the existing NEPA document(s) appropriate with respect to the new Proposed Action, given current environmental concerns, interests, and resource values?

3. Is the existing analysis valid in light of any new information or circumstances (such as, rangeland health standard assessment, recent endangered species listings, updated lists of BLM-sensitive species)? Can you reasonably conclude the new information and new circumstances would not substantially change the analysis of the new Proposed Action?

4. Are the direct, indirect, and cumulative effects that would result from implementation of the new Proposed Action similar (both quantitatively and qualitatively) to those analyzed in the exiting NEPA document?

5. Are the public involvement and interagency review associated with the existing NEPA document(s) adequate for the new Proposed Action?

E. Persons/Agencies/BLM Staff Consulted

Name	Title	Resource/Agency Represented

Note: refer to the EA/EIS for a complete list of the team members participating in the preparation of the original environmental analysis or planning document(s).

Conclusion:

Based on the review documented above, I conclude that this proposal conforms to the applicable LUP and that the NEPA documentation fully covers the new Proposed Action and constitutes BLM's compliance with the requirements of NEPA.

Project Lead: ____
(Signature)

NEPA Coordinator: ____
(Signature)

Authorized Official/Date: ____
(Signature)

Name:
Title: Field Manager
Office:

Note: The signed Conclusion on this Worksheet is part of an interim step in the BLM's internal decision process and does not constitute an appealable decision. However, the lease, permit, or other authorization based on this DNA is subject to protest or appeal under 43 Code of Federal Regulations Part 4 and the program-specific regulations.

APPENDIX 14 ENDANGERED SPECIES ACT (ESA) CONSULTATION

Section 7 of the ESA requires the BLM to work and consult with the FWS (T&E plant and wildlife species) and the NMFS (T&E fish species) for actions the BLM funds, authorizes, or proposes to ensure the project is not likely to jeopardize the continued existence of listed plant, wildlife, or fish species, or destroy or adversely modify their designated critical habitat.

Threatened and Endangered Plants and Fungi

Consultation for federally-listed plants is documented in the *Biological Assessment: Assessment of Activities that May Affect the Federally-Listed Plant Species, Gentner's Fritillary and Cook's Lomatium, on the Medford District BLM* (USDI BLM 2020a).

Threatened and Endangered Wildlife

There are six federally-listed wildlife species (vernal pool fairy shrimp, NSO, marbled murrelet, coastal marten [*Martes caurina humboldtensis*], Franklin's bumble bee, and gray wolf) under the ESA known to occur within the IVM-RL Treatment Area. The Medford District has determined the proposed actions in the EA may affect these species and has completed or is completing consultation for these six species. The fisher had a rule update and is not federally-listed under ESA.

The vernal pool fairy shrimp (*Branchinecta lynchi*) is federally-listed as threatened. Activities affecting vernal pool fairy shrimp are covered in the Medford District *FY2017-FY2022 Programmatic Activities That May Affect the Northern Spotted Owl, Marbled Murrelet, Vernal Pool Fairy Shrimp, and Oregon Spotted Frog Consultation* (USDI BLM and FWS 2017).

Northern spotted owl, marbled murrelet, and the Pacific marten (also referred to as the "coastal" marten) are federally-listed as threatened. The Franklin's bumble bee is federally-listed as endangered (USDI FWS 2021e). The Medford District completed Formal consultation with the FWS for all four of these species in *The Resilient Lands Biological Assessment (covering the Medford District and the South River Field Office of the Roseburg District).* This consultation covers the proposed actions considered in the EA. As part of this consultation, the Medford District had several meetings with the Level 1 consultation team, including a field trip in May 2019 for a field trip. The FWS Wildlife biologist Level 1 Representative also participated in the interdisciplinary meetings. This BA was sent to the FWS in March 2021 and an Amendment was sent to the FWS in October 2021. A Biological Opinion from the FWS was received on December 21, 2021.

The fisher was proposed for federal listing. On November 7, 2019, FWS released a proposed rule to list the West Coast Distinct Population Segment (DPS) of fisher as a threatened species under the ESA (as amended 1973) (USDI FWS 2019b). The 2019 West Coast DPS included two extant historically native subpopulations, Northern California/Southern Oregon (NCSO) and Southern Sierra Nevada (SSN), as well as the NSN and the Southern Oregon Cascades (SOC) subpopulations. On May 15, 2020, the FWS determined that the Northern California/Southern Oregon (NCSO) DPS, which includes the SOC subpopulation, did not warrant listing under the ESA (USDI FWS, 2020a).

The gray wolf (*Canis lupus*) was federally listed as endangered in Oregon west of highways 395 and 78 when the EA was released for public comment in August of 2020. The FWS removed the gray wolf in the lower 48 states from the federal ESA Threatened and Endangered list on November 3, 2020 (effective January 4, 2021) (USDI FWS 2020d). However, a court order vacated the FWS delisting decision on February 10, 2022 (*Defenders of Wildlife et al.* v. *U.S. Fish and Wildlife Service et al.; WildEarth Guardians, et. al.* v. *U.S. Department of the Interior, et al.; Natural Resources Defense Council, Inc.* v. *U.S. Department of the Interior*). Consultation for the gray wolf on the Medford District was completed in 2020, and is covered in the *Biological Assessment and Letter of Concurrence for Medford Bureau of Land Management and Rogue River-Siskiyou National Forest activities affecting the Gray Wolf* (USDA Forest Service /USDI BLM 2016 and USDI FWS 2017, and amendment).

Threatened and Endangered Fish and Aquatic Species

There are two ESUs of coho salmon found on the Medford District; the Southern Oregon/Northern California Coasts (SONCC) and the Oregon Coastal (OC) ESUs. Both ESUs are listed as “threatened”. There are no other listed fish species found on the Medford District. The BLM has determined the proposed actions of the EA may affect coho or their critical habitat.

Consultation between the BLM and the NMFS has already occurred programmatically in the Forest Management Program for Western Oregon (NMFS 2019) for both ESUs; the NMFS issued a Biological Opinion (NMFS consultation # WCR-2017-7574) to the BLM in March of 2019. The Biological Opinion covered a suite of activities that could occur within the RRs, the HLB, the LSRs, and other Reserves LUAs. Actions consulted on include commercial timber harvest, non-commercial thinning and fuels treatments (including prescribed fire), temporary and permanent new road construction and decommissioning, road renovation/maintenance and use, and landing construction and use, among other actions, as consistent with both the SWO and NCO ROD/RMPs. The consultation concluded that the activities proposed were not likely to jeopardize the continued existence of SONCC and OC coho salmon, or destroy or adversely modify their critical habitats. The Biological Opinion is valid for 20 years after its date of issuance.

Activities proposed under the EA are consistent with the activities consulted on under the Programmatic Biological Opinion. For all future projects proposed under IVM-RL, the BLM is required to notify the NMFS of all activities that may affect coho or their critical habitat, at which time the NMFS will review the proposal for consistency with the existing consultation. If the NMFS finds the proposal inconsistent with the programmatic Biological Opinion, the BLM may decide to modify or withdraw the project.

APPENDIX 15 PUBLIC INVOLVEMENT

The BLM conducted extensive public outreach between 2019 and 2020. Formal public scoping started on July 3, 2019. Scoping notices were sent to approximately 171 individuals, organizations and agencies via letter and email. The objective of public scoping was to provide from public with preliminary information on project, and seek public input on potential issues, impacts, and reasonable alternatives to accomplish the project objectives. The scoping period ended on August 2, 2019 and the BLM received approximately 41 public scoping comments letters and emails to consider.

On October 29, 2019 the BLM provided the opportunity for the public to provide input on a preliminary version of Chapters 1 and 2 of the EA. Notices were sent to individuals, organizations and agencies via letter and email. Chapter 1 described the preliminary purpose and need for the project, and Chapter 2 described the preliminary alternatives which included a No Action Alternative and four preliminary action alternatives that explained varying types of treatments including commercial thinning, small diameter and non-conifer treatments, and prescribed fire. The BLM also hosted meetings in Williams on November 5, 2019 (approximately 30 participants) and on November 13, 2019 in Applegate (approximately seven participants), and made a presentation before the Jackson County Board of Commissioners on December 10, 2019. The BLM also hosted a public open house at the Jackson County Expo on November 14, 2019. Approximately 16 people were in attendance. The comment period ended on November 18, 2019 and the BLM received approximately 70 comment letters and emails to consider.

On August 19, 2020 the BLM initiated a 30-day public comment period on the complete EA and 18 appendices including 11 maps. A legal notice was published in Medford's *Mail Tribune* and Grants Pass *The Daily Courier* on August 19, 2020. Notices were sent to individuals, organizations and agencies via letter and email. The public comment period was extended until October 19, 2020 for a total of 62-days. A webinar was hosted by the BLM on August 27, 2020. There were approximately 16 participants. This version of the EA considered the No Action Alternative and three action alternatives analyzed in detail. The EA also included a discussion on eight additional alternatives that were considered, but not analyzed in detail. The BLM received approximately 1,074 emails, form letters, and comment letters to consider.

Outside of any formal comment periods, the BLM received an additional approximately 296 copies of five different versions of form letters.

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APPENDIX 17 ACRONYMS AND GLOSSARY

Acronyms

ACEC	Area of Critical Environmental Concern
ASQ	Allowable Sale Quantity
BA	Biological Assessment
BLM	Bureau of Land Management
BMP	Best Management Practice
BO	Biological Opinion
CAR	Communities at Risk
CAOR	California Oregon
CBH	Canopy Base Height
CC	Canopy Cover
CCO	Central Coastal Oregon
CEQ	Council on Environmental Quality
CI	Crowning Index
CSNM	Cascade-Siskiyou National Monument
CWPP	Community Wildfire Protection Plan
DBH	Diameter at Breast Height
DDR	District Designated Reserve
DNA	Determination of NEPA Adequacy
EA	Environmental Assessment
EFH	Essential Fish Habitat
E.O.	Executive Order
EPA	Extant Population Area
ERMA	Extensive Recreation Management Area
ESA	Endangered Species Act
ESU	Evolutionary Significant Units
F	Foraging
FEIS	Final Environmental Impact Statement
FBFM	Fire Behavior Fuel Model
FL	Flame Length

FOI	Forest Operational Inventory
FMA	Fritillaria Management Area
FONSI	Finding of No Significant Impact
FTEM	Fuel Treatment Effectiveness Monitoring
FWS	[U.S.] Fish and Wildlife Service
GIS	Geographic Information Systems
GNN	Gradient Nearest Neighbor
HLB	Harvest Land Base
HRVA	Highly Valued Resource Asset
HUC	Hydrologic Units Classification
IAE	Institute for Applied Ecology
ICO	Individual Clumps and Openings
IIPM	Integrated Invasive Plant Management
KSA	Klamath Demography Study Area
KSON	Klamath Siskiyou Oak Network
LiDAR	Light Detection and Ranging
LITA	Low Intensity Timber Area
LOCO8 CH	Lomatium Cookii Critical Habitat
LSR	Late Successional Reserve
LUA	Land Use Allocation
LWC	Lands Managed for their Wilderness Characteristics
MBTA	Migratory Bird Treaty Act
MITA	Moderate Intensity Timber Area
NAID	Not Analyzed in Detail
NCC	Northern Coastal California
NCO ROD/RMP	Northwest and Coastal Oregon Resource Management Plan/Record of Decision
NCSO	Northern California/Southern Oregon
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NR	Nesting Roosting
NRF	Nesting Roosting Foraging
NRHP	National Register of Historic Places

NRV	Natural Range of Variability
NSN	Northern Sierra Nevada
NSO	Northern Spotted Owl
NWCG	National Wildfire Coordinating Group
O&C	Oregon and California (Railroad Revested Lands)
OC	Oregon Coast
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODWF	Oregon Department of Fish & Wildlife
OHV	Off-Highway Vehicle
ORBIC	Oregon Biodiversity Information Center
ORV	Outstandingly Remarkable Values
OWAM	Oregon Watershed Assessment Manual
PAG	Plant Association Groups
PBF	Primary or Biological Feature
PCGP	Pacific Connector Gas Pipeline
PDC	Project Design Criteria
PDF	Project Design Feature
PE	Polyethylene
PNW	Pacific Northwest
POD	Potential Wildfire Operational Delineations
PRMP/FEIS	Proposed Resource Management Plan/Final Environmental Impact Statement
PVT	Potential Vegetation Type
QMD	Average Stand Diameter
QWRA	Quantitative Wildlife Risk Assessment
RAWS	Remote Automated Weather Station
RBS	Rogue Basin Strategy
RD	Relative Density
RDI	Relative Density Index
RHS	Relative Habitat Suitability
RMA	Recreation Management Areas
RMP	Resource Management Plan
RNA	Research Natural Area

ROD	Record of Decision
ROS	Recreation Opportunity Spectrum
ROW	Right-of-Ways
RR	Riparian Reserve
Rx	Prescription
SCO	Southern Coastal Oregon
SCS	South Cascade Demographic Study Area
SDI	Stand Density Index
SOC	Southern Oregon Cascades
SONCC	Southern Oregon/Northern California Coasts
SRMA	Special Recreation Management Area
SSN	Southern Sierra Nevada
SVS	Stand Visualization System
SWO ROD/RMP	Southwestern Oregon Resource Management Plan/Record of Decision
TH	Timber Harvest
TI	Torching Index
TPA	Trees per Acre
TPCC	Timber Production Capability Classification
USDI	United States Department of Interior
UTA	Uneven-Aged Timber Area
VRI	Visual Resource Inventory
WARSEM	Washington Road Surface Erosion Model
WDA	Wildland Development Area
WUI	Wildland Urban Interface

Glossary of Terms

Crowning Index (mph): “The open (20 foot) wind speed at which active crown fire is possible for the specified fire environment” (Scott and Reinhardt 2001). Crowning index can be used to compare relative susceptibility of stands to crown fire. An increase in the CI corresponds to a decreased likelihood of an active crown fire moving through a stand, particularly one impacting a given stand from an adjacent area. Crowning index provides an index for relative comparison-Fule et al. (2004) note, “…it would be unrealistic to expect that crowning index values are precise estimates of the exact windspeed at which any real crown fire will be sustained. However, it is reasonable to compare crowning index values across space and time to assess crown fire susceptibility in relative terms.”

Communities at Risk: As used in this EA, those communities identified in the Rogue Basin Strategy: defined by the State of Oregon (Oregon Dept. of Forestry 2006), and augmented with data from the West Wide Wildfire Risk Assessment (Oregon Dept. of Forestry et al. 2013).

Commercial Thinning – Stand thinning in which some or all of the cut trees are removed from the stand for timber (USDI BLM 2016b, p. 301).

District Designated Reserve: Those lands that are managed to maintain values and resources for which the BLM reserved these areas from sustained-yield timber production (USDI BLM, 2016b, p. 54).

Harvest Land Base: "Those lands on which the determination and declaration of the Annual Productive Capacity/Allowable Sale Quantity (ASQ) is based. The ASQ is based on implementing a set of specific timber management activities and assumes those practices will be repeated over time and results in a sustainable harvest level." (USDI BLM 2016a, p. 1072).

Fire & Disturbance Resiliency: "resiliency has been defined in various ways, but at its core are sustainability and resistance to and recovery from disturbance" (USDOI and USDA 2014).

Fire Resistance: In the frequent fire-adapted dry forest, there are important stand attributes that improve resistance to stand-replacing fire, reducing "the likelihood of atypical large-scale crown fires (Agee and Skinner 2005, Jain et al. 2012, Franklin et al. 2013). In general, stands with higher fire resistance have reduced surface fuel loading, lower tree density, large diameter trees of fire-resistant species, increased height to live crown (Brown et al. 2004, Peterson et al. 2005, USDI BLM 2008s), and discontinuous horizontal and vertical fuels" (USDI BLM 2016a, p. 243). In these fire-resistant stands, it is more likely that a "wildfire can burn through …. without substantially altering its structure, composition, or function (Franklin et al. 2013)" (USDI BVM 2016a, p. 242).

Fully Decommission: Roads determined to have not 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. Cuts and fills may be pulled back into the roadbed to restore the natural slope. 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.

Highly Valued Resources & Assets: In general, those places and things that as a society we value and want to protect – our homes and communities; infrastructure; important plant or wildlife habitat; and other natural resources such as timber and recreation sites. For purposes of this EA, HVRA's specifically refers to communities at risk, northern spotted owl habitat and sites, marbled murrelet habitat, special status plants, and special plant communities.

Instant Study Area: One of the 55 primitive and natural areas formally identified by the BLM through a final action published in the Federal Register before November 1, 1975. FLPMA required an accelerated wilderness review of these Wilderness Study Areas.

Land Use Allocation: "The identification in a land use plan of the activities and foreseeable development that are allowed, restricted, or excluded for all or part of the Planning Area, based on desired future conditions." (USDI BLM 2016b, p. 307).

Landscape Resilience: At its core are sustainability and resistance to and recovery from disturbance. Historically, there was a balanced amount and distribution of open and closed vegetation patterns present on the landscape cultivated by frequent low to moderate disturbance so that when disturbance happened, the balance of vegetation patterns would continue to persist on the landscape.

Late Successional Reserve: Those lands managed to maintain and/or promote nesting-roosting habitat for the northern spotted owl and to achieve the characteristics of a late-successional forest.

Long-Term Road Closure (Long-Term Decommission): refers to roads that would be closed with an earthen barrier or its equivalent for an extended/indefinite period, but could be operated and maintained again in the future.

Marbled Murrelet Nesting Habitat: Marbled murrelet nesting habitat has similar structural complexity and is generally characterized as older conifer stands containing large trees with suitable nest structure (at least 19.1 inches DBH, at least 4 inches wide limbs, with protective cover from the nest tree or adjacent trees; USDI BLM 2016b, p. 119).

Natural Range of Variability: A reference condition of expected patterns, given natural disturbance processes (e.g., historic fire regime), assumes a range of variation in the proportion of successional stages in open and closed states by species composition for a given landscape (Barrett et al. 2010), creating a resilient landscape. This reference condition does not represent a specific historical date, but instead approximates an equilibrium condition, or ecological reference condition, based upon the natural biological and physical processes for the area (USDI BLM 2016a, pp. 228-231, Appendix H pp. 1305-1319).

Northern Spotted Owl Nesting-Roosting Habitat: Generally, older conifer stands with a multi-layered, multispecies canopy dominated by large (> 30 inches DBH) conifer overstory trees and an understory of shade-tolerant conifers or hardwoods, with greater than 60 percent canopy cover, snags, coarse woody debris, and trees with cavities, broken tops, and dwarf mistletoe infections (USDI BLM 2016b, p 70.) See Appendix 6 for a more detailed description.

Operationally strategic areas to improve wildfire containment: Landscape features, such as ridgetops, roads, and previously treated areas often provide opportunities during wildfire response operations to contain or limit wildfire growth. These strategic features create management relevant opportunities to reduce risk of loss to HVRAs.

Potential Vegetation Type: The climax vegetation representative for a location, given natural succession. The PRMP/FEIS categorized forest stands as either moist or dry by PVT (USDI BLM 2016a, Appendix C).

Pyrolysis: The heating of an organic material, such as biomass, in the absence of oxygen. Because no oxygen is present the material does not combust but the chemical compounds (i.e., cellulose, hemicellulose and lignin) that make up that material thermally decompose into combustible gases and charcoal.

Quadratic Mean Diameter: The central tendency measure conventionally used in forestry to characterize the average diameter of a group of trees, rather than the arithmetic mean diameter (Curtis and Marshall 2000).

Relative Density: The 2016 ROD/RMP (p. 311) 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.”

Relative Habitat Suitability: As described in U.S. Fish & Wildlife Service 2011. RHS is an output of the MaxEnt model that predicts habitat conditions on the landscape that would support spotted owl occupancy. It is based on several variables including elevation, mean precipitation, slope position, insolation, curvature, and vegetation series.

Riparian Reserve: A federally designated buffer around streams, springs, seeps, ponds, lakes, reservoirs, fens, wetlands, and areas prone to slumping, on federal lands only. RR widths vary by watershed class and stream type.

Selection harvest(ing): A method of uneven-aged management involving the harvesting of single trees from stands (single tree selection) or in groups up to four (4) acres in size (group selection) without harvesting the entire stand at any one time (USDI BLM 2016b, p. 312).

Special Status Species: Plant or wildlife species that are (1) listed as endangered or threatened, proposed for listing, or candidates for listing under the federal ESA; (2) Oregon state-listed species; or (3) Bureau Sensitive species as determined by the Oregon/Washington BLM State Office Director (USDI BLM 2016b, p. 314).

Successional Classes or Stages: Ecological succession is the process of progressive change in an ecological community generally from less complex species structures to more complex species structures. Succession can be thought of as the life cycle of an ecological community, which passes through a series of stages. Disturbances such as fire can shift or sustain ecological community successional stages (also referred to as successional classes).

Thinning: A silvicultural treatment made to reduce the density of trees primarily to improve tree stand growth and vigor (USDI BLM 2016b, p. 315).

Torching index (mph): "The open (20-foot) wind speed at which crown fire activity can initiate for the specified fire environment" (Scott and Reinhardt 2001). An increased torching index would result in a decreased likelihood of torching initiating within the stand. Torching events within a stand can lead to an active crown fire depending on weather, surface, and canopy fuel conditions. As with crowning index, torching index may be interpreted as the relative susceptibility forests may have to tree torching also called "passive crown fire".

Wildland Fuel Profile - is comprised of accumulated live and dead plant biomass generally arranged in terms of surface fuels, ladder fuels, and canopy fuels. Wildland fuels are characterized by quantity (loading), size and shape, compactness (packing ratio), horizontal continuity and vertical arrangement.