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Environmental Assessment
DOI-BLM-ORWA-R040-0006-EA

Blue and Gold Harvest Plan

August 2024
OR/WA Bureau of Land Management
Roseburg District, Swiftwater Field Office
777NW Garden Valley Blvd.
Roseburg, OR 97471

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Chapter 1. Introduction

The Bureau of Land Management (BLM) prepared this environmental assessment (EA) to document the environmental analysis the BLM conducted to disclose the potential site-specific effects on the human environment that would result from implementation of silvicultural treatments and associated forest management actions within the Swiftwater Field Office (SWFO) on the Roseburg District. This EA provides the BLM's Decision Maker with current information to aid in the decision-making process. It also 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, to which this document tiers, or if a Finding of No Significant Impact (FONSI) is appropriate. This EA complies with the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 CFR Parts 1500-1508) and the Department of the Interior's regulations on implementation of the National Environmental Policy Act of 1969 as amended (43 CFR Part 46).

1.1 Project Overview

The SWFO is proposing forest management activities that include commercial thinning and variable retention-regeneration harvest (VRH) and post-harvest activity fuels treatments in the Harvest Land Base (HLB) Low Intensity Timber Area (LITA) and Moderate Intensity Timber Area (MITA) Land Use Allocations described in the 2016 Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (ROD/RMP) (BLM, 2016a, pp. 59-63). Management direction for the HLB land use allocation (LUA) requires the BLM to conduct silvicultural treatments, including commercial thinning and VRH, to contribute timber volume to the Allowable Sale Quantity (ASQ), to enhance timber values, and to reduce fire risks and insect and disease outbreaks (BLM, 2016a, p. 59). The actions proposed in this EA would implement these plan-level decisions, and the design and implementation of these actions would conform to management direction within the ROD/RMP.

The SWFO is also proposing road construction, maintenance, and renovation/improvement as well as yarding wedges or corridors within the HLB, District Designated Reserve (DDR), Late Successional Reserve (LSR), and Riparian Reserve (RR) LUA as described in the ROD/RMP (BLM, 2016a, pp. 56 ,57, 62,65,68-69). Road management for the project consists of developing and maintaining a transportation system that serves resource management needs in an environmentally sound manner, including applying road location, design, and construction Best Management Practices (BMPs), as directed by the ROD/RMP (p. 81,83).

1.2 Background

In 2017, the BLM queried the Forest Operations Inventory (FOI) database of the entire Roseburg Sustained Yield Unit (SYU) to identify potential planning areas allocated by the ROD/RMP as HLB for forest management actions specifically to achieve the ASQ declared in the ROD/RMP for the Roseburg SYU for approximately a 10-year period (2018-2028). Planning areas, including the Blue and Gold Harvest Plan EA planning area, were considered by the BLM if the planning areas 1) had stand attributes the BLM determined were suitable for silviculture treatments within the 10-year period (the BLM's criteria to evaluate suitability included stand relative density [greater than or equal to 45 percent], average stand diameter [greater than or equal to 12 inches], and board foot (BF) volume [greater than or equal to 8,000 BF/Acre]), 2) had commercial logging feasibility, 3) would be economically viable to produce ASQ, and 4) would be implemented through a variety of commercial mechanisms. The FOI database query process assisted the BLM in refining stands within the Roseburg SYU to analyze for contributing to the ASQ in the time period of 2018-2028.

In 2023, the BLM conducted an additional assessment of remaining potential ASQ volume by hydrologic unit code (HUC) 10 watershed, within the Roseburg SYU, after the Archie Creek Fire, which impacted approximately 40,000 BLM-administered acres within the Roseburg District. This assessment took into consideration past harvest and disturbance events since adoption of the 2016 RMPs and identified the Upper Umpqua HUC 10 watershed (in which the Blue and Gold planning area resides) as having the largest concentration of potential ASQ volume remaining for the first decade of RMP implementation.

The BLM also utilizes stand age (generally 40 years and older to reach a size of commercial value), stand exam data and merchantable tree reports, in addition to Forest Vegetation Simulator (FVS) growth and yield modeling in the PRMP/FEIS to determine appropriate planning harvest areas. Through this process, the BLM identified a total of 2,625 acres, or 3.4 percent, of the Roseburg District SYU total HLB acres within the Blue and Gold Harvest Plan EA planning area as suitable for silvicultural treatment at this time.

Vegetation modeling and harvest assumptions in the PRMP/FEIS, along with Roseburg District's FOI-based analysis described above, assisted the Roseburg District in selecting a project area among possible HLB project areas to contribute to the ASQ declaration. The ASQ volume represents the sustained-yield volume of timber that the BLM is required to offer for sale from each sustained-yield unit; as such, the BLM offers this sustained-yield volume of timber only from the HLB, which has specific objectives for sustained-yield timber production (BLM, 2016a, p. 6).

The BLM developed the Blue and Gold Harvest Plan to manage forest stands to achieve continual timber production that can be sustained through a balance of growth and harvest and to contribute to the declared ASQ as identified in the ROD/RMP (BLM, 2016a, pp. 5-8). The SWFO is one of two field offices that contributes to the Roseburg SYU declared annual target of 32 million board feet (MMbf) of ASQ volume, with a 40 percent allowable annual variation between 19 and 45 MMbf. The management direction for the HLB requires the BLM to conduct silvicultural treatments to contribute timber volume to achieve the ASQ volume (BLM, 2016a, p. 59). The action alternatives proposed in this EA would implement these plan-level decisions, and the design and implementation of these actions would conform to management direction within the ROD/RMP.

1.3 Description of Project Area

The project area is located within the Mehl Creek-Umpqua River, Brush Creek, Yoncalla Creek, McGee Creek-Umpqua River, Yellow Creek, Lost Creek-Umpqua River, Williams Creek-Calapooya Creek, and Cabin Creek-Calapooya Creek Class I subwatersheds[1]. The town of Yoncalla is approximately two miles from the northern edge of proposed harvest units. The town of Sutherlin and Oakland are approximately four and five miles from the eastern edge of the project area.

The project area is located on BLM-administered lands within Douglas County, Oregon (Table 1-1). Appendix A includes maps of the proposed action locations.

Table 1-1. Legal Description of the EA (Willamette Meridian)

Township	Range	Section
23S	5W	17 and 19
23S	6W	17, 19, 20, 21, 23, 25, 27, 28, 29, 31, 33, 35
24S	6W	3, 4, 5, 7, 9, 11, 15, 17, 27

[1]Class I subwatersheds are those that include both designated critical habitat and high-intrinsic potential streams. The 'intrinsic potential' is the set of habitat features that most influence whether that habitat is likely to be used or selected (or not) by an individual fish species. 'High intrinsic potential' streams are those streams with the habitat features that are known to be highly productive for an individual fish species (PRMP/FEIS, p. 91).

The BLM manages approximately 37,966 acres or 21 percent of the lands within the 182,082-acre[2] planning area. Over the three- to-10-year life of this project, the proposed unit acres[3] and associated forest management activities would occur on approximately 3,406 acres of Oregon & California Railroad (O&C) Revested Lands and approximately 188 acres of Public Domain lands, for a total of 3,594 acres of BLM-administered lands[4]. These total acreage values where actions are proposed include reserve land-use allocations such as RR, LSR, and DDR. This acreage is not a representative of proposed treatment acres[5], as those can be found below in alternative tables. Of the remaining 34,352 acres of BLM-administered land in the planning area, 22,025.84 acres are in reserves, and 9,779.31 acres are HLB. The remainder of lands within these watersheds are owned or managed primarily by industrial landowners (141,647 acres, 78 percent). Table 1-2 displays the total acres for each subwatershed, including private lands, the number of acres of BLM-administered lands within each subwatershed, proposed unit acreage, and the percentage of proposed unit acres compared to total watershed acres.

Table 1-2. Total Acres by land ownership and subwatershed on BLM-administered Land

Subwatershed (class 1)	Total Acres	BLM-administered Acres	Private Acres	Unit Acreage[i]	Percent of Proposed Unit Acreage Compared to Total Acreage
Brush Creek	13,474	7,185	6,289	261	2
Cabin Creek-Calapooya Creek	31,528	664	30,864	128	Less than 1
Lost Creek-Umpqua River	19,933	7,013	12,920	140	1
McGee Creek-Umpqua River	19,940	5,541	14,399	6	Less than 1
Mehl Creek-Umpqua River	31,118	7,539	23,579	51	Less than 1
Williams Creek-Calapooya Creek	34,025	1,661	32,364	263	Less than 1
Yellow Creek	13,535	7,365	6,170	2,482	20
Yoncalla Creek	18,529	998	17,531	75	Less than 1
TOTALS	182,082	37,966	141,647	3,406	2

[i] Acreage in this column represents Alternative 3 which proposes the most VRH acreage among the proposed action alternatives.

1.4 Purpose and Need

The purpose of the BLM conducting silvicultural treatments as analyzed in the Blue & Gold Harvest Plan EA is to implement the HLB LUA management direction to meet the need for ASQ volume in a manner that provides economically viable sales and efficient timber sale planning and to contribute ASQ timber volume of approximately 59 to 158 MMbf of ASQ volume over the next three to eight years.

The specific management direction from the ROD/RMP that is the purpose of the Action Alternatives proposed in the Blue & Gold Harvest Plan EA is:

- Conduct silviculture treatments to contribute timber volume to the Allowable Sale Quantity (BLM, 2016a, p. 59).

[2]This acreage is determined by the SWFO GIS specialist using OR/WA BLM Corporate GIS data and may vary based on interpretation. The acreage provided includes water features which total 2,069 acres or 1 percent of the total land in the project area.
[3]Unit Acres – Acres where the BLM is analyzing potential effects of silviculture treatments (VRH and commercial thinning) as well as associated timber management actions. These acres include all Land Use Allocations for an individual Forest Operations (FOI) Inventory stand. Stand delineation were derived from the Microstorms database.
[4] This acreage include RR, TPCC, DDR which are not suitable for silviculture treatments. There are 128 acres (103 acres with RR removed) of HLB within 300 feet of the occupied MAMU stands (RMP pg. 98) in the proposed project area that are not included in the treatment area.
[5] Treatment acres – Treatment acres are a subset of the unit acres that include only Harvest Land Base (HLB) Land Use Allocations where the BLM is proposing Variable-Retention Regeneration Harvest (VRH) or Commercial Thinning (CT).

The Roseburg District has a need to provide for the declared annual ASQ of 32 MMbf each year (with an allowable annual 40 percent variation of 19 and 45 MMbf) (BLM, 2016a, pp. 5-7). The stands proposed for silvicultural treatments have reached a condition that makes them suitable for treatments, based upon the following factors:

- Stands of Douglas fir in the HLB LUA within the planning area range from 40 to 140 years old, which indicates the stands should be analyzed for silvicultural treatments to implement HLB management direction.
- The BLM has existing legal and physical road access into the planning area.
- The planning area can support commercially viable timber harvest where the value of timber exceeds the cost of harvesting (including road costs).
- Based on a 2023 ASQ assessment, the planning area lies within the highest concentration of potentially available ASQ volume within the Roseburg SYU.

The proposed Action Alternatives are being analyzed because the BLM determined and decided the ASQ for the Roseburg SYU in the ROD/RMP, accounting for the requirements of compliance with other laws and with consideration of the objectives, land use allocations, and management direction of the RMP (BLM, 2016a, p. 5). To meet the minimum ASQ declaration for fiscal years (FY) 2024 through at least FY 2025, the BLM needs to harvest timber from the HLB in the Blue & Gold Harvest Plan EA planning area.

Since the BLM has an annual need to achieve the declared ASQ for the Roseburg SYU and timber sale planning requires two to five years of preparation, the BLM has a need for efficient ROD/RMP planning and implementation by including several years of ASQ accomplishment in one project area versus duplicating work and resource expenditure planning individual timber sales on an annual basis.

1.5 Decision to be Made

The BLM would decide whether to offer timber within the planning area described above for sale, and if timber is offered for sale, the BLM would decide the number of acres and the locations of silvicultural treatments, and how to implement harvest (logging systems, landings, yarding wedges and corridors, road renovation, improvement and construction, subsoiling, and treatment of activity fuels) on BLM-administered lands. Additionally, the BLM would determine which specific BMPs and Project Design Features (PDFs) are required and would be applied to the harvesting of timber and associated forest management activities.

The decision to harvest timber would be based on how well the proposed actions achieve the purpose and need for the project after considering the environmental effects. The decision would also determine if the impacts of the proposed project are within the range analyzed in the PRMP/FEIS. If effects are determined to be insignificant, then a FONSI would be issued, and a decision record(s) would be signed and implemented.

1.6 Conformance with Land Use Plan

The BLM signed a Record of Decision approving the ROD/RMP on August 5, 2016. The ROD/RMP addresses how the BLM would comply with applicable laws, regulations, and policies in western Oregon including, but not limited to the O&C Act, the Federal Land Policy and Management Act of 1976 (FLPMA), Endangered Species Act, National Environmental Policy Act (NEPA), Archaeological Resources Protection Act, National Historic Preservation Act as amended (NHPA), Clean Air Act, and Clean Water Act. The Swiftwater Field Office, Roseburg Oregon District, initiated and designed the Blue and Gold Harvest Plan to conform to the management direction in the ROD/RMP.

1.7 Consultation and Coordination

1.7.1 Tribal Consultation

The BLM sent the project initiation letter to the Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz, and Cow Creek Band of Umpqua Tribe of Indians notifying them of project initiation on August 13, 2019. The BLM received one response.

On December 5, 2019, the BLM sent scoping letters to the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians, the Confederated Tribes of Grand Ronde, the Confederated Tribes of Siletz, and the Cow Creek Band of Umpqua Tribe of Indians. The BLM received no responses.

The BLM participated in coordination level meetings with cultural resource staff from the Cow Creek Band of Umpqua Tribe of Indians on October 17, 2019, and with the cultural resources staff from the Confederated Tribes of Grand Ronde on February 28, 2020. Neither meeting resulted in any comments regarding the EA.

Coordination level notifications were sent to all the Tribal Historic Preservation Officers (THPOs) via email on May 14, 2020. On July 8, 2020, the BLM sent scoping letters to the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians, the Confederated Tribes of Grand Ronde, the Confederated Tribes of Siletz, and the Cow Creek Band of Umpqua Tribe of Indians. The BLM received no responses.

1.7.2 National Historic Preservation Act - Section 106 and 36 CFR 800

A Class III cultural resource inventory was completed for this project. Consultation with the State Historic Preservation Office (SHPO) was not needed as the BLM determined that the project would have "no effect" to cultural resources. Post-monitoring and inspection protocols are in place.

1.7.3 Section 7 Consultation under Endangered Species

U.S. Fish and Wildlife Service

The federally threatened northern spotted owl (NSO), marbled murrelet, and the Franklin's bumble bee are ESA-listed wildlife species known to occur within or near the Blue and Gold EA planning area. The BLM has determined that the action alternatives are likely to adversely affect the NSO and the marbled murrelet. The BLM anticipates that incidental take will occur for the marbled murrelet and will request an incidental take permit from the U.S. Fish and Wildlife Service (USFWS). The BLM met with the Level 1 consultation team multiple times, and two field trips were provided as an overview of the project and to discuss potential effects to listed species. Formal consultation with the USFWS was initiated when the BLM sent the Biological Assessment (BA) to the USFWS in July 2024. The BLM anticipates a Biological Opinion (BO) from the USFWS in September 2024.

National Marine Fisheries Service (NMFS)

The Blue and Gold planning area is within the range of the federally listed Oregon Coast coho salmon. The anticipated effects of the action alternatives to coho salmon and their critical habitat are within those consulted on with the National Marine Fisheries Service (NMFS) in the Programmatic BA/BO for the BLM's Forest Management Program for Western Oregon (NMFS Reference Number WCR-2017-7574). The BLM has submitted a Project Notification Form to NMFS within 60 days of the decision, confirming the Blue and Gold Harvest Plan Project is consistent with the Programmatic BO. Consultation was initiated on June 12, 2024. The BLM anticipates a verification letter from the NMFS confirming that the proposed actions are consistent with the effects analysis and conclusions of the NMFS BO.

1.8 Public Involvement

The BLM notified the public of project initiation in the Roseburg District Quarterly Planning Update (December 2016). The Quarterly Planning Updates are published in ePlanning, and the Notice of Availability is mailed to the Roseburg District mailing list. The project has been included in the Quarterly Planning Updates since the project was initiated.

The BLM mailed letters to landowners with property adjacent to BLM-administered lands where timber harvest is proposed in the Blue and Gold Harvest Plan project area and those whose property lies beside or astride identified haul routes on December 6, 2019. The BLM received one written response.

The BLM posted the scoping document in ePlanning and sent a Notification of Availability of the scoping document to the Roseburg District email list on December 6, 2019. Scoping comment letters were received from four organizations and seven individuals.

The BLM conducted an additional scoping effort on July 8, 2020, following the addition of 1,820 acres for silvicultural treatments to the initial Blue and Gold Harvest Plan proposal. The BLM received four scoping comment letters from individuals and one from an organization.

The Interdisciplinary Team (IDT) reviewed all scoping responses and used the substantive comments to refine the proposed actions, identify issues, develop alternatives, and develop PDFs.

On April 27, 2022, the BLM posted a Blue and Gold Harvest Plan EA and unsigned FONSI on the BLM's ePlanning website for public review. On April 29, 2022, that EA and unsigned FONSI were withdrawn, and the project was temporarily paused. The BLM reinitiated the project analysis in August 2023.

1.9 Issue Development

The BLM National Environmental Policy Act Handbook (H-1790-1) identifies issues as points of disagreement, debate, or dispute with a proposed action based on some anticipated effect (BLM, 2008c, p. 40).

Issues raised by the public or in IDT meetings were considered and either analyzed as a part of this EA (Chapter 3), or as an issue considered but not analyzed in detail addressed in Appendix C. The IDT identified relevant issues based on applicable law, management direction in the ROD/RMP, and information gathered during project planning and preparation. The BLM analyzed these issues in detail if the analysis was useful for making a reasoned choice between alternatives or if the analysis was necessary to determine the significance of the effects. Analysis of the issues provide a basis for comparing the environmental effects of the action alternatives and the no action alternative and aids in the decision-making process. The IDT analyzed the following issue-based questions:

- Issue 1: How would the proposed timber harvest contribute to the achievement of the Allowable Sale Quantity for the Roseburg Sustainable Yield Unit?
- Issue 2: How would proposed actions affect the northern spotted owl (Strix occidentalis caurina) and their habitats?
- Issue 3: How would proposed actions affect the marbled murrelet (Brachyramphus marmoratus) and their habitats?
- Issue 4: How would proposed VRH affect winter peak flows and summer low flows?
- Issue 5: How would installation of the Yellow Creek crossing impact Oregon Coast coho salmon, their designated critical habitat, and BLM sensitive fish species?
- Issue 6: How would the alternatives affect fire hazard on BLM-administered lands in close proximity to Wildland Developed Areas and overall wildfire risk to values at risk?

Chapter 2. Alternatives

Chapter 2 describes the No Action Alternative (Alternative 1) and the Action Alternatives (Alternatives 2, 3, 4, 5, and 6). All six of the alternatives are analyzed in detail in this EA. Elements common to all Action Alternatives are described in section 2.3. Maps of the Action Alternatives are included as Appendix A. This chapter also describes the alternatives the BLM considered but did not analyze in detail (Section 2.9).

Throughout this document, analysis figures and reference maps depict EA timber harvest units, road locations, riparian reserves, and other information using GIS mapping techniques and geospatial data. GIS products are intended to aid the reader in understanding the approximate locations, shapes, and sizes of proposed actions. Although electronic technology can produce information that appears precise, GIS projections are subject to refinement during the project implementation phase. During timber sale layout and other pre-sale activities performed by the BLM, unit size and shape, extent or designation of riparian reserves, road lengths, proposed road surfacing, road locations, and post-harvest actions would be refined. These refinements would be reviewed by the IDT to identify if any alterations to the proposed action changes their analysis provided in this document.

All Action Alternatives have measures to avoid or minimize adverse environmental effects and conform with regulations, laws, and policies. Measures include adhering to ROD/RMP management direction by incorporating appropriate PDFs and BMPs (Appendix B). Project design features are required operating procedures developed by the IDT used to avoid or reduce adverse environmental effects and ensure proposed action alternatives conform with regulations, laws, and policies. BMPs are specific measures, methods, or practices that are designed to prevent or reduce water pollution. The BLM would implement PDFs and BMPs during design, layout, and implementation of the proposed actions, through binding contract requirements and BLM-conducted contract administration, monitoring, and enforcement, including authority for contract suspension and termination to ensure PDF and BMP compliance. The BLM would adjust unit design and layout to ensure feasibility and implementation of PDFs and BMPs. Examples include adjusting FOI boundaries which delineate stand types in GIS that are inconsistent with actual stand features, adjusting boundaries for unmapped terrain features, updating stream bed locations as inception points are evaluated and determined in the field, and refining yarding wedge sizes and location as operators, purchasers and contract administrators determine yarding corridor locations based on logging feasibility and unit design features. These changes would be reviewed by BLM resource staff prior implementation, any alterations to analysis provided in this EA (Chapter 3 and Appendix B) would be reflected in further NEPA documentation.

2.1 Comparison of Alternatives

This section summarizes the alternatives by comparing the level of management activity by alternative.

Table 2-1. Comparison of alternatives by management activity

Management Activity	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres of VRH	0	1,094	2,625	1,409	0	738
Acres of VRH – LITA	0	1,055	2,285	1,263	0	505
Acres of VRH – MITA	0	39	340	146	0	233
Total Acres of Commercial Thinning	0	42	0	161	2,625	1,667
Acres of Commercial Thinning – LITA	0	42	0	110	2,285	1,574
Acres of Commercial Thinning – MITA	0	0	0	51	340	93
Acres of Yarding Wedges on BLM	0	24	53	24	53	53
Acres of Yarding Wedges on Private Lands	0	16	21	20	21	21
Total Miles of Road Construction	0	3.3	16.3	9.8	16.3	14.6
Miles of Road Construction within RR	0	0.1	0.6	0.3	0.6	0.6
Total Miles of Road Construction within LSR	0	0.1	0.4	0.1	0.4	0.4
Total Miles of Road Construction within HLB + Private land Ownership+ DDR	0	2.2 +0.5	12 +2.3	7.3 +1.6	12 + 2.3	10.8 + 2

Management Activity	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
		+ 0.4	+1	+0.5	+1	+0.8
Total Miles of Road Renovation within all LUAs	0	58	86	64	86	74
Miles of in-unit Road Renovation within HLB	0	1	1	0	1	1
Miles of in-unit Road Renovation within RR	0	7	8	7	8	8
Miles of in-unit Road renovation within LSR	0	7	8	7	8	8
Miles of Road Renovation outside unit within DDR (haul route)		43	69	50	69	57
Yellow Creek Crossing	No	Yes	Yes	No	Yes	Yes

2.2 No Action Alternative

The No Action Alternative provides the environmental baseline against which the effects of the proposed Action Alternatives can be compared (i.e., the No Action Alternative describes the current existing conditions in the project area if the BLM does not implement the project). The analysis of the No Action Alternative discusses the consequences of not implementing any proposed actions at this time and assumes that current resource trends would continue. Individual stands would continue to develop under their current successional pathway.

Selection of the No Action Alternative does not constitute a decision to reallocate these lands to non-commodity uses and would not preclude future forest management actions in this area. If the decision maker selects this alternative, the proposed actions would not be conducted at this time. It is reasonably foreseeable that the BLM would return to the area to implement a timber harvest in the future. Given the predominance of 50 to 140-year old stands in the project area – ages at which the BLM generally plans for harvest treatments – along with the prior (current) investment in planning for timber sales here, and the large volume of timber located in the project area specifically, it is reasonably foreseeable that the BLM would re-initiate planning for a timber harvest project in the Blue and Gold area within as soon as five years, with implementation as soon as six to 10 years from now. Future activities in the area would be analyzed in subsequent NEPA documents. The units identified in this analysis would be selected as part of the same treatment units or be grouped with other units to create a new project area in order to meet the ASQ requirements identified in the ROD/RMP (BLM, 2016a, pp. 5-8).

Ongoing activities that would continue to occur include fire suppression, road maintenance, special forest products collection, reforestation and stand maintenance, and other actions with previous NEPA documentation and decisions (see Section Introduction to Cumulative Effects 3.2).

2.3 Project Elements Common to All Action Alternatives

This section describes elements common to all Action Alternatives. Road construction and/or renovation/improvement would occur prior to commercial thinning and VRH. During harvest operations, activities would include tree felling, snag creation, yarding, log haul, and road use. After completion of harvest operations, project activities would include activity fuels reduction treatments, subsoiling, and road maintenance. The Action Alternatives also incorporate PDFs and BMPs listed in Appendix B.

2.3.1 Lands and Realty Actions

The BLM would pursue obtaining access across privately owned lands to BLM-administered lands in support of the project area. Any documentation for proposed road access needed across privately owned lands would be covered under another NEPA analysis as necessary and is not part of this action. This analysis assumes the effects of acquiring the necessary road access to complete the actions proposed under each respective action alternative.

2.3.2 Harvest Land Base Forest Management Activities

The BLM would conduct VRH and/or commercial thinning within the HLB LUA. When conducting timber harvest activities to manage forest stands for sustained-yield production, the BLM would adhere to the specific management direction found in the ROD/RMP, p. 59-63. While the type of treatment (e.g., commercial thinning and VRH) and the retention levels prescribed vary by alternative (see Table 2-1), the BLM would incorporate the following timber harvest practices and design features under all the action alternatives.

2.3.3 Variable-Retention Regeneration Harvest

Where VRH is proposed, the BLM would retain trees in a variety of spatial patterns including aggregate and dispersed retention (See Appendix K for descriptions on different harvest types). In the HLB-MITA land use allocation, approximately 5 to 15 percent of pre-harvest stand basal area in live trees would be retained. Treatments in the HLB-LITA land use allocation would retain approximately 15 to 30 percent of pre-harvest stand basal area in live trees (BLM, 2016a, pp. 62-63).

2.3.4 Commercial Thinning

Where commercial thinning is proposed, harvest units would result in a stand average relative density between 25 percent and 45 percent after harvest. The BLM would leave untreated areas (skips) and create group selection openings (areas with equal to or less than two live trees that are equal to or greater than 7 inches DBH per acre) to provide structural complexity in the post-treatment stand (See Appendix K). At least five percent of the planned harvest area would be left in untreated areas, and no more than 10 percent of the planned treatment acres unit would be in group selection openings (BLM, 2016a, p. 60).

2.3.5 BLM-Identified Trees Established Prior to 1850

The BLM would retain all trees that are both greater than or equal to 40” diameter breast height (DBH) and that the BLM identifies were established before 1850, except where falling the tree is necessary for safety or operational reasons including yarding corridors, skid trails, road construction, renovation/maintenance, and/or improvement. If such trees need to be cut, the cut trees will be retained in the stand or adjacent stand as coarse woody debris. The BLM identification of trees established prior to 1850 may be based on any of a variety of methods, such as evaluation of bark, limb. Trunk, or crown characteristics, or increment coring, at the discretion of the BLM (BLM, 2016a, p. 60). Per RMP management direction, BLM would include these trees in in the 5-15 percent (MITA) and in the 15-30 percent (LITA) tree stand retention (BLM, 2016a, pp. 62-63).

2.3.6 Snag Retention and Creation

Per RMP management direction, in the HLB LUA, the BLM would retain existing snags during commercial harvest activities that are greater than 20” DBH, retain existing snags 6” to 20” DBH in decay classes III, IV, and V, retain existing down woody material greater than 20” in diameter at the large end and greater than 20 feet in length, and retain existing down woody material 6” to 20” in diameter at the large end and greater than 20 feet in length in decay classes III, IV, and V, except if safety, operational, or fuels reduction reasons prevent the retention (BLM, 2016a, p. 60). The BLM would retain snags equal to or less than 6” DBH cut for safety or operational reasons as down woody material unless they would also pose a safety hazard or for fuels reduction reasons.

In stands with less than 26 snags per acre greater than 10” DBH and less than 8 snags per acre greater than 20” DBH on average across the harvest unit, the BLM would create three snags per acre greater than 20” DBH within one year of completion of yarding the timber in the timber sale. If insufficient trees are available in the pre-harvest stand in the size class specified, the BLM would use trees from the largest size class available. Snag creation would be met at the harvest unit; snag creation levels are not required to be attained on every acre (BLM, 2016a, p. 61).

2.3.7 Road Management

Road and Landing Construction

Consistent with RMP management direction, the BLM would construct new roads within the HLB, RR, LSR and District Designated Reserve (DDR) and within adjacent private lands to access units proposed for silvicultural treatments. However, existing roads would be used to the greatest extent practicable in all action alternatives. The BLM would construct road segments to move landings off heavily travelled roads to avoid user conflict, improve safety, or access landing locations that would reduce impacts to resources. Road construction would provide satisfactory yarding deflection or corridor alignment to facilitate environmentally responsible yarding and allow for safe yarding and decking of logs.

Constructed roads and landings would be located on geologically stable locations, e.g., ridge tops, stable benches or flats, and gentle-to-moderate side-slopes where possible. Roads and short (less than 500 feet) temporary road segments for access (spurs) would be designed to the minimum width needed for the intended use; a 14-foot-wide road surface and an average road clearing width of 45 feet (22.5 feet from centerline) (BLM, 2011). Factors requiring road clearing widths greater than 45 feet would include slope steepness, turnouts, and a safe line-of-sight on approaches to curves. Constructed roads would be surfaced with rock when needed to allow for wet and dry season hauling. Road and landing construction would occur during the dry season (typically, mid-May through mid-October) but would be adjusted based on weather conditions (BLM, 2016a, pp. 143-147).

BMPs for roads and landings guide final locations and design (Appendix B). As individual sales are developed, some spur roads would be required that would better facilitate harvest operations. The spur road construction would be implemented following these same BMPs as well as any applicable PDFs and would be identified in the timber sale contract. Spur roads would be decommissioned following completion of post-harvest activities. Appendix C of the ROD/RMP describes the best management and conservation practices for harvest related activities that the BLM would require during implementation of the proposed project.

Consistent with ROD/RMP management direction, when trees are cut for road construction, maintenance, and improvement in the LSR and/or the Outer Zone of the RR, the trees would be retained in adjacent stands as down woody material, moved for placement in streams for fish habitat restoration, or sold at the discretion of the BLM (BLM, 2016a, pp. 65, 68). As provided above, trees that are both equal to or greater than 40 inches DBH and that the BLM identifies were established prior to 1850 would be retained—but, as allowed by the RMP, they may need to be cut for safety or operational reasons, If such trees are cut, the BLM would retain those cut trees in the adjacent stand as down woody material. When trees are cut for road construction, maintenance, and improvement in the Inner and Middle Zone of RR, the BLM would retain those trees in adjacent stands as down woody material or would move cut trees for placement in streams for fish habitat restoration, at the discretion of the BLM (BLM, 2016a, pp. 65, 68-69).

Road Renovation

Road renovation consists of restoring a degraded road to its original design standard such as replacing worn out cross drain culverts and depleted rock surfacing (BLM, 2016b, p. 793). Road renovation would include but is not limited to clearing brush and trees; cleaning, adding, or replacing ditch relief/stream crossing culverts; restoring proper road surface drainage; grading; road realignments; adding turnouts and landings; repairing slumps and fill failures; and adding rock surfacing.

In some instances, trees and other plant species have re-vegetated the original road prism and would require removal to reestablish the original road design specifications. The road prism is defined as the area between the top of the cut slope and toe of the fill slope. The road prism typically varies from 40-80 feet in width. The clearing width associated with road renovation would vary depending on topography, road design, and vegetation conditions but would not exceed 80 feet (40 feet from centerline). The road prism variable clearing limits extend five feet beyond the top of cut and the toe of the fill on either side of the road prism during horizontal curves in the road. Any further road renovation outside the description of the prosed action here would be subject to further NEPA documentation.

Road renovation would be conducted on any existing inventoried or un-inventoried road. Features of an existing road include a defined cut and fill, compacted surface, rock surfacing, and/or drainage structures. Renovated roads planned for wet season haul would be surfaced with rock. Road renovation would occur during the dry season (typically, mid-May through mid-October) but would be adjusted based on weather conditions.

Road Decommissioning

Road decommissioning would be accomplished in a variety of ways based upon evaluation of circumstances specific to each road. At a minimum, decommissioning would include leaving roads in a well-drained condition and blocking access to vehicular use with barriers such as trenches, rocks, or logs. Based on site specific conditions, road decommissioning would also include various combinations of removing drainage structures, subsoiling the roadbed, mulching with weed-free straw, seeding with native grasses, and/or mulching with logging slash to further discourage off-highway vehicle use. Decommissioning of existing roads would be subject to agreements by holders of reciprocal rights-of-way, easements, or other legal interests, such as roads constructed prior to 1983 using plough-back funds from the O&C Act.

2.3.8 Yarding Wedges

Topography is a critical factor in logging system selection, landing location, and harvest unit design. Where topographic constraints make road access into a harvest unit impractical, it may be feasible to locate roads and/or landings outside of the harvest unit. This situation, where a landing is not located within the harvest unit, results in an area that is exterior to the harvest unit through which timber must be yarded or skidded—these areas are commonly referred to as "yarding wedges" when referencing cable or ground-based logging systems and "flight paths" when referencing helicopter logging systems.

Yarding wedges in western Oregon are frequently associated with differing ownerships but may also be associated with differing LUAs and/or stand types within the same LUA on BLM-managed lands. Some of the factors that determine the intensity of clearing on a yarding wedge include current forest conditions; topography; safety considerations; the total harvest area accessed from a landing; the number yarding corridors needed to reach the harvest area, and the logging machinery used to yard/skid, process, deck and load logs. The intensity of clearing would generally be highest on the portion of a yarding wedge closest to the landing—in most situations all trees above the sapling stage would be cleared a minimum of 40 – 60 feet from the landing, resulting in a cleared area ranging from a quarter to one acre for most yarding wedges. Forest canopy on portions of yarding wedges beyond approximately 120 feet from the landing would receive a lower intensity of clearing consisting of minimal width (approximately 10 – 15 foot-wide) yarding corridors (See Appendix H for yarding corridor configuration) or skid trails spaced as far apart as practical (up to 150 foot spacing) to balance operational productivity with impacts to natural resources. Proposed locations of yarding wedges are displayed in Appendix A.

Exact location and size of yarding wedges would be determined during timber sale implementation. For analysis purposes, BLM has estimated the acres of yarding wedges needed under each alternative based on field reviews, review of past projects, and agency expertise. Per RMP management direction, when trees are cut for yarding wedges and skid trails in the LSR or the Outer Zone of the RR the BLM retains cut trees in adjacent stands as down woody material, moves cut trees for placement in streams for fish habitat restoration, or sells trees, at the discretion of the BLM (BLM, 2016a, p. 65).

2.3.9 Subsoiling

Subsoiling would occur on native surfaced landings and main skid trails to reduce soil bulk density[6] and provide some soil aeration, allowing for increased water infiltration, and reduced erosion and water runoff. Landings and main skid trails would be subsoiled to a minimum depth of 18 inches, if deemed necessary by the soil scientist, based on site conditions and risk of future erosion issues. Areas of shallow, rocky soils would not be subsoiled to avoid mixing rock with topsoil. Logging slash and adjacent topsoil, where available, would be placed on at least 50 percent of subsoiled areas to re-establish displaced duff and surface soil organic matter (BLM, 2016a, p. 160).

2.3.10 Activity Fuels Treatment

The BLM proposes to use a combination of prescribed fire and mechanical treatment to reduce residual activity fuels and hazardous fuel loadings. At a minimum, slash piles at harvest landings would be burned. Estimated acres of post-harvest activity fuels treatment is displayed in Table L-1, see Appendix L. Prescribed fire treatments would include pile burning and broadcast burning[7]. The BLM fuels specialists and/or silviculturist would evaluate each harvest unit other than the landing pile areas based on characteristics like fuel loads, vegetation type and amount, and topography to reduce fire risk and/or prepare for planting (BLM, 2016a, pp. 77-78). Generally, broadcast burning units would be considered if fuel loading exceeds 150 tons per acre as this is not only a fuels concern but also would hinder replanting. Post-harvest slash reduction would be done through machine piling, hand piling, or yarding of unmerchantable material. Mechanical treatments can include lop and scatter, and cutting and piling, with or without subsequent burning. Fuels treatments can consist of more than one type in a unit based on professional judgement by Fuels staff. An estimation of the acres of landing piles and possible broadcast burns are summarized in Table L-1, see Appendix L. All burning would be in accordance with DOI/BLM policy and will follow regulations in the Oregon State Smoke Management Plan (State of Oregon , 2019).

2.3.11 Best Management Practices (BMPs) and Project Design Features (PDFs)

The ROD/RMP contains measures in both Management Direction and BMPs designed to prevent and reduce the amount of pollution generated by non-point sources to a level compatible with water quality goals (BLM, 2016a, p. 139). The IDT incorporated a list of BMPs (from Appendix C in the ROD/RMP) into the Blue and Gold Harvest Plan project (Appendix B) for roads and landings, timber harvest activities, silvicultural activities, and fire and fuels management to comply with the Clean Water Act.

The IDT developed and incorporated PDFs (Appendix B) to avoid, minimize or reduce effects on resources, and these are included as part of the Action Alternatives. BMPs and PDFs are site-specific measures, restrictions, and requirements included in the design of a project to reduce adverse environmental consequences.

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[6] Increases in Bulk Density because of compaction can be lowered by breaking up the compacted layer through subsoiling. Bulk density varies based on site specific factors like organic matter content and soil texture. Bulk density ranges from <1.60 - <1.10 g/cm^3 with sand and loamy sand textures having higher bulk densities and clay having lower bulk densities. Bulk density that impacts rooting growth also varies based on soil texture with 1.69g/cm^3 for sand and loamy sand and 1.39g/cm^3 for clay generally impacting plant growth (NRCS, 2019).

[7] Broadcast burning, is defined by the 2016 ROD/RMP, as a prescribed fire applied to most or all of an area within a unit boundary to meet resource objectives. Canopy is either non-existant or not an objective to retain.

2.4 Alternative 2

Alternative 2 would include VRH of 1,094 acres and commercial thinning of 42 acres in the HLB-LITA and HLB-MITA LUA.

Alternative 2 includes 53 new road segments totaling approximately 3.3 miles of temporary road construction. Additionally, 263 existing road segments totaling approximately 58 miles of road renovation would occur. Approximately 39 acres of yarding wedges would be constructed on approximately 23 acres of HLB, one acre on LSR, and 16 acres on private land. Approximately seven acres of subsoiling would occur in ground-based harvest areas. Subsoiling would occur to reduce and re-direct water, minimizing the likelihood of erosion and slope failures.

The BLM would replace a stream crossing, previously removed approximately 20 years ago, that is located on BLM Road 23-6-34.2 where it crosses Yellow Creek (Appendix A, Map 41). A large (14–18-foot span) permanent culvert or prefabricated bridge would be installed. The BLM would design and construct the culvert or bridge according to the fish passage requirements in the NMFS Programmatic Forest Management Biological Opinion (WCR-2017-7574). The associated approaches would be re-aligned to provide safe access. Approximately one mile of road beyond the crossing would be rocked.

Installing a culvert would involve placing a permanent culvert in the stream channel, backfilling around the pipe, and constructing a road over the top of it.

A bridge would involve installing a prefabricated bridge over the channel. This would require re-alignment of the existing road to remove the horizontal curve that is currently centered over the creek. Abutments would be constructed on either side of the channel and the bridge would be placed on top. The bridge would be designed with a sufficient span and height above the creek to accommodate a 100-year flood. The stream channel beneath the bridge would not be altered. Therefore, existing passage conditions for aquatic organisms would be maintained.

Table L-2 provides a summary of proposed harvest treatments, acres of treatment by LUA, and the associated harvest method. Proposed activities are also illustrated in Appendix A. Appendix E includes detailed road-by-road information.

2.5 Alternative 3

Alternative 3 would include VRH of 2,625 acres in the HLB-LITA and HLB-MITA LUAs.

Alternative 3 includes 125 new road segments totaling approximately 16.3 miles of permanent road construction. Additionally, 344 existing road segments totaling approximately 86 miles of road renovation would occur. Yarding wedges consisting of approximately 74 acres would be constructed on approximately 52 acres of HLB, one acre of LSR, and 21 acres on private land. Approximately nine acres of subsoiling would occur in ground-based harvest areas.

The BLM would replace a stream crossing located on BLM Road 24-6-34.2 where it crosses Yellow Creek (Appendix A, Map 41). The description of the crossing is the same as described in Alternative 2.

Table L-3 provides a summary of proposed harvest treatments, acres of treatment by LUA and the associated harvest method. Proposed activities are also illustrated in Appendix A. Appendix E includes detailed road-by-road information.

2.6 Alternative 4

Alternative 4 would include VRH of 1,409 acres and commercial thinning of 161 acres in the HLB-LITA and HLB-MITA LUAs.

External and internal scoping identified a desire to develop an alternative that in comparison to the highest ASQ alternative (Alternative 3) would have reduced road construction and effects to northern spotted owl and marbled murrelet habitat through thinning and/or unit deferral.

Alternative 4 would not include harvest units that are within occupied NSO home ranges that the BLM determined were occupied at the time of this assessment. Alternative 4 also deferred for treatment units meeting minimum diameter and timber volume harvest criteria but continuing to display volume accretion with relative densities below 55. A relative density of 55 is the criterion commonly considered optimum for harvest timing for lands managed for a timber production emphasis goal [HLB-LITA, HLB-MITA] (BLM, 2016b, p. 1192)

Alternative 4 includes 72 new road segments totaling approximately 9.8 miles of permanent road construction. Additionally, 270 existing road segments totaling approximately 64 miles of road renovation would occur. Yarding wedges consisting of approximately 44 acres would be constructed on approximately 24 acres in HLB and 20 acres on private land. Approximately three acres of subsoiling would occur in ground-based harvest areas.

The BLM would not replace the stream crossing located on BLM Road 24-6-34.2 where it crosses Yellow Creek because the units proposed on the other side of the creek have been deferred.

Table L-4 provides a summary of proposed harvest treatments, acres of treatment by LUA, and the associated harvest method. Proposed harvest is also illustrated in Appendix A. Appendix E includes detailed road-by-road information.

2.7 Alternative 5

Alternative 5 would include commercial thinning of 2,625 acres in the HLB-LITA and HLB-MITA LUAs.

Alternative 5 includes 125 new road segments totaling approximately 16.3 miles of permanent road construction. Additionally, 344 existing road segments totaling approximately 86 miles of road renovation would occur. Yarding wedges consisting of approximately 74 acres would be constructed on approximately 52 acres of HLB, one acre of LSR, and 21 acres on private land. Approximately nine acres of subsoiling would occur in ground-based harvest areas.

The BLM would replace a stream crossing located on BLM Road 24-6-34.2 where it crosses Yellow Creek (Appendix A, Map 41). The description of the crossing is the same as described in Alternative 2.

Table L-5 provides a summary of proposed harvest treatments, acres of treatment by LUA and the associated harvest method. Proposed activities are also illustrated in Appendix A. Appendix E includes detailed road-by-road information.

2.8 Alternative 6

Alternative 6 would include commercial thinning 1,667 acres in stands that range in age between 40-140 years and VRH 738 acres in stands that range in age between 40-90 years in the HLB-LITA and HLB-MITA LUAs.

Alternative 6 includes approximately 116 new road segments totaling 14.6 miles of permanent road construction. Additionally, 336 existing road segments totaling approximately 74 miles of road renovation would occur. Yarding wedges consisting of approximately 74 acres would be constructed on approximately 52 acres of HLB, one acre of LSR, and 21 acres on private land. Approximately nine acres of subsoiling would occur in ground-based harvest areas.

The BLM would replace a stream crossing located on BLM Road 24-6-34.2 where it crosses Yellow Creek (Appendix A, Map 41). The description of the crossing is the same as described in Alternative 2.

Table L-6 provides a summary of proposed harvest treatments, acres of treatment by LUA and the associated harvest method. Proposed activities are also illustrated in Appendix A. Appendix E includes detailed road-by-road information.

2.9 Alternatives Considered but Eliminated from Detailed Analysis

2.9.1 Design an alternative that includes no new road construction.

The BLM received comments during public scoping and internal IDT discussion requesting consideration of an alternative that achieves the proposed timber harvest without the construction of new roads to reduce costs and reduce impacts to the environment. Comments suggested that timber harvest units that cannot be accessed from the existing road system be deferred.

This alternative was eliminated from detailed analysis because Alternative 2 (temporary road construction only) is substantially similar to the objectives of a no road construction alternative with respect to reducing costs and impacts to the environment. Harvest units requiring more extensive road construction (generally greater than 0.10 miles) were deferred from Alternative 2. Road construction proposed under Alternative 2 only consists of multiple temporary operator spurs totaling approximately 3.3 miles of which approximately 1.75 miles are within planned harvest unit boundaries where the effects of tree removal and soil disturbance from yarding would result regardless.

The BLM determined that the objectives of a no new road construction alternative is substantially similar or less effective in reducing impacts to the environment as Alternative 2 and for this reason, this alternative was considered but not analyzed in detail.

2.9.2 Design an alternative that uses helicopter yarding as an alternative to road construction.

The BLM determined that due to existing topography and an extensive existing road network, a helicopter yarding only alternative was greater in effects compared to existing action alternatives with respect to infrastructure development needs outside of planned harvest units. Helicopter landings require a clear flight path into and out of a given landing and can range in size from 1-2 acres for each log landing, and up to 5 acres for service landings.

Under the Action Alternatives, most of the road construction occurs within the harvest unit. For example, Alternative 3 has the highest amount of road construction, 16.3 miles, and 13.4 miles are located within harvest units. Even under a helicopter yarding alternative, road construction within existing harvest units would still be necessary to provide feasible yarding distances of 0.5 miles or less. Additional road construction and/or expansion of existing landing areas to create log landings and service landings needed for helicopter yarding would result in a greater impact than the 1.8 miles of roads outside the harvest units (approximately 9 acres of additional clearing and development for log and service landings).

The BLM determined that a helicopter yarding only alternative was overall less effective in reducing impacts to the environment than the existing action alternatives and for this reason, this alternative was considered but not analyzed in detail.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

Chapter 3 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. The BLM has combined the affected environment and the environmental consequences into this single chapter to provide all the relevant information on an issue in a single discussion. The general format of this chapter is organized by the issue statements that were identified by the IDT through internal and external scoping.

For each issue statement, the BLM describes the area environment to be affected by the alternatives, including the reasonably foreseeable environmental trends and planned actions in the area and the methodologies and assumptions of the analysis. The BLM answers the questions captured in the issue statements by describing the environmental consequences of the alternatives analyzed in detail, including the No Action Alternative.

This chapter presents the scientific and analytical basis for comparison of alternatives presented in the previous chapter and summarizes the affected environments of the project area and the potential changes to those environments due to implementation of the proposed alternatives. The IDT developed resource specific analysis reports for this project, which are incorporated by reference in this EA. These analyses consider the effects of the alternatives as they relate to the ROD/RMP, the PRMP/FEIS, laws, regulations, and policies where applicable. The analysis reports and supporting information are on file at the Roseburg District Office, 777 NW Garden Valley Blvd., Roseburg, OR 97471, and are available upon request.

3.2 Introduction to Cumulative Effects

The cumulative effects of the overall BLM forest management program on the Roseburg District were described and analyzed in the PRMP/FEIS (BLM, 2016b, pp. 12, 25, 199-122). A discussion of the cumulative effects analyses, including incorporation by reference to the PRMP/FEIS, is in the environmental effects section of each issue analyzed. The PRMP/FEIS also considered the cumulative effects of non-BLM management actions. The BLM assumes that private industrial timber lands are utilized primarily for timber production. Harvest location and scheduling on privately managed industrial forest lands is proprietary information; therefore, throughout this analysis the BLM assumed late-seral forest stands on private land have been converted to early-or mid-seral conditions. The BLM assumed large industrial owners would continue to manage their lands primarily for timber production on a rotation of 40 to 65 years based on previously observed trends. It is assumed that industrial forest managers would follow the Oregon Forest Practices Act and other such requirements (BLM, 2016b, pp. 168, 340).

The BLM's determination and description of current conditions in the project area inherently includes the cumulative effects of past and current land management activities undertaken by the BLM. However, ongoing and future foreseeable actions or projects are specifically named in the cumulative effects analysis for each issue. Ongoing and reasonably foreseeable BLM actions in the Upper Umpqua River watershed include silvicultural maintenance of young stands including pre-commercial thinning, dispersed recreation, special forest products gathering, road maintenance, fire suppression, aquatic restoration projects, and weed control. Future reasonably foreseeable timber sale projects that would occur on the Roseburg District in the next five years include the 42 Divide Stand Management Plan, Little River Timber Management Project and Eagle Claw Harvest Plan. These proposed timber sale projects are located in different watersheds and proposed actions are still being evaluated. As mentioned above cumulative actions would be identified by each resource below or in Appendix C.

3.3 Issue 1. How would the proposed timber harvest contribute to the achievement of the Allowable Sale Quantity for the Roseburg Sustainable Yield Unit?

The purpose of the timber harvest actions proposed in this EA is to offer timber for sale in the HLB LUA to contribute to the attainment of the declared ASQ for the Roseburg SYU. To understand how each of the alternatives would or would not contribute to meeting this purpose, the BLM calculated estimates of existing ASQ volumes by alternative. The BLM based volume estimates on data obtained from a variety of sources, as described below in the methodology and assumptions, using the same modeling assumptions and data used in the (BLM, 2016b, pp. 1183-1208, 1215-1217), as well as on stand exam data collected for the project.

The analysis of Issue 1 answers how well each of the alternatives meets the purpose and need for conducting commercial timber harvest within the selected stands in the HLB to produce timber to contribute to the attainment of the declared ASQ for the Roseburg SYU beginning with fiscal years 2024 (see section 1.4 Purpose and Need).

3.3.1 Methodology and Assumptions

Indicators measured include the estimated volume this project is expected to produce, by alternative and foreseeable future actions which would contribute to each of those in the timeframe of this project (approximately 2024-2027).

The BLM's analyses incorporated area reconnaissance, stand exams (stratified by Forest Operations Inventory (FOI) unit), aerial photos, BLM Micro*Storms (a corporate forest activity tracking database), LiDAR data products, and historical information held in timber atlases as data sources, supplemented by the analyses, direction, and conclusions found in the 2016 ROD/RMP.

Stands may contain one or more FOI units, as mapped in the District's database. Micro*Storms stand ages were validated with past harvest histories in the District's timber atlases and site-specific stand inventories. The BLM determined condition of individual stands and stand volume from stand-specific inventory data (stand exams) collected between 2006 and 2020 combined with Forest Vegetation Simulator [FVS] (Smith-Mateja, 2015) simulations to update the data to current year where necessary. The BLM based stand volumes on weighted average volumes of FOI units and the number of proposed treatment acres.

In preparing this analysis, the BLM made the following analytical assumptions to provide the framework to the analysis of the issues:

- The measurement unit used for this analysis is volume of timber in either thousand board feet (Mbf) or MMbf that is harvested from the HLB.
- All stands in the project area proposed for commercial thinning or VRH would remain available for sustained-yield timber harvest consistent with management direction for the HLB (BLM, 2016a, pp. 59-63).
- All HLB stands within the project area would follow RMP direction for retention in VRH units in the HLB LITA and MITA LUAs (BLM, 2016a, pp. 62-63).
- All HLB stands where commercial thinning is the selected method of treatment within the project area would follow RMP direction for maintaining stand densities to promote vigor and health of the stand (BLM, 2016a, p. 60).
- BLM assumes stand examination data and Forest Vegetation Simulator modelling outputs are accurate to analyze the effects of this issue based on the use of these programs in previous timber projects.
- Stand volume was calculated from BLM stand exams, as calculated by FOI unit, and multiplied by the number of acres proposed to be harvested in each alternative.
- Stands would return to harvestable conditions (BLM, 2016b, p. 1192) approximately 25-40 years after commercial thinning and 60-80 years after VRH.
- The BLM would plan to offer timber analyzed in this EA beginning in 2024.
- Annual ASQ for the Roseburg SYU will remain at 32 MMbf (with an annual variation factor of 40 percent and decadal variation of 30 percent) each year during the timeframe the actions proposed in this EA would be implemented.

The BLM analyzed stand level and aggregate impacts by examining site-specific data, reviewing scientific literature, and the outputs from computer simulations. The BLM determined existing stand metrics and post-harvest conditions through use of the BLM EcoSurvey program, FVS-ORGANON Southwest (OC) variant (Smith-Mateja, 2015), and Microsoft Excel. All stands were grown to common year 2021 to reference current conditions.

In addition to volume estimates, FVS derived stand attributes were used to evaluate differences between alternatives for other issues. Stand structural types and forest structural stage class criteria used for the effects analysis are described in detail in the PRMP/FEIS (BLM, 2016b, pp. 1184, 1203-1206).

Spatial Scale

The analysis area is the HLB LUA acres proposed for silvicultural treatment in the Blue and Gold Harvest Plan project area, which is all lands where treatment would contribute to the Roseburg SYU ASQ. Estimated harvest volume was analyzed at the spatial scale of the individual forest stand considered for treatment and summarized for comparison of alternatives. (BLM, 2016a, p. 314.). The ASQ for the Roseburg SYU is calculated at the Roseburg District boundary (BLM, 2016a, p. 5).

Temporal Scale

The temporal scale is approximately 2024 to 2032. This is based on the potential range of harvest volumes from the Blue and Gold project and other near-term foreseeable actions, i.e., the 42 Divide, Little River, and Eagle Claw harvest projects. For each of these projects the range of possibilities is based on bookend alternatives of "thinning only" or "regeneration harvest only" using the benchmark of the declared ASQ of 32 million board feet per year to determine number of potential years.

3.3.2 Affected Environment

The Blue and Gold Harvest Plan project area includes approximately 2,625 acres of HLB LUA forest land which the BLM proposes for silvicultural treatments identified in Chapter 2 of this EA. The proposed project area is located in the Tsuga heterophylla (western hemlock) vegetation zone (Franklin & Dyrness, 1973). The stands being proposed for treatments range in age from 40 to 140 years located in the watersheds identified in Table 1-2 of this EA. Appendix I provides information on the current forest stand attributes.

Stand structure varies throughout the analysis area due to differences in management and disturbance history as well as site characteristics. Past treatments include timber harvest, tree planting, fertilization, herbicide, and pre-commercial thinning. Mature stands in the area exhibit a single, dominant cohort of Douglas-fir, suggesting a stand-replacement disturbance around the turn of the 20th century.

Douglas-fir (*Pseudotsuga menziesii*) is the predominant overstory tree species comprising on average approximately 87 percent by basal area of the stands proposed for treatment (BLM, 2016b, pp. 316-318).

Most stands are well-stocked or over-stocked based on calculated relative density[8]. Average relative density index is currently 66 percent, ranging from 40-95 percent. The PRMP/FEIS, p.1077 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." A large body of research shows that high stand densities are associated with reduced tree vigor and increases in tree mortality (Bennett, et al., 2023).The onset of inter-tree competition occurs at about 25 percent of maximum, 35 percent is the lower limit of full site occupancy, and 55-60 percent is associated with the lower limit of self-thinning, the zone where mortality from inter-tree competition and timber volume losses begins (Long & Daniel, 1990). The level of individual tree vigor, and by extension stand level vigor, is influenced by the relative competitive status among trees. Relative density measures probably

[8] Relative density is a competition index derived from *Stand Density Index* which is widely used by foresters as a measure of inter-tree competition for water, light and nutrients, or how "crowded" a forest stand is (North et al. 2022).

best describe the level of inter-tree competition experienced by individual trees within a stand because they consider both tree size and number of trees per unit area (Trappeiner, et al., 2007, p. 182). High relative densities combined with drought have been found to be stressors predisposing stands to insect infestation (Fettig, et al., 2007) (Bottero, et al., 2017) (Stephens, et al., 2018).

3.3.3 Environmental Consequences

The HLB stands in the Blue and Gold Harvest Plan project area have reached a condition that makes them suitable for commercial timber harvest (Table L-7). Every individual timber sale planned within the HLB LUA, including this proposed project, serves an integral function in contributing toward meeting the ASQ declared in the ROD/RMP. The BLM expects proposed commercial harvest within this project area to contribute to the annual declared ASQ beginning in fiscal year 2024 (Figure 3-1).

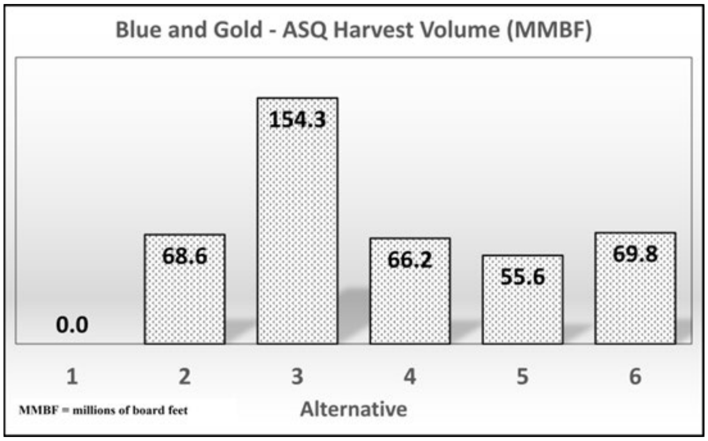

Figure 3-1. Comparison by alternative of expected harvest volume

Alternative 1 – No Action

Under the No Action alternative, HLB stands within the project area would not be treated commercially or non-commercially at this time. This alternative would not produce any ASQ volume for the Roseburg SYU; therefore, it would not meet the purpose and need for the project. The underlying land use allocations would not change, and the lands would remain available for future timber harvest. The BLM would not harvest approximately 58 to 158 MMbf proposed in the action alternatives. In the absence of harvest or natural disturbance, stands would continue growth and net accretion of potential future ASQ volume. Due to the three-year lead time required to plan and analyze a new commercial timber harvest project to meet the ASQ declaration and the full workloads for BLM staff assigned to outyear projects, the BLM would not meet the ASQ targets for the Roseburg SYU for fiscal year 2024.

Alternative 2

Alternative 2 proposes VRH of approximately 1,094 acres and commercial thinning of approximately 42 acres in the HLB-LITA and HLB-MITA LUAs. Alternative 2 would be expected to contribute approximately 68.6 MMbf toward the Roseburg SYU's ASQ.

Alternative 2 would contribute 2.1 years' worth of declared ASQ (32 MMbf), or between 1.5- and 3.6-years' worth of ASQ within the limits of the variance allowed from the declared ASQ (plus or minus 40 percent of 32 MMbf).

Alternative 3

Alternative 3 proposes VRH of approximately 2,625 acres in the HLB-LITA and HLB-MITA LUAs. Alternative 3 would be expected to contribute approximately 154.3 MMbf toward the Roseburg SYU's ASQ.

Alternative 3 would contribute 4.8 years' worth of declared ASQ (32 MMbf), or between 3.4- and 8.0-years' worth of ASQ within the limits of the variance allowed from the declared ASQ (plus or minus 40 percent of 32 MMbf).

Alternative 4

Alternative 4 proposes VRH of approximately 1,409 acres and commercial thinning of approximately 161 acres in the HLB-LITA and HLB-MITA LUAs. Alternative 4 would be expected to contribute approximately 66.2 MMbf toward the Roseburg SYU's ASQ.

Alternative 4 would contribute 2.1 years' worth of declared ASQ (32 MMbf), or between 1.5- and 3.5-years' worth of ASQ within the limits of the variance allowed from the declared ASQ (plus or minus 40 percent of 32 MMbf).

Alternative 5

Alternative 5 proposes commercial thinning of 2,625 acres in the HLB-LITA and HLB-MITA LUAs. Alternative 5 would be expected to contribute 55.6 MMbf toward the Roseburg SYU's ASQ.

Alternative 5 would contribute 1.7 years' worth of declared ASQ (32 MMbf), or between 1.2- and 2.9-years' worth of ASQ within the limits of the variance allowed from the declared ASQ (plus or minus 40 percent of 32 MMbf).

Alternative 6

Alternative 6 proposes VRH of approximately 738 acres and commercial thinning of approximately 1,667 and in the HLB-LITA and HLB-MITA LUAs. Alternative 6 would be expected to contribute 69.8 MMbf toward the Roseburg SYU's ASQ.

Alternative 6 would contribute 2.2 years' worth of declared ASQ (32 MMbf), or between 1.6- and 3.6-years' worth of ASQ within the limits of the variance allowed from the declared ASQ (plus or minus 40 percent of 32 MMbf).

Cumulative Effects

At the SYU scale, timber harvest from the proposed 42 Divide Harvest Plan, Little River Forest Management Plan and Eagle Claw Harvest Plan would also contribute to the Roseburg SYU's ASQ over the next four to ten years. The proposed 42 Divide Harvest Plan has been publicly scoped and includes proposed treatments in the HLB that are being analyzed for contribution toward the BLM Roseburg SYU's ASQ from 2025 to 2028. The Eagle Claw Harvest Plan and Little River Forest Management Plan are in the pre-planning stages (no project initiation or public scoping has occurred) and are subject to substantial changes but would be expected to contribute to the District's ASQ production beginning as early as 2025. The BLM expects the Blue and Gold project to contribute between 58.7 to 157.5 MMbf to the Roseburg SYU ASQ target over four to ten-years.

3.4 Issue 2. How would proposed actions affect the northern spotted owl (*Strix occidentalis caurina*) and their habitats?

The Blue and Gold Harvest Plan project area is located within the range of the northern spotted owl (NSO) which is listed as threatened under the Endangered Species Act. This section analyzes the potential effects from the proposed silvicultural treatments and associated forest management activities on NSO and their habitat.

3.4.1 Methodology and Assumptions

The BLM wildlife biologists conducted analysis for Issue 2 using GIS data from the Roseburg District habitat database (2019, 2020), BLM Northern Spotted Owl database (2023), aerial photography (2018), and LiDAR (2009, 2012, and 2015). In addition to the datasets listed, field visits to the proposed action areas were conducted by BLM biologists to determine the habitat status of the forest stands.

The analysis indicators for Issue 2 include:

- Acres of NSO nesting, roosting, and foraging (NRF) habitat and dispersal-only habitat modified, downgraded, or removed. Definitions of these terms (modified, downgraded, removed) associated with changes to nesting habitat used by the northern spotted owl are provided in Table L-10 in Appendix L.
- Number of territories (i.e., carrying capacity) supported by the amount and distribution of suitable and unsuitable NSO habitats across all ownerships (BLM adapted model based on Glen et al. 2017).
- Acres of NSO designated critical habitat modified, downgraded, or removed.
- Acres of NRF and dispersal-only habitat in occupied and unoccupied NSO sites (nest patches or activity centers, core-use areas, home ranges).

For all Action Alternatives, this analysis assumes the following:

- The BLM would 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 has begun (BLM, 2016a, p. 30) .
- The BLM would follow the Situational Management Strategy as described in Appendix B of this document and would implement other applicable PDFs listed in Appendix B to avoid incidental take of northern spotted owls.
- The BLM anticipates NSO nest sites and activity centers to shift locations from year to year within the Analysis Area.
- All VRH harvest units are located within the HLB and are expected to be harvested again within 60 - 80 years and are not expected to develop into NRF habitat (BLM, 2018a, p. 112). VRH treatments would remove NRF and dispersal-only habitat and result in capable habitat for an estimated period of approximately 40 years at which point BLM expects these stands to function as dispersal habitat. At approximately 80 years BLM expects these stands to also function as foraging habitat.
- Commercial thinning of NRF habitat in the HLB LUAs would retain a minimum post-harvest canopy cover of 60 percent and would modify but retain NRF habitat function.
- Commercial thinning of dispersal-only habitat in the HLB LUAs would retain a minimum post-harvest canopy cover of 40 percent and would be modified but continue to function as dispersal-only habitat.
- The Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls (as revised on January 9, 2012) is the established methodology to identify spotted owl presence and/or occupancy because the protocol accounts for the presence of the barred owl, identifies the most effective nighttime and daytime survey strategy, identifies the most effective survey methods, reviews the importance of high quality equipment, and presents the effective life span of the survey results.
- Private industrial forest lands within and adjacent to the project area have different management objectives, and generally, those lands provide minimal to no habitat for NSO. The BLM assumes this situation would continue for the life of this project.
- Road activities (construction, renovation, etc.) and yarding wedges are analyzed where activities are located outside the proposed timber harvest unit boundaries. Any road activity or yarding action within the units are included in the unit analysis because the harvest action would remove trees within the proposed road activity areas and meet the road objectives. Road construction and road renovation were analyzed using a maximum clearing width of 45 feet (22.5 feet from center) and 80 feet (40 feet from center) respectively.

Temporal Scale

The effects from the proposed actions on forest stands used by the northern spotted owl would last from 40-80 years depending on the treatment.

Spatial Scale

The 130,359-acre analysis area was delineated for Issue 2 using twenty-seven 14th-field drainages (Oregon Watershed Boundary Dataset 2017) Appendix A, Map 37). This analysis area is appropriate because it is large enough to encompass the proposed actions and the NSO home ranges that may be affected by the proposed actions (Table L-8 and Appendix A). Changes in the haul route added approximately 13 miles of road that extends outside the original NSO Analysis Area. Although the added route crosses additional watersheds and NSO territories, the road maintenance activities would not impact the NRF or dispersal only habitat within these NSO home ranges or within the Critical Habitat Unit (CHU) that overlaps the route. Therefore, the territories are included in the analysis, for disturbance considerations, but the habitat acres within the involved watersheds are not included in Table L-8 and Table L-9.

Northern spotted owl sites are defined as a location with continued use by northern spotted owls (OR/WA BLM Northern Spotted Owl GIS Editing User Guide, March 2024, p. 6). Each site is assigned a unique identifier known as a master site number (MSNO). The analysis in this EA is based on the last known location of occupancy by a pair or resident single NSO associated with each MSNO. For this analysis the occupied location (most recent activity center) was selected to represent the nest patch, core-use area, and home range centers. The occupied NSO location during each year was determined using the most recent survey data.

The BLM assessed habitat conditions by evaluating available NRF and dispersal-only habitat at the three analytical scales that surround the known NSO activity centers: the nest patch, core-use area, and home range. A description of the three analytical scales is described in Appendix L.

3.4.2 Affected Environment

Based on studies of owl habitat selection, including habitat structure and use, and prey preference throughout the range of the owl, NSO habitat consists of these components: nesting, roosting, foraging, and dispersal (Thomas, et al., 1990).

Nesting, roosting, and foraging habitat is dominated by large overstory trees greater than 30 inches in DBH; canopy cover greater than 60 percent; substantial decadence in the form of large, live conifer trees with deformities; ground cover characterized by large accumulations of logs and other woody debris, and a canopy that is open enough to allow northern spotted owls to fly within and beneath it (BLM, 2016b, p. 64).

For this analysis, dispersal-only habitat consists of conifer-dominated forest stands at approximately 40 to 79 years old. Thomas et al. (1990) defines dispersal-only habitat as conifer-dominated forest stands with canopy cover of 40 percent or greater and an average diameter at breast height of 11 inches or greater. Dispersal-only habitat is essential for the movement of juvenile and non-territorial (e.g., single birds) NSO to fill territorial vacancies and provide adequate gene flow across the range of the species (FWS, 2008a). Dispersal-only habitat may contain snags, coarse down wood, and prey sources (FWS, 2008a).

Acres of Nesting, Roosting, and Foraging and Dispersal-only Habitats

Nesting, roosting, and foraging habitat is present in 56 percent (17,899 acres) of the BLM-administrated lands in the analysis area while dispersal-only habitat is found in 32 percent (10,199 acres). The distribution of NRF and dispersal-only habitat by land use allocation within the analysis area is displayed in Table L-9.

Carrying Capacity of Northern Spotted Owls in the Analysis Area

The BLM calculated (using 2024 binary raster data) northern spotted owl carrying capacity using the methodology described in Glenn et al., 2017. The estimator described in Glen et al., 2017 is based on remote-sensed (satellite) data and uses biological and physical features. The amount and distribution of suitable and unsuitable northern spotted owl habitat, and the maximum number of owl sites that could be within the analysis area is:

- 29,511.68 acres of habitat
- 100,966.22 acres of non-habitat
- Modeled median carrying capacity of 51.5 NSO Territories

The modeled occupancy rates in this portion of the Oregon Coast Range (Tyee) is =0.17. This rate multiplied by the modeled carrying capacity (51.5 territories) gives an estimated 8.75 territories in the analysis area. However, the actual number of known occupied territories (based on call-back survey data) as of 2023 is two territories.

Acres of Northern Spotted Owl Designated Critical Habitat

The conservation role of NSO critical habitat is to "adequately support the life-history needs of the species to the extent that well-distributed and inter-connected spotted owl nesting populations are likely to persist within properly functioning ecosystems at the critical habitat unit and range-wide scales" (FWS, 2012b, p. 71938). In November 2021, the USFWS revised the designation of critical habitat for the NSO by withdrawing the January 15, 2021, final rule (USDI FWS 2021a). The revised designation reduced the amount of NSO critical habitat by approximately 204,294 acres in Oregon, mostly on the Harvest Land Base as designated in the ROD/RMP. and other inclusions (Federal Reserves) that remain within HLB.

Portions of two critical habitat subunits (OCR3 and OCR5) overlap the general footprint of the Blue and Gold project. However, proposed actions that modify or remove NSO critical habitat are not proposed in OCR3 so this analysis only assess the impacts to the OCR5 subunit.

Overall, the amount of sub-unit OCR5 in the Analysis Area is 19,634 acres. Of these acres, 13,721 acres are NRF habitat, dispersal-only are 4,321 acres, capable is 1,218 acres, non-capable is 310 acres, and 64 acres are unknown status.

Acres of NRF and dispersal-only habitat in occupied and unoccupied NSO sites (nest patches or activity centers, core-use areas, home ranges)

The BLM determined occupancy using the USFWS Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls (FWS, 2012a). Results for the 2019-2023 surveys are in displayed in Table L-11 Appendix L.

All NRF habitat on BLM-administered lands within 1.5 miles of the proposed units are currently being surveyed and are planned to receive two consecutive years of protocol surveys by the end of the 2024 breeding season. In subsequent years, full protocol surveys are planned throughout the analysis area and through the first year of each timber sale contract, followed by spot check surveys as described in the survey protocol within 0.25 mile of proposed units during the final two years of harvest operations (FWS, 2012a).

Table L-11 shows the current quantity of NRF and dispersal-only habitat within the home range, core-use area, and nest patch of the 39 NSO sites in the Analysis Area. Two of these NSO sites (MSNO 0392 and 3267) are currently occupied and both are considered habitat-limited (Table L-12). Seven of these sites (MSNOs 0266, 0267, 1160, 1816, 1988, 2049, and 2201) are presumed occupied but survey status is unknown () in 2023 until surveys (as outlined above) updates the status completion of two-year protocol surveys.

The analysis area overlaps the Tyee Demography Study Area (DSA), which has had NSO surveys conducted annually since the early 1990s. All 39 known northern spotted owl sites are within or overlap the Tyee DSA. The BLM has continued with survey efforts in the Tyee DSA.

In 2022 and 2023 up to 20 autonomous recording units (ARU) were deployed in the Blue and Gold project area to supplement ongoing call back surveys. Detections of NSO from the 2022 and 2023 ARU results were considered in the 2023 NSO occupancy status determination. Autonomous recording units did not record any vocalizations indicative of northern spotted owl occupancy, but detections did result in 3 sites (MSNO 1987; 0391; and 1972) being classified as incidental. This selective use of ARUs did not follow the ARU protocol (FWS, 2021) given its supplementary nature.

3.4.3 Environmental Consequences

In the PRMP/FEIS, the BLM modeled for VRH and commercial thinning in the HLB LITA and MITA LUAs (BLM, 2016b, pp. Table V2 and V3, pp. 1825-1826). The action alternatives proposed in the Blue and Gold project would apply various amounts of commercial thinning or VRH only in the HLB LITA and MITA LUAs. By the allocation of lands to the HLB in the ROD/RMP, the BLM made all lands in this LUA available for timber harvest and planned that all HLB lands over time would be harvested, consistent with the management direction (BLM, 2016a, p. 104).

The PRMP/FEIS harvest model also shows a decadal estimate of acres of stand types associated with NRF; for Roseburg District this analytical assumption was 5,304 acres of HLB NRF in the first decade (2013-2022) and 3,321 acres in the second decade (2023-2032). A review of the MS Harvest Poly (GIS feature class, April 2023) and 2023 NSO habitat (GIS feature class) data shows approximately 1,856 acres of NRF has been harvested on District from 2016 to 2023, well below the assumed acres in the PRMP/FEIS.

The BLM, in the PRMP/FEIS, analyzed the effect of allocating the Planning Area to the HLB, with its modeled rate and intensity of harvest, on NSO NRF and dispersal habitat (BLM, 2016b, pp. 346-347, 928-947). The BLM, in the PRMP/FEIS, analyzed the effect of this type of harvest (in the planning area) on NSO habitat together with the effects of other ROD/RMP decisions and concluded that implementation of the ROD/RMP 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 (BLM, 2016b, pp. 932-941). Those analyses are incorporated here by reference.

The USFWS confirmed in their Biological Opinion on the ROD/RMP 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 RMP (FWS, 2016, p. 603).

As described earlier in the EA, the Blue and Gold project is within the PRMP/FEIS analysis area and only implements activities analyzed in the PRMP/FEIS. With the incorporation of PDFs to align the project with the ROD/RMP's required management direction, this project is consistent with the NSO effects analysis of the PRMP/FEIS (BLM, 2016b, pp.932-941).

Additionally, the Biological Opinion (FWS 2015, p. 691) issued by the USFWS for the PRMP/FEIS concluded that although the loss of physical and biological features (PBFs) within NSO critical habitat in the HLB is an adverse effect and cannot be discounted, the protection, in-growth and development of the PBFs within NSO critical habitat in the reserve LUAs is expected to improve function of all CHUs within the action area and has additional advantage of improving critical habitat conditions in areas where we expect to conduct barred owl management" (FWS 2016, p. 691).

The proposed actions in this EA are consistent with the Recovery Plan for the NSO (FWS, 2011a) because timber harvest in HLB LUA was considered by the USFWS and the BLM in context of the objectives of the 2011 Recovery Plan for the NSO in the PRMP/FEIS. The FWS Biological Opinion for the PRMP/FEIS (FWS, 2016, pp. 4-5) acknowledged that the BLM incorporated the recovery strategy into the ROD/RMP. The PRMP/FEIS described the effect of harvest on designated critical habitat for NSO and concluded that the PRMP would meet the recovery goals and long-term ecosystem restoration and conservation needs for NSO (BLM, 2016b, pp. 931-998).

Although the analysis area identified the maximum number of NSO home ranges (39) affected by the proposed actions, the BLM's analysis also shows that different alternatives would affect different numbers of home ranges, core-use areas, and nest patches.

Alternative 1 – No Action

Under the No Action Alternative, NRF and dispersal-only habitat would not be modified, downgraded, or removed, none of the 39 NSO sites within the analysis area would be affected, carrying capacity would remain same as current condition, and effects to designated critical habitat would not happen. However, the ROD/RMP designated these acres as HLB and directs the Roseburg District to harvest sufficient quantities of timber over the next decade to meet the ASQ declaration in the ROD/RMP. The ROD/RMP states that all HLB acres would be harvested at some point during the life of the PRMP/FEIS (BLM, 2016a, pp. 104-105). Consequently, it is unlikely that all of these NRF and dispersal-only habitat acres would remain unharvested for the next decade even under Alternative 1. Foregoing harvest of the acres proposed for harvest in the Action Alternatives would cause the BLM to plan timber harvest elsewhere in the HLB LUA to meet ASQ requirements in the RMP/ROD.

Alternative 2

Acres of northern spotted owl NRF and dispersal habitat modified, downgraded, or removed.

In total, the combination of harvest units, road, and yarding activities would remove 788 acres of NRF habitat and 444 acres of dispersal-only habitat in the analysis area. A summary of NRF, dispersal-only, and capable habitat acres affected by all actions is displayed in Appendix L, Table L-13.

Harvest Actions

Variable-retention regeneration harvest would remove approximately 703 acres of NRF habitat from the total 17,899 NRF habitat acres and approximately 349 acres of dispersal-only habitat from the total 10,199 acres of dispersal habitat within the analysis area.

Nesting, roosting and foraging stands treated with VRH prescription would no longer function as NRF habitat but rather function as capable habitat because important elements like complex multistory canopies would be simplified to individual tree, and snag retention and aggregate tree retention areas. The retention areas and the RR would retain important habitat components (e.g., snags, down wood, hardwoods, and legacy conifer trees) that would provide corridors for NSOs to travel through the post-harvest units(s) and into adjacent NRF and dispersal-only habitat while avoiding large open areas. However, theses retention areas would not provide nesting opportunities to the northern spotted owl.

Dispersal-only habitat treated with VRH prescription would become capable habitat with the potential to grow again and begin to develop characteristics (trees large enough to provide a minimum of 40 percent canopy cover) similar to the existing conditions in about 40 years. Like in other VRH treatments, the units would retain portions of the forest stands in the form of aggregates and RR interspersed with concentrated harvest and dispersed retention of individual trees (BLM, 2016a, pp. 62-63).

Although thinning treatments in NRF would reduce relative density to 35 to 45 percent at the treatment unit level (including skips and gaps), the stand-average canopy closure would be maintained at desired level of 60 percent as a result of retention being focused on dominant and codominant trees having generally higher live crown conditions (30 percent or more) in addition to consideration of the canopy cover of other LUA inclusions within the stand such as RR (BLM, 2018a, p. 58). At the stand level, commercial thinning would maintain canopy closure at or above 60 percent in the NRF habitat resulting in a modification of NRF but would continue to function as NRF habitat for the NSO.

Initially, NSOs are not expected to avoid thinned NRF stands (because of 60 percent canopy) but would avoid thinned dispersal-only stands post-harvest to a greater extent. However, the development of understory vegetation (shrubs, etc.) in the subsequent years following harvest would increase small mammal presence and prey availability and as a result NSO use of thinned stands would increase through time. Thinning in young and mid-seral forest stands has been documented to maintain or increase many populations of small mammals, many of which are nocturnal and comprise part of NSOs prey base (Irwin, et al., 2015).

Because of the large amount of NRF habitat (17,196 acres) remaining-post harvest in the analysis area (Table 3-4), the retention in the HLB units, and untreated RR, there would be sufficient habitat remaining across the landscape to provide nesting opportunities for the NSO NRF. Likewise, the removal of dispersal-only habitat and commercial thinning of dispersal-only habitat (42 acres) would continue in the analysis area given the remaining over 9,000 acres of dispersal only habitat. The PRMP/FEIS described the effects of harvest on northern spotted owl habitat and concluded that actions conducted following the PRMP would result in sufficient NRF and dispersal-only habitat to meet the recovery goals and long-term ecosystem restoration and conservation needs for the northern spotted owl (USDI 2016, pp. 931-998).

Likewise, commercial thinning of dispersal-only habitat would modify and maintain canopy closure above 40 percent and would continue to function as dispersal-only habitat for the northern spotted owl.

Road Activities and Yarding Wedges

The permanent loss of NRF, dispersal-only, or capable habitat along the linear road areas, outside the harvest units, would not inhibit use by northern spotted owls nor their ability for continued movement across the landscape. The BLM expects NSO use of the treated corridors and adjacent stands to continue post-treatment. PDFs (Appendix B) would be applied where applicable (e.g., LSR and RR LUAs) to retain habitat function. Because of the linear nature of road construction and renovation, effects are limited to the linear edge of the forest stands that are treated. The existing road edge or newly added edge would modify the temperature, light, and wind in the remaining stands, and allows access by predators to various degrees. The effects of such changes on vegetation composition have been measured as far as 2 to 3 tree-heights from the edge of a clearcut (Chen, et al., 1992). Although some of these changes would happen along the linear edge, post-treatment, remaining adjacent forest stands would continue to function as NRF or dispersal-only habitat.

Road construction would remove and convert one acre of NRF habitat of the 17,899 acres of NRF habitat in the analysis area to road prism (non-capable habitat). Due to the limited opening size created by the construction of new roads (on average, approximately 45 feet total clearing (22.5 feet from centerline) the function of the adjacent stands would be maintained. Therefore, road construction activities would not inhibit northern spotted owls from using adjacent stands. Three acres of the available 3,969 acres of capable habitat in the analysis area would be removed via road construction.

Road renovation would remove and convert a total of 79 acres of NRF and 93 acres of dispersal-only habitat to road prism (non-capable habitat). Fifty-three acres of the available capable habitat would be removed via road renovation.

Yarding wedges proposed outside of five harvest units would remove five acres of the available 17,899 acres of NRF in the LSR and two acres of the available 10,199 acres of dispersal-only habitat in the HLB and DDR within the analysis area. Where yarding corridors are constructed within NRF stands, habitat adjacent to treated corridors would continue to provide cover for northern spotted owls. The BLM expects NSO use of treated corridors and adjacent stands to continue post-treatment. Fifteen acres of the available (3,969 acres) of capable habitat in the Analysis Area would be affected but would remain as capable habitat.

Carrying Capacity of Northern Spotted Owls in the Analysis Area

The amount and distribution of suitable and unsuitable northern spotted owl habitat as used in the estimator of spotted owl carrying capacity is shown in Appendix L, Table L-14.

The model shows that non-habitat increases post-harvest while the carrying capacity (number of territories that could be supported) within the analysis area increases slightly from 51.5 to 52.0. The post-harvest shows a drop in habitat while non-habitat acres increase. This positive change in carrying capacity in the face of habitat removal is counterintuitive and the reason not totally known. The BLM expects that habitat removal would reduce carrying capacity by about half a territory instead of the shown increase. One must keep in mind that models created for large scale landscapes would not be as accurate at smaller scales. Historically, the number of NSO territories has been lower than predicted in this model run in large part because the known sites are limited to BLM land within the analysis area.

Acres of northern spotted owl critical habitat modified, downgraded, or removed

Under alternative 2 the acres of habitat with the CHU affected by the proposed actions are shown in Table L-25. Although northern spotted owl critical habitat would be affected (removal of 135 acres of NRF and 152 acres of dispersal-only habitat), and one acre of dispersal-only modified, the ORC 5 subunit would continue to function as intended. The FEIS for the RMPs for Western Oregon described the effect of harvest on designated critical habitat for the northern spotted and concluded that the PRMP would meet the recovery goals and long-term ecosystem restoration and conservation needs for the northern spotted owl (PRMP/FEIS, pp. 931-998).

Acres of NRF and dispersal-only habitat in occupied and unoccupied NSO sites (nest patches or activity centers, core-use areas, home ranges).

Occupied sites

Under Alternative 2, the proposed actions overlap entirely or in part with 39 northern spotted owl home ranges, 15 core-use areas, and 10 nest patches. Of the 39 sites within the analysis area, two are currently occupied (Table L-12; Appendix A Map 37).

The BLM would follow and implement the Situational Management Strategy and the applicable PDFs as described in Appendix B to avoid incidental take of NSOs. This would result in the modification of treatment or deferral of timber sale units within occupied NSO sites. The proposed actions would affect two occupied NSO sites, (MSNO 0392 and 3267) but would not change the habitat-limited status (Table L-11) of the NSO sites.

Site 0392

There is no timber harvest, road construction, yarding wedges, or yarding corridors construction proposed within the site. This site was included within the analysis because a main haul route proposed for road maintenance is located within the home range. Road maintenance would only occur within the existing road prism (45-foot total width), and no habitat removal would occur outside of the existing road prism. Although, this site is deficient in NRF and dispersal-only habitat at the nest patch, core-use area, and home range scales (Table L-11), the BLM does not expect NSO use of the site to change due to the proposed road maintenance and use because no NRF or dispersal-only would be removed from the spatial scales.

Site 3267

Variable-retention regeneration harvest in unit 24-6-17C would remove 59 acres of dispersal-only habitat from the home range. Road renovation would remove two acres of NRF and 12 acres of dispersal-only habitat in the home range. This site is deficient in NRF habitat at the core-use area and home range scales and is considered “habitat-limited” (Table L-11). The current activity center, nest patch and most of the core-use area (468 acres) are located on private land. The BLM does not expect NSO use of the site to change due to the proposed forest management prescriptions and road renovation because the removal of

NRF along the road and removal of 71 acres of dispersal would not change the overall function of the available NRF habitat.

The removal of 71 acres of dispersal-only habitat would change the available dispersal-only habitat in the outer portions of the home range. Meiman et al. (2003, p.1260-1261), found that NSOs shift away from treated stands. These changes in behavior require NSOs to expend more energy while foraging over larger areas and would reduce survival, productivity, and occupancy of a site (Meiman, et al., 2003, p. 1261). However, there is no specific data to show the foraging and dispersal patterns of this NSO site, and other foraging and dispersal opportunities are present within the home range such that the MSNO 3267 site would continue to persist.

Unoccupied sites

The proposed actions under Alternative 2 would not downgrade any NRF or dispersal-only habitat. It would remove NRF and dispersal-only habitat within 22 of the 37 unoccupied NSO home ranges, 21 core-use areas, and two nest patches (Appendix A).

The proposed actions that would not remove or modify NRF or dispersal-only habitat within the home range of MSNOs 0266, 0267, 0269, 392, 514, 1359, 1160, 1359, 1816, 1925, 1977,1988, 2201,2049, 3904, and 4574. These sites are included within the analysis because units or road activities within the home range, core-use area, and nest patch would have maintenance work done that could disrupt NSOs if present through noise. Application of PDFs as needed (Appendix B, Wlf 1 and Wlf 3) would mitigate potential disruption during the critical breeding season (March 1- July 15th). As there is no direct effect to NRF and dispersal-only habitat within these sites, the BLM expects these sites to continue to function at the same level as current conditions and would remain available for use by NSOs.

The following sites, MSNOs 0271, 0272, 1802, 1803, 1923, 1980, 1983, 3904, and 4682 are grouped together because they are all "habitat limited" at one or more spatial scales (Appendix H). The proposed actions would remove from less than one to three percent of the existing (home range) NRF habitat. Likewise, MSNOs 272, 1803, 1972, 1983, and 4661 also have less than three percent of the existing (core-use area) NRF habitat removed. Although these sites are at or below "habitat-limited" thresholds (less than 50 percent or 250 acres of NRF in the core-use area and less than 40 percent or 1,809 acres in the home range) post-treatment, the NRF habitat within these sites would remain untreated and available for use by the NSO. Although the NRF habitat within these home ranges would remain available for use by new or transient NSOs, the BLM does not expect them to support long-term use because they are unoccupied and already well below habitat thresholds.

These 11 sites, MSNOs 0391, 1804, 1916, 1924, 1972, 1987, 1992, 2051, 4055, 4506, 4516, 4659, and 4682 are grouped together because they are currently or would be habitat-limited at all spatial scales post-treatment because the proposed actions would remove NRF habitat (from greater than 3 to 30 percent) of the available NRF habitat within the home range. Alternative 2 includes proposed actions within the core-use area and nest patch of these unoccupied sites. Due to current habitat conditions, and the proposed action, the habitat limited status would not change but these sites are unlikely to support recolonization by new or transient NSOs.

One MSNO (1992) currently above the "habitat-limited" threshold would change to below the "habitat-limited" threshold of NRF habitat at the home range of less than 1,809 acres (Appendix G). This removal of NRF habitat would reduce the future use of this home range by NSO. The 1804 MSNO would also be affected but would remain above the 1,809 habitat-limited threshold with 1,870 NRF acres. Both MSNOs 1804 and 1992 would remain above the 250-acre threshold at the core-use area scale with 300 and269 acres respectively. Effects to MSNOs 1992 would be more pronounced (~400 acres) but MSNO would remain above the threshold and technically would be able to support use by NSO. Appendix G contains tables displaying the habitat acreages by Alternative for each unoccupied MSNO.

The PRMP FEIS analysis assumed that unoccupied sites in the HLB would be subject to harvest activity (BLM, 2016b, p. 2001). The FEIS estimated that approximately 44 percent of known sites (1,085) would potentially be affected by management actions in HLB (BLM, 2016b, p. 2002). The potential effects (Alternative 2) to all the unoccupied NSO sites fall within this larger plan estimate and its effects includes the potential to reduce the probability of occupancy of these sites by spotted owls in the future (USDI FWS 2016, p.583) because habitat available for nesting and foraging activities would be reduced. Therefore, the effects to unoccupied Northern Spotted Owl sites within the Analysis Area are within the scope of the PRMP/FEIS.

Alternative 3

Acres of northern spotted owl NRF and dispersal habitat modified, downgraded, or removed

In total, the combination of harvest units, road, and yarding activities would remove 1,759 acres of NRF habitat and 1,002 acres of dispersal-only habitat in the analysis area (Table L-15).

Harvest Actions

Variable-retention regeneration harvest would remove approximately 1,622 acres from the total available NRF habitat of 17,899 acres within the analysis area and approximately 872 acres of the available 10,199 acres dispersal-only habitat within the analysis area (Table L-15).

Under this Action Alternative, effects to NRF and dispersal habitat alteration resulting from VRH are the same as described under Alternative 2.

Road Activities and Yarding Wedges

Under this Action Alternative, effects to NRF and dispersal-only habitat alteration resulting from road construction, road renovation, and yarding wedge construction, are the same as described under Alternative 2.

Road construction would remove and convert five acres of NRF and 8 acres of dispersal-only habitat to road prism (non-capable habitat; Table L-15).

Road renovation outside of harvest units would remove and convert 86 acres of the 17,899 acres of NRF and approximately 124 acres of the 10,199 acres of dispersal-only habitat within the analysis area (Table L-15).

There are seven yarding wedges proposed outside of harvest units, which would remove three acres of the 17,899 acres of NRF and eight acres of the 10,199 acres of dispersal-only habitat within all LUAs in the analysis area (Table L-15).

Carrying Capacity of Northern Spotted Owls in the Analysis Area

The amount and distribution of suitable and unsuitable northern spotted owl habitat as used in the estimator of spotted owl carrying capacity (Glen et al. 2017; using 2024 binary raster data) is show in Table L-16.

The model shows that non-habitat increases post-harvest (Table L-16) while the carrying capacity (number of territories that could be supported) within the analysis area decreases slightly from 51.5 to 51.0. One must keep in mind that models created for large scale landscapes would not be as accurate at smaller scales. Historically, the number of NSO territories has been lower than predicted in this model run in large part because the known sites are limited to BLM land within the analysis area. This result matches the overall fact that Alternative 3 removes the largest amount of NRF and dispersal-only habitat in the proposed actions.

Acres of northern spotted owl critical habitat modified, downgraded, or removed

Variable-retention regeneration harvest, road activities and yarding wedges would remove 225 acres of the 13,819 acres of NRF habitat and 172 acres of the 4,208 acres of dispersal-only habitat within the 19,595 acres of the ORC 5 critical habitat subunit overlapping the analysis area (Table L-15). The remaining untreated 13,594 acres of NRF and 4,036 acres of dispersal-only critical habitat within the analysis area, would continue to contribute to the overall function of the ORC 5 critical habitat subunit. The ORC 5 critical habitat subunit would continue to fulfill its intended role of providing landscape-level dispersal connectivity (north-south and potentially east-west), and demographic support to the local and regional NSO population in any meaningful measure (FWS, 2018b, p. 63).

Acres of northern spotted owl NRF and dispersal-only habitat in occupied and unoccupied northern spotted owl sites (home ranges, core-use areas, nest patches, or most recent activity centers)

Under Alternative 3, the proposed actions overlap entirely or in part with 30 NSO home ranges, 15 core-use areas, and 10 nest patches. Of the 30 sites being analyzed, two are currently occupied (MSNO 0392 and 3267) (2020- 2021 NSO Database, Table L-11 and Table L-12, Appendix A Map 39).

Effects to habitat in occupied NSO sites as summarized here, are the same as described under Alternative 2; and are not discussed in detail under this Action Alternative.

<u>Occupied sites</u>

The proposed actions would modify, downgrade, or remove NRF and dispersal-in one of two occupied NSO sites, MSNO 0392 and 3267.

Site 0392

Effects to Site 3092 are the same as described under Alternative 2 and are not discussed in detail under this Action Alternative

Site 3267

Variable-retention regeneration harvest in unit 24-6-17C would remove 59 acres of dispersal-only habitat from the home range. Road renovation would remove two acres of NRF and 12 acres of dispersal-only habitat in the home range. This site is deficient in NRF habitat at the core-use area and home range scales and is considered “habitat-limited” (Table L-12). The current activity center, nest patch and most of the core-use area (468 acres) are located on private land. The BLM does not expect NSO use of the site to change due to the proposed forest management prescriptions and road renovation because the removal of NRF along the road and removal of 71 acres of dispersal would not change the overall function of the available NRF habitat.

The removal of 71 acres of dispersal-only habitat would change the available dispersal-only habitat in the outer portions of the home range. Meiman et al. (2003, p.1260-1261), found that NSOs shift away from treated stands. These changes in behavior require NSOs to expend more energy while foraging over larger areas and would reduce survival, productivity, and occupancy of a site (Meiman, et al., 2003, p. 1261). However, there is no specific data to show the foraging and dispersal patterns of this NSO site, and other foraging and dispersal opportunities are present within the home range such that the MSNO 3267 site would continue to persist.

<u>Unoccupied sites</u>

Alternative 3 would not downgrade any NRF or dispersal-only habitat. It would remove NRF and dispersal-only habitat within 22 of the 37 unoccupied NSO home ranges, 21 core-use areas, and two nest patches (Appendix A).

The proposed actions that would not remove or modify NRF or dispersal-only habitat within the home range of MSNOs 0266, 0267, 0269, 392, 1359, 1160, 1359, 1816, 1925, 1977,1988, 2201,2049, 3904, and 4574. These sites are included within the analysis because road activities within the home ranges, core-use area, and nest patch would have maintenance work done that could disrupt (via noise) NSOs if present adjacent to the work area. Application of PDFs as needed (Appendix B, Wlf 1 and Wlf 3) would mitigate potential disruption during the critical breeding season (March 1- July 15th). As there is no direct effect to

NRF and dispersal-only habitat within these sites, the BLM expects these sites to continue to function at the same level as current conditions and would remain available for use by NSOs.

The following sites, MSNOs 0271, 0272, 514, 1802, 1803, 1923, 1980, 1983, 3904, and 4682 are grouped together because they are all "habitat limited" at one or more spatial scales (Appendix G). The proposed actions would remove from less than one to three percent of existing (home range) NRF habitat. Likewise, MSNOs 272, 1803, 1972, 1983, and 4661 also have less than three percent of the existing (core-use area) NRF habitat removed. Although these sites are well below habitat thresholds (less than 50 percent or 250 acres of NRF in the core-use area and less than 40 percent or 1,809 acres in the home range) post-treatment, the NRF habitat within the sites would remain untreated. Although the NRF habitat within these home ranges would remain available for use by new or transient NSOs, the BLM does not expect them to support long-term use because they are unoccupied and already well below habitat thresholds.

These 13 sites, MSNOs 0391, 1804, 1916, 1924, 1972, 1987, 1992, 2051, 4055, 4506, 4516, 4659, and 4682 are grouped together because they are currently or would be habitat-limited at all spatial scales post-treatment because the proposed actions would remove greater than three percent of the available NRF habitat in the home ranges or core use areas. Alternative 3 includes proposed actions within the core-use area and nest patch of these unoccupied sites. Due to current habitat conditions, and the proposed action, the habitat limited status would not change but these sites are unlikely to support recolonization by new or transient NSOs.

One MSNO (1804) currently above (2,237 acres) the "habitat-limited" threshold would change to 1,340 acres and below the "habitat-limited" threshold (1,809 acres) of NRF habitat (Appendix G). This removal of NRF habitat would reduce the future use of these home ranges by NSO.

Effects to MSNOs 1992, currently above (2,010 acres) the "habitat-limited" threshold would change to 967 acres and below the "habitat-limited" threshold (1,809 acres) of NRF habitat (Appendix G). The NRF habitat would by 898 and 1,043 acres respectively. Both MSNOs 1804 and 1992 would have NRF acres reduced below the 250-acre threshold (at the core-use area scale) to 146 and 74 acres respectively (Appendix G). These changes would decrease the ability of these MSNOs to support NSO.

The PRMP FEIS analysis assumed that unoccupied sites in the HLB would be subject to harvest activity (BLM, 2016b, p. 2001). The FEIS estimated that approximately 44 percent (of 1,085) known sites would potentially be affected by management actions in HLB (BLM, 2016b, p. 2002). The potential effects (Alternative 3) to all the unoccupied NSO sites fall within this larger plan estimate and its effects includes the potential to reduce the probability of occupancy of these sites by spotted owls in the future (USDI FWS 2016, p.583) because habitat available for nesting and foraging activities would be reduced. Therefore, the effects to unoccupied Northern Spotted Owl sites within the Analysis Area are within the scope of the PRMP/FEIS.

Alternative 4

Acres of NSO NRF and dispersal habitat modified, downgraded, or removed

In total, the combination of harvest units, road, and yarding activities would remove 852 acres of NRF habitat and 391 acres of dispersal-only habitat in the analysis area (Table L-17).

Harvest Actions

Variable-retention regeneration harvest would remove approximately 1,243 acres of NRF habitat from the total 17,899 acres and 326 acres of dispersal-only habitat from the 10,199 acres within the analysis area. Commercial thinning treatments would downgrade four acres of the 17,899 acres of NRF habitat to dispersal-only habitat and modify 155 acres of dispersal-only habitat from the total 10,199 acres within the analysis area.

Under this Action Alternative, effects to NRF and dispersal -only habitat alteration resulting from VRH and commercial thinning treatments are the same as described under Alternative 2.

<u>Road Activities and Yarding Wedges</u>

Under this Action Alternative, effects to NRF and dispersal-only habitat alteration resulting from road construction, road renovation, and yarding wedge construction, are the same as described under Alternative 2.

Road construction would remove and convert three acres of NRF and 6 acres of dispersal-only habitat to road prism (non-capable habitat, Table L-17).

Road renovation outside of harvest units would remove and convert 78acres of the 17,899 acres of NRF and 107 acres of the 10,199 acres of dispersal-only habitat within the analysis area.

Three yarding wedges proposed outside of two harvest units would remove less than eight acres of the 17,899 acres of NRF habitat and three acres of the 10,199 acres of dispersal-only habitat within the analysis area.

Carrying Capacity of Northern Spotted Owls in the Analysis Area

The amount and distribution of suitable and unsuitable northern spotted owl habitat as used in the estimator of spotted owl carrying capacity (Glen et al. 2017; using 2024 binary raster data) is shown in Table L-18.

The model shows that non-habitat increases post-harvest (Table L-18) while the carrying capacity (number of territories that could be supported) within the analysis area increases slightly from 51.5 to 52.0. One must keep in mind that models created for large scale landscapes would not be as accurate at smaller scales. Historically, the number of NSO territories has been lower than predicted in this model run in large part because the known sites are limited to BLM land within the analysis area.

Acres of northern spotted owl critical habitat modified, downgraded, or removed

Variable-retention regeneration harvest, road activities, and yarding wedges would remove 173 acres of the 13,819 acres of NRF habitat and 164 acres of the 4,208 acres of dispersal-only habitat within the 19,595 acres of the ORC 5 critical habitat subunit overlapping the analysis area. Commercial thinning would downgrade less than one percent (0.6 acres) of NRF and modify two acres of the 4,208 acres of dispersal-only habitat within the ORC 5 critical habitat subunit overlapping the analysis area. The remaining untreated 13,646 acres of NRF and 4,044 acres of dispersal-only critical habitat within the analysis area, would continue to contribute to the overall function of the ORC 5 critical habitat subunit. The ORC 5 critical habitat subunit would continue to fulfill its intended role of providing landscape-level dispersal connectivity (north-south and potentially east-west), and demographic support to the local and regional NSO population in any meaningful measure (BLM, 2018b, p. 63).

Acres of NSO NRF and dispersal-only habitat in occupied and unoccupied northern spotted owl sites (home ranges, core-use areas, nest patches, or most recent activity centers)

Under Alternative 4, the proposed actions overlap entirely or in part with 39 NSO home ranges, 12 core-use areas, and six nest patches. Of the 39 sites being analyzed, one is currently occupied (MSNO 3267) (2019- 2023 NSO Database). The effects to Site 3267 are the same as described under Alternative 2 and are not discussed in detail under this Action Alternative.

<u>Occupied sites</u>

Site 3267

Under this Action Alternative, there is no timber harvest, road construction, yarding wedge or yarding corridor construction proposed within the site. Road renovation would remove three acres of NRF and 12 acres of dispersal-only habitat in the home range. The removal of NRF and dispersal-only habitat along the road would not change the available dispersal-only habitat in the outer portions of the home range. Effects would be localized to the edge of the road and the existing NRF and dispersal-only habitat in the home range would continue to function. Changes in behavior and increased energy expenditure (Meiman et al., 2003, p.1260-1261) during the use of dispersal-only habitat by NSOs would not happen since there is no treatment.

Unoccupied sites

The proposed actions under Alternative 4 would not downgrade any NRF or dispersal-only habitat. It would remove NRF and dispersal-only habitat within 22 of the 37 unoccupied NSO home ranges, 21 core-use areas, and two nest patches (Appendix A).

The proposed actions would not remove or modify NRF or dispersal habitat within the home range of MSNOs 0266, 0267, 0269, 392, 514, 1359, 1160, 1359, 1816, 1925, 1977,1988, 2201,2049, 3904, and 4574. These sites are included within the analysis because units or road activities would have maintenance work done that could disrupt NSOs if present through noise. Application of PDFs as needed (Appendix B, Wlf 1 and Wilf 3) would mitigate potential disruption during the critical breeding season (March 1- July 15th). As there is no direct effect to NRF and dispersal-only habitat within these sites, the BLM expects these sites to continue to function at the same level as current conditions and would remain available for use by NSOs.

The following sites, MSNOs 0271, 0272, 1802, 1803, 1923, 1980, 1983, 3904, 4661, 4673, and 4682 are grouped together because they are all "habitat limited" at one or more spatial scales (Appendix G). The proposed actions would remove between less than one and three percent of existing (home range) NRF habitat. Likewise, MSNOs 272, 1803, 1972, 1983, and 4661 also have less than three percent of the existing (core-use area) NRF habitat removed. Although these sites are well below habitat thresholds (less than 50 percent or 250 acres of NRF in the core-use area and less than 40 percent or 1,809 acres in the home range) post-treatment the NRF habitat within the sites would remain available for use by the NSO. The remaining NRF habitat within the sites would continue to support NSOs dispersing throughout the landscape but the BLM does not expect them to support long-term use because they are unoccupied and already well below habitat thresholds, making these sites less likely to support recolonization by new or transient NSOs.

These 12 MSNOs, 0391, 1804, 1916, 1924, 1972, 1987, 1992, 2051, 4055, 4506, 4516, and 4659 are grouped together because they are currently or would be habitat-limited at all spatial scales post-treatment because the proposed actions would remove (greater than three percent) of the available NRF habitat in the home range. The habitat-limited status would not change but the further reduction of available NRF habitat would contribute to the home range being unlikely to support recolonization by new or transient NSOs.

One MSNO (1804) currently above (2,237 acres) the "habitat-limited" threshold would change to 1,340 acres and below the "habitat-limited" threshold (1,809 acres) of NRF habitat (Appendix G). This removal of NRF habitat would reduce the future use of these home ranges by NSO.

Effects to MSNOs 1992 would be more pronounced and causing both MSNOs to drop under the "habitat limited" threshold by reducing the available NRF habitat in the home range by 898 and 1,043 acres respectively. Both MSNOs 1804 and 1992 would have NRF acres reduced below the 250-acre threshold (at the core-use area scale) to 146 and 74 acres respectively (Appendix G). These changes would decrease the ability of these MSNOs to support NSO and would reduce the future use of these home ranges by NSO. The PRMP FEIS analysis assumed that unoccupied sites in the HLB would be subject to harvest activity (BLM, 2016b, p. 2001). The FEIS estimated that approximately 44 percent (of 1,085) known sites would potentially be affected by management actions in HLB (BLM, 2016b, p. 2002).

The potential effects (Alternative 4) to all the unoccupied NSO sites fall within this larger plan estimate and its effects includes the potential to reduce the probability of occupancy of these sites by spotted owls in the future (USDI FWS 2016, p.583) because habitat available for nesting and foraging activities would be reduced. Therefore, the effects to unoccupied Northern Spotted Owl sites within the Analysis Area are within the scope of the PRMP/FEIS.

Alternative 5

Acres of northern spotted owl NRF and dispersal habitat modified, downgraded, or removed

In total, the combination of harvest units, road, and yarding activities would remove 99 acres of NRF habitat, modify 1,662 acres of NRF, remove 130 acres of dispersal-only habitat, and modify 872 acres of dispersal-only habitat in the analysis area (Table L-19).

Harvest Actions

Commercial thinning would modify 1,662 acres of the 17,899 acres of NRF habitat and would modify 872 acres of dispersal-only habitat from the total 10,199 acres of dispersal-only habitat within the analysis area. There is no VRH in Alternative 5; therefore, no habitat would be removed by VRH actions.

Effects to NRF habitat and dispersal-only habitat alteration resulting from commercial thinning harvest are the same as described under Alternative 2.

Road Activities and Yarding Wedges

Under this Action Alternative, effects to NRF, dispersal-only habitat, and capable habitat alteration resulting from road construction, road renovation, and yarding wedge construction, are the same as described under Alternative Two.

Road construction would remove and convert three acres of NRF, eight acres of dispersal-only habitat, and seven acres of capable habitat to road prism (non-capable habitat).

Road renovation outside of harvest units would remove and convert 86 acres of the 17,899 acres of NRF, approximately 113 acres of the 10,199 acres of dispersal-only habitat, and 50 acres of capable habitat within the analysis area.

Yarding wedges proposed outside of the harvest units would remove 10 acres of the 17,199 acres of NRF, eight acres of the 10,199 acres of dispersal-only habitat, and 33 acres of the 3,969 of capable habitat within the analysis area.

Carrying Capacity of Northern Spotted Owls in the Analysis Area

The amount and distribution of suitable and unsuitable northern spotted owl habitat as used in the estimator of spotted owl carrying capacity (Glen et al. 2017; using 2024 binary raster data) is shown in Table L-20.

The model shows that non-habitat increases post-harvest by a slight amount but the carrying capacity of the analysis area drops from 52.0 to 51.5 NSO territories. One must keep in mind that models created for large scale landscapes would not be as accurate at smaller scales. Historically, the number of NSO territories has been lower than predicted in this model run in large part because the known sites are limited to BLM land within the analysis area. This result shows that carrying capacity would decrease by half a territory in spite the fact that regeneration harvest of NRF or dispersal-only habitat would not occur.

Acres of northern spotted owl critical habitat modified, downgraded, or removed

Road activities and yarding wedges would remove 95 acres of the 13,819 acres of NRF habitat. Commercial thinning would modify 120 acres of NRF, would modify 120 acres of the 4,208 acres of dispersal-only habitat, and would remove 74 acres of capable habitat (within the 19,595 acres of the ORC 5 critical habitat subunit overlapping the analysis area (Table L-8). The remaining untreated 13,594 acres of NRF and 4,126 acres of dispersal-only critical habitat within the analysis area, would continue to contribute to the overall function of the ORC 5 critical habitat subunit. The ORC 5 critical habitat subunit would continue to fulfill its intended role of providing landscape-level dispersal connectivity (north-south and potentially east-west), and demographic support to the local and regional NSO population in any meaningful measure (BLM, 2018b, p. 63).

Acres of NSO NRF and dispersal-only habitat in occupied and unoccupied northern spotted owl sites (home ranges, core-use areas, nest patches, or most recent activity centers)

Under Alternative 5, the proposed actions overlap entirely or in part with 30 NSO home ranges, 15 core-use areas, and ten nest patches. Of the 30 sites being analyzed, two are currently occupied (MSNO 0392 and 3267) (2020-2021; Table L-11and Table L-12; Appendix A).

<u>Occupied sites</u>

Site 0392
Effects to Site 3092 are the same as described under Alternative 2; and are not discussed in detail under this Action Alternative

Site 3267
Under Alternative 5, there is no timber harvest, road construction, yarding wedge or yarding corridor construction proposed within the site. Road renovation would remove three acres of NRF and 12 acres of dispersal-only habitat in the home range. The removal of NRF and dispersal-only habitat along the road would not change the available dispersal-only habitat in the outer portions of the home range. Effects would be localized to the edge of the road and the existing NRF and dispersal-only habitat in the home range would continue to function. Changes in behavior and increased energy expenditure (Meiman et al., 2003, p.1260-1261) would be more limited to the road edges.

Commercial thinning in unit 24-6-17C would modify 59 acres of dispersal-only habitat from the home range. Road renovation would remove two acres of NRF and 12 acres of dispersal-only habitat in the home range. This site is deficient in NRF habitat at the core-use area and home range scales and is considered “habitat-limited” (Table L-12). The current activity center, nest patch and most of the core-use area (468 acres) are located on private land. The BLM does not expect NSO use and occupancy status of the site to change because proposed forest management prescriptions (above canopy closure post-harvest of greater than 40 percent) would continue to provide dispersal function in the outer portion of the home range.

Overall, the loss of NRF and dispersal along the roads, plus the modification of dispersal-only habitat would not prevent the continued use of the NRF and dispersal-only habitat in the home range.

<u>Unoccupied sites</u>

Alternative 5 would not downgrade any NRF or dispersal-only habitat. It would remove NRF and dispersal-only habitat within 23 of the 37 unoccupied NSO home ranges, 8 core-use areas, and three nest patches (Appendix A) because of road activities. It would also treat (through thinning) NRF and dispersal-only habitat within home ranges. These MSNOs 0266, 0267, 0269, 514, 1359, 1160, 1359, 1816, 1925, 1977,1988, 2201,2049, 3904, and 4574 are included because units or road activities within the home rang, core-use area, and nest patch would have maintenance work done that could disrupt NSOs if present through noise. Application of PDFs as needed (Appendix B, Wlf 1 and Wlf 3) would mitigate potential disruption during the critical breeding season (March 1- July 15th). As there is no direct effect to NRF and dispersal-only habitat within these sites, the BLM expects these sites to continue to function at the same level as current conditions and would remain available for use by NSOs.

The following 21 sites, MSNOs 0271, 0272, 391, 514, 1802, 1803, 1804, 1923, 1924, 1972, 1980, 1983, 1987, 1992, 2051, 4055, 4506, 4516, 4569, 4661, and 4673 are grouped together because they are all “habitat limited” at one or more spatial scales (Appendix G). The proposed actions would remove between less than one and three percent of NRF habitat and between within the home range. Although these sites are well below habitat thresholds (less than 50 percent or 250 acres of the existing (core-use area) NRF habitat removed. Although these sites are well below habitat thresholds (less than 50 percent or

250 acres of NRF in the core-use area and less than 40 percent or 1,809 acres in the home range) post-treatment the NRF habitat within the sites would remain available for use by the NSO. The remaining NRF habitat within the sites would continue to support NSOs dispersing throughout the landscape but the BLM does expect a higher chance of future use by NSO because the thinning of NRF while keeping 60 percent canopy closure would retain NRF function. That said the unoccupied history of the MSNOs and the below NRF thresholds would contribute to a lesser likelihood of future recolonization by new or transient NSOs.

Implementation of the proposed actions would not change the habitat-limited status of the unoccupied NSO sites. Both MSNO 1804 and 1992, currently above the "habitat-limited" threshold would remain above the "habitat-limited" threshold of NRF habitat at over 1900 acres in the home range (Appendix G). Both core-use areas (MSNOs 1804 and 1992) would remain above the 250-acre threshold at the core-use area scale with 327 and 316 acres respectively (Appendix G).

The PRMP FEIS analysis assumed that unoccupied sites in the HLB would be subject to harvest activity (BLM, 2016b, p. 2001). The FEIS estimated that approximately 44 percent (of 1,085) known sites would potentially be affected by management actions in HLB (BLM, 2016b, p. 2002). The potential effects (Alternative 5) to all the unoccupied NSO sites fall within this larger plan estimate and its effects includes the potential to reduce the probability of occupancy of these sites by spotted owls in the future (USDI FWS 2016, p.583) because habitat available for nesting and foraging activities would be reduced. Therefore, the effects to unoccupied Northern Spotted Owl sites within the Analysis Area are within the scope of the PRMP/FEIS.

Alternative 6

Acres of northern spotted owl NRF and dispersal habitat modified, downgraded, or removed

In total, the combination of harvest units, road, and yarding activities would remove 119 acres of NRF habitat, 704 acres of dispersal-only habitat, and 100 acres (three percent) of capable habitat in the Analysis Area (Table L-21).

Harvest Actions

Proposed treatments would remove 21 acres of the 17,899 acres of NRF habitat. Commercial thinning would modify 1,539 acres of NRF habitat such that it would continue to function as NRF habitat post-treatment. This is because the post-treatment stand average relative density would be between 25 to 45 percent and would retain a minimum of 60 percent canopy closure. In addition, the prescription would leave untreated areas and create group selection openings to provide areas of structural complexity in the treated stand.

Dispersal-only habitat (704 acres) would be removed and not function as dispersal-only habitat until it attains a minimum age of 40 years. Thinning of dispersal-only habitat (122 acres) would modify the habitat but continue to function as dispersal-only habitat after treatment.

Effects to NRF habitat and dispersal-only habitat alteration resulting from commercial thinning harvest are the same as described under Alternative 2.

Road Activities and Yarding Wedges

Road construction would remove and convert four acres of NRF and eight acres of dispersal-only habitat to road prism (non-capable habitat). In addition, six acres of the available 3,639 acres of capable habitat would be removed.

Road renovation outside of harvest units would remove 84 acres of the 17,899 acres of NRF, approximately 108 acres of the 10,199 acres of dispersal-only habitat, and 61 acres of the available 3,639 acres of capable habitat within the analysis area.

Yarding wedges proposed outside of harvest units would remove 10 acres of the 17,199 acres of NRF, nine acres of the 10,199 acres of dispersal-only habitat, and 33 acres of the available capable habitat in the analysis area.

Carrying Capacity of Northern Spotted Owls in the Analysis Area

The amount and distribution of suitable and unsuitable northern spotted owl habitat as used in the estimator of spotted owl carrying capacity (Glen et al. 2017; using 2024 binary raster data) is shown in Table L-22. The model shows that non-habitat increases post-harvest by a slight amount but the carrying capacity of the analysis area drops from 52.0 to 51.0 NSO territories. One must keep in mind that models created for large scale landscapes would not be as accurate at smaller scales. Historically, the number of NSO territories has been lower than predicted in this model run in large part because the known sites are limited to BLM land within the analysis area. This result matches the fact that Alternative 6 removes NRF and dispersal-only habitat in the proposed actions.

The model shows that non-habitat increases post-harvest thereby changing the carrying capacity of the analysis area. In this case it decreases from 52 to 51 territories.

Acres of northern spotted owl critical habitat modified, downgraded, or removed

Timber harvest and associated harvest activities (road activities and yarding wedges) would remove 95 acres of NRF habitat from the available 13,819 acres of NRF in the ORC 5 critical habitat subunit. The amount of dispersal-only habitat affected by the proposed actions (units, road activities and yarding wedges) would remove 85 acres of dispersal-only habitat.

Modification of 102 acres of NRF habitat would occur as part of unit harvest. These acres are expected to continue to function as NRF habitat because the post treatment stand average relative density would be between 25 to 45 percent and would retain a minimum of 60 percent canopy closure. In addition, the prescription would leave untreated areas and create group selection openings to provide areas of structural complexity in the treated stand.

Similarly, the modified 22 acres of dispersal-only habitat would continue to function as dispersal habitat because the canopy closure average would remain above 40 (range 50-60 percent) (Table L-22). The remaining untreated 13,807 acres of NRF and 4,123 acres of dispersal-only critical habitat within the analysis area, would continue to contribute to the overall function of the ORC 5 critical habitat subunit. The ORC 5 critical habitat subunit would continue to fulfill its intended role of providing landscape-level dispersal connectivity (north-south and potentially east-west), and demographic support to the local and regional northern spotted owl population in any meaningful measure (FWS, 2018b, p. 63).

Acres of NSO NRF and dispersal-only habitat in occupied and unoccupied northern spotted owl sites (home ranges, core-use areas, nest patches, or most recent activity centers)

The effects to occupied NSO sites are the same as described under Alternative 2; therefore, they are not discussed further under this Action Alternative.

<u>Occupied Sites</u>

Site 0392

Effects to Site 3092 are the same as described under Alternative 2; and are not discussed in detail under this Action Alternative

Site 3267

Under Alternative 6, road renovation would remove two acres of NRF and 12 acres of dispersal-only habitat in the home range. The removal of NRF and dispersal-only habitat along the road would not change the available dispersal-only habitat in the outer portions of the home range. Effects would be localized to the edge of the road and the existing NRF and dispersal-only habitat in the home range would continue to function. Changes like shifting away from treated edge and increased energy expenditure

(Meiman et al., 2003, p.1260-1261) would be more limited and would not prevent NSO from using the NRF and dispersal-only habit in the home range.

Commercial thinning in unit 24-6-17C would modify 59 acres of dispersal-only habitat from the home range. This site is deficient in NRF habitat at the core-use area and home range scales and is considered "habitat-limited" (Table L-12). The current activity center, nest patch and most of the core-use area (468 acres) are located on private land. The BLM does not expect NSO use and occupancy status of the site to change because proposed forest management prescriptions (post-harvest canopy closure of greater than 40 percent) would continue to provide dispersal function in the outer portion of the home range.

Unoccupied sites

Alternative 6 would not downgrade any NRF or dispersal-only habitat. It would remove NRF and dispersal-only habitat via all actions within 23 of the 37 unoccupied NSO home ranges, 9 core-use areas, and three nest patches (Appendix A. These sites (MSNOs 0266, 0267, 0269, 514, 1359, 1160, 1359, 1816, 1925, 1977,1988, 2201,2049, 3904, and 4574) are included within the analysis because units or road activities within the home rang, core-use area, and nest patch would have maintenance work done that would disrupt NSOs if present through noise. Application of PDFs would be done as outlined in Alternative 5.

The following sites, MSNOs 0271, 0272, 391, 514, 1802, 1803, 1804, 1923, 1924, 1972, 1980, 1983, 1987, 1992, 2051, 4055, 4506, 4516, 4569, 4661, and 4673 are grouped together because they are all "habitat limited" at one or more spatial scales (Appendix G). The proposed actions would remove between less than one and three percent of NRF within the home range within the home range. Although these sites are below habitat thresholds (less than 50 percent or 250 acres of NRF in the core-use area and less than 40 percent or 1,809 acres in the home range), post-treatment NRF habitat would remain available for use by the NSO. The remaining NRF habitat within the sites would continue to support NSOs dispersing throughout the landscape but the BLM does not expect them to support long-term use because they are unoccupied and already well below habitat thresholds, making these sites less likely to support recolonization by new or transient NSOs.

These two sites (MSNOs 1916 and 4682) are grouped together because they are currently or would be habitat-limited at all spatial scales post-treatment because the proposed actions would remove NRF habitat (greater than 3 percent of the available habitat at one or more spatial scales within the sites. Alternative 6 includes proposed actions within the core-use area and nest patch of these unoccupied sites. Due to current habitat conditions, and the proposed action, the habitat limited status would not change but these sites are unlikely to support recolonization by new or transient NSOs.

Both MSNO 1804 and 1992, currently above the "habitat-limited" threshold would remain above the "habitat-limited" threshold of NRF habitat at over 1900 acres in the home range (Appendix G). The thinning of NRF habitat would not reduce the future use of these home ranges by NSO. Both MSNOs 1804 and 1992 would remain above the 250-acre threshold at the core-use area scale with 327 and 316 acres respectively (Appendix G).

The PRMP FEIS analysis assumed that unoccupied sites in the HLB would be subject to harvest activity (BLM, 2016b, p. 2001). The FEIS estimated that approximately 44 percent (of 1,085) known sites would potentially be affected by management actions in HLB (BLM, 2016b, p. 2002).

The potential effects (Alternative 6) to all the unoccupied NSO sites fall within this larger plan estimate and its effects includes the potential to reduce the probability of occupancy of these sites by spotted owls in the future (USDI FWS 2016, p.583) because habitat available for nesting and foraging activities would be reduced. Therefore, the effects to unoccupied Northern Spotted Owl sites within the Analysis Area are within the scope of the PRMP/FEIS.

Summary of Direct and Indirect Effects

Figure L-1 shows the relative amounts of NSO NRF and dispersal-only habitat treated (removed, downgraded, and modified) by alternatives. Harvest actions that remove NRF and dispersal-only are more pronounced in Alternatives 2 and 3. In contrast Alternatives 5 has the least amount of NRF and dispersal-only removal while treating and maintaining function of NRF and dispersal only habitat in the proposed harvest areas. Like Alternative 5, Alternative 6 treats and maintains function in a large amount of NRF while removing the second highest amount of dispersal-only habitat. The proposed actions would also remove (via road activities and harvest wedges) some capable habitat. Table in Alternatives 2,3,4,5, and 6 in the amount of 71, 32 acres, 67 acres, and 100 acres respectively.

Table L-23 shows the change in NRF and dispersal-only acres post-treatment within NSO occupied site (MSNO 3267). range of NRF and dispersal-only habitat affected by the Action Alternatives. It shows that Alternative 2 and 3 would reduce the amount of dispersal-only habitat in the home range. Alternative 4 would not treat (harvest a unit) at all within the home range. In contrast, both Alternative 5 and 6 would treat 59 acres of dispersal-only but the total available acres would remain the same while expecting providing dispersal-only function to the NSO.

The mean carrying capacity of NSO territories post-actions is shown in Table L-24. The results shows that alternatives that have a more reduced amount of harvest (Alternatives 2 and 4) show a slight positive increase in carrying capacity while others show a slight decrease (Alternatives 3, 5, and 6) in carrying capacity.

Table L-25 shows the amount of NRF and dispersal-only habitat affected in Critical Habitat by the all the proposed action in each alternative. Alternatives 2 and 3 have more acres (135 and 214 respectively) of NRF and dispersal-only (153 and 252 acres respectively) removed by VRH in critical habitat. Alternative 4 has the 277 acres of NRF and 57 acres of dispersal-only habitat removed. In contrast, both Alternatives 5 and 6 the removal of NRF and dispersal-only habitat within critical habitat is lower.

The overall effects to CHU OCR5 from removal and downgrade of NRF and dispersal-only habitat would not change the intended north to south connectivity function of this sub-unit, and the connectivity between other adjacent sub-units would not be negatively impacted because the proposed downgrade of NRF and dispersal-only habitat would result in a reduction of 0.1 percent of the dispersal habitat (NRF plus dispersal-only habitat) in the OCR5.

Cumulative Effects

At this time there are no future foreseeable actions to include because the one potential instream restoration project that is foreseeable is under development on private and BLM land and impacts would be analyzed in future NEPA documents.

3.5 Issue 3. How would proposed actions affect the marbled murrelet (*Brachyramphus marmoratus*) and their habitats?

The Blue and Gold Harvest Plan project area is located within the 35–50-mile marbled murrelet management zone (Zone 2). The marbled murrelet is listed as threatened under the Endangered Species Act. This section analyzes the potential impacts from the proposed silvicultural and associated forest management activities on marbled murrelet and their habitat.

No proposed activities would occur within marbled murrelet occupied sites nor are there any proposed activities adjacent to known marbled murrelet occupied sites that would cause any edge effects to suitable nesting habitat within the occupied stands or nesting structure. Known occupied marbled murrelet sites adjacent to the units have a 300-foot buffer in place as per direction in the NCO ROD/RMP (BLM 2016a, p. 98). Therefore, the effects to occupied sites are not analyzed in this EA because there would be no impacts to known occupied sites from the proposed project.

3.5.1 Methodology and Assumptions

The analysis indicators for Issue 3 are the same for direct, indirect, and cumulative effects for all alternatives:

- Acres of marbled murrelet nesting and recruitment habitat modified, downgraded, or removed.
- Acres of marbled murrelet nesting and recruitment critical habitat modified, downgraded, or removed.

The BLM conducted analysis for Issue 3 using GIS data from the Roseburg BLM District habitat database (2020, 2021), Roseburg BLM Marbled Murrelet database (2021), aerial photography (2018) and LiDAR (2009, 2012, and 2015). In addition to the datasets listed, field visits to the proposed action areas were conducted by biologists to determine the status of the forest stands as nesting habitat by confirming the presence of trees with nesting structures (potential nesting platforms). Definition of terms associated with changes to nesting habitat used by the marbled murrelet is provided in Appendix L Table L-26.

For all Action Alternatives 2, 3, 4, 5 and 6, this analysis assumes the following:

- The BLM expects private timber lands within the analysis areas to be managed under intensive forest management practices and that any remaining late-seral forests on private timber lands would be converted to early seral forest over the next 20 to 30 years. Therefore, private timber lands are not considered as contributing towards nesting habitat for the marbled murrelet.
- For this analysis, the term recruitment habitat describes forested stands (40-79 years old) within 50 miles of the coast with or without a residual component of potential nesting structure. If younger stands have a minimum of six platform trees per a moving five-acre circle then such areas are considered nesting habitat (BLM, 2016a, p. 98).
- Road activities (construction, renovation, etc.) and yarding wedges are analyzed where activities are located outside the proposed unit boundaries. Any road activity or yarding action within the units are included in the unit analysis. Road construction and road renovation were analyzed using a maximum clearing width of 45 feet (22.5 feet from center) and 80 feet (40 feet from center) respectively.

Temporal Scale

The effects from the proposed actions on forest stands used by the marbled murrelet would last from 60-120 years depending on the treatment.

Spatial Scale

The BLM Identified the areas (nesting and recruitment habitat in LSR and RR) that would be affected by road construction and renovation, yarding wedges, and large areas of log yarding. A quarter mile buffer was created around these areas and overlayed on the 14th field drainages (Oregon Watershed Boundary Dataset 2017). The quarter mile buffer identifies the minimum area nesting habitat that falls within the proposed project area and within one-quarter mile (402 m) of the project area boundary that is contiguous with the project area (Mack et al. 2003, p.6). Nineteen 14th field drainages were identified to create one polygon that could encompass the original quarter mile buffers. This larger polygon is the Analysis Area for this section. Changes in the haul route added 13.5 miles of road that extends outside the original marbled murrelet Analysis Area. However, the road maintenance activities would not impact nesting or recruitment habitat used by the marbled murrelet or the Critical Habitat Unit (CHU) that overlaps the route because maintenance actions are limited to understory shrubs and sub-canopy trees within the road prism. Therefore, the route is included in the analysis, for disturbance considerations but the habitat acres within the involved watersheds are not included in this analysis.

The distribution of ownership and the BLM Land Use Allocations (LUAs) in the Analysis Area is summarized in Appendix L Table L-27.

3.5.2 Affected Environment

The recovery plan for the marbled murrelet identifies six recovery zones along the coast of Washington, Oregon, and northern California (FWS, 1997). In Oregon, there are two marbled murrelet Management Zones; Management Zone 1 extends 35 miles inland from the ocean and Management Zone 2 is located 35 to 50 miles inland. The analysis area for this project is in Management Zone 2.

There are six known occupied sites within the marbled murrelet analysis area; two historic sites are at least one mile from any of the proposed actions and are not discussed further in this analysis because the one-mile distance is sufficient to prevent any of the project activities from affecting murrelets or the habitat within the occupied site. Four marbled murrelet occupied sites were found in the proposed project area in 2023 and they are protected as per direction in the NCO ROD RMP (BLM 2016a, p.52, 64, 98).

The BLM is conducting ongoing clearance surveys to determine marbled murrelet occupancy. If surveys indicate occupancy those sites would be protected following direction in the ROD/RMP (BLM, 2016a, p. 98). Current marbled murrelet clearance survey results indicate the presence[9] (one detection per unit) of marbled murrelets in three EA harvest units (24-6-7B, 24-6-5E, and 24-6-4B)[10]. The second year of surveys are ongoing in 2024. On July 3, 2024, a marbled murrelet was detected in the vicinity of unit 24-06-04B. the detection is a presence detection and as such requires no specific protection until behavior indicative of nesting is observed.

Marbled murrelet nesting habitat is usually found in older forest stands with canopies dominated by large overstory trees, an abundance of large mossy branches, dwarf mistletoe brooms, natural depressions on large limbs, or old stick nests that can serve as platforms for egg laying (Lank, et al., 2003; Hamer & Nelson, 1995). The most critical characteristic of marbled murrelet nesting habitat is the presence of nest platforms (McShane, et al., 2004) (FWS, 2011b, p. 61599) that are typically found in old-growth and mature forests but can also be found in younger forests containing trees (of various sizes including remnant large trees with platforms. Potential nesting habitat may contain fewer than one platform tree per acre and nest trees may be scattered or clumped throughout the area (FWS, 2016, p. 51355). The quality and abundance of platform trees and the number of platforms per tree are more apparent in stands over 150 -years old.

Acres of marbled murrelet nesting and recruitment habitat

In the Roseburg District, nesting habitat generally consists of forested stands 80 years of age or older (i.e., a stand birthdate prior to 1937) that are within 50 miles of the Oregon coast and contain nesting structures on conifer trees with the following characteristics (BLM, 2016a, p. 98):

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

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[9] A site with murrelet **presence** is a site of potential habitat where there has been at least one murrelet detection. Presence sites include occupied sites. An **occupied site** is where murrelets have been observed exhibiting **subcanopy behaviors,** which are behaviors that occur at or below the forest canopy and that strongly indicate that the site has some importance for breeding

[10] Detections include flying over the canopy and a jet sound; a sound caused by air passing over the feathers when a murrelet is in a steep decent or when it is ascending after a dive (Evans Mack, et al., 2003, p. 58). Observed behavior of murrelets flying above the tree canopy denotes presence only, while occupied behavior includes murrelets flying below the canopy, landing, calling from a stationary point, or discovery of a nest, downy chick, or eggs (Evans Mack, et al., 2003, pp. 22-23). Currently a jet sound is not listed as a subcanopy behavior used to determine occupancy. The lifetime of probable absence sites (no detections) is five years before considering additional survey after communicating with regulatory agency (Evans Mack, et al., 2003, p. 24).

The analysis area contains 11,590 acres (54 percent of the total BLM-administered acreage) of nesting habitat and 6,564 acres of recruitment habitat (31 percent of total BLM-administered acreage) for the marbled murrelet (Table L-28).

Acres of marbled murrelet nesting and recruitment critical habitat

Critical habitat was designated for the marbled murrelet in 1996 (FWS, 1996) and revised in 2011 (FWS, 2011b). Critical habitat extends through management Zones 1 and 2 (Map 39). The Action Alternatives that affect nesting habitat are all within marbled murrelet Critical Habitat Unit (CHU) OR-04-f. This CHU is composed of three separate parts that total 20,839 acres of Federal land within the Roseburg District. The portion of the CHU that overlaps the analysis area contains approximately 11,813 total acres including 7,905 acres of nesting habitat, 2,188 acres of recruitment habitat and 1,712 acres of capable habitat, and 8 acres of non-capable habitat. Some road maintenance activities cross through about 150 acres of CHU OR-04-g but would not modify nesting habitat and is not discussed in this analysis.

3.5.3 Environmental Effects

The proposed actions would affect the marbled murrelet due to habitat loss from activities on the HLB, new road construction, and yarding wedges in the LSR. The PRMP/FEIS concluded that timber harvest would not affect the functionality of marbled murrelet critical habitat above the stand-scale at any time during the next 50 years because of the limited extent of timber harvest and because most or all designated critical habitat would be within reserves (BLM, 2016b, pp. 901-909). With buffers and seasonal timing restrictions in the LSR and RR, there would not be any significant effects from harvest to marbled murrelets nesting habitat and their critical habitat beyond those evaluated in the PRMP/FEIS (BLM, 2016b, pp. 895-918). Additionally, the USFWS concluded in their biological opinion on the PRMP/FEIS that:

> *"Although future implementation activities will impact murrelet nest sites in zone 2 (35-50 miles from the coast) within the harvest land base and the district designated reserve LUAs (all of which will be subject to their own, future consultation), the overall protections and management of murrelet habitat and sites in the PRMP are expected to result in an increase in the murrelet population within BLM lands and within the action area" (FWS, 2016, pp. 284-285)).*

The PRMP/FEIS (BLM, 2016b, p. 910) analyzed for harvest of 28,493 acres of marbled murrelet nesting habitat from 2013-2023 and 21,166 acres from 2023-2033.

Regarding harvest of marbled murrelet nesting habitat in CHU OR-04-f, the USFWS Biological Opinion for the PRMP/FEIS expected adverse effects to critical habitat at the (HLB) stand level in this subunit of 1,647 acres (2013-2023) and 208 acres in the second decade (2023-2033). At the same time, the total nesting habitat expected to develop in the CHU is a total of 21,751 acres (2013-2023) and 19,986 (2023-2033). Including 2014, 308 acres of harvest (184 VRH;124 acres of thinning) are completed in the CHU. VRH in 182 recruitment habitat acres and 2 acres of nesting while 123 acres of recruitment habitat was thinned and one acre of nesting habitat.

Alternative 1-No Action

Under the No Action Alternative, there would be no reduction in acres of marbled murrelet nesting or recruitment habitat, or critical habitat at this time. However, the ROD/RMP designated these acres as HLB and directs the Roseburg District to harvest sufficient quantities of timber over the next decade to meet the targets set in the ASQ statement in the ROD/RMP. The ROD/RMP states that all HLB acres would be harvested at some point during the life of the PRMP/FEIS (BLM, 2016a, pp. 104-105). Consequently, the BLM would harvest these acres within the next decade proposed under a different NEPA document.

Alternative 2

Acres of marbled murrelet nesting and recruitment habitat modified, downgraded, or removed

The combination of harvest units, road activities, and yarding corridors would remove, downgrade, or modify 816 acres of nesting habitat and 73 acres of recruitment habitat in the analysis area as outlined in Table L-29.

Harvest Actions

Variable-retention regeneration harvest would remove approximately 703 acres of nesting habitat from the total 11,590 acres of nesting habitat available within the Analysis Area. Variable-retention regeneration harvest would remove approximately 349 acres of recruitment habitat from the total 6,564 acres of recruitment habitat within the analysis area.

Variable-retention regeneration harvest would convert nesting and recruitment habitat to capable habitat. However, portions of the forest stands would be retained in the form of aggregates, and RR interspersed with concentrated harvest and dispersed retention of individual trees (BLM, 2016a, pp. 62-63). Units treated with VRH would not develop into nesting habitat given ROD/RMP objective to manage stands in the HLB to achieve continual timber production (BLM, 2016a, p. 59). Marbled murrelets may fly over or through the individual trees, aggregate areas or retained RR but would avoid large openings lacking platform trees with vertical and horizontal cover. Commercially thinned acres would function as recruitment habitat but would not develop into nesting habitat given the BLM's direction to harvest in HLB again in 40-60 years (BLM, 2018a, p. 112).

The remaining nesting habitat in the LSR, RR, and retention areas would provide nesting opportunities for murrelets. In the 50-year post harvest temporal scale, the treated stands would develop into recruitment habitat and would not develop into nesting habitat because the average VRH age in the PRMP/FEIS HLB is 88 years in the first decade and 80 years in the second decade (BLM, 2016b, p. 326).

Commercial thinning treatments would downgrade nesting habitat to recruitment habitat in 28 acres, representing less than one percent of the 11,590 acres of nesting habitat within the analysis area. Commercial thinning treatments would also modify 29 acres (less than one percent) of the 6,564 acres of recruitment habitat within the Analysis Area (Table L-29 and Table L-30).

Overall, the proposed harvest acres of nesting habitat is within the analyzed harvest acres (28,493) in the PRMP for the first decade (2013-2023) and the 21,166 acres of nesting habitat during the second decade (BLM, 2016b, p. 910). Recruitment habitat as described here is not identified in the PRMP/FEIS but its equivalent, non-habitat was part of the relative habitat suitability model of 0-100. As defined here, recruitment habitat fits the lower suitability thresholds and is not considered nesting habitat.

Road Activities and Yarding Wedges

Because of the linear nature of road construction and renovation, effects are limited to the edge of the forest stands that are treated. Road renovation and construction within nesting habitat and recruitment habitat would not inhibit use by marbled murrelets nor their ability for continued movement across the landscape. Marbled murrelets use of the treated corridors and adjacent stands is expected to continue post-treatment. PDFs would be applied where needed to retain nesting habitat function where applicable (Appendix B). Road construction will remove trees, shrubs, and down woody material and could cause the loss of nesting and recruitment habitats where it occurs – and along the edges of roads when conducting road renovation. This would result in the loss of potential nesting structure due to the felling of large diameter trees (greater than 20 inches DBH). Creation of gaps and openings associated with landings, yarding wedges, and road constructions would provide greater access and opportunity for visual predators (e.g., corvids) to locate marbled murrelet nests. In addition, corvids may be attracted to the gaps and openings created because of increased sunlight and reduced competition that stimulates berry-producing shrub growth along newly created road edges.

Road construction outside the harvest units would remove and convert one acre (less than one percent) of 11,590 acres of nesting habitat, and three acres (less than one percent) of capable habitat to road prism (non-capable habitat). Due to the limited removal of nesting and recruitment habitat along the road corridors (on average, approximately 45 feet total width), marbled murrelets would continue to use the adjacent forest stands for nesting.

Road renovation would remove and convert 79 acres of nesting habitat, 93 acres of recruitment habitat, and 53 acres of capable habitat to road prism (non-capable habitat). The removal of nesting habitat represents less than one percent of the available 11,590 acres of nesting habitat, less than one percent of the available 6,564 acres of recruitment habitat, and less than one percent of the available acres of capable habitat within the analysis area. Effects would be as described above.

Yarding wedges proposed outside of the harvest units would remove five acres (less than one percent) of the 11,590 acres of nesting habitat, two acres (less than one percent) of the 6,567 acres of recruitment habitat, and 15 (less than one percent) of the available 2,910 acres of capable habitat in the analysis area. Yarding wedge construction would clear all trees and vegetation, eliminating all vertical and horizontal cover. Therefore, the BLM expects that marbled murrelets would avoid constructed yarding wedges. Where yarding corridors are constructed within nesting habitat stands, habitat adjacent to treated corridors would continue to provide cover for marble murrelets and use (fly) through or over the treated corridors and adjacent stands.

Acres of marbled murrelet nesting and recruitment critical habitat modified, downgraded, or removed

Variable-retention regeneration harvest, road activities, and wedges would remove approximately 729 acres of the 7,905 acres of nesting habitat, 194 acres of the 2,188 acres of recruitment habitat, and 42 acres of capable habitat (1,712) within the portion of the CHU that overlaps the analysis area. In total, 965 acres of the 11,813 acres of the OR-04-f CHU within the analysis area would be affected (Table L-29). The remaining nesting and recruitment habitat within the CHU would continue to function as intended and provide landscape level nesting and recruitment habitat for the marbled murrelet. Regarding harvest of marbled murrelet nesting habitat in CHU OR-04-f, the USFWS Biological Opinion for the PRMP/FEIS expected adverse effects to nesting habitat in critical habitat at the (HLB) stand level in this subunit was modeled at 1,647 acres (2013-2023) and 208 acres in the second decade (2023-2033). At the same time, the total nesting habitat expected to develop in the CHU is a total of 21,751 acres (2013-2023) and 19,986 (2023-2033).

Including 2014, 308 acres of harvest (184 VRH;124 acres of thinning) are completed in the CHU. Variable-retention regeneration harvest in 182 recruitment habitat acres and 2 acres of nesting; and 123 acres of recruitment habitat and one acre of nesting habitat were thinned from 2013-2023. Including the planned treatment of 729 nesting habitat acres, the total nesting habitat treated since 2013 is 732 acres.

Alternative 3

Acres of marbled murrelet nesting and recruitment habitat modified, downgraded, or removed.

Under this Action Alternative, effects to nesting and recruitment habitat resulting from harvest actions road activities, and yarding wedge construction are the same as described under Alternative 2. There is no commercial thinning in Alternative 3, therefore only habitat removal would occur (Table L-32).

<u>Harvest Actions</u>

Variable-retention regeneration harvest would remove 1,662 acres of nesting habitat from the total the 11,590 acres available within the analysis area.

Road Activities and Yarding Wedges

Road construction would remove and convert three acres of nesting and eight acres of recruitment habitat to road prism (non-capable habitat). The conversion of nesting represents less than one percent of the available 11,590 acres of nesting and less than one percent of the 6,564 acres of recruitment habitat within the analysis area.

Road renovation would remove and convert 86 acres of nesting and 113 acres of recruitment habitat to road prism (non-capable). The conversion of nesting represents less than 86 acres of the available 11,590 acres of nesting and 129 acres of the 6,564 acres of recruitment habitat within the analysis area.

There are seven yarding wedges proposed outside of five harvest units, which would remove eight acres of the 11,590 acres of nesting and nine acres of the 6,743 acres of recruitment habitat within the analysis area.

Acres of marbled murrelet nesting and recruitment critical habitat modified, downgraded, or removed.

Variable-retention regeneration harvest would remove approximately 1,533 acres of the 7,905 acres of nesting habitat and 288 acres of the 2,188 acres of recruitment habitat available within the portion of the CHU that overlaps the analysis area. Road and yarding activities would remove 56 acres of nesting habitat and 52 acres of recruitment habitat within the portion of the CHU that overlaps the analysis area. In total, 15 percent (1,929 acres) of the 11,813 acres of the OR-04-f CHU within the analysis area would be affected. The remaining nesting and recruitment habitat within the CHU would continue to provide landscape level nesting and recruitment habitat for the marbled murrelet.

Alternative 4

Acres of marbled murrelet nesting and recruitment habitat modified, downgraded, or removed.

Under this Action Alternative, effects to nesting and recruitment habitat resulting from harvest actions road activities, and yarding wedge construction are the same as described under Alternative 2 (Table L-33).

Harvest Actions

Variable-retention regeneration harvest of nesting habitat would remove 1,243 acres of the 11,590 acres of nesting habitat and 326 acres of recruitment habitat from the 6,564 acres of recruitment habitat within the analysis area.

Commercial thinning would downgrade 0 acres of the 11,590 acres of nesting habitat and modify recruitment habitat in 155 acres of the 6,564 acres of recruitment habitat within the analysis area (Table L-33).

Road Activities and Yarding Wedges

Road construction outside of harvest units would remove and convert three acres of nesting and six acres of recruitment habitat to road prism (non-capable habitat). The conversion of nesting represents less than one percent of the available 11,590 acres of nesting and, less than one percent of the 6,564 acres of dispersal-only habitat within the analysis area.

Road renovation would remove less than one percent (78 acres) of the available 11,590 acres of nesting and less than two percent (107 acres), of the 6,743 acres of recruitment habitat within the analysis area.

Three yarding wedges proposed outside of two harvest units would remove less than one percent (eight acres) of the available 11,590 acres of nesting habitat, less than one percent (three acres) of the available 6,743 acres of recruitment habitat within the analysis area, and 13 acres of capable habitat.

Acres of marbled murrelet nesting and recruitment critical habitat modified, downgraded, or removed.

Variable-retention regeneration harvest would remove approximately 1,022 acres of the 7,905 acres of nesting habitat 145 acres of the 2,188 acres of recruitment habitat available within the portion of the CHU that overlaps the analysis area. Road and yarding activities would remove 10 acres of nesting habitat and three acres of recruitment habitat within the portion of the CHU that overlaps the analysis area. In total, nine percent (1,345 acres) of the 11,813 acres of the OR-04-f CHU within the analysis area would be affected. The remaining nesting and recruitment habitat within the CHU would continue to provide landscape level nesting and recruitment habitat availability for the marbled murrelet.

Alternative 5

Acres of marbled murrelet nesting and recruitment habitat modified, downgraded, or removed.

Under this Action Alternative, effects to nesting and recruitment habitat resulting from harvest actions road activities, and yarding wedge construction are the same as described under Alternative 2 (Table L-35). There is no VRH in Alternative 5 therefore there is no removal of habitat from harvest actions.

Harvest Actions

Commercial thinning would modify 1,662 acres of the 11,590 acres of nesting habitat and would modify 872 acres of the total 6,564 acres of nesting habitat within analysis area (Table L-35).

Road Activities and Yarding Wedges

Road construction outside of harvest units would remove and convert three acres of nesting habitat and eight acres of recruitment habitat to road prism (non-capable habitat). The conversion of nesting habitat represents less than one percent of the available 11,590 acres of nesting habitat and less than one percent of the 6,564 acres of recruitment habitat within the analysis area.

Road renovation would remove and convert 86 acres of nesting and 113 acres of recruitment habitat to road prism (non-capable). The conversion of nesting represents less than one percent (86 acres) of the available 11,590 acres of nesting and two percent (113 acres) of the 6,564 acres of recruitment habitat within the analysis area.

Seven yarding wedges proposed outside of five harvest units would remove less than one percent (10 acres) of the available 11,590 acres of nesting and less than one percent nine acres) of the available 6,743 acres of recruitment habitat within the analysis area.

Acres of marbled murrelet nesting and recruitment critical habitat modified, downgraded, or removed.

Commercial thinning would downgrade approximately 1,533 acres of the 7,905 acres of nesting habitat and modify 268 acres of the 2,188 acres of recruitment habitat within the portion of the CHU that overlaps the analysis area. Road and yarding activities would remove 56 acres of nesting habitat and 52 acres of recruitment habitat within the portion of the CHU that overlaps the analysis area. In total, 15 percent (1,823 acres) of the 11,813 acres of the OR-04-f CHU within the analysis area would be affected. The remaining 6,412 acres of nesting and 1,808 acres of recruitment habitat available within the CHU would continue to provide landscape level nesting and recruitment habitat availability for the marbled murrelet.

Alternative 6

Acres of marbled murrelet nesting and recruitment habitat modified, downgraded, or removed.

Under this Action Alternative, effects to nesting and recruitment habitat resulting from VRH actions road activities, and yarding wedge construction are the same as described under Alternative 2 and effects from thinning are the same as Alternative 5. Table L-37 presents the distribution of the proposed treatments in nesting and recruitment habitat present in the project area.

Harvest Actions

Table L-37 presents the effects from timber harvest and associated actions (road activities and yarding wedges) to the quantity of marbled murrelet nesting and recruitment habitat in the Analysis Area. Alternative 6 would remove 119 total acres (less than one percent) of nesting habitat in the analysis Area.

The proposed thinning (1,539 acre) of nesting habitat to 25-to 45 relative density and equivalent 60 percent canopy closure would downgrade nesting habitat for the following reasons:

Retention of 60 percent canopy cover and other forest stand components (1840 age trees and skip areas) would not avoid impacts to individual trees considered platform trees. The harvest prescription doesn't specifically target marbled murrelet platform trees for protection.

Harvest in near vicinity (within 150 feet) of platform trees would remove cover around the platform trees.

The overall harvest activity would increase openings within the current nesting habitat. Decrease of forest canopy can lead to increase predation of nesting murrelets.

Overall, thinning would downgrade 13 percent (1,539 acres) of the available 11,590 acres of nesting habitat in the analysis area.

Harvest and associated actions would remove 829 acres of recruitment habitat. Given the management direction for the Harvest Land Base, there is no expectation that these acres would return to forest condition that would function as nesting habitat for the marbled murrelet. In total, the Analysis Area would continue to have recruitment habitat but would lose 13 percent of the available 6,564 acres in the Analysis Area.

Thinning of 122 acres of recruitment habitat would retain its function post treatment as recruitment habitat because the forest stand would be modified but would continue to function and grow as recruitment habitat into the future.

Road Activities and Yarding Wedges

Road construction outside of harvest units would remove and convert four acres of nesting habitat and eight acres of recruitment habitat to road prism (non-capable habitat). The conversion of nesting habitat represents less than one percent of the available 11,590 acres of nesting habitat and less than one percent of the 6,564 acres of recruitment habitat within the analysis area.

Road renovation would remove and convert 84 acres of nesting and 108 acres of recruitment habitat to road prism (non-capable). The conversion of nesting represents less than one percent (86 acres) of the available 11,590 acres of nesting and two percent (113 acres) of the 6,564 acres of recruitment habitat within the analysis area.

Seven yarding wedges proposed outside of five harvest units would remove less than one percent (10 acres) of the available 11,590 acres of nesting and less than one percent (nine acres) of the available 6,743 acres of recruitment habitat within the analysis area.

Acres of marbled murrelet critical habitat modified, downgraded, or removed.

Road activities and yarding wedges would remove 137 acres (about 2 percent) of the available nesting habitat (7,905) in the critical habitat unit. While harvest activities and associated actions would downgrade 1,470 acres (14 percent) of nesting habitat via commercial thinning.

Harvest and associated actions would remove 267 acres (12 percent) and modify 60 acres (3 percent) of the recruitment habitat within the portion of the CHU that overlaps the analysis area.

In total, 16 percent (1,934 acres) of the 11,813 acres of the OR-04-f CHU within the analysis area would be affected. The remaining 6,300 acres of nesting and 1,861 acres of recruitment habitat available within the CHU would continue to provide landscape level nesting and recruitment habitat availability for the marbled murrelet.

Cumulative Effects

At this time there are no future foreseeable actions to include because the one potential instream restoration project that is foreseeable is under development on private and BLM land and impacts would be analyzed in future NEPA documents.

3.6 Issue 4. How would proposed VRH affect winter peak flows and summer low flows?

3.6.1 Background

Removal of trees and leaf area decreases evapotranspiration rates and reduces canopy interception of rainfall leading to increased soil moisture in harvested areas and more water available for stream channels. These effects scale more or less linearly with the amount of vegetation harvested (Harr, 1976; Rothacher, 1973). This means that the larger the harvest area the more pronounced the flow changes, and conversely, the smaller the harvest area the less pronounced the flow changes. To assess the potential sensitivity to hydrologic impact, the amount of Equivalent Clearcut Area (ECA) was determined from aerial photography and GIS data of all the HUC 14 Drainage Areas within the Blue and Gold Project Area (Table L-38, Appendix L). ECA is an accounting method that includes the area in roads within a watershed and unrecovered canopy openings resulting from recent timber harvest. The greater the amount of unrecovered canopy openings or ECA within a watershed, the greater the risk for changes in flow to the watershed. For peak flow effects, the possibility of measurable changes to peak flows occurs when the combination of road area and unrecovered canopy openings from recent timber harvest results in an ECA value of greater than 19 percent for rain-on-snow dominated hydroregions, or greater than 29 percent for rain dominated hydroregions based on (Grant, et al., 2008).

For summer low flow effects, no similar threshold has been suggested in the literature to estimate when measurable changes would occur. The work by Perry and Jones (2016) and Segura et al. (2020), advances our understanding about the timing, magnitude and duration of flow in response to vegetation management activities and subsequent hydrologic recovery, in a site-specific context. Their work builds upon an existing body of literature that federal land management agencies use to inform vegetation treatment design and analyze the effects of our proposed activities with regard to stream flow and water quality. Perry and Jones (2016) indicate that "the magnitude, duration, causes, and consequences of summer water deficits associated with forest plantations are not well understood." For Douglas fir plantations, the magnitude of effect appears to be related to the size of harvest area, the harvest prescription, the age of the recovering stand, and the density of stocking within the stand. The rate and trajectory of low flow hydrologic recovery depend in part upon species-specific water use changes with stand age (Moore & Wondzell, 2005; Perry, 2007). Cut areas can produce surplus low flow relative to the pre-harvest condition and transition to deficit low flow relative to the pre-harvest condition as young, densely planted, and vigorously growing trees increase site transpiration. Deficits diminish over time because trees exhibit declining transpiration with increasing stand age (Perry, 2007; Perry & Jones, 2016; Moore, et al., 2004). Perry (2007) and Perry and Jones (2016) found that entirely clearcut catchments produced the largest and most persistent summer streamflow deficits. Since these effects also appear to scale linearly with the amount of area harvested, the thresholds produced from the peak flow studies would be used to guide this analysis as to when further investigation of summer low flows is needed within individual drainage areas in the project area.

3.6.2 Methodology and Assumptions

Analytical Methodology for Assessing Low Flow Response

- Step 1—Bin BLM HLB and forested Reserve acres (The Reserve category includes BLM forested acres in Late-Successional Reserve, and Riparian Reserve.) by age category using BLM's Forest Operations Inventory data. This information represents BLM pre-harvest, baseline vegetation conditions (Table L-39).
- Step 2—Adjust the proportion of BLM acres in the respective age class bins to account for proposed VRH (e.g., for Bear-Doe Creek, remove 242 acres from the 130-year column and return these acres to the HLB 0-year column). This 2030 projection (Table L-39) represents BLM post-harvest vegetation conditions (i.e., the direct effect of implementing Alternative 3).
- Step 3—Based on the analytical assumptions, calculate BLM HLB and forested Reserve acres in flow surplus (0- and 10-year columns), flow deficit (20–70-year columns), partial hydrologic recovery (80–120-year columns), and hydrologic recovery (130+ year column). Graph acres by flow category for 2024, 2030, and every decade thereafter through 2160 by advancing HLB and reserve forest acres to the next older age column (Table L-39). Harvest Land Base acres would advance through the decades until reaching the 90-year column at which point these acres are returned to the 0-year column signifying harvest Reserve forest acres would continue to age and accrue in the 130+ year category. This multi-decadal information (Figure L-2, Figure L-3, Figure L-4**)** represents the cumulative effect of the proposed harvest and subsequent harvests at the 90-year mean rotation age, and the maturation of Reserve Forest.
- Note that Steps 2 and 3 use total treatment acres and do not reflect LITA or MITA management direction to retain 5–30 percent of pre-harvest stand basal area in live trees, resulting in an overestimate of harvest effect. In Step 2, retention would reduce the number of acres returning to flow surplus from flow deficit and partial hydrologic recovery. In Step 3, retention would reduce the number of acres leaving partial hydrologic recovery to return to flow surplus at the 90-year mean rotation age.
- Step 4—Bin private forest land acres by age category and drainage area by Using Google Earth Imagery and LiDAR heights and stand ages corresponding to BLM-administered lands : 0–19-year-old stands are 0–57 feet tall, 20–79-year-old stands are 58–100 feet tall, 80–129-year-old stands are 101–122 feet tall, and 130+ year old stands are over 122 feet tall. These age categories correspond to flow surplus, flow deficit, partial hydrologic recovery, and hydrologic recovery. Because the BLM does not have fine scale stand age data for private forest land, this step is done once to show current conditions, with the assumption that the relatively young private age class distribution that we see today is very likely the age class distribution that we will see in the future.

The magnitude or intensity of anticipated flow changes is given in the context of the results from regional paired watershed studies. The BLM would not directly measure stream discharge, or the loss or gain in summer streamflow volume and flow connectivity. Streamflow gaging data that describes baseline low flow conditions in the catchments, drainages, and subwatersheds of the analysis area does not exist, and the BLM is not planning to install the research-grade equipment necessary to provide high resolution low flow measurements; therefore, comparisons of actual low flow measurements from pre- to post-harvest and through time are not possible. Also, the BLM has not mapped the seasonal extent of perennial (continuous) and intermittent (discontinuous) flow at lowest discharge or measured or estimated the volume of individual pools at lowest discharge, and it would be an unreasonable commitment for the BLM to complete such fine-scale surveys at the appropriate time of year every year.

The BLM would show existing flow conditions on BLM and private (baseline), BLM post-harvest conditions (direct effect), and trends for BLM forest acres through the year 2160 (cumulative effect) by graphing the proportion of forest acres in each of the four hydrologic recovery categories by time period and drainage area. Areas that are in partial hydrologic recovery and hydrologic recovered status will be combined into one hydrologic recovery category to simplify data presentation.

The BLM's proposed vegetation management would produce a less intense maximum summer low flow response than that described by Perry (2007) and Perry and Jones (2016). As mentioned previously, the authors found that entirely clearcut catchments produced the largest and most persistent summer streamflow deficits and thinning and smaller patch cuts (less than eight acres) produced much less low flow response than clearcutting, and no summer streamflow deficits over time. The BLM is not proposing to clearcut entire catchments, but the proposed VRH openings would be greater than eight acres in areas suggesting a summer low flow response moderate in intensity (i.e., some low flow effect, at times positive (surplus) and negative (deficit), that may persist for a decade or more). Maintaining the RR would enhance stream-aquifer interactions (Moore & Wondzell, 2005) and benefit low flow maintenance. Water storage capacity in the smaller intermittent and perennial headwater streams and larger perennial main stems draining the proposed harvest units would temper potential harvest-related summer streamflow changes. The RR provides a continual source of large wood for channels, and small headwater streams function as one of the dominant storage reservoirs for sediment in mountainous terrain given an adequate supply of in-stream wood (May *et al.* 2004). Studies in the Oregon Coast Range (May & Gresswell, 2003a; May & Gresswell, 2003b) and Cascade Range (Swanson, et al., 1982; Grant & Wolff, 1991) indicate fluvial transport of sediment and wood in high gradient headwater streams is minimal in the interval between debris flows. Large wood recruited from adjacent hillslopes and riparian areas is typically large in relation to the size of the channel and therefore resistant to movement. As wood continues to accumulate, the water storage capacity of low order channels increases (May & Gresswell, 2003b). This water storage capacity is important, especially in late summer when deep hillslope and long hyporheic flowpath contributions to streamflow become increasingly dominant (Bond, et al., 2002). Wood recruited from the RR would also benefit both the magnitude and duration of water storage in larger channels by capturing sediment and organic material, creating and enlarging pools, and enhancing stream–floodplain connectivity. Streams with well-connected floodplains and deep sediment store water from periods of higher runoff and release the water gradually during periods of lower runoff (Coutant, 1999; Winter, et al., 1998).

Maintaining the RR would prevent riparian species composition changes that can exacerbate low flow deficits. Persistent summer flow deficits developed in WS1, a 237-acre clearcut catchment in the H.J. Andrews Experimental Forest analyzed by Perry (2007) and Perry and Jones (2016), in part because hardwoods colonized the relatively wide valley floor after logging, and hardwoods use more water per unit leaf area than the conifer species that were present in the riparian zone prior to logging. Hicks *et al.* (1991) suggest that the establishment of hardwoods in the riparian zone following clearcut logging caused water yields to drop below predicted yields. Red alder established after debris flows in WS3, a 250-acre catchment in the H.J. Andrews Experimental Forest that was 25 percent patch cut, intensified summer streamflow deficits (Perry, 2007). The BLM's proposed harvest would not result in near-stream species composition changes like those seen in the H.J. Andrews thus eliminating this as a factor influencing post-harvest low flow change.

The RR is just one of the features that distinguish the proposed LITA and MITA harvest from the entire catchment clearcuts analyzed by Perry (2007) and Perry and Jones (2016). In each VRH unit, the BLM would retain 5–30 percent of pre-harvest stand basal area in live trees. Retaining individual trees and aggregate groups of trees outside of and in addition to the RR reduces the harvest footprint and decreases the potential for adverse changes to summer streamflow volume in fish habitat. Retained portions of the stand would exhibit declining transpiration with increasing age somewhat offsetting increased transpiration from younger vegetation.

The spatial layout of BLM's proposed harvest units further distinguishes LITA and MITA vegetation management from the entire clearcut catchments and drainages analyzed by Perry (2007), Perry and Jones (2016), and Segura *et al.* (2020). Clearcutting whole experimental catchments and drainages concentrated disturbance and maximized summer streamflow change. Contrast this with the BLM where topographic divides split the proposed harvest units, the proposed harvest units drain to multiple different catchments within 14 different drainages and eight different subwatersheds, and all within-unit streams are surrounded by site-potential-tree-height RR. This spatial layout keeps disturbance away from streams and disperses disturbance minimizing the amount of change in any one area. Also, in addition to being staggered in space, the proposed BLM timber harvest would be staggered in time desynchronizing flow changes. Proposed timber sales would occur between 2024 and 2027 and dependent on the extent of sale contract work, purchasers would have two to four years to harvest.

It is a given that the BLM's proposed vegetation management would affect summer flow surplus and summer flow deficit by changing interception and evapotranspiration. What is less certain is determining the amount of flow surplus, and more importantly, flow deficit that would come from the proposed vegetation management within the context of experimental forest treatments. The BLM's proposed VRH of 40-140 year-old stands with PDFs (Appendix B) has no treatment intensity and treatment arrangement analogues in the handful of experimental treatments completed in western Oregon—six clearcuts, two larger-opening patch cuts, and one smaller-opening patch cut (Table L-41). The way flow deficit is created and measured in the experimental forests also makes it difficult for the BLM to compare study results with proposed management outcomes. Researchers establish a streamflow relationship between a reference or control catchment/drainage and a treatment catchment/drainage prior to harvest, and then measure the relative mean daily streamflow departure (treatment versus reference) following harvest (Table L-41 Summer Flow Deficit column). Studies have subjected older, hydrologically recovered forests to intense treatments that maximize flow surplus and later flow deficit, conditions that create more departure from older, hydrologically recovered reference stand streamflow conditions. Compare this with the BLM's proposal to treat younger, flow deficit and partially hydrologically recovered stands less intensely through implementation of PDFs, conditions that limit flow surplus and flow deficit relative to pre-harvest streamflow conditions.

Flow surplus, unlike flow deficit, is regarded as a good or positive outcome due to additional water being available; therefore, the following analysis concentrates on the magnitude or intensity of anticipated flow deficit. Direct comparison notwithstanding, the BLM can use the experimental results as a frame of reference for estimating the magnitude of management-related summer streamflow deficit. The BLM's proposed vegetation management would clearly not generate flow deficit similar to experimental clearcutting (Table L-41). Clearcutting entire older forests and establishing plantations took stands with fewer, slower growing trees and replaced them with openings with few or no trees (lower transpiration/higher streamflow) followed decades later by stands with fast growing and densely planted young trees (higher transpiration/lower streamflow). The BLM is not proposing to harvest entire catchments or drainages without riparian buffers as was done in the experimental forests, establish dense plantations, or remove wood from stream channels as was done in Needle Branch, part of the Alsea Watershed Study (Segura, et al., 2020); therefore, the maximum flow deficit would not develop. With live tree stand retention acres outside of and in addition to the RR, the BLM would be leaving more of the forest than it proposes to harvest as a total across all fourteen HUC 13 drainage areas 13,280 Reserve acres + 5-30 percent retention from the treatment acres. The BLM stands would not approach the extremes of transpiration and streamflow seen at the experimental forests, and retaining trees, thinning trees to control density, interspersing cut and uncut areas, and implementing longer rotations means streams would experience less streamflow change compared to wholesale harvest.

It's more plausible that BLM's proposed vegetation management would generate flow deficit nearer that demonstrated by the larger-opening patch cuts, if not more modest. Still the comparison is problematic given such a small sample size (two experimental treatments), and obvious differences in forest age, harvest configuration, and stream channel condition. The patch cut versus clearcut flow deficit values support the idea that streamflow change is generally proportional to the amount of vegetation removed. Streamflow change is also sensitive to harvest distance from streams, and on this point, there is an obvious difference between the BLM's proposed management and experimental treatments. The BLM is not proposing to harvest through intermittent and perennial streams or use narrow buffers on perennial streams as was done in the patch cuts. The BLM's RR would be 167-188 feet on all perennial and intermittent streams. These wider buffers in the experimental patch cuts would have reduced treatment acres or shifted harvest upslope providing for a better comparison to BLM's contemporary practices. It is conceivable that the 21 percent flow deficit for the one larger-opening patch cut in the H.J. Andrews would have been reduced if not for large debris flows in December 1964 and February 1996 that resulted in the destruction of the gaging station in the catchment and riparian vegetation changes. Swanson *et al.* (1980) state that "the road fill failures at the heads of long, steep, straight channels-initiated debris torrents which flushed the WS3 channel system." As mentioned previously, Perry (2007) noted that red alder established after debris flows intensified summer streamflow deficits. In contrast, the streams draining the BLM's proposed harvest units do not show signs of recent debris flow activity (i.e., they have accumulated sediment that facilitates water storage and more gradual water release) and the RR prevents encroachment of species that transpire more water and diminish streamflow. The 14 percent flow deficit for the one larger-opening patch cut in the Alsea (original harvest 1966) is also the product of additional clearcutting and thinning between 1978 and 1988 in three units totaling just over 100 acres (Stednick, 2008, pp. 145-147, Figures 9.2 and 9.3; Segura, et al., 2020, p. Figure 2)—1969 aerial photo showing three original patches outlined in yellow and 1994 aerial photo showing three patches harvested later outlined in orange). Considering the important differences between the experimental treatments and what's being proposed, it's reasonable and conservative for the BLM to assume a 15 percent flow deficit to further this analysis.

The BLM cannot quantify a 15 percent flow deficit using measured summer streamflow values from the analysis area, but modeled data is available and useful. Since Bear-Doe Creek has the greatest amount of change in ECA and the proposed action would result in an exceedance of the threshold for detectable change in flow, it will serve as an example for estimating and quantifying the potential change in flow. The BLM downloaded July and September 50 percent duration values from StreamStats (USGS, 2024) for the Bear-Doe Creek HUC 14 Drainage Area. The 50 percent duration value represents a flow that is equaled or exceeded 50 percent of the time, and, for reference, one cubic foot per second of flow equals approximately 449 gallons per minute (gpm). The modeled 50 percent duration for July and September is 394 and 137 gpm, so a 15 percent flow deficit reduces July and September flow by 59 and 21 gpm. A summary of low flow response is provided in Table L-42 below:

The proposed vegetation management would cause summer streamflow volume change. The direct effect (occurring in the same time and place) would be an incremental flow surplus. The relative change in flow surplus pre-harvest to post-harvest would be muted by within-unit vegetation retention and would fall within the range of streamflow variability.

The anticipated relatively modest flow surplus response lessen the probability that fish habitat would be exposed either directly or indirectly to a substantially different flow regime post-harvest. If streams within the proposed harvest units were instrumented to provide high resolution low flow measurements, there would be more flow response in the first- and second-order headwater streams than in the higher order streams where fish habitat is located (Reiter & Beschta, 1995; Surfleet & Skaugest, 2013). Smaller watersheds generally have greater variability in streamflow and show a relatively larger impact of land use change than larger watersheds (Pilgrim, et al., 1982). Flow surplus would produce a relatively small rise in stage or flow depth in perennial stream fish habitat, and this would primarily affect riffles as explained in the next paragraph. Even small flow surplus provides improved habitat conditions by increasing stream volume (Reiter & Beschta, 1995). The flow surplus would not drastically increase the amount of habitat available at tributary junctions for volitional fish use because the flow increase would be small, there are a finite number of non-fish tributaries entering fish habitat, and these tributaries increase in gradient and become difficult to ascend within feet to tens of feet of fish habitat in the main stems. A continual supply of large wood from the RR to the proposed harvest unit streams would enhance the storage of sediment and organics in and upstream of fish habitat, boosting the storage of water including flow surplus, however small.

The indirect effect (later in time) of the proposed vegetation management would be an incremental flow deficit moderated by project design features. The magnitude or intensity of the flow deficit beginning roughly 20 years post-harvest would be substantially less than the relative changes reported by Perry (2007), Perry and Jones (2016), and Segura *et al.* (2020) for entirely clearcut catchments and drainages, and the magnitude of the flow deficit would be within the range of streamflow variability. Anadromous species that rear in freshwater throughout the year must tolerate a wide range of streamflow conditions in coastal streams. Fish are adapted to the environment in which they have evolved, and salmonids are well adapted to steep western watersheds characterized by seasonal variability in streamflow. There is a low probability that the extent of fish habitat, defined within the context of naturally variable streamflow and naturally variable habitat conditions, would contract (hundreds of feet) downstream solely in response to the proposed vegetation management. There is also a low probability that fish habitat would be exposed to a management-related flow deficit that results in persistent (year after year) and widespread loss of flow connectivity, trapping of fish in isolated habitats, or dewatering mortality. Fish habitat within the proposed harvest units occurs in higher-order, valley-bottom perennial streams.

The BLM's ecologically based forest management practices are unlike experimental forest clearcuts or private forest practices. VRH as proposed would produce a modest change in summer surplus and deficit streamflow compared to clearcutting. Fish habitat would not be exposed either directly or indirectly to a significantly different flow regime post-harvest. Summer streamflow conditions on BLM-administered land as measured by stand age would improve during the time period for this analysis. The Reserve, (LSR and RR) making up 71 percent of the BLM's forest acres in the analysis area, would see flow deficit acres move to partial hydrologic recovery and then hydrologic recovery. In the HLB, retention and longer rotations would contribute to older age classes and an uptick in the amount and duration of partial hydrologic recovery acres on the landscape.

Analytical Assumptions

- The BLM, consistent with Harr et al. (1979) and Perry (2007), defines summer streamflow as streamflow occurring from July through September. In summer, evapotranspiration is at its maximum, and both rainfall and streamflow drop to seasonally low levels. Summer streamflow, low streamflow, and low flow are used synonymously in this analysis.
- Lower summer streamflows affect salmonids and other native fish by reducing available summer rearing habitat and increasing thermal stress. Specific detrimental flow effects may include loss of flow connectivity, trapping of fish in isolated habitats, inhibiting of migration, increased predation, interruption of juvenile behaviors such as feeding, and direct dewatering mortality.
- Regional paired watershed studies including those by Perry (2007), Perry and Jones (2016), and Segura et al. (2020) provide a frame of reference for interpreting the potential effects of BLM's proposed vegetation management on summer streamflow volume. However, vegetation treatments in regional paired watershed studies are generally dissimilar from BLM's vegetation treatments under the 2016 RMPs for Western Oregon limiting direct comparison of study results and proposed management outcomes. Also, regional paired watershed studies have been important to show local consequences of forest manipulation on streamflow but generalizing these findings and making predictions from them across diverse climate, geology, vegetation, and topographic settings has been difficult. Predicting the response of streamflow to forest cover change is complicated due to the variability of water stored in soil and weathered and fractured rock, and the evolving and

differential forest access to available water (McDonnell, et al., 2018; Blandon, et al., 2019). It is challenging to transfer results beyond watershed boundaries where suitable data exist due to scaling issues, the unique characteristics of individual watersheds, and the complexity of the processes involved. Interactions between climate variability and disturbance affect water quantity response making predictions of end-states difficult (Pike, et al., 2010).

- Hydrologic recovery refers to the decreasing impact of forest practices through time as a result of vegetation regrowth (Moore & Wondzell, 2005). Hydrologic recovery also refers to the processes by which hydrologic functions return to pre-harvest levels, and to the degree of recovery (Perry, et al., 2016). Reduced interception of precipitation and reduced evapotranspiration following timber harvest can increase water yield including low flow (Harr, 1983). Streamflow changes are generally proportional to the amount of vegetation removed (Harr, 1976) (Harr, et al., 1979) (Bosch & Hewlett, 1982), and harvested areas do not permanently change streamflow. Streamflow returns to pre-harvest levels or the hydrologically recovered state as interception and evapotranspiration change in response to the growth of planted trees and the growth of remaining and naturally recruited vegetation.

Spatial Scale

The BLM's geographic scales for this analysis include the headwater catchments draining the proposed VRH and commercial thinning units, the drainages or named streams to which these catchments contribute, and the eight subwatersheds that contain the catchments, drainages, and proposed harvest units. Subwatersheds are generally 10,000-40,000 acres in size and have a single outlet (BLM, 2016b, p. 386). Drainage areas (HUC14) are smaller, nested inside a subwatershed (HUC12), and may contain one or more proposed harvest units. Subwatersheds are nested within the larger watersheds (HUC10) which are provided for a general reference of location and displayed in Table L-42 below. The project area used in this analysis, is the total area of the 13 drainage areas. These scales of analysis are appropriate because they allow for a meaningful analysis of hydrologic effects downstream and facilitate cumulative effects analysis.

Temporal Scale

Following timber harvest, if large openings are created, altered hydrologic processes are assumed to occur until canopy openings reach of state of hydrologic recovery. Using silvicultural research data, interim recovery is estimated by applying a recovery factor based on the number of years since harvest to calculate the ECA.

In assessing for peak flow effects, hydrologic recovery is assumed to occur when a canopy cover of at least 40 percent and tree height of 15 feet is attained. This is based on the accumulation and re-distribution of snowfall in the open vs. being intercepted on tree canopies, and the reduction of wind speed at the ground level. Both of these factors affect the rain-on-snow signature in changing snow accumulation and melt (Carpenter, personal communication, 2014). Based on data from Flewelling et al. (2001), this criterion is reached approximately seven years following harvest and reforestation in moist forest areas.

Low flow analysis, unlike peak flow analysis, has no threshold or linear envelope curve (Grant, et al., 2008, p. 35) to facilitate comparison of proposed BLM harvest treatments and study results. The rate and trajectory of low flow hydrologic recovery occur on a continuum influenced by not only stand age and the intensity and arrangement of harvest, but also species composition, stocking density, site productivity, disturbance, precipitation, soils, geology, aspect, elevation, and hydrologic regime (rain-dominated versus snow-dominated) (Moore & Wondzell, 2005; Perry, 2007; Perry & Jones, 2016; Winkler, et al., 2010; Brown, et al., 2005) Perry and Jones (2016) do not give an estimate of years to low flow hydrologic recovery; 37–46-year-old densely stocked plantations in 100 percent clearcut catchments exhibited deficit low flow relative to the 100+ year-old stands they replaced. Perry (2007 p. 102) does suggest, based on limited information from entirely clearcut catchments, that stand level transpiration would return to near old-growth levels by 130 years in Douglas-fir dominated stands. The BLM considers this 130-year figure as a coarse screen for hydrologic recovery to historical low flow conditions.

3.6.3 Affected Environment

There are approximately 80 first- or second-order headwater streams and three higher order streams (Yellow Creek, Bear Creek, and Doe Creek) adjacent to or within the proposed units totaling approximately 32 miles of stream length. Approximately 65 percent of this stream length is classified as intermittent (i.e., they stop flowing in the dry season and surface water is no longer transported downstream), and 35 percent is classified as perennial (i.e., surface water flows year-round with the channels passing some volume of water throughout the year). All of the streams within and adjacent to treatment units in the Blue and Gold project area are high gradient cascade and step-pool stream types. There are 62 waterbodies, seeps or springs (all less than one acre) within the project units. All of these features would be allocated RR and no harvest buffers. The BLM would construct yarding corridors and roads within the RR under each alternative as proposed in Chapter 2 and identified in Appendix A.

Almost all of the project area (98 percent) lies within the rain dominated hydroregion where snow accumulation is uncommon (i.e., below 2,100 feet elevation). The rest (2 percent) of the project area lies within the rain-on-snow hydroregion (i.e., 2,100-4,000 feet in elevation) where snow accumulation occurs transiently throughout the wet season.

Stream flows are dependent upon the capture, storage, and runoff of precipitation. Timber harvest can alter the amount and timing of peak flows and summer low flows by changing site-level hydrologic processes. These hydrologic processes include changes in evapotranspiration, snowmelt, forest canopy interception of rain and snow, road interception of surface and subsurface flow and changes in soil infiltration rates and soil structure (BLM, 2008b, p. 352).

Peak Flow Response

Based on a compilation of watershed studies in the Pacific Northwest, completed in catchments, a peak flow response is possible when at least 29 percent of the drainage area is harvested in rain dominated watersheds (Grant, et al., 2008, p. 35). No experimental study shows a peak flow increase when less than 29 percent of a drainage area in the rain dominated hydroregion has been harvested (BLM, 2008b, p. 353). For rain-on-snow watersheds this threshold is 19 percent (Grant, et al., 2008, p. 35). The largest peak flow increases reported were for small storms with a recurrence interval much less than 1 year. Grant *et al*. (2008) concluded that field reviews did not provide evidence that timber harvest increases peak flows for storms with return intervals longer than 6 years, because the storm event is strong enough that forest management is not an influencing factor in peak flows. Peak flows from storms less than 1 year lack the energy to alter channel form. Therefore, peak flows from storms with 1- to 6- year return intervals reflect the range for measuring the impacts on peak flows from timber harvest. The recurrence interval (RI) or return period of a flow is the average number of years over the period of record that an annual peak flow equals or exceeds a specified discharge. This metric may also be reported as the annual exceedance probability, which is calculated as the inverse of the recurrence interval, e.g., the probability that the flow will be equaled or exceeded in any given year. For example, a flow with a 5-year RI has a 0.2 probability (20 percent chance) of being equaled or exceeded in any given year.

Summer Low Flows

Previously, common understanding on this issue has been that summer streamflow would increase following clear-cut logging, and then recover 10 to 15 years later after a new stand of trees gets established. Perry and Jones (2016) document that conversion of 130 to 450+ year old mature and old-growth forest to Douglas-fir plantations causes an increase in evapotranspiration (p. 10), and a reduction in summer stream flows within 15 years of conifer plantation establishment with the deficit persisting and intensifying in 50-year-old forest stands (p. 8). The reduction can be up to 50 percent less than flows from nearby mature and old-growth forests. The research was conducted in catchments that were 22 to 250 acres in size.

Perry and Jones found that the largest summer streamflow surpluses and the largest, persistent summer streamflow deficits resulting from the growth of dense plantations were produced by the largest openings (49 to 247 acres). Surpluses were lowest and disappeared most quickly in shelterwood or 50 percent thinned basins, and summer streamflow deficits did not occur in shelterwood basins and basins with small openings (1.5 to 3.2 acres). Therefore, thinning projects and silvicultural prescriptions which only create small openings are not expected to contribute to reductions in summer low flow over time.

Hydrologic recovery can have two end points: hydrologic recovery to pre-harvest or baseline conditions, or hydrologic recovery to historical conditions (i.e., flow conditions associated with a previously unmanaged stand). Recovery to historical stand and low flow conditions as measured by stand age is not a management objective of the Moderate Intensity Timber Area (MITA) or Low Intensity Timber Area (LITA) Land Use Allocation. The proposed MITA and LITA harvests in 40–140-year-old stands represent a cessation of hydrologic recovery towards historical low flow conditions. Hydrologic recovery would occur during the post-harvest decades, and forest stands would achieve at least partial hydrologic recovery relative to historical conditions before the next, relatively long harvest rotation. The portions of BLM's HLB in MITA and LITA would have a mean VRH age of 90 years between 2024 and 2114 (BLM, 2016b, p. 317). Early-successional stand conditions are an outcome from our ASQ harvest and removing a portion of the existing stand would produce some measure of surplus summer streamflow relative to both the existing baseline and historical flow conditions. Two other LITA and MITA management outcomes, develop diverse late-successional ecosystems for a portion of the rotation, and provide a variety of forest structural stages distributed both temporally and spatially (BLM, 2016a, p. 63), provides for summer streamflow recovery and maintenance because older trees would exhibit declining transpiration with increasing stand age making more water available for other vegetation, groundwater storage, and streamflow, and retention of stand components reduces harvest area and harvest-related streamflow changes.

Recovery to historical stand and low flow conditions as measured by stand age would eventually occur on Reserve forest acres. Reserve forest acres are exempt from VRH, and BLM management direction limits the extent and intensity of upslope harvest in the Reserve. Even if Reserve forest acres are thinned, the remaining forest would continue to age and contribute to the pool of older forest acres.

The hydrologic relationships that have been described in past and current research are based on the results of study designs in which a large percentage of small catchments were clearcut logged with minimal stream buffers (Rothatcher, 1973; Ziemer, 1981; Jones & Grant, 1996; Thomas & Megahan, 1998; Jones, 2000; Beschta, et al., 2000; Grant, et al., 2008; Surfleet & Skaugset, 2013; Perry & Jones, 2017; Harr, et al., 1975) (Harr, 1976) (Harr, et al., 1979) (Ziemer & Lisle, 1998; Jones & Grant, 2001)To date, the BLM is not aware of any published research that describes the effect of Northwest Forest Plan or subsequent Western Oregon Plan Revision designed timber sales (such as under the 2008 or 2016 ROD/RMPs), with RR buffers on changes in summer streamflow. Current BLM management restricts commercial harvest within 120 feet of all streams within the Blue and Gold Harvest Plan project area, and no timber harvest is proposed within the RR Untreated RRs serve to decrease the amount of watershed area which would be treated which acts to reduce the potential hydrologic response.

3.6.4 Environmental Effects

For the Blue and Gold project area, all the HUC 14 drainage areas have greater than 60 percent of their area in the rain dominated hydroregion (this ranges from 90 to 100 percent) and therefore was analyzed using the 29 percent harvested threshold for rain dominated watersheds. The calculated ECA is shown in Table L-43, in Appendix L, for all alternatives. Three Drainage Areas exceed the 29 percent threshold, Bear-Doe Creek for Alternatives 2, 3, and 4, Headwaters Brush Creek for Alternative 3, and Upper Yellow Creek for Alternative 3. A discussion on these effects follows below.

Increases in peak flow can also occur when roads and other impermeable areas occupy more than 12 percent of a drainage that is in a rain-on-snow hydroregion (BLM, 2008b, p. 353). Within the project area, roads currently occupy approximately three to five percent of the drainages (all of which are rain dominated) and do not pose a risk of increased peak flows. Table L-44 below shows the percentage of area in road for each HUC 14 Drainage Area and what the percentage would be after implementing the proposed road construction under each alternative. All drainage areas would remain below 12 percent and would not pose a risk of increased flow response.

Alternative – No Action

Canopy Opening Impacts on Peak Flow and Low Summer Flow Susceptibility

Foregoing BLM harvest in the near term (next 20 years) would mean that 860 acres of HLB forest proposed for management would move from flow deficit to partial hydrologic recovery. These acres would join the other 1390 acres of HLB forest proposed for management that are currently in partial or full hydrologic recovery. Foregoing BLM harvest now does not mean that harvest in the analysis area would not occur. It is reasonably foreseeable that the BLM would harvest most if not all of the 7260 acres of HLB within the project area during the temporal scale identified for this analysis (135 years). Future harvest is probable because the HLB occupies a small percentage of total BLM acres, and an objective of the HLB is to manage forest stands to achieve continual timber production that can be sustained through a balance of growth and harvest (BLM, 2016a, p. 59). HLB acres make up 39 percent of all BLM forested acres in the analysis area, and approximately 20 percent of the BLM-administered land in the planning area for the ROD/RMP. Reserve forest acres would continue to get older independent of management actions affecting the HLB. Aging of Reserve forests is the primary driver for the future partial hydrologic recovery and hydrologic recovery acreage gains.

Under the No Action Alternative, no canopy openings would be created. Therefore, peak flow and summer low flow would not be affected and there would be no susceptibility of increased peak flow or decreased summer flow.

Road Impacts on Peak Flow Susceptibility

There would be no increase in road density within the project area since there would be no road construction. Therefore, peak flow would not be affected and there would be no susceptibility of increased peak flow.

Fuels Management Impacts on Peak Flow and Low Summer Flow Susceptibility

Under the No Action Alternative, no fuels management would occur. Therefore, peak flow and summer low flow would not be affected and there would be no susceptibility of increased peak flow or decreased summer flow.

Alternative 2, 3, and 4

Canopy Opening Impacts on Peak Flow and Summer Low Flow Susceptibility

Peak Flow Response

The PRMP/FEIS (pp. 384-394) analyzed peak flow effects from forest management on subwatersheds (HUC 12 watersheds) across western Oregon. Although some subwatersheds would be susceptible to increases in peak flows, this does not necessarily imply adverse effects on stream form. It is presumed that hydrologic impacts, such as peak flow increases, would vary depending on the intensity of a treatment (i.e., clear-cut regeneration harvest having the greatest impact and thinning having the least impact), although past experimental studies in the Pacific Northwest did not fully examine the differences (Grant, et al., 2008). Stream flow fluctuates with climate and over time, channels have developed under a wide range of stream flows including infrequent peak flows. These stream flows have the potential to affect the frequency of sediment transport and the depth of scour. However, the potential for peak flow effects would vary depending on stream type (Grant, et al., 2008). The PRMP/FEIS (p. 390) indicated within high gradient cascade and step-pool stream types there is little potential to affect sediment transport and peak flow enhancement because these are highly stable systems with large capacity to dissipate stream energy. All of the streams within and adjacent to treatment units in the Blue and Gold project area are these types of streams.

Within the rain dominated drainages, existing ECA ranges between 7 and 23 percent. Headwaters Brush Creek and Bear-Doe Creek have the highest ECA at 23 and 21 percent, due to approximately 760 and 670 acres of private timber harvest within the last 7 years. The addition of VRH under Alternative 2 would increase the ECA by approximately 12 percent for the Lower Yellow Creek Drainage, nine percent in the Bear-Doe Creek Drainage and zero to three percent in all the other drainages. Except for Bear-Doe Creek, all the HUC 14 Drainages in the Blue and Gold Project Area would remain below the 29 percent ECA threshold where measurable increases in peak flows would be anticipated (Grant, et al., 2008). Bear-Doe Creek ECA would increase to 30 percent and would be above the detection limit where measurable increases in peak flow would be detected. The detection limit for changes in stream flow is plus or minus 10 percent. Percentage changes in peak flow that fall in this range are within the experimental and analytical error of flow measurement and cannot be ascribed as a treatment effect. (Grant, et al., 2008, p. 23) For Bear-Doe Creek this would result in a potential increase in peak flows which range from 0 to 11 percent with return intervals of 1 to 6 years. USGS StreamStats estimates for streamflow for a two year flood is 359 cfs and 526 cfs for a 5 year flood. The maximum increase would amount to an additional 39 to 58 cubic feet per second (cfs) of flow for storm events with an RI between 2 and 5 years.

The VRH proposed in the Blue and Gold project under Alternative 3 would result in a greater peak flow response in Bear-Doe Creek as Alternative 2 but would also increase the Headwaters of Brush Creek and Upper Yellow Creek Drainages above the detection limit for peak flow response. The proposed harvest would increase the ECA by approximately 26 percent for the Bear-Doe Creek Drainage, 22 percent for Upper Yellow Creek, and seven percent for Headwaters of Brush Creek. Except for Bear-Doe Creek, Headwaters Brush Creek, and Upper Yellow Creek, all the other HUC 14 Drainages in the Blue and Gold Project Area would remain below the 29 percent ECA threshold where measurable increases in peak flows would be expected (Grant, et al., 2008). Bear-Doe Creek ECA would increase to 47 percent and would be above the detection limit where measurable increases in peak flow would be detected. The detection limit for changes in stream flow is plus or minus 10 percent. Percentage changes in peak flow that fall in this range are within the experimental and analytical error of flow measurement and cannot be ascribed as a treatment effect. (Grant, et al., 2008, p. 23) For Bear-Doe Creek this would result in a potential increase in peak flows which range from 0 to 18 percent with return intervals of 1 to 6 years. Using USGS StreamStats estimates for streamflow, the maximum increase would amount to an additional 65 to 95 cfs of flow for storm events with an RI between 2 and 5 years. For Upper Yellow Creek, ECA would increase to 36 percent, and would result in a maximum potential increase in peak flows from 0 to 14 percent, which would be an additional 78 to 118 cfs. For Headwaters Brush Creek, ECA would increase to 30 percent, and would result in a maximum potential increase in peak flows from 0 to 11 percent, which would be an additional 51 to 75 cfs.

The VRH proposed in the Blue and Gold project under Alternative 4 would result in a similar peak flow response in Bear-Doe Creek as Alternative 3 but would not increase the Headwaters of Brush Creek and Upper Yellow Creek Drainages above the detection limit for peak flow response. The proposed harvest would increase the ECA by approximately 23 percent for the Bear-Doe Creek Drainage, all the other HUC 14 Drainages in the Blue and Gold Project Area would remain below the 29 percent ECA threshold where measurable increases in peak flows would be expected (Grant, et al., 2008). Bear-Doe Creek ECA would increase to 44 percent. This would result in a potential increase in peak flows which range from 0 to 16 percent with return intervals of 1 to 6 years. Using USGS StreamStats estimates for streamflow, the maximum increase would amount to an additional 57 to 84 cfs of flow for storm events with an RI between 2 and 5 years.

The presence of wide riparian buffers, a VRH prescription that includes the retention of 5-30 percent of the pre-harvest basal area, moderate soil drainage efficiency based on the soil types found in the project area, and low to moderate road density would keep the likelihood of a peak flow increase in the low to moderate range as discussed in (Grant, et al., 2008, p. 40). Increases in peak flow have little potential to affect the high gradient, step-pool stream types found below the harvest units (Grant, et al., 2008, p. 43). The expected increase in peak flows would be within the range of natural variability, and recent aquatic habitat restoration downstream has increased the steam's ability to absorb and dissipate this additional energy. A summary of peak flow response for Alternatives 2, 3, and 4 is shown in Table Appendix L.

Canopy Opening Impacts on Summer Low Flow Susceptibility

For summer low flow, hydrologic recovery rates for stand-level processes can be quantified using a chronosequence approach (Perry, et al., 2016). Hydrologic recovery can be computed based on how an individual stand relates to newly harvested areas and reference stands, with hydrologic recovery ranging from zero percent for a new clearing up to 100 percent for a stand that functions like the original stand, baseline or historical. The BLM defines four categories of hydrologic recovery for this analysis based on this chronosequence approach and the preceding analytical assumptions: flow surplus, flow deficit, partial hydrologic recovery, and hydrologic recovery. These categories are relative to older stands, 130+ years old, that occupied the proposed harvest units before commercial harvest reset stand age trajectories. Flow surplus occurs when reduced interception and reduced evapotranspiration following timber harvest increase low flows.

Forest acres in flow surplus are less than 20 years old (Table L-40, 0- and 10-year columns). Flow deficit occurs when replanted harvest units transition to deficit low flow relative to the pre-harvest condition as young, densely planted, and vigorously growing trees increase site transpiration. Flow deficit acres are found in the 20–70-year columns in Table L-40. Perry and Jones (2016) do not report on low flow hydrologic recovery for stands greater than 50 years old but given that their graph (p. 8 Figure 6(b)) still shows deficit flow at the end of their study period, it is appropriate to assume continued flow deficit beyond 50 years relative to historical stand conditions. Hydrologic recovery acres are captured in the 130+ columns in Table L-40. The BLM includes a partial hydrologic recovery category between flow deficit and hydrologic recovery because hydrologic recovery progresses along a continuum and does not occur in discrete steps at specific times. Partial hydrologic recovery acres are found in Table L-40, 80–120-year columns. The mean annual increment, referring to the average growth per year that a tree or stand accrues at a specified age (Curtis 1995, McArdle *et al.* 1961), supports using 80 years as a partial recovery inflection point. While a tree always accrues growth in the absence of damage, the volume growth rate starts out small as the seedling establishes, then increases markedly as the tree matures until it hits a certain age. Once the age is attained, the growth rate declines slowly over the remainder of the tree's life. For Douglas-fir, the age where the decline presents itself is generally around 80 years of age. Because the rate and trajectory of low flow hydrologic recovery depend on many factors, it is possible for a stand in the partial hydrologic recovery category to produce low flow similar to a stand in the hydrologic recovery category. For example, a 90-year-old stand with relatively wide spacing either as a result of management or stochastic events would produce low flow comparable to the 130-year-old stand that it replaced. Forest acres in partial hydrologic recovery are behaving more like hydrologically recovered acres because the maximum flow deficit has already occurred and stand age and stand structure are getting closer to historical conditions.

Private forest land accounts for about 76 percent of the 14 drainage areas containing the BLM's proposed harvest units, and the BLM assumes that the relatively young private age class distribution that we see today (Table L-40) is very likely the age class distribution that we will see in the future—a distribution resulting from one or more rotations of relatively high-intensity, short-duration forestry. Over time, private would produce relatively small contributions to older forest age classes due to access and productivity limitations, and maturation of Riparian Management Areas, and this would incrementally benefit low flow volume. Clearcutting most of a young stand on private, at 40 years for example, would produce low flow surplus relative to the 40-year-old stand and a much older stand, 130 years for example, due to reductions in interception and evapotranspiration. As the clearcut 'matures' to rotation age (40 years for example) it would return to the baseline condition of higher transpiration and lower streamflow, and it would exhibit low flow deficit relative to the historical low flow condition. Private harvest units, therefore, cycle between low flow surplus and low flow deficit relative to the older forests that occupied private forest land prior to initial logging entry.

Conclusion

In conclusion, summer streamflow conditions on BLM-administered land are improving as stands get older and transpiration rates diminish. The HLB occupies a relatively limited portion of the planning area for the ROD/RMPs for Western Oregon, and the HLB and reserves form a complex mosaic across the landscape, including substantial RR. Intermittent streams that naturally have a dry period are common in the headwater areas managed by the BLM, and aquatic organisms are adapted to seasonal drought. There would be no change in flow response beyond the range of natural variability and the project would have no different effect on fish habitat than existing conditions.

Road Impacts on Peak Flow

There would be approximately 3 miles of new spur road construction in Blue and Gold under Alternative 2, 16 miles under Alternative 3, and 10 miles under Alternative 4, increasing the net number of roads within the project area. Consequently, the area covered by roads within the project area drainages would increase, but it would remain well below the 12 percent threshold where measurable increases in peak flows would be expected (Harr, et al., 1975).

Fuels Management Impacts on Peak Flow and Low Summer Flow Susceptibility

The fuels management activity would have no measurable effect on hydrologic function within the project area, because large areas of unrecovered canopy openings would not be created. Therefore, peak flow and summer low flow would not be affected and there would be no susceptibility of increased peak flow or decreased summer flow.

Alternative 5

Canopy Opening Impacts on Peak Flow and Summer Low Flow Susceptibility

The all thinning alternative proposed under Alternative 5 would result in no increase in ECA. Under Alternative 5, no canopy openings would be created. Therefore, peak flow and summer low flow would not be affected and there would be no susceptibility of increased peak flow or decreased summer flow.

Road Impacts on Peak Flow.

There would be approximately 16 miles of temporary spur road construction in Blue and Gold, as described in Section 2.3, increasing the net amount of roads within the project area. Consequently, the area covered by roads within the project area drainages would increase, but it would still remain well below the 12 percent threshold where measurable increases in peak flows would be expected (Harr, et al., 1975).

Fuels Management Impacts on Peak Flow and Low Summer Flow Susceptibility

Same as Alternative 2, 3, and 4.

Alternative 6

Canopy Opening Impacts on Peak Flow and Summer Low Flow Susceptibility

The VRH proposed in the Blue and Gold project under Alternative 6 would result in a similar response as Alternative 2 but would not increase the Bear-Doe Creek drainage above the detection limit for peak flow response. The proposed harvest would increase the ECA by approximately 1 to 4 percent for all drainages, but all HUC 14 drainages in the Blue and Gold Project Area would remain below the 29 percent ECA threshold where measurable increases in peak flows would be expected (Grant et al. 2008). Therefore, peak flow and summer low flow would not be affected and there would be no susceptibility of increased peak flow or decreased summer flow.

Road Impacts on Peak Flow

There would be approximately 14 miles of temporary spur road construction in Blue and Gold. The amount of roads within the project area would increase, the resulting area covered by roads within the project area drainages would increase by approximately 0.13 percent, to 4.35 percent which is less than the 12 percent threshold where measurable increases in peak flows would be expected (Harr et al. 1975).

Fuels Management Impacts on Peak Flow and Low Summer Flow Susceptibility

Same as Alternative 2, 3, 4, and 5.

3.7 Issue 5. How would installation of the Yellow Creek crossing impact Oregon Coast coho salmon, their designated critical habitat, and BLM sensitive fish species?

3.7.1 Background

In February 2008, the National Marine Fisheries Service (NMFS) listed the Oregon Coast coho salmon (*Oncorhynchus kisutch*) (hereafter 'coho') evolutionary significant unit as threatened under the Endangered Species Act. This included the designation of critical habitat for coho (NMFS, 2008). Coho are the only fish species on the Roseburg District currently listed under the Endangered Species Act. Critical habitat is present and occupied in the Yellow Creek - Umpqua sub-watershed as well as within the analysis area. (Appendix A – Map 43). No coho have been observed within the work area (where equipment would be working in the channel to replace the crossing) during three site visits using visual survey techniques. The area of Yellow Creek where the culvert replacement is proposed is also habitat for one BLM sensitive fish Species steelhead (*Oncorhynchus mykiss)*

3.7.2 Methodology and Assumptions

The methods used for this analysis included field surveys (July 2020), GIS, and research of coho and steelhead life history and habitat requirements. Information collected included qualitative estimates of substrate embeddedness at the crossing location, and potential for changes in habitat access associated with the proposed stream crossing replacement at Yellow Creek.

This analysis discusses potential effects to fish from the replacement of a permanent crossing across Yellow Creek. Two crossing design alternatives are under consideration, a bridge or a large culvert (1.3 times back full width). The indicators used to determine potential effects to fish, or designated critical habitat are Suspended Sediment, Fish Mortality, and Access to Habitat. The bridge or the culvert would have similar impacts, so their effects on fish and designated critical habitat are discussed in tandem.

Indicators for Analysis

Suspended Sediment

The availability of high-quality spawning substrate, characterized by gravel and small cobbles relatively free from embedded sediment, is important to resident and anadromous salmonid productivity. Spawning habitat suitability varies with the amount, size, and quality of substrate (Kondolf, 2000). Fine sediment can fill interstitial spaces within redds[11] increasing the possibility of embryo suffocation, entombment, and disease (Chapman, 1988). The accumulation of fine sediment can also reduce availability of

[11] A redd is defined as a spawning nest made by a fish, especially a salmon or trout, where eggs and sperm are deposited.

macroinvertebrates, a food source for coho and steelhead, and limit breathing capacity in fish (Waters, 1995). Fine sediment can impair respiration by clogging gill membranes and increase overall stress levels (Waters, 1995). Fish Mortality and Access to Habitat

Fish mortality is caused by a host of factors including, but not limited to disease, predation, starvation, and suffocation. Access to habitat is not a limiting factor within the analysis area because there are no known natural or unnatural barriers that would be limiting.

Spatial Scale

The analysis area includes the portion of Yellow Creek upstream of the proposed crossing replacement for 100 feet and downstream of the culvert replacement for 500 feet. This spatial scale was chosen because potential effects to the indicators listed above would not be expected beyond those distances based upon BLM observations and monitoring of previous crossing replacements.

The work area is defined as the portion of Yellow Creek that is 50 feet up and downstream from the crossing location. Equipment/operations would be limited to working operating within the work area to replace the crossing.

Temporal Scale

The temporal scale of this analysis would be the duration of the crossing replacement project, which would occur within approximately a 10–14-day window and would occur during the Oregon Department of Fish and Wildlife, instream work window (July 1-September 15). This scale was selected based on BLM observations and monitoring of previous crossing replacements.

3.7.3 Affected Environment

Yellow Creek within the analysis area is highly simplified, with a very low gradient of one to two percent. The stream is incised within a relatively broad floodplain, and there are pieces of large wood present (Photo 1, see Appendix L). Yellow Creek within the analysis area is a depositional reach that is comprised mainly of fine sediment and smaller gravel sized particles. About 80 percent of the visible gravel in the analysis area is embedded (Photo 2, see Appendix L), meaning that it is not suitable for spawning and macroinvertebrate prey is limited due to lack of interstitial spaces in the gravel to complete the life cycle for macroinvertebrates. Steep hill slopes and landslide scars suggest a history of events that transport sediment/substrate and wood to downstream fish bearing reaches. Lower gradient (less than five percent) depositional reaches have higher accumulations of smaller particle sizes (i.e., sand, gravel, and cobble) due to reduced water velocities that allow sediment to fall out of the water column.

It's expected that the analysis area is not used for spawning by coho or steelhead because the lack of suitable spawning gravel available, and the stream is otherwise highly simplified where conditions reduce opportunity for hiding cover during spawning. No coho or steelhead were observed in the analysis area during field work, however portions of Yellow Creek with a more complex habitat, appeared to be fully occupied by rearing coho. This suggests that coho spawned in Yellow Creek near the analysis area the previous winter, but that rearing juveniles are not selecting habitat in the analysis area (presumably due to poor habitat quality).

A culvert had previously been in place at the proposed Yellow Creek crossing to allow access to previous timber harvests. That culvert was pulled (for unknown reasons) out of the channel and left on the bank approximately 20 years ago.

3.7.4 Environmental Effects

Alternative One (No Action) and Alternative Four

Under the no Action Alternative and Alternative Four, the Yellow Creek crossing replacement would not occur and there would be no equipment working in the stream channel. There would be no impact to suspended sediment, fish mortality, or access to habitat. Fish habitat and aquatic populations would continue to be managed as outlined in the current ROD/RMP (p. 78).

Alternatives Two, Three, Five, and Six

The bridge or large culvert design alternatives are discussed in tandem because they are expected to have similar impacts. PDFs and BMPs would be adopted for either action during construction (Appendix B, Fish 2-5). A bridge or a large culvert are permanent structures that would necessitate equipment crossing the stream channel several times. For the bridge, limited or no in channel excavation is expected, but excavation of each bank would be necessary to install bridge footings. Installation of a culvert would require excavation and shaping of the stream bed, followed by placement of the culvert, backfilling/compaction of open graded fill material, followed by construction of the road surface. For all crossing design alternatives, coho, and steelhead (as well as other fish and amphibians) would be relocated (through means described in the Fish Mortality and Access to Habitat section of this analysis) outside of the work area during the in-water work window and nets would be installed to prevent their re-entry (Appendix B, Fish 4). Stream flow would be diverted around the work area and back into the channel to reduce the amount of suspended sediment that would occur from in channel work.

Suspended Sediment

The short-term effect of suspended sediment is that it impairs fish respiration and feeding. Over time, suspended sediment falls out of suspension which becomes embedded in gravel substrate. Embedded substrate decreases interstitial spaces which are needed for robust macroinvertebrate populations, thus limiting prey availability to coho, and steelhead when substrate is embedded.

Streamflow would be diverted around the work area to reduce turbidity, but there would still be a turbidity pulse expected downstream of initial in-channel operations in the work area. Increases in turbidity would be expected to clear up within fifteen minutes following in channel work because the stream channel is low gradient and suspended sediment would fall out of suspension. It is unlikely that a short increase in turbidity would have measurable effects on rearing fish because pulses of fine sediment would be short in duration allowing fish to recover quickly or avoid it by moving to portions of the stream less affected. Due to the limited area of stream disturbance, few fish would be subject to temporary increases in turbidity relative to the total fish population in the stream because no fish were observed in the analysis area during field work and all work would be conducted during the ODFW instream work period when spawning adults are not present and no eggs are in the gravel. (Appendix B, Fish 3,5). Habitat quality is currently degraded within the area of stream crossing disturbance, in future years (when the Yellow Creek crossing would be installed) it is possible that a different amount of fish would be in the stream disturbance area due to natural variability in their populations than were present in 2020 when field surveys were conducted for this analysis. However, spawning and rearing habitat in the analysis area is very limited. Even if more fish return from the ocean to spawn in future years, and the habitat within the area remains degraded, it is not likely that juvenile fish will rear in the analysis area.

Where fine sediment drops out of suspension downstream of the work area there is potential for the substrate to become more embedded. There can be a period (approximately 2-4 hours) of increased turbidity during increased flows from fall rains. The stream gradient is so low that the majority of sediment generated from increased stream flow at the work area would be expected to fall out of suspension within the analysis area. Sustained sediment suspension can lead to substrate becoming more embedded, but the limited duration of fine sediment expected from this project due to PDFs and BMPs

(Appendix B, Fish 2-5) make it unlikely that substrate embeddedness would measurably change. In the unlikely event that substrate became measurably embedded from the installation, it is unlikely that fish would be affected because the substrate in the analysis area is already unsuitable for spawning.

Fish Mortality and Access to Habitat

Construction of a bridge or culvert would be in compliance with NMFS Programmatic Forest Management Biological Opinion (WCR-2017-7574) and BMP R-17 of the ROD/RMP. BMP R-17 states "On construction of a new culvert, major replacement, or fundamental change in permit status of a culvert in stream containing native migratory fish, install culverts consistent with ODFW fish passage criteria (OAR 635-412-0035 (3)), and at the natural stream grade, unless a lessor gradient is required for fish passage, On construction of new culverts in streams with ESA listed fish, stream crossings must also meet ARBO II USDC NMFS 2013 and USDIFWS 2013 fish passage criteria" because the culvert was pulled for unknown reasons; when it is replaced ARBO II requirements must be followed as there is currently not a culvert in the stream. BMP Fish 3 of this document would require compliance with National Marine Fisheries Service guidelines for salmonid stream crossings. Requiring dewatering of the stream segments at the work site and fish removal/relocation prior to implementation. Dewatering is accomplished by constructing an upstream berm and either pumping or piping water around the project site or constructing a temporary stream channel. These actions would limit movement of fish during construction and have the potential to strand fish in pools and pockets of water through the dewatered reach.

The BLM would remove coho, steelhead and other fish and aquatic organisms captured from the site prior to construction work. Fish relocation would occur before the work area would be dewatered and flow routed around the work area. Nets would be set up at the boundary of the work area prior to relocation so that relocated fish would not be able to re-enter the work area. Fish relocation would be conducted by BLM fish biologists with a backpack electrofisher and nets in compliance with requirements outlined in Programmatic Forestry Management Biological Opinion (BO), issued by NMFS on March 9, 2018 (NMFS Reference Number WCR-2017-7574) which would reduce impacts to fish species Temporarily immobilized fish would be relocated outside of the work area to minimize mortality that would have been caused by dewatering the work area or equipment working in the stream.

The effects to fish would include the short-term (minutes) stress of capture, movement, and re-release, with minimal mortality. Fish relocation during culvert replacement would increase stress and mortality for a small number of fish. However, the stress of stranded, captured, and relocated fish would be temporary and would only occur once. Mortality rates from electrofishing are low, three percent or less (McMichael, et al., 1998), which is considered negligible compared to natural mortality rates. Relocating fish from the work area to pools with suitable habitat outside of the work area would minimize lethal effects to fish present or stranded during construction by heavy equipment. Electrofishing capture efficiency is reduced where complex habitat such as log jams, boulders, or undercut banks are present. While habitat complexity in the work area is low, it is possible that not all fish would not be captured during relocation efforts; and be injured or killed within the work area during the crossing installation.

There would be no change in access to spawning habitat for migrating fish because the crossing would be replaced when adults are not present during the ODFW in water work period and in compliance with fish passage guidelines. The dewatered work area and nets at the work area boundaries would limit movement of fish for the duration of the crossing replacement (10-14 days). Fish movement in streams occurs when flow or water temperature changes, or with changes in prey availability or pressure from predators. Limiting mobility for the duration of the crossing replacement would cause non-lethal effects such as increased competition for resources (i.e., higher fish density due to relocation) or stress due to sub-optimal stream temperature conditions to any fish present at the time. Fish present would be at risk to increased predation due to limited mobility; however, predators are expected to have less presence in the area due to the increased human activity and equipment operating.

There is a potential for sub-lethal and lethal effects to fish from the crossing replacement, but the magnitude of the potential effect would be low because the degraded quality of existing habitat within the analysis area would limit the number of fish present when the crossing is replaced and the BMPs in appendix B for fish, soil, and roads would minimize impacts to stream habitat and suspended sediment.

Because there is potential to harm/take Coho a federally threatened species consultation is required with NMFS on the potential effects of the Blue and Gold Harvest Plan project on ESA fish species and their critical habitat within a portion of the project area through the use of the Programmatic Forestry Management Biological Opinion (BO), issued by NMFS on March 9, 2018 (NMFS Reference Number WCR-2017-7574), titled the Endangered Species Act Section 7(a)(2) BO. Consultation was initiated on 6-12-24 by submitting a project notification form to NMFS.

Cumulative Effects

The BLM does not expect that interactions of potential effects resulting from other land management activities occurring on private and public land would generate significant cumulative effects. There is no other known mainstem Yellow Creek culvert replacements planned. There are smaller culverts and cross drains that would be installed during road renovation, (Appendix C, Issue J) but that work would not be expected to cause effects to coho due to the application of the Fish, and Road BMP's and PDF's listed in Appendix B, and they would be far removed from the Yellow Creek crossing replacement. Instream restoration actions are being developed on private and BLM portions of Yellow Creek, these restoration actions and impacts would be analyzed in future NEPA documents prior to implementation once the plan is finalized. If private actions that result in similar effects as the proposed culvert replacement would occur, that work would need to adhere to various forest and watershed related protections such as the Oregon Forest Practices Act or the Clean Water Act. Areas downstream of the culvert replacements are managed for ranching, farming, or timber production for which no foreseeable actions are known. The aquatic conditions in these areas are degraded. Replacement of the Yellow Creek crossing would result in a pulse of fine sediment during initial installation that would be deposited in pools and other low gradient stream reaches downstream. However, because Fish BMPs and PDFs identified in Appendix B would be implemented, the amount of sediment that accumulates downstream would be immeasurable, and there is little to no chance that it would measurably lower substrate quality downstream; and fish passage would remain unchanged no cumulative effects to designated critical habitat are expected for either the bridge or large culvert design alternatives.

3.8 Issue 6. How would the alternatives affect fire hazard on BLM-administered lands in close proximity to Wildland Developed Areas and overall wildfire risk to values at risk?

3.8.1 Background

The BLM provided a thorough analysis in the PRMP/FEIS for the entirety of Western Oregon regarding fire resiliency, fire resistance, fire hazard levels, and risk from residual activity fuels associated with timber management activities. Two key points addressed in the PRMP/FEIS are 1) the importance of the BLM treating activity fuels associated with forest management to reduce the potential fire intensity, particularly in areas with higher fuels risk, and 2) the actions implemented in conformance with the RMP would reduce fire hazard on BLM-administered lands within the Wildland Urban Interface compared to current conditions (BLM, 2016b, p. 223).

This site-specific analysis uses the analytical methods of the analysis done for the PRMP/FEIS regarding fire hazard within close proximity to Wildland Development Areas (WDA). In addition, to provide useful information to the decision maker and stemming from the same analysis indicator, this analysis focused on specific harvest units only and models change by alternative to the risk to values at risk. Analysis for these factors began with stand structural stage (SSS) data provided by silviculture. This information was then either used directly or extrapolated to fuel model for use in fire behavior estimation.

Fire behavior modeling to determine the effects or the specific proposed actions on BLM-administered lands required the BLM to tailor the model inputs. For this analysis, private lands were not excluded from the modeled fire areas; however, the BLM limited the model to a single burn period of six hours and all ignition points were placed on proposed treatment units. During modeling, if a wildfire was predicted to burn for more than one day or if the ignitions were placed on adjacent BLM or private lands, the predicted effects of the proposed actions were indiscernible.

This analysis and the parameters used are within normal measured conditions but are not meant to mimic real world scenarios. For example, the weather parameters have occurred and are representative of fire season in the area. However, ignition points were selected and would not necessarily be replicated during a typical Roseburg District fire season. The complete parameters used for this analysis are incorporated by reference into this document and are available in the project record at the Roseburg District office upon request.

This issue is presented in two interrelated parts: fire hazard in close proximity to WDA and wildfire risk to values at risk.

3.8.2 Methodology and Assumptions

Indicators

Fire Hazard

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).

For this issue, the PRMP/FEIS describes the methodology in analyzing fire hazard in close proximity to developed areas and is hereby incorporated by reference (BLM, 2016b, pp. 253-255). In summary, the WDA (known more commonly as Wildland Urban Interface) data layer provides a delineation of where people live in the wildland. The magnitude of human-caused ignitions that occur within this area illustrates the exposure and demand on firefighting resources as well as the risk to life and property. As was done for the PRMP/FEIS, the BLM assumed a one-mile buffer around the West Wide Wildfire Risk Assessment Wildland Development Areas data layer, and proposed units were mapped to determine acres within or outside the buffered WDA (WWRA, 2013; BLM, 2016b, p. 253).

The BLM silviculturist determined SSS for each proposed unit. This data was also estimated for proposed units immediately post-harvest, aged 20 years and aged 40 years (BLM, 2016b, p. Appendix C). Stand structural stage was used in the 2016 PRMP/FEIS to determine fire hazard levels based on several assumptions regarding surface fuel loading, canopy base height, and canopy fuel bulk density (continuity) and is hereby incorporated by reference (BLM, 2016b, pp. 1321-1331).

The relative ranking of stand-level fire hazard was determined using Table 3-34 from PRMP/FEIS (pg. 254) (Table L-46). These categories range from high to moderate fire hazard (i.e., relatively difficult to control) to Low fire hazard (i.e., relatively easy to control). Mixed fire hazard indicates the potential to exhibit the full range of hazard categories (High to Low).

The BLM used FOI data to infer hazard rating based upon 10-year age class for BLM-administered lands outside of the proposed units. Stand age is a useful, although not wholly inclusive, indicator to infer hazard rating within developed areas. Because this issue is restricted to effects in the WDA, analysis was restricted to only BLM-administered lands within the WDA as described above. The analysis area is currently 78 percent within the WDA. BLM-administered lands in the analysis area make up 40 percent of the total lands and are 36 percent of the WDA lands. The maximum proposed treatment acres are 27 percent of the WDA on BLM-administered lands. There are several homes adjacent to BLM-administered lands as well as a highway and transmission lines.

Risk to Values at Risk

For this analysis, the BLM identified values at risk as, private lands in the WDA and BLM or private structures as estimated from 2022 aerial photography.

Using the current and estimated SSS provided by silviculture, along with field verification, the BLM assigned an initial single fuel model representing current fuel conditions in the proposed treatment units, then estimated single fuel models for post-treatment, by unit, based on the proposed actions. Deferred units in each alternative were kept the same fuel model as the no action alternative. While this is a simplification of actual conditions, this allowed direct comparison of pre and post treatment conditions and how those conditions would influence potential fire risk to values at risk.

The BLM assumed activity fuels in concentrations near log landings would be treated in all units. In addition, specific, strategically located units would be treated for activity fuels at the stand scale including those nearest to homes in the WDA. These types of treatments do not change the SSS; however, they do influence fuel model and resulting modeled fire growth.

The BLM used Short Term Fire Behavior (STFB) modeling in this analysis. The BLM assumed all wildfires would be suppressed at the smallest possible size, within 24 hours of ignition and model runs were restricted to a single day burn period to minimize the acres of private lands involved. In the event of a large (greater than 100 acres) fire, private lands would likely be involved. However, the purpose of this modeling was to determine the overall risk to values at risk with implementation of the proposed treatments on BLM-administered lands while assuming no change in conditions on private lands or adjacent BLM lands.

The STFB model utilizes fuels, weather, and topography, the factors that influence fire spread, to produce likely fire perimeters, assuming no suppression action by firefighters (Finney, 2006). Historic fire weather from Remote Automated Weather Stations were compiled and analyzed using the Fire Family Plus program to determine high (hotter) and low (cooler) fire weather conditions as used for the National Fire Danger Rating System. A typical summer day with high temperature of 88 degrees and relative humidity of 24 percent was chosen as a representative day, conditions considered high fire danger but not extreme. The fire behavior modeling only allows adjustment to fuel moisture and wind speed to create the distinct weather differences, creating the hotter and cooler conditions. Otherwise, the model considers the actual weather conditions for that day, automatically adjusting for temperature and humidity hourly from the historical weather data. The input weather parameters were held constant over those six hours for each model comparison. Detailed parameters used in the modeling are incorporated into this document by reference, in the EA Project Record, and available at the Roseburg District Office for inspection upon request.

The STFB model required the BLM to input ignition polygons simulating fire starts, becoming the initial fire perimeter from which STFB estimates fire growth and the primary direction(s) of spread for a single day burn period. The ignition layer created for this analysis was 94 acres scattered over 51 polygons, all within proposed treatment units. Ignition polygons were insured to be well within a treatment unit but placed randomly and not every unit received an ignition polygon if it was adjacent to another unit. The same ignition polygons were used for each model comparison regardless of prescription or alternative and untreated units by alternative remained the same as pre-treatment. The model was run multiple times for each treatment to provide an average result. The model accounts for changes in fuel model, which includes non-burnable fuel model on roadways, which can influence the predicted fire spread, but is not otherwise restricted by land ownership or any other type of barrier. See Figure L-7 for a screen capture example of results from this modeling located in Appendix L.

The BLM used the STFB model results to estimate negative effects to specific values at risk. Modeling runs selected for this analysis were the largest fire acreage out of the multiple results for each treatment to represent a worst-case scenario. These model runs were downloaded and overlaid over 2022 aerial photography and other geographic information to estimate the impacts to the pre-identified values at risk used for this analysis. The BLM then estimated the number of buildings within the modeled footprint of the fire. Model results were clipped to the WDA, then estimates were also made of acres of private land impacted by the modeled fire. Figure L-7 (located in Appendix L) is an example of the results of the STFB model output for Alternative 6 post-treatment. The green areas represent the proposed treatment units, gray areas are the ignition polygons created for the analysis, red areas represent the model output fire growth after six hours, and the blue building symbols approximate locations of structures.

The analysis indicator for fire risk was estimated by potential damage to values at risk overlayed by modeled fires. For this analysis values at risk considered include acres of private lands in the WDA and an ocular estimation of the number of buildings potentially impacted.

Spatial Scale

The BLM analysis area for this issue is the WDA at the sub-watershed scale (HUC 12) (Table 1-2). This scale is relevant for analysis of fire issues because ridgelines can provide appropriate locations for fire control breaks. The relevant drainages were then combined into a single analysis area for comparison of effects at the project scale.

Temporal Scale

The BLM considered short-term effects to be less than or equal to twenty years post-treatment. This is based upon the time it would take for activity generated fine fuels (less than three inches diameter) to degrade (McIver & Ottmar, 2007). Long-term effects would last up to 40 years and are based on the time required for change(s) in fuel model (Agee, 1993). Past actions are considered in the baseline conditions. Current and reasonably foreseeable future management actions used for the cumulative effects analysis are considered for 40 years into the future.

3.8.3 Affected Environment

Fire Hazard

HLB on BLM-administered lands currently in the WDA within the analysis area (AA) are predominately high hazard (74 percent) and mixed hazard (24 percent). The proposed treatment acres within the WDA, approximately 1,476 acres, are currently 60 percent mixed hazard, 25 percent low hazard and 15 percent high hazard as estimated from stand structural stage (SSS) (Table L-47; Figure 8).

The PRMP/FEIS analyzed BLM-administered HLB in WDA and predicted a decrease in hazard rating on these lands over the life of the proposed action (BLM, 2016b, p. 260). The PRMP/FEIS estimated high hazard would be reduced by half, moderate hazard would be static, mixed hazard would decrease slightly, and low hazard would increase in acres by a factor of seven (BLM, 2016b, p. 1328). The rating system used in the PRMP/FEIS and for this analysis uses a single SSS to attribute fire hazard. The BLM identified VRH would change the SSS in the WDA, but commercial thinning would not change the young high density stands.

Risk to Values at Risk

Based upon the SSS and field verification, current conditions for the proposed treatment units are primarily moderate or heavy timber litter with some timber shrub for the proposed acres within and outside the WDA (WWRA, 2013) (Table L-48). Multiple sample fires were modeled with STFB producing an average fire size of 579 acres in low conditions, 641 acres in high conditions. The largest modeled fire burned 461 acres in the WDA.

The largest modeled fire for pre-treatment conditions overlay an estimated zero buildings that could be affected by fire originating on BLM-administered lands, assuming no suppression actions. Within the WDA, this same modeled fire affected a total of 461 acres, 63 acres of private lands.

3.8.4 Environmental Effects

Alternative 1

Fire Hazard

Without treatment, as stands age, downed fuels in the proposed units would gradually accumulate and suppressed trees would die out, all adding to the existing fuel. Aging stands would change from young, high density structural stage to mature single-story, changing the fire hazard rating from high to low. Stands currently classified as mature or structurally complex would remain as such, maintaining mixed hazard ratings. Aged 20 years and 40 years, the proposed acres within the WDA would be 60 percent mixed hazard and 40 percent low hazard.

Risk to Values at Risk

Fuel model would change SSS described above as stands age from low and moderate load models to high or very high models. After stands age 20 years, fire modeling resulted in average fire size of 640 acres in low conditions and 692 in high conditions. Within the WDA, the largest fire burned 498 acres including 57 acres on private lands. The fire perimeter did not overlay any structures.

Stands aged 40 years resulted in average fire size of 584 acres in low conditions and 623 acres in high conditions. The largest fire after aging 40 years burned 630 acres. Within the WDA, the largest fire burned 443 acres, 43 acres of private lands and 400 acres of BLM-administered lands. The fire perimeter did not overlay any structures (Table L-48).

Common to All Actions Alternatives

Proposed VRH units, from time of harvest until approximately 10 years post-harvest, would remain early successional SSS and moderate or heavy load slash fuel models (SB2 or SB3) which would allow fires in those areas to spread readily (Andrews & Rothermel, 1982; McIver & Ottmar, 2007). Commercially thinned units would be low load or moderate load slash model (SB1 or SB2) for five to ten years (Table L-47). Areas treated for activity fuels would be low to moderate timber litter fuel model.

As treated stands age 20 years, VRH units would become stand establishment SSS and very high load shrub (SH7) fuel model. Commercially thinned stands would become mature single story SSS and moderate load timber litter models (TL3 or TL4). After 40 years, VRH units would become young, high density SSS and very high load timber-shrub (TU5). The commercially thinned stands would remain mature single story SSS and moderate or high load timber litter models (TL3, TL4 or TL5) (Table L-47).

Alternative 2

Fire Hazard

The unit acres in the WDA proposed for treatment under alternative 2 comprise 41 percent of the total proposed WDA treatment acres (641 treatment acres and 835 untreated unit acres in WDA) which is 11 percent of the BLM-administered lands within WDA in the AA. Immediately post-harvest, 94 percent of the treated acres would change to early successional SSS with moderate hazard and six percent to mature single story SSS with low hazard (see summary Table L-47 and Figure 8). 20-40 years post treatment, structural stage would change as described in the common to all action alternatives (see summary Table L-47 and Figure L-8).

Risk to Values at Risk

With the activity fuels treatment, modeled fires within this scenario ranged from an average of 1,872 acres in low conditions to 2,390 acres in high conditions. The largest modeled fire post activity fuels treatment burned 2,448 acres, 1,434 acres inside the WDA. Within the WDA, this fire burned 303 acres of private lands and 1,131 acres of BLM-administered lands. This modeled fire did not intersect with any structures (Table L-49).

Twenty years post-treatment, as described in the common to all action alternatives, VRH areas would be high hazard and average fire size increases (Table L-49). The largest modeled fire burned 1,742 acres in the WDA and intersected one structure. Forty years post-treatment, hazard remains high but the fuel model changes, resulting in lower average fire size and the largest fire burning 1,236 acres in the WDA with no impacts to structures (Table L-49).

Alternative 3

Fire Hazard

Alternative 3 would VRH all the proposed treatment acres, resulting in 100 percent Early Successional structural stage and moderate hazard for the 1,476 acres in the WDA post-treatment (see summary Table L-47 and Figure 8). 20-40 years post treatment, the structural stage would be Stand Establishment, then Young High Density with resulting fire hazard becoming 100 percent high for all treated acres as described in the PRMP/FEIS (p. 1319-1322).

Risk to Values at Risk

Treatment units would be slash fuel models moderate or heavy load activity (SB2 or SB3) except for the strategic areas targeted for activity fuels treatment. With implementation of those activity fuels treatments, modeled fires within this scenario ranged from an average of 3,879 acres in low conditions to 4,991 acres in high conditions. As stands age post-treatment, modeled fire size increases at age 20 then decreases to less than conditions estimated immediately post-treatment by age 40 (Table L-50).

The largest modeled fire post-treatment burned 3,192 acres in the WDA, 822 acres of private lands in the WDA, and did not intersect any structures. After 20 years, as described in the common to all alternatives, the stand establishment SSS with the corresponding shrub fuel model causes an increase in acres burned in the WDA to 3,777 acres. Of the multiple model runs, all but the largest intersected three structures while the largest intersected seven structures (Table L-50). After 40 years post-treatment, the largest modeled fire burned 2,903 acres in the WDA and intersected zero structures (Table L-50).

Alternative 4

Fire Hazard

The unit acres in the WDA proposed for treatment under alternative 4 comprise 72 percent of the total proposed treatment acres (1,063 treatment acres and 413 untreated unit acres) within the WDA which is 13 percent of the BLM-administered lands within WDA in the AA. Post-treatment, 85 percent of the treatment acres would be Early Successional structural stage with moderate hazard. The remaining treatment acres would be thinned, resulting in no change to structural stage. Of the thinned acres, 13 percent would remain Mature Single-Layered Canopy with low hazard and two percent would remain Young High Density with high hazard. After 20-40 years the VRH acres, 85 percent of the treatment acres in WDA, would change to structural stage Stand Establishment, then Young High Density, both with high hazard. The thinned acres would become or remain Mature Single-Layered Canopy with low hazard (see summary Table L-47 and Figure L-8).

Risk to Values at Risk

Post-treatment modeled fires within this scenario ranged from an average of 2,617 acres in low conditions to 3,320 acres in high conditions. As stands age post-treatment, modeled fire size remains similar at age 20 and decreases at age 40 (Table L-51).

The largest modeled fire post-treatment burned 2,428 acres in the WDA, 621 acres of which were private lands, and intersected zero buildings. After 20 years, as the VRH treatments become high hazard, the largest modeled fire increases slightly and intersected three structures. Forty years post-treatment, the largest modeled fire decreases to 1,555 acres in the WDA in intersected zero structures (Table L-51).

Alternative 5

Fire Hazard

Alternative 5 would commercially thin all the proposed treatment acres, however, this prescription would not alter conditions enough to change the structural stage in young, high density stands. Thinning of stands that are currently structural stage Mature Single-Layered Canopy, Mature Multi-Layered Canopy, or Structurally Complex would result in all acres being Mature Single-Layered Canopy. Therefore, immediately post-treatment, the fire hazard would change to 85 percent low hazard with 15 percent remaining high hazard. After 20-40 years, all of the treatment acres would be Mature Single-Layered Canopy with low fire hazard (see summary Table L-47 and Figure L-8).

Risk to Values at Risk

Commercially thinned units would be slash fuel model light load or moderate load activity (SB1 or SB2). Modeled fires within this scenario ranged from 2,454 acres in low conditions to 3,055 acres in high conditions. As stands age post-treatment, modeled fire size decreases greatly, and remains small at age 20 and at age 40 (Table L-52).

The largest modeled fire post-treatment burned 1,933 acres in the WDA, of which 395 acres were on private lands, and this fire intersects with zero structures. After 20 years the largest fire burned only 283 acres in the WDA, 15 percent of immediately post treatment. At 40 years post-treatment, the largest fire burned 348 acres in the WDA, 20 acres of which was on private lands. None of the modeled fires intersected with structures as the treatment ages (Table L-52).

Alternative 6

Fire Hazard

The unit acres in the WDA proposed for treatment under alternative 6 comprise 94 percent of the total proposed treatment acres (1,381 treatment acres and 95 untreated unit acres) in the WDS which is 17 percent of the BLM-administered lands within WDA in the AA. Immediately post-treatment, the VRH units which are 26 percent of the treated acres would be early successional structural stage with moderate hazard. The commercially thinned acres would be 72 percent mature single-layered canopy with low hazard, and two percent would remain young high density with high hazard (see summary Table L-47 and Figure L-8). After 20-40 years the VRH acres, 24 percent of the treatment acres, would change to structural stage stand establishment, then young high density, both described as high hazard in the PRMP/FEIS p. 1320. The thinned acres would become or remain mature single-layered canopy with low hazard.

Risk to Values at Risk

Modeled fires within this scenario ranged from an average of 2,951 acres in low conditions to 3,794 acres in high conditions. As stands age post-treatment, 83 percent of the treatment acres would be mature single-layered canopy with low hazard resulting in modeled fire size decreasing at age 20 and again at age 40 (Table L-53).

As treated stands age conditions would change as described in the common to all action alternatives. The largest modeled fire post-treatment burned 2.307 acres in the WDA, 528 acres on private lands, intersecting with zero structures. At 20 years post-treatment, the largest fire burns 55 percent of the acres as immediately post-treatment with 248 acres on private lands. Forty years post-treatment, the largest fire burned 221 acres of private lands. The largest fires at 20- or 40-years post-treatment intersected with zero structures (Table L-53).

Summary of Environmental Effects

Fire Hazard

In the VRH units, from time of harvest to approximately twenty years post-harvest, the structural stage would be early successional and fire hazard rating would be moderate. As the planted trees grow the structural stage would change to stand establishment, then young high density and fire hazard would worsen from moderate to high as defined in the PRMP/FEIS (p. 1319-1322). Sometime after 40 years, usually between 60 to 80 years, the stands would mature enough the trees no longer maintain limbs touching the ground, the structural stage would be mature single-layered canopy, and the fire hazard would improve to low.

In the commercially thinned units, acres that are currently structural stage young high density would not change and hazard would remain high. Acres currently structural stage mature single-layered canopy, mature multi-layered canopy or structurally complex would become mature single-layered canopy with low fire hazard. Once stands have aged 20 or 40 years the structural stage would become mature single-layered canopy with low fire hazard.

Immediately post-treatment, all action alternatives would eliminate mixed hazard rating. Except for Alternative 5, the action alternatives would reduce acres at high hazard and increase acres at moderate hazard in the WDA. Alternative 5, because it is thinning only, would not change the proportion of treated acres at high hazard rating but the remaining treated acres would be low hazard. Alternative 6 would be 72 percent low hazard immediately post-treatment, increasing to 74 percent over time (Table x). Alternatives 2, 3, and 4 would be moderate hazard post-treatment, changing to high hazard over time.

When considered at the AA scale, including all BLM HLB lands in the WDA, approximately 4,900 acres, all action alternatives reduce the number of high hazard acres (Figure L-9). Alternative 6 has the greatest reduction in high hazard acres while alternative 5 has the greatest increase in low hazard acres. Of the action alternatives, alternative 2 has the greatest percentage of high hazard acres followed by alternative 4. This is attributed to the small percentage of acres treated because the current conditions are 74 percent high hazard (Figure L-10).

As stands age over time, the percentage of acres at high hazard continue to reduce in all alternatives assuming no additional management of HLB by BLM in the AA. To facilitate this analysis, the BLM did not speculate on the timing or manner of HLB management, however, it can be expected that harvest actions would continue. The PRMP/FEIS model estimated 612 acres per year would be VRH on HLB regardless of WDA in the first decade, totaling 6,120 acres. To date, the Roseburg District has VRH 1,322 acres since the implementation of the ROD/RMP. Implementation of alternative 2 would result in 40 percent of the modeled VRH, alternative 3 would be 63 percent of the modeled amount, alternative 4 would be 44 percent of the modeled amount and alternative 6 would be 34 percent of the modeled VRH for the Roseburg District this decade.

Estimated hazard rating compared to the PRMP/FEIS, once stands age, have lower than estimated high hazard rating acres and higher than estimated low hazard rating acres but are within the predictions analyzed (Figure L-10). Addition of the already VRH treated acres this decade would mean alternative 3 would exceed the acres of high fire hazard model estimated in the PRMP/FEIS. Alternative 4 would also approach the total amount modeled. However, the alternatives 2, 5, or 6 would still be within the estimated acres of high hazard for the decade.

Risk to Values at Risk

Utilizing the tailored model parameters, all proposed action alternatives increased the average modeled fire size when compared to the current conditions immediately post-treatment. This is partially explained for example, because the model is limited to burning six hours and the fuel models in pre-treatment stands are mostly timber litter, the modeled fires burned slowly enough so as not to spread to surrounding stands. This type of limitation extends even once stands age 20 or 40 years. The average modeled fire size for the action alternatives remains above that of alternative 1, except for alternative 5, which is like alternative 1 (Figure 11).

When considering potential private land acres burned by the largest modeled fire, all action alternatives would burn more private land than alternative 1 except for alternative 5. This can be attributed to the high fire hazard created by VRH as defined by the PRMP/FEIS (p. 1320). Alternatives with more proposed VRH had larger modeled fires. Alternative 5 would be a mixture of hazard levels, resulting in moderate modeled fire growth post-treatment, but would mature within 20 years to low hazard levels and corresponding smaller modeled fires.

When considering potential for impacts to structures surrounding the project area, the largest modeled fire for alternative 3 impacted the most structures immediately post-harvest and after aging 20 or 40 years (Figure L-12).

Cumulative Effects

Ongoing, proposed and reasonably foreseeable actions were considered. Private lands influence fire resiliency on BLM-administered lands and 60 percent of the analysis area used for this analysis is private ownership. The BLM did not exclude private lands from this analysis; however, no modifications were made to the estimated conditions in the STFB modeling for private lands as the BLM has no knowledge of specific planned treatments on private lands. No other, non-BLM, federal land is contained within the analysis area that may have been considered for cumulative effects.

There are no ongoing, proposed, or foreseeable BLM projects within the analysis area, nor within adjacent small drainages (HUC 12) to the analysis area that would be considered for cumulative effects.

Fire Hazard

As described in each issue analyzed in the PRMP/FEIS, the proposed action would result in little change in conditions on BLM-administered lands for the Roseburg District mainly because the proposed treatment acres represent a small portion of the analysis area (e.g., (BLM, 2016b, p. 242)). The total BLM-administered lands in the analysis area is 11,372 acres. The total amount of WDA in the AA is 21,964 acres. The BLM-administered WDA lands comprise 36 percent of the total WDA in the AA.

When considering the HLB acres within the WDA, estimated from stand age correlated to stand structural stage, the current conditions are 74 percent high hazard. As stands age, high hazard transitions to either low or mixed. In VRH treatments, stands begin as moderate hazard, then transition to high until after 40 years of age. At the AA scale, all the alternatives are of similar trajectory, with differences in hazard levels depending on the amount of the area proposed for VRH treatment.

Conversely, commercial thinning can immediately change structural stage from mixed hazard to low hazard. Stands currently high hazard would remain high hazard until 20 years post thinning. Therefore, alternative 4, 5, and 6 all show an effect of commercial thinning on fire hazard when compared to the other alternatives, including alternative 1, particularly after 20 years post-treatment.

The PRMP/FEIS predicted fire hazard would decrease in mixed and high, changing to more moderate and some low hazard (PRMP/FEIS p. 261) (Figure L-13). The current conditions in the analysis area and alternative 5 diverge the greatest from the predicted in 2063, mainly due to lack of young stands in the AA currently. Alternative 6 is the closest to the predicted conditions, however, all the action alternatives would result in fire hazard levels within those analyzed in the PRMP/FEIS (same Figure L-13).

Risk to Values at Risk

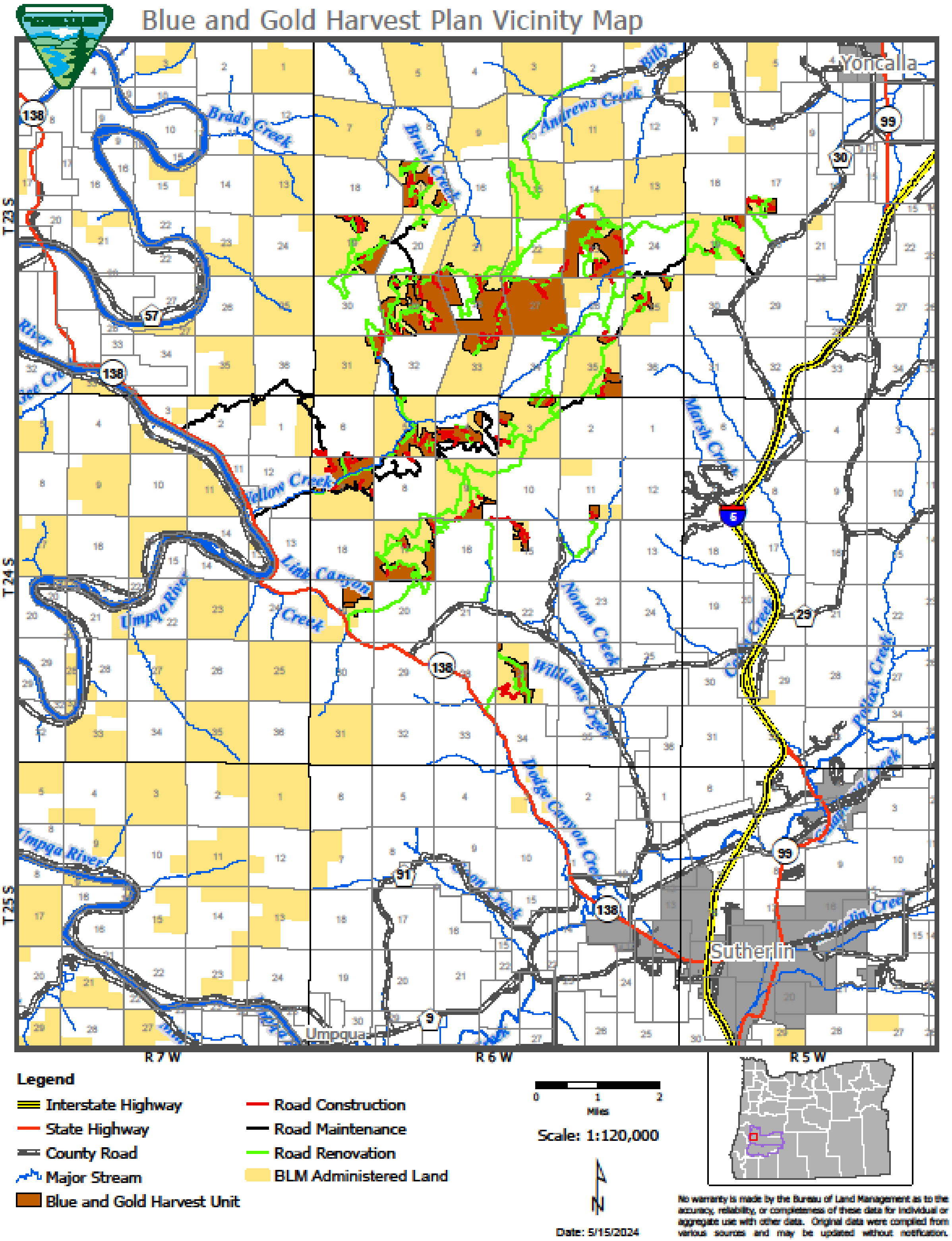
This analysis was designed to demonstrate how the different alternatives would directly influence the approximately 2,524 acres proposed for treatment while minimizing confounding effects from surrounding lands. The limitation of this design is the results do not incorporate changes in the surroundings, on BLM-administered lands or on private lands. The PRMP/FEIS acknowledges that VRH results in stand establishment and young high density stand structural stages, which are described as high fire hazard (PRMP/FEIS p. 1320). This project is well within the scope of actions analyzed in the PRMP/FEIS based on the assumption that HLB would be managed for ASQ, as described in the purpose and need of this document (EA, Section 1.4). In addition, this modeling assumes no active fire suppression, a major limitation. Finally, actual natural fire ignitions are impossible to predict and could occur anywhere on the landscape.

As stated previously, as proposed VRH stands develop from early successional to stand establishment and young high density, surrounding BLM stands would be transitioning from high fire hazard to low or mixed fire hazard. Although the fire behavior modeling predicts average fire size would increase post-treatment, conditions on surrounding lands would also change, dramatically changing how fires would burn through the environment. Alternatives 2, 4, 5, and 6 propose commercially thinning. Post-treatment many commercially thinned stands would maintain slash fuels for up to ten years. During this time, stands that are currently young high density SSS would change to mature single layer canopy, dramatically reducing fire hazard and modeled fire size.

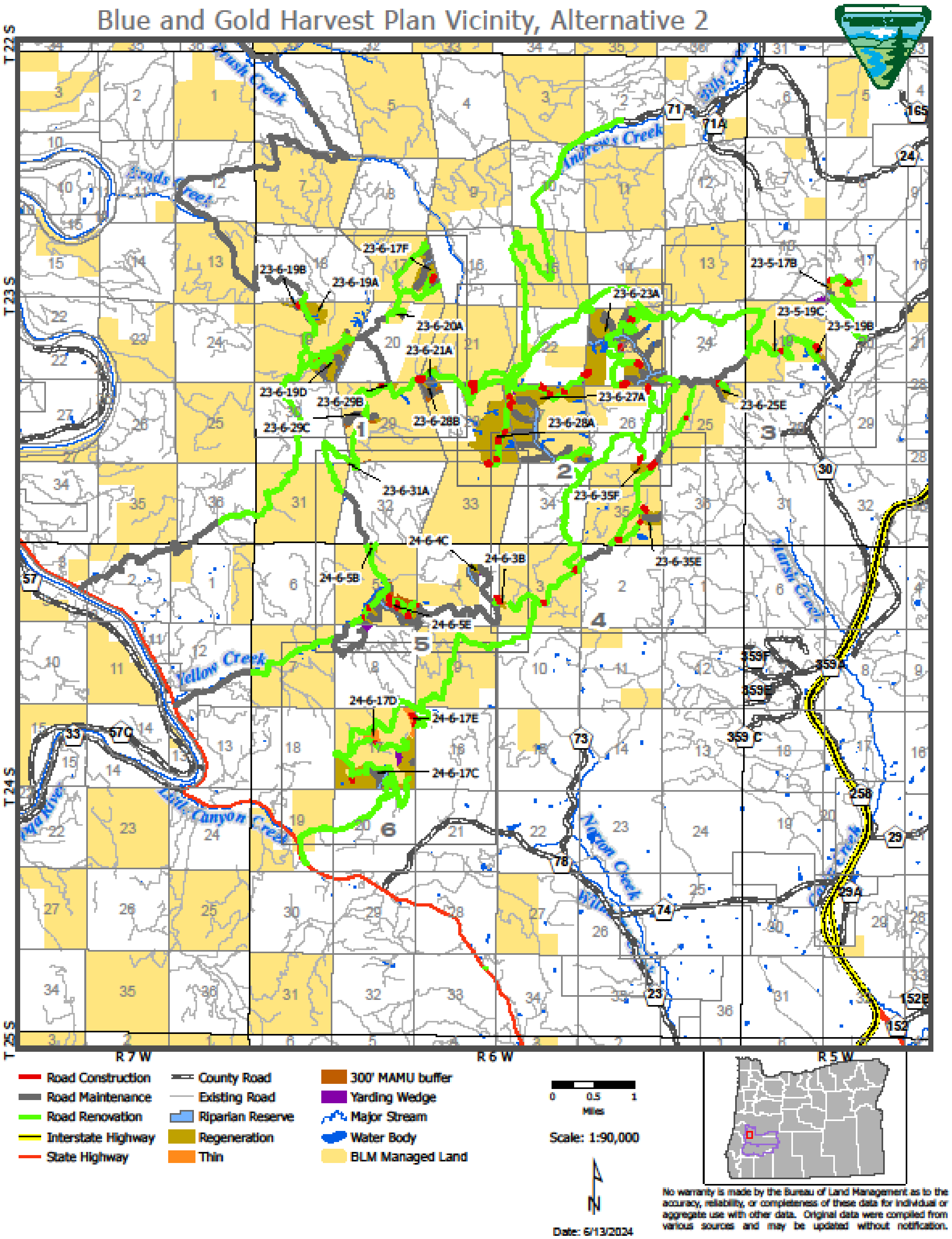
Although alternative 6 proposes to treat 95 percent of the total proposed acres, 69 percent of the acres would be commercially thinned, resulting in smaller modeled fires when compared to alternatives 2, 3, or 4. Alternative 5 would have the greatest reduction in modeled fire size within the individual units.

Appendix A. Project Maps

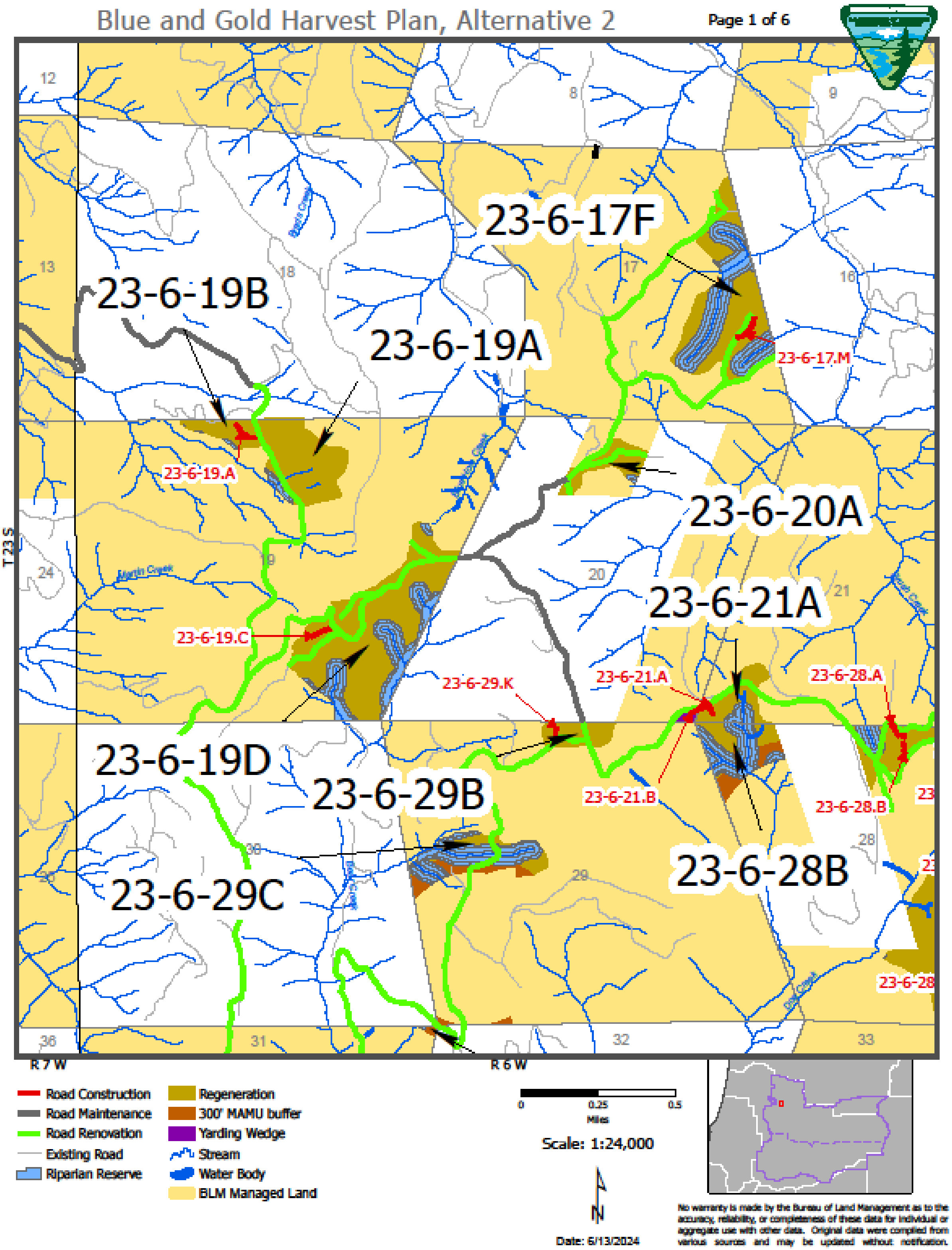
The maps in this appendix show approximate locations based on the electronic dataset for the EA. Maps would be refined on a project specific basis as decision documents are prepared but not to any extent that would alter effects analysis conclusions.



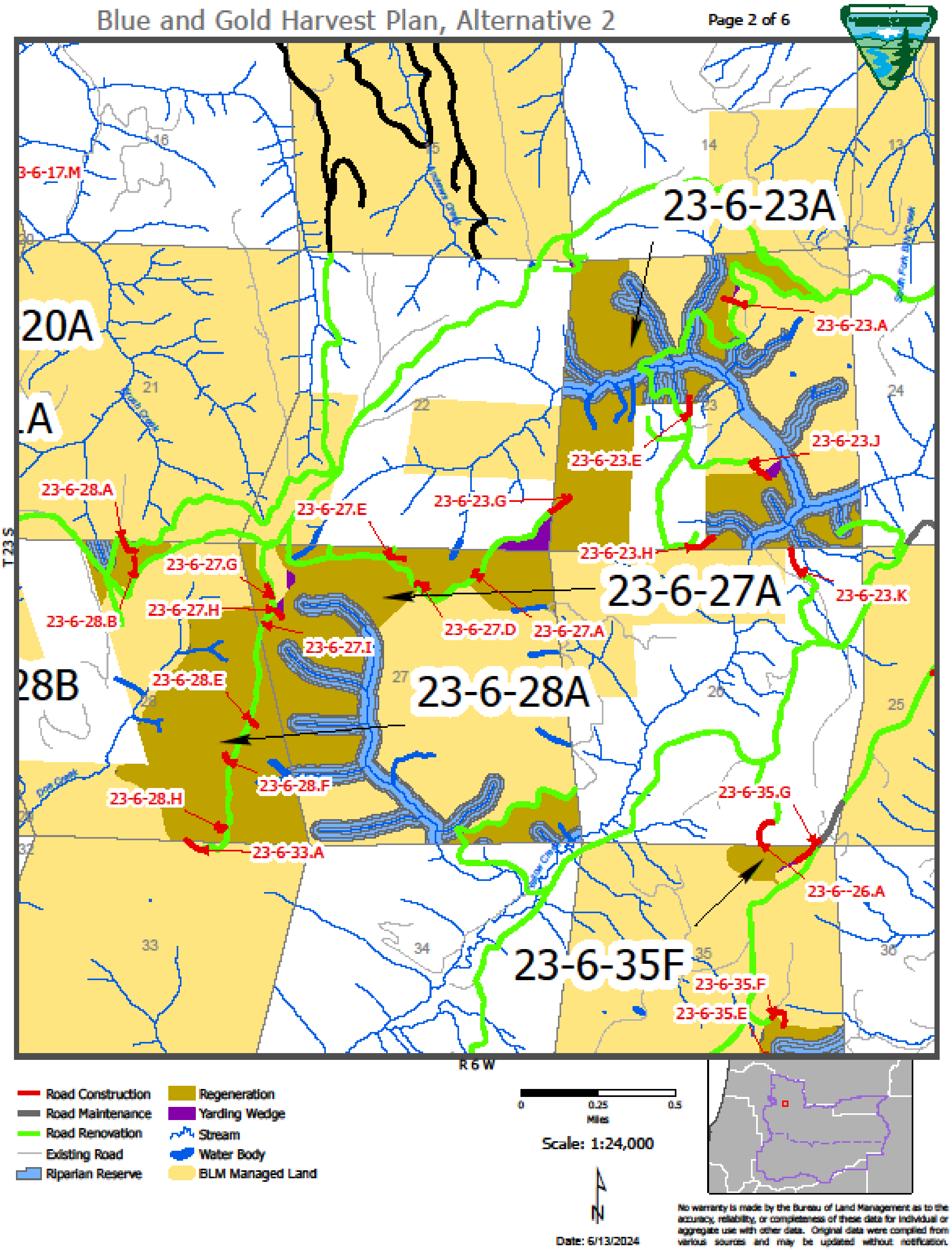
Map 1. Blue and Gold Harvest Plan Vicinity Map



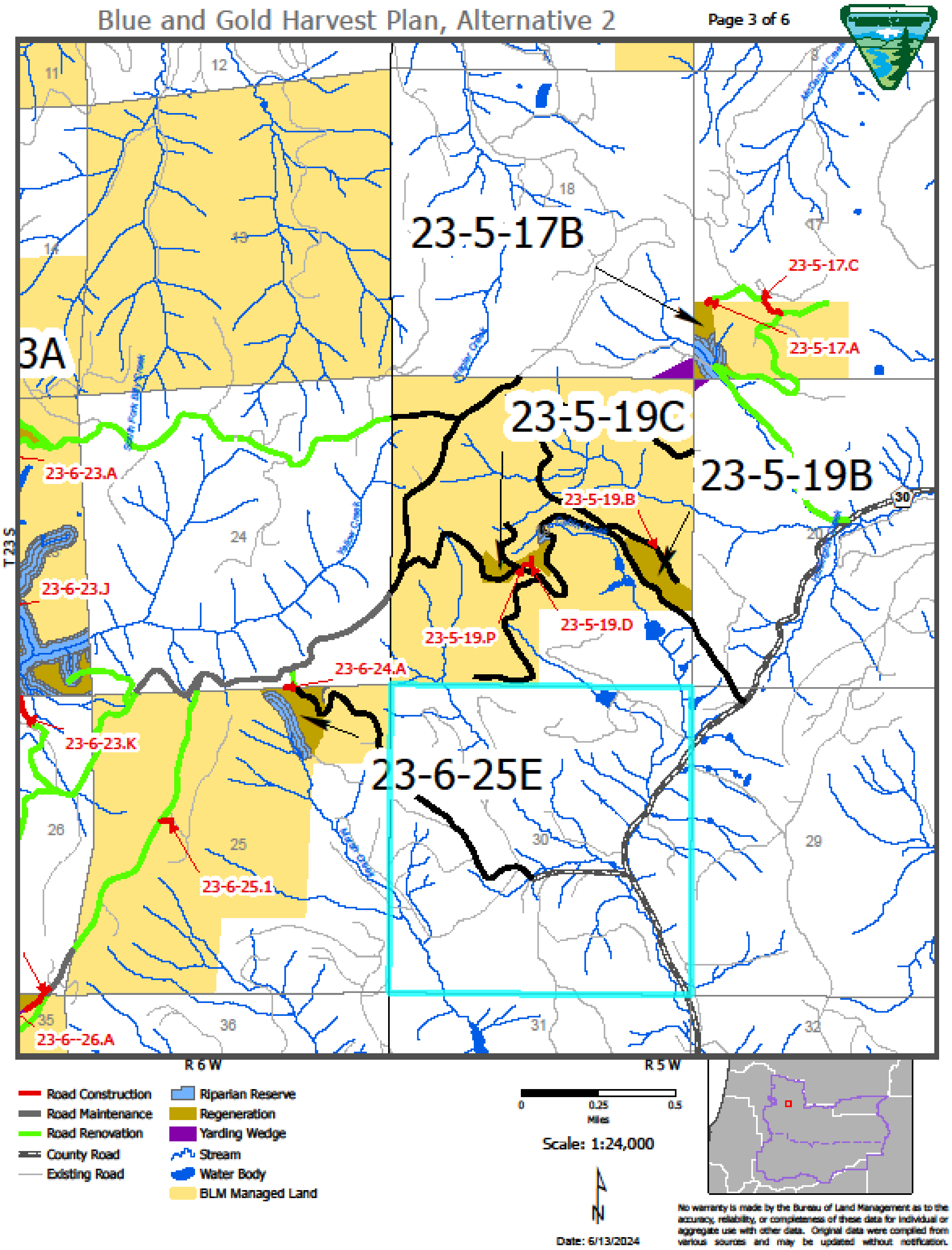
Map 2. Alternative 2 Overview Map



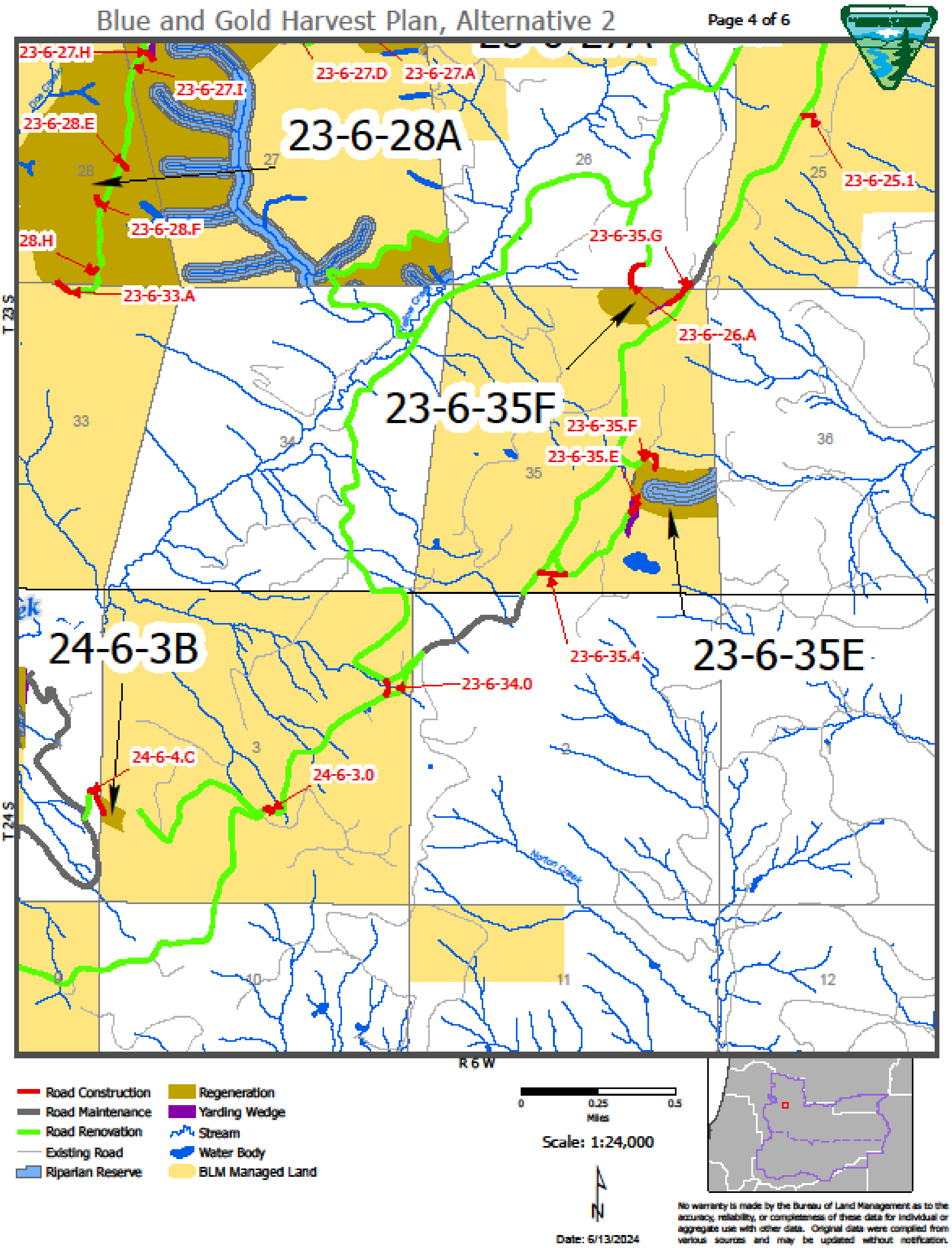
Map 3. Alternative 2 Detail Map 1



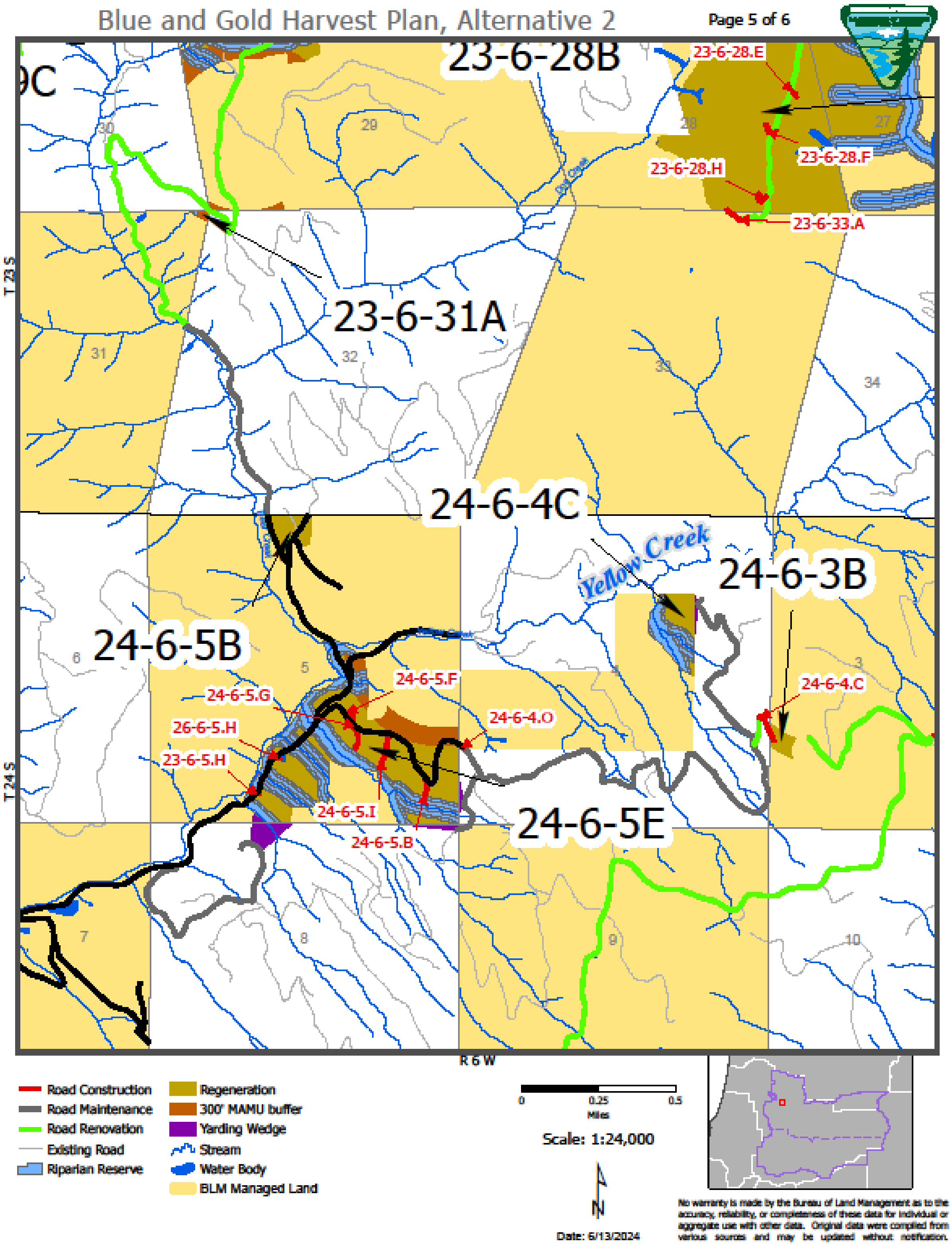
Map 4. Alternative 2 Detail Map 2



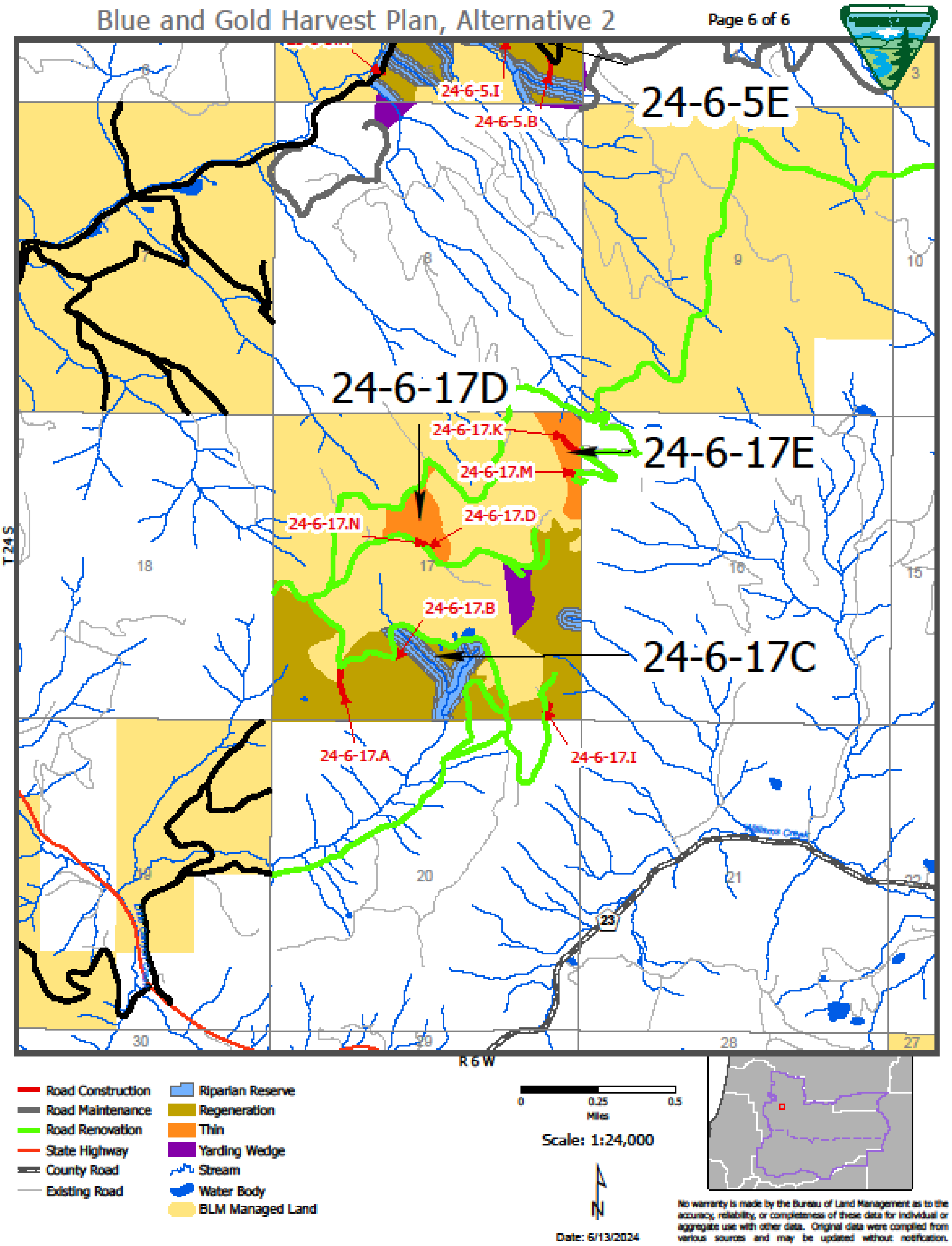
Map 5. Alternative 2 Detail Map 3



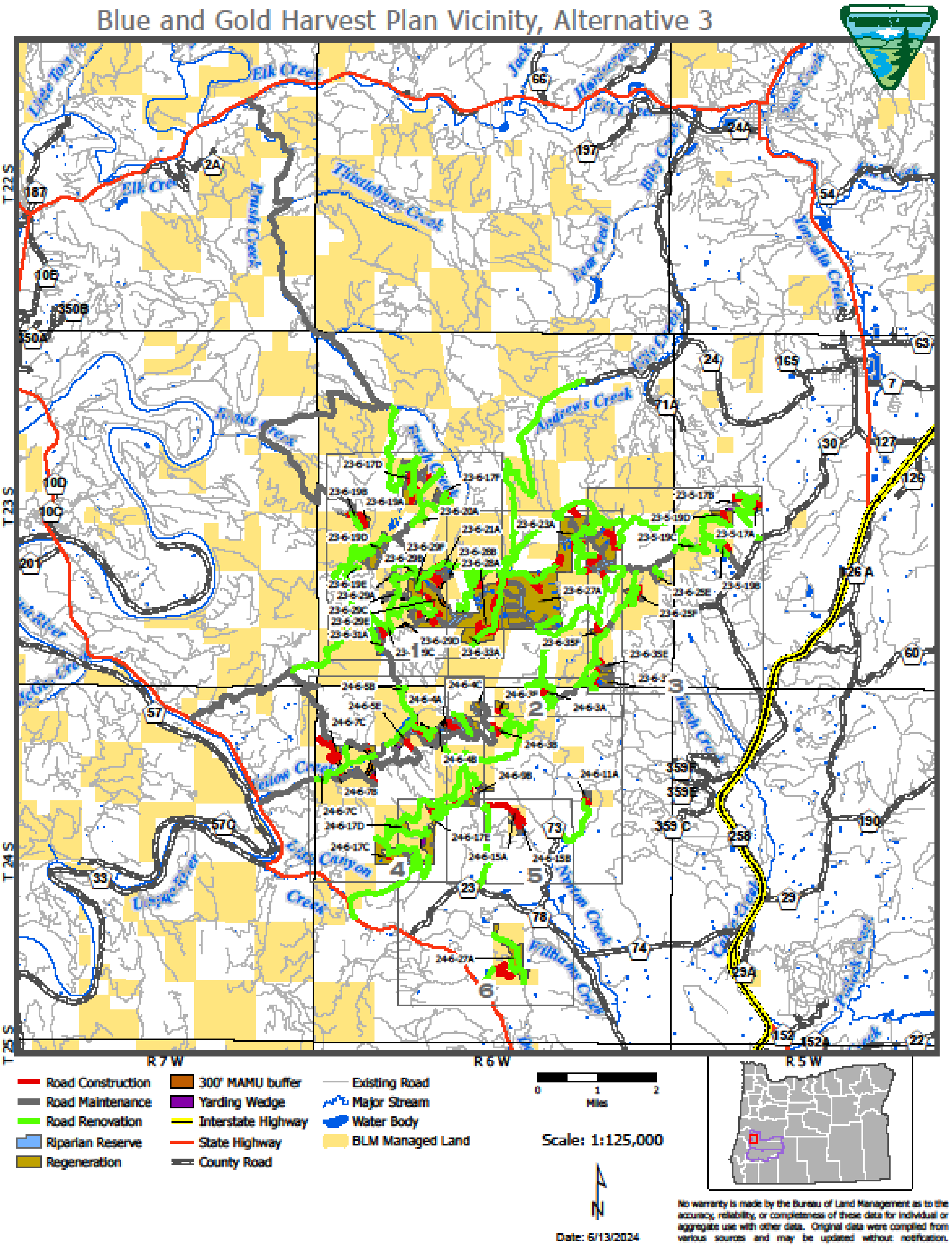
Map 6. Alternative 2 Detail Map 4



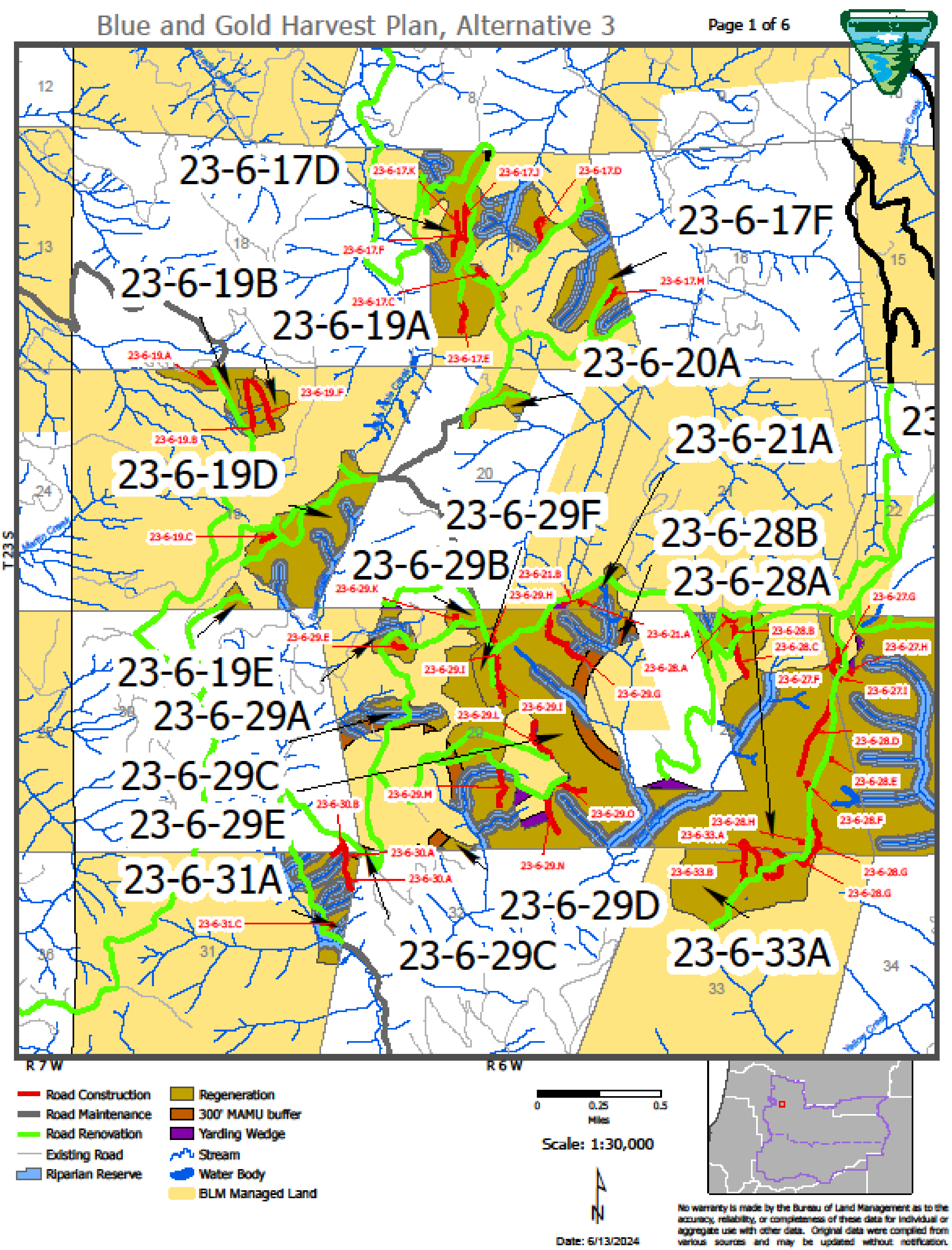
Map 7. Alternative 2 Detail Map 5



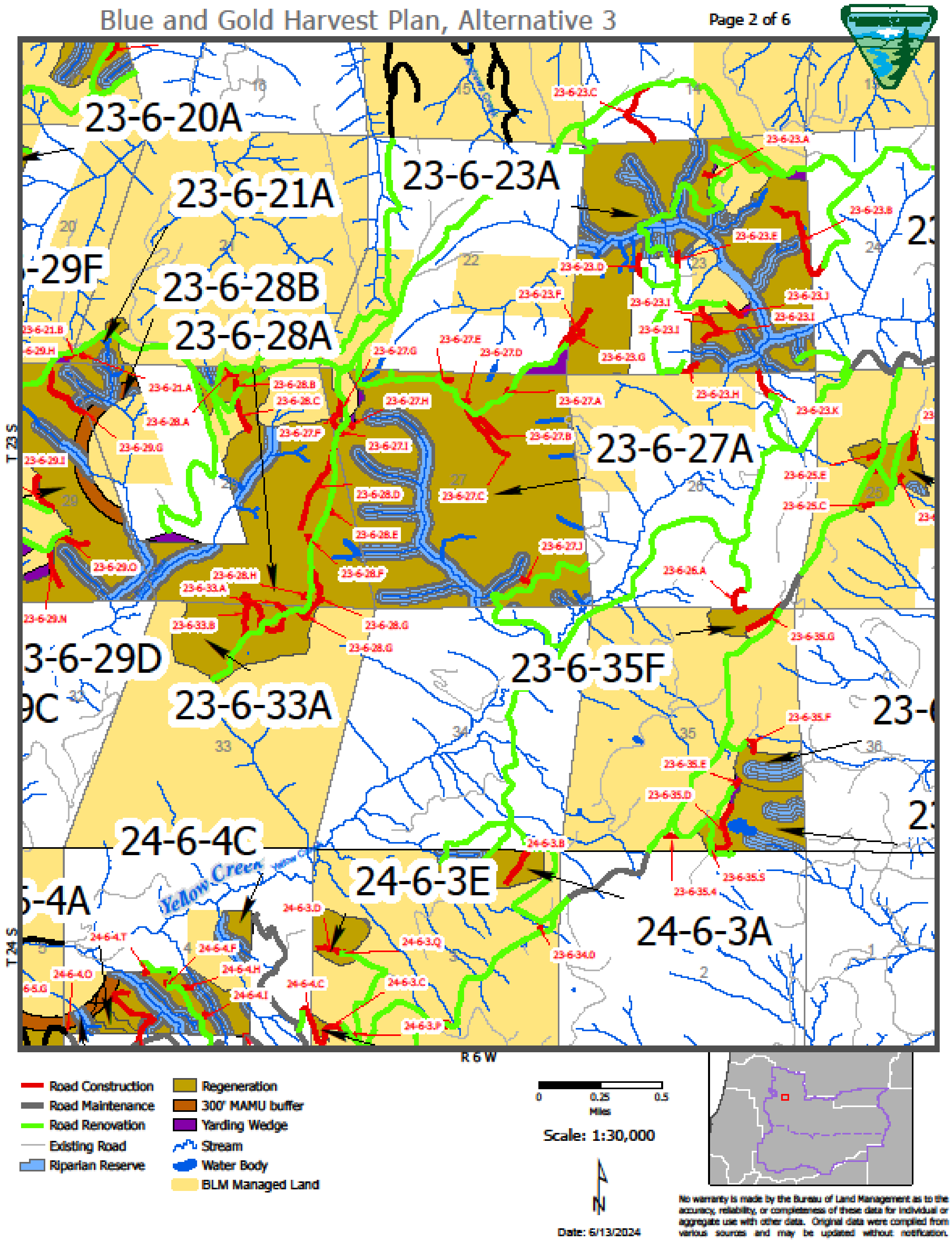
Map 8. Alternative 2 Detail Map 6



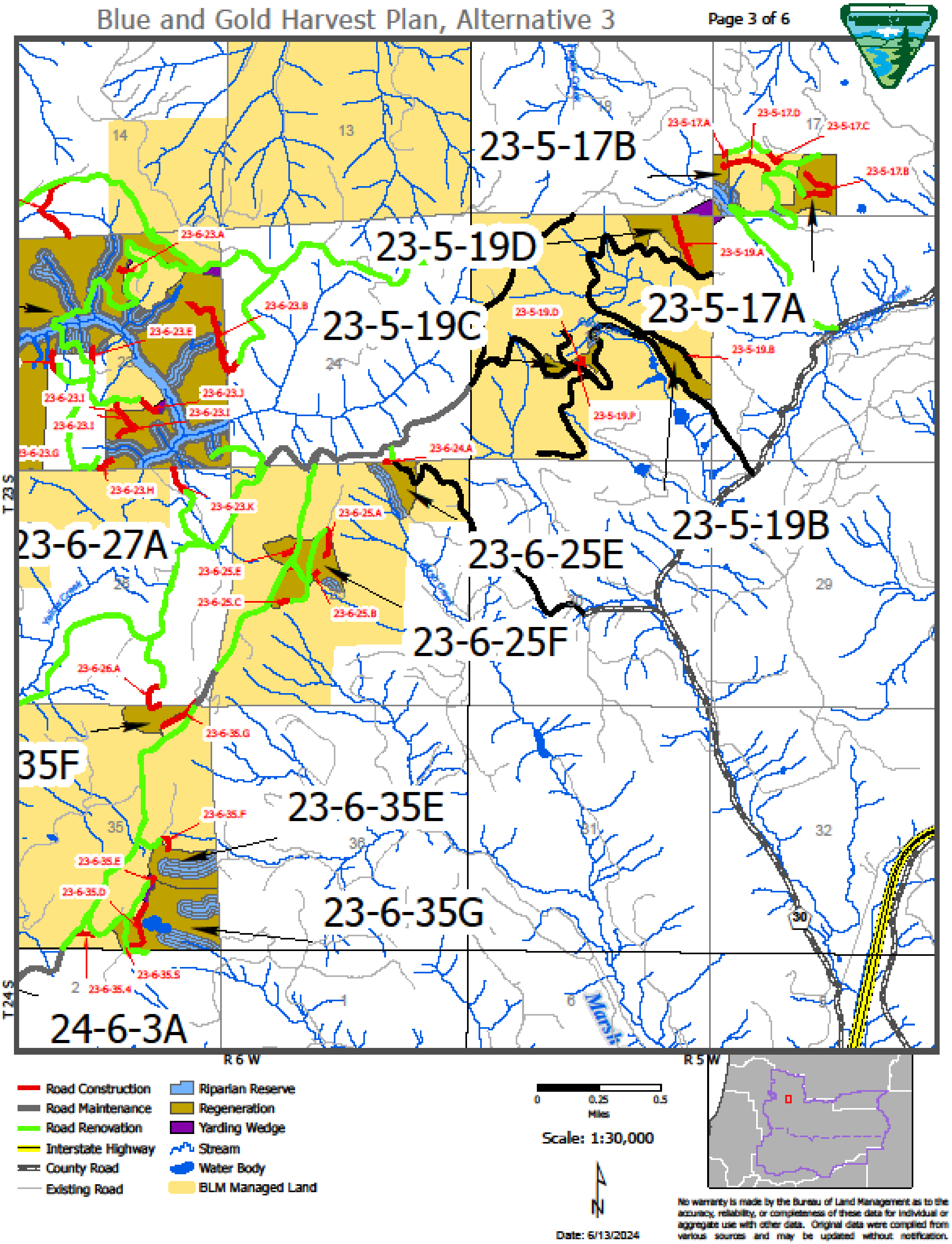
Map 9. Alternative 3 Overview Map



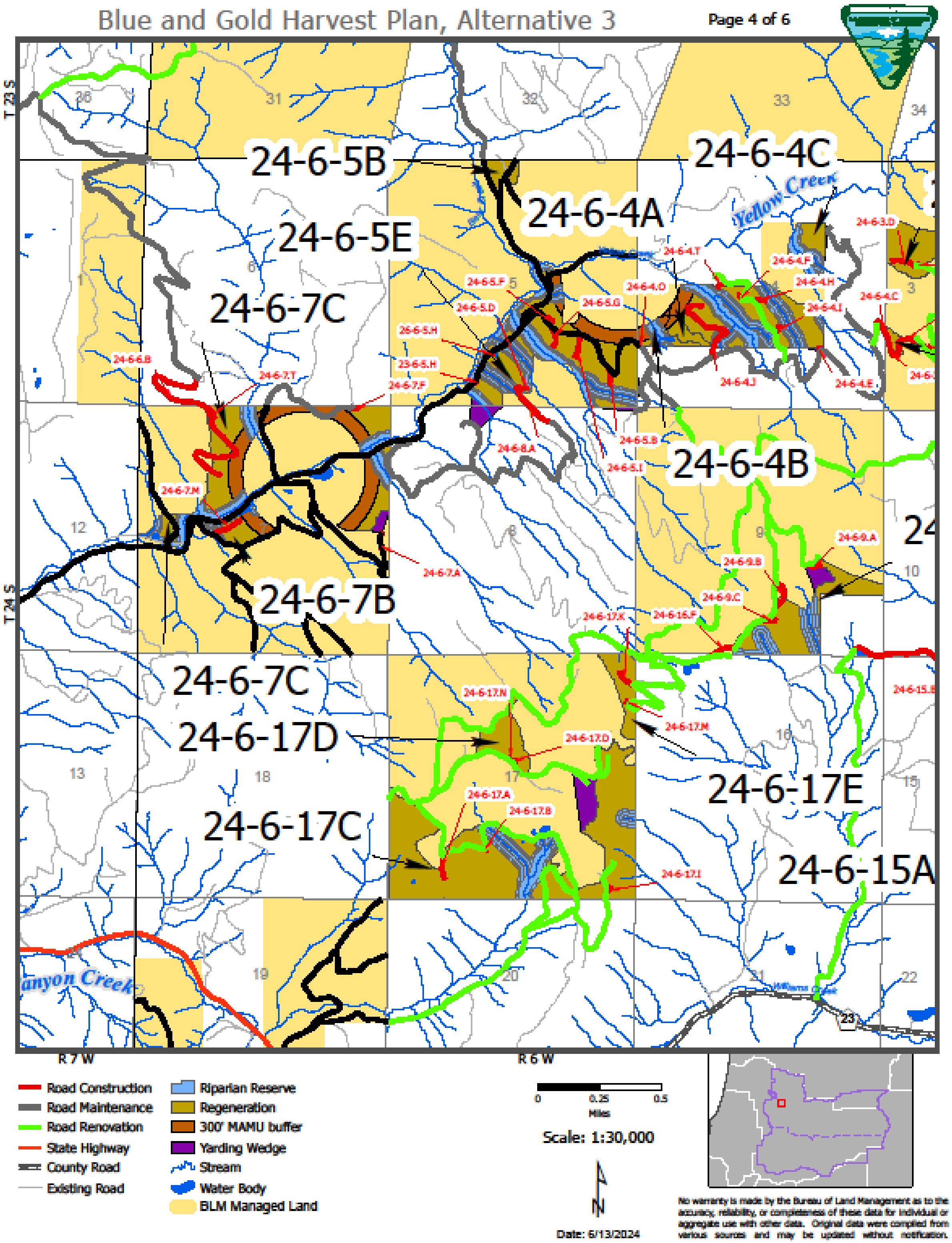
Map 10. Alternative 3 Detail Map 1



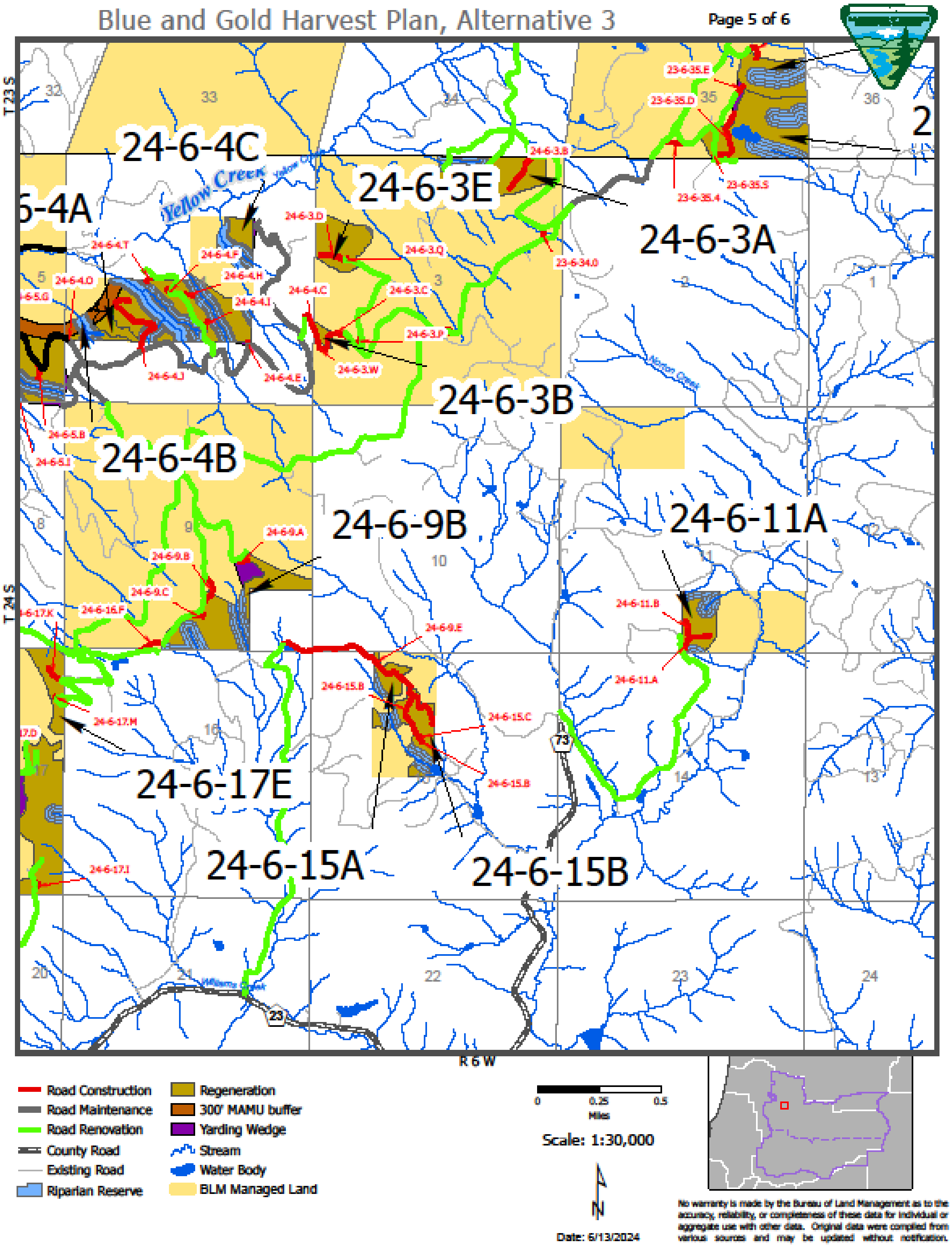
Map 11. Alternative 3 Detail Map 2



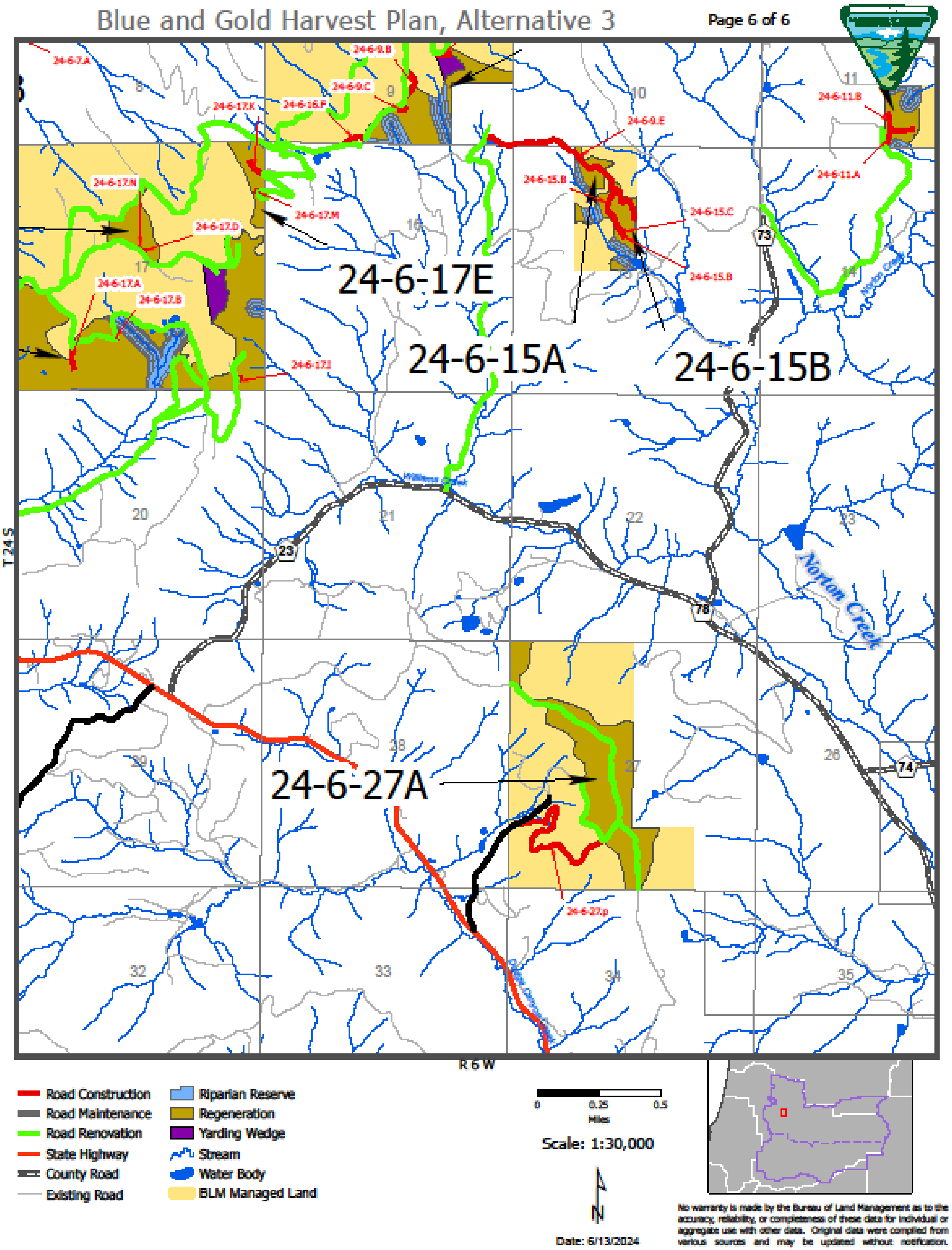
Map 12. Alternative 3 Detail Map 3



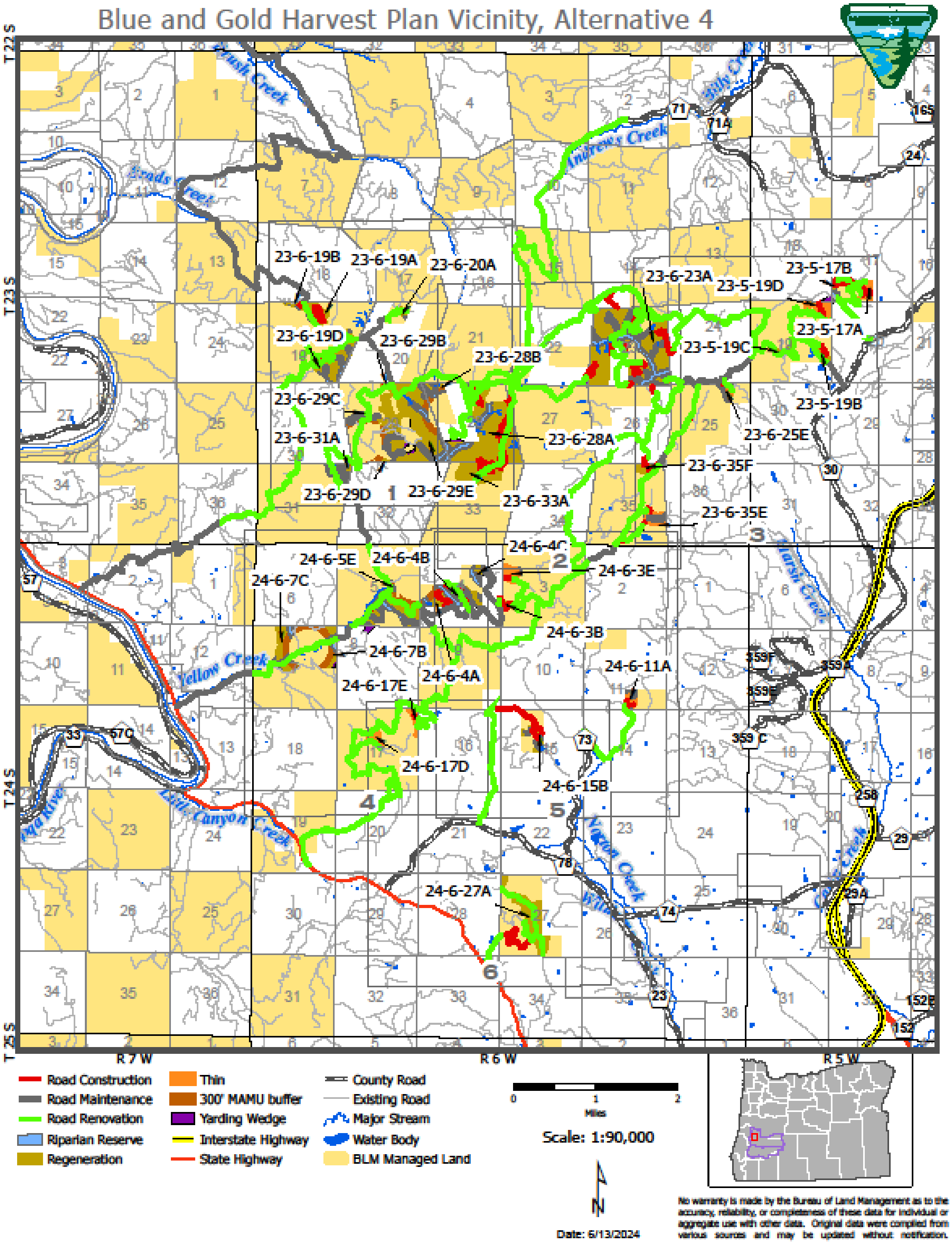
Map 13. Alternative 3 Detail Map 4



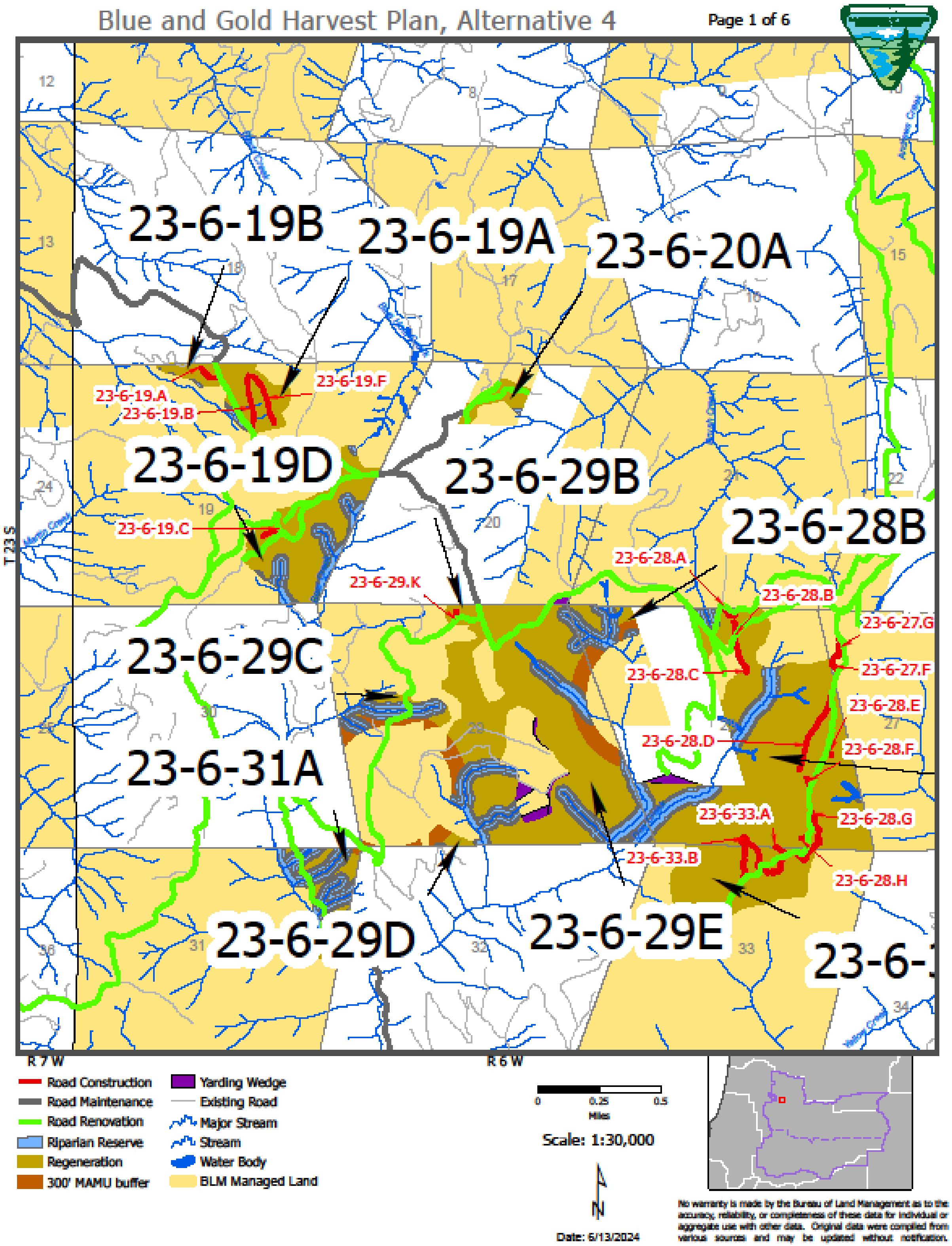
Map 14. Alternative 3 Detail Map 5



Map 15. Alternative 3 Detail Map 6



Map 16. Alternative 4 Overview Map



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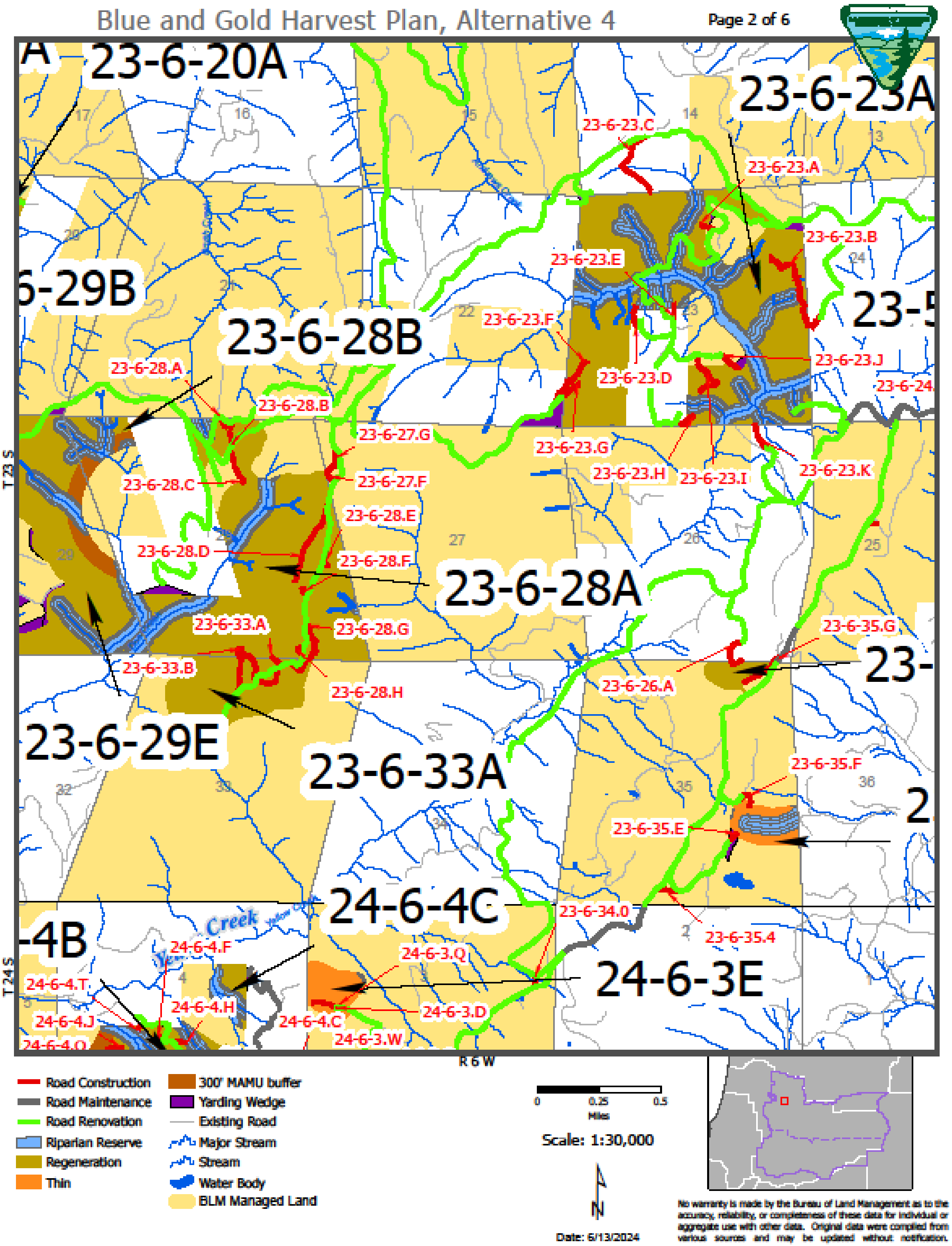

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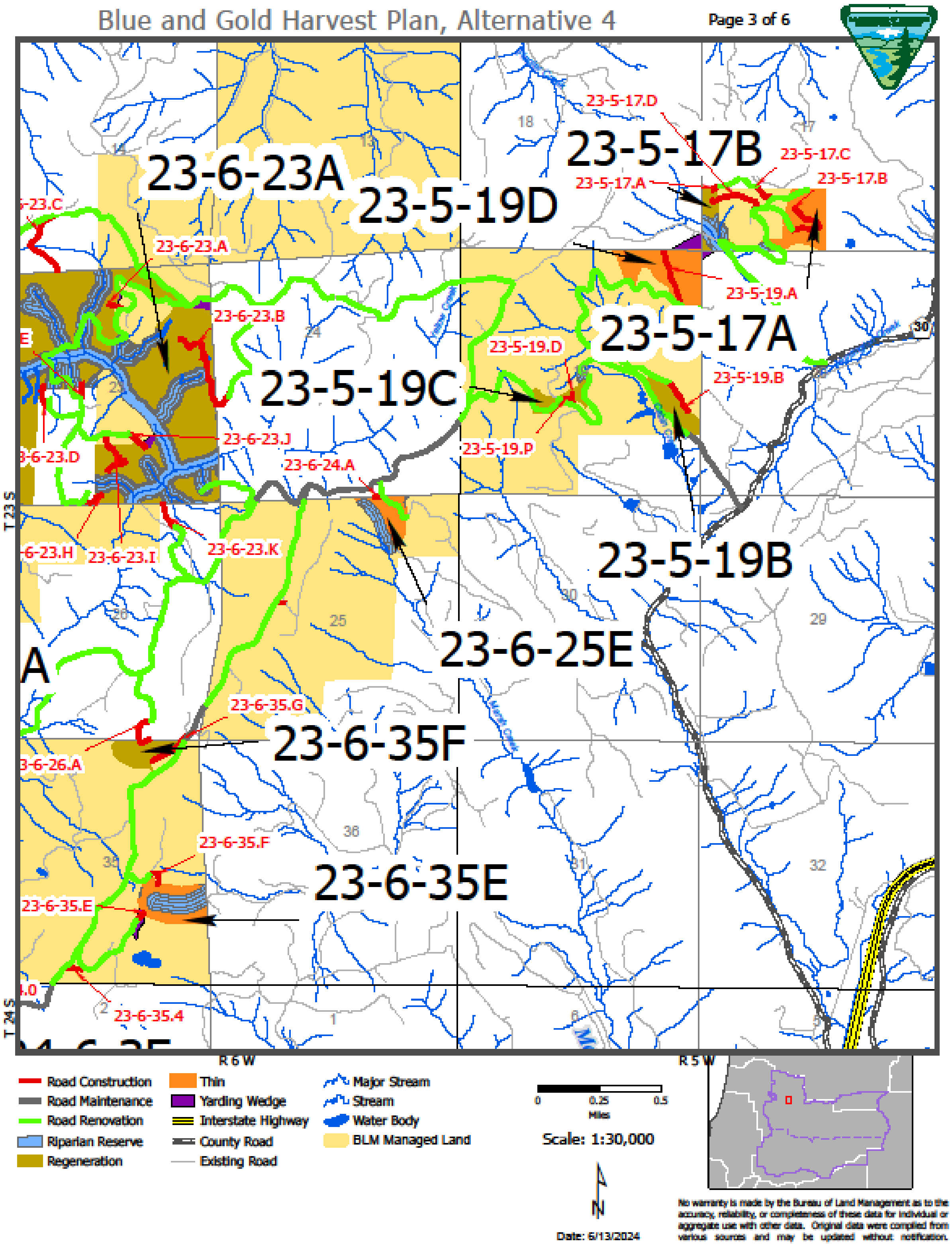

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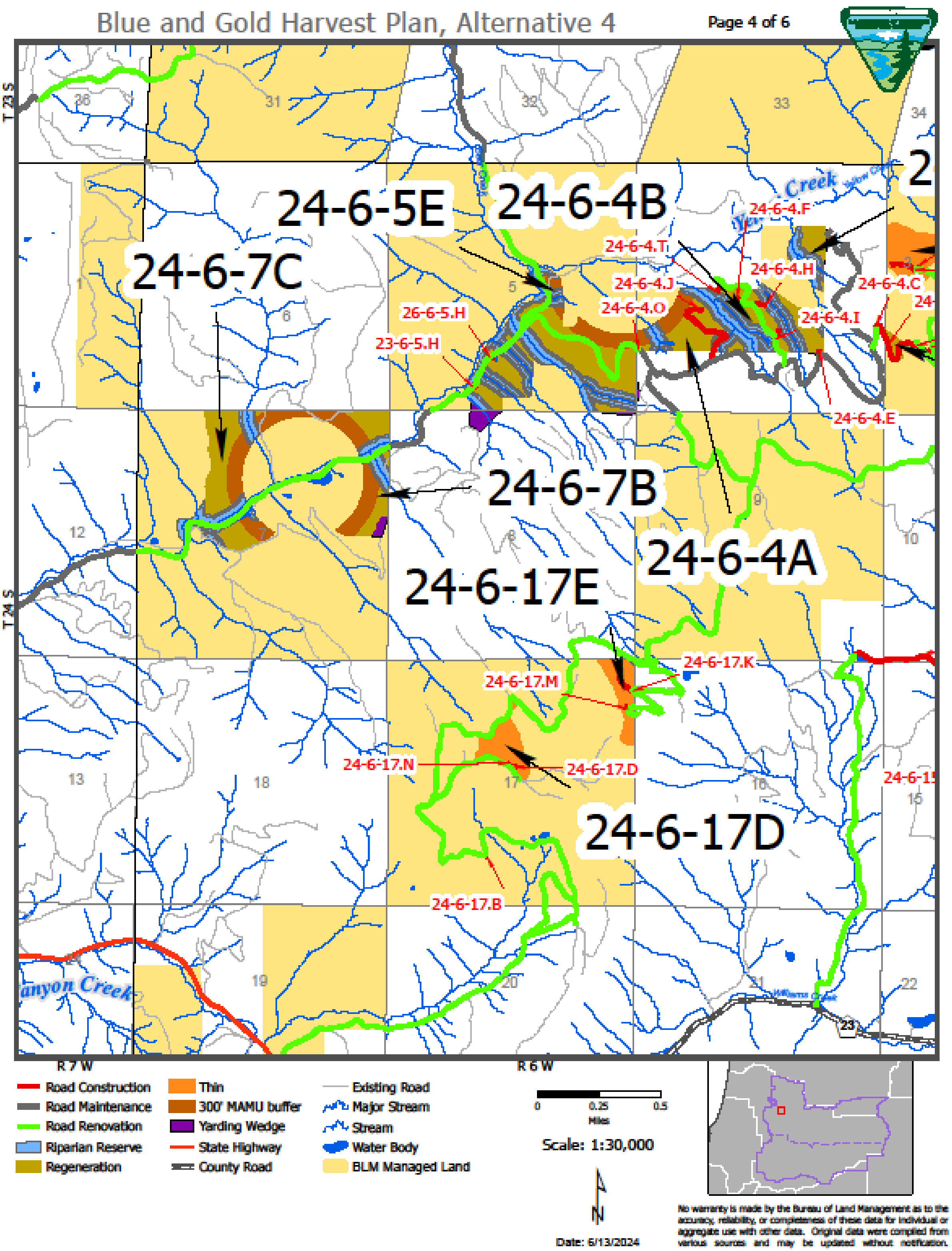

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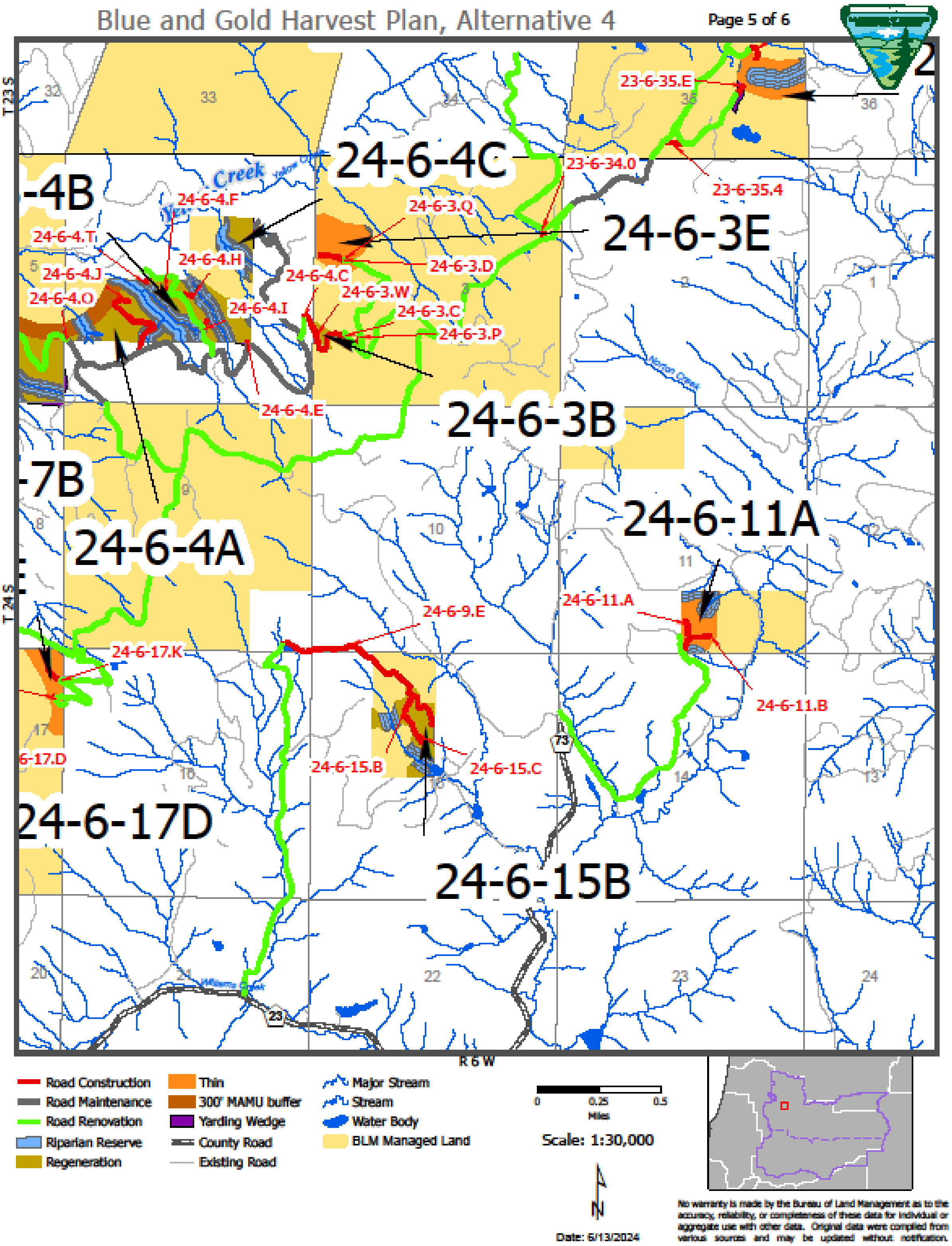
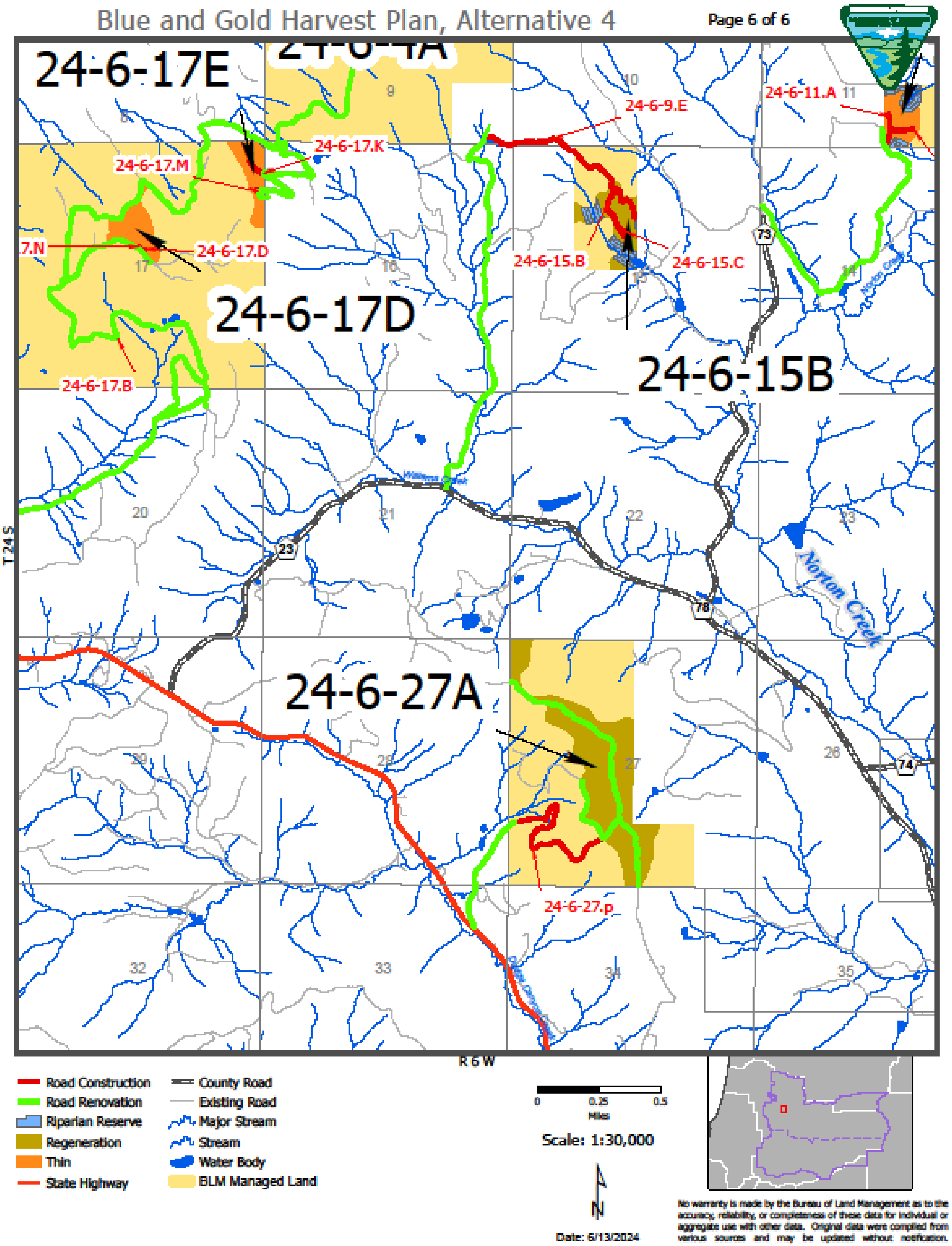


Map 21. Alternative 4 Detail Map 5



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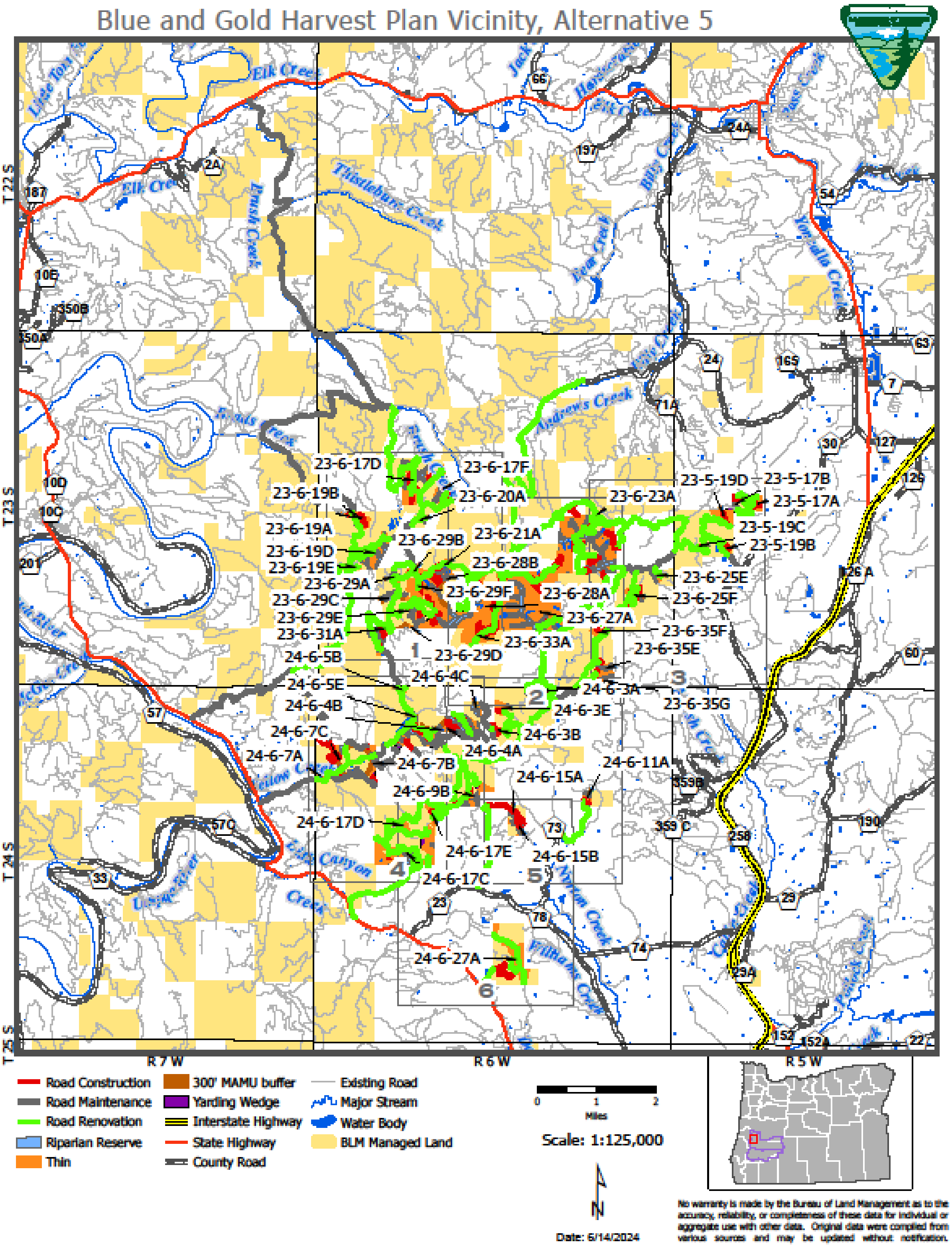
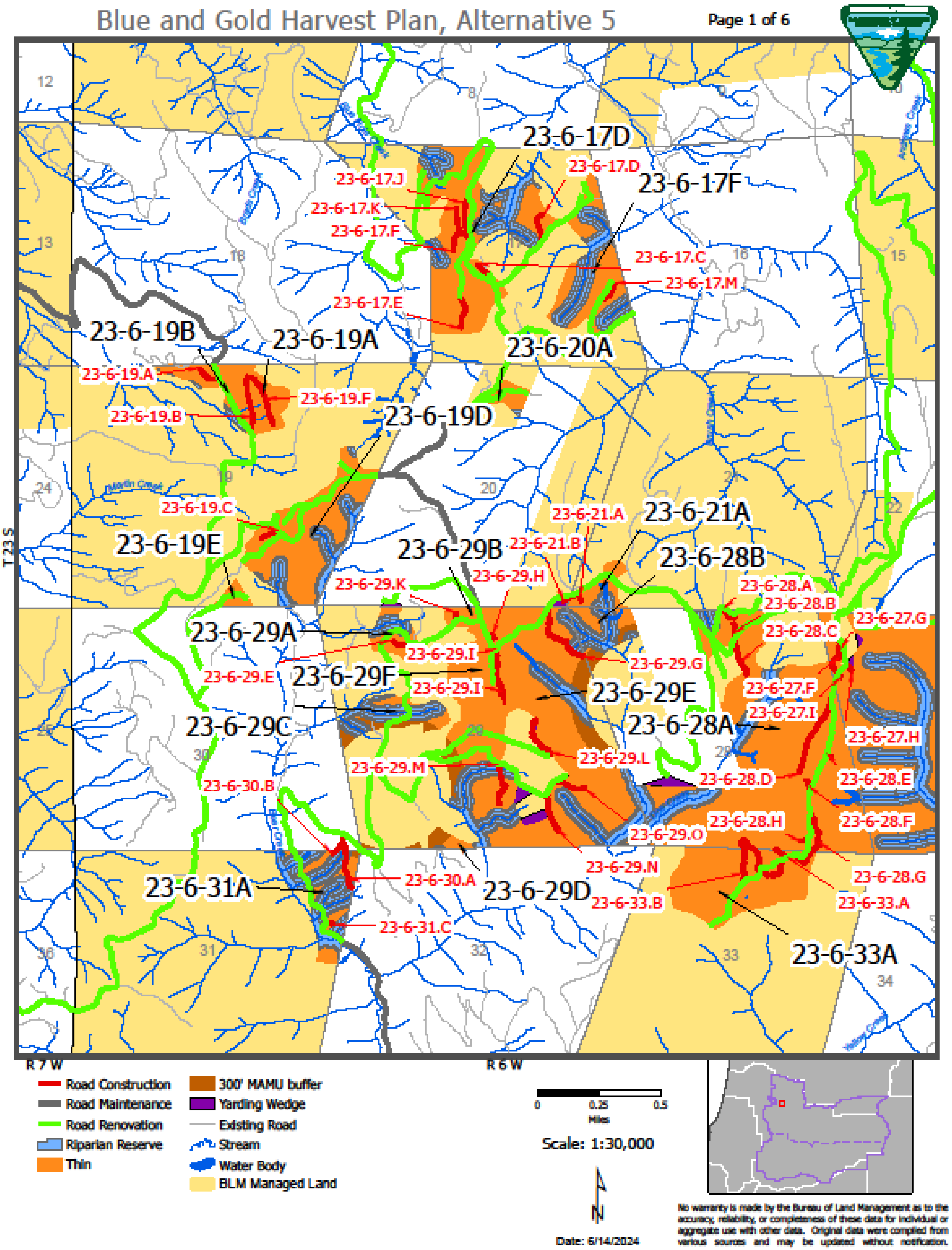
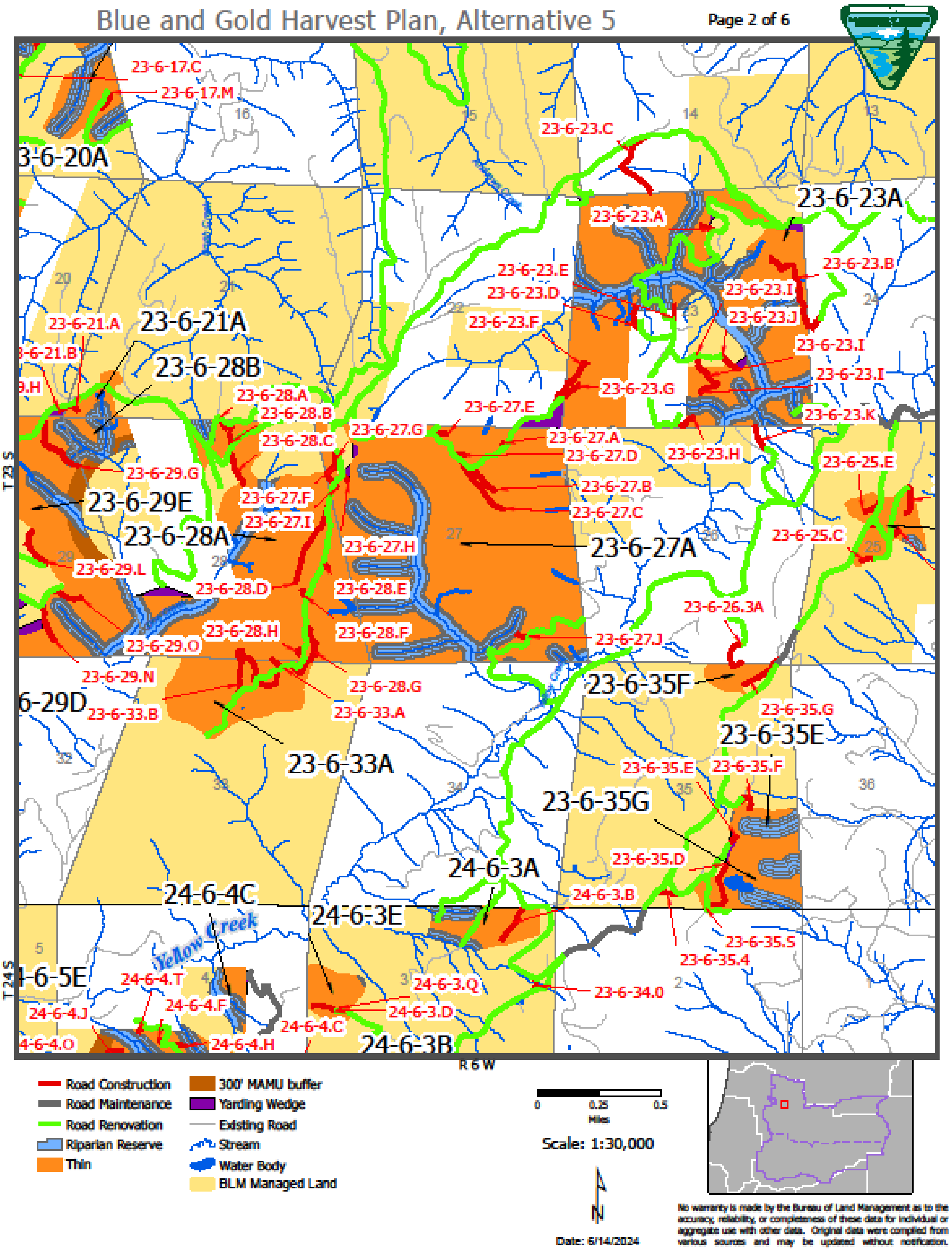


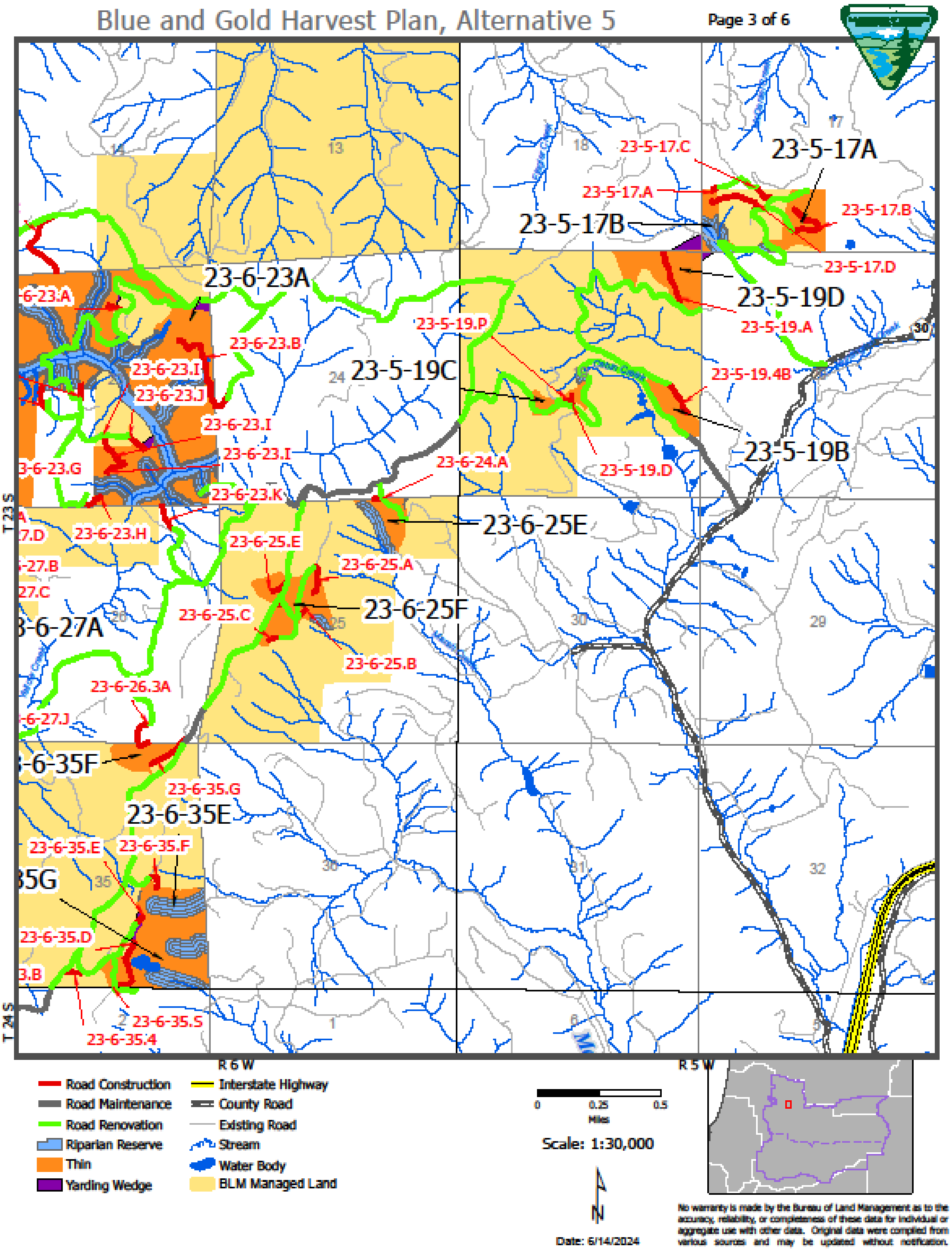
Map 23. Alternative 5 Overview Map



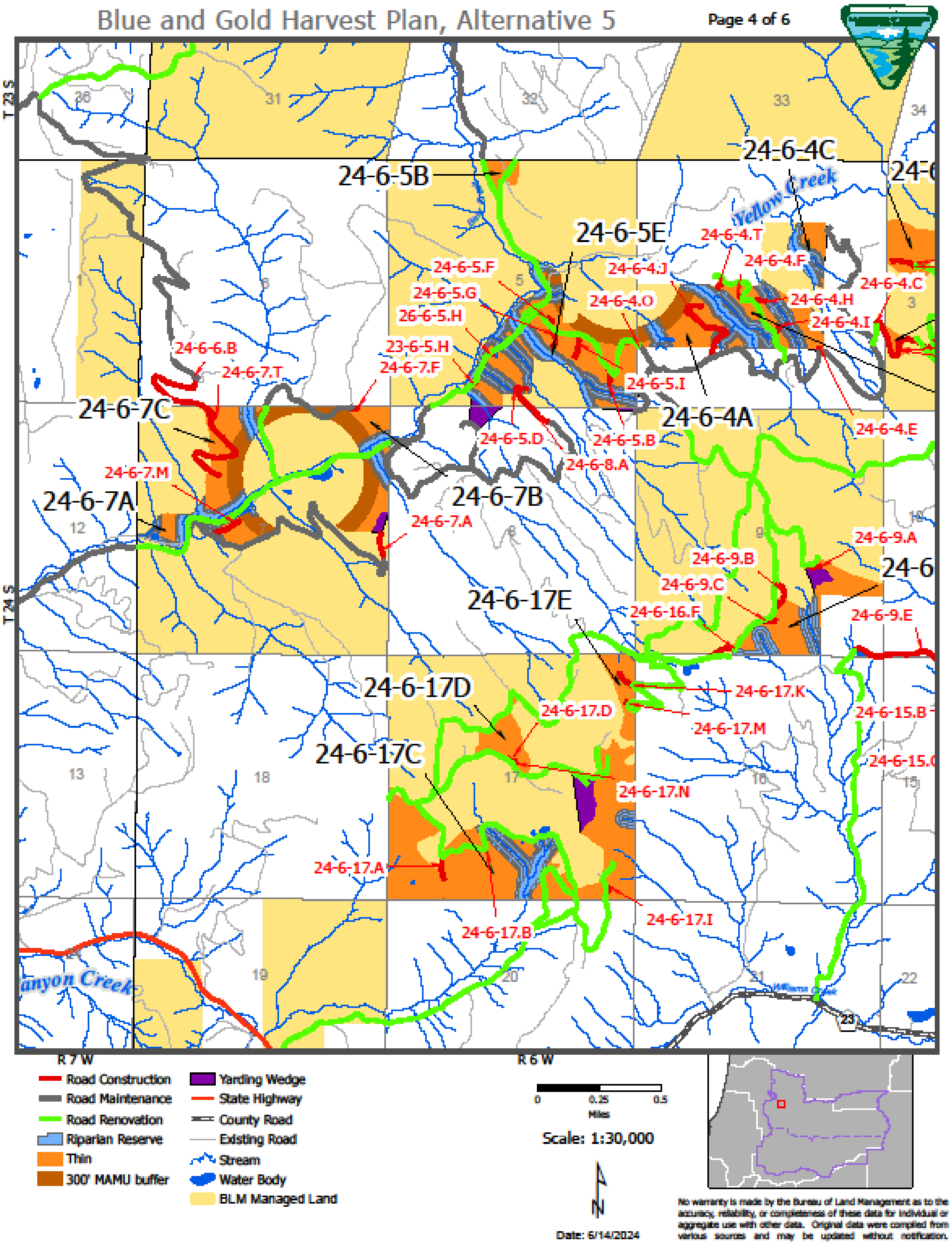
Map 24. Alternative 5 Detail Map 1



Map 25. Alternative 5 Detail Map 2



Map 26. Alternative 5 Detail Map 3



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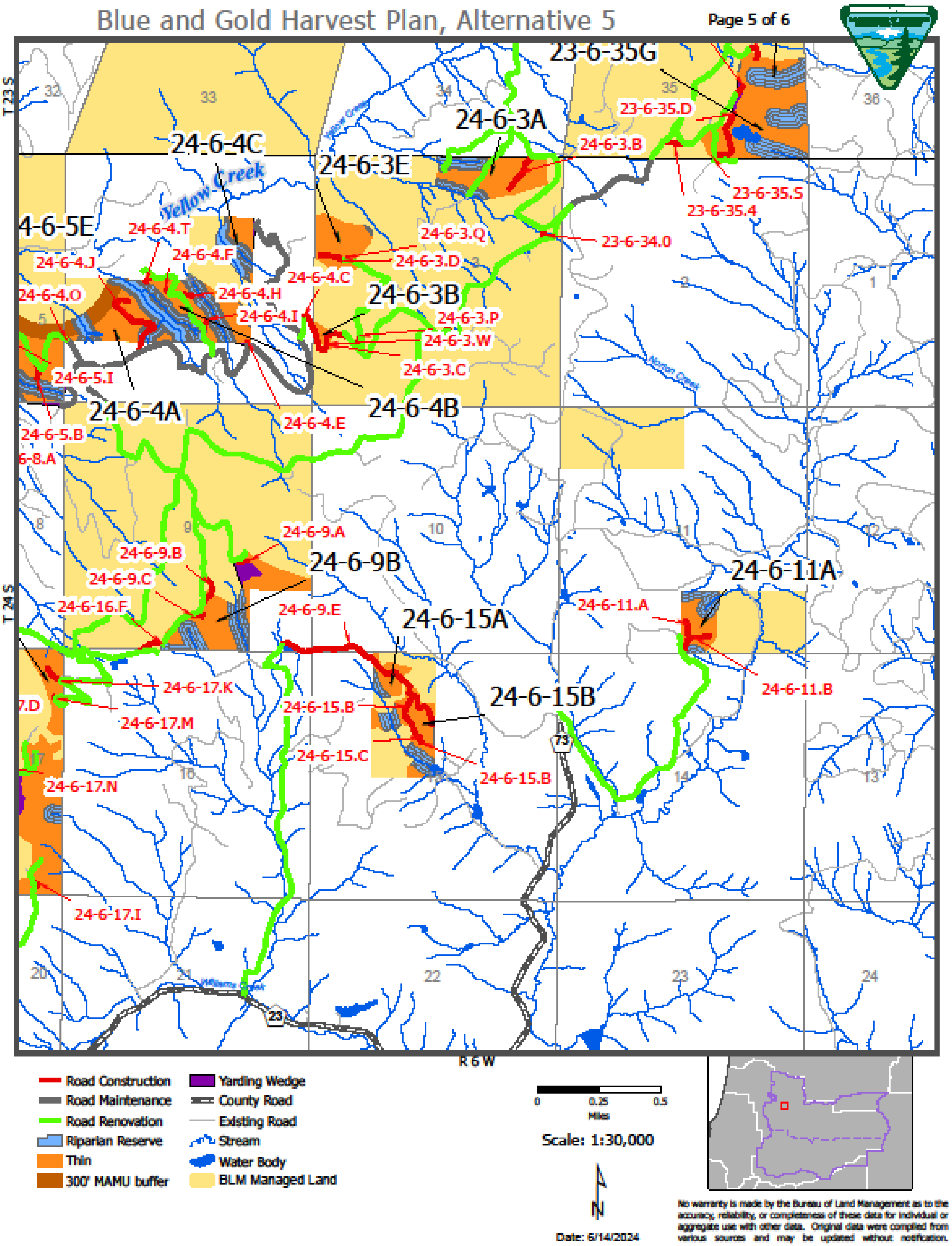

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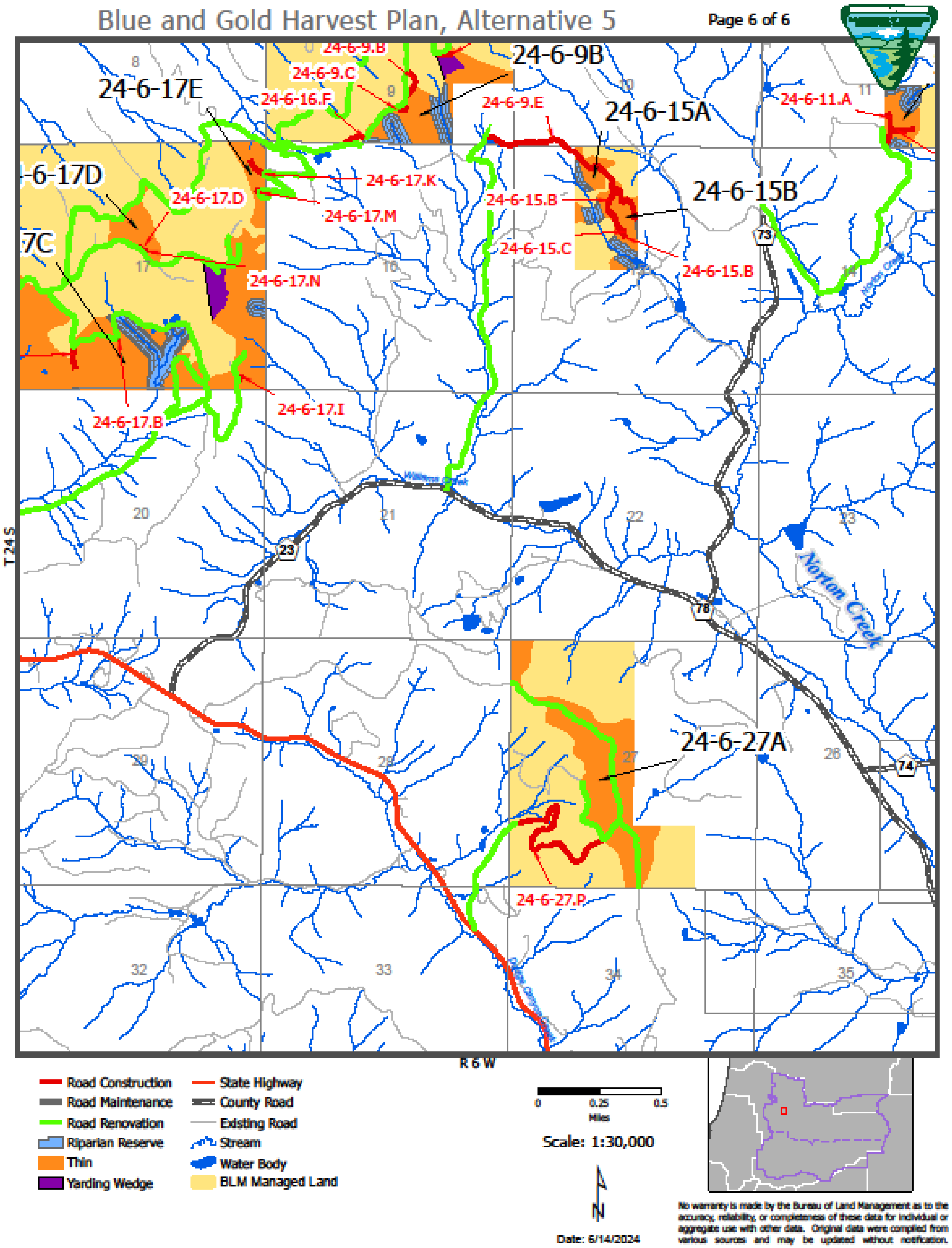

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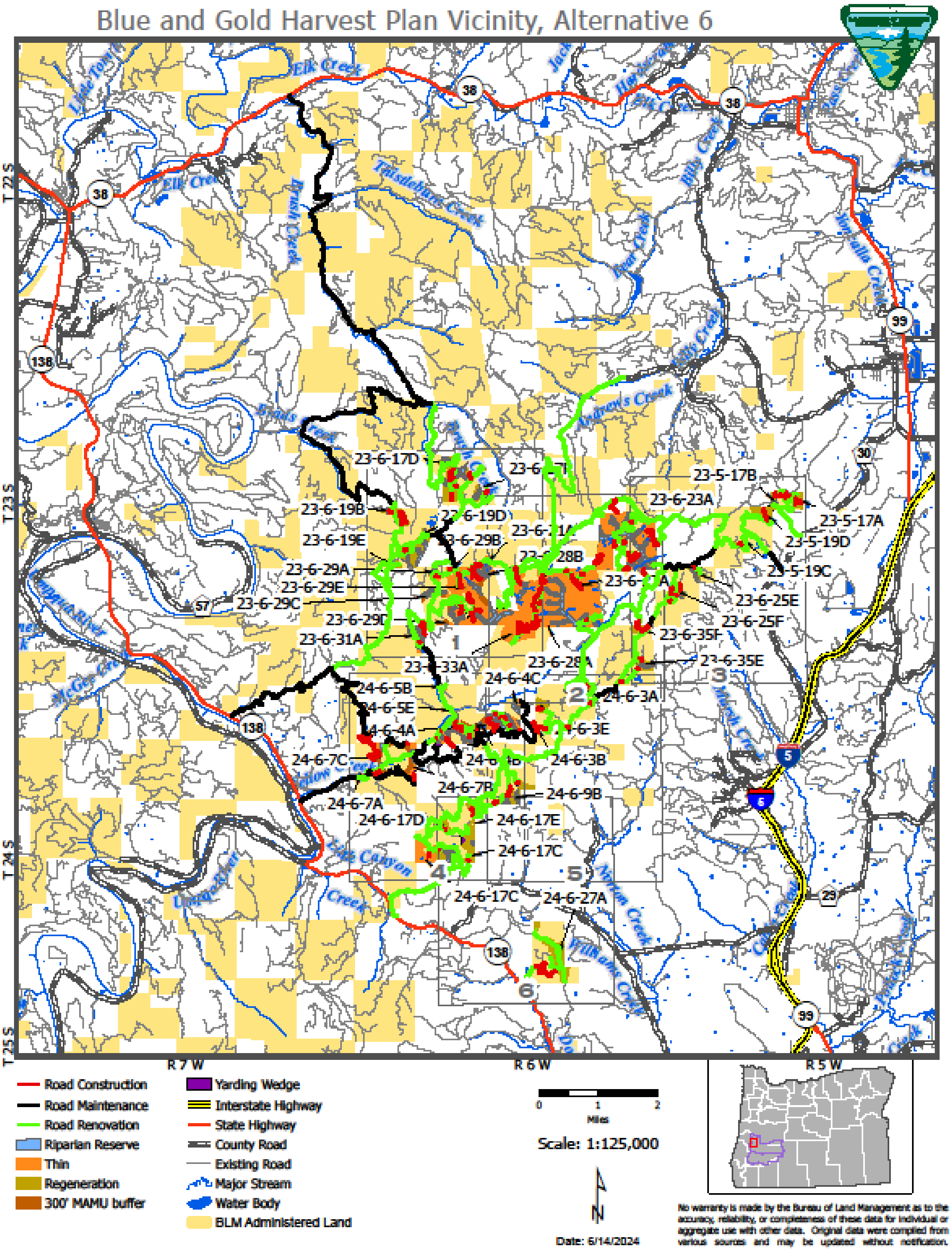
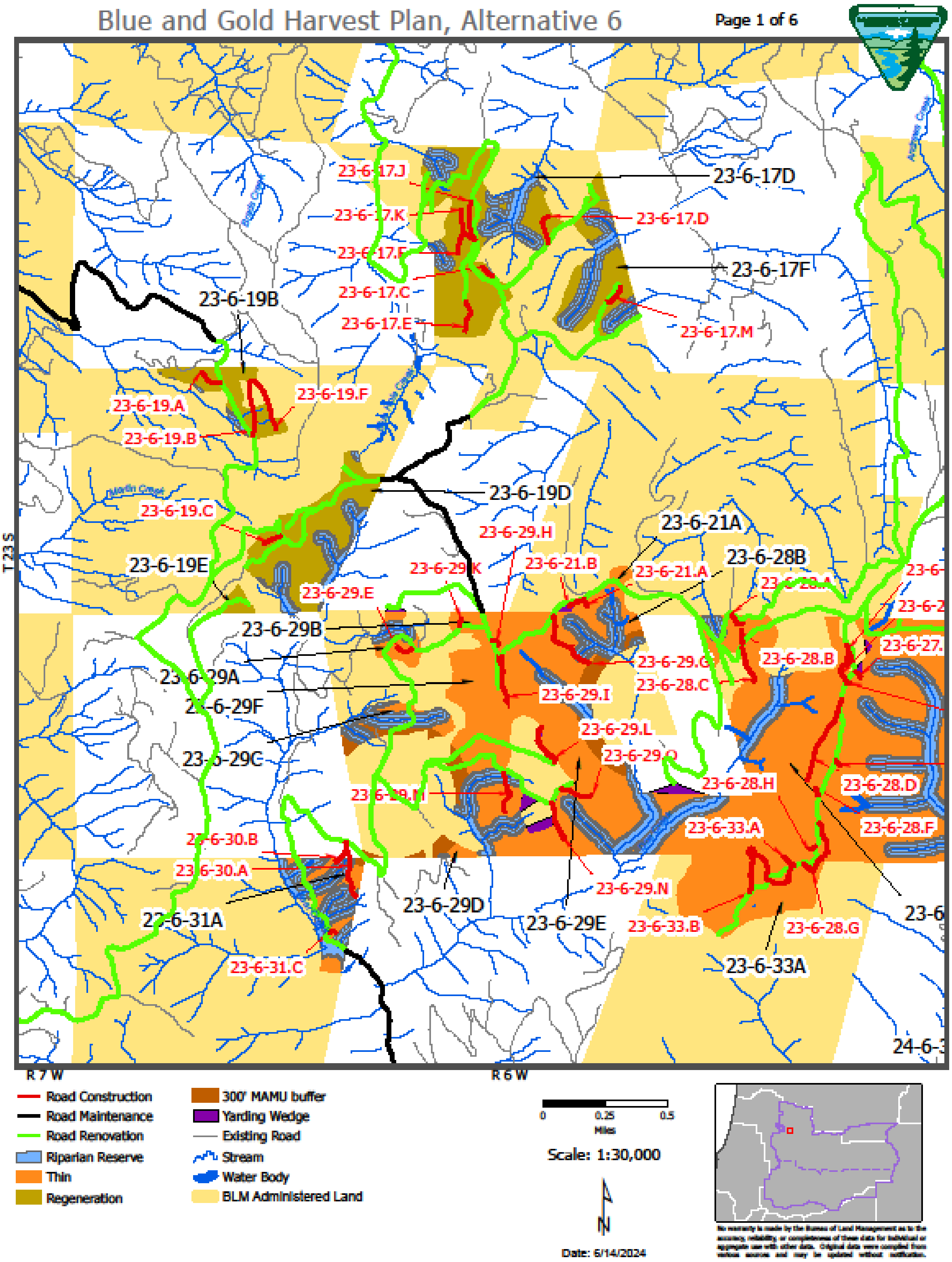
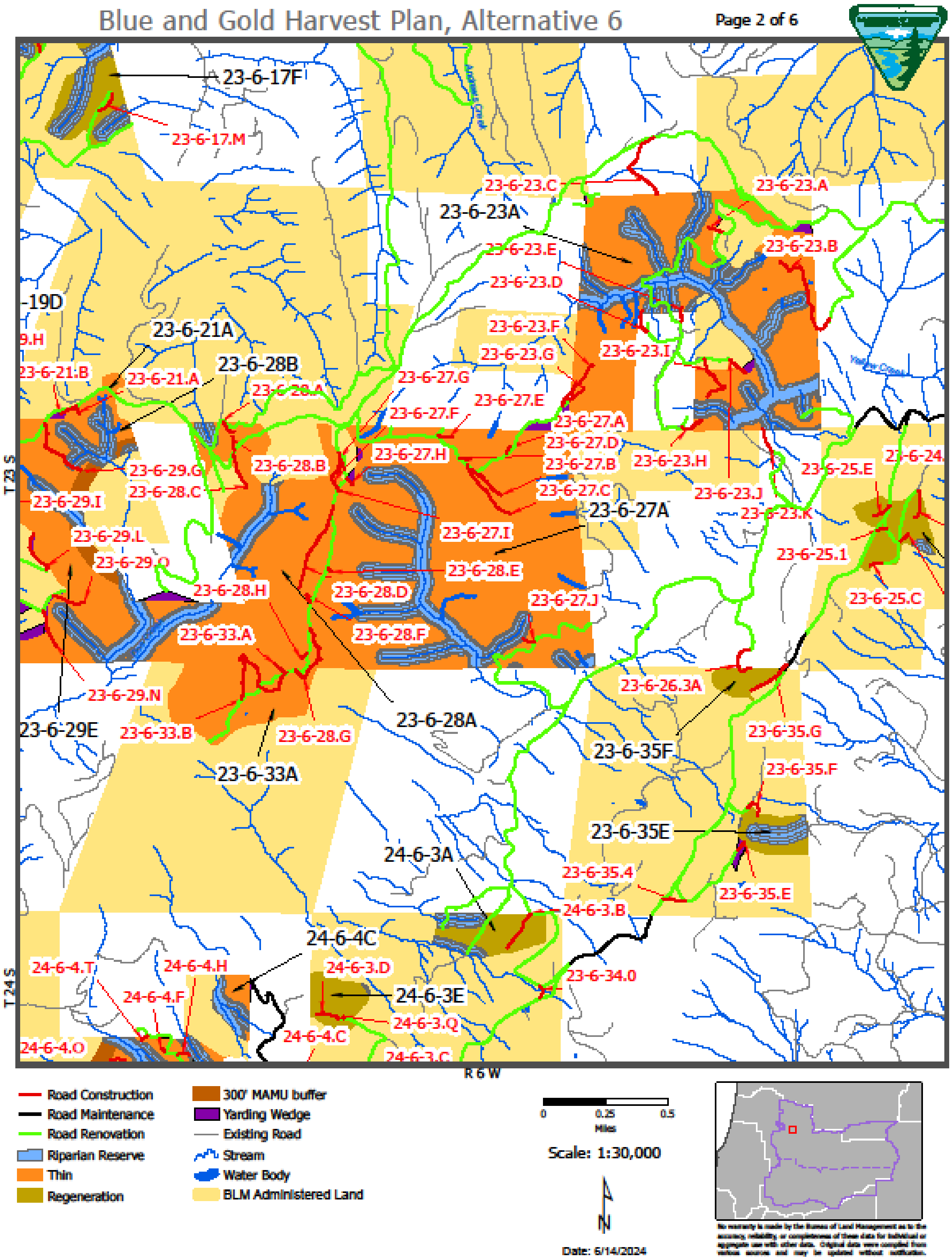


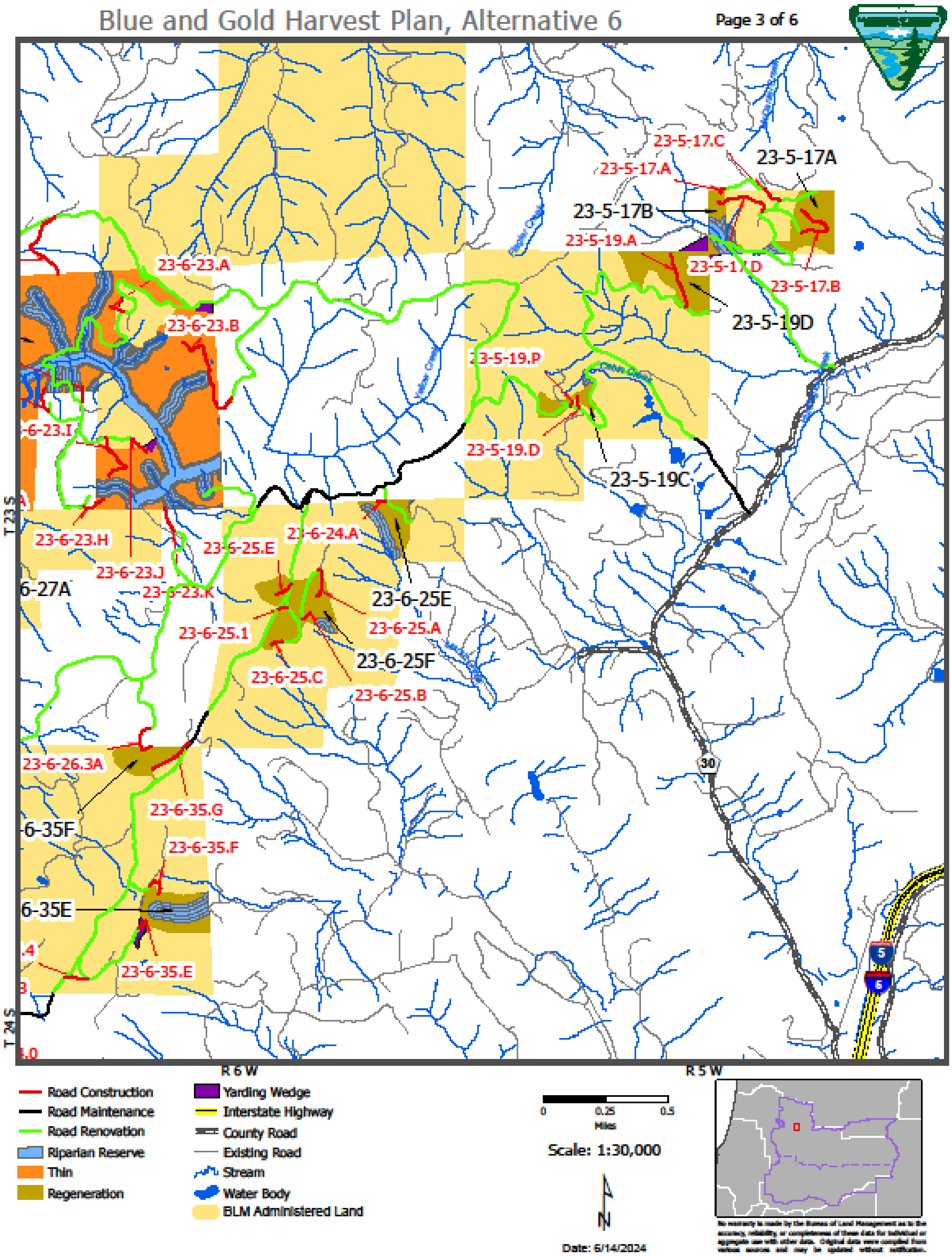
Map 30. Alternative 6 Vicinity Map



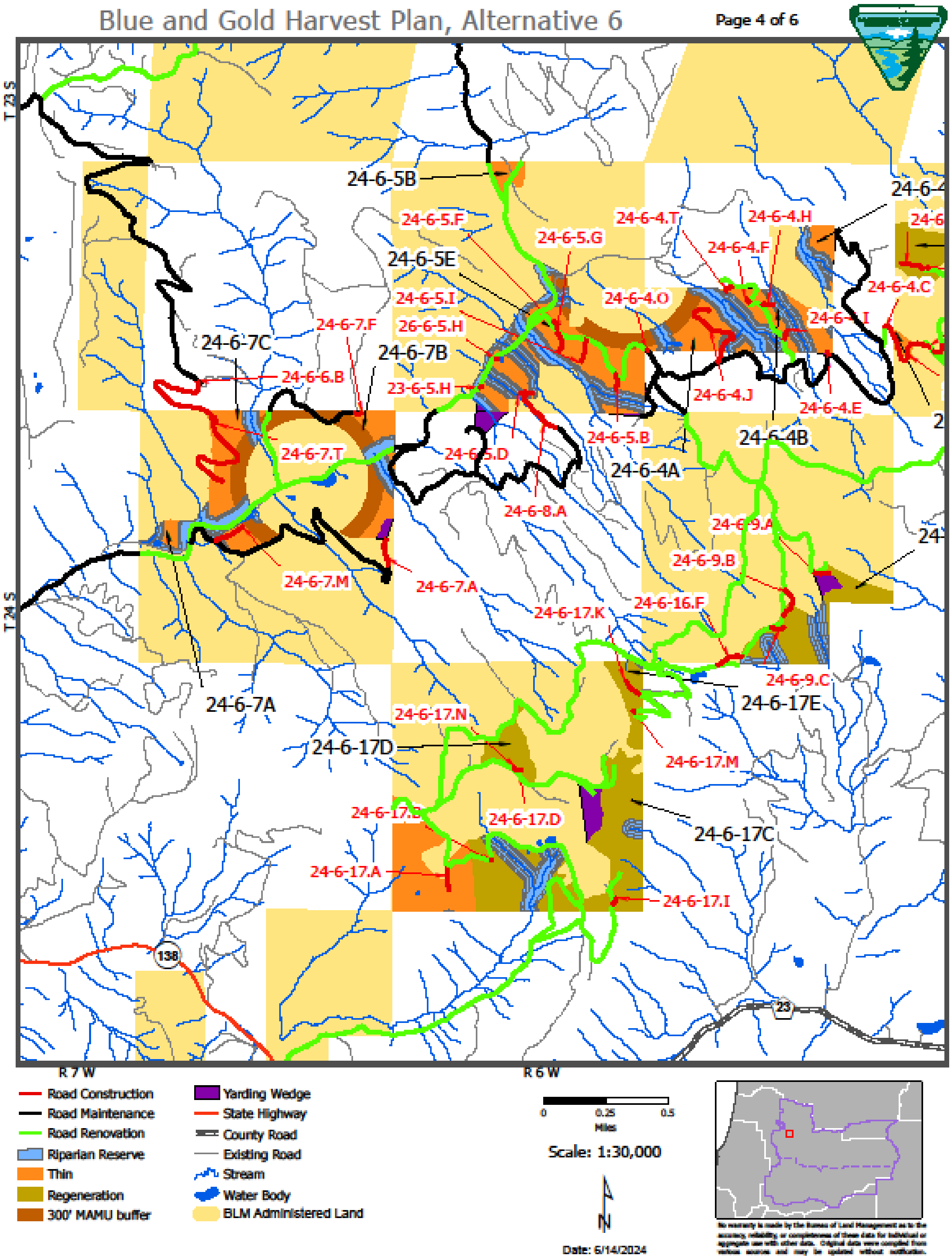
Map 31. Alternative 6 Detail Map 1



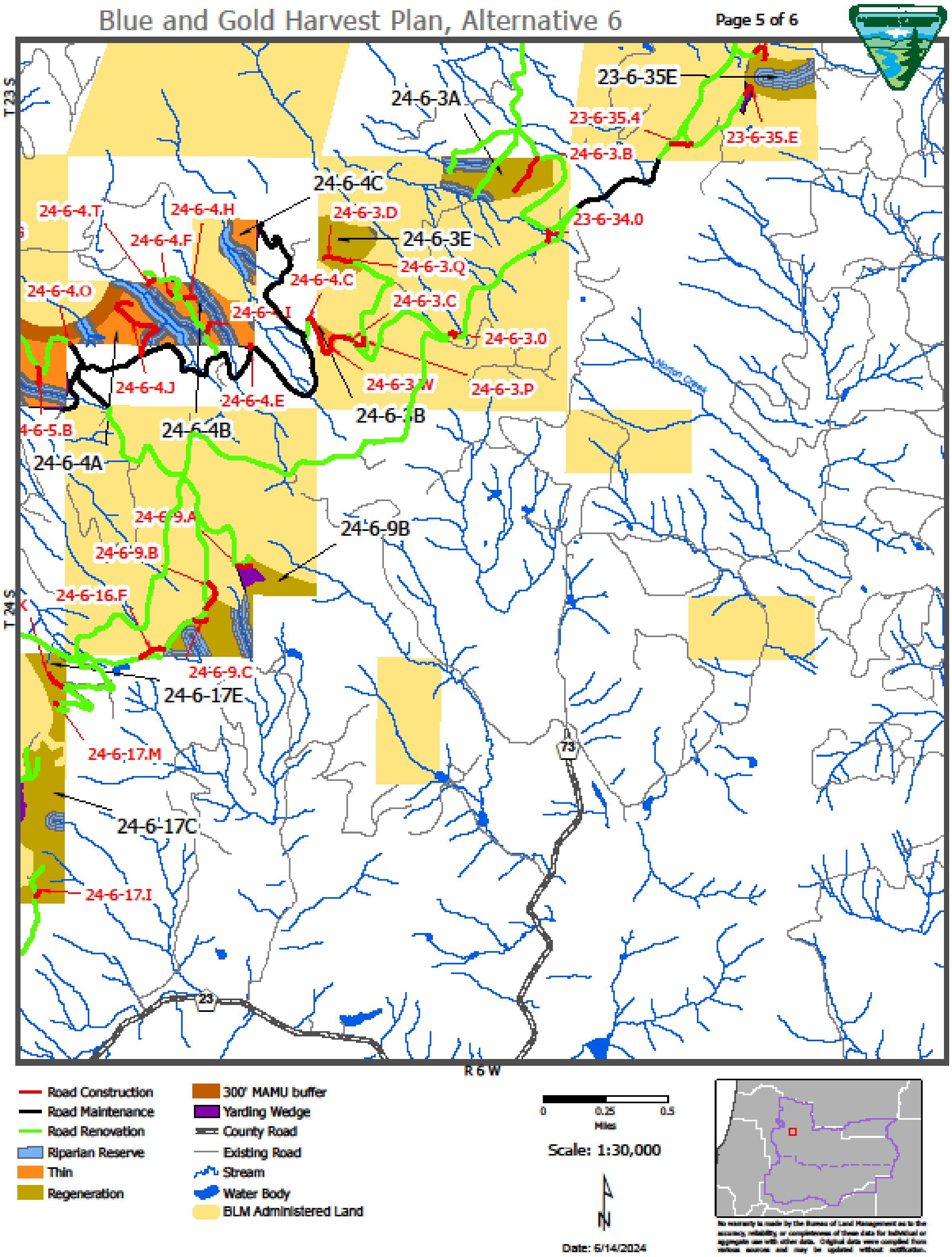
Map 32. Alternative 6 Detail Map 2



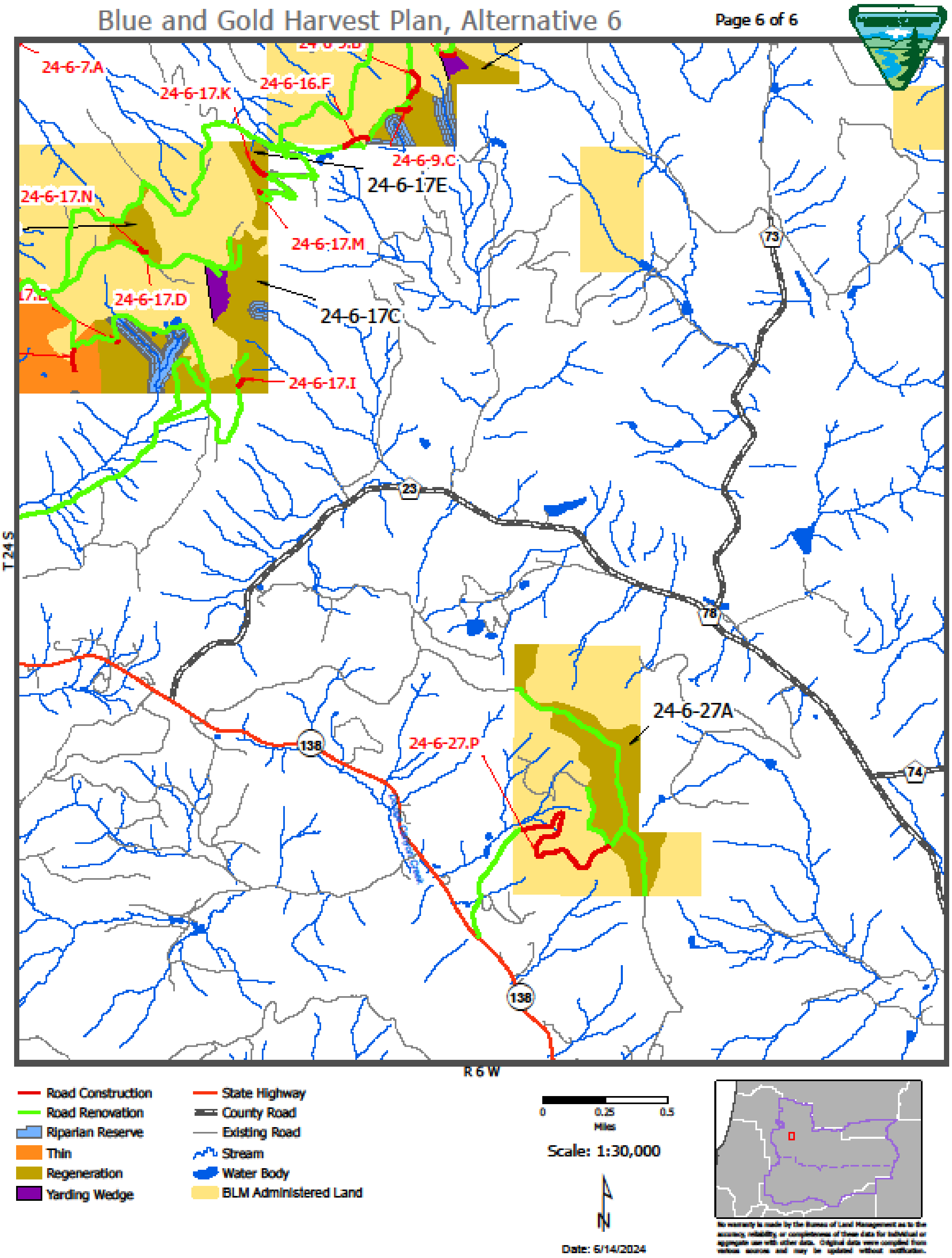
Map 33. Alternative 6 Detail Map 3



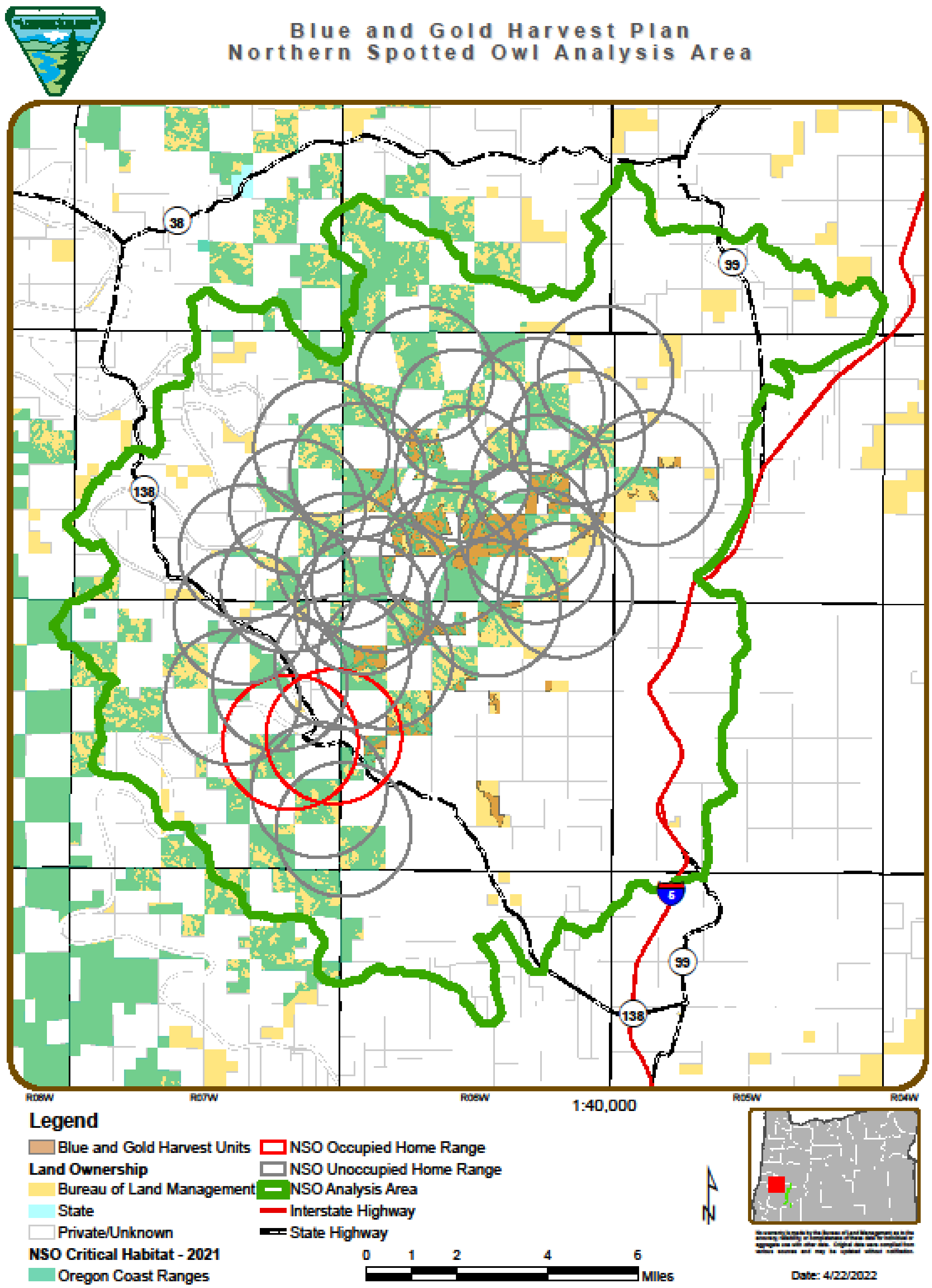
Map 34. Alternative 6 Detail Map 4



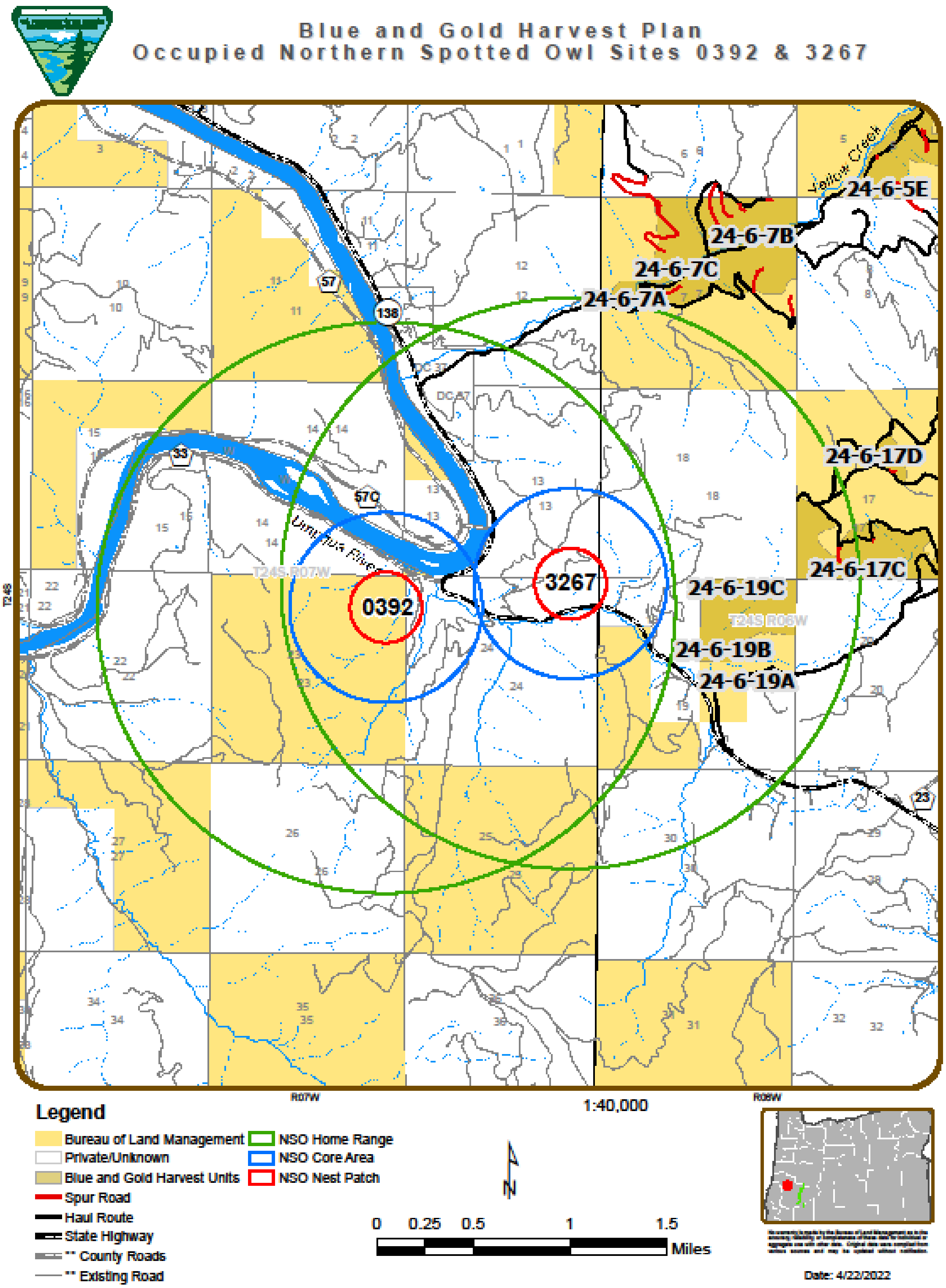
Map 35. Alternative 6 Detail Map 5



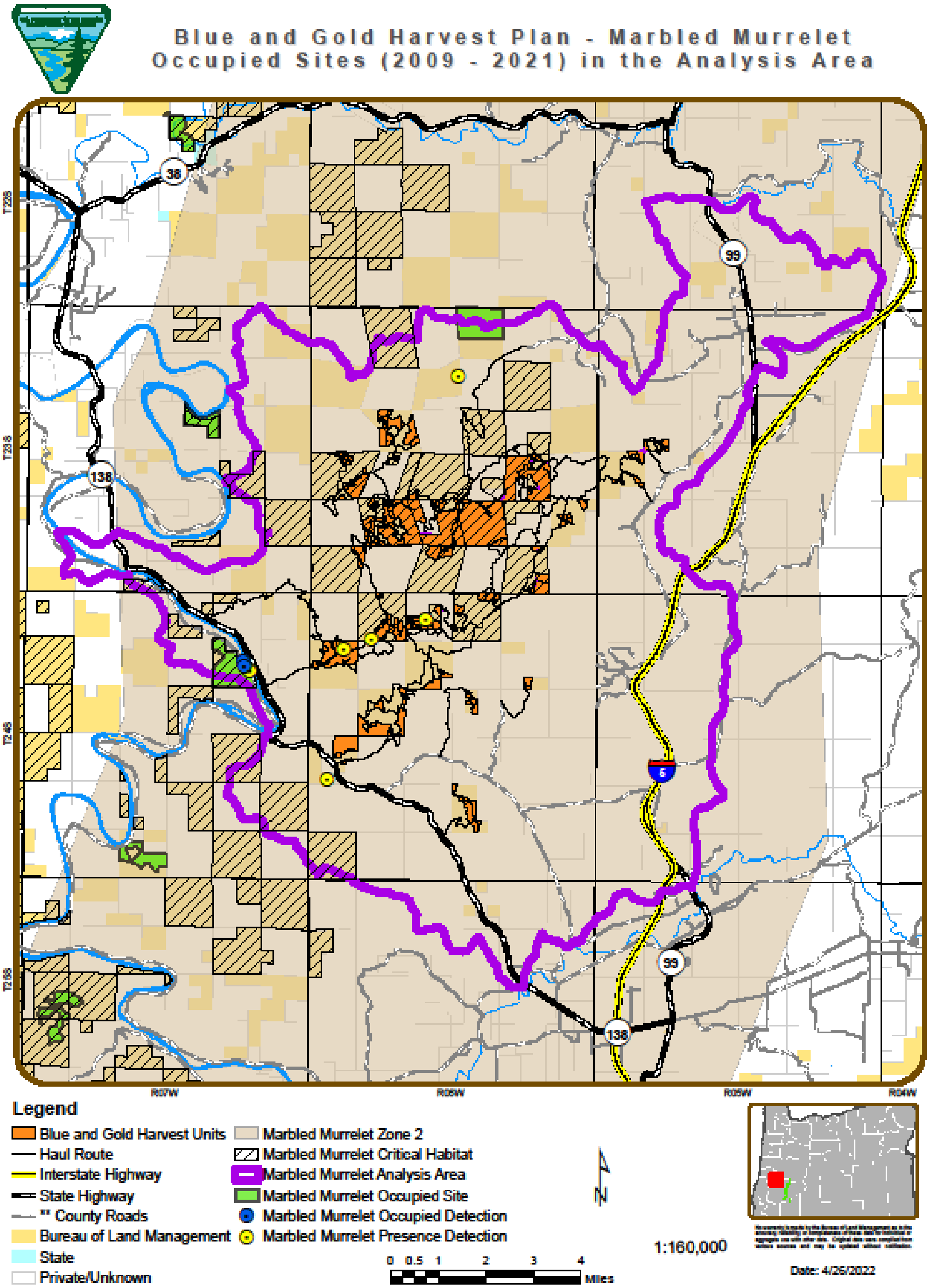
Map 36. Alternative 6 Detail Map 6



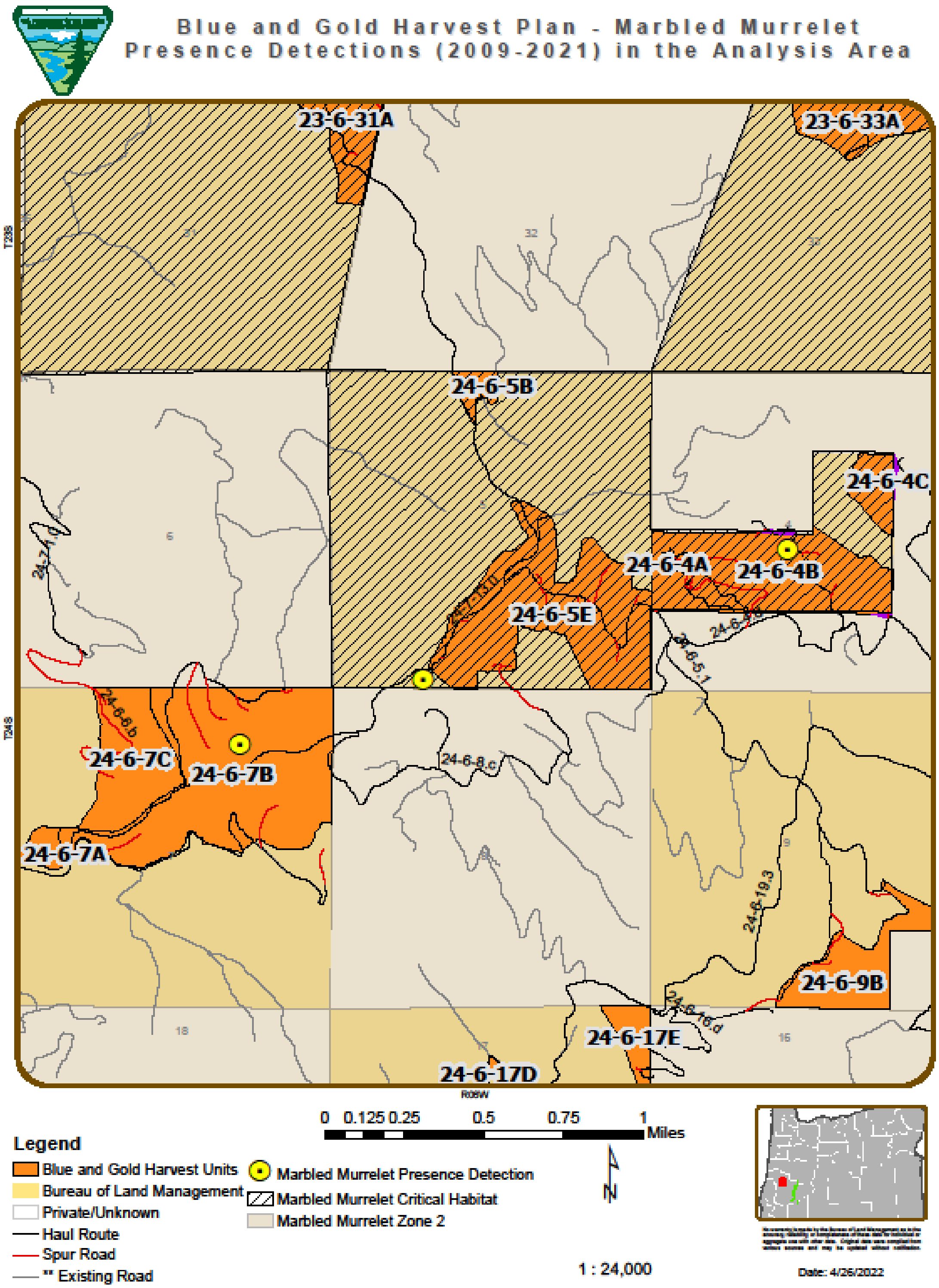
Map 37. Blue and Gold Harvest Plan Northern Spotted Owl Analysis Area



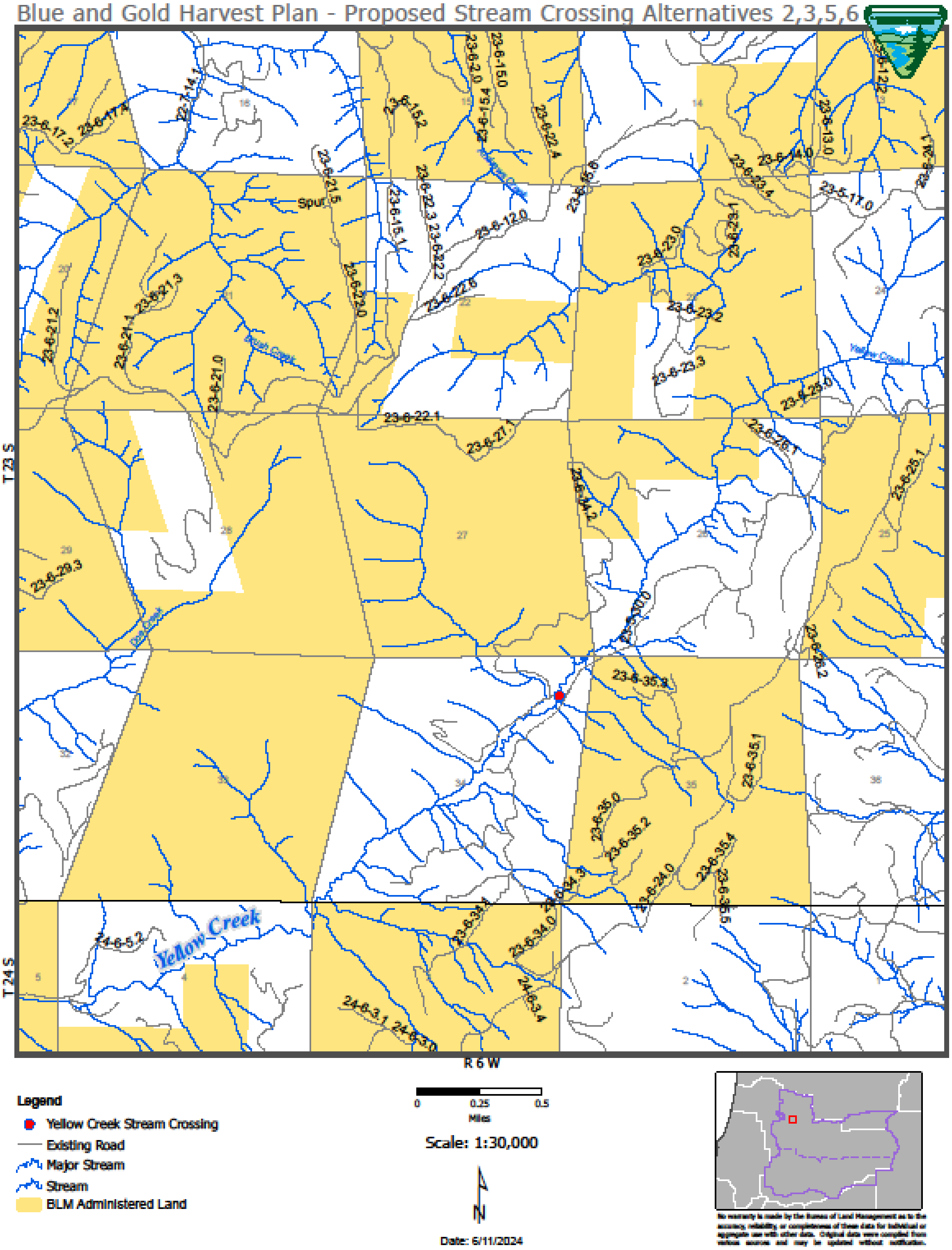
Map 38. Blue and Gold Harvest Plan Northern Spotted Owl Occupied Sites within the Analysis Area



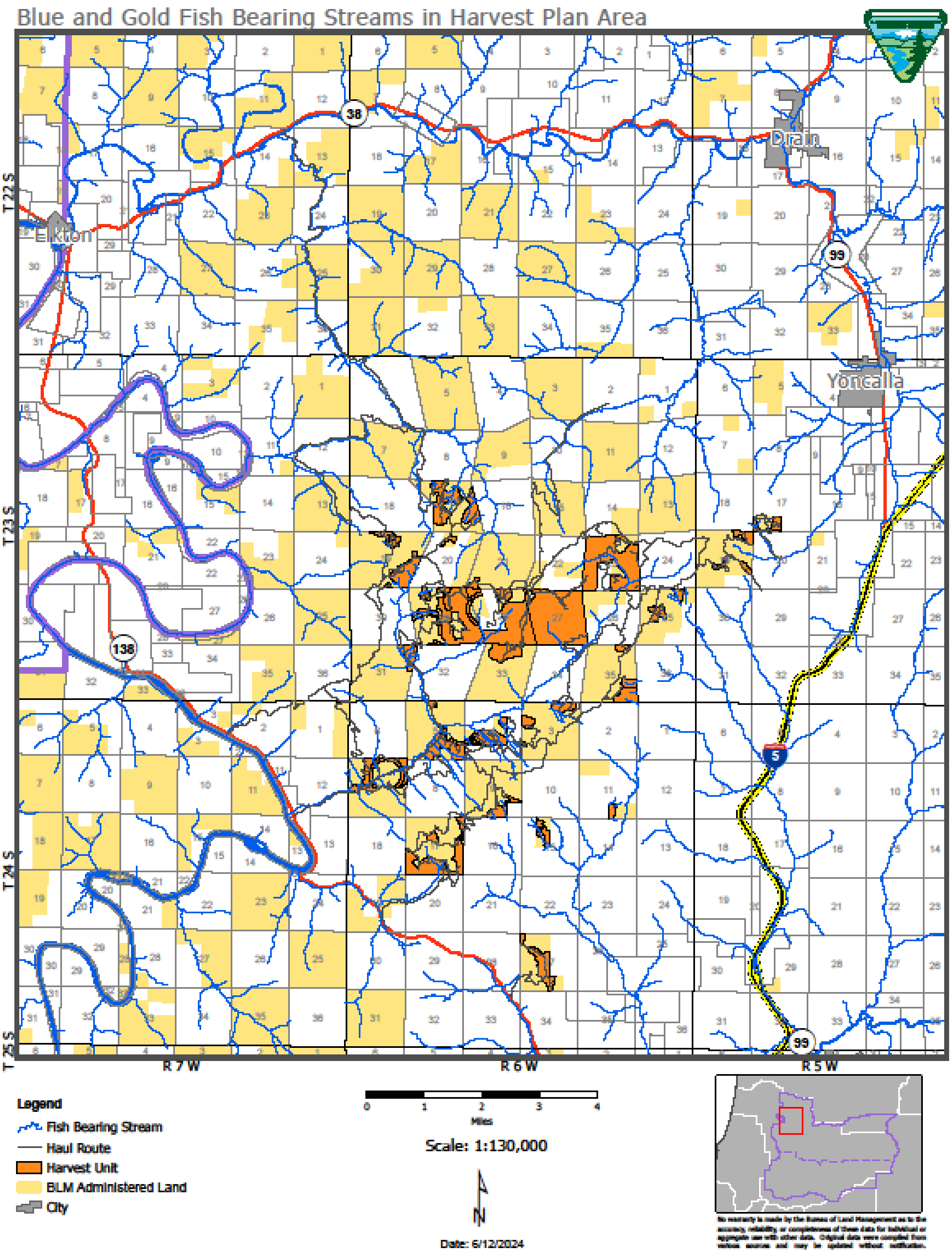
Map 39. Blue and Gold Harvest Plan Marbled Murrelet Occupied Sites within the Analysis Area



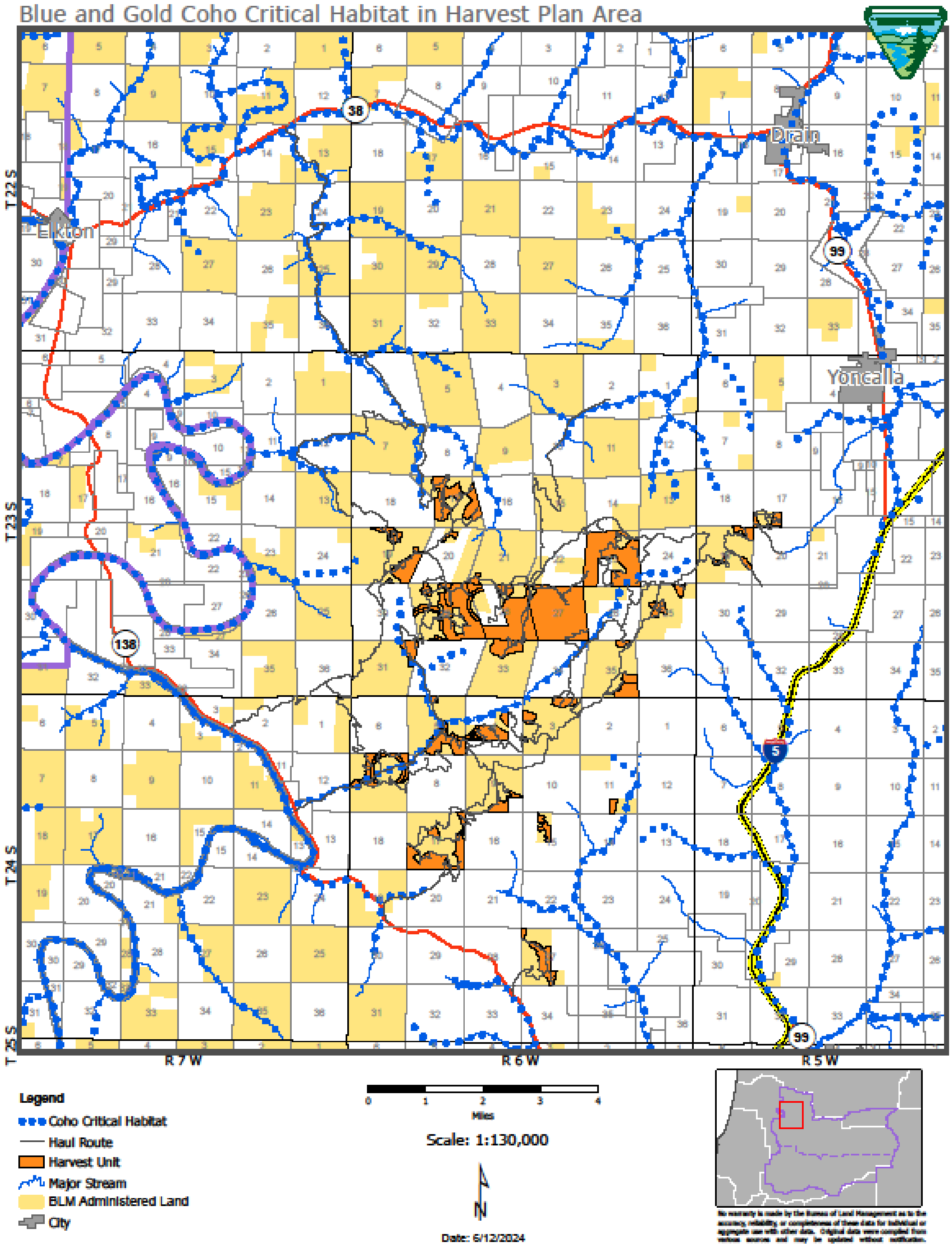
Map 40. Blue and Gold Harvest Plan Marbled Murrelet Detection within the Analysis Area



Map 41. Yellow Creek Culvert Replacement Location.



Map 42. Fish Bearing Streams in the Blue and Gold Vicinity.



Map 43. Oregon Coast Coho Salom Critical Habitat within the Blue and Gold Vicinity.

Appendix B. Project Design Features and Best Management Practices

Project design features (PDFs) are an integral part of each Action Alternative and serve to minimize or prevent the spread of noxious and invasive plants, and lessen impacts of activities on cultural, fisheries, soil, water, wildlife, and botanical resources resource. In addition to best management practices (BMPs) and legal requirements, these measures would be applied during implementation. To minimize or prevent sediment delivery to streams and comply with the Clean Water Act of 1972 and its revisions, the BMPs would be incorporated into the project design. Implementing these BMPs and others found in the ROD/RMP (pp. 143-164) would disconnect road surface runoff from stream channels and minimize or reduce the conveyance and delivery of sediment to the waters of the United States (BLM, 2012). It is not intended that all of the BMPs listed would be selected for any specific management action. Each activity is unique, based on site-specific conditions and the selection of an individual BMP or a combination of BMPs and measures to become the BMP design. Forest road engineers and aquatic staff select the appropriate BMPs as part of the road construction, renovation and maintenance plans as appropriate to ensure effects from implementation are within the scope of effects assessed for this EA. The most common BMPs for disconnecting road related sediment delivery are listed below.

Table B-1. Project Design Features and BMPs

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Noxious and Nonnative Invasive Plant Species Control Measures			
Invasives 1	Prevent the introduction and spread of noxious weeds and invasive plants	Steam clean or pressure wash equipment used in logging and road construction prior to entering BLM-administered lands to remove soil and materials that could transport weed propagules (e.g. seeds, root fragments). Off-road equipment removed from the contract area during the life of the contract must be re-cleaned before re-entry into the contract area. *BLM Manual 9015: Integrated Weed Management (1992); ROD/RMP* BMP SP 03 (2016); *Integrated Invasive Plant Management on the Roseburg District Environmental Assessment No. DOI-BLM-ORWA-R000-2021-0004-EA*	Prior to moving equipment onto BLM land
Invasives 2	Prevent the introduction and spread of noxious weeds and invasive plants	Schedule timber harvest activities in uninfested timber sale units prior to timber sale units containing noxious weed infestations. If infested areas are harvested first, equipment would be washed prior to moving from infested areas to uninfested areas. Conforms with ROD/RMP (2016) management objectives for Invasive Species.	All treatment areas
Invasives 3	Prevent the introduction and spread of noxious weeds and invasive plants	Where practicable, seed and mulch disturbed areas where natural regeneration is unlikely to prevent weed establishment with native grass seed or revegetate with native plant species where natural regeneration is unlikely to prevent weed establishment, where practicable. *Integrated Invasive Plant Management on the Roseburg District Environmental Assessment No. DOI-BLM-ORWA-R000-2021-0004-EA (p. 21,75)*	All treatment areas
Invasives 4	Prevent the spread of noxious weeds and invasive plant species	Existing infestations of priority noxious weed species would be prioritized for treatment through the annual weed treatment plan. Treatment would occur prior to timber harvest operations and road renovation/construction as part of implementation. *Integrated Invasive Plant Management on the Roseburg District Environmental Assessment No. DOI-BLM-ORWA-R000-2021-0004-EA (p. 20).*	All treatment areas

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Invasives 5	Prevent the spread of noxious weeds and invasive plant species	Treatment units and new road construction lacking current botanical surveys will be surveyed for weed species prior to project implementation. Any List A weeds found on these surveys will be treated prior to project implementation or flagged and avoided. *BLM Manual 9015: Integrated Weed Management (1992)*, p. 19-20.	All treatment areas
Invasives 6	Prevent the spread of noxious weeds and invasive plant species	BLM will conduct post-treatment monitoring for a minimum of three years, as funding and staffing allows, to implement management measures to identify new invasive plant populations and to control new and existing weed populations. *BLM Manual 9015: Integrated Weed Management (1992)*, p. 8-9.	All treatment areas
Invasives 7	Prevent invasion of noxious weed and invasive plant species into meadow habitats	BLM will treat noxious weed species within and adjacent to at-risk shallow soil meadow habitat. BLM will conduct post-treatment monitoring for a minimum of three years at these locations. *BLM Manual 9015: Integrated Weed Management (1992)*, p. 8-9, *ROD/RMP* BMP SP 03 (2016); *Integrated Invasive Plant Management on the Roseburg District Environmental Assessment No. DOI-BLM-ORWA-R000-2021-0004-EA (p. 58)*	T23S-R6W-S27, T23S-R6W-S28, and T23S-R6W-S29
		Cultural Resources	
Cultural 1	Protect cultural resources	If cultural and/or paleontological resources (historic or prehistoric site or object) are discovered during project activities, all operations in the immediate area of such discovery would be suspended until an evaluation of the discovery can be made by a BLM archaeologist or BLM contracted archeologist to determine appropriate actions to prevent the loss of significant cultural or scientific values.	All treatment areas
Cultural 2	Protect cultural resources	Known cultural and paleontological resources would be buffered from harvest activities and all associated actions excluded from harvest unit boundaries.	All treatment areas
		Fisheries	
Fish 1	Minimize water quality threats.	No log hauling on native surface roads or harvest equipment off existing roads would occur during the wet season (mid-October – mid-May); these dates may be extended or shortened based on weather and road conditions.	All haul routes
Fish 2	BMP R 13	Use temporary sediment control measures to slow runoff and contain sediment from road construction areas. Remove any accumulated sediment and the control measures when work or haul is complete.	All road construction near streams where sediment would be expected to reach the stream
Fish 3	BMP R 17	When installing a new culvert or replacing culverts in streams containing native migratory fish, install culverts consistent with National Marine Fisheries Service guidelines for salmonid stream crossings and meet ARBO II (USDC NMFS 2013a and USDI FWS 2013) fish passage criteria and state fish passage criteria.	All road activities needing culvert work
Fish 4	BMP R 23	Utilize stream diversion and isolation techniques when installing stream crossings	All roads where stream crossing is needed

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Fish 5	BMP R 48	Conduct all nonemergency in-water work during the ODFW instream work window (July 1 - September 15)	For work in fish bearing streams
Fish 6	BMP TH 03	Full suspension yarding would be required over all stream channels. Yard away from streams where possible. Where not practicable, fish biologists/hydrologists would be consulted to ensure resource damage is minimized.	All harvest units and road activities
Fish 7	Restrict sediment delivery to streams	Following road renovation actions, but prior to wet season haul, areas of potential sediment delivery (stream crossings) would be inspected by BLM fisheries, hydrology, and/or engineering staff to determine if additional sediment control measures are warranted. These measures could include seasonal suspension of haul, or installation of such devices as silt fences, straw bales, geofabric rolls, or similar measures.	Stream crossings with road renovation
Fish 8	Restrict sediment delivery to streams and protect coho critical habitat	Road conditions within Riparian Reserves and/or critical habitat for Oregon coast coho salmon would be periodically inspected by a BLM fisheries biologist, hydrologist, and/or engineer to evaluate the effectiveness of sediment control measures. If improvements are required to increase their effectiveness, these actions would be implemented as soon as practicable.	Harvest units adjacent to streams and/or coho critical habitat
Fish 9	Restrict sediment delivery to streams and protect coho critical habitat	The contract administrator would suspend operations before and after periods of substantial rainfall that would result in road surface degradation, causing delivery of generated sediment from log haul to stream channels and/or critical habitat for Oregon coast coho salmon.	Harvest units adjacent to streams and/or coho critical habitat
Fish 10	Maintain/promote fish habitat	Trees cut for yarding corridors, skid trails, road construction, road maintenance, and road improvement within the inner or middle zones would be retained in the adjacent stand or moved for placement in streams for fish habitat restoration (ROD/RMP, p. 68).	Activities in the RRD inner and middle zones excluding thinning and fuels reduction.
Soils			
Soils 1	Maintain Soil Productivity	Equipment would be capable of maintaining a minimum one-end log suspension in all cable areas. For thinning units, have a minimum of 75 feet of lateral yarding capability. If necessary, contract requirements may specify the type of logging carriage used and/or require intermediate support.	Cable yarding
Soils 2	Maintain Soil Productivity. Protect water quality.	Yarding corridors in upland thinning units and in, or through, Riparian Reserves would be pre-designated and a maximum of 20-feet in width, in a manner approved by the contract administrator.	Cable yarding

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Soils 3	Maintain Soil Productivity	Minimize disturbance to natural meadows. Designate these areas as non-harvest/leave areas. Locate landings in between meadows where possible. If yarding through meadows is essential for timber harvest activity: • Require a minimum of 75 feet lateral yarding capability to reduce the number of yarding corridors through the meadows. • Do not allow yarding unmerchantable material (YUM yarding) to reduce the amount of yarded material through the meadows. • Place appropriate erosion control (water bars, coir logs, mulch mats, for example) on yarding corridors located in meadows to minimize additional damage. • Conifers would not be planted within the meadows consistent with Botany 4.	Meadows in T 23 S., R 6 W., NE ¼ Section 27 and N ½ Section 29. Additional areas may be identified during implementation.
Soils 4	Maintain Soil Productivity	Landings in thinning units would be located at least 150 feet apart, to the greatest extent possible.	Cable yarding
Soils 5	Protect water quality.	Completed cable yarding corridors that are near or crossing stream channels within Riparian Reserves, or hydrologically connected to ditch lines would be water-barred and have slash placed over them prior to winter rains.	Cable yarding
Soils 6	Maintain Soil Productivity	Processors and harvesters (which do not stay on designated skid trails) would travel over a slash mat created from cutting and limbing the harvested trees.	All ground based harvest
Soils 7	Maintain Soil Productivity	Restrict mechanized equipment used for piling fuels and slash to roads, landings and designated skid trails, as much as practicable.	All ground based harvest units with fuels treatments
Soils 8	Maintain Soil Productivity	Install water bars and place slash/mulch in cable yarding corridors that have soil gullying or trenching deeper than 2 feet for longer than 50 feet or deeper than 1 ½ feet for longer than 100 feet, on steep slopes 60 percent or steeper, to control surface erosion and reduce potential for channeling water.	Cable harvest units with very severe erosion hazard rating and /or high amounts of sensitive soils for burning (Category 1 soils).
Soils 9	BMP TH 01	Design yarding corridors crossing streams such that the corridors are perpendicular to the orientation of the streams, as is practicable	Cable yarding
Soils 10	BMP TH 02	Directionally fall trees to lead for skidding and skyline yarding to minimize ground disturbance when moving logs to skid trails and cable yarding corridors.	Cable yarding and ground based skidding

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Soils 11	BMP TH 08 and 12	Limit ground-based yarding equipment to designated skid trails, using pre-existing trails to the greatest extent practicable. Limit mechanized equipment used for felling to one pass off of skid trails, roads and landings. Feller bunchers will be required to stay on designated roads, landings and skid trails in ground based harvest areas where the harvest area has moderate to high amounts of clay and low rock content. Limit designated skid trails for thinning and regeneration to less than or equal to 15 percent of the harvest unit area. Incorporate existing skid trails and landings where feasible, into a designated trail network for ground-based harvest equipment, with proper spacing of skid trails, skid trail direction and location. Space skid trails at least 150 feet apart, or average 150 feet apart.	All ground based harvest units and fuels treatments
Soils 12	BMP TH 07	Equipment operators would avoid using equipment in perennially wet areas.	All ground-based harvest
Soils 13	BMP TH 09	Limit skid trails and skid roads to single width, a maximum of 14 feet wide. Where multiple machines are used, provide a minimum-sized pullout for passing.	All ground-based harvest
Soils 14	BMP TH 10	Ensure leading end of logs is suspended when skidding in ground-based skidding.	All ground-based harvest
Soils 15	BMP TH 11	Limit ground-based equipment to the dry season, typically May 15 through October 15. The operating season may be shortened or extended, dependent on weather conditions, when soils are at their driest and least susceptible to compaction. Generally, soils will be at or below 25 percent by weight in water content, before allowing ground-based yarding operations.	All ground-based harvest
Soils 16	BMP TH 13	Limit the use of non-specialized skidders or tracked equipment to slopes less than 35 percent except when using previously constructed trails or accessing isolated ground-based harvesting areas requiring short trails over steeper pitches.	Ground based harvest units with slopes greater than 35 percent
Soils 17	BMP TH 14	Limit the use of specialized ground-based mechanized equipment (those machines specifically designed to operate on slopes greater than 35 percent) to slopes less than 50 percent except when using previously constructed trails or accessing isolated ground-based harvesting areas requiring short trails over steeper pitches.	Ground based harvest units with slopes greater than 35 percent
Soils 18	BMP TH 18	Subsoil skid trails, landings, or temporary roads where needed to achieve no more than 20 percent detrimental soil conditions, and minimize surface runoff, improve soil structure, and water movement through the roadbed. See also R 91-92.	All ground-based harvest
Soils 19	BMP TH 16, 17, and 19	Skid trails would be water-barred according to BLM standards where necessary. Skid trails would be winterized, prior to the rainy season, as necessary to prevent chronic erosion.	All ground-based harvest
Soils 20	BMP TH 22	Maintain at least the minimum percent of effective ground cover needed to control surface erosion, following forest management operations. See Table C-3 of the ROD/RMP, p. 161	All harvest units and fuels treatment units
Soils 21	Maintain Soil Productivity	Limit burning to when large fuels, >12” diameter, are moist to reduce intensive soil heating. Limit broadcast burning to when soils are moist to reduce soil heating from broadcast burning.	All fuel treatment units.

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Soils 22	BMP F05 pp.163	In broadcast burning, consume only the upper horizon organic materials and allow no more than 15 percent of the burned area mineral soil surface to change to a reddish color.	All fuel treatment units.
Soils 23	BMP F07 pp.163	Avoid creating piles greater than 16 feet in height or diameter. Pile smaller diameter materials and leave pieces >12" diameter within the unit. Reduce burn time and smoldering of piles by extinguishment with water and tool use.	All forest management operations.
Soils 24	BMP F08 pp.163	When burning machine-constructed piles, preferably locate and consume organic materials on landings or roads. If piles are within harvested units and more than 15 percent of the burned area mineral soil (portion beneath the pile) surface changes to a reddish color, then consider that amount of area towards the 20 percent detrimental soil disturbance limit.	All forest management operations.
Soils 25	Maintain Soil Productivity	Areas rated as category soils 1 and 1-2 which are considered most sensitive to burning would be excluded to the extent possible from potential broadcast burning.	Broadcast burning
Soils 26	TPCC Changes; 2016 NWC Oregon ROD/RMP (pp. 57-58)	For additional areas found to be nonsuitable woodland according to the TPCC (Timber Production Capability Classification) criteria, these areas would be either: 1. Excluded from potential timber harvest areas; or 2. Designated as "no harvest areas" if kept within harvest units; or 3. Identified as requiring uncut, residual trees, such as for slope stability, for unstable and/or high risk for slope movement areas; or other measures as needed.	Harvest units with areas of nonsuitable woodland
		Roads	
Roads 1	BMP R 22	Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow in ditchlines.	Haul Routes
Roads 2	BMP R 23	Effectively drain the road surface by using crowning, insloping, outsloping, grade reversals (rolling dips), waterbars, or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and non-erodible	Haul Routes
Roads 3	BMP R 31	Disconnect road runoff to the stream channel by outsloping the road approach. If outsloping is not possible, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Minimize ditch flow conveyance to streams by placing cross drains above stream crossings.	Haul Routes
Roads 4	BMP R 32	Locate cross drains to prevent or minimize runoff and sediment delivery to wetlands, riparian management areas, floodplains, and waters of the state. Implement sediment reduction techniques, such as settling basins, brush filters, sediment fences, or check dams to prevent or minimize sediment delivery.	Haul Routes

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Roads 5	BMP R 33	Space cross drain culverts at intervals sufficient to prevent water volume concentration and accelerated ditch erosion.	Haul Routes
Roads 6	BMP R 35	Locate surface water drainage measures (e.g. cross drain culverts, rolling dips, or water bars) where water flow would be released on convex slopes or other stable and non-erodible areas that would absorb road drainage and prevent sediment flows from reaching wetlands, floodplains, and waters of the state. Where possible, locate surface water drainage structures above road segments with steeper downhill grades.	Haul Routes
Roads 7	BMP R 37	Discharge cross drain culverts at ground level on non-erodible material. Install downspout structures or energy dissipaters at cross drain outlets or drivable dips where water is discharged onto loose material, erodible soils, fills, or steep slopes.	Haul Routes
Roads 8	BMP R 62	Manage road construction so that any construction can be completed, and bare soil protected and stabilized prior to fall rains. Apply native seed and certified weed free mulch to cut and fill slopes, ditchlines, and waste disposal sites with the potential for sediment delivery to wetlands, riparian management areas, floodplains, and waters of the state. Apply upon completion of construction or as early as possible to increase germination and growth. Reseed if necessary to accomplish erosion control. Select seed species that are fast growing, have adequate germination, and provide ample ground cover and soil-binding properties. Apply mulch that would stay in place and at site specific rates to prevent erosion.	Haul Routes
Roads 9	BMP R 71	Prior to the wet season, provide effective road surface drainage by machine cleaning ditches, blading surfaces including berm removal, constructing sediment barriers, and cleaning inlets and outlets.	Haul Routes
Roads 10	BMP R 72	Avoid undercutting cut-slopes when cleaning ditchlines. Retain ground cover in ditchlines, except where sediment deposition or other obstructions require maintenance.	Haul Routes
Roads 11	BMP R 75	Inspect and maintain culvert inlets and outlets, drainage structures, and ditches before and during the wet season to diminish the possibility of plugged culverts and washouts.	Haul Routes
Roads 12	BMP R 94	On roads being hauled on during the wet season, use durable rock surfacing with sufficient surface depth to resist rutting or the development of sediment on roads that drain directly to wetlands, floodplains, or waters of the state.	Haul Routes
Roads 13	BMP R 96	Suspend commercial use when the road surface is rutted, covered by a layer of mud, or runoff from the road surface is causing a visible increase in stream turbidity.	Haul Routes

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Roads 14	BMP R 98	Do not allow wet season haul on natural surface roads or sediment producing surfaced roads without practicable and effective mitigation.	Haul Routes
		Wildlife	
Wlf 1	Maintain or promote northern spotted owl nesting roosting and foraging habitat	Avoid where practical suitable northern spotted owl nest trees (trees with broken tops, visible cavities, or platforms, visible nest structures, and debris structures, typically greater than or equal to 24 inches in width) trees adjacent to nest trees, or potential nest trees that provide habitat function regardless of conditions except when they pose public and/or operational safety hazards (may reach the road or pose hazards to operations).	Yarding wedges within LSR
Wlf 2	Prevent disruption to NSO (northern spotted owl) during nesting season	Seasonal restrictions would be applied in nesting, roosting habitat as described in the Biological Assessment and Biological Opinion. The BLM may waive the restriction and spot check requirement in the third and fourth years if two years of protocol surveys covering all northern spotted owl habitat within the survey area indicate no resident single owls, territorial owl pairs, or pairs/two owls of unknown status and no activity centers are known to occur in the survey area and no barred owls are detected in the survey area (USDI/FWS 2012). .	All activities within disturbance distance of NSO NRF habitat in all LUAs

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Wlf 3	Prevent direct or indirect incidental take of NSO via habitat removal or disruption to NSO during the critical breeding period	a. Apply the Situational Management Strategy (this EA Appendix B, Table 2, p. 168) to avoid incidental take of a northern spotted owl. b. Activities within 65 yards of occupied northern spotted owl nest tree, fledging locations, edge of most recent nest patch or unsurveyed nesting, roosting, and foraging (NRF) would be prohibited from **March 1 to July 15**, both dates inclusive. c. This restriction could be waived by the BLM until March 1 of the following year, following implementation of the northern spotted owl survey protocol (USDI/FWS 2012a). d. If two years of protocol surveys covering all northern spotted owl habitat within the survey area indicate no resident single owls, territorial owl pairs, or pairs/two owls of unknown status and no activity centers are known to occur in the survey area and no barred owls are detected in the survey area then spot checks in the third and fourth years are not required (USDI/FWS 2012). e. To avoid harm to fledgling spotted owls, timing restrictions would be implemented from July 15th – August 15th both dates inclusive within un-surveyed NRF habitat or occupied nest patches.	All activities within disruption distance of NSO NRF habitat in all LUAs
Wlf 4	Maintain NSO NRF habitat	Directionally fall trees to avoid removal or damage to trees identified for retention.	All activities within NSO NRF habitat in all LUAs
Wlf 5	Protect NSO NRF habitat	Where possible, use equipment as anchors along roads instead of trees within suitable northern spotted owl nesting habitat components.	Tailholds or guylines In LSR and/or RR
Wlf 6	Protect wildlife habitat trees/nest trees from damage	Where possible, avoid the use of trees that are tagged or marked as wildlife habitat trees and/or nest trees as tailhold or guyline trees.	Tailhold or guyline trees in LSR and/or RR
Wlf 7	Protect wildlife habitat trees/nest trees from damage	Where possible, avoid using conifer trees over 30 inches dbh with broken tops, obvious cavities, nest platforms and/or large limbs (6 inches or greater) as tailhold or guyline trees.	Tailhold or guyline trees in LSR and/or RR
Wlf 8	Protect wildlife habitat	Protect tailhold trees from girdling by the use of cribbing, straps, tree plates, etc. (to the greatest extent practicable, do not notch more than 50 percent of the circumference of the bole so that the tree may be able to heal over and survive).	Tailhold or guyline trees in LSR and/or RR

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Wlf 9	Protect Bureau Sensitive Species	In the event a Bureau Sensitive Species is discovered within the project area (, coordinate with wildlife biologist and inform decision maker to evaluate whether there is a need to adjust treatments to meet RMP objectives.	Activities in all LUAs.
Wlf 10	Protect Bald and Golden Eagle nests and winter roosting areas.	Do not conduct timber harvest operations (including road construction, tree felling, and yarding) during the breeding season (January 1st through August 31st, both days inclusive) within 660 feet of known 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.	Bald eagle: EA Harvest Units 24-06-04A, 24-06-04B, 24-06-04C; 24-06-5B and 24-06-07A, 24-06-07B, 24-06-07C
Wlf 11	Protect Bald and Golden Eagle nests	Do not remove overstory trees within 330 feet of bald eagle or golden eagle nests, except for removal of hazard trees.	EA Harvest Units 24-06-04A, 24-06-04B, 24-06-04C; 24-06-5B and 24-06-07A, 24-06-07B, 24-06-07C
Wlf 12	Protect Meadow Habitat	Block spur road 23-06-29I post-harvest to avoid disturbance of area with off-road vehicles.	EA Harvest Unit 29-6-29E
Wlf 13	Protect Meadow Habitat to maintain ecological function	Avoid ground-based yarding through meadows. Place retention trees along outer edge of meadows when feasible, to limit yarding through meadows. Directionally fall trees away from meadows. Snag creation would be emphasized along the down slope side of meadows.	Meadows in T 23 S., R 6 W., NE ¼ Section 27 and N ½ Section 29. Additional areas may be identified during implementation.
Wlf 14	Protect naturally occurring special habitats	When operationally feasible avoid yarding over rocky outcrops, and cliffs and use retention to create buffers around outcrops and cliffs.	T 23 S., R 6 W., NE ¼ Section 27 and N ½ Section 29. Additional areas may be identified during implementation.
Wlf 15	Reduce impacts to marbled murrelet	Before modifying forest stands in any 5-acre portion of the analysis area that contain at least 6 trees with nesting structure implement pre-project clearance. If surveys have not yet been completed use a seasonal restriction to avoid effects (ROD/RMP, p. 99).	Any activities in unsurveyed LSR and RR
Wlf 16	Reduce impacts to marbled murrelet	Before modifying forest stands in any 5-acre portion of the analysis area that contain at least 6 trees with nesting structure conduct surveys to determine occupancy. If marbled murrelet occupancy is determined do not conduct activities within the **occupied stand** and all forest within 300 feet of the occupied stand (Option 1; ROD/RMP, p. 98).	Nesting habitat in the LSR, RR and occupied sites

Criteria Number	Objective	Design feature	Land use allocation, units, or activity type
Wlf 17	Reduce impacts to Franklin's and Western Bumble Bee	Pre-treatment assessment of the nesting, foraging, and hibernating habitat conditions the action areas and within areas adjacent to the action areas. If meadows, oak woodlands, and brush fields that provide a diverse supply of flowers that bloom throughout the colony's life cycle, from spring to autumn are located, then using the best available bumble bee protocol and best available science at the time: • Conduct project clearance surveys of potential, high quality Franklin's bumble bee habitat impacted by the habitat disturbing activities, in order to determine occupancy. • In the absence of clearance surveys, habitats are considered occupied	All activities in all LUAs
Wlf 18	Reduce impacts to Franklin's and Western Bumble Bee	In occupied habitat: • No habitat disturbing activities (including prescribed fire and tree planting) in nesting, foraging habitat, or hibernating habitat. • Seasonally restrict operations in unit (15 May - 30 September) • Contact USFWS to determine more detailed project design features.	All habitat disturbing activities within occupied bumble bee habitat.
Botany			
Botany 1	Protect Special Status Plant Species (ROD/RMP, p. 87)	Treatment units and new road construction lacking current botanical surveys will be surveyed for special status botanical species. Populations of any Federally Listed Threatened or Endangered, or Bureau Sensitive botanical species found during surveys would be managed consistent with any conservation agreements or strategies including the protection and restoration of habitat, alteration of the type, timing, and intensity of actions, and other strategies designed to conserve populations of the species.	All activities in additional units of Sections T. 23 S., R. 6 W. Sections 24, 27,28, 29, & 33.
Botany 2	Protect Special Status Plant Species (ROD/RMP, p. 87)	Locate green tree retention and limit yarding activities within 100 feet of the *Rhizopogon ellipsosporus* location (10T 4644390 4820490, NAD83). Avoid all activities in the LSR adjacent to the special status site.	Unit 23-6-29C
Botany 3	Protect Special Habitats (ROD/RMP, pp. 86, 95)	Where yarding in meadows results in bare soils, reseed or plant with native vegetation appropriate to the site. Consult with botanist on appropriate species mix.	Meadows in 23-6-27 NE1/4 and 23-6-29 N1/2.
Botany 4	Protect Special Habitats (ROD/RMP, pp. 86, 95)	During reforestation following regeneration harvest, avoid planting tree species in designated meadow habitats.	Reforestation, Tree Planting

B.1 Situational Management Strategy – Avoid Incidental Take Based on NSO Occupancy

The BLM would not authorize timber sales that cause the incidental take of northern spotted owl territorial pairs or resident singles from timber harvest until a barred owl management program is implemented (ROD/RMP, pp. 30-31, 100, 105). To date, no barred owl management program has been implemented. Thus, the BLM would not allow timber harvest analyzed in the Blue and Gold Harvest Plan EA to be implemented if timber harvest would cause incidental take of northern spotted owl territorial pairs or resident singles.

Due to the NSO shifting nesting locations from year to year, the BLM would adhere to the NSO Situational Management Strategy to Avoid Northern Spotted Owl Incidental Take, illustrated in Table B-2, before and while implementing any timber harvest activities for the purpose of avoiding incidental take of northern spotted owl territorial pairs or resident singles. The Situational Management Strategy would be triggered if northern spotted owl occupancy status changes from unoccupied or incidental to occupied status at any of the known MSNO sites or if a new site is detected. In the event of occupancy changes, the District would notify the USFWS Level 1 Team to discuss the new information and what components of the Situational Management Strategy need be implemented to avoid incidental take of northern spotted owls.

Depending upon site specific conditions and circumstances, such as northern spotted owl occupancy, location of sale units relative to northern spotted owl sites, current habitat conditions, and type of northern spotted owl habitat potentially affected at the time of sale preparation, the BLM would defer harvest or change harvest prescriptions to avoid incidental take of northern spotted owls as shown in Table B-2.

Table B-2. Situational Management Approach to Avoid Northern Spotted Owl Incidental Take.

<table>
<tr><th>Monitoring Metric</th><th>Trigger
(If the unit[2] is….)</th><th>Spatial Scale (…and the unit[2] is within the…)</th><th>NSO Habitat Type/ Function</th><th>Adaptive Management Response
(…then BLM may take the following actions subject to the other PDCs described in the Proposed Action…)</th></tr>
<tr><td rowspan="4">NSO Occupancy Based on Protocol Survey[1] Results</td><td rowspan="4">OCCUPIED
(Territorial pair or resident single status)</td><td>Nest Patch[3]</td><td>NRF, Dispersal-only, Post-fire Foraging, and Forest-capable</td><td>Defer</td></tr>
<tr><td rowspan="3">Core-Use Area[4] Not Habitat-Limited (≥50% NRF)[6a]</td><td>NRF</td><td>Defer, Modify, Downgrade, or Remove; The extent of activities that modify/downgrade/remove habitat would be limited (a) so as not to reduce the core-use area to one that is habitat limited (i.e., ≥ 250 acres of NRF habitat would remain) or (b) so as not to reduce interior NRF habitat through additional exposure from edge by newly forest-capable or non-capable (e.g., through the creation of gaps, corridors, or roads).</td></tr>
<tr><td>Dispersal-only</td><td>Defer, Modify, or Remove; The extent of activities that would modify/remove would not reduce the amount of interior NRF remaining in the core-use area (i.e., removal of dispersal-only would not expose interior NRF to edge).</td></tr>
<tr><td>Forest-capable</td><td>Defer, Modify, or Remove</td></tr>
</table>

Monitoring Metric	**Trigger** *(If the unit[2] is….)*	**Spatial Scale** *(…and the unit[2] is within the…)*	**NSO Habitat Type/ Function**	**Adaptive Management Response** *(…then BLM may take the following actions subject to the other PDCs described in the Proposed Action…)*
		Core –Use Area[4] Habitat-Limited (<50% NRF)[6a]	NRF	Defer or Modify: The extent of activities that modify NRF habitat could occur if there is no loss of interior NRF habitat through additional exposure from edge by newly created forest-capable or non-capable (e.g., through the creation of gaps, roads, or corridors) and *if* site-specific evaluations determine actions in a particular core-use area would not lead to adverse effects.
			Dispersal-only	Defer, Modify, or Remove: The extent of activities that would modify/remove would not reduce the amount of interior NRF remaining in the core-use area (i.e., removal of dispersal-only would not expose interior NRF to edge).
			Forest-capable	Defer, Modify, or Remove
		Home Range[5] Not Habitat-Limited (≥ 1,158 acres (40%) NRF)[6b]	NRF	Defer, Modify, Downgrade, or Remove; The extent of would be limited such that the extent of modification/downgrade/removal would not reduce the home range to one that is habitat-limited (i.e., ≥ 40 percent of the home range[4] would remain as untreated NRF habitat).
			Dispersal-only	Defer, Modify, or Remove; so long as other actions in the home range do not reduce the amount of untreated NRF to less than 40 percent of the home range.
			Forest-capable	Defer, Modify, or Remove
		Home Range[5] Habitat-Limited (<1,158 acres (40%) NRF)6[12]	NRF	Defer or Modify: The extent of activities would be limited such that the modification of NRF habitat could occur but would still be functional NRF habitat following treatment.
			Dispersal-only	Defer, Modify, or Remove; Site-specific evaluation would be needed to be determine if the conditions and actions proposed in a particular home range would lead to adverse effects.
			Forest-capable	Defer, Modify, or Remove.
	UNOCCUPIED7	Nest Patch, Core-Use Area, Home Range	NRF, Dispersal-only, and Forest-capable	Defer, Modify, Downgrade, or Remove.

[**]Habitat within and adjacent to harvest units may be modified to accommodate harvest systems.

1. Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls (USDI FWS 2012).
2. Applicable to entire or portion of unit.
3. Nest Patch = 300-meter circle centered on the most recent activity center (70 acres).

4. Core-Use Area = 0.5-mile radius circle centered on the most recent activity center (500 acres).
5. Provincial home range radii are centered on the most recent activity center; radii distance and acreages vary by physiographic province:
    a. Coast Range = 1.5-mile radius circle (4,524 acres)
    b. Western Cascades = 1.2-mile radius circle (2,955 acres)
    c. Klamath = 1.3-mile radius circle (3,340 acres)

1. Habitat-limited =
    a. The Core-Use Area (500 acres) has less than 50 percent (250 acres) NRF.
    b. The provincial Home Range has less than 40 percent nesting, roosting, and foraging habitat (NRF) habitat available.
        i. Coast Range <1810 acres NRF.
        ii. Western Cascades <1,182 acres NRF.
        iii. Klamath <1,136 acres NRF.
2. Consider RMP Appendix A guidance with respect to sites not currently occupied but known to have been occupied within the past 10 years (NWCO RMP, Appendix A, pp. 107-108 or SWO RMP, Appendix A, pp. 129-130).

Appendix C. Issues Considered but not Analyzed in Detail

Issue A. What effects would the proposed actions have on fire risk from residual activity fuels on BLM-administered lands?

Background:
This analysis tiers to the PRMP/FEIS (BLM, 2016b), Fire and Fuels section, issues analyzed in detail. Specifically issue 4; the effects predicted on the number of acres at risk from residual activity fuels associated with timber management (p. 264-270).

The analysis indicators are acres of hazardous residual activity fuels resulting from forest management activity. This issue does not consider naturally accumulating fuels.

In the PRMP/FEIS, analysis regarding effects of residual activity fuels associated with forest management (Issue 4), the BLM used weighted variables to estimate risk categories based on predicted residual activity fuel following harvest, proximal location to Wildland Development Areas, and Wildland Fire Potential (now known as Wildfire Hazard Potential WHP) which is hereby incorporated by reference (BLM, 2016b, pp. 266-267). When used in the PRMP/FEIS, Wildland Fire Potential utilized 2012 data from LANDFIRE Vegetation Dynamics Models. These national data layers are designed for use in large scale landscape strategic analyses like the 2016 PRMP/FEIS. The WHP used for this analysis was updated in 2020, using the LANDFIRE layer from 2014 (USGS 2019).

Residual fuel load was inferred from harvest method (BLM, 2016b, p. 266). The Wildland Development Areas layer was used to determine proximity to homes (WWRA 2013). Wildland fire potential was determined from the Wildfire Hazard Potential (WHP formerly known as Wildland Fire Potential) and community wildfire risk data layers. These parameters were then used to assign each unit a residual activity fuel hazard rating from forest management activities category (BLM, 2016b, p. 267). Areas outside of close proximity to developed areas are not excluded in this analysis. Instead, proximity to developed areas is a factor in the determination of residual activity fuel hazard rating (BLM, 2016b, p. 267).

Currently within the WDA BLM-administered lands in the AA contain approximately 171 acres of recent pre-commercial thinning and/or brushing treatments, some adjacent to proposed harvest units, approximately 20 acres of recent regeneration harvest, and approximately 414 acres of recent commercial thinning. In the AA, 98 percent is classified as very low or low wildfire hazard potential, therefore the residual risk posed from these activities is low even for the recent pre-commercially thinned acres (BLM, 2016b, p. 267).

The initial Wildfire Hazard Potential in the analysis area is 98 percent low or very low (Scott, et al., 2024). In addition, the residual risk rating is affected by inclusion or exclusion in the WDA (BLM, 2016b, p. 267) and/or the proposed management action (BLM, 2016b, p. 266). Each of these factors are inputs into Table 3-38 pf the PRMP/FEIS page 267 that is used to determine a residual risk category.

Activity fuels treatments including machine piling in ground-based harvest areas coupled with pile and/or jackpot burning would lessen the residual risk from forest management activities, however, no specific treatments are planned within this environmental assessment.

Since this issue is discussing residual risk based upon treated acres, this analysis considered only treatment acres and does not include the deferred units by alternative. Each rating is a proportion of the treated acres proposed by that alternative.

Alternative 1

Under the no action alternative, the residual risk from forest management activities would stem only from existing treatments e.g., recent pre-commercial thinning or harvest activities as summarized in the affected environment as low. The 605 acres currently represents five percent of BLM lands in the AA and two percent of the AA.

Alternative 2

Alternative 2 which would treat 1,135 acres, would result in 69 percent of those acres as low residual risk and 31 percent moderate (Table C-1). Combined with the current conditions, 12 percent of BLM lands in the AA or five percent of the total AA would be low residual risk and three percent of BLM lands in the AA or one percent of the total AA moderate.

Alternative 3

Alternative 3 which would treat 2,524 acres, would result in 68 percent of those acres as low residual risk and 32 percent moderate (Table C-1). Combined with the current conditions, 20 percent of BLM lands in the AA or eight percent of the total AA would be low residual risk and seven percent of BLM lands in the AA or three percent of the total AA moderate.

Alternative 4

Alternative 4 which would treat 1,546 acres would result in 70 percent of those acres as low residual risk and 30 percent moderate (Table C-1). Combined with the current conditions, 15 percent of BLM lands in the AA or six percent of the total AA would be low residual risk and four percent of BLM lands in the AA or two percent in the total AA moderate.

Alternative 5

Commercial thinning results in a lower residual load value which, when combined with proximity to WDA and wildfire potential, results in a lower residual risk ranking for those units (BLM, 2016b, pp. 266-267). Therefore, Alternative 5 which would treat 2,524 acres would result in entirely low residual risk rating (Table C-1). Combined with the current conditions, 27 percent of BLM lands in the AA or 11 percent of the total AA would be low residual risk.

Alternative 6

Alternative 6 which would treat 2,407 acres, would result in 91 percent of those acres as low residual risk and nine percent moderate (Table C-1). Combined with the current conditions, 25 percent of BLM lands in the AA or ten percent of the total AA would be low residual risk and two percent of BLM lands in the AA or one percent in the total AA moderate.

Table C-1. Residual Risk from Activity Fuels by Action Alternative

Residual Risk Rating	Alternative 2 (acres)	Alternative 3 (acres)	Alternative 4 (acres)	Alternative 5 (acres)	Alternative 6 (acres)
Low	746	1,722	1,077	2,524	2,201
Moderate	389	802	469	0	208
High	0	0	0	0	0
Untreated	1,389	0	978	0	117

Ongoing, proposed and future foreseeable actions were evaluated against this issue and there are none within or adjacent to the analysis area. Approximately 60 percent of the analysis area is owned by private individuals or commercial timber companies in a checkerboard ownership pattern and BLM is not privy to planned actions on private.

Rationale:

The proposed action would result in little change in conditions on BLM-administered lands for the Roseburg District because the actions would result in no more than eleven percent of the analysis area having residual fuels, including existing residual fuels. Of those, no more than three percent (alternative 3) of the analysis area would be moderate residual risk. This project would create untreated activity fuels in concentrated areas, but residual risk from activity fuels is a dynamic factor as fuels degrade over time and new fuels are created elsewhere.

The majority (68 to 100 percent of the treated acres) of any action alternative would be at low risk from residual activity fuels, not significantly differing from those estimated in the PRMP/FEIS (BLM, 2016b, pp. 264-270). Therefore, this issue is not analyzed in detail for the EA.

Issue B. What are the effects of VRH on upland slope stability?

Background:

The Northwestern and Coastal Oregon ROD/RMP directs land management to "Avoid Road construction and timber harvest on unstable slopes where there is a high probability to cause a shallow, rapidly moving landslide that would likely damage infrastructure (e.g., BLM or privately owned roads, State highways, or residences) or threaten public safety." (BLM 2016a, p. 89-90). Haul routes and roads within units are reviewed for hillslope stability while roads outside of units are not reviewed as they are privately owned. Slope stability is a natural landscape evolution process which can provide sediment to stream channels. There are many contributing factors for hillslope stability and both climatic and environmental triggers are unpredictable therefore, the probability of landsliding is not assessed in this analysis.

To inform hillslope stability review of available data and field surveys occurred. Prior to field surveys available data was reviewed including GIS data sets (NAIP, Lidar Slope Percent, hillshade, and SSURGO) and aerial photography from the field office aerial photo library. The BLM Soil Scientist conducted extensive field reviews of the proposed harvest units and road locations (Ward, 2018, 2019, 2020). During field review areas of instability were flagged "no cut areas" or "no cut trees". "No cut areas" are buffered at a minimum one tree surrounding the area of instability and all trees flagged and those inside the flagging are excluded from the harvest prescription and therefore, remain post-harvest. "No cut trees" are individual trees at points of instability that are excluded from harvest and remain post-harvest. The purpose of both "no cut areas" and "no cut trees" is to maintain rooting strength, transpiration, and water interception.

Typical indicators of instability are pistol butting trees, open canopy, presence of facilitative wet species outside of riparian reserves (indicative of an increase in water), near vertical headwalls (scarps), eroding and/or exposed soils that are steepened, and non-vegetated steepened pitches. While any one indicator can be egregious and warrant removal from harvest when extreme, most areas reserved typically exhibit multiple indicators at a site. Consistent with the RMP, "During project planning, the BLM would evaluate project areas for slope stability and would reserve unstable areas under the TPCC system.", areas were reserved by reclassifying the TPCC rating to non-suitable forest when concerns for hillslope stability were identified following field review of the harvest units.

Rationale:

Through rigorous field surveys by the Field Office Soil Scientist, exclusion of areas indicating instability, and application of Soil PDFs reducing erosion potential (especially PDFs 20[13], 25[14], and 26[16]) there is no potential for significant effects.

Issue C. What are the effects to soil productivity and detrimental soil disturbance from all forest management operations?

Background:

The Northwestern and Coastal Oregon ROD/RMP directs land management to "limit detrimental soil disturbance from forest management operations to a total of <20 percent of the harvest unit area. Where the combined detrimental soil 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 of the harvest unit area. Detrimental soil disturbance can occur from erosion, loss of organic matter, severe heating to seeds or microbes, soil displacement, or compaction." (BLM 2016a, p. 89-90) Previous harvest activities in some of the proposed units have resulted in detrimental soil effects, particularly from soil compaction and displacement from skid trails, landings, and roads. Cable and ground-based yarding systems were generally used in the late 1950's up to the present. In proposed units that were previously ground-based yarded, old skid trails and landings are compacted to varying degrees.

The BLM conducted LiDAR examinations and field surveys to evaluate the current existing detrimental soil disturbance (DSD) in the proposed cable and ground-based harvest units. Existing (legacy) detrimental soil disturbance ranges from zero to twelve percent, from old roads, landings and skid trails, including the existing transportation road system (Table C-2).

Table C-2. Detrimental soil disturbance (DSD) for all units

EA Unit Number	Harvest Method	Current DSD % (ALT 1)	Estimated Total DSD % (Legacy + Project)*	Estimated Subsoiling for DSD (Acres)
23-6-17F	Cable	3	6	
23-6-17D	Cable	9	13	
23-6-19D	Cable/Ground	4	8	1.04
23-6-19E	Cable/Ground	8	13	0.16
23-6-19B	Cable/Ground	4	9	
24-6-4A	Cable/Ground	3	7	
23-6-29C	Cable/Ground	5	11	0.32
23-6-29D	Cable/Ground	2	7	
23-6-29B	Ground	4	11	
23-6-31A	Cable/Ground	5	9	
24-6-5E	Cable	9	13	
23-6-29A	Cable/Ground	4	8	0.24
24-6-7B	Cable/Ground	3	6	
24-6-7C Combined with 7A	Cable/Ground	7A 2% 7C 10%	9	0.32
24-6-5B	Cable/Ground	5	11	
23-6-19A	Cable/Ground	4	8	
24-6-4B	Cable	9	13	
24-6-4C	Cable	3	6	
24-6-3A	Cable/Ground	7	11	.4
24-6-3E	Cable/Ground	10	14	
24-6-3B	Ground	4	12	
24-6-9B	Cable	2	5	
24-6-17C	Cable/Ground	6	9	

[13] PDF 20 maintains ground cover to reduce water erosion, delay the infiltration of water, and maintain transpiration lowering the water content and delaying pore water pressure increases within the soil matrix.
[14] PDF 25 excludes soils rated as category 1 or 1-2 which are the most sensitive to burning and will therefore, have an increased risk of erosion post burning
[16]PDF 26 excludes areas of instability identified during implementation from harvest.

24-6-17D	Cable/Ground	12	16	0.24
24-6-17E	Cable/Ground	3	7	
26-4-27A	Cable/Ground	4	8	
23-6-35E	Cable/Ground	2	6	
23-6-35G	Cable/Ground	1	5	
23-6-35F	Cable/Ground	12	15	
23-6-25F	Cable/Ground	5	10	
23-6-25E	Cable	3	6	
23-5-17B	Cable/Ground	3	7	
23-5-17A	Cable/Ground	4	8	
23-5-19D	Cable/Ground	10	13	.24
23-5-19B	Cable/Ground	4	9	
23-5-19C	Cable/Ground	10	14	
24-6-15A	Cable/Ground	3	10	
24-6-15B	Cable/Ground	3	7	
24-6-11A	Cable/Ground	4	8	
24-6-27A	Cable/Ground	4	8	
23-6-20A	Cable/Ground	2	6	
23-6-29F	Cable	2	5	
23-6-28B	Cable	0	3	
23-6-29E	Cable	2	5	
23-6-28A	Cable	Alt 2 = 2 Alts 3, 4, 5, 6 = 2	Alt 2 = 5 Alts 3, 4, 5, 6 = 5	
23-6-27A	Cable	Alt 2 = 1 Alts 3, 4, 5, 6 = 1	Alt 2 = 4 Alts 3, 4, 5, 6 = 4	
23-6-23A	Cable	Alt 2 = 1 Alts 3, 4, 5, 6 = 1	Alt 2 = 4 Alts 3, 4, 5, 6 = 4	
23-6-33A	Cable	2	5	
23-6-21A	Cable	4	8	

*Estimated Total DSD Legacy & Project is calculated by adding an additional 3% for cable and 8% for ground-based harvesting. The addition of 3 and 8 percent are based on RBD average DSD (2000-2016 years from Annual Monitoring Report).

Cable Yarding

The ROD/RMP gives management direction for DSD after harvest activities to be less than twenty percent of each harvest unit area, including new road construction (BLM, 2016a, pp. 89-90). The ROD/RMP does not specify a range of allowable DSD for each applicable forest management operation and instead combines all forest operations for a total per unit. BLM monitoring of past cable-yarded harvest operations on the Roseburg District has shown that application of PDFs and BMPs limits the areal extent of detrimentally disturbed soil to less than three percent, including cable corridors and landings. Within the project area legacy DSD ranges from zero to three percent with a maximum of nine percent (Table C-2Table).

Based on monitoring results from past timber sales with similar activities and the legacy soil conditions in the proposed cable yarded units, the additional DSD in the cable units is not expected to exceed thirteen percent (Table C-2).

Ground-based Yarding

The BLM would achieve the RMP objective to maintain or enhance soil functions of managed ecosystems (BLM, 2016a, p. 89) in ground-based areas by limiting the amount of skid trails to 15 percent or less of harvest unit areas (BLM, 2016a, pp. TH 08, p 159), along with other project design features and BMPs, such as re-using old skid trails (BLM, 2016a, pp. TH 12, p 159), and subsoiling to reduce the amount of compacted and displaced soils from skid trails and landings (PDF Soils 18). The BLM monitoring of ground-based harvesting on the Roseburg District from 2006 through 2017 has shown that with the application of appropriate project design features and BMPs, the amount of DSD from ground-based harvest has ranged from four to ten percent (Table C-2) (BLM, 2010-2016; BLM, 2016f; BLM, 2007; BLM, 2008d; BLM, 2017). Within the project area there are units that exceed eight percent current DSD. Despite the legacy DSD total project DSD is not expected to exceed sixteen percent. Therefore, the amount of resulting DSD in ground based VRH units is expected to remain within the twenty percent management direction.

Fuels Treatments

If necessary, logging slash would be broadcast burned to reduce fire risk and prepare for planting. The BLM estimated the amount of DSD from fuels treatments, "would reflect a ten percent reduction of growth on less than half of one percent of the decision area, which constitutes an insignificant loss" (BLM, 2016b, p. 760) pg.762. While the project proposes a maximum of 780 acres of broadcast burning BMPs in place will reduce the impacts of broadcast burning. Light to moderate burn intensity would be prescribed to minimize consumption of duff and large down wood. Broadcast burning would occur in the fall, winter, or spring when moisture content of soil, duff and large fuels is high and when conditions are conducive to achieving burn plan objectives for light to moderate intensity burning (PDF Soils 21).

In broadcast burned units, the degree of change in levels of organic matter and nitrogen is directly related to the magnitude of soil heating and the intensity of fire. When organic matter is burned, the stored nutrients are either volatilized or are changed into highly available forms that can be taken up readily by microbial organisms and vegetation (Neary, et al., 2005). The proposed project actions direct that broadcast burning would be conducted under conditions that achieve an objective of light to moderate intensity burning, thus minimizing the consumption of duff and large woody debris (BLM, 2016a, pp. TH 21, TH 22, p 161, F 05 p. 163). Nutrients such as cationic calcium, magnesium, sodium and potassium usually remain on site in a highly available form. By implementing PDFs and BMPs, the BLM would minimize volatilization of nutrients in units proposed for broadcast burning.

Burning piles may create temperatures that can cause adverse effect to soils (Korb, et al., 2004). To reduce and, or eliminate these effects, machine and hand piles would be burned in late-autumn or winter after periods of extended precipitation when soil and duff moisture would be high (PDFs Soils 21 & Soils 23).

Potential effects would be limited to areas directly under the piles (Neary, et al., 2005). High soil moistures would moderate loss of soil carbon, nitrogen and other nutrients from lower soil horizons underneath the piles. Machine piling of activity fuels would be mainly along roads, primary skid trails and landings, and thus would be limited in extent (PDF Soils 24). The duff and fine litter between the piles would be retained on site and contribute to soil nutrient availability. Soil nutrients at the unit scale would be minimally affected.

Combined Forest Management Operations

Total legacy DSD within the proposed cable and ground-based units ranges from zero to twelve percent. These figures include current existing roads and landings, as well as old roads, landings, and skid trails. Estimated combined DSD, adding legacy and project-caused DSD, ranges from three to sixteen percent. The estimated legacy and project expected DSD is not anticipated to exceed twenty percent (Table C-2). By adding at most eight percent DSD in certain harvest units and incorporating PDFs/BMPs (especially PDFs Soils 7, 11, 13, and 24) which concentrate timber harvest activities to those areas already counted in the legacy DSD for the unit, the maximum anticipated DSD for the project would not exceed sixteen percent. As a result, this issue was considered but eliminated from detailed analysis because there is no potential for significant impacts to soil compaction and displacement beyond what is disclosed in the PRMP/FEIS (pp. 746) and in the ROD/RMP (pp. 89-90). There are no other projects planned for in these HLB harvest unit areas, and therefore, the cumulative effects equate to past soil disturbance plus project estimated (Table C-2).

Issue D. How would soil disturbance and changes in canopy cover affect special status botanical species?

Background:

The RMP/ROD requires botany surveys for vascular plants, lichens and mosses be completed prior to implementation of actions that could result in habitat modification or disturbance of Special status botanical species (BLM, 2016a, p. 87). The BLM surveyed for vascular, non-vascular and lichen botanical species in proposed harvest units on BLM administered land in 2018, 2019,2020, and 2022. Special Status species include federally threatened and endangered species, proposed listed species, and species on the Interagency Special Status / Sensitive Species Program (ISSSSP) list (Revised June 21, 2021). The ISSSSP is a collaboration between the U.S Forest Service Pacific Northwest Regional Office, and the Oregon/Washington state office BLM (Appendix J, Table J-1) Surveys in 2018, 2019, and 2020 were conducted based on the 2019 ISSSSP list. Two new vascular species were added to the ISSSSP list. Neither of those species have been documented within the project area.

No BLM Special status botanical species were detected during these surveys. Any populations of BLM special status plants found would be protected by following the PDF Botany 1- *Treatment units and new road construction lacking current botanical surveys will be surveyed for special status botanical species. Populations of any Federally Listed Threatened or Endangered, or Bureau Sensitive botanical species found during surveys would be managed consistent with any conservation agreements or strategies including the protection and restoration of habitat, alteration of the type, timing, and intensity of actions, and other strategies designed to conserve populations of the species.*

In addition to field surveys, existing records were reviewed in the BLM GeoBOB database, U.S. Forest Service NRIS (National Resource Information Systems) database, and ORBIC database. These databases were queried for occurrences within 100 meters of the Blue and Gold treatment units, roads, and yarding corridors. The database review conducted on 9/14/2020 found one documented special status species, *Rhizopogon elipsoporus,* requiring BLM Management consideration. No special status species were documented in the project area in the ORBIC or NRIS databases.

GeoBOB: As mentioned above, a BLM sensitive fungi species, *Rhizopogon elipsoporus* is documented on the boundary of the 23-6-29C unit in the proposed Mean Mustard sale area. Application of the following PDF *Botany 2 – Locate green tree retention and limit yarding activities within 100 feet of the documented occurrence and avoid all activities in the adjacent LSR,* would preserve the site.

The GeoBOB database also includes records of former Survey and Manage species that do not have current BLM special status designations. Within the Blue and Gold project area a number of former Survey and Manage species were detected including *Buxbaumia viridis, Cantharellus subalbidus, Chaenotheca chrysocephala, Chaenotheca ferruginea, Chaenotheca subroscida, Chalciporus piperatus, Clavariadelphus ligula, Clavariadelphus truncatus, Dichelostemma ida-maia, Gomphus clavatus, Gyromitra infula, Hydnum repandum, Lactarius crassus, Otidea leporina, Otidea onotica, Phaeocollybia olivacea, Phaeocollybia sipei, Ramalina thrausta, Sarcosphaera coronaria.* Under the Northwestern and Coastal Oregon ROD/RMP, 88 percent of Survey and Manage sites are protected, and the BLM does not require management considerations for these species (BLM, 2008b, pp. 534-540)..

Rationale:

Based on the botanical survey results and database review, special status plant *Rhizopogon elipsopsorus* populations were identified within the project area. The BLM would implement PDFs (Botany-1 and Botany-2, Appendix B) to protect these, and any other special status populations found during pre-implementation surveys. With the implementation of the PDFs and pre-implementation surveys the BLM does not expect any special status botanical species to be impacted by the proposed actions. For this reason, this issue was dismissed from further analysis because there is no potential for significant effects to botanical special status species.

Issue E. How would changes in forest canopy cover, road management, and soil disturbance affect the spread and persistence of nonnative invasive plant species?

Background:

Nonnative invasive plant species are managed under the Integrated Invasive Plant Management on the Roseburg District Environmental Assessment (DOI-BLM-ORWA-R000-2021-0004-EA), in accordance with the Northwestern and Coastal Oregon RMP/ROD (p. 80), and following direction from the BLM manual 9015 – Integrated Weed Management.

Botany surveys were completed in the project area in 2018, 2019 and 2020 using intuitive control methodology. Nonnative invasive plant species occurrences identified during these surveys supplement invasive plant locations that were previously mapped in the National Invasive Species Information Management System (NISIMS) Database. Data was updated in 2024 to reflect additional invasive plant data from the Vegetation Management Action Portal (VMAP) and estimate acreages based on percent cover of the invasive plant population within their mapped areas. This data includes all known locations observed between 2005 and 2023.

Twenty-two nonnative invasive plant species occur within the 3,807 acres of BLM land, and along the 254 miles of proposed road activity throughout both public and private land. Over 50 percent of the invasive plant occurrences found are located along roadways and in other previously disturbed locations.

The most abundant nonnative invasive weeds listed by the Oregon Department of Agriculture (ODA) and/or Douglas County found within the project area were Canada thistle (*Cirsium arvense*) with 177 acres mapped and 35% cover where it was mapped, and Himalayan blackberry (*Rubus armeniacus*) with 141 mapped acres and 44% cover where it was mapped. Oneseed hawthorne (*Crataegus monogyna*) was mapped on 150 acres, but with a percent cover of only 1%. Scotch broom (*Cytisus scoparius*) was also abundant throughout the project area, with 110 acres mapped and an average of 86% cover where it was mapped. A complete list of invasive plant species found within the project area is included in Table C-3.

Table C-3. Acres of nonnative invasive plant species within the project area

Common Name	USDA Plants Code	*Scientific Name*	Acres Mapped	Avg. Percent cover	Net acres of Infestation	ODA List	Douglas County
Canada thistle	CIAR4	*Cirsium arvense*	177.5	35%	62.1	B	B
Oneseed hawthorn	CRMO	*Crataegus monogyna*	149.5	1%	1.5	B	BT
Himalayan blackberry	RUAR9/RUBI	*Rubus armeniacus / Rubus bifrons*	141.1	44%	62.1	B	BT
Scotch Broom	CYSC4	*Cytisus scoparius*	109.7	86%	94.3	B	B #
Perennial pea	LALA4	*Lathyrus latifolius*	9.5	100	9.5	B	Not listed
Robert geranium	GERO	*Geranium robertianum*	9.2	33%	3.09	B	B
Meadow knapweed	CEMO6	*Centaurea ×moncktonii*	9.2	100	9.2	B	B #
Evergreen blackberry	RULA	*Rubus laciniatus*	6.4	21%	1.34	Not Listed	W
Tansy ragwort	SEJA	*Senecio jacobaea*	5.2	99%	5.2	BT	B #
Slender false brome	BRSY	*Brachypodium sylvaticum*	3.8	34%	1.3	B	B
Reed canarygrass	PHAR3	*Phalaris arundinacea*	3.4	100%	3.4	BT	Not listed
Bull thistle	CIVU	*Cirsium vulgare*	1.9	100%	1.9	B	B #

Common Name	USDA Plants Code	*Scientific Name*	Acres Mapped	Avg. Percent cover	Net acres of Infestation	ODA List	Douglas County
Queen Anne's Lace	DACA6	*Daucus carota*	1.7	100%	1.7	Not Listed	Not listed
Purple Foxglove	DIPU	*Digitalis purpurea*	1.7	100%	1.7	Not Listed	Not listed
Oxeye Daisy	LEVU	*Leucanthemum vulgare*	1.7	100%	1.7	Not Listed	Not listed
Hedgehog dogtailgrass	CYEC	*Cynosurus echinatus*	0.3	100%	0.3	Not Listed	Not listed
English holly	ILAQ80	*Ilex aquifolium*	0.2	50%	0.1	Not Listed	Not listed
Fuller's Teasel	DIFU2	*Dipsacus fullonum*	0.2	100%	0.2	Not Listed	B
French Broom	GEMO2	*Genista monspessulana*	0.1	100%	0.1	B	B
Diffuse Knapweed	CEDI3	*Centaurea diffusa*	<0.01	-	<0.01	B	AT
Common St. John's wort	HYPE	*Hypericum perforatum*	<0.01	-	<0.01	B	B #
Shiny Geranium	GELU	*Geranium lucidum*	<.001	-	<0.01	B	B
TOTAL			632.3		260.7		

Net acres of infestation cover data are calculated in the Vegetation Management Action Portal Database based on the estimated percent cover for each infestation polygon. Noxious weed list status based on the Oregon state weed list and the Douglas County weed list. 100% cover is assumed when no percent cover data is known for the site.
"A" These noxious weeds occur in small enough infestations that eradication or containment is possible in the county. Intensive control of these infestations is highly recommended.
"B" These noxious weeds are common and well established in Douglas County. Eradication at the county level is not likely. Containment is possible in some cases and is encouraged. Where these are not feasible, biological control agents may be introduced to slow the spread of the invaders.
Intensive control is recommended on isolated infestations. Control along travel routes is encouraged. Biological control agents may be used to reduce the spread of infestation.
"T" These noxious species are priority weeds "targeted" for control at the county level.
"W" [New category 2023]
"W", "No" These "Watch List" noxious weeds are not yet known in Douglas County but their presence in adjacent counties makes future occurrence likely.
"W", "Yes" These invasive weeds occur in Douglas County and are being considered for the primary list. They should be monitored for spread and considered for biocontrol.

The noxious weed species listed above are designated by both ODA and Douglas County as B list noxious weeds. As defined by ODA, B list noxious weeds are species of economic and environmental importance which are regionally abundant but may have limited distribution in some counties. Douglas County defines B list noxious weeds as those that are common and well established in Douglas County. Douglas County considers eradication of these weed species at the county level unlikely. Biological control is often the primary treatment for B list weeds, though intensive control on small, isolated populations is recommended. B list weeds are treated in accordance with the Integrated Invasive Plant Management Environmental Assessment (DOI-BLM-ORWA-R00-2021-0004-EA) under all alternatives, including the No Action Alternative, on the Roseburg District BLM at high priority sites. These actions include inventory of infestations, assessment of risk for spread, and application of control measures including the release of biological control agents, mowing, hand pulling, and the use of approved herbicides. High priority sites include but are not limited to Special Status plant locations, areas with special management designations, and within project treatment units where there is a risk of spreading weed species during project implementation. Several non-native invasive species that are not on the ODA or Douglas County noxious weed lists were documented. PDF to prevent the spread of these invasive species include working in un-infested areas first (PDF Invasives 2), seeding of disturbed areas (PDF Invasives 3), treatment of existing infestations (PDF Invasives 4) and 3 years post treatment monitoring, as funding and staffing allow, for invasive plant establishment in harvested areas (PDF Invasives 6). Nonnative invasive treatments using herbicide and competitive seeding after project implementation (PDFs 3 and 4) have previously been documented to be 80 percent effective (IIPM, Roseburg District EA. DOI-BLM-ORWA-R000-2021-0004-EA).This project is expected to have a similar level of success and would reduce the nonnative invasive plant population to below the current populations after 3 years of post-project treatment, when accounting for the background rate of spread.

A-list weeds are those nonnative invasive plant species occurring in the state or county in small enough infestations to make eradication or containment possible. In some cases, the plant is not yet known to occur in the state or county but is located in neighboring states/counties such that future invasion is imminent. A list weeds are subject to intensive control and/or eradication. No ODA A list weeds were found within the project area. Diffuse knapweed (Douglas AT listed) was present at less than .01 acres and will be included as a high priority for treatment. Project design features to prevent the introduction of A list and B list species not currently present include equipment washing prior to on-site mobilization (PDF Invasives 1), seeding of disturbing areas (PDF Invasives 3), and weed inventory of all areas prior to implementation (PDF Invasives 5).

The PRMP/FEIS requires sustainable timber harvest in HLB to meet Roseburg District's ASQ targets. This target requires reoccurring disturbance on the 30 – 100-year time scale on HLB lands. Disturbance activities are vectors for weed introduction and increase by increasing areas of exposed soil and creating forest canopy gaps. Periods of no disturbance allow ecosystems to recover. Tree planting activities after harvest result in eventual increased canopy cover, which is detrimental to some weed species, such as Scotch broom and Himalayan blackberry, and would lead to reduction of the biomass and population numbers of those weed species over time. The next timber harvest activity expected 30-100 years from now would reset the disturbance cycle.

The BLM assumes private land in the project area is managed for industrial timber production. Tree harvest occurs regularly (within 40 to 60 years) on these lands as trees grow large enough for harvest. Herbicides are used on industrial timberland after harvest to limit competition of native and nonnative vegetation with commercial tree seedlings. Increased disturbance and removal of native vegetation leads to increased vectors and available substrate for nonnative invasive plants and decreased competition from native species.

Other foreseeable actions within the watershed that are potential vectors for nonnative invasive plant species include: dispersed recreation, special forest products gathering, road maintenance, fire suppression, and aquatic restoration.

The BLM is required to monitor all projects with moderate risk of introducing noxious weeds for a minimum of three years post project implementation (IIPM, Roseburg District EA. DOI-BLM-ORWA-R000-2021-0004-EA). This monitoring and treatment requirement for future projects on BLM land, as well as PDFs to clean equipment, and revegetate disturbed areas ensure that any contribution of the Proposed Action, or action Alternatives, to the spread of weeds, when added to the rate of weed spread caused by past, present, and future actions, would not surpass the effects analyzed in the PRMP/FEIS (pp.428-438).

Noxious Weed Risk Assessment

The BLM Manual 9015 – Integrated Weed Management (p.12) requires a risk assessment for actions in areas that contain noxious weeds, or the habitat for noxious weeds. The risk assessment is completed by analyzing known, mapped, noxious weed populations in the Vegetation Management Action Portal (VMAP) as well as through conducting in-field surveys prior to project implementation to map new noxious weed populations.

Through mapping and in-field surveys, we found that nonnative invasive plant species cover 260.7 acres which is 7% of the project area. This is considered limited invasive species distribution according to the Western Oregon PRMP/FEIS (p. 421), and a moderate likelihood of nonnative weed spread within the project area (BLM Manual 9015). Cleaning equipment between project actions and working in the uninfested areas first would limit spread of nonnative species throughout the project area, and outside of the project area. Therefore, the final risk assessment for noxious weeds in the project area is moderate. Rationale:

Actions taken to contain, control, and eradicate existing infestations of noxious weed species would continue to be implemented under the Integrated Invasive Plant Management on the Roseburg District (DOI-BLM-ORWA-R000-2021-0004-EA) under all alternatives, including the No Action Alternative. These actions include inventory of infestations, assessment of risk for spread, and application of control measures including the release of biological control agents, mowing, hand-pulling, and the use of approved herbicides.

Implementation of the proposed PDFs, including washing equipment, working in uninfested areas first, seeding areas with native seeds after project implementation, and treating weeds for at least three years after project implementation, would effectively reduce the introduction of new weed species to the project area. Because the nonnative invasive plant cover is limited (7 percent cover within the project area) and primarily along roadways, implementation of these proposed PDFs would limit the spread of the weed species already present on site. Based on the low-moderate infestation density from the above Risk Assessment, and the PDFs to protect the native plant community, the risk assessment for the project was moderate (9015 Integrated Weed Management, 1992). This is consistent with the risk analysis for timber harvesting in the PRMP/FEIS (BLM, 2008b, pp. 428-438), which concluded that timber harvest and road construction has a moderate risk for the introduction and spread of nonnative invasive plant species. No further analysis is necessary as there is no potential for effects beyond those analyzed in the PRMP/FEIS (p. 428-438).

Issue F. How would proposed road management, timber harvest, and fuels management affect fish, including Oregon Coast coho salmon critical habitat, Essential Fish Habitat, and BLM sensitive fish species?

Background:

This issue was considered, but not analyzed in detail because the analysis below shows there would be no measurable effects from the proposed actions to fish or aquatic habitat. Additionally, a recent analysis (Days Creek-South Umpqua River Harvest Plan EA, DOI-BLM-OR-R050-2014-0008-EA; Shively-Clark Harvest Plan EA, DOI-BLM-ORWA-R050-2017-0001-EA) evaluated similar proposed actions in nearby watersheds and no measurable effects to fish were identified.

Fish populations within the project area (Appendix A – Map 42) would be unaffected. Commercial timber harvest would not occur in RR, so there would be no chance to negatively impact stream shading, sedimentation, or instream large wood. Individual trees may be cut to facilitate yarding corridors but not to the extent it would have an effect. No commercial harvest in RR would essentially create a 180 foot (each side of stream) no-treatment area that would effectively filter out any sediment generated from upslope areas before being transported to streams. These factors minimize the affect on fish from upslope harvest activities. Both peak and low flows can affect fish habitat these impacts are analyzed in detail under issue 4 How would proposed VRH affect winter peak flows and summer low flows."

Fuels Management would consist of roadside machine piling, hand piling, and pile burning along roads and skid trails. Machine piling for fuels management would not occur in Riparian Reserves. There would be no effect to fish or aquatic habitat because the riparian reserves would effectively buffer the stream from any impacts. Broadcast burning would occur in the fall, winter, or spring when moisture content of soil, duff and large fuels is high and when conditions are conducive to achieving burn plan objectives for light to moderate intensity burning. Fire line construction on the perimeter of RR would be avoided. All fire lines would be rehabilitated by constructing water bars, seeding with native grasses, where deemed necessary, and mulching with logging slash where available. Numerous BMPs (BLM, 2016a, pp. Appendix B-F12, p 162-164) would be implemented during fuels management which would eliminate the possibility of negatively impacting fish or their habitat.

Additionally, "no-treatment" buffers 33 feet wide or more have been shown to be effective at intercepting and filtering sediment from upslope areas (Rashin, et al., 2006). Commercial timber harvest would not occur in RR, so "no-treatment" buffers for this project would be more than five times greater than what has been shown to effectively filter sediment from upslope areas.

Where haul routes are paved, there is no mechanism to disturb the road surface or transmit sediment to the stream channel. Gravel surfacing on roads effectively reduces sediment production from roads (Burroughs, 1989). Road maintenance and application of best management practices and project design features would result in negligible sediment production from forest roads. Within the project area, portions of the haul route that are gravel surfaced and parallel or cross streams have the potential to deliver negligible amounts of sediment.

For all alternatives, there is a maximum of 0.6 miles of new road construction proposed in RR, of which one segment will cross an intermittent stream far removed from fish populations. The intermittent nature of the stream at the crossing combined with road PDFs and BMPs in appendix B would minimize impacts to fish and their habitat, therefore measurable quantities of suspended sediment would not be expected to reach fish bearing reaches downstream. The rest of the proposed road construction is hydrologically disconnected from streams and/or sufficient native vegetation or other natural features are present to filter potential road derived sediment before it could be transported to streams. Road construction on private timber land using similar, but somewhat less protective management practices have not measurably affected stream turbidity (Arismendi et al. 2016). Additionally, road construction would occur in the dry season (BLM, 2016a, pp. BMP R62, p 152) and sediment control measures (appendix B roads 1-14) would be used where sedimentation from roads would occur (BLM, 2016a, pp. BMP R63-64, p 153). These BMPS have been shown effective when implementing other timber harvest.

PDFs and BMPs (Appendix B soils, roads, fish) would be used to minimize sedimentation of streams potentially generated from harvest related operations such as yarding corridors, road management, and log haul. Commercial road use would be suspended where the road surface is deteriorating due to vehicular rutting or standing water, or where turbid runoff would reach stream channels (BLM, 2016a, p. 93). Roseburg District specialists have monitored the effectiveness of aquatic and riparian related PDFs and BMPs in similar forest management actions proposed in previous EAs. Monitoring results suggest the PDFs and BMPs are highly effective at minimizing or eliminating sediment transport from the haul route to streams (Albin, 2016).

Rationale:

Because the majority of timber harvest would occur on or near ridge tops far removed from fish presence, haul routes are in good condition and Appendix B PDFs and BMPs would be applied where required, there would not be any impacts to special status fish species and habitat, including Oregon Coast coho salmon critical habitat, and Essential Fish Habitat, and steelhead, Proposed actions would not affect streamside shade, therefore there would be no effect to stream temperature. Spawning gravel and juvenile rearing habitat would not be affected because there would be no detectable increase in sedimentation from proposed actions pertaining to this issue statement. For these reasons, the BLM considered the potential for the project to affect fish, including OCC, their critical habitat, EFH, BLM sensitive fish species and concluded that detailed analysis was not necessary because there is no potential for significant effects.

Issue G. How would timber harvest and associated actions affect cultural resources?

Background:

Cultural resource inventories within the proposed treatment areas are complete. Twenty-nine pedestrian surveys (48501, 48530, 48534, 48608, 48713, 48720, 48721, 48725, 48803, 48817, 490001, 490003, 49106, 49211, 49223, 49224, DW9301, DW1701, DW1801, DW1802, SW9804, SW0305, SW0307, SW1008, SW1515, SW1605, SW1906, & TY9605) resulted in the identification of three sites (35DO1659, 35DO1660, & 35DO1661) within the project area. Two sites are unevaluated to the National Register of Historic Places (NRHP) and would be treated as eligible (35DO1659 & 35DO1660). Eligible/unevaluated sites would be avoided through unit boundary modification and/or protected via project design features, best management practices, and stipulations. One site (35DO1661) has been determined Not Eligible to the National Register of Historic Places and no protection measures are recommended. Therefore, no soil disturbance from forest management, road activities, tree tipping activities, or hazard fuels management would occur within eligible/unevaluated site boundaries. No soil heating from fuels management would occur within eligible/unevaluated sites.

No soil disturbance from any proposed activities and no soil heating from fuels management are anticipated to affect historic properties because all known NRHP eligible, or potentially eligible, cultural resources have been protected through project design. Therefore, no additional mitigation measures were necessary for this issue. A post-harvest cultural inventory would be conducted in accordance with Appendix A of the Oregon State Protocol, which requires that 20 percent or more of the project area be surveyed post-treatment.

The undertaking's 36 CFR 800/NHPA Section 106 requirements, project compliance and 2015 Oregon BLM Protocol review have been met, documented, and concurred with by the Oregon State Historic Preservation Office and our federally recognized Tribal Partners. If any other cultural and/or paleontological resources (historic or prehistoric site or object) are discovered during project activities, all operations in the immediate area of such discovery would be suspended until an evaluation of the discovery can be made by a professional archaeologist to determine appropriate actions to prevent the loss of significant cultural or scientific values.

Rationale:

The avoidance of known sites and project design features for unforeseen site discovery during project implementation ensures having No Effect. The undertaking is fully in compliance with Section 106 of the National Historic Preservation Act of 1966 (amended 2004).

However, if previously unidentified cultural resources are discovered during any project activities authorized after the submission and approval of this report, the Authorized Official of the subject operations and all other involved personnel shall exercise care to ensure that such finds are not disturbed. The following stipulations are included: operator/permittee/supervisor shall inform the authorized Bureau of Land Management official of such a discovery(s) as soon as is possible. A BLM representative shall expeditiously implement measures and procedures to evaluate the significance of such a find(s) in consultation with the District Archaeologist. If the subject cultural resource(s) is determined to be significant, the BLM shall prescribe and implement appropriate action(s) to preserve or conserve the subject resource(s). The operator/permittee/supervisor shall not continue or proceed with any activity that may disturb the subject resource(s) until permission to proceed with the project is granted from the authorized BLM representative.

Failure of the operator, permittee, supervisor, or other involved personnel to comply with the above conditions and/or other lawful conditions imposed here or elsewhere by the BLM to protect cultural resources may be a violation of the 1906 Federal Antiquities Act (P.L. 59-209), the Archaeological Resources Protection Act (P.L. 96-95 as amended, 36 CFR 296), BLM regulations, National Register of Historic Places (NRHP), existing Indian Treaties NHPA/36 CFR 800, 36 CFR 60-64, and, or other federal laws and regulations. In such cases, the Bureau of Land Management may suspend and, or terminate operations and offenders may be subject to disciplinary or legal actions noted.

Should the scope or design of the proposed project be altered or changed, additional review by the Roseburg District Heritage Department Staff will be required. If any previously unrecorded cultural resources are discovered during the proposed project undertaking, all project-related activities must cease. A qualified professional archaeologist will then assess the discovery, and the consultation process as outlined in Section 800.13 of the Advisory Council on Historic Preservation's regulations 36 CFR 800, will be reinitiated.

Post harvest survey would occur in accordance with USDOI- SHPO 2015 Appendix A. Post-harvest survey will focus on areas of high cultural probability with flat ground, nearby water sources, ridgelines, slope percent and, or previously documented cultural resources. Two unevaluated sites (35DO351; 35DO352) would be monitored post-harvest by BLM subject matter experts to ensure that all protection measures were implemented.

Issue H. How would the proposed vegetation treatments affect the species addressed in the Bald and Golden Eagle Protection Act and their habitat?

Background:

The USFWS listed bald eagles as an endangered species under the Endangered Species Act on March 11, 1967, reclassified them as a threatened species July 12, 1995 (FWS, 1995), and delisted them due to recovery on July 9, 2007 (FWS, 2007). Bald and golden eagles are currently Bureau Sensitive species and are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Both bald and golden eagles are present and breeding within the Blue and Gold Harvest Plan project area

On the Roseburg 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.

Rationale:

The effects of the proposed alternatives to bald and golden eagles 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 (BLM, 2016b, pp. 825-828, 883-885). The proposed actions would remove trees suitable for bald eagle and golden eagle nests. However, potential nest trees would remain in the proposed units because the BLM would retain large trees that were established prior to 1850 (BLM, 2016a, pp. 62-63). These trees would serve as potential bald eagle nest trees where they occur within two miles of large bodies of water (BLM, 2016b, 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 proposed RMP alternative. However, the PRMP, also determined that additional habitat would develop in subsequent decades through the allocation of reserve land use allocations, which would lead to an increase in bald and golden eagle habitat (BLM, 2016b, p. 828 and 885). The proposed vegetation management activities would not affect the persistence of bald eagles and golden eagles in project area, or range wide. Additionally, the implementation of PDFs would prevent disturbance to nesting eagles by implementing seasonal restrictions during the breeding season.

Issue I. How would proposed actions affect Franklin's Bumble Bee (*Bombus franklini*) and their foraging or nesting habitat?

Background:

The Franklin's bumblebee was proposed to be federally-listed as endangered under the ESA in 2019 (FWS, 2019) and the final rule for federal listing as endangered was effective on November 23, 2021 (FWS, 2021c). 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 (FWS, 2018a, pp. 3, 42).

Information about specific pollinator-plant interactions in the Roseburg 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) which in turn appear key to their survival and reproductive success (FWS, 2018a, p. Table 1). In the Roseburg District, the majority flowering trees, shrubs, and herbaceous species occur in non-conifer dominated plant communities or in opening within forest stands.

There are three locations where Franklin's Bumble Bee has historically been found in the Roseburg District and none of the locations are within the project area. The most recent location last reported in 1998 is west of Sutherlin, OR at Ford's Pond, approximately 2 miles southeast from the project area. The other locations are within the city limits of Roseburg reported from the 1930's and another on the Umpqua National Forest approximately 25 miles east of BLM-administered lands where no year was specified – though it is noted as "historic" (McGraw, 2021).

Franklin's bumble bee habitat would 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. The only potential negative impact to Franklin's bumble bee from the proposed actions would be prescribed burning and associated timber harvest actions (yarding corridors, road construction, etc.) in meadows and other open plant communities containing flowering herbaceous species during the growing, flowering, and seed production periods.

Given the listed status of this species the BLM would implement the following PDFs to reduce effects:

- Following PDFs (Roseburg BLM LOC Sept. 16, 2022; File #: 01EOFW00-2022-I-0044) to avoid impacts from herbicide and weed management.
- Block spur road 23-06-29I post-harvest to avoid disturbance of area with off -road vehicles.
- When operationally feasible avoid yarding (ground and cable) through special habitat areas
- (meadows, rocky outcrops, and cliffs). Directionally fell trees away from special habitats. and use
- retention to create buffers around outcrops and cliffs.
- Pre-treatment assessment of the nesting, foraging, and hibernating habitat conditions will be conducted within the action areas and within areas adjacent to the action areas to determine is
- "Significant Floral Resources" (SFR) exist. SFRs are habitat (meadows, oak woodlands, and brush fields) that provide a diverse supply of flowers that bloom throughout the colony 's life
- cycle, from spring to autumn are located, then using the best available bumble bee protocol and
- best available science at the time. If SRFs are present:

- Seasonally restricted from habitat modifying actions in meadows between May 15 and
- September 30 (active flight season) to avoid adverse impacts, or
- Within 100 meters of an SFR minimize the disturbed area, maintaining minimum corridor widths and designating areas for tree retention.
- Maintain one-end suspension when cable logging within 100 meters of an SFR.

Rationale

The effects of the proposed alternatives on Franklin's bumble bee are not analyzed in detail, because there would be a low 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 such as loss of meadows and SFR habitat would be largely minimized by following the PDFs outlined above.

The PRMP/FEIS acknowledged that the implementation of the PRMP/FEIS would result in no changes to meadow habitats and the species associated with these habitats (BLM, 2016b, pp. 1667-1675) because the PRMP would not remove or degrade meadow habitat. 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 (BLM, 2016b, p. 834). In light of the harvest treatments that include thinning and VRH, the floral resources in the Blue and Gold project area would increase as understory plants (forbs and shrubs) respond to increase light conditions for up to 15 years depending on site specific treatment (post-harvest elative densities of thinning or VRH).

The BLM would complete the ongoing consultation with the USFWS and implement any additional protection measures provided by the USFWS in their biological opinion.

Issue J. How would the proposed harvest and associated activities affect carbon storage, greenhouse gas emissions, climate change, and the social cost of carbon?

Background:
The effects of the proposed action (i.e., timber harvest activities) on carbon storage and greenhouse gas emissions, including estimates of their social cost, is not analyzed in detail, because, regardless of project-specific or site-specific information, there would be no reasonably foreseeable significant effects of the proposed action beyond those disclosed in the PRMP/FEIS.

On August 5, 2016, the BLM issued the Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (2016 ROD/RMP) revising the 1995 RMP for the Roseburg District. The ROD/RMP was based on the analysis conducted in the PRPM/FEIS. The PRMP/FEIS analyzed the effects of timber harvesting, prescribed burning, and livestock grazing on greenhouse gas emissions and carbon storage, and the potential impacts of climate change on major plan objectives. The PRMP/FEIS also analyzed the estimated future values associated with carbon storage and greenhouse gas emissions, using methods developed at that time by the Interagency Working Group on Social Cost of Carbon, United States Government (2016).

The effects of the proposed actions on carbon storage and greenhouse gas emissions, and their associated values, tiers to the analysis in the PRMP/ FEIS. As described below, the proposed action is consistent with the ROD/RMP, and the proposed action is not expected to have significant effects beyond those already analyzed in the FEIS. While analysis of the project-specific and site-specific conditions could give greater specificity to the analysis in the PRMP/FEIS, there is no potential for reasonably foreseeable significant effects of the proposed action beyond those disclosed in the PRMP/FEIS. The analysis in the PRMP/FEIS addressed the effects on carbon storage and greenhouse gas emissions of implementing the entire program of work for timber resources based on high quality and detailed information (FEIS, pp. 165-180; 1295-1304; 598-600; 621, 653; 657). The information available on project-specific and site-specific conditions, while more specific, is not fundamentally different from the information used in the FEIS analysis of effects on carbon storage and greenhouse gas emissions, and their associated values, and thus cannot reveal any fundamentally different effects than that broader analysis.

The PRMP/FEIS upon which the ROD/RMP was based examined the most recent science regarding climate change, carbon storage, and greenhouse gas emissions. The analysis in Volume 1 on pages 165–211 are relevant to this project and are incorporated by reference.

The key points from PRMP/FEIS analyses include (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.

Social Cost of Carbon is calculated using a non-market based valuation for the storage of carbon as a good or service and greenhouse emissions expected to result from the alternatives. The analysis finds that the value would increase from current (2012) valuation of $85 million per year to a value of $159 million per year under the ROD/RMP.

The PRMP/FEIS concluded that the approved ROD/RMPs support the State of Oregon's interim strategy for reducing greenhouse gas emissions (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.

In early September of 2020 the Archie Creek Fire burned approximately 40,600 acres of BLM administered lands in the Swiftwater Resource area of the Roseburg District. Regarding climate change, the wildfire changed baseline conditions by reducing the amount of current forest carbon on BLM-administered lands and temporarily increasing the amount of greenhouse gas emissions estimated from wildfire in the PRMP/FEIS (pp. 173, 176). However, the wildfire did not alter the effects of ROD/RMP implementation on carbon storage and greenhouse gas emissions described in the PRMP/FEIS. The carbon storage and greenhouse gas emission baseline condition change does not alter PRMP/FEIS basic analytical conclusions. Additionally, the baseline conditions change does not alter the resource use scope or the ability to make progress towards achieving the desired conditions described in the ROD/RMP management objectives (RMP Plan Evaluation Report, March 2022, p. A-3). At this time there is no other new information or changed circumstances that would substantially change the effects anticipated in the PRMP/FEIS. This is because: the harvest levels remain within the range of that analyzed in the PRMP/FEIS; the Roseburg District expected annual harvest is 32 MMbf from the HLB and the acres of activity fuels prescribed burning and expected tonnage consumed remains within the range analyzed in the PRMP/FEIS.

The PRMP/FEIS estimates the effect of implementing actions consistent with the ROD/RMP as follows:

Table C-4. 2016 PRMP/FEIS Storage and GNG Estimates (PRMP/FEIS p. 170 and 179)

	Current	2023	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

Net Carbon Storage	85 Million	159 Million – Average/year 2013-2022

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

- The PRMP/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 (BLM, 2016b, p. 307). The expected annual harvest for the Roseburg District is 39 MMbf (32 MMbf from the HLB and 6 MMbf from non-ASQ related harvest).
- Activity fuels treatments are aligned with the harvest program with estimated acres of prescribed fire treatment type provided by the Woodstock model (BLM, 2016b, p. 1300). The decadal average of activity fuels prescribed burning for the first 20 years of the ROD/RMP would be an estimated 64,806 acres over the entire decision area (BLM, 2016b, p. 362). For the Roseburg sustainable-yield unit, the expected decadal average activity fuels program covers approximately 11,000 acres.
- The PRMP/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 sustained-yield unit (BLM, 2016b, p. 270). Approximately 173,300 acres of natural fuels treatment is expected to occur on average each decade across the planning area (BLM, 2016b, p. 167). The expected natural fuels treatment program for the Roseburg sustained-yield unit is approximately 3,657 acres per decade, on average.

The amount of prescribed burning of activity fuels is the primary driver of greenhouse gas emissions (BLM, 2016b, p. 178). Greenhouse gas emissions would increase substantially largely due to the projected increases in activity fuels prescribed burning. The PRMP/FEIS assumed no change in the natural fuels prescribed burning program from the recent past. Greenhouse gas emissions analyzed included those from prescribed burning and harvest operations (BLM, 2016b, p. 174).

Rationale:

The BLM considered this issue but did not analyze it in detail because there would be no reasonably foreseeable significant effects of the proposed action regarding carbon storage, greenhouse gas emissions, climate change, and the social cost of carbon beyond those disclosed in the RPMP/FEIS.

Issue K. How would proposed actions affect the Northwestern pond turtle (*Actinemys marmorata*) and their nesting, aestivating, overwintering, and aquatic habitats?

The USFWS proposed listing both the northwestern pond turtle (*Actinemys marmorata*) as threatened, throughout its range which Washington, Oregon, California, and Nevada (88 FR 68370). No critical habitat is proposed currently.

The northwestern pond turtles (NWPT) use terrestrial habitats for nesting, overwintering, and aestivation. Aquatic habitats are used for breeding, feeding, overwintering, shelter, basking, and movement/dispersal (p. 21, USFWS 2023). Pond turtles utilize all types of aquatic habitats, permanent and ephemeral rivers and stream, lakes and pond, wetlands, and irrigation ditches. Within these general aquatic habitat types the pond turtle prefers those areas that provide basking sites, underwater shelter, and standing or slow-moving water (p. 29, USFWS 2023). Basking sites are provided by exposed shoreline, rocks, logs, and emergent vegetation that allows for quick movements back into the water.

Female pond turtles typically lay their eggs in close proximity to aquatic habitat, characterized by sparse vegetation and little or no canopy cover, allowing for direct sunlight. Nests are excavated in dry, compact soils up to 400 meters from water (Holland 1994, p. 2-10, Holte 1998, p. 54; as cited in USFWS 2023, p.29).

Terrestrial habitats, above the high-water line, are also used for overwintering and aestivation. Leaf litter is typically present at the site, open areas are avoided (USFWS 2023, p. 30). Overwinter/aestivation sites have been located up to 260 meters from aquatic habitat (Holland 1994, pp 8-12 to 8-13; as cited in USFWS 2023, p. 30). Oregon Department of Fish and Wildlife uses, up to, 500 meters (ODFW 2015, p. 35).

Based on these biological needs the BLM identified an analysis area for the NWPT by buffering proposed actions by 500 meters. A more focused management area is identified within 100 meters of third order and larger stream and water bodies; and open areas identified in, and adjacent to, the treatment units.

Although NWPT are documented in the Roseburg District there is no record (BLM GeoBOB database 2023) of a population or individuals in the streams (aquatic habitat) within the identified 500 meter analysis area and the 100 meter management area. Given the potential listing (88 FR 68370) of the species, the BLM is conferencing with the USFWS and until a final rule is published, plans to implement the PDFs listed below: PDFs would be lifted if surveys determine that the NW pond turtle habitat is not present):

- Maintain one end suspension of logs when cable logging through pond turtle management areas.
- No road building during the nesting season (May 15 - July 30) in pond turtle management areas; unless surveys have been conducted to determine pond turtle presence/absence.
- Roads built to minimum width standards in pond turtle management areas.
- Minimized disturbed area by using maximum spacing between cable corridors and
- maintaining minimum corridor widths.
- Maintain one-end suspension when cable logging in pond turtle management area.
- Installation of the Yellow Creek crossing (23-6-34) on 32-6-34.2 road would require:
- Site surveys by wildlife biologists to review for NWPT occurrence and habitat and make site specific recommendations to protect any turtle or important nest habitat features located.
- Daily inspection of project area to look for any NWPT that may have entered the work zone and relocate pond turtle out of the area.

The PRMP/FEIS addressed the NWPT 1) as a Bureau Sensitive Species (BLM 2016b, p.1670) and forecasted no change to the 17,976 acres of wet habitat from 2013 to 2063 and 2) the PRMP/FEIS further stated that the BLM would manage naturally occurring special habitats, such as wetlands and natural ponds, to maintain their ecological function. Removal of culverts and other instream structures like blockages would cause stream channel disturbance during summer instream operating periods. The addition of structure to stream channels would create additional pools and slow-flowing, shallow areas that would be favorable for pond turtles (BLM 2016b, pp. 1970-1971). The PRMP/FEIS did not address nesting, overwintering, and aestivating habitat mentioned here.

Rationale

The effects of the proposed alternatives on NWPT are not analyzed in detail, because impacts related to wet (aquatic) habitat would remain within the parameters of the PRMP/FEIS discussion of "No Change ", given that activities would not occur within the stream channel (aquatic wet habitat). Effects to other overwintering, nesting, and aestivating habitats would occur and be minimized by following the PDFs mentioned above. In the event the NWPT is listed, the BLM would complete consultation with the USFWS and implement any additional protection measures provided by the USFWS. In the interim, the BLM would implement any protection measures that results from the ongoing conferencing with the USFWS.

Appendix D. Sample Tree Falling

Background

The code of Federal Regulations requires the BLM to sell timber on a tree cruise basis (43 CFR 5422.1) and to have an accurate appraisal at the time BLM offers the sale (43 CFR 5420.0-6). The BLM would sell the timber within Blue and Gold Harvest Plan project areas as lump-sum timber sales. In a lump-sum sale, timber cruisers assess the standing timber and give it a specific value. This value becomes the BLM cruise estimate and is the minimum bid for the removal of the timber in the advertised sale. The winning bidder pays the exact amount of the winning bid to the BLM.

Conversely, the Forest Service in western Oregon normally uses a log-scale sale process. The Forest Service does provide prospective purchasers an appraisal of the timber; however, they make a bid on the average stumpage. The Forest Service removes logs from a sale, scales, and then assesses a value using the average stumpage bid by the purchaser. The final price of the sale is determined after cutting the trees (Howard & DeMars, 1985).

The Forest Service does not use sample tree falling, because they do not need as accurate a cruise before they offer a timber sale because they use the log-scaling process. However, the Forest Service has used validation falling in the past. The BLM needs a more accurate cruise to prepare the best appraisal for the minimum lump-sum bid price, before the sale advertisement.

It is in the public interest that the BLM maintains accurate and reliable timber cruises. Sample tree falling maintains accurate and reliable timber cruises; the practice provides statistically reliable data available in no other way. It helps ensure the public receives fair market value for the timber sold as required by Congress through the Federal Land Policy and Management Act.

Other Cruise Methods

The BLM has frequently used visual timber cruise methods, but this technique does not allow the BLM to check the accuracy of the final cruise. The pure ocular cruising method makes many assumptions about the trees measured:

The cruiser selects the correct form class/bark thickness ratio/volume equation.
The cruiser accurately measures the tree height and DBH.
The form of the tree and merchantable height fit the measured form class/volume equation.
Tree defect is apparent by visible indicators.
The cruiser assumes the correct amount of hidden defect and breakage.

Although form class and bark thickness can be obtained by climbing the tree, these other variables are estimated which are subject to inherent measurement bias.

Accuracy of Sample Tree Falling

Conducting sample tree falling removes the measurement bias inherent in making visual estimates. Through checking measurements directly by felling a sample tree, cruisers can make corrections to their estimates. This is because sample tree falling provides the direct measurement of form class, bark thickness, taper, defect, breakage, volume and value without bias. This is a statistically valid sampling methodology (Bell and Dilworth 1997 (Revised), Iles 2003, USDI- 1989) where cruisers select a portion of the cruise trees to be felled, bucked (cut-to-length) and scaled. By felling a sample tree and substituting the scale of the tree for the cruise in the volume calculations, it eliminates the measurement bias created through ocular estimation. Cruisers can apply the measurements gained by felling, such as form class, bark thickness, and stump to DBH ratio, to the remaining standing trees and incorporate that information into district databases.

The BLM Manual Supplement Handbook 5310-1, 1989 states, "In addition to meeting sample error standards, the volume estimates of all 3P and variable plot methods must be checked by felling a portion of sample trees. The following minimum number of sample trees must be felled, bucked, and scaled to minimize technique error through an on-site check of merchantable tree height, form class/bark thickness, defect deduction, and grade estimation."

Because of the statistically valid cruise design, cruisers can reliably extrapolate the sample results to the rest of the unit.

Sample Tree Falling as a Connected Action

The BLM includes sample tree falling in the Blue and Gold Harvest Plan EA as a project design feature and thus analysis of the Proposed Action includes the effects of sample tree felling. There is no CEQ requirement that a Federal agency must issue a single decision for actions considered and analyzed in the same EA document. Sample tree felling is a ground-disturbing activity that must occur prior to the offering of a timber sale.

All of the proposed timber sales could proceed without sample tree falling. In addition, sample tree falling does not depend on the larger action (the timber sales) for its justification. Sample tree falling can proceed without taking other actions. The BLM might not choose to offer these sales. However, the BLM could use these volume tables gained from conducting sample tree falling to assess the final cruise volume in sales that occur within the same watershed and have similar stand characteristics.

The BLM conducts many activities in preparation of a timber sale before the Authorized Officer decides to offer a timber sale. These activities include tree marking, flagging of sale boundaries, surveying property lines, and biological surveys. Unlike sample tree falling, these activities are not ground disturbing and occur as part of routine timber sale preparation. Like sample tree falling, these activities do not justify that a timber sale goes forward. The BLM has conducted many of these activities for a sale and the sale has never gone forward. Issuing a decision to conduct sample tree falling does not itself constitute a decision to offer a timber sale.

Appendix E. Detailed Road Information

Table E-1. Alternative 6 Detailed Road Information

EA Road Number	Road Activity	Length (Miles)
24-6-7.A	Road Construction	0.11
24-6-7.F	Road Construction	0.04
24-6-8.A	Road Construction	0.20
24-6-5.D	Road Construction	0.03
23-6-17.F	Road Construction	0.14
23-6-17.E	Road Construction	0.14
23-6-17.D	Road Construction	0.13
23-6-19.B	Road Construction	0.26
23-6-19.A	Road Construction	0.10
23-6-19.C	Road Construction	0.08
24-6-17.A	Road Construction	0.09
24-6-17.B	Road Construction	0.01
24-6-17.D	Road Construction	0.03
24-6-9.C	Road Construction	0.06
24-6-9.B	Road Construction	0.14
24-6-9.A	Road Construction	0.07
24-6-3.C	Road Construction	0.12
24-6-4.E	Road Construction	0.02
24-6-3.D	Road Construction	0.10
24-6-3.B	Road Construction	0.17
23-6-25.A	Road Construction	0.13
23-5-19.D	Road Construction	0.06
24-6-17.I	Road Construction	0.04
24-6-4.F	Road Construction	0.03
24-6-4.T	Road Construction	0.04
24-6-4.H	Road Construction	0.05
24-6-4.I	Road Construction	0.04
23-6-25.C	Road Construction	0.05
23-5-19.A	Road Construction	0.23
23-6-17.C	Road Construction	0.06
23-6-30.B	Road Construction	0.10
23-6-30.A	Road Construction	0.21
24-7-13.0	Road Renovation	0.19
24-6-5.0	Road Renovation	0.09
24-6-5.1	Road Renovation	0.07
24-7-13.0	Road Renovation	0.07
24-6-7.1	Road Renovation	0.33
24-7-13.0	Road Renovation	0.18
24-7-13.0	Road Renovation	0.34
24-6-5.0	Road Renovation	0.10
24-7-13.0	Road Renovation	0.19
24-7-13.0	Road Renovation	0.44
24-6-5.1	Road Renovation	0.36
24-7-13.0	Road Renovation	0.24
24-7-13.0	Road Renovation	0.23
24-7-13.0	Road Renovation	0.07
24-6-19.3	Road Renovation	0.01
24-6-19.3	Road Renovation	0.29
24-6-19.4	Road Renovation	0.18
24-6-19.3	Road Renovation	0.25
24-6-19.3	Road Renovation	0.09
24-6-19.3	Road Renovation	0.09
24-6-19.3	Road Renovation	1.41
24-6-20.0	Road Renovation	0.12
24-6-20.0	Road Renovation	0.25

EA Road Number	Road Activity	Length (Miles)
24-6-20.0	Road Renovation	0.09
24-6-20.0	Road Renovation	0.26
24-6-19.3	Road Renovation	0.17
24-6-19.3	Road Renovation	0.15
24-6-19.3	Road Renovation	0.41
24-6-19.3	Road Renovation	0.08
24-6-17.0	Road Renovation	0.23
24-6-19.3	Road Renovation	0.26
24-6-19.3	Road Renovation	0.46
24-6-17.0	Road Renovation	0.19
24-6-17.0	Road Renovation	0.23
24-6-17.0	Road Renovation	0.16
24-6-17.0	Road Renovation	0.13
24-6-9.2	Road Renovation	0.64
24-6-19.3	Road Renovation	1.06
24-6-19.3	Road Renovation	0.21
24-6-19.3	Road Renovation	0.06
24-6-9.1	Road Renovation	0.09
24-6-19.3	Road Renovation	0.13
24-6-9.1	Road Renovation	0.08
24-6-19.3	Road Renovation	0.02
23-6-24.0	Road Renovation	0.46
23-6-24.0	Road Renovation	0.12
24-6-9.1	Road Renovation	0.34
23-6-24.0	Road Renovation	0.51
23-6-24.0	Road Renovation	0.06
24-6-4.g	Road Renovation	0.17
24-6-4.g	Road Renovation	0.11
23-6-24.0	Road Renovation	0.28
24-6-3.m	Road Renovation	0.11
24-6-3.0	Road Renovation	0.23
24-6-3.0	Road Renovation	0.28
24-6-3.0	Road Renovation	0.36
24-6-3.1	Road Renovation	0.20
23-6-24.0	Road Renovation	0.53
23-6-24.0	Road Renovation	0.39
23-6-24.0	Road Renovation	0.04
23-6-35.4	Road Renovation	0.17
23-6-24.0	Road Renovation	0.27
23-6-24.0	Road Renovation	0.33
23-6-35.4	Road Renovation	0.04
23-6-35.4	Road Renovation	0.10
23-6-35.4	Road Renovation	0.10
23-6-34.0	Road Renovation	0.09
23-6-34.0	Road Renovation	0.24
23-6-34.0	Road Renovation	0.50
23-6-34.1	Road Renovation	0.14
23-6-34.1	Road Renovation	0.02
23-6-34.1	Road Renovation	0.20
23-6-35.1	Road Renovation	0.12
23-5-30.0	Road Renovation	0.06
23-6-24.0	Road Renovation	0.19
23-6-24.0	Road Renovation	0.39
23-6-24.0	Road Renovation	0.39
23-5-20.0	Road Renovation	0.18
23-5-19.0	Road Renovation	1.18
23-5-20.0	Road Renovation	0.19
23-5-20.0	Road Renovation	0.21

EA Road Number	Road Activity	Length (Miles)
23-5-17.1	Road Renovation	0.16
23-5-20.0	Road Renovation	0.05
23-5-20.0	Road Renovation	0.11
23-5-20.0	Road Renovation	0.09
23-5-20.0	Road Renovation	0.05
23-5-20.0	Road Renovation	0.66
23-5-29.0	Road Renovation	0.59
23-5-29.0	Road Renovation	0.35
23-6-25.y	Road Renovation	0.13
23-6-25.1	Road Renovation	0.23
23-6-25.1	Road Renovation	0.11
23-5-29.0	Road Renovation	0.08
23-5-29.0	Road Renovation	0.56
23-5-29.0	Road Renovation	0.09
23-5-19.3	Road Renovation	0.03
24-6-27.c	Road Renovation	0.66
24-6-33.0	Road Renovation	0.01
24-6-27.d	Road Renovation	0.57
24-6-27.j	Road Renovation	0.31
24-6-33.0	Road Renovation	0.16
24-6-33.0	Road Renovation	0.28
24-6-33.0	Road Renovation	0.02
24-6-27.d	Road Renovation	0.25
24-6-19.3	Road Renovation	0.36
24-6-19.3	Road Renovation	0.38
24-6-5.1	Road Renovation	0.20
24-6-5.1	Road Renovation	0.06
24-6-5.1	Road Renovation	0.03
24-6-5.1	Road Renovation	0.03
24-6-5.1	Road Renovation	0.25
24-6-9.1	Road Renovation	0.06
23-6-18.1	Road Renovation	0.32
23-6-18.1	Road Renovation	0.08
23-6-18.1	Road Renovation	0.36
23-6-17.h	Road Renovation	0.08
23-6-18.1	Road Renovation	0.25
23-6-18.1	Road Renovation	0.05
23-6-18.1	Road Renovation	0.12
23-6-18.1	Road Renovation	0.25
23-6-17.5	Road Renovation	0.15
23-6-18.1	Road Renovation	0.17
23-6-17.0	Road Renovation	0.54
23-6-18.1	Road Renovation	0.04
23-6-17.4	Road Renovation	0.22
23-6-18.1	Road Renovation	0.06
23-6-18.1	Road Renovation	0.03
23-6-17.2	Road Renovation	0.39
23-6-17.1	Road Renovation	0.27
23-6-17.2	Road Renovation	0.26
23-6-17.p	Road Renovation	0.03
23-6-17.6	Road Renovation	0.04
23-6-17.0	Road Renovation	0.01
23-6-18.1	Road Renovation	0.24
23-7-25.3	Road Renovation	0.52
23-6-19.4	Road Renovation	0.17
23-6-18.1	Road Renovation	0.23
23-6-19.h	Road Renovation	0.10
23-7-25.3	Road Renovation	0.13

EA Road Number	Road Activity	Length (Miles)
23-6-18.1	Road Renovation	0.22
23-6-18.3	Road Renovation	0.61
23-7-25.3	Road Renovation	0.07
23-6-18.1	Road Renovation	0.07
23-6-18.3	Road Renovation	0.45
23-6-30.1	Road Renovation	0.09
23-6-30.1	Road Renovation	0.51
23-6-30.1	Road Renovation	0.75
23-6-29.0	Road Renovation	0.21
23-6-30.1	Road Renovation	0.02
23-6-30.1	Road Renovation	0.09
23-6-30.1	Road Renovation	0.35
23-6-30.1	Road Renovation	0.07
24-7-13.0	Road Renovation	0.48
24-7-13.0	Road Renovation	0.28
24-7-13.0	Road Renovation	0.53
23-6-30.1	Road Renovation	0.31
23-6-15.1	Road Renovation	0.06
23-6-15.1	Road Renovation	0.01
24-7-13.0	Road Renovation	0.02
23-6-17.3	Road Renovation	0.01
24-6-8.A	Road Construction	0.03
24-6-5.1	Road Renovation	0.29
24-6-5.1	Road Renovation	0.02
24-6-4.g	Road Renovation	0.06
24-6-4.g	Road Renovation	0.06
24-6-4.g	Road Renovation	0.05
24-6-4.g	Road Renovation	0.12
23-5-17.A	Road Construction	0.04
23-5-17.B	Road Construction	0.25
23-5-17.C	Road Construction	0.09
23-5-17.D	Road Construction	0.23
23-6-25.B	Road Construction	0.05
23-6-26.k	Road Renovation	0.25
23-5-30.0	Road Renovation	0.07
23-5-30.0	Road Renovation	0.11
23-5-30.0	Road Renovation	0.04
23-5-30.0	Road Renovation	0.26
23-5-30.0	Road Renovation	0.17
23-5-30.0	Road Renovation	0.34
23-6-26.3A	Road Construction	0.16
23-5-17.E	Road Renovation	0.09
23-5-17.F	Road Renovation	0.10
24-6-17.4	Road Renovation	0.09
24-6-16.d	Road Renovation	0.87
23-6-25.E	Road Construction	0.09
23-6-34.k	Road Renovation	0.30
24-6-4.K	Road Renovation	0.09
24-6-3.A	Road Renovation	0.07
24-6-4.C	Road Construction	0.11
24-6-4.O	Road Construction	0.01
24-6-17.y	Road Renovation	0.08
23-6-29.E	Road Construction	0.07
24-6-5.B	Road Construction	0.07
24-6-5.G	Road Construction	0.09
24-6-5.F	Road Construction	0.05
26-6-5.H	Road Construction	0.02
24-6-17.K	Road Construction	0.08

EA Road Number	Road Activity	Length (Miles)
24-6-16.e	Road Renovation	0.33
24-6-16.F	Road Construction	0.11
23-6-29.K	Road Construction	0.04
23-6-20.a	Road Renovation	0.48
23-6-19.2	Road Renovation	0.10
23-6-19.2	Road Renovation	0.16
23-6-19.2	Road Renovation	0.37
24-7-3.0	Road Renovation	0.11
23-6-30.c	Road Renovation	0.37
23-6-5.H	Road Construction	0.02
24-6-5.I	Road Construction	0.10
23-6-31.C	Road Construction	0.04
23-6-18.1	Road Renovation	0.14
23-6-19.F	Road Construction	0.21
23-6-17.K	Road Construction	0.10
23-6-17.J	Road Construction	0.17
23-5-19.P	Road Construction	0.02
23-6-24.A	Road Construction	0.04
23-5-30.0	Road Renovation	0.15
23-6-35.E	Road Construction	0.05
23-6-35.F	Road Construction	0.10
24-6-17.s	Road Renovation	0.13
24-6-17.N	Road Construction	0.01
24-6-17.t	Road Renovation	0.09
23-6-17.n	Road Renovation	0.16
23-6-17.M	Road Construction	0.10
24-6-7.M	Road Construction	0.13
24-6-17.M	Road Construction	0.02
23-6-18.1	Road Renovation	0.03
23-6-24.0	Road Renovation	0.10
24-6-19.3	Road Renovation	0.09
23-6-24.0	Road Renovation	0.42
23-6-24.0	Road Renovation	0.20
23-6-35.G	Road Construction	0.18
24-6-3.Q	Road Construction	0.01
24-6-3.P	Road Construction	0.07
24-6-3.W	Road Construction	0.10
24-6-6.B	Road Construction	1.04
24-6-7.T	Road Construction	0.04
23-6-29.3	Road Renovation	0.75
23-6-29.O	Road Construction	0.14
23-6-29.P	Road Renovation	0.14
23-6-29.0	Road Renovation	0.17
23-6-29.0	Road Renovation	0.59
23-6-15.1	Road Renovation	0.19
23-6-2.0	Road Renovation	0.31
23-5-17.0	Road Renovation	0.22
23-5-19.1	Road Renovation	0.31
23-6-23.4	Road Renovation	0.07
23-6-22.A	Road Renovation	0.03
23-6-12.0	Road Renovation	0.09
23-5-17.0	Road Renovation	0.43
23-6-12.0	Road Renovation	0.22
23-5-17.0	Road Renovation	0.05
23-6-15.1	Road Renovation	0.17
23-6-23.0	Road Renovation	0.52
23-6-2.0	Road Renovation	0.09
23-6-12.0	Road Renovation	0.15

EA Road Number	Road Activity	Length (Miles)
23-6-23.3	Road Renovation	0.10
23-6-27.0	Road Renovation	0.16
23-6-28.K	Road Renovation	0.52
23-6-23.3	Road Renovation	0.12
23-6-12.0	Road Renovation	0.05
23-6-12.0	Road Renovation	0.09
23-6-12.0	Road Renovation	0.10
23-6-12.0	Road Renovation	0.08
23-6-12.0	Road Renovation	0.19
23-6-27.3	Road Renovation	0.04
23-6-23.0	Road Renovation	0.91
23-6-15.1	Road Renovation	0.51
23-5-19.1	Road Renovation	0.25
23-6-23.0	Road Renovation	0.09
23-6-22.1	Road Renovation	0.19
23-6-28.K	Road Renovation	0.46
23-6-28.L	Road Renovation	0.13
23-6-15.1	Road Renovation	0.33
23-6-12.0	Road Renovation	0.13
23-6-27.1	Road Renovation	0.49
23-5-17.0	Road Renovation	0.20
23-6-2.0	Road Renovation	0.15
23-6-15.1	Road Renovation	0.17
23-6-23.0	Road Renovation	0.10
23-6-12.0	Road Renovation	0.14
23-6-12.0	Road Renovation	0.37
23-6-12.0	Road Renovation	0.78
23-6-27.1	Road Renovation	0.24
23-6-15.1	Road Renovation	0.12
23-6-12.0	Road Renovation	0.18
23-5-17.0	Road Renovation	0.07
23-6-15.1	Road Renovation	0.50
23-6-27.0	Road Renovation	1.46
23-6-2.0	Road Renovation	0.11
23-6-12.0	Road Renovation	0.67
23-6-27.2	Road Renovation	0.04
23-5-17.0	Road Renovation	0.11
23-6-2.0	Road Renovation	0.36
23-6-28.M	Road Renovation	0.17
23-6-2.0	Road Renovation	0.38
23-6-22.1	Road Renovation	0.25
23-6-15.1	Road Renovation	0.28
23-6-2.0	Road Renovation	1.41
23-6-15.5	Road Renovation	0.08
23-6-23.3	Road Renovation	0.26
23-6-15.6	Road Renovation	0.04
23-5-17.0	Road Renovation	0.27
23-6-2.0	Road Renovation	0.10
23-6-2.0	Road Renovation	0.30
23-6-2.0	Road Renovation	0.11
23-6-15.1	Road Renovation	0.18
23-6-12.0	Road Renovation	0.05
23-6-15.6	Road Renovation	0.06
23-6-15.5	Road Renovation	0.04
23-6-15.1	Road Renovation	0.11
23-6-15.1	Road Renovation	0.08
23-6-2.0	Road Renovation	0.16
23-6-12.0	Road Renovation	0.04

EA Road Number	Road Activity	Length (Miles)
23-6-15.1	Road Renovation	0.05
23-6-12.0	Road Renovation	0.04
23-6-23.0	Road Renovation	0.09
23-6-15.1	Road Renovation	0.24
23-6-15.1	Road Renovation	0.38
23-6-15.1	Road Renovation	0.11
23-6-15.1	Road Renovation	0.61
23-6-15.1	Road Renovation	0.01
23-6-15.1	Road Renovation	0.02
23-5-30.0	Road Renovation	0.16
23-5-30.0	Road Renovation	0.59
23-6-34.2	Road Renovation	0.34
23-5-30.0	Road Renovation	0.42
23-5-30.0	Road Renovation	0.06
23-6-34.2	Road Renovation	0.07
23-6-34.0	Road Renovation	0.18
23-5-30.0	Road Renovation	0.05
23-6-34.0	Road Renovation	0.31
23-6-34.2	Road Renovation	0.54
23-5-30.0	Road Renovation	0.16
23-6-23.M	Road Renovation	0.19
23-6-23.P	Road Renovation	0.12
23-6-23.0	Road Renovation	0.03
23-6-23.J	Road Construction	0.09
23-6-23.I	Road Construction	0.25
23-6-23.D	Road Construction	0.10
23-6-23.E	Road Construction	0.06
23-6-27.H	Road Construction	0.04
23-6-27.I	Road Construction	0.02
23-6-28.E	Road Construction	0.03
23-6-28.F	Road Construction	0.05
23-6-28.G	Road Construction	0.31
23-6-28.H	Road Construction	0.04
23-6-23.H	Road Construction	0.10
23-6-25.0	Road Renovation	0.04
23-6-25.0	Road Renovation	0.18
23-6-25.0	Road Renovation	0.09
23-6-24.A	Road Renovation	0.51
23-6-23.K	Road Construction	0.11
23-6-23.B	Road Construction	0.45
23-6-26.F	Road Renovation	0.26
23-6-26.F	Road Renovation	0.06
23-6-12.0	Road Renovation	0.06
23-6-12.0	Road Renovation	0.00
23-6-15.6	Road Renovation	0.02
23-6-15.5	Road Renovation	0.00
23-6-12.0	Road Renovation	0.01
23-6-27.C	Road Construction	0.27
23-6-27.B	Road Construction	0.16
23-6-23.G	Road Construction	0.09
23-6-23.F	Road Construction	0.23
23-6-27.A	Road Construction	0.03
23-6-27.D	Road Construction	0.05
23-6-27.E	Road Construction	0.07
23-6-28.A	Road Construction	0.07
23-6-28.B	Road Construction	0.06
23-6-28.C	Road Construction	0.16
23-6-21.A	Road Construction	0.04

EA Road Number	Road Activity	Length (Miles)
23-6-21.B	Road Construction	0.06
23-6-29.H	Road Construction	0.05
23-6-29.G	Road Construction	0.29
23-6-29.N	Road Construction	0.17
23-6-29.M	Road Construction	0.18
23-6-29.L	Road Construction	0.20
23-6-29.I	Road Construction	0.23
23-6-23.A	Road Construction	0.06
23-6-27.F	Road Construction	0.18
23-6-27.G	Road Construction	0.05
23-6-28.D	Road Construction	0.37
23-6-33.B	Road Construction	0.52
23-6-33.A	Road Construction	0.07
23-6-27.J	Road Construction	0.05
23-6-23.C	Road Construction	0.34
23-6-12.0	Road Renovation	0.02
24-6-27.P	Road Construction	0.80
24-6-33.0	Road Renovation	0.22
24-6-4.J	Road Construction	0.40
24-7-3.0	Road Renovation	0.12
24-7-3.0	Road Renovation	0.06
24-7-3.0	Road Renovation	0.07
24-7-3.0	Road Renovation	0.23
24-7-3.0	Road Renovation	0.22
24-7-3.0	Road Renovation	0.67
24-7-3.0	Road Renovation	0.36
24-7-3.0	Road Renovation	0.12
24-7-3.0	Road Renovation	0.21
24-7-3.0	Road Renovation	0.13
23-6-6.2	Road Renovation	0.42
23-6-18.1	Road Renovation	0.15
23-6-6.2	Road Renovation	0.18
23-6-6.2	Road Renovation	0.21
23-6-18.1	Road Renovation	0.22
23-6-6.2	Road Renovation	0.05
23-6-6.2	Road Renovation	0.01
23-6-6.2	Road Renovation	0.02
23-6-6.2	Road Renovation	0.07
23-6-6.2	Road Renovation	0.51
23-6-6.2	Road Renovation	0.09
23-6-6.2	Road Renovation	0.16
24-7-3.0	Road Renovation	0.01
23-6-18.3	Road Renovation	0.13
23-6-18.3	Road Renovation	0.03
23-5-17.0	Road Renovation	0.08
24-6-3.0	Road Construction	0.04
23-6-34.0	Road Construction	0.06
23-6-35.4	Road Construction	0.09
23-6-25.1	Road Construction	0.05

Appendix F. Wildlife Species Not Analyzed in Detail

Table F-1 presents animal species which are documented or suspected to occur within the Roseburg District BLM. The species listed are selected from several lists including:

The Bureau of Land Management Special Status Species List (BLM, 2019) which includes Federally Threatened and Bureau Sensitive Species. To comply with Bureau policy (BLM, 2008a), Districts may assess and review the effects of proposed actions on Bureau Sensitive species by using one or more of the following techniques (BLM, 2003):

  - Evaluation of species-habitat associations and presence of potential habitat.
  - Application of conservation strategies, plans, and other formalized conservation mechanisms.
  - Review of existing survey records, inventories, and spatial data.
  - Utilization of professional research and literature and other technology transfer methods.
  - Use of expertise, both internal and external, that is based on documented, substantiated professional rationale.
  - Complete pre-project survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

- Game Birds Below Desired Condition (GBBDC) (FWS, 2013b) are species for which there is evidence of declining population trends.
- Game Species- Secretarial Order (S.O.) 3362 Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors (BLM, 2018b), emphasizes the importance of conserving and improving deer habitat.
- The Migratory Bird Program’s Focal Species-These species or populations are covered under the Migratory Bird Treaty Act, are a subset of the Birds of Management Concern, and are those the program believes need additional investment of resources to address pertinent conservation or management issues.

Table F-1. Terrestrial species considered but excluded from detailed analysis

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
Bureau Sensitive	A Water Flea *(Dumontia oregonensis)*	*Dumontia oregonensis* is closely associated with seasonal wetland ecosystems and has been found in vernal ponds in desert and wet prairie habitat types as well as in temporary ephemeral vernal pools, native wet prairies, seasonally wet meadows (Hietala-Henschell et al. 2018). Species is associated with vegetation cover greater than 60 percent (Hietala-Henschell et al. 2018).	Any pond or seasonally inundated area would be protected as per direction in the ROD/RMP 2016 (p. 70). Impacts the species are not expected because of the above-mentioned requirement and lack of water features within the unit boundaries.
Game Bird Below Desired Condition	Band-tailed Pigeon (*Patagioenas fasciata*)	In Oregon, nest primarily in closed Douglas-fir stands with canopy cover above 70 percent (Leonard 1998). Presence is linked to mineral springs (Altman 1999, Sanders and Jarvis 2000). Used mineral sites are rare in western Oregon and are seemingly essential resources for this species (Sanders and Jarvis 2000). Sanders and Jarvis (2003) indicate availability of food sources may be directly related to the declining band-tailed pigeon population in Oregon. Potential Nesting Habitat: 28,098 acres of 40 years or older forest stands on BLM administered land within Analysis Areas.	Known to occur within the Analysis Areas. Based on Altman (1999) and Sanders and Jarvis (2000), mineral springs are considered the limiting factor in band-tailed pigeon use in the Analysis Area. No mineral springs noted in proposed action areas during field review; therefore, no effects to mineral springs would occur. Based on Sanders and Jarvis (2003), foraging habitat may be a limiting factor, so thinning would improve foraging conditions. Regeneration harvest (RH) would reduce available suitable nesting habitat in concentrated harvest areas until canopy cover is restored to 70 percent (approximately 60 years), but untreated riparian reserves and aggregate retention areas would continue to provide suitable nesting habitat. Thinning would reduce canopy cover, which would reduce habitat quality. Within thinned units, skips would continue to provide suitable nesting habitat for band-tailed pigeons. Proposed actions may impact individuals or their habitat, however the effects would not likely result in the decline in population due to the suitable nesting habitat remaining in the Analysis Areas.
Bureau Sensitive	Black Swift *(Cypseloides niger)*	Black swifts feed on the wing on insects above forested and open areas. They breed on steep cliffs, behind waterfalls, and on the coast on rocky shorelines (Marshall et al. 2003 p. 334-336)	Effects to this species are not expected because suitable breeding habitat is not present within the harvest units.

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
Bureau Sensitive	Bufflehead *(Bucephala albeola)*	This diving duck typically nests at high elevation forested lakes where it uses cavities (Marshall et al. 2003 p. 124-126).	Effects to this species are not expected because suitable breeding habitat is not present within the harvest units.
Federally Threatened	Coastal Marten (*Martes caurina*)	The marten is associated strongly with mature conifer forests characterized by closed canopies, large trees, and abundant snags and down woody material (Zielinski et al. 2001 p. 478) with a dense shrub component (Zielinski et al. 2001 p. 485).	Listed as threatened species under the Endangered Species Act of 1973 was published on October 8, 2020, and the rule was effective as of November 9, 2020. (85 FR 63806). The current, extant range of the Coastal Marten is approximately 39 miles west of the project area and is not within Roseburg District BLM-administered lands and its administrative boundary.
Game Species	Columbian Black-tailed Deer *(Odocoileus hemionus columbianus)*	Fawn on gentle slopes with low trees and shrubs within several hundred feet of water. In summer they spend considerable time near water where green forage is available (Watson and Schirato 1998). Forage on a variety of shrubs and trees, lichens and mushrooms (Watson and Schirato 1998). High-quality deer range includes transitory open stands are used for foraging (Hayden et al. 2008).	Known to occur within the Analysis Areas. Proposed actions would create foraging habitat by allowing for increase in herbaceous vegetation (i.e., forbs, grasses, shrubs etc.).
Bureau Sensitive	Columbian White-tailed Deer *(Odocoileus virginianus leucurus)*	Oak woodland habitats near and north of Roseburg, OR (USDI/FWS 1983).	The Analysis Areas are outside of the currently accepted distribution range of the species.
Bureau Sensitive	Crater Lake Tightcoil Snail *(Pristiloma crateris)*	Above 2000 feet in elevation throughout the Oregon Cascades and associated with perennially wet situations in mature conifer forests, among rushes, mosses within 10 meters of open water in wetlands, springs, and riparian areas (Duncan et al. 2003, Duncan 2004B).	There are no known sites within the Analysis Areas (BLM GeoBoB Data 2020). Proposed actions would not remove suitable habitat or unique habitat features (i.e., seeps, wetlands etc.) but may cause ground disturbance and compaction to occur. Microclimate conditions may be affected resulting from an increase in solar radiation, air and soil temperatures. Suitable habitat would remain available in the untreated riparian reserves.
Federally Endangered	Fender's Blue Butterfly *(Plebejus icaroides fender)*	Fender's blue butterfly is found exclusively in prairie habitats containing its larval food plants, primarily Kincaid's lupine, but also spur lupine, and occasionally sickle-keeled lupine (USDI/FWS 2010). These butterflies have limited dispersal ability and remain close to their natal lupine patches when foraging. More than 95 percent of Fender's blue butterflies are found within 33	None of the proposed actions are within any known lupine patches. The action would have no effects on the Fender's blue butterfly and would be within the analysis of the PRMP which stated that implementation of the PRMP would not have any measurable effects on populations or habitats of the…Fender's blue butterfly (PRMP/FEIS p.655).

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
		feet of lupine patches (Schultz 1998 p. 289, USDI/FWS 2010).	
Bureau Sensitive and under USFWS Species Status Assessmen	Fisher *(Pekania pennanti)*	Large contiguous blocks of mature coniferous forest with structural complexity (Verts and Carraway 1998). The Roseburg District is within the historic range of the fisher. Potential Habitat: 17,899 acres of 80 years or older forest stands on BLM administered land within Analysis Areas.	On June 15,2020 the USFWS determined that the West Coast Distinct Population Segment (DPS) would be separated into two DPS, the Northern California/ Southern Oregon (NCSO) DPS and the Southern Sierra Nevada (SSN) DPS. They found the NCSO DPS to not warrant listing under the Endangered Species Act. A reproducing population on the Roseburg District has not been documented, however vagrant individuals may use available suitable habitat. Regeneration harvest (RH) would remove suitable habitat and thinning treatments would modify suitable habitat by reducing canopy cover below 70 percent. Although modification and removal of suitable habitat through proposed actions may impact individuals or their habitats, the effects would not result in disruption of fisher behaviors associated with known natal or maternity sites. Currently there are no known fisher denning sites in the Roseburg district. Under Species Status Assessment by USFWS as of September 26, 2023 (FR 88:65939).
Bureau Sensitive	Foothill Yellow-legged Frog *(Rana boylii)*	Low-gradient streams with bedrock or gravel substrate (Corkran and Thoms 1996).	This species is known to occur within the Analysis Areas. Proposed actions would not modify stream systems, ponds, or wetlands within the Analysis Areas.
Bureau Sensitive	Fringed Myotis Bat *(Myotis thysanodes)*	Hibernacula and roost sites includes caves, mines, buildings and large snags (Weller and Zabel 2001). Potential Habitat: 28,098 acres of 40 years or older forest stands on BLM administered land within Analysis Areas.	Within the Analysis Areas, large snags and rock crevasse would be candidates for dispersed and aggregate retention areas within harvest units. Snags in the riparian reserves would be left except were safety dictates removal. Snag requirement specified in the 2016 RMP would be met (ROD/RMP pgs. 60-61). The increase of herbaceous growth following proposed actions would improve foraging habitat by providing rich food sources for insects preyed on by bats (Taylor 2006 p.07). Proposed actions may impact individuals or their habitat, the effects to the total population within the Analysis Areas are unknown.

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
Bureau Sensitive	Grasshopper Sparrow *(Ammodramus savannarum)*	Species occurs in grasslands and grainfields in dry habitats (Marshall et al. 2003).	The proposed actions would not affect the habitat or the species.
Federally Endangered	Gray Wolf *(Canis Lupus)*	Large carnivore listed as endangered in 1978. The species lives in packs and den sites often have forest cover nearby and are distant from human activity (ARBO II 2013, p. 415). Documented on the Roseburg District.	Proposed projects would not affect the gray wolf due to implementation of project design features outlined in the (BLM 2026a, p. 97) to restrict any activities that create noise or visual disturbance(s) above ambient conditions within one mile of known active gray wolf dens from April 1 to July 15. To date there is no evidence of wolf activity or a known wolf den within a mile of the proposed actions.
Bureau Sensitive	Green Sideband Snail *(Monadenia fidelis flava)*	Wet forest habitats or near springs or other water sources in forest situations, generally with rock substrates or large woody debris and logs for refugia (Frest and Johannes 2000). Many species are known to be arboreal, climbing trees to forage on lichens and using moss accumulations in the canopy as refugia sites (Stone 2009).	There are no known sites within the Analysis Areas (BLM GeoBoB Data 2020).
Bureau Sensitive	Harlequin Duck *(Histrionicus histrionicus)*	Found in large fast flowing streams. Nesting has not been documented in the Umpqua River Basin (Dowlan 2003, p. 116). In the western Cascades, breeding pairs are observed on low to moderate gradient (1-7%) third to fifth-order streams in the western hemlock zone (Dowlan 2003, p. 116).	Proposed actions would not modify large fast-flowing streams at occupied sites.
Landbird Strategy	Hermit Warbler *(Dendroica occidentalis)*	Douglas-fir dominated stands greater than 30 years old, where dense canopy provides foraging and nesting habitat (reviewed by Altman 1999). Species utilizes stands with >90 percent canopy cover and average tree size of > 30cm) (Altman and Alexander 2012). Potential Habitat: 28,098 acres of 40 years or older stands on BLM administered land within Analysis Areas.	Known to occur within the Analysis Areas. Hagar et al. (1996, 2004) found their response to thinning treatments to be neutral, reporting densities of hermit warblers declined in the initial years after thinning but increased to pre-treatment levels seven to eight years after treatment; similar results would be expected in the Analysis Areas. Although individuals and their habitat maybe impacted, the effects of proposed actions would not likely result in the decline in population because the regeneration harvest (RH) units, aggregates, skips and untreated riparian reserves would continue to provide habitat depending on size and canopy cover. The effects of RH on the hermit warbler would not be

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
			discernable because of the abundance of nesting habitat within the Analysis Areas.
Bureau Sensitive	Lewis' Woodpecker *(Melanerpes lewis)*	Open woodland with ground cover and snags. Lewi's woodpecker is referred to as a "specialist" in burned pine forests, and benefit from greater than 50 percent snag retention of snags greater than 23cm DBH (diameter at breast height) in post-wildfire areas (Tobalske 2013).	The closest known sites to the Analysis Areas 5 miles Southeast within the Swiftwater Field Office on the Roseburg District (BLM GeoBoB Data 2020). The Analysis Areas are outside the breeding and wintering range and associated habitats for the species.
Game Bird Below Desired Condition	Mourning Dove *(Zenaida macroura)*	Forests, woodland edges, savannas, grasslands, deserts, suburban and urban areas, and agricultural lands. Frequently seen on the Roseburg District along roadsides and forest openings. Nesting may occur on the ground, on ledges, in bushes and in trees (Otis et al. 2008), in edge-habitats between woodlands/shrubs and open areas (Csuti et al. 1997). Generally, avoid extensive forests and wetlands.	Known to occur within the Analysis Areas. Proposed actions would create nesting and foraging habitat by increasing edge habitat, herbaceous stand components and ground cover.
Protected Landbird	Northern Goshawk *(Accipiter gentilis gentilis)*	Mature and older mixed conifer forests with high canopies for nesting (Squires, John R. and Richard T. Reynolds. 1997). Modeled Potential Habitat: 17,899 acres of 80 years or older forest stands on BLM land within the Analysis Areas.	Known to occur within Analysis Area. Regeneration and harvest (RH) would reduce available nesting habitat in concentrated harvest areas, but aggregates and untreated riparian reserves would continue to provide potential suitable nesting and foraging habitat. Thinning would reduce canopy cover, which would reduce nesting habitat quality. Northern goshawks often forage in natural openings and open stands conditions, so the use of thinned stands would continue. Proposed actions may impact individuals or their habitat, however the effects of harvest activities would not likely result in the decline in population because of the available nesting habitat within the Analysis Areas.
Bureau Sensitive	Oregon Red Tree Vole *(Arborimus longicaudus)*	Red tree voles are widely distributed throughout much of their range in Oregon, except in the northern Oregon Coast Range – particularly within the North Coast Distinct Population Segment (DPS) area north of Highway 20. In the northern portion of the North Coast Distinct Population Segment area, red tree voles are uncommon and sparsely distributed as compared to the rest of their range (USDI/BLM 2016 p. V 2, p.919).	On December 19, 2019 the USFWS determined that the North Coast Distinct Population Segment (DPS) was not warranted for listing. Most of the Roseburg District including the Blue and Gold Analysis Areas are outside the DPS area of concern.

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
Bureau Sensitive	Oregon Shoulderband *(Helminthoglypta hertleini)*	The species is associated with rocks and woody debris in moist, rocky areas within forest habitats, often adjacent to areas with substantial grass or seasonal herbaceous vegetation (Duncan, 2004a edited by Foltz Jordan and Hoffman Black 2015).	Known to occur within Analysis Area. (BLM GeoBob Data 2018) Proposed actions would not remove suitable habitat or unique habitat features (i.e. rock outcrops and talus deposits), but may cause ground disturbance and compaction to occur. Microclimate conditions may be affected resulting from an increase in solar radiation, air and soil temperatures. Within regeneration harvest (RH) units, suitable habitat in aggregate retention areas and untreated riparian reserves would remain available, lowering the harvest related loss of organisms and may improve biodiversity by (1) 'life boating' species over the regeneration phase, (2) providing micro habitats both for old-forest species in re-established forest stands and for disturbance-phase species on the recent cuts, and (3) enhancing species' retained forested refuges to logged areas (depends heavily on density, spatial arrangement and species of retained trees) (Jordan and Black 2012 p.17).
Bureau Sensitive	Oregon Vesper Sparrow *(Pooecetes gramineus affinis)*	Species is known to occupy grasslands and agricultural lands and historically associated with native upland prairies and savannas (Vesely and Rosenberg 2010 p. 95)	There are no known document observations within the Analysis Areas (BLM GeoBoB Data 2020). No suitable grassland habitat is present within harvest units.
Bureau Sensitive	Pallid Bat *(Antrozous pallidus)*	Hibernacula and roost sites in caves, mines, rock crevices, bridges, hollow trees and snags (Lewis 1994). Potential Habitat: 28,098 acres of 40 years or older forest stands on BLM administered land within Analysis Areas.	Within the Analysis Areas, large snags would be candidates for dispersed and aggregate retention areas within harvest units. Snags in the riparian reserves would be left except were safety dictates removal. Snag requirements specified in the 2016 RMP would be met (USDI BLM 2016 pgs. 63-73). The increase of herbaceous grow following timber harvest would improve foraging habitat by providing rich food sources for insects preyed on by bats (Taylor 2006 p. 07). The proposed actions may impact individuals or their habitat but the effects to the total range-wide population, but the PRMP/FEIS modelled that habitat for this species would increase by 142 percent by 2063.

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
Land bird Strategy	Pacific Wren *(Troglodytes pacificus)*	Require complex vegetative structure on the forest floor. In Oregon, Pacific wrens are more abundant along streams (McGarigal and McComb 1992). Nests are in concealed cavities in root wads, stumps and downed logs, forages for insects on the ground and in low understory vegetation. Modeled Potential Habitat: 18,695 acres of 40 years or older stands on BLM administered land within Analysis Areas.	Species is known to occur within the Analysis Areas. Foraging habitat would increase as a result of proposed actions. Thinning would modify but maintain nesting habitat. Hagar et al. (2004) found Pacific wren was more abundant in thinned stands in the Oregon Coast Range during the breeding and winter season because the abundance of hardwoods was greater in thinned stands. Hayes et al. (2003) showed Pacific wren numbers did not change in response to thinning. Altman (1999) recommends thinning to enhance growth of understory vegetation that benefits this species. Although thinning would disrupt Pacific wrens during harvest, this wren would likely continue to use thinned habitats. Regeneration harvest (RH) would remove potential nesting habitat, however aggregates and untreated riparian reserves would be utilized for nesting and foraging within the RH units. Although RH may impact individuals or their habitat, the effects on pacific wren would be undiscernible because of the abundance of suitable nesting habitat available within the Analysis Area.
Bird of Conservation Concern	Purple Finch *(Haemorhous purpureus)*	Open areas or edges of low to mid-elevation mixed coniferous/hardwood forests (Csuti et al. 1997). Primarily nest in Douglas-fir, pine or spruce but may use oak, maple, and fruit trees. Potential Habitat: 28,098 acres of 40 years or older stands on BLM administered land within Analysis Areas.	Species is known to occur within the Analysis Areas. Purple finch would use the thinned areas (Hagar 1996). Hagar et al. (2004) noted a neutral response to thinning and that the species would generally benefit from more open tree canopy and associated increase in shrub growth. Regeneration harvest (RH) would remove suitable habitat. Based on Hagar et al. (2004) findings, the purple finch would be expected to continue to use aggregate areas, untreated riparian reserves, and retention trees in RH units. Although RH may impact individuals or their habitat, the effects on purple finch would be undiscernible because of the abundance of suitable nesting habitat available within the Analysis Area.
Bureau Sensitive	Purple Martin *(Progne subis)*	Snags, woodpecker cavities; typically found in open areas near water (Marshall et al. 2003).	Known to occur within the Analysis Areas. Regeneration harvest (RH) may shift prey species from those associated with forest stands to species associated with open areas and early successional plant communities. RH treatments

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
			would create large openings that may be used by purple martins. Within the Analysis Areas, large snags would be candidates for dispersed and aggregate retention areas within harvest units. Snags outside of harvest units but within proposed action areas (daylighting) would be retained at the greatest extent practicable. Snags in the riparian reserves would be left except were safety dictates removal. Snag requirements specified in the 2016 RMP would be met (ROD/RMP pgs. 59-62)). The effects of proposed actions may impact individuals or their habitat but would not likely result in the decline in population and there would be no discernible effects to the species because of the abundance of available potential suitable habitat within the Analysis Areas.
Game Species	Roosevelt Elk *(Cervus elaphus roosevelti)*	Inhabit large blocks of forests containing a considerable amount of diverse ages, size, and understory (Starkey et. al. 1982). Forage on grasses, forbs, and deciduous shrubs (Starkey et. al. 1982).	Known to occur within the Analysis Areas. Proposed actions would create foraging habitat by allowing for increases in herbaceous components (i.e., grasses, forbs and shrubs).
Bureau Sensitive	Highcap Lanx Snail *(Lanx subrotunda)*	The Highcap lanx is confined to the main stem of the Rogue and Umpqua Rivers in southwestern Oregon (Blevins 2015).	Known to occur within the Analysis Areas. There are no expected effects to the species because the proposed actions would not modify river or stream habitat.
Bird of Conservation Concern	Rufous Hummingbird *(Selasphorus rufus)*	Nests in shrubs and small trees and is highly dependent on nectar producing flowering plants.	Known to occur within the Analysis Areas. Proposed actions would increase nesting and foraging habitat by creating open areas allowing for the growth of shrubs and small trees used for nesting and flowering plants, which would increase availability of nectar. Although nesting habitat would also be lost as the result of treatments, the species is expected to persist in the treated areas and the Analysis Areas.
Bureau Sensitive	Siskiyou Hesperian Snail *(Vespericola sierranus)*	Generally found in perennially moist habitat, including spring seeps and deep leaf litter along stream banks and under debris and rocks (Hatfield and Foltz Jordan 2015, Edited by Jepsen 2015).	Proposed actions would not remove suitable habitat or unique habitat features (i.e. seeps, wetlands etc.) which would be candidates for aggregate retention areas and skips but may cause ground disturbance and compaction to occur; microclimate conditions may be affected resulting from an increase in solar radiation, air and soil temperatures. Proposed actions may impact individuals or their habitat, the effects of timber harvest would not likely result in a discernable decline

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
			in population because of the availability of abundant habitat within the Analysis Areas.
Bureau Sensitive	Siskiyou Short-horned Grasshopper *(Chloealtis aspasma)*	Species is found in forest meadows and balds and appears to be associated with drier upslope habitat along margins of wetlands and forest edges. Females lay eggs in the pith of blue elderberry (Sambucus caerulea) or other pithy plants (Hietala-Henschell 2017)	The species is suspected on the Roseburg BLM District. Proposed actions would affect meadows due to disturbance from logging corridors. Impacts to the species are unknown because there is no available data on the distribution of the species on the Roseburg BLM District.
Bureau Sensitive	Townsend's Big-eared Bat *(Corynorhinus townsendii)*	This bat is primarily a cavity-dwelling bat, with most known roost sites being located in caves or mines, but in a California Coast study, all known maternity sites were located in buildings or a bridge (Fellers and Pierson 2002). A nursery colony was found using the basal hollows of large redwood trees in northern California and in Muir Woods Nation Monument near San Francisco (Woodruff and Ferguson2005). The bats in Fellers and Pierson (2002) study used tree roosts, which were associated with large diameter (45-76 inches DBH) fire-scarred redwood trees. Snags of this size would most commonly be found in old growth habitats in the Analysis Area. Fellers and Pierson (2002) reported this bat foraged along the edge of the forest, often along riparian corridors favoring habitats along streams. In the California study, the bats spent the majority of their time near riparian vegetation. Potential Habitat: 28,098 acres of 40 years or older forest stands on BLM administered land within Analysis Areas.	Within the Analysis Areas, large snags would be candidates for dispersed and aggregate retention areas within harvest units. Snags outside of harvest units but within proposed action areas (daylighting) would be retained at the greatest extent practicable. Snags in the riparian reserves would be left except were safety dictates removal. Snag requirements specified in the 2016 RMP would be met (ROD/RMP pgs. 59-62). The increase of herbaceous growth following timber harvest would improve foraging habitat by providing rich food sources for insects preyed on by bats (Taylor 2006 p.7). Although the proposed actions may impact individuals or their habitat, the effects to the total population within the analysis area is unknown but considered low because of the propensity of the species to use caves or mines. Field review did not locate any caves or mines within the proposed action areas.
Bureau Sensitive	Western Bumble Bee *(Bombus occidentalis)*	Western bumble bees forage on flowering shrubs and forbs usually found in open spaces including lupines and California poppy (Evans et al. 2008)	Beneficial effects based on forage created by regeneration harvest (RH) and thinning treatments. Newly created open areas would allow for pollen producing forage growth, providing a food source. Proposed actions would also create foraging habitat by allowing pollen producing forage to grow within the newly opened areas, providing more food sources for the species.

STATUS	COMMON NAME (SCIENTIFIC NAME)	KEY HABITAT FEATURES	RATIONALE FOR EXCLUSION FROM DETAILED ANALYSIS
Bureau Sensitive	Northwestern Pond Turtle *(Actinemys marmorata)*	Marshes, ponds, lakes, streams, and rivers with emergent structure (Csuti et al. 1997). Nesting habitat is in areas of high solar exposure and sparse vegetation consisting of grass, forbs, compact soil composed of clay, silt or sandy loam and sometimes a mix of soil and gravel/cobble (Rosenberg et. al. 2009).	Known to occur within the Analysis Area within Yellow Creek and the Umpqua River. Proposed actions would not modify suitable marshes, pond, lakes, streams, or riverine habitat within the Analysis Area. Specific locations of turtle nesting, overwintering, or aestivating habitat is not known. Project design features in Section L would minimize potential impacts on the Northwestern pond turtle.
Bureau Sensitive	Western Ridged Mussel *(Gonidea angulata)*	Low to mid-elevation streams with cobble, gravel, or mud substrates (Nedeau et al. 2009).	Proposed actions would not modify stream habitat within the Analysis Area
Bureau Sensitive	White-headed Woodpecker *(Picoides albolarvatus)*	Occurs mainly in open ponderosa pine or mixed conifer forest dominated by ponderosa pine where they usually excavate cavities in snags, stumps, leaning logs, or dead tops of live trees (Marshall et al. 2003)	Proposed actions are unlikely to impact individuals or the population because the proposed action is not dominated by ponderosa pine and the species has not been documented in the Analysis Areas. Snag retention in proposed action areas in harvest land base (ROD/RMP pgs. 59-62) would contribute to presence of cavities for the species.
Land bird Strategy	Wilson's Warbler *(Wilsonia pusilla)*	Nest in low deciduous vegetation in mature conifer forests, and forages in stands with a diverse deciduous shrub and/or mid-canopy layer.	Known to occur within the Analysis Area. Proposed actions would allow for the development of early successional plant communities and an increase in herbaceous components, creating future nesting and foraging habitat.
Game Bird Below Desired Condition	Wood Duck (*Aix sponsa)*	Nest in tree cavities (Lewis and Kraege 1999) in the vicinity of wooded swamps, flooded forest, marsh, or ponds (Ehrlich et. al.1988). At least 10 acres of wetland or other aquatic habitat in a contiguous unit or in isolated parcels separated by no more than 100 feet of upland is needed in close proximity to nesting habitat is needed. Open water makes up 25 percent of brood-rearing area with the remainder a mixture of shrubs and herbaceous emergent plants and trees (Hepp and Bellrose 2013).	Some units with small (less than one acre) ponds did not have sign of use by wood ducks. Direct effects to the wood duck are not expected.

Appendix G. Effects to Occupied and Unoccupied NSO Sites

Table G-1, Table G-2, and Table G-3, display the effects from proposed actions, including harvest units, road construction, road renovation and construction of yarding wedges to **occupied** and unoccupied northern spotted owl sites by alternative. MSNOs in **red bold** font show that pot-action the NRF habitat acres drop below the viability threshold.

Table G-1. Home range acres of NRF habitat within occupied* and unoccupied northern spotted owl sites by alternative.

MSNO	EXISTING **HOME RANGE** NRF ACRES	HOME RANGE NRF VIABILITY THRESHOLD ACRES (COAST RANGE PROVINCE)	ALTERNATIVE 2 POST ACTION HOME RANGE NRF ACRES	ALTERNATIVE 3 POST ACTION HOME RANGE NRF ACRES	ALTERNATIVE 4 POST ACTION HOME RANGE NRF ACRES	ALTERNATIVE 5 POST ACTION HOME RANGE NRF ACRES	ALTERNATIVE 6 POST ACTION HOME RANGE NRF ACRES
266	1722	1809	1722.00	1722.00	1722.00	1722.00	1722.00
267	1424	1809	1424.00	1424.00	1424.00	1424.00	1424.00
269	972	1809	972.00	972.00	972.00	972.00	972.00
271	1159	1809	1158.55	1158.49	1158.49	1158.49	1158.55
272	1097	1809	1095.00	1094.89	1094.89	1094.89	1094.94
391	1264	1809	1174.95	1099.08	1122.66	1244.08	1233.64
392*	**926**	**1809**	**926.00**	**926.00**	**926.00**	**926.00**	**926.00**
514	808	1809	808.00	805.66	808.00	805.66	805.95
1359	614	1809	614.00	614.00	614.00	614.00	614.00
1160	968	1809	968.00	968.00	968.00	968.00	968.00
1802	751	1809	750.89	749.89	750.89	750.89	750.89
1803	1047	1809	1042.02	1040.25	1041.96	1040.25	1040.61
1804	**2237**	1809	1869.97	1339.29	1601.88	2218.29	2217.95
1816	949	1809	949.00	949.00	949.00	949.00	949.00
1916	311	1809	293.41	287.93	287.93	300.93	300.15
1923	1045	1809	1015.88	1015.65	1017.42	1038.65	1036.81
1924	1686	1809	1554.21	1301.95	1426.74	1677.95	1678.44
1925	694	1809	694.00	694.00	694.00	694.00	694.00
1972	1318	1809	1268.80	1167.50	1171.92	1302.50	1301.69
1977	922	1809	922.00	922.00	922.00	922.00	922.00
1980	819	1809	804.94	799.59	799.59	808.59	808.88
1983	755	1809	753.87	753.87	753.87	753.87	753.87
1987	1581	1809	1269.67	965.60	1261.41	1558.60	1559.35
1988	1809	1809	1809.00	1809.00	1809.00	1809.00	1809.00
1992	**2010**	1809	1432.85	967.04	1416.28	1987.04	1988.41
2201	**1923**	1809	1923.00	1923.00	1923.00	1923.00	1923.00
2049	756	1809	756.00	756.00	756.00	756.00	756.00
2051	1526	1809	1239.29	1109.25	1250.50	1499.25	1499.89
3267*	**811**	**1809**	**808.56**	**808.50**	**808.50**	**808.50**	**808.56**
3904	1010	1809	1009.98	1009.97	1009.97	1009.97	1009.99
4055	1410	1809	1353.76	1291.95	1301.31	1390.95	1391.38
4506	953	1809	876.86	771.70	771.70	944.70	945.07
4516	889	1809	873.77	812.36	822.20	876.36	877.78
4574	413	1809	413.00	413.00	413.00	413.00	413.00
4659	1731	1809	1282.77	902.71	1388.90	1719.71	1720.42
4661	582	1809	566.16	566.11	566.12	579.11	577.52
4673	713	1809	701.25	698.62	705.35	699.62	700.15
4682	582	1809	552.03	454.21	573.24	561.21	573.73

Table G-2. Home range acres of NRF habitat within occupied* and unoccupied northern spotted owl sites by alternative.

MSNO	EXISTING **CORE USE** AREA NRF ACRES	CORE USE AREA NRF VIABILITY THRESHOLD ACRES	ALTERNATIVE 2 POST ACTION CORE USE AREA NRF ACRES	ALTERNATIVE 3 POST ACTION CORE USE AREA NRF ACRES	ALTERNATIVE 4 POST ACTION CORE USE AREA NRF ACRES	ALTERNATIVE 5 POST ACTION CORE USE AREA NRF ACRES	ALTERNATIVE 6 POST ACTION CORE USE AREA NRF ACRES
266	234	250	234	234	234	234	234
267	99	250	99	99	99	99	99
269	266	250	266	266	266	266	266
271	104	250	104	104	104	104	104
272	264	250	262	264	264	264	264
391	221	250	204	198	199	215	221
392	**249**	**250**	**249**	**249**	**249**	**249**	**249**
514	212	250	212	212	212	212	212
1359	95	250	95	95	95	95	95
1160	77	250	77	77	77	77	77
1802	202	250	202	202	202	202	202
1803	170	250	165	166	166	166	166
1804	**328**	250	300	146	146	**327**	**327**
1816	182	250	182	182	182	182	182
1916	115	250	96	99	99	111	110
1923	222	250	206	210	210	220	220
1924	186	250	179	185	185	185	185
1925	23	250	23	23	23	23	23
1972	305	250	296	305	305	305	291
1977	171	250	171	171	171	171	171
1980	229	250	219	229	229	229	229
1983	194	250	193	194	194	194	194
1987	**269**	250	246	111	113	264	264
1988	143	250	143	143	143	143	143
1992	**316**	250	269	74	293	316	316
2201	308	250	308	308	308	308	308
2049	148	250	148	148	148	148	148
2051	220	250	194	220	220	220	220
3267*	**31**	**250**	**29**	**31**	**31**	**31**	**31**
3904	141	250	141	141	141	141	141
4055	139	250	123	139	139	139	139
4506	79	250	65	79	79	79	79
4516	229	250	220	226	228	226	226
4574	41	250	41	41	41	41	41
4659	155	250	141	93	154	154	154
4661	116	250	113	116	116	116	116
4673	93	250	82	93	93	93	93
4682	116	250	106	72	111	111	112

Table G-3. Nest patch acres of NRF habitat within occupied* and unoccupied northern spotted owl sites by alternatives.

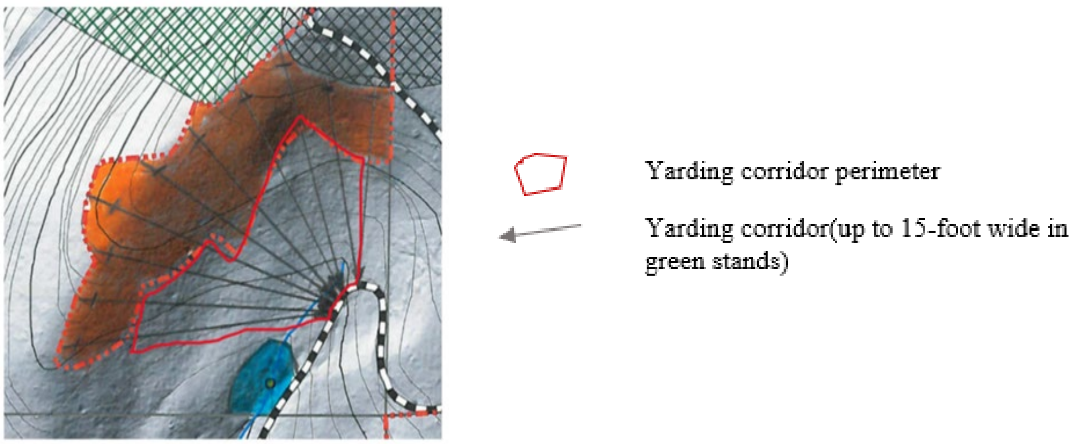
. Nest patch acres of NRF habitat within occupied* and unoccupied northern spotted owl sites by alternatives.

MSNO	EXISTING **NEST PATCH** AREA NRF ACRES	NEST PATCH AREA NRF VIABILITY THRESHOLD ACRES	ALTERNATIVE 2 POST ACTION NEST PATCH AREA NRF ACRES	ALTERNATIVE 3 POST ACTION NEST PATCH AREA NRF ACRES	ALTERNATIVE 4 POST ACTION NEST PATCH AREA NRF ACRES	ALTERNATIVE 5 POST ACTION NEST PATCH AREA NRF ACRES	ALTERNATIVE 6 POST ACTION NEST PATCH AREA NRF ACRES
266	50	70	50	50	50	50	50
267	24	70	24	24	24	24	24
269	45	70	45	45	45	45	45
271	19	70	19	19	19	19	19
272	53	70	53	53	53	53	53
391	39	70	38	29	32	38	39
392*	**64**	**70**	**64**	**64**	**64**	**64**	**64**
514	18	70	18	18	18	18	18
1359	51	70	51	51	51	51	51
1160	19	70	19	19	19	19	19
1802	61	70	61	61	61	61	61
1803	25	70	25	25	25	25	25
1804	51	70	51	34	33	50	50
1816	47	70	47	47	47	47	47
1916	31	70	31	30	30	30	13
1923	42	70	37	37	42	42	37
1924	67	70	67	67	67	67	67
1925	16	70	16	16	16	16	16
1972	69	70	69	69	69	69	69
1977	49	70	49	49	49	49	49
1980	49	70	49	49	49	49	49
1983	52	70	52	52	52	52	52
1987	69	70	47	34	69	69	69
1988	43	70	43	43	43	43	43
1992	64	70	64	33	63	64	64
2201	62	70	62	62	62	62	62
2049	15	70	15	15	15	15	15
2051	53	70	53	53	53	53	53
3267*	**0**	**70**	**0**	**0**	**0**	**0**	**0**
3904	33	70	33	33	33	33	33
4055	5	70	5	5	5	5	5
4506	23	70	15	23	23	23	23
4516	42	70	42	42	42	42	42
4574	35	70	35	35	35	35	35
4659	2	70	2	2	2	2	2
4661	27	70	27	27	27	27	27
4673	25	70	25	25	25	25	25
4682	27	70	27	8	27	27	27

Appendix H. Yarding Corridor Configuration

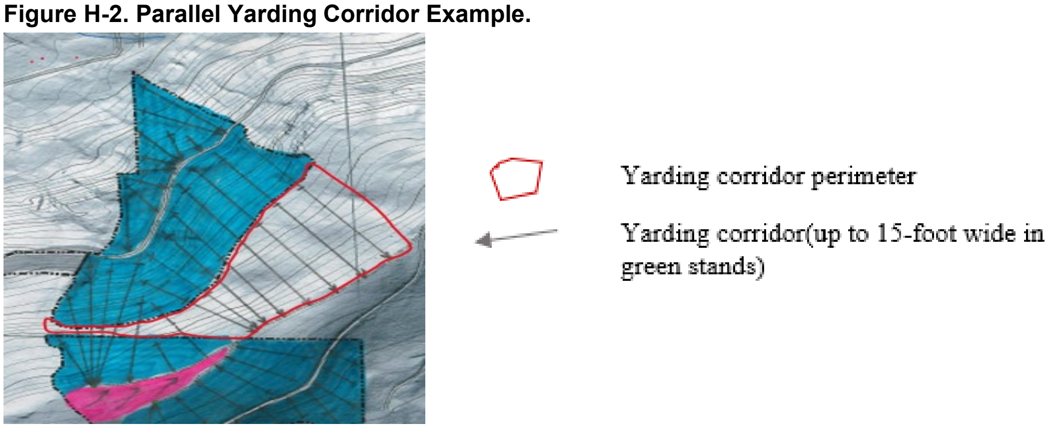
Proposed yarding corridors would be configured as fan/wedge, parallel, or inclusions (Figure H-1, Figure H-2, Figure H-3). FigFigure H-1ure results when a harvest unit is yarded to a fixed location, such as a landing at the end of a road. As the unit harvest progresses, a new corridor is established. Corridor consolidation in the proximity of the landing results in green forest canopy removal ranging from one-tenth acre to two-acre openings. The size of this area would vary, based on the yarding corridor acreage and the tributary unit acreage.

Figure H-1. Fan Yarding Corridor Example



Parallel yarding corridor (Figure H-2) settings result when yarding to a road and equipment moves upon the completion of each yarder setting. Corridors are parallel to each other and are the result of yarding to straight ridgetop roads or other linear features. However, corridor spacing would be narrow due to road curvature. Upon the completion of a corridor setting, the equipment would move, causing the corridors to remain parallel to each other at a relatively consistent distance.

Figure H-2. Parallel Yarding Corridor Example.



Inclusions (Figure H-3) are simply non-HLB portions within the unit that must be traversed by cable or ground-based harvest systems. These are existing large landings or rock stockpiles along road systems that lack forest canopy.

Figure H-3. Inclusion Yarding Corridor Example and Aerial Photo Overlay.

Appendix I. Current Forest Stand Attributes

Table I-1. Current Forest Stand Attributes for all trees greater than 4.5 feet in height by EA Harvest Unit.

EA Harvest Unit	10 Year Age Class	Stand Structural Class[15]	Trees per Acre	Basal Area per Acre	SDI Max percent	Quadratic Mean Diameter (inches)	Board Foot Volume (thousands per acre)	Canopy Cover (percent)
23-5-17A	60	YHD-WOSL	140	239	66	18	56	83
23-5-17B	50	YHD-WOSL	95	163	45	18	40	76
23-5-19B	140	SC-Dev	91	308	71	25	88	85
23-5-19C	40	YHD-WOSL	267	266	78	14	55	94
23-5-19D	50	YHD-WOSL	138	222	62	17	53	83
23-6-17D	50	YHD-WOSL	219	252	74	15	38	87
23-6-17F	60	SE-WSL	150	202	58	16	45	85
23-6-19A	110	YLD-WOSL	134	355	84	22	111	84
23-6-19B	60	YHD-WOSL	180	206	60	15	45	90
23-6-19D	50	YHD-WOSL	174	192	56	14	42	85
23-6-19E	60	YHD-WOSL	84	143	40	18	29	73
23-6-20A	90	M-single	107	177	46	17	45	74
23-6-21A	110	M-Multi	114	420	92	26	161	91
23-6-23A	130	M-Multi	151	364	87	21	119	92
23-6-25E	60	YHD-WOSL	140	213	59	17	50	87
23-6-25F	60	YHD-WOSL	88	168	44	18	42	77
23-6-27A	130	M-Multi	129	358	83	23	111	96
23-6-28A	120	M-Multi	133	363	86	22	119	92
23-6-28B	120	M-Multi	95	347	79	26	133	76
23-6-29A	50	YHD-WOSL	142	157	46	14	30	76
23-6-29B	70	YHD-WOSL	102	357	82	25	121	78
23-6-29C	50	YHD-WOSL	188	228	66	15	47	91
23-6-29D	50	YHD-WOSL	340	311	95	13	60	96
23-6-29E	130	SC-Dev	143	361	87	22	119	92
23-6-29F	40	SE-WOSL	73	152	40	20	34	76
23-6-31A	50/90[16]	YHD-WOSL	106	198	52	19	52	77
23-6-33A	80	YHD-WOSL	89	238	55	22	78	77
23-6-35E	60	YHD-WOSL	172	229	65	16	56	87
23-6-35F	60	YHD-WOSL	180	238	69	16	56	90
23-6-35G	100	YHD-WOSL	130	257	65	19	75	88
24-6-11A	60	YHD-WOSL	122	215	58	18	48	81
24-6-15A	100	YHD-WSL	380	304	91	12	58	98
24-6-15B	140	YLD-WOSL	167	304	79	18	74	92
24-6-17C	60	YHD-WOSL	155	224	62	16	50	92
24-6-17D	60	YHD-WOSL	214	250	73	15	55	89
24-6-17E	60	YHD-WOSL	125	229	61	18	54	85
24-6-27A	50	SE-WSL	178	188	56	14	35	92
24-6-3A	50	YHD-WOSL	182	181	55	14	34	85
24-6-3B	80	M-Multi	170	303	79	18	53	85
24-6-3E	60	YHD-WOSL	185	242	70	16	51	88
24-6-4A	60	YHD-WOSL	154	297	78	19	85	90
24-6-4B	140	M-Multi	90	276	64	24	102	85
24-6-4C	140	M-Multi	56	271	60	30	114	80
24-6-5B	60	YHD-WOSL	146	197	56	16	43	87
24-6-5E	70/90[17]	YHD-WOSL	134	239	63	18	67	88
24-6-7A	60	YHD-WOSL	143	234	63	17	58	88
24-6-7B	90	YHD-WOSL	164	271	71	17	71	92
24-6-7C	90	YHD-WOSL	164	271	71	17	71	92
24-6-9B	60	YHD-WOSL	112	153	43	16	36	80
[1] **Stand Structural Classes defined in FEIS, pp. 1203-1206 (BLM 2016b).**								

[15] YHD-WOSL = Young High Density without Structural Legacies, YHD-WSL = Young High Density with Structural Legacies, SE-WSL = Stand Establishment with Structural Legacies, M-Multi = Mature Multiple Canopy, SC-Dev = Structurally Complex Developed Structurally Complex

[16] Approx. 13 ac in age class 50 and 42 in age class 90.

[17] Approx. 98 ac in age class 70 and 44 ac in age class 90

Appendix J. Special Status Vascular Plants, Bryophytes and Lichens currently known or suspected to be within the Roseburg District

Table J-1. Bureau Sensitive Species Documented or Suspected on the Roseburg District

Status	Present within project area: Yes/No	Taxon	Common name (Scientific name)	General Habitat
OR-SEN	No	Fungi	Helvella crassitunicata	Montane. Occurs with mountain hemlock in drier/ well drained sites- tolerant of mildly disturbed sites from recreation but not larger-scale disturbance from logging/fires/landslides (NatureServe, 2002)
OR-SEN	No	Fungi	Otidea smithii	Soil, duff, or moss under Populus trichocarpa, Pseudotsuga menziesii, and Tsuga heterophylla. Coastal forests/mixed woodlands (NatureServe, 2019)
OR-SEN	No	Fungi	Phaeoclavulina abietina	Drier rain shadow sites. Doug-Fir zone. Grows under conifers (ORBIC, 2017)
OR-SEN	No	Fungi	Phaeocollybia gregaria	Late successional/old growth forests. Ectomycorrhizal with conifers. Coastal forests with Tsuga heterophylla, Picea sitchensis, Pseudotsuga menziesii, and Abies amabilis (Loring, 2020)
OR-SEN	No	Fungi	Phaeocollybia oregonensis	High elevation conifer forests with T. heterophylla (ORBIC, 2017)
OR-SEN	No	Fungi	Ramaria rubella var. blanda	Decomposing wood - often conifers (Castellano et al., 1999)
OR-SEN	No	Fungi	Rhizopogon chamaleontinus	Dependent mycorrhizal relationship with P. menziesii and P. lambertiana. 1000-1100 meter elevation (NatureServe, 2023)
OR-SEN	No	Fungi	Rhizopogon clavitisporus	Mycorrhizal with conifers (Trappe et al. 2009).
OR-SEN	Yes	Fungi	Rhizopogon ellipsosporus	Mycorrhizal with the pinaceae family. P. menziesii, P. lambertiana and P. ponderosa (Castellano et al., 1999)
OR-SEN	No	Fungi	Rhizopogon exiguus	Associated with roots of P. menziessi and T. heterophylla. (Castellano et al., 1999)
OR-SEN	No	Fungi	Sarcodon fuscoindicus	Old growth conifers. On moss near western hemlock. Mycorrhizal association quickly dies if host tree dies. (NatureServe, 2019)
OR-SEN	No	Lichen	Calicium adspersum	The bark of conifers 200 years or older (NatureServe, 2002)
OR-SEN	No	Lichen	Lobaria linita	var. tenuior grows on conifer trunks in old conifer forests of the western cascades. Var.linita grows on mossy rocks, alpine sod in arctic and subalpine areas (Exeter et al., 2016)
OR-SEN	No	Lichen	Pilophorus nigricaulis	Basalt rock over bedrock, may be forested or not forested. Generally north-facing cool slopes (Exeter et al., 2016)
OR-SEN	No	Lichen	Stereocaulon spathuliferum	Non-calcareous rock. Cool/moist north facing slopes. Sheltered habitat 3000-5000 ft (Exeter et al., 2016).
OR-SEN	No	Liverwort	Cephaloziella spinigera	Bogs and fens (Wagner, 2008)
OR-SEN	No	Liverwort	Gymnomitrion concinnatum	Scree
OR-SEN	No	Liverwort	Phymatoceros phymatodes	Meadow-like openings in mid-successional forests (NatureServe, n.d).
OR-SEN	No	Liverwort	Porella bolanderi	Forest/woodland Bark of living trees (NatureServe, 1999)
OR-SEN	No	Moss	Bryum calobryoides	Montane to alpine environments. On soil or rock, shade or full sun (Exeter et al., 2015).
OR-SEN	No	Moss	Entosthodon fascicularis	exposed soil, seeps, intermittent streams. Has been found in disturbed areas (Exeter et al., 2015).
OR-SEN	No	Moss	Racomitrium depressum	Mats on rocks in perennial or intermittent streams/seasonally wet areas. Montane/subalpine (Exeter et al., 2015).
OR-SEN	No	Moss	Tetraphis geniculata	Cut/Broken ends of large, rotted logs/stumps. Peaty banks in moist coniferous woodlands. Can occur with T. pellucida (Exeter et al., 2015).
OR-SEN	No	Moss	Tortula mucronifolia	Sheltered ledges/ rock outcrops. Can grow on soil. Calcium or acidic rocks (Exeter et al., 2015).
OR-SEN	No	Moss	Trematodon asanoi	Bare soil by trails, streams and ponds in subalpine. Grows on soils that get water from melting late-season snow

Status	Present within project area: Yes/No	Taxon	Common name (Scientific name)	General Habitat
				beds (Exeter et al., 2015).
OR-SEN	No	Vascular Plant	Bensonia (Bensoniella oregana)	Wet meadows or bogs. Shady fir forests; 1000-1600 meters (Wells and Elvander, 2020)
OR-SEN	No	Vascular Plant	Bristly sedge (Carex comosa)	Marshes, lake shores and wet meadows (NatureServe, 1998).
OR-SEN	No	Vascular Plant	California globe-mallow (Iliamna latibracteata)	Streamside in conifer forests (NatureServe, 2020).
OR-SEN	No	Vascular Plant	California maiden-hair (Adiantum jordanii)	Seasonally moist and shaded rocky stream banks and seepages. Oak woodlands or chaparral up to 1000 meters elevation (NatureServe, 2023).
SEN	No	Vascular Plant	California sword-fern (Polystichum californicum)	Generally dry rocky areas. Woodlands or streambanks, under 1100 meters (Smith, 2012).
OR-SEN	No	Vascular Plant	Clustered lady's-slipper (Cypripedium fasciculatum)	Mixed conifer forest. Pine and black oak forests (NatureServe, 2018)
OR-SEN	No	Vascular Plant	Coffee fern (Pellaea andromedifolia)	Dry, open, rocky soil (Kirkpatrick, 2012.)
OR-SEN	No	Vascular Plant	Columbia water-meal (Wolffia columbiana)	Standing, shallow water in temperate areas below 1100 meters (NatureServe, 2023)
OR-SEN	No	Vascular Plant	Crinite mariposa-lily (Calochortus coxii)	Grasslands, open woodlands or forest margins. Tends to be moist/north facing, near ridges and on serpentine soils (NatureServe, 2012).
OR-SEN	No	Vascular Plant	Dotted smartweed (Persicaria punctata)	Wet areas: Shores, marshes, floodplains. Below 1500m (Hinds et al., 2019)
OR-SEN	No	Vascular Plant	Dotted water-meal (Wolffia borealis)	Floats in standing, shallow water, below 1400 meters (NatureServe, n.d)
OR-SEN	No	Vascular Plant	Drooping bulrush (Scirpus pendulus)	Below 600 meters. Calcareous soils. Marshes, moist meadows. Occasionally in ditches (NatureServe, n.d).
OR-SEN	No	Vascular Plant	Fragrant kalmiopsis (Kalmiopsis fragrans)	Rocky outcrops. Steel talus slopes. Tends to be south facing slopes. Sites can be shaded or open in mixed conifer forests (NatureServe, 2012).
OR-SEN	No	Vascular Plant	Gasquet manzanita (Arctostaphylos hispidula)	Rocky outcrops. Serpentine or sandstone. (NatureServe, 2014)
OR-SEN	No	Vascular Plant	Gold poppy (Eschscholzia caespitosa)	Less than 1800 meters, open chaparral/grassy slopes (Still et al., 2023)
OR-SEN	No	Vascular Plant	Grass-fern (Asplenium septentrionale)	High montane cliffs: 700-2900 meters (NatureServe, 2016)
OR-SEN	No	Vascular Plant	Hitchcock's blue-eyed grass (Sisyrinchium hitchcockii)	Oak savanna, wetland prairies (NatureServe, 2021)
OR-SEN	No	Vascular Plant	Howell's camas (Camassia howellii)	Moist and open grassy meadows, rocky soils in transition zone to Doug-fir/ oak woodlands (Nature Serve, 2014)
OR-SEN	No	Vascular Plant	Humped bladderwort (Utricularia gibba)	Floats in standing, shallow water (NatureServe, 2000)
OR-SEN	No	Vascular Plant	Indian tobacco (Nicotiana quadrivalvis)	Well drained soils in washes and on slopes (NatureServe, 1995)
FT	No	Vascular Plant	Kincaid's lupine (Lupinus oreganus)	Upland prairie, ecotones between grassland and forests. Well drained soil below 900 meters (Oregon Department of Agriculture, n.d)
OR-SEN	No	Vascular Plant	Koehler's rockcress (Arabis koehleri var. koehleri)	Basalt rock cliffs - associated with grassland communities (NatureServe, 1999).
OR-SEN	No	Vascular Plant	Lee's lewisia (Lewisia leeana)	Grows in subalpine habitat on rock (NatureServe, 1991).
OR-SEN	No	Vascular Plant	Milo baker's cryptantha (Cryptantha milo-bakeri)	Serpentine derived soils. Conifer/mixed conifer (NatureServe, 1999)
OR-SEN	No	Vascular Plant	Oregon willow-herb (Epilobium oreganum)	Found in bogs-serpentine systems. 335-800 meters. Can be found in other wet systems with meadow species (NatureServe 2009).
OR-SEN	No	Vascular Plant	Red larkspur (Delphinium nudicaule)	Most, talus slopes (Koontz & Warnock, 2012)
OR-SEN	No	Vascular Plant	Red-rooted yampah (Perideridia erythrorhiza)	Heavy clay soils with poor drainage. Moist prairies. Associated with D. cespitosa and D. californica (NatureServe, 2009).
FE	No	Vascular Plant	Rough popcorn flower (Plagiobothrys hirtus)	Seasonally wet pools. Generally, in clay soils that are deep and poorly drained but dry out in the summer. Needs full sun, 130-170m elevation (Oregon Department of

Status	Present within project area: Yes/No	Taxon	Common name (Scientific name)	General Habitat
				Agriculture, n.d).
OR-SEN	No	Vascular Plant	Shaggy horkelia (Horkelia congesta ssp. congesta)	Wet or dry prairies. Savannahs/grassy balds. Mixed oak woodlands. (NatureServe, 2021).
OR-SEN	No	Vascular Plant	Short stemmed sedge (Carex brevicaulis)	Coastal dunes, under 400 meters (Zika et al, 2015).
OR-SEN	No	Vascular Plant	Slender meadow-foam (Limnanthes alba ssp. gracilis)	Serpentine valley bottom lands in wet and open meadows, intermittent creeks or other wet areas (NatureServe, 2012).
OR-SEN	No	Vascular Plant	Stipuled trefoil (Lotus stipularis)	Open pine forests. 600-1200 meters (NatureServe, n.d)
OR-SEN	No	Vascular Plant	Tall hairy groovebur (Agrimonia gryposepala)	Wide variety of habitats. From open fields to woodlands. Wet streambanks to upland prairies (NatureServe, 2000)
OR-SEN	No	Vascular Plant	Thin-leaved peavine (Lathyrus holochlorus)	Disturbed areas, prairies, roadsides. Grows with low/shrubby vegetation. Prairie-oak edges. (Oregon Flora, 2019)
OR-SEN	No	Vascular Plant	Thompson's mistmaiden (Romanzoffia thompsonii)	Seasonally wet, rocky, open areas (Oregon Flora, 2019.)
OR-SEN	No	Vascular Plant	Three-toothed horkelia (Horkelia tridentata ssp. tridentata)	Volcanic/granitic soils (NatureServe, 2021).
OR-SEN	No	Vascular Plant	Timwort (Cicendia quadrangularis)	Roadsides, meadows, rocky soils in vernal pools (NatureServe, n.d)
OR-SEN	No	Vascular Plant	Umpqua mariposa-lily (Calochortus umpquaensis)	Serpentine derived soils. Closed to open canopies. Often found in ecotones (NatureServe, 2020).
OR-SEN	No	Vascular Plant	Umpqua swertia (Frasera umpquaensis)	Damp, shaded conifer forests. Primarily associated with true firs (Oregon Flora, 2019).
OR-SEN	No	Vascular Plant	Water clubrush (Schoenoplectus subterminalis)	Submerged or emergent. Occasionally terrestrial near water (Smith, 2002)
OR-SEN	No	Vascular Plant	Wayside aster (Eucephalus vialis)	Shallow/Rocky soils in gaps and edges of Doug-fir forests. Often south facing slopes (Oregon Flora, 2019).
SEN	No	Vascular Plant	White fairypoppy (Meconella oregana)	Systems that are open, moist in spring and dry in summer at low elevations (NatureServe, 2020).

"OR-SEN "– Sensitive species in Oregon
"SEN "– Sensitive species in Oregon and Washington
"FT "– Federally threatened
"FE "– Federally endangered

Appendix K. Blue and Gold Timber Harvest Descriptions

The commercial timber harvest actions proposed for the Blue and Gold project include variations of regeneration harvest and commercial thinning.

REGENERATION HARVEST

Regeneration harvesting is the removal of trees intended to promote the survival and growth of regeneration already present or make regeneration possible. *Regeneration* refers to tree seedlings or saplings already existing in a stand, or the process of re-establishing tree seedlings on a tract of forestland where harvest or some natural event has removed a substantial amount of the existing large trees (BLM, 2016b, p. 1077). Common regeneration harvest types in western Oregon include variable-retention regeneration (VRH), clearcut, and selection. These regeneration harvest types produce stands with very different age and structural characteristics [see Figure K-1 and Figure K-2] (BLM, 2016b, p. 1184).

Where regeneration harvest is implemented in the LITA or MITA land use allocations of the Blue and Gold project, a *Variable-retention Regeneration Harvest* aka Variable Retention Harvest (VRH) treatment is utilized [see Figures 16, 17, 18, 19]. This approach to regeneration harvesting is based on the retention of structural elements or biological legacies from the harvested stand for integration into the new stand to achieve various ecological objectives. The resultant stand is generally two-aged or multi-aged [see Figure K-1, Figure K-2, 18, 19, 22, 23, 24]. The major variables in variable-retention harvest systems are the types, densities, and spatial arrangement of the retained structures; (1) aggregated retention is the retention of structures as (typically) intact forest patches within or adjacent to the harvest unit [see Figure 17]; (2) dispersed retention is the retention of structures or biological legacies in a more or less scattered pattern [see Figure 17]. Both aggregated and dispersed retention may occur within the same harvest unit [see Figures 18, 19].

Variable-retention regeneration harvest is synonymous with *green-tree retention, retention harvest, retention forestry* (BLM, 2016b, p. 1083). The amount of green-tree retention varies by HLB land use allocation [see Figures 18, 19], (BLM, 2016a, pp. 62-63).

In contrast to VRH*, Clearcut harvesting* is a commonly employed regeneration harvest method on industrial private lands in western Oregon interspersed with BLM administered lands. Clearcut timber harvesting removes essentially all trees in an area, producing a fully exposed microclimate over the majority of the harvested area (BLM, 2016b, p. 1066) [see Figure K-1, 20, 21, 22, 23, 24].

Note that the BLM *does not propose* utilizing this type of harvest for the proposed Blue and Gold project. The definition of clearcut harvesting is included only for comparison and contrast to the BLM proposed actions.

COMMERCIAL THINNING

Commercial Thinning is the other timber harvest method proposed for the Blue and Gold project. Commercial Thinning is generally an intermediate harvest implemented to recover anticipated mortality, control stand density for maintenance of stand vigor and health, provide revenue, and to alter or maintain stands on developmental paths so that desired stand characteristics result in the future (BLM, 2016b, p. 1192). It can be implemented by using a single residual density, or spacing approach to a stand [see Figure 25] or create two or more densities [see variable-density thinning below and Figure 26] if more within stand heterogeneity is desired. Implementation of commercial thinning on LITA and MITA land use allocations generally utilize the first type.

Variable-density thinning (VDT) [not to be confused with *VRH,* see Figures 27, 28] is a variation of commercial thinning where two or more densities of retained trees are used to promote stand heterogeneity. Provision of conditions conducive to the initiation and growth of tree regeneration on some portion of the treated area is usually an objective of VDT (BLM, 2016b, p. 1083). VDT also may include the creation of a limited amount [≤ 10% of an HLB unit area] of *group selection openings* [synonymous with '*patch cut*,' and '*gaps* creation', [see Figures 26, 27, 28] up to four acres in size. These openings may contain none, or up to two residual overstory trees (BLM, 2016a, p. 60) providing environmental conditions conducive to the survival and growth of tree regeneration.

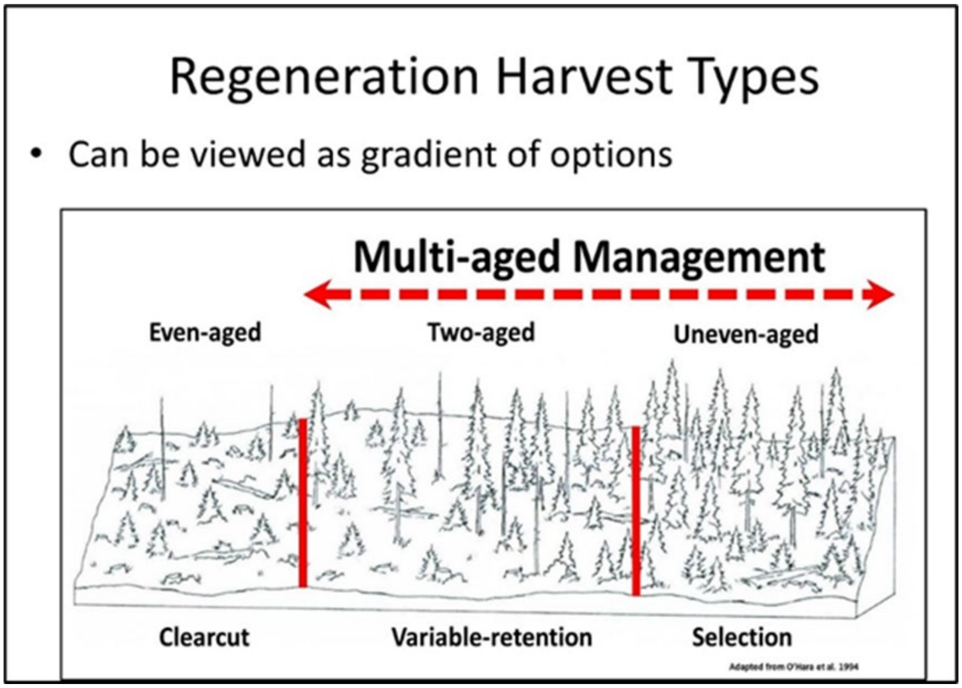


Figure K-1. Regeneration harvest types and structural outcomes immediately post-harvest.

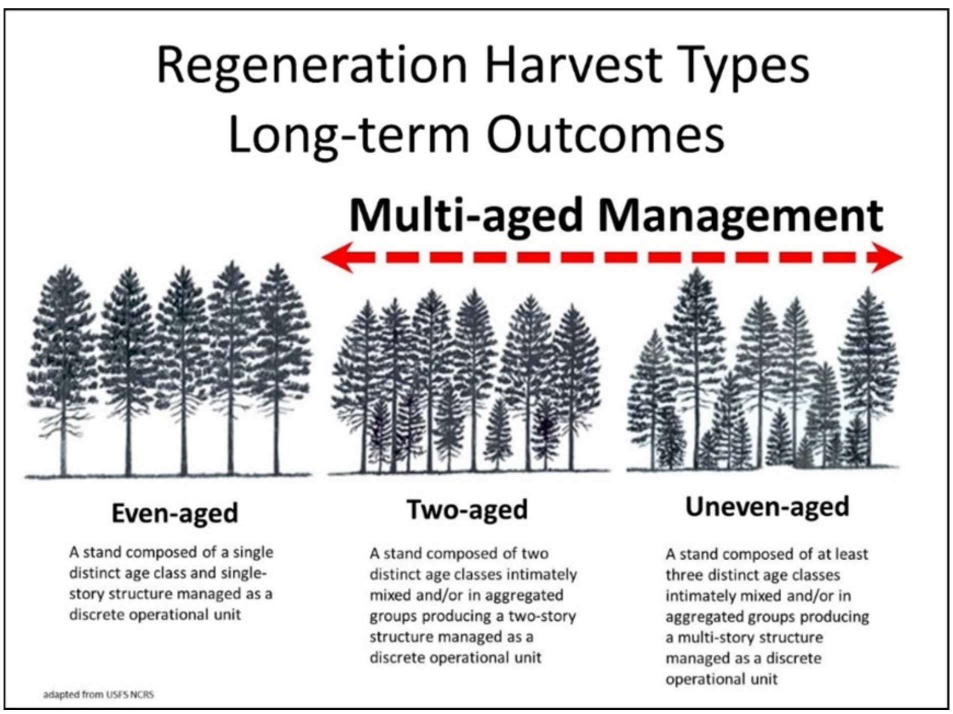


Figure K-2. Future stand structure outcomes

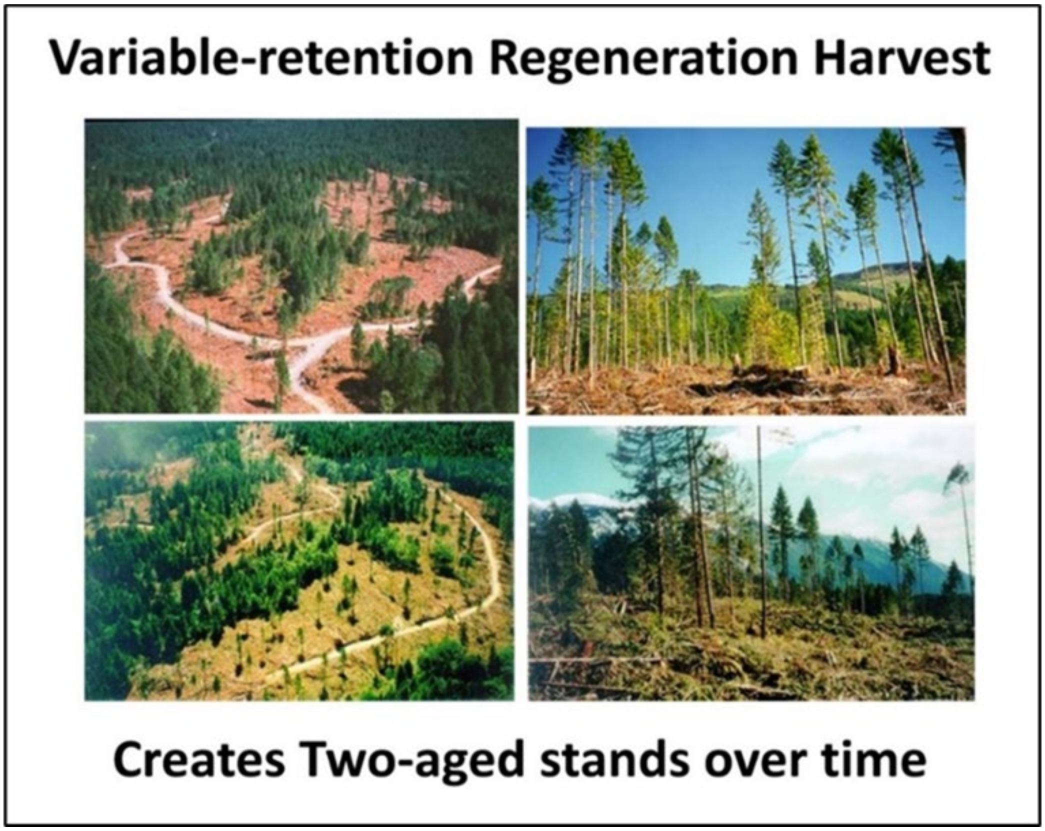


Figure K-3. VRH stand structures immediately post-harvest.

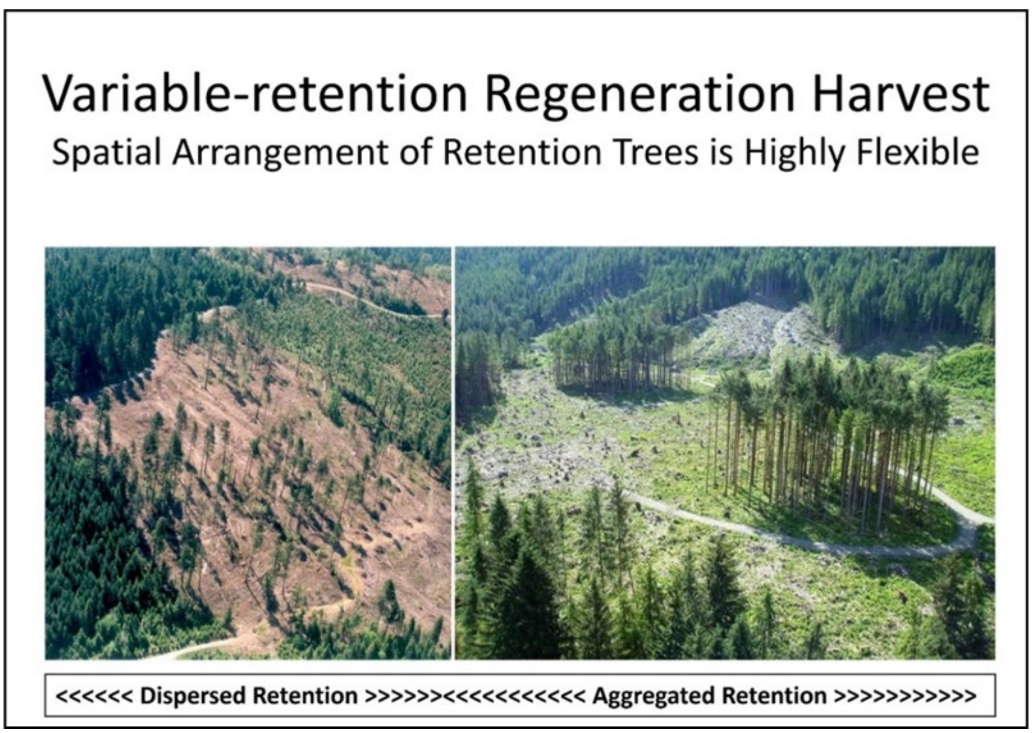


Figure K-4. Spectrum of VRH retention spatial distribution immediately post-harvest.

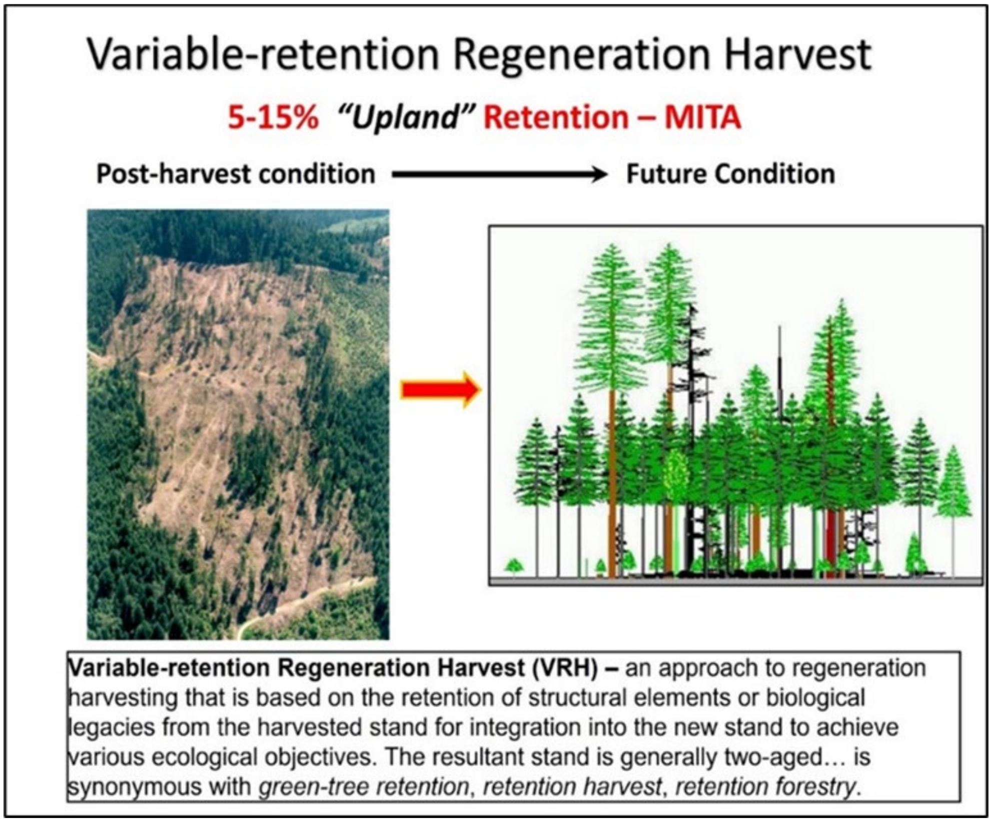


Figure K-5. Example of MITA VRH harvest with 5-15% retention post-harvest and future development.

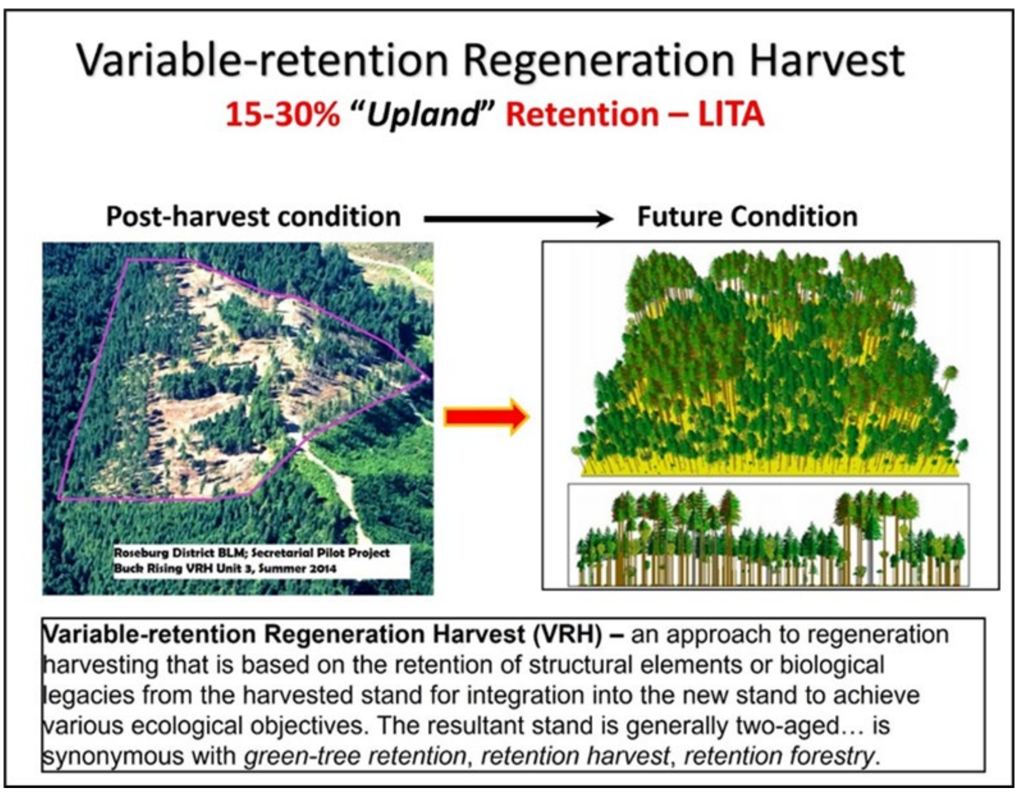


Figure K-6. Example of LITA VRH harvest with 15-30% retention post-harvest and future development.

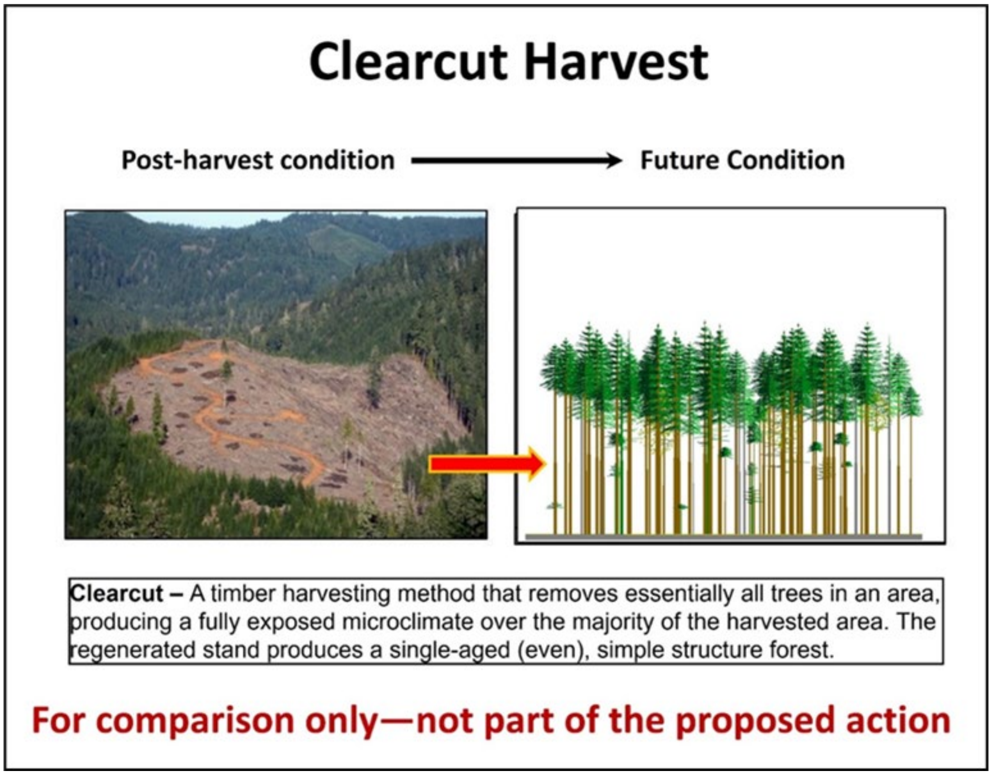


Figure K-7. Example of clearcut harvest and future development.

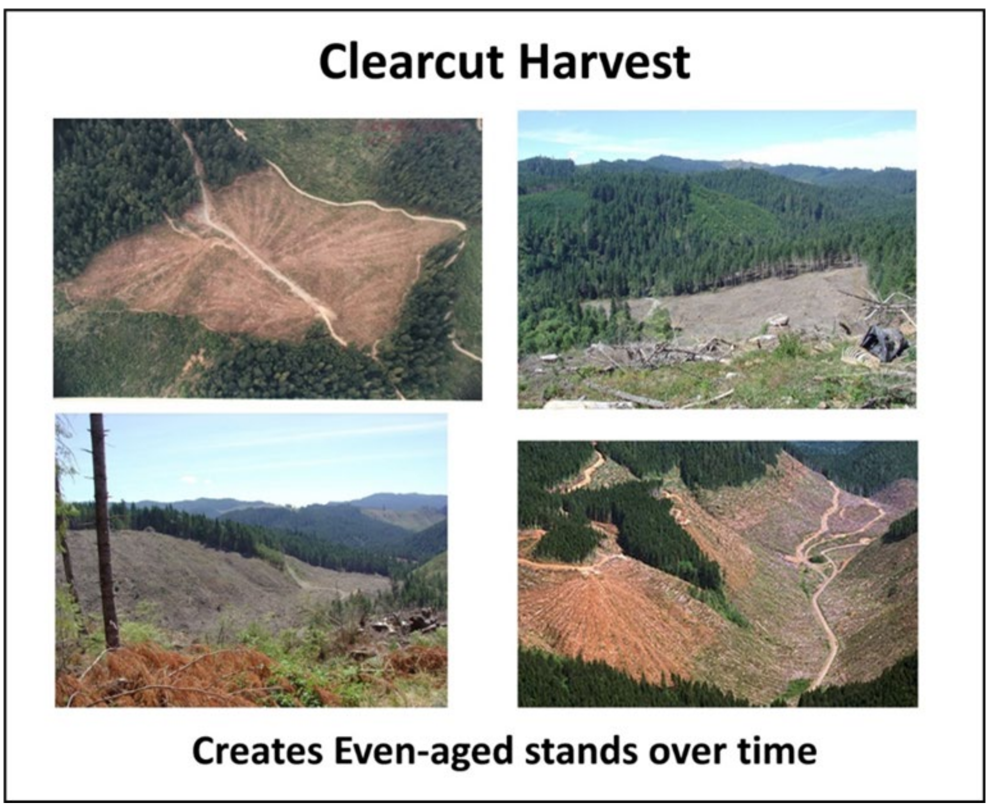


Figure K-8. Examples of clearcut harvest.

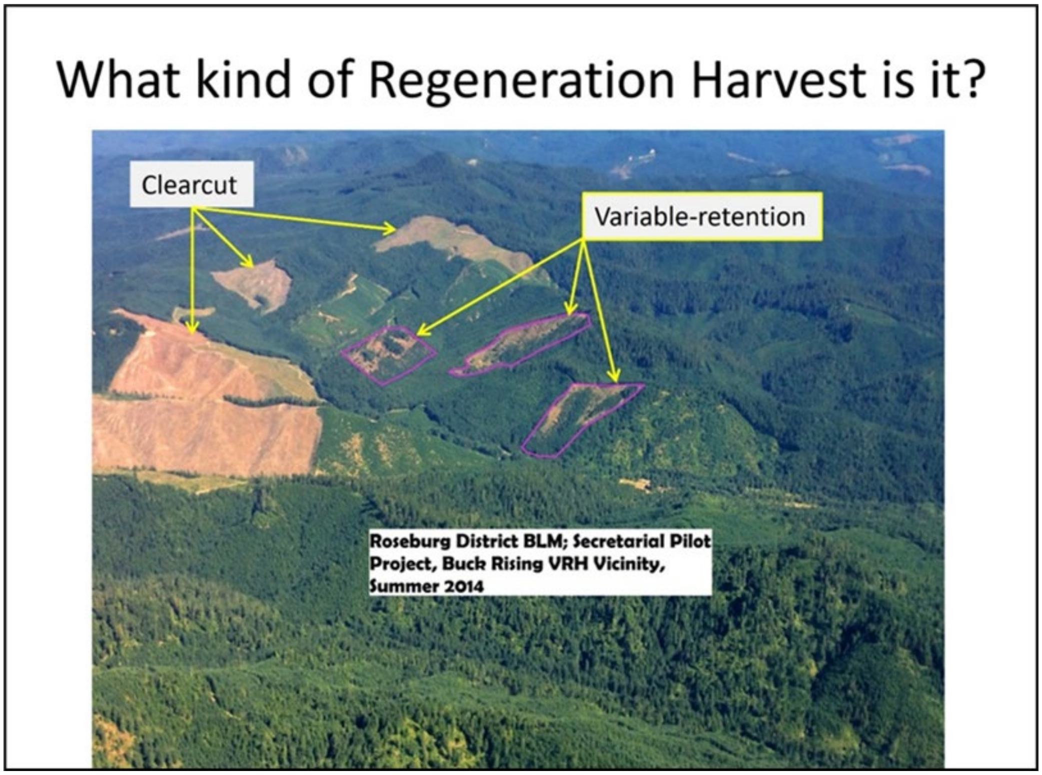


Figure K-9. Examples of clearcut and VRH harvest outcomes.

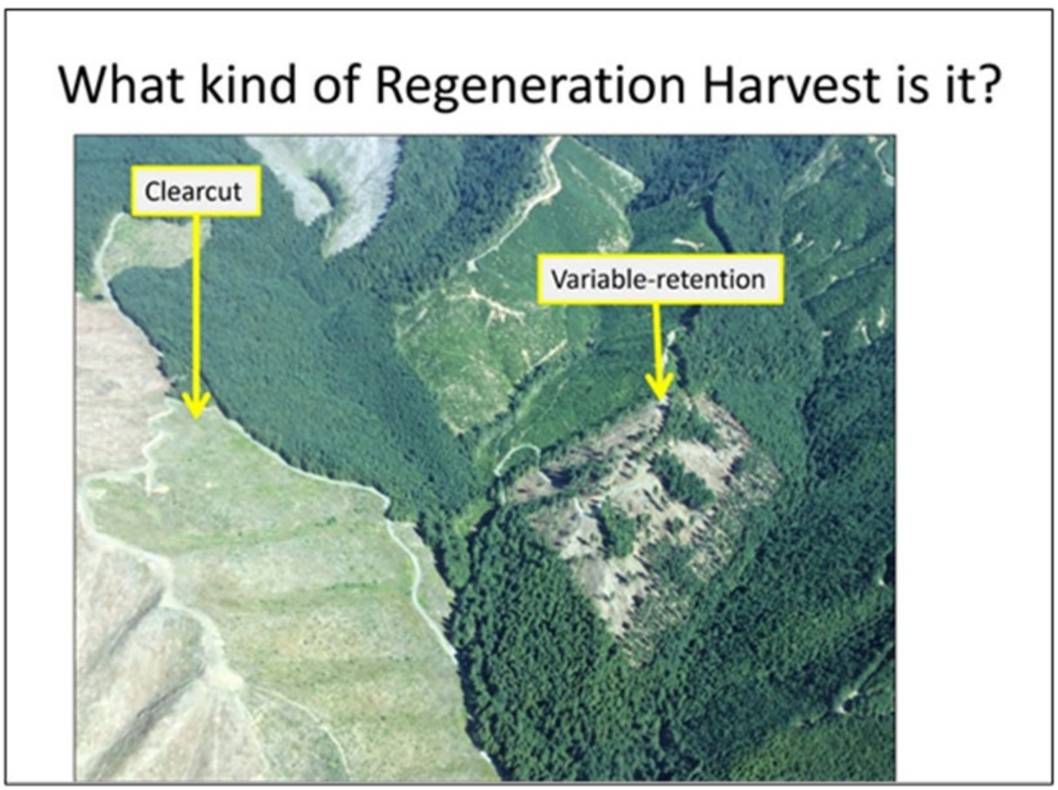


Figure K-10. Examples of clearcut and VRH harvest outcomes.

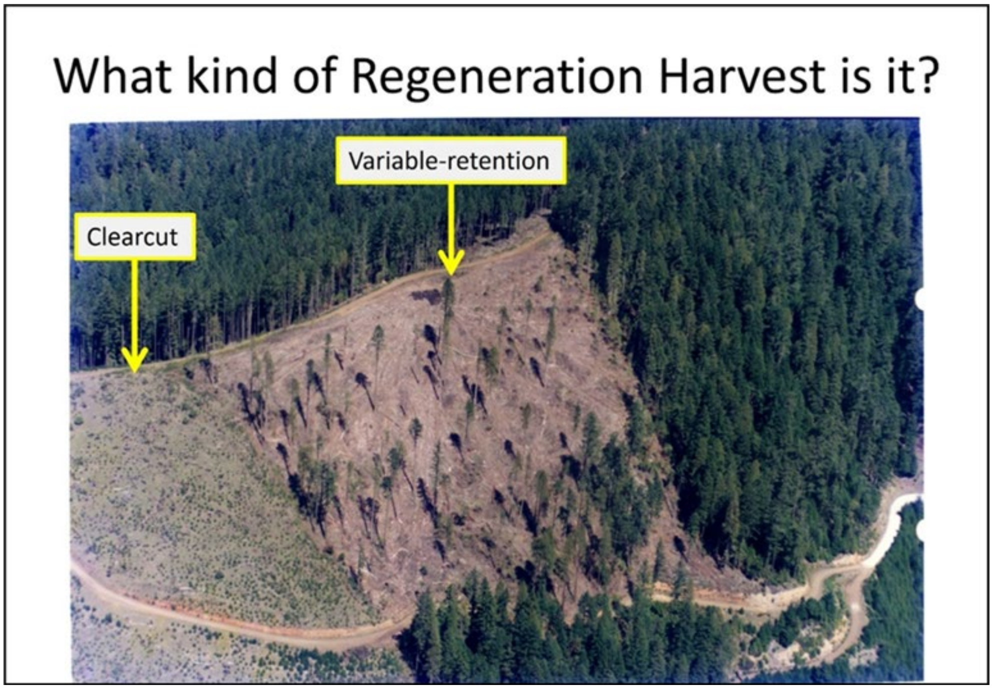


Figure K-11. Examples of clearcut and VRH harvest outcomes.

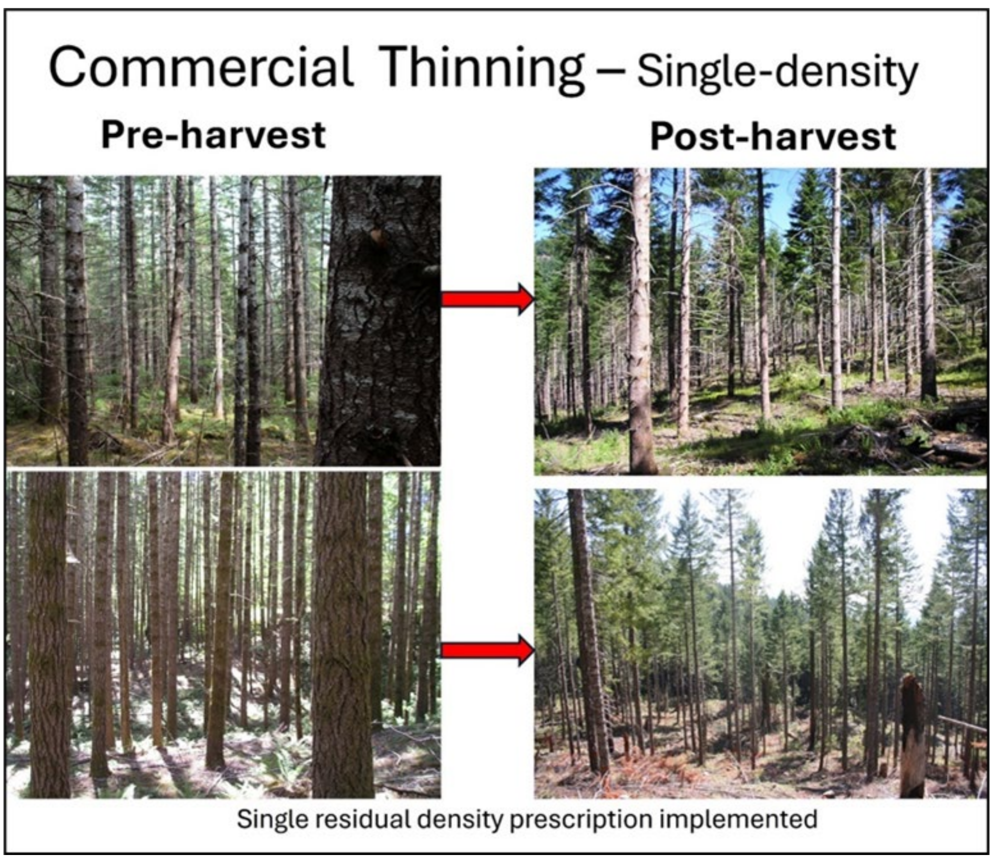


Figure K-12. Examples of commercial thinning using a single density harvest prescription.

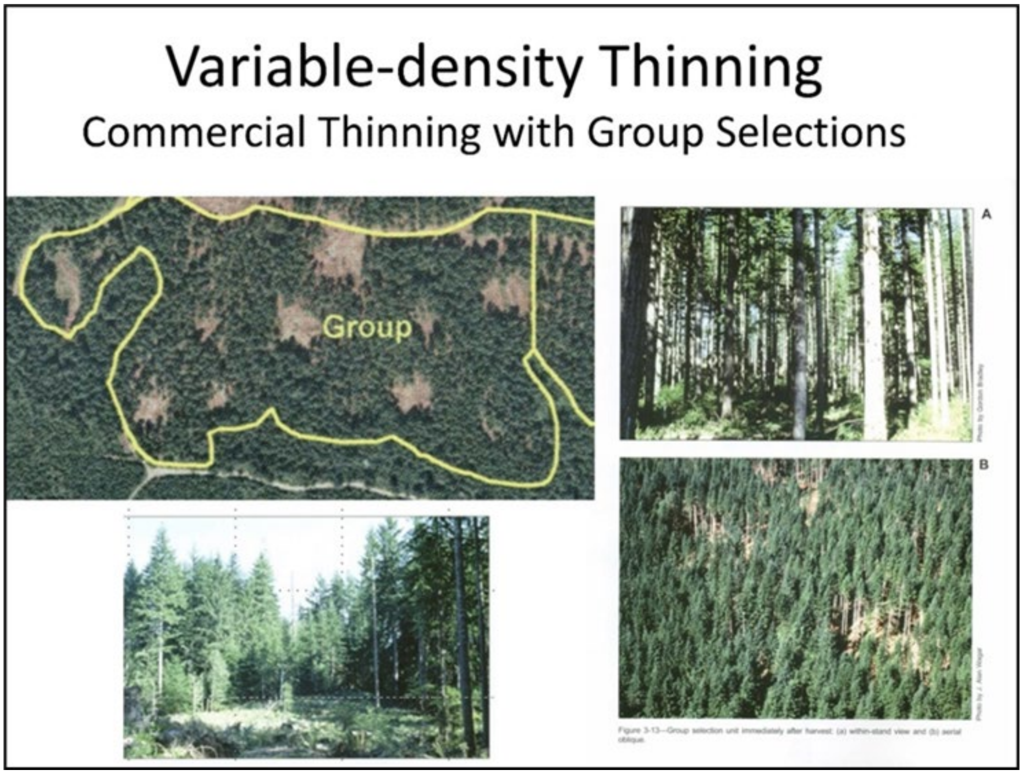


Figure K-13. Example of a variable-density thinning. Majority of the stand commercially thinned, small untreated areas ("skips") retained, and group selection openings created.

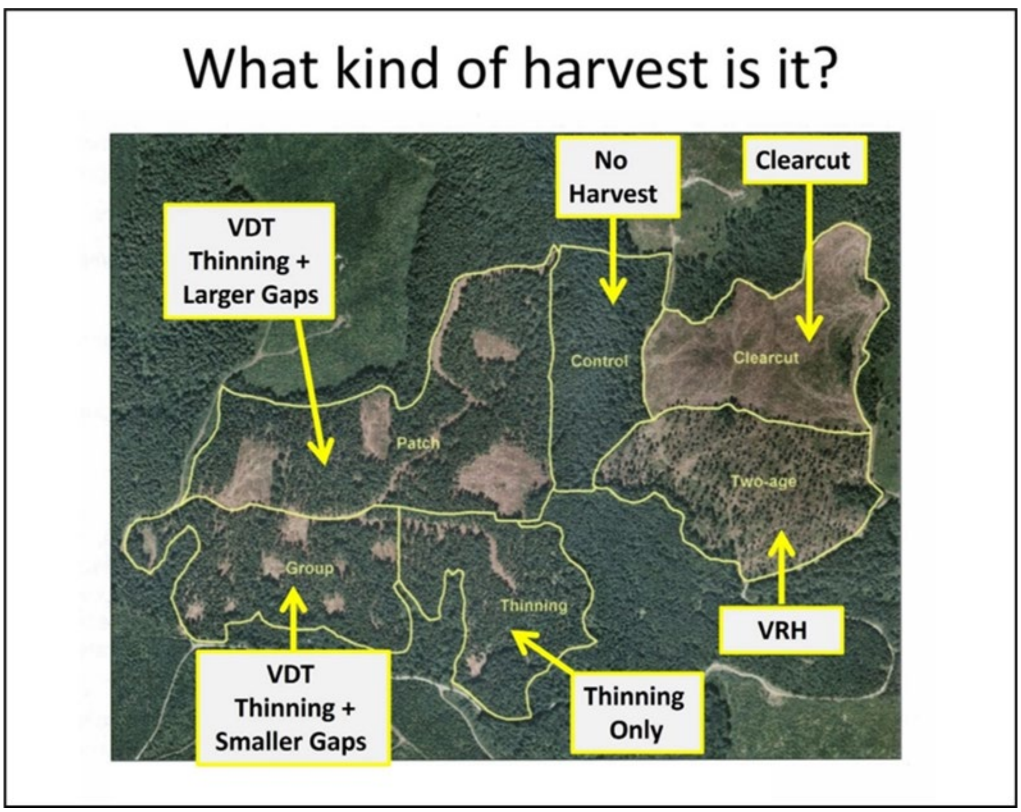


Figure K-14. Comparison of harvest types.

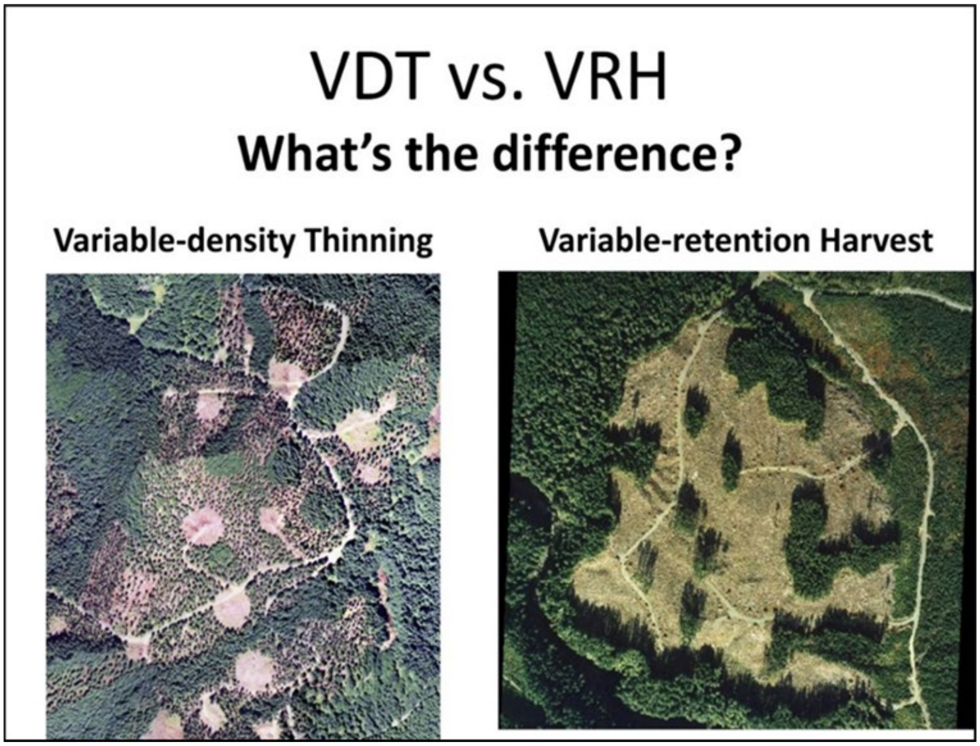


Figure K-15. Comparison of variable-density thinning and variable-retention regeneration harvest.

Appendix L. Alternative tables and supporting information

L.1 Chapter 2 Tables

Table L-1 Estimated post-treatment activity fuels treatments by action alternative (landing pile and broadcast burn acres estimated using current fuel model and proposed harvest prescription, some acres would overlap but be burned at different times; Estimates also consider soil stability concerns).

	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Proposed Treatment Acres used for this estimation	1,135	2,625	1,546	2,254	2,409
Estimated Acres covered by Landing Piles	345	756	467	558	507
Estimated Maximum Broadcast Burn Acres (some acres would overlap landing pile acres)	367	784	516	784	724
Estimated Acres of Landing Piles Outside of Possible Broadcast Burn Areas (no possible overlap with broadcast burn acres)	230	470	274	364	281

Table L-2. Alternative 2 Proposed EA Harvest Units, HLB Sub-Land Use Allocations, Treatment Type and Harvest Method

EA Harvest Unit Number	Land Use Allocation	Ten Year Stand Age Class	Harvest Treatment	Total Unit Acres	Treatment Acres	Harvest Method	Approximate Harvest MMbf
23-6-17F	LITA	60	VRH	68	37	Cable	1.12
23-6-19A	LITA	110	VRH	14	14	Cable/Ground	1.08
23-6-19B	LITA	60	VRH	32	30	Cable/Ground	0.9
23-6-19D	LITA	50	VRH	102	78	Cable/Ground	2.26
23-6-29C	LITA	50	Commercial Thin	32	6	Cable/Ground	0.09
23-6-29B	LITA	70	VRH	11	11	Ground	0.94
23-6-31A	LITA	50/90	VRH	1	0	Cable/Ground	0
24-6-5E	LITA	70/90	VRH	131	64	Cable	2.87
24-6-5B	LITA	60	VRH	9	9	Cable/Ground	0.28
24-6-4C	LITA	140	VRH	17	7	Cable	0.54
24-6-3B	LITA	80	VRH	3	3	Ground	0.16
24-6-17C	LITA	60	VRH	193	166	Cable/Ground	5.56
24-6-17D	LITA	60	Commercial Thin	19	19	Cable/Ground	0.34
24-6-17E	LITA	60	Commercial Thin	17	17	Cable/Ground	0.3
23-6-35E	LITA	60	VRH	26	15	Cable/Ground	0.59
23-6-35F	LITA	60	VRH	13	13	Cable/Ground	0.52
23-6-25E	MITA	60	VRH	19	12	Cable	0.5
23-5-17B	MITA	50	VRH	14	6	Cable/Ground	0.2
23-5-19B	MITA	140	VRH	14	13	Cable/Ground	0.9
23-5-19C	MITA	40	VRH	9	8	Cable/Ground	0.34
23-6-20A	LITA	90	VRH	12	12	Cable/Ground	0.36
23-6-28B	LITA	120	VRH	27	8	Cable	0.76
23-6-28A	LITA	120	VRH	209	204	Cable	16.32
23-6-27A	LITA	130	VRH	294	191	Cable	15.66
23-6-23A	LITA	130	VRH	323	181	Cable	14.66
23-6-21A	LITA	110	VRH	15	12	Cable	1.36
Total				**1,624**	**1,136**		**68.6**

Table L-3. Alternative 3 Proposed EA Harvest Units, HLB Sub-Land Use Allocations, Treatment Type and Harvest Method

EA Harvest Unit Number	Land Use Allocation	Ten Year Stand Age Class	Harvest Treatment	Total Unit Acres	Treatment Acres	Harvest Method	Approximate Harvest MMbf
23-6-17F	LITA	60	VRH	68	37	Cable	1.12
23-6-17D	LITA	50	VRH	142	107	Cable	4.02
23-6-19D	LITA	50	VRH	102	78	Cable/Ground	2.26
23-6-19E	LITA	60	VRH	5	5	Cable/Ground	0.11
23-6-19B	LITA	60	VRH	32	30	Cable/Ground	0.9
24-6-4A	LITA	60	VRH	6	5	Cable/Ground	0.29
23-6-29C	LITA	50	VRH	32	6	Cable/Ground	0.22
23-6-29D	LITA	50	VRH	6	3	Cable/Ground	0.12
23-6-29B	LITA	70	VRH	11	11	Ground	0.94
23-6-31A	LITA	50/90	VRH	55	15	Cable/Ground	0.51
24-6-5E	LITA	70/90	VRH	131	64	Cable	2.87
23-6-29A	LITA	50	VRH	18	11	Cable/Ground	0.23
24-6-7A	LITA	60	VRH	9	4	Cable/Ground	1.24
24-6-7B	LITA	90	VRH	78	27	Cable/Ground	1.24
24-6-7C	LITA	90	VRH	45	27	Cable/Ground	1.24
24-6-5B	LITA	60	VRH	9	9	Cable/Ground	0.28
23-6-19A	LITA	110	VRH	14	14	Cable/Ground	1.08
24-6-4B	LITA	140	VRH	92	40	Cable	3.24
24-6-4C	LITA	140	VRH	17	7	Cable	0.54
24-6-3A	LITA	50	VRH	41	30	Cable/Ground	0.75
24-6-3E	LITA	60	VRH	25	25	Cable/Ground	0.9
24-6-3B	LITA	80	VRH	3	3	Ground	0.16
24-6-9B	LITA	60	VRH	52	37	Cable	0.89
24-6-17C	LITA	60	VRH	193	166	Cable/Ground	5.56
24-6-17D	LITA	60	VRH	19	19	Cable/Ground	0.72
24-6-17E	LITA	60	VRH	17	17	Cable/Ground	0.63
24-6-27A	MITA	50	VRH	99	99	Cable/Ground	2.77
23-6-35E	LITA	60	VRH	26	15	Cable/Ground	0.59
23-6-35G	LITA	100	VRH	57	40	Cable/Ground	1.92
23-6-35F	LITA	60	VRH	13	13	Cable/Ground	0.52
23-6-25F	LITA and MITA	60	VRH	38	36	Cable/Ground	1.26
23-6-25E	MITA	60	VRH	19	12	Cable	0.5
23-5-17B	MITA	50	VRH	14	6	Cable/Ground	0.2
23-5-17A	MITA	60	VRH	26	25	Cable/Ground	1.15
23-5-19D	LITA	50	VRH	34	34	Cable/Ground	1.29
23-5-19B	MITA	140	VRH	14	13	Cable/Ground	0.9
23-5-19C	MITA	40	VRH	9	8	Cable/Ground	0.34
24-6-15A	MITA	100	VRH	10	8	Cable/Ground	0.33
24-6-15B	MITA	140	VRH	28	20	Cable/Ground	1.18
24-6-11A	MITA	60	VRH	21	14	Cable/Ground	0.55
23-6-20A	LITA	90	VRH	12	12	Cable/Ground	0.36
23-6-29F	LITA	40	VRH	13	13	Cable	0.31
23-6-28B	LITA	120	VRH	27	8	Cable	0.76
23-6-29E	LITA	130	VRH	309	225	Cable	18.23
23-6-28A	LITA	120	VRH	316	278	Cable	22.24
23-6-27A	LITA	130	VRH	568	464	Cable	38.05
23-6-23A	LITA	130	VRH	430	288	Cable	23.33
23-6-33A	LITA	80	VRH	86	86	Cable	4.56
23-6-21A	LITA	110	VRH	15	12	Cable	1.36
Total				**3,406**	**2,625**		**157.53**

Table L-4. Alternative 4 Proposed EA Harvest Units, HLB Sub-Land Use Allocations, Treatment Type and Harvest Method

EA Harvest Unit Number	Land Use Allocation	Ten Year Stand Age Class	Harvest Treatment	Total Unit Acres	Treatment Acres	Harvest Method	Approximate Harvest MMBF
23-6-19D	LITA	50	VRH	102	78	Cable/Ground	2.26
23-6-19B	LITA	60	VRH	32	30	Cable/Ground	0.9
23-6-28B	LITA	120	VRH	27	8	Cable	1.71
23-6-29B	LITA	70	VRH	11	11	Ground	0.94
23-6-29C	LITA	50	VRH	32	19	Cable/Ground	0.68
23-6-29D	LITA	50	VRH	6	3	Cable/Ground	0.12
23-6-29E	LITA	130	VRH	283	225	Cable	18.23
23-6-19A	LITA	110	VRH	14	14	Cable/Ground	1.08
24-6-7C	LITA	90	VRH	45	27	Cable/Ground	1.24
24-6-7B	LITA	90	VRH	78	27	Cable/Gound	1.24
24-6-5E	LITA	70/90	VRH	131	64	Cable	2.87
24-6-4A	LITA	60	VRH	6	5	Cable/Ground	0.29
24-6-4B	LITA	140	Commercial Thin	92	40	Cable	3.24
24-6-4C	LITA	140	VRH	17	7	Cable	0.54
24-6-3B	LITA	80	VRH	3	3	Ground	0.16
24-6-3E	LITA	60	Commercial Thin	25	25	Cable/Ground	0.42
23-6-31A	LITA	50/90	VRH	56	15	Cable/Ground	0.51
23-6-35E	LITA	60	Commercial Thin	26	15	Cable/Ground	0.28
23-6-35F	LITA	60	VRH	13	13	Cable/Ground	0.52
23-6-25E	MITA	60	Commercial Thin	19	12	Cable	0.2
23-5-17B	MITA	50	VRH	14	6	Cable/Ground	0.2
23-5-17A	MITA	60	Commercial Thin	26	25	Cable/Ground	0.46
23-5-19D	LITA	50	Commercial Thin	34	34	Cable/Ground	0.6
23-5-19B	MITA	140	VRH	14	13	Cable/Ground	0.9
23-5-19C	MITA	40	VRH	9	8	Cable/Ground	0.34
23-6-20A	LITA	90	VRH	12	12	Cable/Ground	0.36
23-6-28A	LITA	120	VRH	316	278	Cable	22.24
23-6-23A	LITA	130	VRH	430	288	Cable	23.33
23-6-33A	LITA	80	VRH	86	86	Cable	4.56
24-6-17D	LITA	60	Commercial Thin	19	19	Cable/Ground	0.35
24-6-17E	LITA	60	Commercial Thin	17	17	Cable/Ground	0.3
24-6-15B	MITA	140	VRH	28	20	Cable/Ground	1.18
24-6-11A	MITA	60	Commercial Thin	21	14	Cable/Ground	0.22
24-6-27A	MITA	50	VRH	99	99	Cable/Ground	2.77
Total				**2,143**	**1,570**		**95.24**

Table L-5. Alternative 5 Proposed EA Harvest Units, HLB Sub-Land Use Allocations, Treatment Type and Harvest Method

EA Harvest Unit Number	Land Use Allocation	Ten Year Stand Age Class	Harvest Treatment	Total Unit Acres	Treatment Acres	Harvest Method	Approximate Harvest MBF
23-6-17F	LITA	60	Commercial Thin	68	37	Cable	0.55
23-6-17D	LITA	50	Commercial Thin	142	107	Cable	1.98
23-6-19D	LITA	50	Commercial Thin	102	78	Cable/Ground	1.08
23-6-19E	LITA	60	Commercial Thin	5	5	Cable/Ground	0.05
23-6-19B	LITA	60	Commercial Thin	32	30	Cable/Ground	0.45
24-6-4A	LITA	60	Commercial Thin	6	5	Cable/Ground	0.14
23-6-29C	LITA	50	Commercial Thin	32	6	Cable/Ground	0.09
23-6-29D	LITA	50	Commercial Thin	6	3	Cable/Ground	0.06
23-6-29B	LITA	70	Commercial Thin	11	11	Ground	0.33
23-6-31A	LITA	50/90	Commercial Thin	55	15	Cable/Ground	0.26
24-6-5E	LITA	70/90	Commercial Thin	131	64	Cable	1.42
23-6-29A	LITA	50	Commercial Thin	18	11	Cable/Ground	0.11
24-6-7A	LITA	60	Commercial Thin	9	4	Cable/Ground	0.48
24-6-7B	LITA	90	Commercial Thin	78	27	Cable/Ground	0.48
24-6-7C	LITA	90	Commercial Thin	45	27	Cable/Ground	0.48
24-6-5B	LITA	60	Commercial Thin	9	9	Cable/Ground	0.13
23-6-19A	LITA	110	Commercial Thin	14	14	Cable/Ground	0.39
24-6-4B	LITA	140	Commercial Thin	92	40	Cable	1.02
24-6-4C	LITA	140	Commercial Thin	17	7	Cable	0.2
24-6-3A	LITA	50	Commercial Thin	41	30	Cable/Ground	0.34
24-6-3E	LITA	60	Commercial Thin	25	25	Cable/Ground	0.42
24-6-3B	LITA	80	Commercial Thin	3	3	Ground	0.05
24-6-9B	LITA	60	Commercial Thin	52	37	Cable	0.44
24-6-17C	LITA	60	Commercial Thin	193	166	Cable/Ground	2.74
24-6-17D	LITA	60	Commercial Thin	19	19	Cable/Ground	0.35
24-6-17E	LITA	60	Commercial Thin	17	17	Cable/Ground	0.3
23-6-35E	LITA	60	Commercial Thin	26	15	Cable/Ground	0.28
23-6-35G	LITA	100	Commercial Thin	57	40	Cable/Ground	0.75
23-6-35F	LITA	60	Commercial Thin	13	13	Cable/Ground	0.24
23-6-25F	LITA and MITA	60	Commercial Thin	38	36	Cable/Ground	0.38
23-6-25E	MITA	60	Commercial Thin	19	12	Cable	0.2
23-5-17B	MITA	50	Commercial Thin	14	6	Cable/Ground	0.08
23-5-17A	MITA	60	Commercial Thin	26	25	Cable/Ground	0.46
23-5-19D	LITA	50	Commercial Thin	34	34	Cable/Ground	0.6
23-5-19B	MITA	140	Commercial Thin	14	13	Cable/Ground	0.29
23-5-19C	MITA	40	Commercial Thin	9	8	Cable/Ground	0.15
24-6-15A	MITA	100	Commercial Thin	10	8	Cable/Ground	0.12
24-6-15B	MITA	140	Commercial Thin	28	20	Cable/Ground	0.37
24-6-11A	MITA	60	Commercial Thin	21	14	Cable/Ground	0.22
24-6-27A	MITA	50	Commercial Thin	99	99	Cable/Ground	1.14
23-6-20A	LITA	90	Commercial Thin	12	12	Cable/Ground	0.14
23-6-29F	LITA	40	Commercial Thin	13	13	Cable	0.15
23-6-28B	LITA	120	Commercial Thin	27	8	Cable	0.26
23-6-29E	LITA	130	Commercial Thin	309	225	Cable	6.7
23-6-28A	LITA	120	Commercial Thin	316	278	Cable	8.3
23-6-27A	LITA	130	Commercial Thin	568	464	Cable	12.88
23-6-23A	LITA	130	Commercial Thin	430	288	Cable	8.57
23-6-33A	LITA	80	Commercial Thin	86	86	Cable	1.68
23-6-21A	LITA	110	Commercial Thin	15	12	Cable	0.48
Total				3,406	2,625		58.78

Table L-6. Alternative 6 Proposed EA Harvest Units, HLB Sub-Land Use Allocations, Treatment Type and Harvest Method

EA Harvest Unit Number	Land Use Allocation	Ten Year Stand Age Class	Harvest Treatment	Total Unit Acres	Treatment Acres	Harvest Method	Approximate Harvest MBF
23-6-17F	LITA	60	VRH	68	37	Cable	1.12
23-6-17D	LITA	50	VRH	142	107	Cable	4.02
23-6-19D	LITA	50	VRH	102	78	Cable/Ground	2.26
23-6-19E	LITA	60	VRH	5	5	Cable/Ground	0.11
23-6-19B	LITA	60	VRH	32	30	Cable/Ground	0.9
24-6-4A	LITA	60	Commercial Thin	6	5	Cable/Ground	0.14
23-6-29C	LITA	50	Commercial Thin	33	6	Cable/Ground	0.09
23-6-29D	LITA	50	Commercial Thin	6	3	Cable/Ground	0.06
23-6-29B	LITA	70	Commercial Thin	11	11	Ground	0.33
23-6-31A	LITA	50/90	Commercial Thin	56	15	Cable/Ground	0.26
24-6-5E	LITA	70/90	Commercial Thin	130	64	Cable	1.42
23-6-29A	LITA	50	Commercial Thin	18	11	Cable/Ground	0.11
24-6-7A	LITA	60	Commercial Thin	9	4	Cable/Ground	0.48
24-6-7B	LITA	90	Commercial Thin	78	27	Cable/Ground	0.48
24-6-7C	LITA	90	Commercial Thin	45	27	Cable/Ground	0.48
24-6-5B	LITA	60	Commercial Thin	9	9	Cable/Ground	0.13
24-6-4B	LITA	140	Commercial Thin	92	40	Cable	1.02
24-6-4C	LITA	140	Commercial Thin	17	7	Cable	0.2
24-6-3A	LITA	50	VRH	41	30	Cable/Ground	0.75
24-6-3E	LITA	60	VRH	25	25	Cable/Ground	0.9
24-6-3B	LITA	80	Commercial Thin	3	3	Ground	0.05
24-6-9B	LITA	60	VRH	52	37	Cable	0.89
24-6-17C	LITA	60	Commercial Thin	193	61	Cable/Ground	1.04
24-6-17C	LITA	60	VRH	*	105	Cable/Ground	4.49
24-6-17D	LITA	60	VRH	19	19	Cable/Ground	0.72
24-6-17E	LITA	60	VRH	17	17	Cable/Ground	0.63
23-6-35E	LITA	60	VRH	26	15	Cable/Ground	0.59
23-6-35F	LITA	60	VRH	13	13	Cable/Ground	0.52
23-6-25F	LITA and MITA	60	VRH	38	36	Cable/Ground	0.5
23-6-25E	MITA	60	VRH	19	12	Cable	0.5
23-5-17B	MITA	50	VRH	14	6	Cable/Ground	0.2
23-5-17A	MITA	60	VRH	26	25	Cable/Ground	1.15
23-5-19D	LITA	50	VRH	34	34	Cable/Ground	1.29
23-5-19C	MITA	40	VRH	9	8	Cable/Ground	0.34
24-6-27A	MITA	50	VRH	99	99	Cable/Ground	2.77
23-6-29F	LITA	40	Commercial Thin	13	13	Cable	0.15
23-6-28B	LITA	120	Commercial Thin	27	8	Cable	0.27
23-6-29E	LITA	130	Commercial Thin	283	225	Cable	6.69
23-6-28A	LITA	120	Commercial Thin	316	278	Cable	8.27
23-6-27A	LITA	130	Commercial Thin	568	464	Cable	12.88
23-6-23A	LITA	130	Commercial Thin	430	288	Cable	8.57
23-6-33A	LITA	80	Commercial Thin	86	86	Cable	1.68
23-6-21A	LITA	110	Commercial Thin	15	12	Cable	0.48
Total				**3,225**	**2,405**		**69.93**

* For this Alt., 24-6-17C was split acreage (CT and VRH) this cell does not provided acreage here because it is the same unit acreage as the cell above (193 acres).

L.2 Chapter 3 Supporting Information

Issue 1

Table L-7. Proposed treatment and expected volume in thousand board feet (MMbf) by unit and alternative.

EA Unit Number	Alt 2 Harvest Rx	Alt 2 Volume	Alt 3 Harvest Rx	Alt 3 Volume	Alt 4 Harvest Rx	Alt 4 Volume	Alt 5 Harvest Rx	Alt 5 Volume	Alt 6 Harvest Rx	Alt 6 Volume
23-5-17A	Defer	0	VRH	1.150	Thin	0.462	Thin	0.462	VRH	1.150
23-5-17B	VRH	0.198	VRH	0.198	VRH	0.198	Thin	0.079	VRH	0.198
23-5-19B	VRH	0.897	VRH	0.897	VRH	0.897	Thin	0.286	VRH	0.897
23-5-19C	VRH	0.336	VRH	0.336	VRH	0.336	Thin	0.145	VRH	0.336
23-5-19D	Defer	0	VRH	1.292	Thin	0.595	Thin	0.595	VRH	1.292
23-6-17D	Defer	0	VRH	4.015	Defer	0	Thin	1.977	VRH	4.015
23-6-17F	VRH	1.116	VRH	1.116	Defer	0	Thin	0.549	VRH	1.116
23-6-19A	VRH	1.078	VRH	1.078	VRH	1.078	Thin	0.389	Defer	0
23-6-19B	VRH	0.900	VRH	0.900	VRH	0.900	Thin	0.446	VRH	0.900
23-6-19D	VRH	2.262	VRH	2.262	VRH	2.262	Thin	1.081	VRH	2.260
23-6-19E	Defer	0	VRH	0.105	Defer	0	Thin	0.048	VRH	0.105
23-6-20A	VRH	0.360	VRH	0.360	VRH	0.360	Thin	0.135	Defer	0
23-6-21A	VRH	1.356	VRH	1.356	Defer	0	Thin	0.483	Thin	0.483
23-6-23A	VRH	14.661	VRH	23.328	VRH	23.328	Thin	8.568	Thin	8.568
23-6-25E	VRH	0.504	VRH	0.504	Thin	0.198	Thin	0.198	VRH	0.504
23-6-25F	Defer	0	VRH	1.260	Defer	0	Thin	0.378	VRH	1.260
23-6-27A	VRH	5.662	VRH	38.048	Defer	0	Thin	12.876	Thin	12.876
23-6-28A	VRH	16.320	VRH	22.240	VRH	22.240	Thin	8.271	Thin	8.271
23-6-28B	VRH	0.760	VRH	0.760	Defer	0	Thin	0.266	Thin	0.266
23-6-29A	Defer	0	VRH	0.231	Defer	0	Thin	0.109	Thin	0.109
23-6-29B	VRH	0.935	VRH	0.935	VRH	0.935	Thin	0.333	Thin	0.333
23-6-29C	Thin	0.093	VRH	0.216	Defer	0	Thin	0.093	Thin	0.093
23-6-29D	Defer	0	VRH	0.123	Defer	0	Thin	0.059	Thin	0.059
23-6-29E	Defer	0	VRH	18.225	Defer	0	Thin	6.694	Thin	6.694
23-6-29F	Defer	0	VRH	0.312	Defer	0	Thin	0.146	Thin	0.146
23-6-31A	Defer	0	VRH	0.510	Defer	0	Thin	0.257	Thin	0.257
23-6-33A	Defer	0	VRH	4.558	VRH	4.558	Thin	1.677	Thin	1.677
23-6-35E	VRH	0.520	VRH	0.520	Thin	0.520	Thin	0.240	VRH	0.520
23-6-35F	VRH	0.585	VRH	0.585	VRH	0.277	Thin	0.277	VRH	0.585
23-6-35G	Defer	0	VRH	1.920	Defer	0	Thin	0.750	Defer	0
24-6-11A	Defer	0	VRH	0.546	Thin	0.222	Thin	0.222	Defer	0
24-6-15A	Defer	0	VRH	0.328	Defer	0	Thin	0.116	Defer	0
24-6-15B	Defer	0	VRH	1.180	VRH	1.180	Thin	0.370	Defer	0
24-6-17C	VRH	2.561	VRH	5.561	Defer	0	Thin	2.739	VRH/Thin	5.561
24-6-17D	Thin	0.345	VRH	0.722	Thin	0.345	Thin	0.345	VRH	0.722
24-6-17E	Thin	0.303	VRH	0.629	Thin	0.303	Thin	0.303	VRH	0.629
24-6-27A	Defer	0	VRH	2.772	VRH	2.772	Thin	1.143	VRH	1.143
24-6-3A	Defer	0	VRH	0.750	Defer	0	Thin	0.337	VRH	0.750
24-6-3B	VRH	0.162	VRH	0.162	VRH	0.162	Thin	0.052	Thin	0.052
24-6-3E	Defer	0	VRH	0.900	Thin	0.421	Thin	0.421	VRH	0.900
24-6-4A	Defer	0	VRH	0.285	Thin	0.285	Thin	0.140	Thin	0.140
24-6-4B	Defer	0	VRH	3.240	Thin	3.240	Thin	1.020	Thin	1.020
24-6-4C	VRH	0.535	VRH	0.535	VRH	0.535	Thin	0.200	Thin	0.200
24-6-5B	VRH	0.279	VRH	0.279	Defer	0	Thin	0.128	Thin	0.128
24-6-5E	VRH	2.783	VRH	2.873	Defer	0	Thin	1.415	Thin	1.415
24-6-7A	Defer	0	VRH	0.155	Defer	0	Thin	0.077	Thin	0.077
24-6-7B	Defer	0	VRH	1.932	Defer	0	Thin	0.746	Thin	0.746
24-6-7C	Defer	0	VRH	1.242	Defer	0	Thin	0.479	Thin	0.479
24-6-9B	Defer	0	VRH	0.888	Defer	0	Thin	0.440	VRH	0.888
Totals MMBF	N/A	68.600	N/A	154.318	N/A	66.243	N/A	55.558	N/A	69.819

Issue 2

Descriptions for analytical scales: nest patch, core-use area, and home range

Nest Patch

The 70-acre nest patch is represented by a circle with a 300-meter radius that is centered on the nest tree or area of most recent activity. Optimally, the condition for the nest patch is to be entirely comprised of NRF habitat.

Core-use Area

The core-use area is represented by a 0.5-mile radius circle centered on the nest tree or area of most recent activity; encompassing an area of approximately 500 acres that is the most heavily used area during the nesting season. For this analysis, "habitat-limited" means the NSO core-use area has less than 50 percent (less than 250 acres) of NRF habitat available (BLM, 2008a, p. 24).

Home Range

The home range is represented as a circle centered on a nest tree or area of most recent activity, representing the area northern spotted owls are assumed to use for nesting, roosting, and foraging when occupying the site. Home ranges frequently overlap, and habitat may be shared by adjacent resident and dispersing northern spotted owls (FWS, 2009a). Home range size varies by physiographic province. All the proposed actions are within the Coast Range Province, with a home range radius of 1.5 miles that encompasses approximately 4,522 acres (FWS, 2008a). In this analysis, "habitat-limited" means that the provincial home range has less than 40 percent (less than 1,809 acres) NRF habitat available, which is considered an analytical threshold for how much NRF is necessary to maintain northern spotted owl life functions within the home range (BLM, 2018a, p. 24; Thomas, et al., 1990; Courtney, et al., 2004).

Issue 2 – Tables and Figures

Table L-8. Acres of land ownership within the analysis area

Total Acres	BLM	Private/ Local Government	Water/ Undetermined
130,359	**32,305**	**96,601**	**1,453**

Table L-9. Habitat acres within the Analysis Area by LUA on BLM-administered lands within the Blue and Gold Project

Habitat Type	District-Designated Reserve	Harvest Land Base	Late Successional Reserve	Riparian Reserve	Habitat Acreage Totals
NRF	163	2,322	14,109	1,305	**17,899**
Dispersal-only	411	5,584	427	3,777	**10,199**
Capable	161	2,251	52	1,505	**3,969**
Non-capable	22	19	2	1	**44**
Non-capable; roads	-	-	-	-	**194**
Total Acres	757	10,176	14,590	6,588	**32,305**

Table L-10. Definition of terms describing changes in forest stand conditions used for NSO

Term	Definition
Modify	Post-treatment, forest stands would not change their function for the NSO. NRF habitat as a result of treatment would retain a minimum of 60 percent canopy cover. Dispersal-only habitat, post treatment, would retain a minimum of 40 percent canopy cover.
Downgrade	Harvest treatments would temporarily alter the function of NSO NRF habitat so that the forest stands would no longer support nesting, roosting, and foraging. Downgraded NRF habitat would be converted to dispersal-only habitat, with a minimum canopy cover of 40 percent. Harvest treatments would reduce canopy cover below 40 percent and dispersal-only forest stands would be converted to capable habitat, no longer supporting northern spotted owl dispersal.

Term	Definition
Remove	Harvest treatments would convert NSO NRF and/or dispersal-only habitat to capable habitat, which would no longer support nesting, roosting, foraging or dispersal for northern spotted owls.

Table L-11. Habitat acres for each MSNO site on BLM-administered lands within the NSO analysis area

MSNO	Home Range NRF	Home Range Dispersal- only	Core-Use Area NRF	Core-Use Area Dispersal- only	Nest Patch NRF	Nest Patch Dispersal- only
0266	1772	706	234	162	50	18
0267	1424	344	99	0	24	0
0269	972	440	266	69	45	24
0271	1,159	703	104	149	19	25
0272	1,097	610	264	117	53	16
0391	1,264	698	221	0	39	0
0392	926	360	249	5	64	0
0514	808	966	212	102	18	32
1359	614	332	95	36	51	0
1160	968	574	77	97	19	29
1802	751	108	202	0	61	0
1803	1,047	699	170	0	25	0
1804	2,237	317	328	0	51	0
1816	949	761	182	80	47	11
1916	311	536	115	135	31	35
1923	1,045	922	222	38	42	6
1924	1,686	482	186	128	67	2
1925	694	520	23	27	16	0
1972	1318	406	305	40	69	1
1977	922	390	171	0	49	0
1980	819	916	229	82	49	20
1983	755	417	194	70	52	1
1987	1,581	627	269	0	69	0
1988	1809	831	143	128	43	13
1992	2010	423	316	0	64	0
2049	756	451	148	91	15	26
2051	1,526	623	220	11	53	0
2144	816	287	59	26	24	10
2201	1923	423	308	33	62	1
3267	811	473	31	0	0	0
3904	1,010	605	141	106	33	4
4055	1,410	343	139	9	5	0
4506	953	747	79	241	23	43
4516	889	222	229	8	42	1
4574	413	290	41	0	35	0
4659	1,731	369	155	29	2	0
4661	582	317	116	36	27	21
4673	713	875	93	105	25	6
4682	582	317	116	36	27	21

Northern Spotted Owl Occupancy

As defined in the protocol, the following definitions apply:

- An occupied site (O) is where a pair (female ♀ and male ♂) of northern spotted owls are detected.

- A resident single (R) is where male (♂) or female (♀) northern spotted owl is detected at least 3 times during the year (at least a week apart or 3 times over a consecutive two- year period and there is no detection of the opposite sex).
- An incidental (I) (female ♀ or male ♂) northern spotted owl occurs when at least one owl is detected on one of the visits, but Pair or Resident status does not apply; Usually refers to a single response by a northern spotted owl.
- An unoccupied (N) site is where northern spotted owls are not detected or if detected do not meet pair or resident status.
- Historical site centers where survey effort is incomplete are identified with the letter U.

Table L-12. Five-year occupancy status of northern spotted owl sites within the analysis area[1]

MSNO[1]	Site Name	Last Year with Pair or Resident Status	Last Year Status	2019	2020	2021	2022	2023
0266	THISTLEBURN CREEK	2019	R	O	O	N	N	U
0267	DEADMAN BUTTE	2015	R	N	N	N	N	U
0269	UPPER BRADS CREEK	2016	R	N	N	N	N	N
0271	MARVIN GARDENS	2010	R	I	I	N	N	N
0272	LITTLE CANYON CREEK	2002	R	I	N	N	N	N
0391	YELLOW CREEK	2012	P	N	N	N	I	I
0392	**ROOKERY**	**2023**	**P**	**N**	**I**	**O**	**O**	**O**
0514	SQUAWK CREEK	2011	R	N	N	N	N	N
1160	38 LOOKOUT	2016	P	N	N	N	N	U
1359	MAUPIN ROAD	1992	P	N	N	N	N	N
1802	EAGLES VIEW	2016	P	N	N	N	N	N
1803	UPPER MARTIN CREEK	2006	P	N	N	N	N	N
1804	DOE CREEK	2016	P	I	N	U	U	N
1816	HANCOCK CREEK	2019	R	O	O	N	N	U
1916	BLACKBERRY CANYON	2010	P	N	N	N	N	N
1923	NORTH MARTIN	2003	P	N	N	N	N	N
1924	UPPER YELLOW CREEK	2005	R	N	N	U	I	I
1925	BRADS TRIB	2007	P	N	N	N	N	N
1972	BEAR CREEK	2018	P	O	N	N	I	I
1977	MYRTLES UMPQUA	2005	P	I	N	N	N	N
1980	SNAIL CANYON	2012	P	N	I	I	N	N
1983	UMPQUA OVERLOOK	2014	P	I	I	I	I	N
1987	RICE FLAT	2010	P	N	N	I	I	I
1988	LOWER THISTLEBURN	2019	P	O	O	N	N	U
1992	YELLOW BUTTE	2016	P	N	N	U	U	N
2049	ELK BEND	2013	P	N	N	N	N	U
2051	BRUSH HEADWATERS	2010	P	N	N	N	N	N
2144	ROCKADILE OVERLOOK	2019	R	O	O	I	N	N
2201	SQUAWK TRIB	2010	B	I	I	N	N	U
3267	**LOWER LITTLE CANYON**	**2023**	**P**	**O**	**O**	**O**	**N**	**O**
3904	MARTINS TRIB	2017	R	N	N	N	N	N
4055	YELLOW MARTIN	2008	P	N	N	N	N	N
4506	FLAGLER CREEK	2012	P	N	N	N	N	N
4516	SPOONER RIDGE	2016	R	N	I	I	N	N
4574	EF FLAGLER CREEK	2008	P	N	N	N	N	N
4659	YELLOW TRIB	2014	R	N	N	N	I	I
4661	NORTH MARTIN II	2004	P	N	N	N	N	N
4673	BLUE HOLE	2009	B	N	N	N	N	N
4682	MARSH TRIB	2013	R	N	N	N	N	N

1-MSNOs in Bold text indicate sites are currently occupied; I= Incidental; N= Unoccupied; P= Pair; O = Occupied reflects status two years including initial status; R = Resident Single; U= Unknown because survey effort incomplete but for 2023 year unknown because not surveyed.

Table L-13. Alternative 2 Summary of NRF, dispersal-only, and capable habitat acres affected by all actions.

Affects to Habitat	Timber Treatment Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
NRF Habitat Removed:	703	1	79	5	788
NRF Habitat Modified	28	0	0	0	28
NRF Habitat Downgraded	0	0	0	0	0
Dispersal-only Habitat Removed	349	0	93	2	444
Dispersal-only Habitat Modified	42	0	0	0	42

Affects to Habitat	Timber Treatment Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
Capable Habitat Removed	0	3	53	15	71
Critical Habitat NRF Removed	51	1	79	4	135
Critical Habitat NRF Modified	0	0	0	0	0
Critical Habitat NRF Downgraded	0	0	0	0	0
Critical Habitat Dispersal-only Removed	57	1	93	1	152
Critical Habitat Dispersal-only Modified	1	0	0	0	1
Critical Habitat Capable Removed	1	2	53	1	57

Table L-14. Alternative 2 modelled northern spotted owl habitat and carrying capacity in the analysis area (BLM modeling tool based on Glen et al. 2017)

	Current Condition	Post Harvest
Habitat (Acres)	29,511.68	28,564.27
Non-Habitat (Acres)	100,966.22	101.912.63
Median Carrying Capacity (# Territories)	51.5	52.0
Actual Occupied Territories (2023)	2	2
Predicted Occupancy Rate (ORC-Tyee=0.17)	8.75	8.84

Table L-15. Alternative 3 Summary of NRF, dispersal-only, and capable habitat acres affected by all actions.

Affects to Habitat	Timber Treatment Harvest Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
NRF Habitat Removed:	1662	3	86	8	1759
NRF Habitat Modified	0	0	0	0	0
NRF Habitat Downgraded	0	0	0	0	0
Dispersal-only Habitat Removed	872	8	113	9	1002
Dispersal-only Habitat Modified	0	0	0	0	0
Capable Habitat Removed	0	7	0	25	32
Critical Habitat NRF Removed	120	3	86	5	214
Critical Habitat NRF Modified	0	0	0	0	0
Critical Habitat NRF Downgraded	0	0	0	0	0
Critical Habitat Dispersal-only Removed	130	8	113	1	252
Critical Habitat Dispersal-only Modified	0	0	0	0	0
Critical Habitat Capable Removed	1	7	64	0	72

Table L-16. Alternative 2 modelled northern spotted owl habitat and carrying capacity in the analysis area (BLM modeling tool based on Glen et al. 2017)

	Current Condition	Post Harvest
Habitat (Acres)	29,511.68	27,423.65
Non-Habitat (Acres)	100,966.22	103054.25
Median Carrying Capacity (# Territories)	51.5	51.0
Actual Historic NSO Territories	35	35
Actual Occupied Territories (2023)	2	2
Predicted Occupancy Rate (ORC-Tyee=0.17)	8.75	8.67

Table L-17. Alternative 4 Summary of NRF, dispersal-only, and capable habitat acres affected by all actions

Affects to Habitat	Timber Treatment Harvest Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
NRF Habitat Removed	1243	3	78	8	1332
NRF Habitat Modified	4	0	0	0	4

NRF Habitat Downgraded	0	0	0	0	0
Dispersal-only Habitat Removed	326	6	107	3	442
Dispersal-only Habitat Modified	155	0	0	0	155
Capable Habitat Removed	0	4	50	13	67
Critical Habitat NRF Removed	191	3	78	5	277
Critical Habitat NRF Modified	0	0	0	0	0
Critical Habitat NRF Downgraded	0	0	0	0	0
Critical Habitat Dispersal-only Removed	71	6	107	1	185
Critical Habitat Dispersal-only Modified	0	0	0	0	0
Critical Habitat Capable Removed	0	4	50	3	57

Table L-18. Alternative 4 modelled northern spotted owl habitat and carrying capacity in the analysis area (BLM modeling tool based on Glen et al. 2017)

	Current Condition	Post Harvest
Habitat (Acres)	29,511.68	28,130.37
Non-Habitat (Acres)	100,966.22	102347.53
Median Carrying Capacity (# Territories)	51.5	52
Actual Historic NSO Territories	35	35
Actual Occupied Territories (2023)	2	2
Occupancy Rate (ORC-Tyee=0.17)	8.75	8.84

Table L-19. Alternative 5 Summary of NRF, dispersal-only, and capable habitat acres affected by all actions.

Affects to Habitat	Timber Treatment Harvest Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
NRF Habitat Removed:	0	3	86	10	99
NRF Habitat Modified	1662	0	0	0	1662
NRF Habitat Downgraded	0	0	0	0	0
Dispersal-only Habitat Removed	0	8	113	9	130
Dispersal-only Habitat Modified	872	0	0	0	872
Capable Habitat Removed	0	7	50	33	90
Critical Habitat NRF Removed	0	3	86	6	95
Critical Habitat NRF Modified	0	0	0	0	0
Critical Habitat NRF Downgraded	0	0	0	0	0
Critical Habitat Dispersal-only Removed	0	8	113	1	122
Critical Habitat Dispersal-only Modified	120	0	0	0	120
Critical Habitat Capable Removed	0	7	64	3	74

Table L-20. Alternative 5 modelled northern spotted owl habitat and carrying capacity in the analysis area (BLM modeling tool based on Glen et al. 2017)

	Current Condition	Post Harvest
Habitat (Acres)	29,511.68	29,170.67
Non-Habitat (Acres)	100,966.22	101307.23
Median Carrying Capacity (# Territories)	52.0	51.5
Actual Historic NSO Territories	35	35
Actual Occupied Territories (2023)	2	2
Occupancy Rate (ORC-Tyee=0.17)	8.84	8.75

Table L-21. Alternative 6 Summary of NRF, dispersal-only, and capable habitat acres affected by all actions

Affects to Habitat	Timber Treatment Harvest Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
NRF Habitat Removed:	21	4	84	10	119

Affects to Habitat	Timber Treatment Harvest Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
NRF Habitat Modified	1539	0	0	0	1539
NRF Habitat Downgraded	0	0	0	0	0
Dispersal-only Habitat Removed	704	8	108	9	829
Dispersal-only Habitat Modified	122	0	0	0	122
Capable Habitat Removed	0	6	61	33	100
Critical Habitat NRF Removed	2	4	83	6	95
Critical Habitat NRF Modified	102	0	0	0	102
Critical Habitat NRF Downgraded	0	0	0	0	0
Critical Habitat Dispersal-only Removed	76	8	108	1	193
Critical Habitat Dispersal-only Modified	22	0	0	0	22
Critical Habitat Capable Removed	0	6	60	3	69

Table L-22. Alternative 6 modelled northern spotted owl habitat and carrying capacity in the analysis area (BLM modeling tool based on Glen et al. 2017)

	Current Condition	Post Harvest
Habitat (Acres)	29,511.68	29,180.56
Non-Habitat (Acres)	100,966.22	101297.34
Median Carrying Capacity (# Territories)	52	51
Actual Historic NSO Territories	35	35
Actual Occupied Territories (2023)	2	2
Occupancy Rate (ORC-Tyee=0.17)	8.75	8.84

Table L-23. Summary of acres of NRF and dispersal-only habitat remaining post proposed actions within site MSNO 3267 by Alternative

Alternatives	NRF within the Home Range	Dispersal-only within the Home Range	NRF within the Core-Use Area	Dispersal-only within the Core-Use Area	NRF within the Nest Patch	Dispersal-only within the Nest Patch
Alt.1 (Current Condition)	811	473	31	0	0	**0**
Alternative 2	809	402	31	0	0	**0**
Alternative 3	809	402	31	0	0	**0**
Alternative 4	809	473	31	0	0	**0**
Alternative 5	809	473	31	0	0	**0**
Alternative 6	809	473	0	0	0	**0**

Table L-24. Summary of modelled northern spotted owl carrying capacity by alternative.

	No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Pre-Action Habitat Acres	29,511.68	29,511.68	29,511.68	29,511.68	29,511.68	29,511.68
Post-Action Habitat Acres	29,511.68	28,565.27	27,423.65	28,130.37	29,170.67	29,180.56
Pre Mean Carrying Capacity		51.5	51.5	51	52	52
Post Mean Carrying Capacity		52	51	52	51.5	51
Change in Mean Capacity		+0.5	-0.5	+1	-0.5	-1

Table L-25. Summary of affected acres of northern spotted owl critical habitat within the analysis area by alternative

Alternatives	Acres of NRF Removed	Acres of NRF Modified	Acres of NRF Downgraded	Acres of Dispersal-only Modified	Acres of Dispersal-only Removed	Total Affected NRF Acres	Total Affected Dispersal-only Acres
Alt. 1	0	0	0	0	0	0	**0**
Alt. 2	135	0	0	1	152	135	**153**
Alt. 3	214	0	0	0	252	214	**252**
Alt. 4	277	0	0	0	57	277	**57**
Alt. 5	1	73	0	73	122	95	**242**

Alternatives	Acres of NRF Removed	Acres of NRF Modified	Acres of NRF Downgraded	Acres of Dispersal-only Modified	Acres of Dispersal-only Removed	Total Affected NRF Acres	Total Affected Dispersal-only Acres
Alt 6	75	0	73	73	193	197	**215**

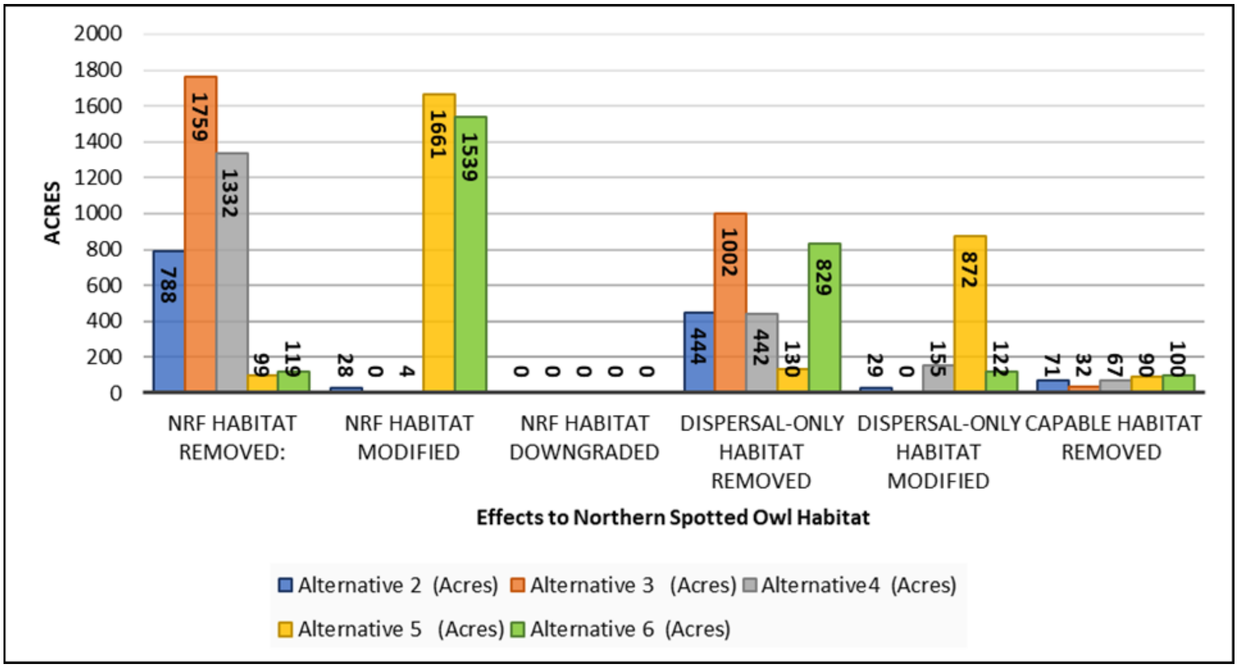


Figure L-1. Effects to northern spotted owl habitat by all alternatives.

Issue 3

Table L-26. Definition of terms describing changes in forest stand conditions used for the marbled murrelet in this analysis.

Term	Definition
Modify	Post-treatment, forest stands would not change their designated nesting habitat function as a result of treatment. Post-treatment, nesting habitat would retain greater than 6 platform trees per five (5) acre roving circle. (ROD RMP, p. 98). For recruitment habitat, post-treatment forest stands, would continue to develop into nesting habitat.
Downgrade	Harvest treatments would alter the function of marbled murrelet nesting habitat (reducing the canopy cover to a minimum of 40 percent) so that the forest stands no longer supports nesting. Downgraded nesting habitat would serve as recruitment habitat with the potential to develop platform trees in the future.
Remove	Harvest treatments would alter marbled murrelet nesting habitat so that it no longer provides nesting or recruitment conditions.

Table L-27. Acres of land ownership in marbled murrelet analysis area

Total Acres	BLM (percent of Total)	Private/ Local Government (percent of Total)	Water/ Undetermined (percent of Total)
84,978	21,107 (25)	63,516 (75)	**355 (less than 1)**

Table L-28. Marbled murrelet habitat acres within the Analysis Area by LUA on BLM-administered lands

Habitat Type	District-Designated Reserve (percent of Habitat Total)	Harvest Land Base (percent of Habitat Total)	Late Successional Reserve (percent of Habitat Total)	Riparian Reserve (percent of Habitat Total)	Habitat Acreage Totals
Nesting	122 (1)	1,821 (16)	8,643 (75)	1,004 (9)	**11,590**
Recruitment	277 (4)	3,714 (57)	221 (3)	2,352 (36)	**6,564**
Capable	122 (4)	1,672 (57)	18 (less than 1)	1,098 (38)	**2,910**
Non-capable	22 (51)	18 (42)	2 (5)	1 (2)	**43**
Totals	**543**	**7,225**	**8,884**	**4,454**	**21,107**

Table L-29. Alternative 2 Summary of nesting, recruitment, and capable habitat acres affected by all actions

Affects to Habitat	Timber Treatment Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
Nesting Habitat Removed	703	1	79	5	788
Nesting Habitat Modified	28	0	0	0	28
Nesting Habitat Downgraded	0	0	0	0	0
Recruitment Habitat Removed	349	0	93	2	444
Recruitment Habitat Modified	29	0	0	0	29
Capable Habitat Removed	0	3	53	15	71
Critical Habitat Nesting Removed	677	1	48	3	729
Critical Habitat Nesting Modified	0	0	0	0	0
Critical Habitat Nesting Downgraded	0	0	0	0	0
Critical Habitat Recruitment Removed	146	1	46	1	194
Critical Habitat Recruitment Modified	0	0	0	0	0
Critical Habitat Capable Removed	0	1	36	5	42

Table L-30. Alternative 2 nesting and recruitment habitat acres affected by VRH and commercial thinning.

Habitat Acres	Existing Condition	Acres of Habitat Removed	Acres of Habitat Downgraded	Acres of Habitat Modified
Nesting	11,590	703	0	28
Recruitment	6,564	349	0	**29**
Acreage Totals	18,154	1052	4	**57**

Table L-31. Acres of marbled habitat OR-04-f unit within the analysis area (11,590 acres of nesting and 6,564 acres of recruitment), affected by the proposed actions by alternative.

Alternatives	Acres of Nesting Habitat Removed (percent of Total)	Acres of Nesting Habitat Modified (percent of Total)	Acres of Nesting Habitat Downgraded (percent of Total)	Acres of Recruitment Habitat Modified (percent of Total)	Acres of Recruitment Habitat Removed (percent of Total)	Total Affected Nesting Acres (percent of Total)	Total Affected Recruitment Acres (percent of Total)
Alt. 1	0	0	0	0	0	0	0
Alt. 2	729	0	0	0	194	729	194
Alt. 3	1589	0	0	0	340	1589	340
Alt. 4	1085	0	0	2	198	1085	200
Alt. 5	56	0	1533	268	52	1589	320
Alt. 6	137	0	1470	60	267	1600	327

Table L-32. Alternative 3 Summary of nesting, recruitment, and capable habitat acres affected by all actions.

Affects to Habitat	Timber Treatment Harvest Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
Nesting Habitat Removed	1662	3	86	8	1759
Nesting Habitat Modified	0	0	0	0	0
Nesting Habitat Downgraded	0	0	0	0	0
Recruitment Habitat Removed	872	8	113	9	1002
Recruitment Habitat Modified	0	0	0	0	0
Capable Habitat Removed	0	7	0	25	32
Critical Habitat Nesting Removed	1533	1	47	8	1589
Critical Habitat Nesting Modified	0	0	0	0	0
Critical Habitat Nesting Downgraded	0	0	0	0	0
Critical Habitat Recruitment Removed	288	2	47	3	340
Critical Habitat Recruitment Modified	0	0	0	0	0
Critical Habitat Capable Removed	0	4	44	21	69

Table L-33. Alternative 4 Summary of nesting, recruitment, and capable habitat acres affected by all actions.

Affects to Habitat	Timber Treatment Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
Nesting Habitat Removed	1243	3	78	8	1332
Nesting Habitat Modified	4	0	0	0	4
Nesting Habitat Downgraded	0	0	0	0	0
Recruitment Habitat Removed	326	6	107	3	442
Recruitment Habitat Modified	155	0	0	0	155
Capable Habitat Removed	0	4	50	13	67
Critical Habitat Nesting Removed	1022	2	51	10	1085
Critical Habitat Nesting Modified	0	0	0	0	0
Critical Habitat Nesting Downgraded	0	0	0	0	0
Critical Habitat Recruitment Removed	145	2	48	3	198
Critical Habitat Recruitment Modified	0	2	0	0	2
Critical Habitat Capable Removed	0	11	38	11	60

Table L-34. Alternative 4 nesting and recruitment habitat acres affected by VRH and commercial thinning

Habitat Acres	Existing Condition	Acres of Habitat Removed	Acres of Habitat Downgraded	Acres of Habitat Modified
Nesting	11,590	1243	0	**0**
Recruitment	6,564	326	0	**155**
Acreage Totals	18,154	1569	0	**155**

Table L-35. Alternative 5 Summary of nesting, recruitment, and capable habitat acres affected by all actions

Affects to Habitat	Timber Treatment Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges	Total Acres
Nesting Habitat Removed	0	3	86	10	99
Nesting Habitat Modified	1662	0	0	0	1662
Nesting Habitat Downgraded	0	0	0	0	0
Recruitment Habitat Removed	0	8	113	9	130
Recruitment Habitat Modified	872	0	0	0	872
Capable Habitat Removed	0	7	50	33	90
Critical Habitat Nesting Removed	0	1	47	8	56
Critical Habitat Nesting Modified	0	0	0	0	0
Critical Habitat Nesting Downgraded	1533	0	0	0	1533
Critical Habitat Recruitment Removed	0	2	47	3	52
Critical Habitat Recruitment Modified	268	0	0	0	268
Critical Habitat Capable Removed	1	4	44	14	63

Table L-36. Alternative 5 nesting and recruitment habitat acres modified or downgraded by commercial thinning in the HLB-LITA and HLB-MITA LUAs

Habitat Acres	Existing Condition	Acres of Habitat Removed	Acres of Habitat Downgraded	Acres of Habitat Modified
Nesting	11,590	0	1,662	0
Recruitment	6,564	0	0	872
Acreage Totals	18,154	0	1,662	872

Table L-37. Alternative 6 Summary of nesting, recruitment, and capable habitat acres affected by all actions.

Affected Habitat	Timber Treatment Acres	Road Construction Activity Acres	Road Renovation Activity Acres	Yarding Wedges Acres	Total Acres
Nesting Habitat Removed:	21	4	84	10	119
Nesting Habitat Modified	0	0	0	0	0
Nesting Habitat Downgraded	1539	0	0	0	1539
Recruitment Habitat Removed	704	8	108	9	829
Recruitment Habitat Modified	122	0	0	0	122
Critical Habitat Nesting Removed	0	33	96	8	137
Critical Habitat Nesting Modified	0	0	0	0	0
Critical Habitat Nesting Downgraded	1470	0	0	0	1470
Critical Habitat Recruitment Modified	60	0	0	0	60
Critical Habitat Recruitment Removed	192	7	65	3	267
Critical Habitat Capable Removed	0	4	36	21	61

Issue 4

Table L-38. shows the three watersheds, eight subwatersheds, and 13 drainage areas which comprise the Blue and Gold Project Area.

Watershed (HUC10)	Subwatershed (HUC12)	Drainage Area (HUC14)
Elk Creek	Brush Creek	Headwaters Brush Creek
	Yoncalla Creek	DeVore Mountain
		Huntington Creek
Upper Umpqua River	Yellow Creek	Bear-Doe Creek
		Upper Yellow Creek
		Lower Yellow Creek
	Mehl Creek- Umpqua River	Brads Creek
	McGee Creek- Umpqua River	Martin Creek
	Lost Creek- Umpqua River	Little Canyon Creek
Calapooya Creek	Cabin Creek	Marsh Creek
		Cabin Creek
	Williams Creek-Calapooya Creek	Norton Creek
		Dodge Canyon

Table L-39. BLM and Private forested acres by Land Use Allocation and Age for Bear-Doe Creek, Headwaters Brush Creek, and Upper Yellow Creek HUC 14 Drainage Areas.

Drainage Area	0 Year	10 Year	20 Year	30 Year	40 Year	50 Year	60 Year	70 Year	80 Year	90 Year	100 Year	110 Year	120 Year	130+ Year	Totals
Bear-Doe Creek															
Harvest Land Base	0	0	6	110	112	129	25	13	52	14	0	13	240	242	956
Reserve	0	0	5	37	39	66	4	5	2	27	0	6	77	698	966
Private		665						682							1347
Headwaters Brush Creek															
Harvest Land Base			21	184	58	258	132	4	0	9	0	17	15	39	737
Reserve			10	189	82	180	124	0	0	0	0	14	6	842	1477
Private		1782						182							1964
Upper Yellow Creek															
Harvest Land Base			52	129	88	114	271	4	50	1	5	0	52	778	1544
Reserve			5	83	26	39	52	0	5	2	0	0	5	1618	1835
Private		1968						630							2598

Note: The Reserve category includes BLM forested acres in the LSR, and RR. The HLB category includes all BLM acres in the Moderate Intensity Timber Area and Light Intensity Timber Area. For Private forested acres, a very small amount of area was in partly recovered and recovered, but too small to accurately break out.

Table L-40. Projected 2025 BLM and Private forested acres by Land Use Allocation and Age for Bear-Doe Creek, Headwaters Brush Creek, and Upper Yellow Creek HUC 14 Drainage Areas following proposed harvest under Alternatives 2,3, and 4 where a potential response to low flow is expected.

Drainage Area	0 Year	10 Year	20 Year	30 Year	40 Year	50 Year	60 Year	70 Year	80 Year	90 Year	100 Year	110 Year	120 Year	130+ Year	Totals
Bear-Doe Alt 2															
Harvest Land Base	294	0	6	110	112	16	24	6	52	14	0	0	88	234	956
Reserve	0	0	5	37	39	66	4	5	2	27	0	6	77	698	966
Private		665						682							1347
Bear-Doe Alt 3															
Harvest Land Base	694	0	6	110	112	34	0	0	0	0	0	0	0	0	956
Reserve	0	0	5	37	39	66	4	5	2	27	0	6	77	698	966
Private		665						682							1347
Headwaters Brush Creek Alt 3															
Harvest Land Base	261	0	21	184	58	174	0	0	0	0	0	0	0	39	737
Reserve	0	0	10	189	82	180	124	0	0	0	0	14	6	842	1477
Private		1782						182							1964
Upper Yellow Creek Alt 3															
Harvest Land Base	991	0	52	129	88	59	222	0	0	0	3	0	0	0	1544
Reserve			5	83	26	39	52	0	5	2	0	0	5	1618	1835
Private		1968						630							2598
Bear Doe Alt 4															
Harvest Land Base	694	0	6	110	112	34	0	0	0	0	0	0	0	0	956
Reserve	0	0	5	37	39	66	4	5	2	27	0	6	77	698	966
Private		665						682							1347

Figure L-2. Projected Flow Status 2024 to 2160 All Acres Combined. Under Alternative 2 Bear-Doe Creek HUC 14 Drainage Area

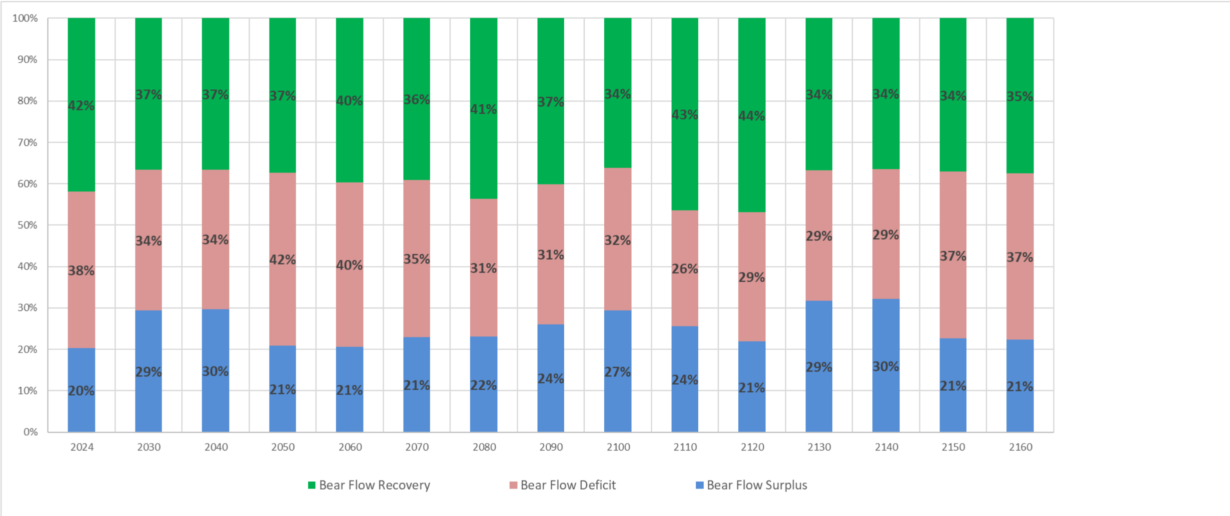


Figure L-3. Projected Flow Status 2024 to 2160 All Acres Combined. Under Alternative 3 Bear-Doe Creek HUC 14 Drainage Area

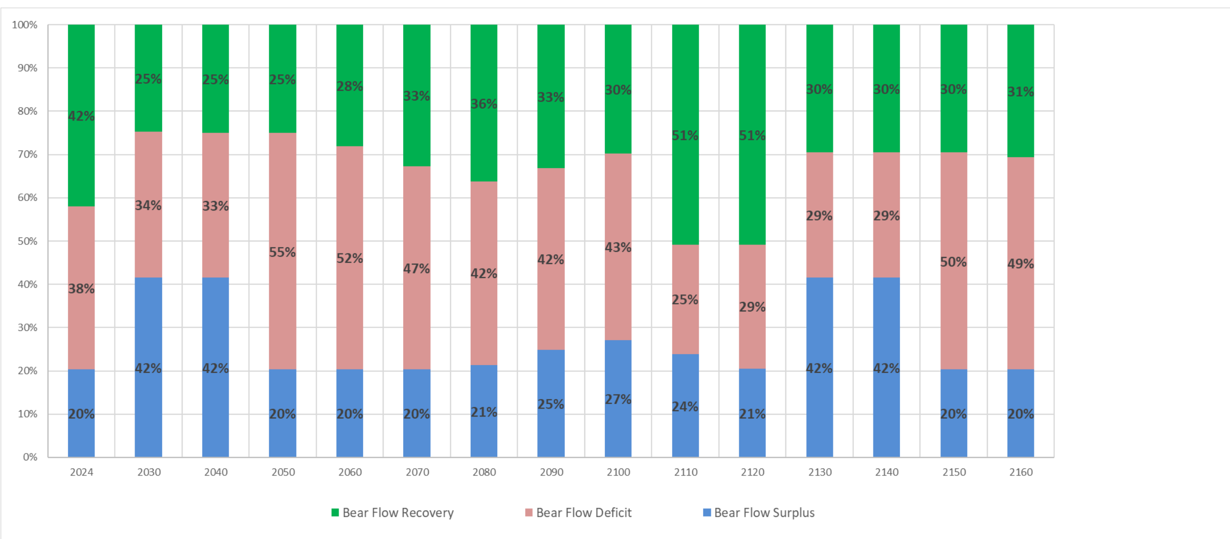


Figure L-4. Projected Flow Status 2024 to 2160 All Acres Combined under Alternative 3 Headwaters Brush Creek HUC 14 Drainage Area

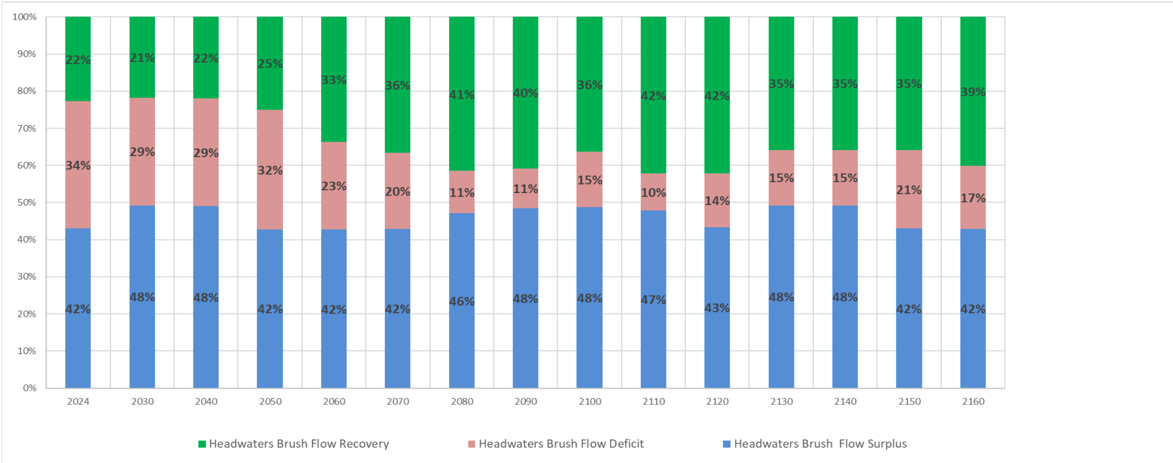


Figure L-5. Projected Flow Status All Acres Combined under Alternative 3 Upper Yellow Creek HUC 14 Drainage Area

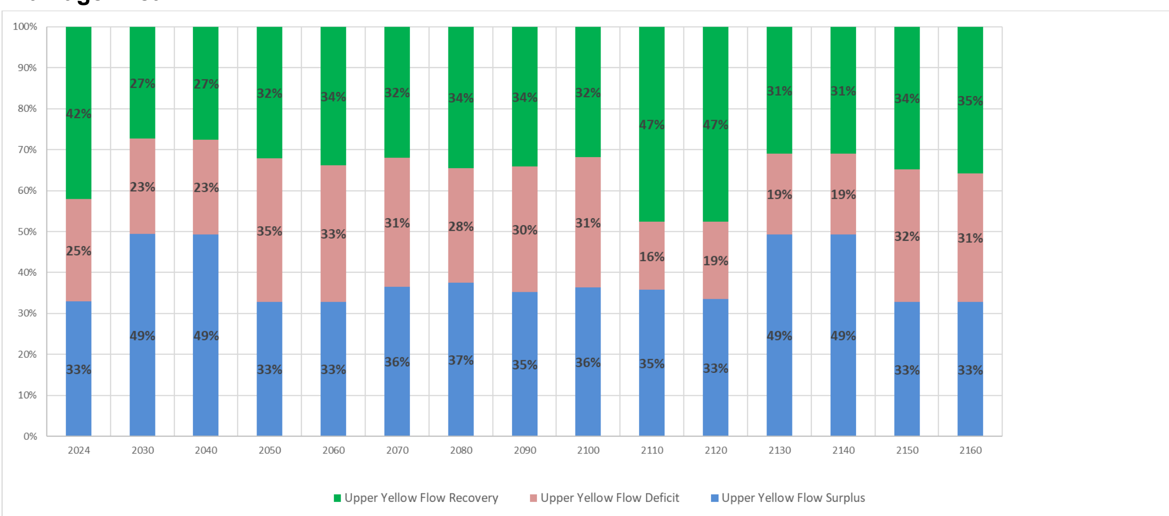


Figure L-6. Projected Flow Status All Acres Combined under Alternative 4 Bear-Doe Creek HUC 14 Drainage Area

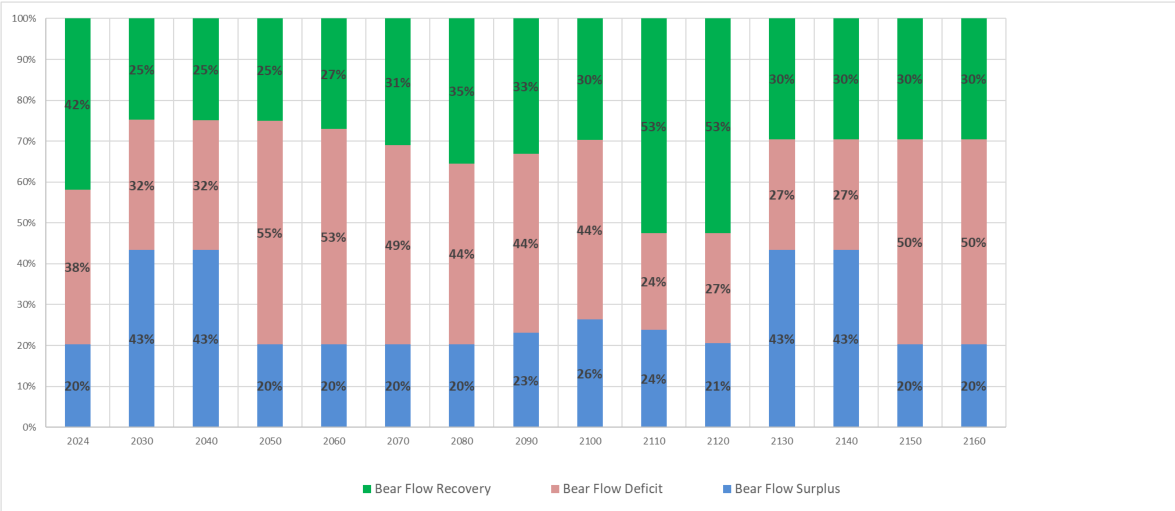


Table L-41. Summer flow deficit for different experimental harvest treatments

Experimental Treatment	Forest Age (Years) R=reference stand T=treatment stand	Summer Flow Deficit (Percent)	Notes
H.J. Andrews and Coyote Creek **Clearcutting five 25–237-acre catchments, plantations greater than 50 years old**	R 100–500 T 100–500	40–75	
Alsea **Clearcutting one 185-acre drainage, plantation 40–53 years old**	R 90–170 T 70–110	50	
H.J. Andrews **One larger-opening patch cut 250-acre catchment, patches 13, 20, and 28 acres**	R 450–50 T 450–500	21	One patch overlapped the main stem, and one patch overlapped headwater streams
Alsea **One larger-opening patch cut, 768-acre drainage, three 61-acre patches with plantations 40–53 years old**	R 90–170 T 50–110	14	50–100-foot buffers on perennial streams, intermittent streams not buffered
Coyote Creek **One smaller-opening patch cut, 169-acre catchment, 30 percent cut, patches greater than eight acres**	R 100–300 T 100–300+	None	Some patches adjacent to streams and overlapping streams

Sources: Perry and Jones (2016), Segura *et al.* (2020), Harr and Krygier (1972), Rothacher (1964)

Table L-42. Summary of Low Flow Response for the HUC 14 Drainages within the Blue and Gold project area that exceed detection limits.

HUC 14 Watershed	Discharge 50 Percent Duration July (cfs)	Discharge 50 Percent Duration September (cfs)	Range of Variability* (cfs)	Maximum Response Alt 2	Maximum Response Alt 3	Maximum Response Alt 4
Headwaters Brush Creek	1.15	0.409	0.09 to 2.5	No Change	-15% 0.35 to 0.98 cfs	No Change
Bear-Doe Creek	0.878	0.306	0.068 to 4.8	-15% 0.26 to 0.75 cfs	-15% 0.26 to 0.75 cfs	-15% 0.26 to 0.75cfs
Upper Yellow	1.63	0.598	0.14 to 3.5	No Change	-15% 0.51 to 1.4 cfs	No Change

Data from StreamStats | U.S. Geological Survey (usgs.gov) https://www.usgs.gov/streamstats

*Range of variability is based on 90 percent prediction interval provided by USGS.

Table L-43. Equivalent Clearcut Area (ECA) by Alternative For each HUC 14 Drainage within the Blue and Gold project area

HUC 14 Drainages	Drainage Size (Acres)	ECA Threshold (%)	ECA (%) Alt 1	ECA (%) Alt 2	ECA (%) Alt 3	ECA (%) Alt 4	ECA (%) Alt 5	ECA (%) Alt 6
Headwaters Brush Creek	4219	29	23	26	**30**	25	23	27
DeVore Mountain	8604	29	8	8	9	8	8	9
Huntington Creek	2304	29	10	10	13	10	10	12
Bear-Doe Creek	3269	29	21	**30**	**47**	**44**	21	24
Upper Yellow	6055	29	14	26	**36**	25	14	16
Lower Yellow	4200	29	20	23	26	25	20	21
Brads Creek	4106	29	9	10	15	10	9	10
Martin Creek	2538	29	8	8	24	8	8	8
Little Canyon Creek	4641	29	10	13	7	10	10	11
Marsh Creek	2489	29	11	13	18	11	11	13
Cabin Creek	13099	29	10	11	12	11	10	11
Norton Creek	11070	29	7	8	9	8	7	8
Dodge Canyon	5925	29	9	9	6	10	9	10

Table L-44 Percent Area in Road by Alternative For each HUC 14 Drainage within the Blue and Gold project area

HUC 14 Drainages	Road Area Current	Road Area Alt 1	Road Area Alt 2	Road Area Alt 3	Road Area Alt 4	Road Area Alt 5	Road Area Alt 6
Headwaters Brush Creek	4.08	4.08	4.11	4.21	4.10	4.21	4.21
DeVore Mountain	4.22	4.22	4.23	4.23	4.23	4.23	4.23
Huntington Creek	4.76	4.76	4.79	4.95	4.95	4.95	4.92
Bear-Doe Creek	3.16	3.16	3.22	3.66	3.37	3.66	3.66
Upper Yellow	3.26	3.26	3.37	3.73	3.64	3.73	3.73
Lower Yellow	4.49	4.49	4.55	4.78	4.51	4.78	4.78
Brads Creek	4.34	4.34	4.35	4.42	4.42	4.26	4.26
Martin Creek	3.78	3.78	3.80	3.80	3.80	3.80	3.80
Little Canyon Creek	4.25	4.25	4.26	4.26	4.25	4.26	4.26
Marsh Creek	5.05	5.05	5.08	5.15	5.08	5.05	5.11
Cabin Creek	5.24	5.24	5.25	5.25	5.25	5.25	5.25
Norton Creek	2.71	2.71	2.71	2.79	2.77	2.79	2.72
Dodge Canyon	4.32	4.32	4.32	4.40	4.40	4.40	4.40

Table L-45. Summary of Peak Flow Response for the HUC 14 Drainages within the Blue and Gold project area that exceed detection limits.

	Discharge 2 Year RI (cfs)	Discharge 5 Year RI (cfs)	Range of Variability* (cfs)	Maximum Response Alt 2	Maximum Response Alt 3	Maximum Response Alt 4
Headwaters Brush Creek	465	682	274 to1150	No Change	+11% 516 to 757 cfs	No Change
Bear-Doe Creek	359	526	212 to 889	+11% 398 to 584 cfs	+18% 424 to 620 cfs	+16% 416 to 610 cfs
Upper Yellow	558	827	329 to 1400	No Change	+14% 636 to 943 cfs	No Change

Data from StreamStats | U.S. Geological Survey (usgs.gov) https://www.usgs.gov/streamstats

*Range of variability is based on 90 percent prediction interval provided by USGS.

Issue 5

Photo 1. Location of proposed Yellow Creek crossing. Note low gradient habitat and simplified channel.

Photo 2. Representative substrate present in the analysis area

Issue 6

Table L-46 Adapted from Table 3-34. Stand-level fire hazard ratings by structural stage with likely fire behavior fuel model group (PRMP/FEIS p.243)

Structural Stages	Subdivisions	Fire Hazard	Likely Fuel Model Group
Early Successional	with Structural Legacies	Moderate	Slash Blowdown or Grass Shrub
	without Structural Legacies	Moderate	
Stand Establishment	with Structural Legacies	High	Shrub or Timber Shrub
	without Structural Legacies	High	
Young Stands – High Density	with Structural Legacies	High	Timber Shrub Understory
	without Structural Legacies	High	
Young Stands – Low Density	with Structural Legacies	Moderate	Timber Shrub or Timber Litter
	without Structural Legacies	Moderate	
Mature	Single-Layered Canopy	Low	Timber Litter
	Multi-Layered Canopy	Mixed	Timber Shrub
Structurally-complex	Developed Structurally-complex	Mixed	Timber Shrub or Timber Litter
	Existing Old Forest	Mixed	
	Existing Very Old Forest	Mixed	

Figure L-7: Example screen capture from STFB for part of the largest fire modeled for Alternative 6 post-treatment. Green is the proposed harvest units, grey is the ignition polygon, red is the modeled fire perimeter after six hours, and the blue building circles are estimated structure locations.

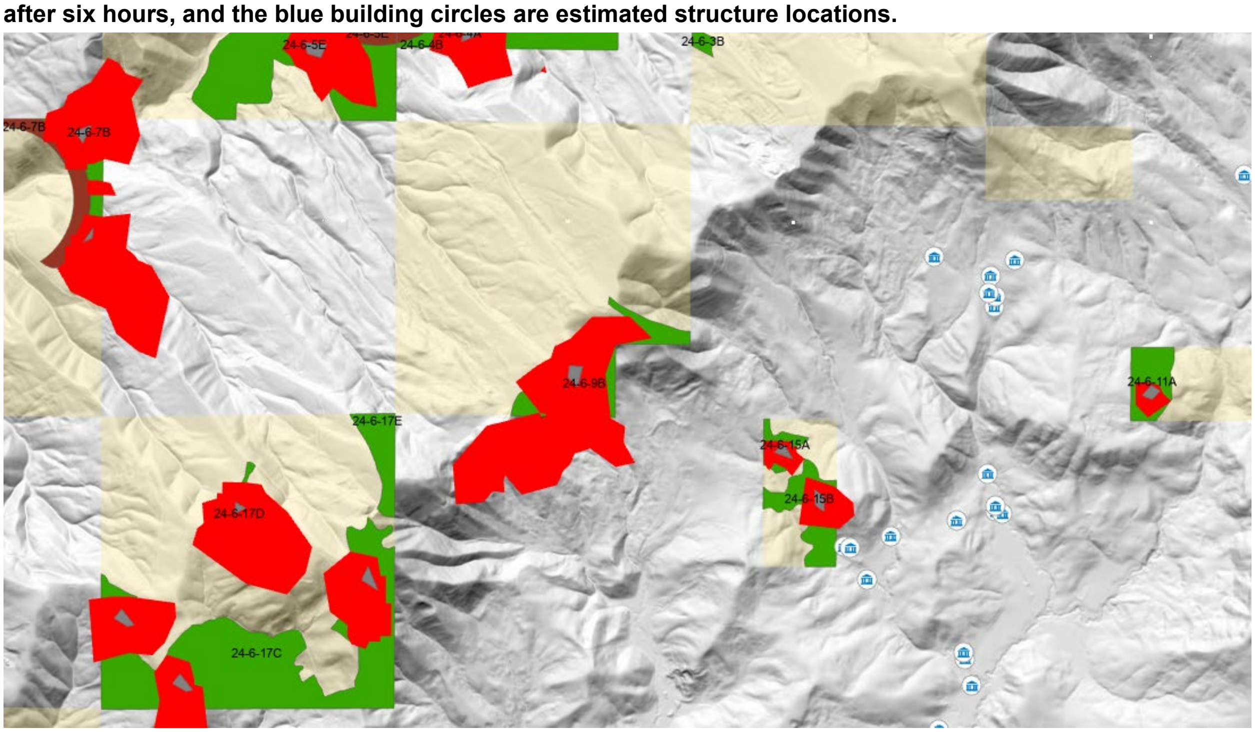


Table L-47: Fire hazard rating for proposed treatment acres within the Wildland Development Area (WDA) by alternative post-treatment, summarization

Hazard Rating	Alternative 1 Treatment Acres	Alternative 2 Treatment Acres	Alternative 3 Treatment Acres	Alternative 4 Treatment Acres	Alternative 5 Treatment Acres	Alternative 6 Treatment Acres
Low	372	36	0	136	1,261	992
Mixed	889	0	0	0	0	0
Moderate	0	605	1,476	902	0	356
High	215	0	0	25	215	33
Untreated	0	623	0	413	0	95
Total	1,476	1,476	1,476	1,476	1,476	1,476

Figure L-8: Proportion of fire hazard rating for proposed units post-treatment by alternative including deferred acres within unit boundaries.

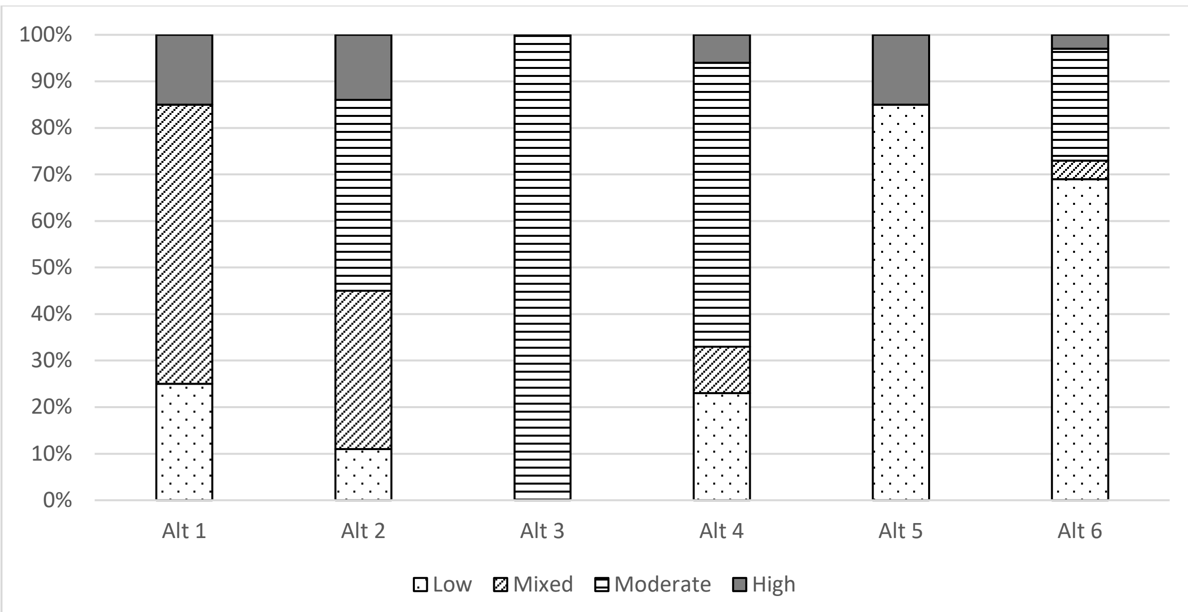


Table L-48. Alternative 1 STFB average modeled fire size in acres and the acres affected by the largest modeled fire overlayed with ownership and estimated building locations.

	Current Conditions	Aged 20 years	Aged 40 years
Average fire size high conditions	641	692	623
Average fire size low conditions	579	640	584
Largest fire acres in WDA	461	498	443
Largest fire private land acres in WDA	63	57	43
Estimated structures impacted by largest modeled fire	0	0	0

Table L-49. Alternative 2 STFB average modeled fire size in acres and the acres affected by the largest modeled fire overlayed with ownership and estimated building locations.

	Immediately post-treatment	Aged 20 years	Aged 40 years
Average fire size high conditions	2,390	2,595	2,076
Average fire size low conditions	1,872	1,929	1,529
Largest fire acres in WDA	1,434	1,742	1,236
Largest fire private land acres in WDA	303	526	250
Estimated structures impacted by largest modeled fire	0	1	0

Table L-50. Alternative 3 STFB average modeled fire size in acres and the acres affected by the largest modeled fire overlayed with ownership and estimated building locations.

	Immediately post-treatment	Aged 20 years	Aged 40 years
Average fire size high conditions	4,991	5,597	4,424
Average fire size low conditions	3,879	4,079	3,185
Largest fire acres in WDA	3,192	3,777	2,903
Largest fire private land acres in WDA	822	1,074	774
Estimated structures impacted by largest modeled fire	0	7	0

Table L-51. Alternative 4 STFB average modeled fire size in acres and the acres affected by the largest modeled fire overlayed with ownership and estimated building locations.

	Immediately post-treatment	Aged 20 years	Aged 40 years
Average fire size high conditions	3,320	3,552	2,920
Average fire size low conditions	2,617	2,659	2,136
Largest fire acres in WDA	2,438	2,596	2,064
Largest fire private land acres in WDA	621	772	509
Estimated structures impacted by largest modeled fire	0	3	0

Table L-52. Alternative 5 STFB average modeled fire size in acres and the acres affected by the largest modeled fire overlayed with ownership and estimated building locations.

	Immediately post-treatment	Aged 20 years	Aged 40 years
Average fire size high conditions	3,055	405	489
Average fire size low conditions	2,454	382	457
Largest fire acres in WDA	1,933	283	348
Largest fire private land acres in WDA	395	7	20
Estimated structures impacted by largest modeled fire	0	0	0

Table L-53. Alternative 6 STFB average modeled fire size in acres and the acres affected by the largest modeled fire overlayed with ownership and estimated building locations.

	Immediately post-treatment	Aged 20 years	Aged 40 years
Average fire size high conditions	3,794	2,150	1,756
Average fire size low conditions	2,951	1,630	1,278
Largest fire acres in WDA	2,307	1,263	1,027
Largest fire private land acres in WDA	528	248	221
Estimated structures impacted by largest modeled fire	0	0	0

Table L-54. Percentage of treated acres within the WDA by fire hazard rating for 20- or 40-years post-treatment by alternative. Deferred acres by alternative were considered to be the same hazard rating as alternative 1.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Low Hazard	40	25	0	29	100	72
Mixed Hazard	60	34	0	10	0	4
Moderate Hazard	0	0	0	0	0	0
High Hazard	0	41	100	61	0	24
Percent of Proposed WDA acres Treated	100	41	100	72	100	94

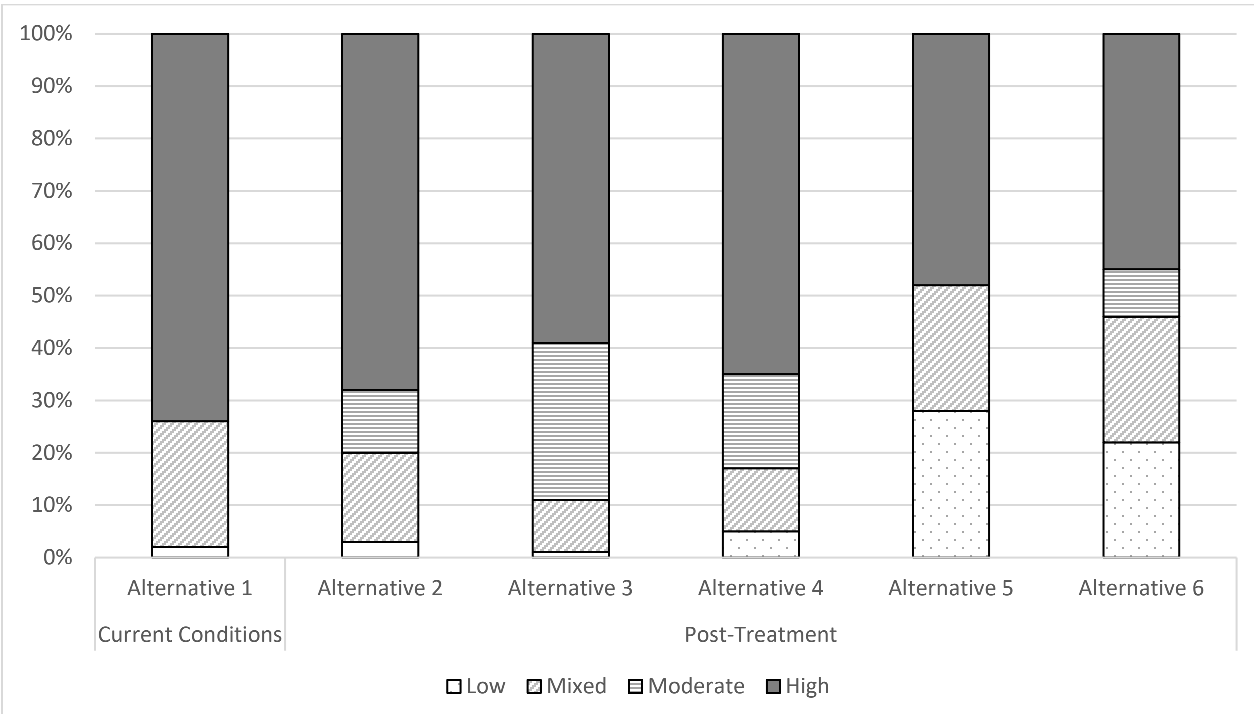


Figure L-9. Percentage of HLB acres in the WDA for the analysis area by alternative.

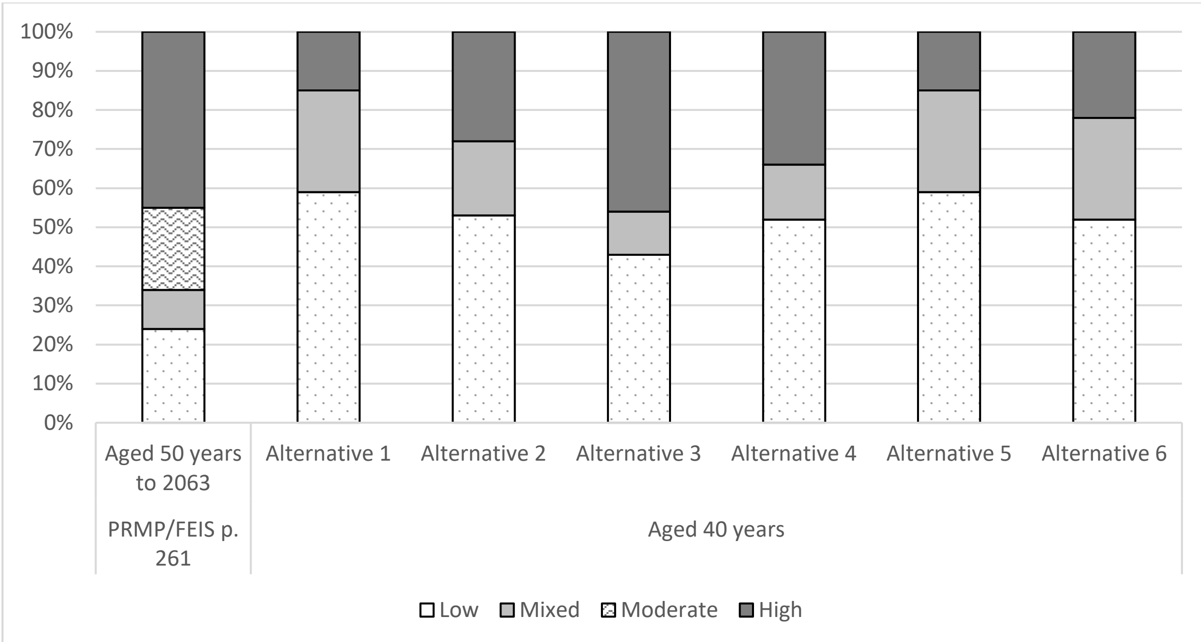


Figure L-10. Percentage of HLB acres in the WDA for the analysis area by alternative, aged 40 years and compared to the conditions predicted in 2063 in the PRMP/FEIS.

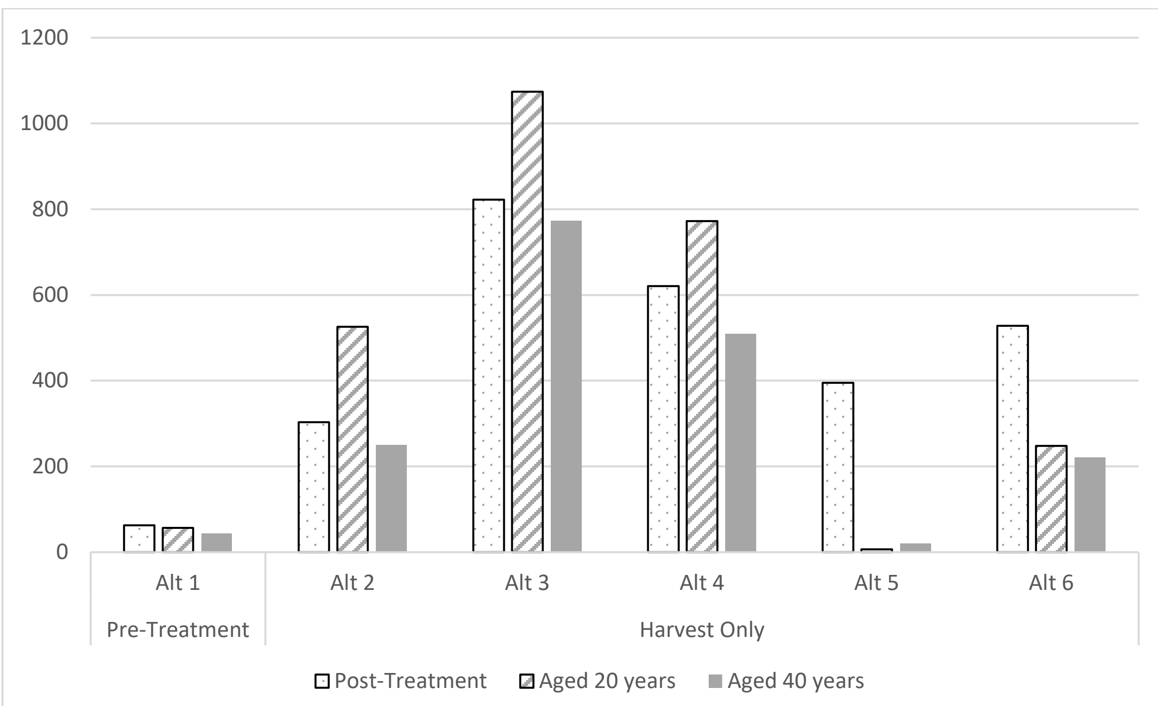


Figure L-11. Acres of private lands burned

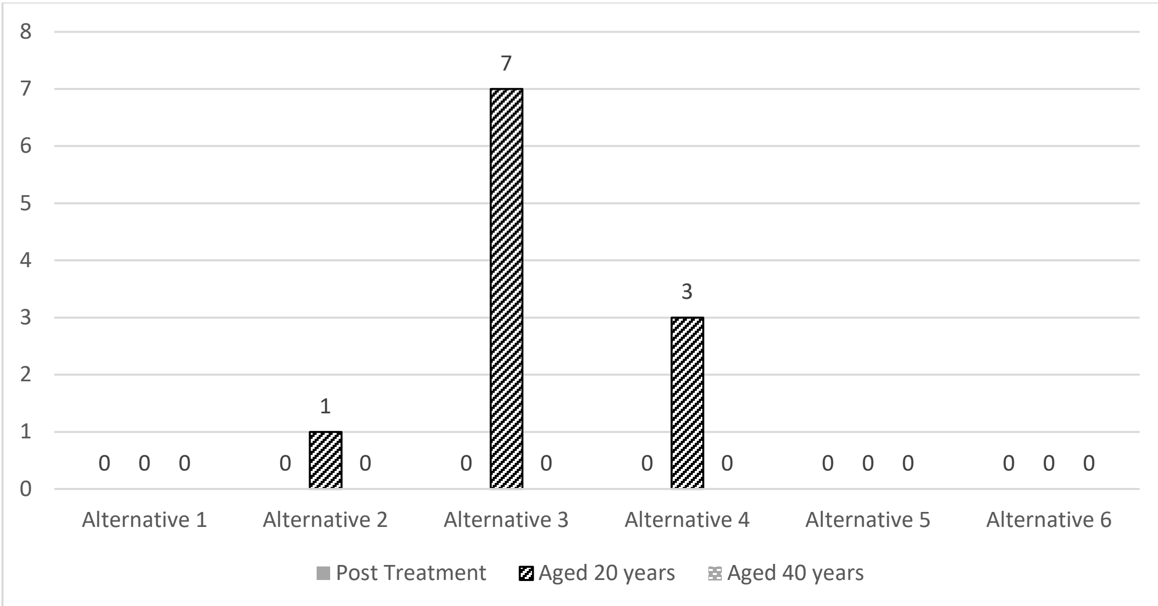


Figure L-12. Number of estimated structures intersected by the largest modeled fire from STFB for each alternative over time.

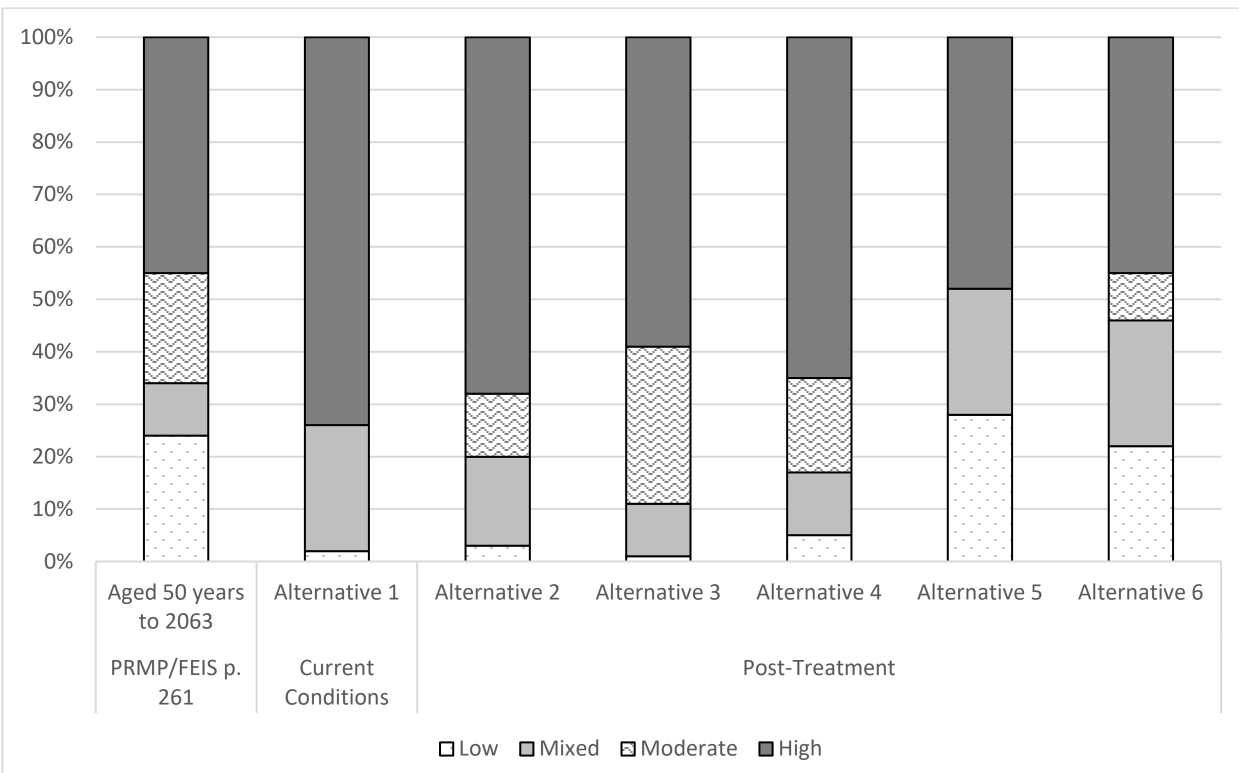


Figure L-13. Proportion of stand level fire hazard in HLB in the coastal/north within the WDA estimated in 2063 compared to the analysis area current conditions and predicted post-treatment for each action alternative.

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References

Agee, J. K., 1993. Fire Ecology of Pacific Northwest Forests. *Island Press,* p. 490.

Albin, B., 2016. *Bureau of Land Management Civil Engineer* [Interview] 2016.

Andrews, P. L., Bevins, C. D. & Seli, R. C., 2008. *BehavePlus fire modeling system, Version 4.0 User's Guide,* Fort Collins, CO: USDA Forest Service, Rocky Mountian Research Station.

Andrews, P. L. & Rothermel, R. C., 1982. *Charts for Interpreting Wildland Fore Behavior Characteristics,* Station Ogden, UT 84401: USDA Forest Service, Intermountian Forest and Range Experiment.

Bennett, M., Shaw, D. & Lowrey, L., 2023. Recent Douglas-fir mortality in the Klamath Mountains ecoregion of Oregon: evidence for a decline spiral. *Journal of Forestry,* Volume 121, pp. 246-261.

Beschta, R. L., Pyles, M. R., Skaugset, A. E. & Surfleet, C. G., 2000. Peakflow responses to forest practices in the western cascades of Oregon, USA. *Journal of Hydrology,* Volume 233, pp. 102-120.

Blandon, K. D. et al., 2019. Increased streamflow in catchments affected by a forest disease epidemic. *Science of the Total Environment,* Volume 691, pp. 112-123.

BLM, 2003. *Special Status Species. USDI IM OR-2003-54.,* Washington DC: USDI Bureau of Land Management.

BLM, 2007. *Roseburg District Annual Program Summary,* Roseburg, Oregon: USDI Bureau of Land Management.

BLM, 2008a. *BLM Manual 6840, Special Status Species Management. IM 2009-039,* Washington, DC: USDI Bureau of Land Mangement .

BLM, 2008b. *Final Envrionmental Impact Statement for the Revision of the Resource Management Plans of the Western Oregon Bureau of Land Managemement,* Portland Oregon: USDI Bureau of Land Mangement.

BLM, 2008c. *National Environmental Policy Act Handbook H-1790-1,* Washington DC: USDI Bureau of Land Management.

BLM, 2008d. *Roseburg District Annual Program Summary,* Roseburg, Oregon: USDI Bureau of Land Management.

BLM, 2010-2016. *Roseburg District Annual Program Summaries,* Roseburg, Oregon: USDI Bureau of Land Mangement .

BLM, 2011. *BLM Manual 9113-1 Roads Design Handbook,* Washington, DC: United States Department of the Interior; Bureau of Land Management.

BLM, 2016a. *Northwestern and Coastal Oregon Record of Decision and Resource Management Plan.* Portland(Oregon): Bureau of Land Management.

BLM, 2016b. *Proposed Resource Managment Plan/Final Environmental Impact Statement for the Resource Management Plans for Western Oregon: Coos Bay, Eugene, Medford, Roseburg, and Salem*

Districts, and the Klamath Falls Field Office of the Lakeview Distirct, Portland Oregon: USDI Bureau of Land Management.
BLM, 2016f. *Roseburg District Annual Program Summary & Monitoring Report FY 2015,* Roseburg Oregon: U.S. Department of the Interior Bureau of Land Management.
BLM, 2017. *Roseburg District Annual Program Summary,* Roseburg Oregon: USDI Bureau of Land Management.
BLM, 2018a. *Biological Assessment for 2018 Package Activities on the Roseburg District BLM. Bureau of Land Management Roseburg District, June 19, 2018.,* Roseburg, Or: USDI Bureau of Land Management.
BLM, 2018b. *Instruction Bulletin No. 2019-005. Secretarial Order 3362: Site-specific Management Activities to Conserve or Restore Big Game Habitat.,* Washington, D.C.: USDI Bureau of Land Management.
BLM, 2019. *Special Status Species. USDI IM OR-2019-003,* Washington DC: USDI Bureau of Land Management.
Bond, B. J. et al., 2002. The zone of vegetation influence on baseflow revealed by diel patterns of streamflow and vegetation water use in a headwater basin. *Hydrological Processes,* Volume 16, pp. 1671-1677.
Bosch, J. & Hewlett, J., 1982. A Review of Catchment Experiments to Determine the Effect of Vegetation Changes on Water Yield and Evapotranspiration. *Journal of Hydrology,* Volume 55, pp. 3-23.
Bottero, A. et al., 2017. Density-dependent vulnerability of forest ecosystems to drough. *Journal of Applied Ecology,* 54(6), pp. 1605-1614.
Brown, A. E. et al., 2005. A review of paired catchment studies for determining changes in water yield resulting from alterations in vegetation. *Journal of Hydrology,* 310(1-4), pp. 28-61.
Burroughs, E. J., 1989. Predicting onsite sediment yield from forest roads. *Proceedings of Conference XXI, International Erosion Control Association, Erosion Control: Technology in Transition,* pp. 223-232.
Carvell, C., 2002. Habitat use and conservation of bumblebees (Bombus spp.) under different grassland management regimes. *Biological Conservation,* 103(1), pp. 33-49.
Chapman, D. W., 1988. Critical Review of Variables Used to Define Effects of Fines in Redds of Large Salmonids. *Transactions of the American Fisheries Society,* 117(1), pp. 1-21.
Chen, J., Franklin, J. F. & Spies, T. A., 1992. Vegetation responses to edge environments in old-growth Douglas-fir forests. *Ecological Applications,* 2(4), pp. 387-396.
Courtney, S. P. et al., 2004. Scientific evaluation of the status of the Northern Spotted Owl. *Sustainable Ecosystems Institute.*
Coutant, C. C., 1999. *Perpectives on Temperature in the Pacific Northwest's Fresh Waters,* Seattle, Washington: Environmental Sciences Division; Publication Number 4849.
Evans Mack, D. et al., 2003. *Methodsfor Surveying Marbled Murrelets in Forests: A Revised Protocol for Land Management and Research,* Olympia, WA: Racific Seabird Group Technical Publication Number 2..
Fettig, C. J. et al., 2007. The effectiveness of vegetation management practices for prevention and control of bark beetle infestations in coniferous forests of the western and southern United States. *Forest Ecology and Management,* Volume 238, pp. 24-53.
Finney, M. A., 2006. *An Overview of FlamMap Fire Modeling Capabilities,* Rocky Mountain Research Station: USDA Forest Service Proceedings RMRS-P-41.
Franklin, J. & Dyrness, C., 1973. *Natural vegetation of Oregon and Washington. Gen. Tech. Rep.,* PNW-8. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station.
FWS, 1995. *Endangered and Threatened Wildlife and Plants; Final Rule to Reclassify the Bald Eagle from Endangered to Threatened in All of the Lower 48 States,* Washington, DC: Federal Register 60(133):3600-36010.

FWS, 1996. *Endangered and threatened wildlife and plants; Final Designation of Critical Habitat for the Marbled Murrelet; Final Rule. May 24, 1996.,* Washington, DC: Federal Register 61 (102): 26256-26320..
FWS, 1997. *Recovery Plan for the Threatened Marbeled Murrelet (Brachyramphus mamoratus) in Washington, Oregon, and California.,* Portland Oregon: US Fish and Wildlife Service.
FWS, 2007. *Endangered and Threatened Wildlife and Plants; Removing the Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Wildlife,* Washington, DC: Federal Register 72(130): pp. 37346-37372.
FWS, 2008a. *Final recovery plan for the northern spotted owl, Strix occidentalis caurina.,* Portland, OR.: US Fish and Wildlife Service.
FWS, 2009a. *U.S. Fish and Wildlife Service. Informal consultation regarding the Roseburg BLM District's proposed commercial thinning, density management and various programmatic activities for fiscal years 2009-2010 that may affect northern spotted owls, marbled murr,* Roseburg, Oregon: Roseburg BLM-FY2009-10-Projects_TAILS 13420-2009-I-0109. 37 pp.
FWS, 2011a. *Revised Recovery Plan for the Northern Spotted Owl (Strix occidentalis caurina),* Portland, Or: US Fish and Wildlife Service.
FWS, 2011b. *Endangered and threatened wildlife and plants; Revised Critical Habitat for the Marbled Murrelet; Final Rule. October 5, 2011.,* Washington, DC: Federal Register 76 (193):61599-61621..
FWS, 2012a. *Protocol for surveying proposed management activities that may impact northern spotted owls.,* Portland, OR: US Fish and Wildlife Service.
FWS, 2012b. *Endangered and threatened wildlife and plants; designation of revised critical habitat for the northern spotted owl,* Portland, Oregon: Federal Register 77: 71876-72068.
FWS, 2013b. *U.S. Fish and Wildlife Service. Game birds below desired condition (GBBDC),* Washington DC: US Fisheris and Wildlife Service .
FWS, 2016. *Biological Opinion on The Bureau of Land Management's Approval of the Proposed Resource Management Plan for Western Oregon.,* Roseburg, OR: Reference Number 01EOFW00-2015-F-0279..
FWS, 2016. *Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Marbled Murrelet.* 81 FR 51348 ed. Washington, DC: Federal Register / Vol. 81, No. 150 / 2016-18376.
FWS, 2018a. *Franklin's Bumble Bee (Bombus franklini) Species Status Assessment. Version 1.0,* Portland, OR: US Fish and Wildlife Service.
FWS, 2018b. *Formal Consultation on the Roseburg District of the Bureau of Land Management's FY 2018 Package of Activities that May Affect the Northern Spotted Owl, the Marbled Murrelet and designated Critical Habitats for both species.,* Roseburg, OR: FWS Reference Number 01EOFW00-2018-F-0508..
FWS, 2019. *Endangered and Threatened Wildlife and Plants; Threatened Species Status for Franklin's Bumble Bee (Bombus franklini); Proposed Rule,* Washington, DC: US Fish and Wildlife Service.
FWS, 2021c. *Endangered and Threatened Wildlife and Plants; Endangered Species Status for Franklin's Bumble Bee; Final Rule. August 24, 2021,* Washington, DC: US Fish and Wildlife.
FWS, 2021. *Protocol for Surevying Proposed Management Activites Thats May Impact Northern Spotted Owls Using Passive Autonomous Recording Unit Methods, v0.1, March,* Oregon: US Fish and Wildlife Service .
FWS, 2021. *Protocol For Surveying Proposed Management Activities That May Impact Northern Spotted Owls Using Passive Autonomous Recording Unit Methods v0.1, March.,* Washington, DC: Fish and Wildlife Service.
Grant, G. E. et al., 2008. Effects of forest practices on peak flows and consequent channel response: a state-of-science report for western Oregon and Washington. *Gen. Tech. Rep. PNW-GTR-760. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.,* p. 76.
Grant, G. & Wolff, A., 1991. Long-term Patterns of Sediment Transport After Timber Harvest, Western Cascade Mountains, Oregon, USA. *Sediment and Stream Water Quality in a Changing Environment: Trends and Explanation ,* Volume 203, pp. 31-40.

Hamer, T. E. & Nelson, S. K., 1995. Characteristics of Marbled Murrelet Nest Trees and Nesting Stands; Chapter 6.. In: C. G. H. J. P. a. M. R. Ralph, ed. *Ecology and Conservation of the Marbled Murrelet.* Pacific Southwest Research Station, Albany, California: US Forest Service.

Harr, D. R., 1976. *Forest Practices and Stream flow in Western Oregon,* Portland Oregon, Pacific Northwest Research Station: USDA Forest Service General Technical Report; PNW-49.

Harr, D. R., 1983. POTENTIAL FOR AUGMENTING WATER YIELD THROUGH FOREST PRACTICES IN WESTERN WASHINGTON AND WESTERN OREGON. *Water Resources Bulletin,* 19(3), pp. 383-393.

Harr, D. R., Fredriksen, R. L. & Rothacher, J., 1979. *Changes in Streamflow Following Tomber Harvest in Southwestern Oregon,* Portland Oregon : Pacific Northwest Forest and Range Experiment Station.

Harr, D. R., Harper, W. C., Krygier, J. T. & Hsieh, F. S., 1975. Changes in Storm Hydrographs After Road Building and Clear-Cutting in the Oregon Coast Range. *Water Resources Research,* 11(3), pp. 436-444.

Howard, J. O. & DeMars, D. J., 1985. *Cpmparison of Logging Residue from Lump Sum and Log Scale Timer Sales,* Portland, OR: PNW-33Z: U.S. Department of Agriculture, Forest Service, Pacific Northwest Forest and Range Experiment Station.

Irwin, L. L. et al., 2015. Forest ecosystem restoration: Initial response of spotted owls to partial harvesting. *Forest Ecology and Management,* 354(15), pp. 232-242.

Jones, J. A., 2000. Hydrologic Processes and Peak Discharge Response to Forest Removal, Regrowth, and Roads in 10 Small Experimental Basins, Western Cascades, Oregon. *Water Resources Research,* 36(9), pp. 2621-2642.

Jones, J. A. & Grant, G. E., 1996. Peak flow responses to clear-cutting and roads in small and large basins, Western Cascades, Oregon. *Water Resources Research,* 32(4), pp. 959-974.

Jones, J. & Grant, G., 2001. Comment on "Peak flow respones to clear-cutting and roads in small and large basins, western, Cascades, Oregon"A second opinion. *Water Resources Research,* 37(1), pp. 175-178.

Kondolf, G. M., 2000. Assessing Salmonid Spawning Gravel Quality. *Transactions of the American Fisheries Society,* 129(1), pp. 262-281.

Korb, J. E., Johnson, N. C. & Covington, W. W., 2004. Slash Pile Burning Effects on Soil Biotic and Chemical Properties and Plant Establishment: Reccomendations for Amelioration. *Restoration Ecology,* 12(1), pp. 52-62.

Lank, D., Parker, N., Krebs , E. & McFarlane-Tranquilla, L., 2003. Geographic Distribution, Habitat Selection, and Population Dynamics with Respect to Nesting Habitat Characteristics of Marbled Murrelets (Brachyramphus marmoratus). In: *Center for Wildlife Ecology.* s.l.:Simon Fraser University. Vancouver, British Columbia.

Long, J. N. & Daniel, T. W., 1990. Assessment of growing stock in uneven-aged stands. *Western Journal of Applied Forestry,* 5(3), pp. 93-96.

May, C. L. & Gresswell, R. E., 2003a. Large wood recruitment and redistribution in headwater streams in the southern Oregon Coast Range, USA. *Canadian Journal of Forest Research,* Volume 33, pp. 1352-1362.

May, C. L. & Gresswell, R. E., 2003b. Processes and rates of sediment and wood accumulation in headwater streams of the Oregon Coast Range, USA. *Earth Surface Processes and Landforms,* Volume 28, pp. 409-424.

McDonnell, J. et al., 2018. Water sustainability and watershed storage. *Nature Sustainability,* Volume 1, pp. 378-379.

McGraw, R., 2021. *Roseburg District Biologist* [Interview] 2021.

McIver, J. D. & Ottmar, R., 2007. Fuel mass and stand structure after post-fire logging of a severely. *Forest Ecology andManagement (238),* pp. 268-279.

McMichael, G., Fritts, A. & Pearsons, T., 1998. Electrofishing Injury to Stream Salmonids; Injury Assesment ay the Sample, Reach, and Stream Scales. *North American Jorunal of Fisheries Management,* 18(4), pp. 894-904.

McShane, C. et al., 2004. *Evaluation report for the 5-year status review of the marbled murrelet in Washington, Oregon, and California,* Seattle, Washington: Unpublished report, EDAW, Inc..
Meiman, S. et al., 2003. Effects of commercial thinning on home range and habitat use patterns of a male northern spotted owl: a case study. *Wildlife Society Bulletin,* Volume 31, pp. 1254-1262.
Moore, D. & Wondzell, S. M., 2005. Physical hydrology and the effects of forest harvesting in the Pacific Northwest: a review. *Journal of the American Water Resources Association,* 41(4), pp. 763-784.
Moore, G. W. et al., 2004. Structural and compositional controls on transpiration in 40- and 450-year-old riparian forests in western Oregon, USA. *Tree Physiology,* Volume 24, pp. 481-491.
Neary, D. G., Ryan, K. C. & DeBano, L. F., 2005. *Wildland Fire in Ecosystems Effects of Fire on Soil and Water,* Ogden, UT: USDA Forest Service.
NMFS, 2008. *Endangered and Threatened Species: Final Threatened Listing Determination, Final Protective Regulations, and Final Designation of Critical Habitat for the Oregon Coast Evolutionarily Significant Unit of Coho Salmon,* Washington, DC: Federal Register; Vol. 73, No. 28.
NRCS, 2019. *Soil Health - Guides for Educators,* Washington DC: USDA NRCS.
Perry, G., Lundquist, J. & Moore, R., 2016. Review of the potential effects of forest practices on stream flow in the Chehalis River Basin. *Environmental Science, Geography,* pp. 1-25.
Perry, T. D., 2007. *Do vigorous young forestes reduce streamflow? Results from up to 54 years of streamflow records in eight paried-watershed experiments in the H. J. Andrews and South Umpqua Experimental Forests ,* Corvallis, Oregon: Oregon State University.
Perry, T. D. & Jones, J. A., 2016. Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA. *Ecohydrology.*
Perry, T. D. & Jones, J. A., 2017. Summer streamflow deficits from regenerating Douglas-fir forest in the Pacific Northwest, USA: Summer streamflow deficits from regenerating Douglas-fir forest. *Ecohydology,* 10(2).
Pike, R. G. et al., 2010. *Compendium of Forest Hydrology and Geomorphology in British Columbia.* Victoria, B.C.: B.C. Min. For. Range, For. Sci. Prog., and FORREX Forum for Research and Extension in Natural Resources, Kamloops, B.C. Land Manag. Handb. 66..
Pilgrim, D. H., Cordery, I. & Baron, B., 1982. Effects of Catchment Size on Runoff Relationships. *Journal of Hydrology ,* Volume 58, pp. 205-221.
Rashin, E. B., Clishe, C. J. & Loch, A. T., 2006. Effectiveness of Timber Harvest Practies for Controlling Sediment Related Water Quality Impacts. *Journal of the American Water Resources Association,* 42(5), pp. 1307-1327.
Reiter, M. & Beschta, R. L., 1995. Effects of Forest Practices on Water. In: *Cumulative Effects of Forest Practies in Oregon: Literature and Synthesis.* Salem, Oregon: Oregon State University, p. 164.
Rothacher, J., 1973. *Does Harvest in West Slope Douglas-fir Increase Peak Flow in Small Forest Streams?,* Portland Oregon : Pacific Northwest Forest and Range Experiment Station .
Rothatcher, J., 1973. Does harvest in west slope Douglas-fir increase peak flow in small forest streams?. *Res. Pap. PNW-RP-163. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.*
Scott, J. H. & Burgan, R. E., 2005. *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model,* s.l.: USDA Forest Service, Rocky Mountain Research Station.
Scott, J. H. et al., 2024. *Wildfire Risk to Communities: Spatial datasets of landscape-wide wildfire risk components for the United States (2nd Edition),* Fort Collins, CO: US Forest Service, Forest Service Research Data Archive.
Segura, C. et al., 2020. Long-term effects of forest harvesting on summer low flow deficits in the Coast Range of Oregon. *Journal of Hydrology.*
Smith-Mateja, E., 2015. *(revised June 29, 2021). ORGANON Pacific Northwest (OP) Variant Overview – Forest Vegetation Simulator,* s.l.: Internal Rep. Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Forest Management Service Center. 76p.

State of Oregon , 2019. *Oregon Department of Forestry Smoke Mangement Plan,* Salem Oregon: Oregon Department of Environmental Quality and Department of Forestry, Division 48.
Stednick, J. D., 2008. Chapter 2: Effects of timber harvesting on streamflow in the Alsea Watershed study. In: *Hydrological and Biological Responses to Forest Practices.* New York: Springer, pp. 19-36.
Stephens, S. et al., 2018. Drought, tree mortality, and wildfire in forests adapted to frequent fire. *Bioscience,* 68(2), pp. 77-88.
Surfleet, C. G. & Skaugest, A. E., 2013. The effect of timber harvest on summer low flows, Hinkle Creek, Oregon. *Western Journal of Applied Foresrty,* 1 January, 28(1), pp. 13-21.
Surfleet, C. G. & Skaugset, A. E., 2013. The Effect of Timber Harvest on Summer Low Flows, Hinkle Creek, Oregon. *Western Journal of Applied Forestry,* 28(1), pp. 13-21.
Swanson, F., Frediksen, R. & McCorison, F., 1982. Material Transfer in a western Oregon forested watershed. In: *Analysis of coniferous forest ecosystems in the western United States .* Stroudsburg, PA: Hutchinson Ross Publishing Company , pp. 233-266.
Thomas, J. et al., 1990. *A Conservation Strategy for the Northern Spotted Owl: A Report of the Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl,* Portland, Oregon: US Fish and Wildlife Service.
Thomas, R. B. & Megahan, W. F., 1998. Peak flow responses to clear-cutting and roads in small and large basins, Western Cascades, Oregon: A second opinion. *Water Resources Research,* 34(12), pp. 3393-3403.
Trappeiner, J., Maquire, D. & Harrington, T., 2007. *Silviculture and ecology of western U.S. forests,* Portland Oregon: Oregon State University Press.
USGS, 2024. *StreamStats,* Washington DC: USGS.
Ward, F., 2018, 2019, 2020. *Field Office Soil Scientist, Field Notes.* Roseburg(Oregon): Buruea of Land Management.
Waters, T. F., 1995. Sediment in streams. Sources, biological effects, and control. *American Fisheris Society,* Volume 7, p. 251.
Winkler, R. D. et al., 2010. The effects of forest disturbance on hydologic processes and watershed respone. In: *Compendium of Forest Hydrology and Geomorphology in British Columbia. BC Land Management Handbook 66.* New York: BC Ministry of Forests and Range, pp. 179-212.
Winter, T. C., Harvey, J. W., Franke, O. L. & Alley, W. M., 1998. *Grand Water and Source Water.* Denver, Colorado, A Single Resource: U.S. Geological Surevy Circular 1139.
WWRA, 2013. *West Wide Wildfire Risk Assesment Final Report,* Portland Oregon: Oregon Department of Forestry.
Ziemer, R. & Lisle, T. E., 1998. Chapter 3: Hydrolody. In: R. E. B. Robert J. Naiman, ed. *River Ecology and Management: Lessons from the Pacific Coastal Ecoregion.* s.l.:Springer-Verlag, N.Y., pp. 43-68.
Ziemer, R. R., 1981. Storm flow response to road building and partial cutting in small streams of northern California. *Water Resources Research,* 17(4), pp. 907-917.