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

Griffin Half Moon Vegetation Management Project

REVISED ENVIRONMENTAL ASSESSMENT

DOI-BLM-ORWA-M060-2018-0001-EA

AUGUST 2018

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Dear Reader,

The Bureau of Land Management (BLM), Ashland Field Office, has completed the environmental analysis for the Griffin Half Moon Vegetation Management Project. This document, the Griffin Half Moon Vegetation Management Project Revised Environmental Assessment (REA), provides a description of the project, the Project Area, background information, and the possible effects of implementing the project.

The REA is designed to implement specific Management Direction consistent with the 2016 Southwestern Oregon Record of Decision and Resource Management Plan. Specifically, it analyzed the following activities proposed on BLM-administered lands in the Project Area (Map 1-1):

Vegetation Management

- Regeneration Harvest
- High Retention Regeneration Harvest
- White Fir Regeneration Harvest
- Commercial Thinning
- Selection Harvest

Ground Based Yarding

Non-Commercial Treatments

- Disease Treatments
- Pre-Commercial Thinning
- Fuels Reduction Treatments
- Planting, Scalping or Grubbing, and Gopher Trapping
- Snag Creation in the Late-Successional Reserve

Transportation Management

- Timber Haul
- Road Renovation
- Temporary Road Construction
- Long-Term Road Closure

The original EA was published on June 8th, 2018. The Notice of EA Availability for Comment was published in the legals section in Medford's *Mail Tribune* newspaper on June 13th, 2018, beginning a 30-day public review, ending on July 13th, 2018.

Based on internal and external review of the environmental assessment (including public comments), I have decided to release this Revised EA (REA) for this project as a part of the Decision Record to clarify portions of the analysis and to make corrections to the EA. New or rewritten text appears in blue in this Revised EA.

Further information on this proposed project is available at the Medford District Office, 3040 Biddle Road, Medford, Oregon 97504 or by calling Brian Lawatch, Planning and Environmental Specialist, at 541-618-2316.

Thank you for your continued interest in the management of your public lands. Your input plays an important part in our land management decisions.

Sincerely,

Kristi J. Mastrofini
Field Manager
Ashland Field Office

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CHAPTER 1 - PURPOSE AND NEED

1.1 INTRODUCTION

This revised environmental assessment (REA) documents the environmental analysis the Bureau of Land Management (BLM) conducted to estimate the potential site-specific effects on the human environment that may result from the implementation of this project. The analysis documented in this EA will provide the BLM's Authorized Officer, the Ashland Field Manager, with current information to aid in the decision-making process. The analysis will also be used to determine if there are significant impacts not already analyzed in the *Proposed Resource Management Plan / Final Environmental Impact Statement for Western Oregon* (PRMP/FEIS) (USDI BLM 2016a) and whether a supplement to that environmental impact statement (EIS) is needed 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 (43 CFR part 46).

1.2 WHAT IS THE BLM PROPOSING?

This section provides a brief summary of BLM's proposal for vegetation management and associated transportation management activities. A more detailed description of BLM's Proposed Action (Alternative 2) and other alternatives considered is included in Chapter 2, *Alternatives*.

The Project Area for the Griffin Half Moon Vegetation Management Project includes all areas where action is proposed, such as units where timber harvest is proposed and where temporary road construction or road renovation are proposed.

BLM's 2016 ROD/RMP provides a system of land use allocations that together provide a strategy for forest management and a sustainable supply of timber while contributing to the conservation and recovery of threatened and endangered species within the planning area, including the northern spotted owl (USDI BLM 2016a, p. 7). BLM's 2016 ROD/RMP provides for large, contiguous blocks of late-successional forest and maintaining older more structurally-complex multi-layered conifer forests (USDI BLM 2016b, pp. 70-71).

The Project Area includes lands within the Harvest Land Base (HLB), Late-Successional Reserve (LSR), Riparian Reserve (RR), and District-Designated Reserve (DDR) land use allocations (Table 1-1). Land use allocations were designated in the *Southwestern Oregon Record of Decision and Resource Management Plan* (USDI BLM 2016b).

Table 1-1. Land Use Allocations in the Griffin Half Moon Project Area.

Land Use Allocation	Acres	Percent
Harvest Land Base–Low Intensity Timber Area	929	96
Late-Successional Reserve (Dry Forest)	4	<1
Riparian Reserve (Dry Forest)	0.10	<1
District-Designated Reserve–Road Corridors	34	4
District-Designated Reserve–TPCC	3	<1
Total	970	100

The HLB land use allocation contains lands dedicated to long-term sustained yield timber management. The HLB contains further sub-allocations to guide forest management based on large-scale forest conditions: Uneven-Aged Timber Area (UTA), Low Intensity Timber Area (LITA), and Moderate Intensity Timber Area (MITA). The Proposed Action would include vegetation and associated transportation management actions in LITA; there is no UTA or MITA in the Project Area.

The LSR is the land use allocation in which the primary objective is to maintain and promote the development of habitat for the northern spotted owl and their prey species. The LSR located within the Griffin Half Moon Project Area falls within the Dry Forest sub-allocation, and is not part of a large block LSR.

The RR is the land use allocation in which the primary objectives are to maintain and restore riparian functions, maintain water quality, and contribute toward the conservation and recovery of Endangered Species Act (ESA)-listed fish species (USDI BLM 2016b, p. 75). The RR within the Project Area is comprised of the Dry Forest sub-allocations.

The DDR is the land use allocation in which the primary objective is to maintain the values and resources for which the BLM has reserved these areas from sustained-yield timber production. The DDR contains further sub-allocations to guide management based on identified site-specific values. The DDR sub-allocations within the Griffin Half Moon Project Area include road corridors and areas identified as unsuitable for sustained-yield timber production through the Timber Production Capability Classification (TPCC) system. The DDR-TPCC within the Project Area includes No Harvest and Non-Forest lands (as identified by the TPCC codes (USDI BLM 1984)). The DDR allows for management of infrastructure, including roads (USDI BLM 2016b, p. 54). On these roads, haul would occur in order to meet management directions within adjacent land use allocations. Within the DDR road corridors in the Project Area, vegetation treatments such as roadside brushing or removal of hazard trees may occur.

The BLM, Ashland Field Office, is proposing vegetation management actions, including timber harvest, on approximately 933 acres of BLM-administered lands in the Griffin Half Moon Project Area. Vegetation management treatments consist of both commercial and non-commercial treatments, including regeneration harvest, selective thinning, pre-commercial thinning, fuels treatments, reforestation and annosus root rot treatments. Fuel loads resulting from silvicultural treatments (activity fuels) would be reduced through lop-and-scatter, hand piling and pile burning, or underburning. Vegetation management would be accomplished through the use of commercial timber sale contract(s) and/or service contracts.

The Proposed Action (Alternative 2) would include timber harvest operations on 15 units comprised of approximately 929 acres of regeneration harvest allocated to the LITA and four acres (within one unit) of selective thinning allocated to the LSR (Dry Forest). The stands proposed for regeneration harvest are overstocked and are experiencing declining vigor and growth rates due to high levels of density-related competition that has primarily occurred from lack of disturbance (i.e., fire). The four acres allocated to the LSR do not exhibit the characteristics of an older, structurally complex forest, but instead have pine site characteristics. Selective thinning around the large ponderosa and sugar pines and Douglas-fir is proposed for this unit in order to promote their development and favor pine and Douglas-fir over shade-tolerant white fir.

Regeneration harvest for lands allocated to the HLB is a plan-level decision made in the 2016 ROD/RMP (USDI BLM 2016b). The Proposed Action would implement this decision in 15 units, and

the design and conduct of regeneration harvest would conform to management direction contained in the 2016 ROD/RMP.

The BLM is also proposing transportation management actions which include temporary road construction (0.39 miles), road renovation (14.92 miles), and long-term closure of existing roads (1.86 miles). An estimated 33.43 miles of haul routes would be used and maintained as needed for use, resource protection, and public and worker safety.

The Proposed Action would include a limited number of designated skid trails and transportation management actions within the RR (Dry Forest Class II and III subwatersheds).

1.3 WHERE IS THE PROJECT LOCATED?

The Griffin Half Moon Vegetation Management Project is located in southwest Oregon, east of the city of Ashland and near Howard Prairie Lake (Map 1-1), and within the Jenny Creek and Little Butte Creek watersheds:

- Jenny Creek 5th field watershed (Johnson Creek and Jenny Creek subwatersheds), Klamath River Basin – 82 percent of the Project Area (764 acres), and

- Little Butte Creek 5th field watershed (Beaver Dam Creek and Middle South Fork Little Butte Creek subwatersheds), Rogue River Basin – 18 percent of the Project Area (169 acres).

The areas proposed for treatment are public lands managed by the Ashland Field Office, Medford District BLM. All (100 percent) of the proposed treatment areas are Oregon and California Railroad Revested Lands (O&C lands). The Public Land Survey System (PLSS) description of the Griffin Half Moon Vegetation Management Project Area is as follows:

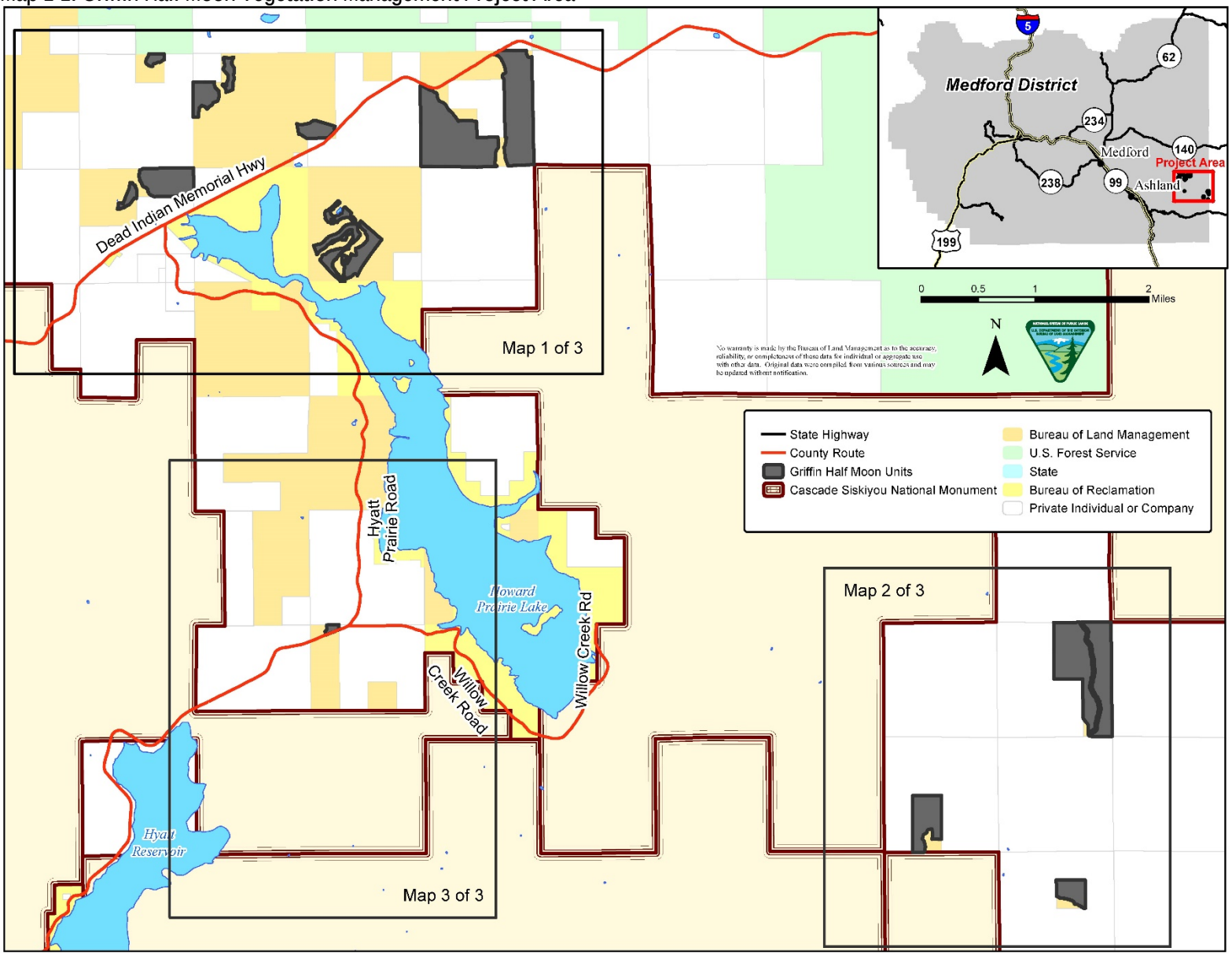
- T38S-R03E-Sections 10, 11, 12, 13, and 15;

- T38S-R04E-Section 7;

- T39S-R03E-Section 1; and

- T39S-R04E-Sections 1, 11, and 13; Willamette Meridian; Jackson County, Oregon.

Map 1-1: Griffin Half Moon Vegetation Management Project Area



1.4 WHY IS THE BLM PROPOSING THIS PROJECT?

1.4.1 Need for Action

The Ashland Field Office, Medford District has a need to harvest timber on these project acres in the Harvest Land Base (HLB) to contribute to the Medford District's annual Allowable Sale Quantity (ASQ). The 15 units proposed for regeneration harvest are located in the LITA, and the stands have reached a condition that makes them ready for regeneration harvest and deferring harvest now will forego the opportunity to contribute timber volume toward meeting the declared Allowable Sale Quantity (ASQ) (USDI BLM 2016b, p. 62) and fail to generate a successive stand of timber for future harvest in accordance with sustained yield timber management as directed by the ROD/RMP. Within the one unit proposed for selective thinning in the LSR, the larger pines and Douglas-fir trees are in competition with a dense understory of white fir and deferring harvest now will fail to promote the development and retention of the larger open trees and reduce susceptibility to disturbances in this stand (USDI BLM 2016b, p. 72).

The BLM's Forest Operations Inventory (FOI) was used to identify stands appropriate for management in the areas considered for treatment in the Jenny Creek and Little Butte Creek watersheds. Stand examinations and field review provided current data on stocking levels, stand health, and species composition in the units proposed for management.

Limited regeneration harvest on BLM-administered lands over the past 20 years has resulted in an overall reduction in the amount of early-seral forests on BLM-administered lands. Accordingly, the 2016 ROD/RMP includes direction to provide complex early-successional ecosystems and a variety of forest structural stages distributed both spatially and temporally (USDI BLM 2016b, p. 64).

The ROD/RMP directs the use of regeneration harvest within the HLB-LITA to produce complex early-successional ecosystems and adjust the age-class distribution while contributing toward meeting the declared ASQ (USDI BLM 2016b, p 64). The PRMP/FEIS detailed that the regeneration harvest under the PRMP would create complex early-successional stands, which would, in time, develop into heterogeneous, multi-layered stands with structural legacies (USDI BLM 2016a, pp. 325-329). The emphasis on longer rotation two-aged management regimes and associated variable-retention regeneration under the PRMP would result in roughly an equal number of acres in each 10-year age class up to the 140-year age class in the drier, lower productivity forests (USDI BLM 2016a, p. 318). As shown in Table 1-2, the early successional stage in the HLB has the lowest representation in the Project Area at two percent, while the percent of BLM-administered lands in the PRMP/FEIS analysis area expected to be in the complex early successional stage in 50 years is approximately 26 percent (USDI BLM 2016a, p. 324, Figure 3-56). The Proposed Action would move the forested stands on BLM lands in the Project Area towards desired future conditions envisioned in the PRMP/FEIS.

Table 1-2. Structural Stage Distribution in the Harvest Land Base within the Griffin Half Moon Project Area.

Structural Stage[1]	Structural Stage 2016 ROD/RMP[2]	Percent of Stand Area
Early Seral	Early Successional	2
Mid-Seral Closed	Stand Establishment	55
Mid-Seral Open	Young	6
Late-seral Open	Mature	3
Late-seral Closed	Structurally-Complex	34
Total		100

[1] Based on Landfire Biophysical Settings GIS Layer.

[2] Structural stages are defined in USDI BLM (2016a: pp. 1080-1081, 1203-1206).

1.4.2 Purpose

The Federal Land Policy and Management Act (FLPMA) requires the BLM to create Resource Management Plans (RMPs) to guide future on-the-ground projects on BLM-administered lands. RMPs contain management objectives that describe the desired future conditions for resource programs, land use allocations for lands that fall under BLM jurisdiction, and management direction that identifies where future actions may or may not be allowed and the restrictions or requirements placed on future actions. Management objectives are intended to describe resource conditions that the BLM envisions or desires would eventually result from implementation of future actions consistent with the decisions in the RMP. Land use allocations and management direction are designed to accomplish RMP objectives. Management objectives are not rules, restrictions, or requirements by which the BLM determines which implementation actions to conduct or how to design specific implementation actions. The 2016 ROD/RMP provides the objectives, land use allocations and management direction for managing BLM-administered lands in the Medford District.

The Griffin Half Moon Vegetation Management Project was designed to address the opportunities identified in the Need for Action above by implementing regeneration harvest in the Harvest Land Base for the following purpose:

- ***Conduct regeneration harvest to produce timber to contribute to the attainment of the declared Allowable Sale Quantity (ASQ)* (USDI BLM 2016b, p. 64).**

  The Medford District's annual achievement of ASQ is dependent upon the sale or offering of timber volume in individual timber sales, which in aggregate, total the District's ASQ under the Medford SYU. Because timber sale planning requires two to three years, the inability to proceed with a given sale in the District's sale plan for any particular fiscal year has the potential to prevent the District from achieving its ASQ in that fiscal year. In the RMP analysis, the BLM modeled a repeated cycle of harvest and regrowth within the HLB that does not decrease over time (see USDI BLM 2016a, Appendix C, pp. 1163-1227). Accordingly, every individual timber sale planned within the HLB, like the proposed project, serves an integral function in contributing toward meeting the sustained yield objectives of the RMP.

And, within the LSR (Unit 13-3B), by implementing selective thinning for the following purpose:

- ***Conduct integrated vegetation management to promote the development and retention of large, open grown trees and multi-cohort stands, increase vegetative species diversity, adjust stand composition or dominance, enhance the development of structural complexity and heterogeneity, create growing space for hardwood and pine persistence and regeneration, and reduce stand susceptibility to disturbances such as fire, disease, or insect infestation*** **(USDI BLM 2016b, p. 72).**

  Unit 13-3B does not possess the characteristics of structurally complex, nesting-roosting habitat for the northern spotted owl, but instead exhibits more open, pine-site characteristics. Selective thinning around the large sugar pines, ponderosa pines, and Douglas-fir trees in this stand would reduce competition from smaller understory Douglas-fir and shade-tolerant white fir, as well as create growing space for hardwood and pine persistence and regeneration.

1.5 DECISION FRAMEWORK

This Environmental Assessment (EA) provides the information needed for the Authorized Officer, the Ashland Field Manager, to select a course of action to be implemented for the Griffin Half Moon Vegetation Management Project. The Field Manager must decide whether to implement one of the Action Alternatives, select the No Action Alternative, or choose a combination of components found within those alternatives analyzed.

In choosing the alternative that best meets the purpose and need, the Field Manager will consider the extent to which each alternative responds to the decision factors listed below. The forthcoming Decision Record will document the Field Manager's rationale for selecting a course of action based on the effects documented in the EA, and the extent to which each alternative responds to the following factors:

1. Compliance with management direction in the RMP.

2. How well the alternative would achieve the purposes for the project.

3. The amount of timber volume produced to contribute to the Medford District's ASQ.

4. The nature and intensity of environmental effects that would result from implementation of the proposed timber harvest and associated transportation management actions and the nature and effectiveness of measures to resolve the issues and mitigate impacts to resources.

The decision will also include a determination of whether or not the impacts of the actions are significant to the human environment. If the impacts are determined to be within the range analyzed in the PRMP/FEIS (USDI BLM 2016a), or otherwise determined to be insignificant, a FONSI can be issued and the decision implemented. If the analysis documented in this EA determines that the significance of impacts are unknown or greater than those previously analyzed and disclosed in the PRMP/FEIS, then a project-specific EIS must be prepared.

1.6 LAND USE CONFORMANCE AND LEGAL REQUIREMENTS

1.6.1 Conformance with Land Use Plans

The BLM signed a Record of Decision approving the *Southwestern Oregon Record of Decision and Resource Management Plan* (2016 ROD/RMP) on August 5, 2016. The Medford District initiated and designed the Griffin Half Moon Vegetation Management Project to conform to the 2016 ROD/RMP.

The project is also consistent with the *Record of Decision for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS* (USDI BLM 2007), the *Record of Decision for Vegetation Treatments Using Herbicides on BLM Lands in Oregon* (USDI BLM 2010b), and the Decision Record for the *Revised Environmental Assessment for Integrated Invasive Plant Management for the Medford District* (USDI BLM 2018b).

1.6.2 Special Status Species Policy

The Griffin Half Moon Vegetation Management Project is consistent with BLM Manual 6840 (USDI BLM 2008), the purpose of which is to provide policy and guidance for the conservation of BLM Special Status Species and the ecosystems upon which they depend on BLM-administered lands. BLM Special Status Species include those species listed or proposed for listing under the ESA, as well as those designated as Bureau Sensitive by the Oregon/Washington State Director. The objectives of the BLM Special Status policy are:

- To conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species; and

- To initiate proactive conservation[1] measures that reduce, or eliminate threats to Bureau Sensitive species to minimize the likelihood of and need for listing of these species under ESA (USDI BLM 2008, Section .02).

1.6.3 Statutes and Regulations

The Proposed Action is designed to be in conformance with the direction given for the management of public lands in the Medford District and the following:

Oregon and California Lands Act of 1937 (O&C Act). Requires the BLM to manage O&C lands for permanent forest production. Timber shall be sold, cut, and removed in accordance with sustained-yield principles for the purpose of providing for a permanent source of timber supply, protecting watersheds, regulating stream flow, contributing to the economic stability of local communities and industries, and providing recreational facilities.

Federal Land Policy and Management Act of 1976 (FLPMA). Defines the BLM's organization and provides the basic policy guidance for the BLM's management of public lands.

[1] Conservation: as applied to Bureau Sensitive species, is the use of programs, plans, and management practices to reduce or eliminate threats affecting the status of the species, or improve the condition of the species' habitat on BLM-administered lands (USDI BLM 2008, Glossary p. 2).

National Environmental Policy Act of 1969 (NEPA). Requires the preparation of environmental impact statements for major federal actions that may have a significant effect on the environment.

Endangered Species Act of 1973 (ESA). Directs federal agencies to ensure their actions do not jeopardize species listed as "threatened and endangered" or adversely modify designated critical habitat for these listed species.

Clean Air Act of 1990 (CAA). Provides the principal framework for national, state, and local efforts to protect air quality.

National Historic Preservation Act of 1966 as amended (NHPA). Requires federal agencies to take into account the effect of their federal or federally-licensed undertakings on historic properties, whether those properties are federally owned or not.

Archaeological Resources Protection Act of 1979 (ARPA). Protects archaeological resources and sites on federally-administered lands. Imposes criminal and civil penalties for removing archaeological items from federal lands without a permit.

Safe Drinking Water Act (SDWA) of 1974 (as amended in 1986 and 1996). Protects public health by regulating the nation's public drinking water supply.

Clean Water Act of 1987 (CWA). Establishes objectives to restore and maintain the chemical, physical, and biological integrity of the nation's water.

Migratory Bird Treaty Act (MBTA) of 1918. Federal agencies will avoid or minimize the negative impact of their actions on migratory birds, and to take active steps to protect birds and their habitat.

Bald and Golden Eagle Protection Act of 1962. Prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald and golden eagles, including their parts, nests, or eggs.

1.7 RELEVANT ASSESSMENTS AND PLANS

The following documents contain information related to existing conditions and management practices in the Griffin Half Moon Vegetation Management Project Area. These documents are incorporated by reference into the project documentation throughout the EA.

Revised Recovery Plan for the Northern Spotted Owl (2011)

In June 2011, the U.S. Fish and Wildlife Service (USFWS) finalized the Revised Recovery Plan for the Northern Spotted Owl, which contains 33 Recovery Actions. Recovery Actions are recommendations to guide activities needed to accomplish the recovery objectives and ultimately lead to delisting of the species. Specifically, Recovery Action 32 (RA 32) in the Revised Recovery Plan recommends "maintaining and restoring the older and more structurally complex multi-layered conifer forests" (USDI USFWS 2011, p. III-67). The intent of RA 32 is to maintain substantially all of the older and more structurally complex multi-layered conifer forests on federal lands to prevent further exacerbation of the competitive interactions between northern spotted owls (NSOs) and barred owls.

Also included in the Revised Recovery Plan is Recovery Action 10 (RA 10) which recommends that federal agencies "Conserve spotted owl sites and high value spotted owl habitat to provide additional demographic support to the spotted owl population" (USDI USFWS 2011, p. III-43).

The land use allocations, management direction, and guidance in the 2016 ROD/RMP constitute BLM's contribution towards Recovery Actions 10 and 32 (USDI BLM 2016b, p. 127). The Griffin Half Moon Vegetation Management Project incorporated applicable RMP direction and guidance and is therefore consistent with the *Revised Recovery Plan for the Northern Spotted Owl* (USDI USFWS 2011).

U.S. Department of Interior, Bureau of Land Management, Western Oregon Districts, Transportation Management Plan (1996, updated 2002 and 2010).

The Western Oregon Transportation Management Plan (USDI BLM 2010c) provides goals, objectives, and guidelines for managing BLM's road and trail transportation systems throughout western Oregon. This transportation management plan, is not a decision document, rather it provides guidance for implementing actions.

Little Butte Creeks and Jenny Creek Water Quality Restoration Plans (2006, 2011)

Water Quality Restoration Plans (WQRP) have been completed for each of these watersheds (USDI BLM 2006, 2011b) to meet the requirements of Section 303d of the 1972 Federal Clean Water Act. WQRPs describe how the BLM will meet Oregon water quality standards for 303(d) listed streams on federal lands. The Oregon Department of Environmental Quality (DEQ) has lead responsibility for creating Total Maximum Daily Loads (TMDLs) and Water Quality Management Plans (WQMP) to address water quality impaired streams for Oregon. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. A WQMP is developed to describe a strategy for reducing water pollution to the level of the TMDL, which will restore the water quality and result in compliance with the water quality standards.

In July 2003, the BLM signed a memorandum of agreement (MOA) with DEQ defining how water quality rules and regulations regarding TMDLs will be met. BLM agreed to develop or revise existing WQRPs as described in MOA, and that they would be the TMDL Implementation Plans for BLM (DEQ 2008).

Medford District BLM Fire Management Plan (2017)

The Medford District BLM Fire Management Plan (FMP) (USDI BLM 2017b) describes how fire management strategies and tactics will protect values and provide tools to meet resource goals and objectives. The FMP tiers to the 2016 ROD/RMP. The FMP provides the Medford District with an integrated concept for coordinated wildland fire planning and protection among federal, state, local government entities and citizen initiatives. The FMP is not a decision document; rather, it identifies management direction to facilitate development and implementation of appropriate fire management strategies that will help achieve resource management decisions as defined in RMPs.

1.8 SCOPING AND ISSUES

Scoping is the process the BLM uses to identify issues related to the proposal (40 CFR 1501.7) and determine the extent of environmental analysis necessary for an informed decision. It is used early in

the NEPA process to identify (1) the issues to be addressed; (2) the depth of the analysis; (3) alternatives or refinements to the scoping proposal; and (4) potential environmental impacts of the scoping proposal. Scoping is performed not to build consensus or get agreement on a project proposal, but rather to solicit relevant site-specific comments that could aid in the analysis and final design of the proposal.

The BLM began public outreach for this project in the Ashland Field Office's Schedule of Proposed Actions published in *Medford's Messenger* (BLM Medford District's quarterly newsletter) in the Summer/Fall 2017 edition (USDI BLM 2017a). A scoping letter briefly describing the Griffin Half Moon proposal and inviting comments was mailed to adjacent landowners, interested individuals, organizations, and other agencies on November 7, 2017. Ten comment letters and 17 Interest Response Forms were received during the 30-day scoping period. One comment letter was received shortly after the end of the scoping period but was fully considered during the planning process. A summary of the comments received during scoping is provided in Appendix A, *Scoping Summary for the Griffin Half Moon Vegetation Management Project*.

Numerous articles were submitted or referenced for BLM review during the scoping process. The BLM reviewed these documents and considered the information in developing the alternatives. The BLM strives to apply the most current, geographically relevant science that represent actions similar in scale and scope to the BLM proposal in its analysis and management considerations. A summary of the BLM's review and evaluation of these documents, as well as a list of the literature is provided in Appendix B, *Scientific Literature Submitted during Scoping*.

On December 1, 2017, the BLM hosted a field trip to portions of the Griffin Half Moon Vegetation Management Project Area. The intent of the field trip was to visit several of the areas proposed for commercial timber harvest activity. Eight members of the public attended the field trip.

1.8.1 Issues Analyzed in Detail

Issues identified during internal (BLM) and external (public) scoping were used to guide the effects analysis in Chapter 3. Not all issues are analyzed to the same level of detail in this EA. To warrant detailed analysis, an issue must be within the scope of analysis; must not already be decided by law, regulation or previous decision; must be open to scientific analysis; and must require analysis for making a reasoned choice from among the alternatives (e.g., there is a measurable difference between the alternatives with respect to the issues). Additionally, public interest may dictate that effects should be displayed in more detail for the issue.

This document and the effects analysis tier to the 2016 PRMP/FEIS for Western Oregon. Tiering refers to using the coverage of general matters in broader NEPA documents in subsequent narrower NEPA documents. Tiering allows agencies to narrow the range of alternatives, narrow the scope of analysis, and reach a Finding of No Significant Impact for an action that may otherwise potentially have significant impacts. Where issue has already been sufficiently addressed by the analysis in the 2016 PRMP/FEIS, the issue is generally not addressed in detail in this EA, or if it is, the EA analysis is generally a site-specific extension of the FEIS analysis.

The following issues were identified for detailed analysis under the Griffin Half Moon Vegetation Management EA; the issues are posed as questions:

Fisheries, Aquatic Habitat, and Water Quality

Issue 1: How would erosion rates, sediment transport, and turbidity from ground disturbance associated with the proposed forest management (i.e., felling and ground-based yarding of timber, fuels treatments, landing construction and use, and timber haul) and transportation management activities (i.e., road renovation, temporary road construction, long-term closure, and decommissioning) affect fish, aquatic habitat, and water quality?

Water Quantity

Issue 2: How would the reduction in canopy cover from the proposed timber harvest and openings created from temporary roads and landings affect water quantity (peak flows)?

Northern Spotted Owl Habitat

Issue 3: How would the proposed timber harvest, pre-commercial thinning, fuels treatments, and associated transportation management activities affect constituent elements (canopy cover, snags and down wood, large trees, mistletoe brooms, stand structure, and prey availability) within stands used by northern spotted owls for nesting, roosting, and foraging?

Reforestation

Issue 4: How would the proposed activities affect the ability to successfully reforest the harvest units as required by the 2016 ROD/RMP considering previously documented reforestation issues associated with frost, pocket gophers, and competing vegetation on the Dead Indian Plateau (Minore 1978)?

1.8.2 Issues Considered but not Analyzed in Detail

Issues raised by the public or the BLM during scoping of this project that are addressed by the project's design (Chapter 2) or are beyond the scope of this project were considered but are not analyzed in detail in Chapter 3. Requests for information that would not further contribute to making a reasoned and fully-informed decision for the project were also not included in the EA. These issues, along with a rationale for their being considered but not analyzed in detail in this EA, are listed in Appendix C, *Issues Considered but not Analyzed in Detail.*

Also see Chapter 2, Section 2.6, *Actions and Alternatives Considered but not Analyzed in Further Detail* for options and alternatives considered but not further analyzed.

CHAPTER 2 - ALTERNATIVES

2.1 INTRODUCTION

This chapter describes how the project was developed, describes what is being proposed in detail, and presents the Proposed Action and alternatives developed by the BLM to achieve the Purpose and Need statements identified in Chapter 1. A "No Action" Alternative is presented to form a baseline for analysis. Project Design Features (PDFs), which apply the Best Management Practices (BMPs) as described in Appendix C of the 2016 ROD/RMP, are integral to the design of the action alternatives (Alternatives 2, 3, and 4). The PDFs are incorporated into the analysis of anticipated environmental impacts described in Chapter 3. Table 2-6 and Table 2-7 in Section 2.5, *Comparison of Alternatives*, presents a cross-walk for comparing the action alternatives.

2.2 DEVELOPMENT OF THE PROJECT

2.2.1 Treatment Area Selection

The Griffin Half Moon Vegetation Management Project was designed to conform to the 2016 *Southwestern Oregon Record of Decision and Resource Management Plan* (USDI BLM 2016b) and to meet the purpose and need identified in Chapter 1. The Griffin Half Moon Project is primarily located in the LITA within the HLB land use allocation (LUA). Objectives for the HLB include managing forest stands to achieve continual timber production that can be sustained through a balance of growth and harvest; offering for sale the declared ASQ of timber; and enhancing the economic value of timber in forest stands (USDI BLM 2016b, p. 62). The Griffin Half Moon Project was considered for treatment at this time as a result of a previous review that identified dense forested stands experiencing declining vigor and growth rates due to high levels of density-related competition due to lack of disturbance.

The BLM initially evaluated a larger area for potential treatments. This larger area of consideration included all BLM-administered lands within the Medford District located on the Dead Indian Plateau outside the Cascade-Siskiyou National Monument expansion area (Presidential Proclamation No. 9564, Federal Register 2017). An interdisciplinary team (IDT) of resource specialists was brought together to begin evaluating the area for potential treatments. The IDT filtered the area of consideration through a series of screens before defining the Project Area and developing the Proposed Action. The purpose of the screening process was to ensure the proposal meets RMP guidelines and conservation and recovery actions for federally listed species. The screening process described below helped to distill feasible treatment areas from the larger area of consideration.

The following screens were then applied to BLM-administered lands within the Dead Indian Plateau area of consideration. They are broken out into three categories to better understand the overarching reason for elimination (policy, stand suitability, and feasibility).

2.2.1.1 Policy

Timber Production Capability Classification (TPCC) Withdrawn Lands

TPCC is the process for partitioning forestland into major classes indicating relative suitability to produce timber on a sustained yield basis. TPCC withdrawn lands are lands identified as unavailable for

planned forest management based on site-specific information. The 2016 ROD/RMP captures TPCC withdrawn lands in the DDR-TPCC land use allocation. The RMP acknowledged that over time, the BLM would add or remove areas from this land use allocation as examinations indicate whether the criteria for reservation are met or not through plan maintenance (USDI BLM 2016b, p. 135). The Griffin Half Moon Project does not include timber harvest on any lands within the DDR-TPCC consistent with RMP management direction (USDI BLM 2016b, p. 55).

Riparian Reserves

Riparian Reserves (RR) incorporated by the 2016 ROD/RMP are located on BLM-administered lands throughout the area of consideration and distances are determined by water feature. Streams and water features were identified in and adjacent to potential treatment units using Light Detection and Ranging (LiDAR) and site-specific field review to ensure that all areas needing Riparian Reserve protection were identified. Stream maps were updated with the new information. Where Riparian Reserves are excluded from commercial treatment, the boundaries would clearly be marked on the ground. The hydrologist, fisheries biologist, and silviculturist worked together and determined that no riparian areas within or adjacent to proposed treatment units are in need of treatment at this time to maintain or restore riparian function.

Special Habitat Management

The 2016 ROD/RMP provides management direction to manage naturally occurring special habitats to maintain their ecological function, such as seeps, springs, wetlands, natural ponds, natural meadows, rock outcrops, cliffs, caves, talus slopes, mineral licks, oak woodlands, etc. (USDI BLM 2016b, p. 115). The Griffin Half Moon Project incorporates this special habitat management direction and would apply no-harvest buffers as needed if site-specific circumstances warrant their application to maintain ecological function.

Northern Spotted Owl (NSO)

The 2016 ROD/RMP incorporated management direction that the BLM will not authorize timber sales that would cause the incidental take of NSOs (determined by the USFWS) until implementation of a barred owl management program is in place (USDI BLM 2016b, p. 121). At the time of the planning of the Griffin Half Moon Project, no barred owl management program is in place; therefore, this project was designed to comply with this RMP management direction. The BLM Field Office wildlife biologist and silviculturist worked together to design treatments that would not result in the incidental take of NSOs as determined by USFWS through the ESA Section 7 consultation process.

2.2.1.2 Stand Suitability

The project silviculturist assessed the timber harvest potential on BLM-administered lands within the area of consideration on the Dead Indian Plateau using the Forest Operations Inventory (FOI) layer, Lidar, other GIS layers, and field reconnaissance. Identified treatment needs were based on the ROD/RMP silvicultural management systems for those lands. The silviculturist considered the following criteria when evaluating whether a stand was in need of treatment:

- Vegetative Condition – grasslands, shrublands, and functioning hardwood/woodlands were not considered for treatment.

- Young stands – stands where trees were too small for harvest or not ready for re-entry were not considered for commercial treatment.

- Recently commercially treated stands (within the last five years) were not considered for treatment.

- Relative density thresholds – stands at or below desired threshold (20 to 25 percent) were not identified for treatment under this project.

2.2.1.3 Feasibility

Potential treatment units were then screened by members of the IDT. The silviculturist, engineer, and logging systems specialist evaluated the potential treatment areas for economic and logistical feasibility. For example, a potential treatment unit may have been eliminated from consideration as uneconomical for a variety of reasons including low volume, harvest volume too scattered, etc. Other resource specialists, such as the soil scientist, botanist, and archaeologist, reviewed stands for potential issues related to their resource.

2.3 ALTERNATIVES ANALYZED IN DETAIL

This section describes the four alternatives considered in detail. A narrative summary is provided for each of the alternatives.

2.3.1 Alternative 1 – No Action

The No Action Alternative describes a baseline against which the environmental effects of the action alternatives can be compared. The No Action Alternative discusses the consequences of not taking action. The No Action Alternative assumes the current resource trends would continue into the future. Under the No Action Alternative, no vegetation management would be implemented; there would be no commercial cutting of trees and there would be no understory reduction or fuels reduction treatments. Normal programmed road maintenance would be performed. Other activities authorized by separate NEPA analyses could happen. The analysis of the No Action Alternative answers the question of what would occur to the resources of concern if the Proposed Action does not take place.

Selection of the No Action Alternative would not constitute a decision to reallocate these lands to non-commodity uses. The decision maker does not need to make a specific decision to select the No Action Alternative. If that is the choice, the action alternatives would simply be dropped and the NEPA process would end. Future harvesting, young stand forest development work, fuels reduction treatments, other connected actions, and road management in this area would not be precluded and could be analyzed under a subsequent NEPA document.

2.3.2 Alternative 2 – Proposed Action

The objective of the Proposed Action is to meet the purpose and needs identified in Chapter 1. In the HLB, Alternative 2 addresses the need to produce timber to contribute to the attainment of the declared ASQ and manage forest stands to achieve continual sustained yield timber production. In the LSR, Alternative 2 promotes the retention of the large, open grown trees; adjusts stand composition; and

increases resilience to disturbance (e.g., wildfire, insects and disease). The following treatments are included as part of Alternative 2 and are shown on Maps 2-1, 2-2, and 2-3.

2.3.2.1 Vegetation Management

The vegetation treatments proposed under Alternative 2 are divided into two categories: commercial and non-commercial treatments. Commercial refers to timber harvest treatments where trees (8 inches diameter at breast height (DBH) and greater) would be removed from the stand to be sold as saw logs to produce dimensional lumber or plywood veneer. Non-commercial refers to treatment types where no commercial forest product is created. For this project, non-commercial treatments includes cutting vegetation and trees smaller than 8 inches DBH, fuels reduction, planting, disease treatments, and snag creation. Some units may include one or all of these treatments, depending on the needs of the stand.

Silvicultural prescriptions take into account changes in the potential vegetation based on factors such as aspect, slope, available moisture, and soil type, in addition to species composition and stand density. The silvicultural prescriptions that would be used to accomplish commercial and non-commercial treatments are described in the following Sections. Table 2-6 in Section 2.5, *Comparison of Alternatives* provides more specific details regarding treatment units for vegetation management.

Commercial Treatment (Timber Harvest)

One general prescription has been designated for the stands in the Harvest Land Base (HLB) – Low Intensity Timber Area (LITA): Regeneration Harvest. One prescription has been designated for a select stand in Late-Successional Reserve (LSR) within the Project Area: Selection Harvest.

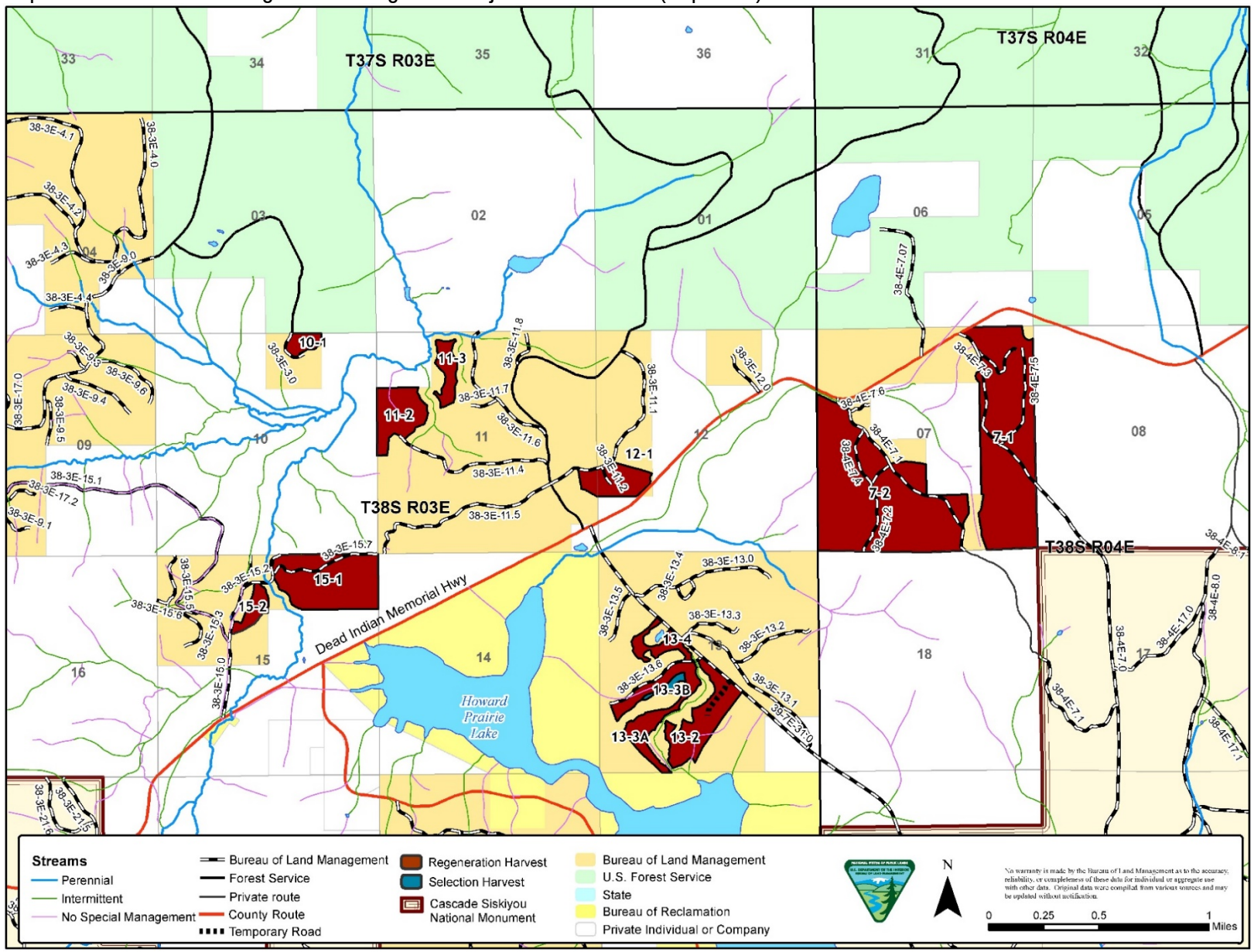
Both prescriptions would set aside and enhance "legacy" structures while treating the remainder of stand to promote both vertical and horizontal structural variability in tree sizes and age classes to address forest fuel hazard, growth, and vigor and forest health.

Regeneration Harvest

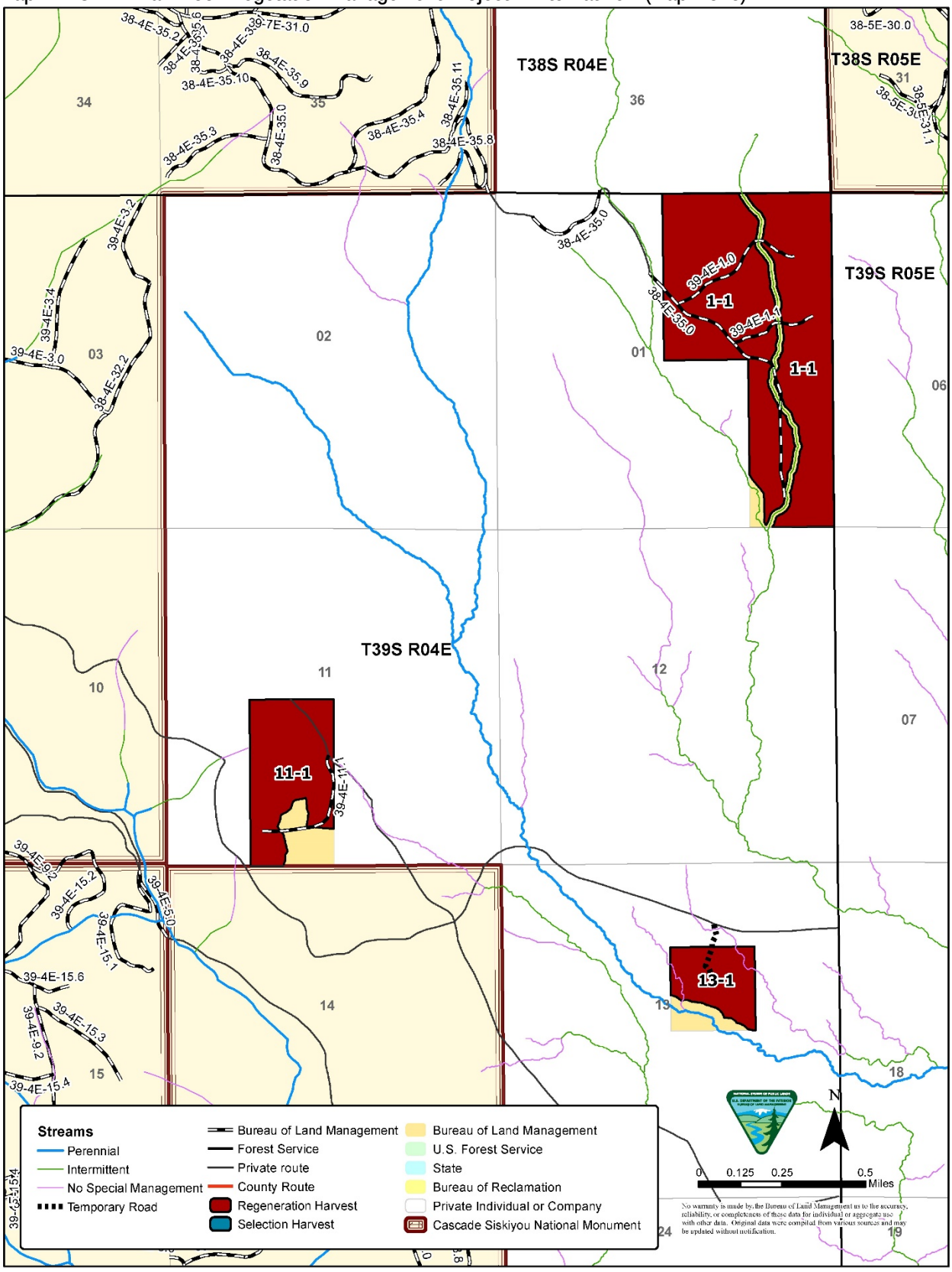
Stands proposed for Regeneration Harvest (RH) have developed understories of shade tolerant white fir as a result of fire exclusion, which are often overly dense. These stands are comprised of a mix of tree species including Douglas-fir, ponderosa pine, sugar pine, incense cedar, and white fir. Regeneration Harvest would be applied on approximately 929 acres (15 units) in the HLB-LITA land use allocation. Stands under this prescription would contain the following components.

- Regeneration harvest would retain 15-30 percent of pre-harvest stand basal area (BA) in live trees, which equates to a range of 40-60 ft^2 BA per acre retention, and a range of 10-20 percent canopy cover retention.
- Trees that exhibit the most dominant old-growth characteristics would be retained.
- Typical leave trees would be the most vigorous dominant and codominant trees having the best live crown ratios (≥ 35 percent), straight boles, and healthy conical-shaped crowns.
- A variety of structures (leaning trees, forked top trees, groups of trees, etc.), different age classes, and a wide range of diameter classes would be retained.

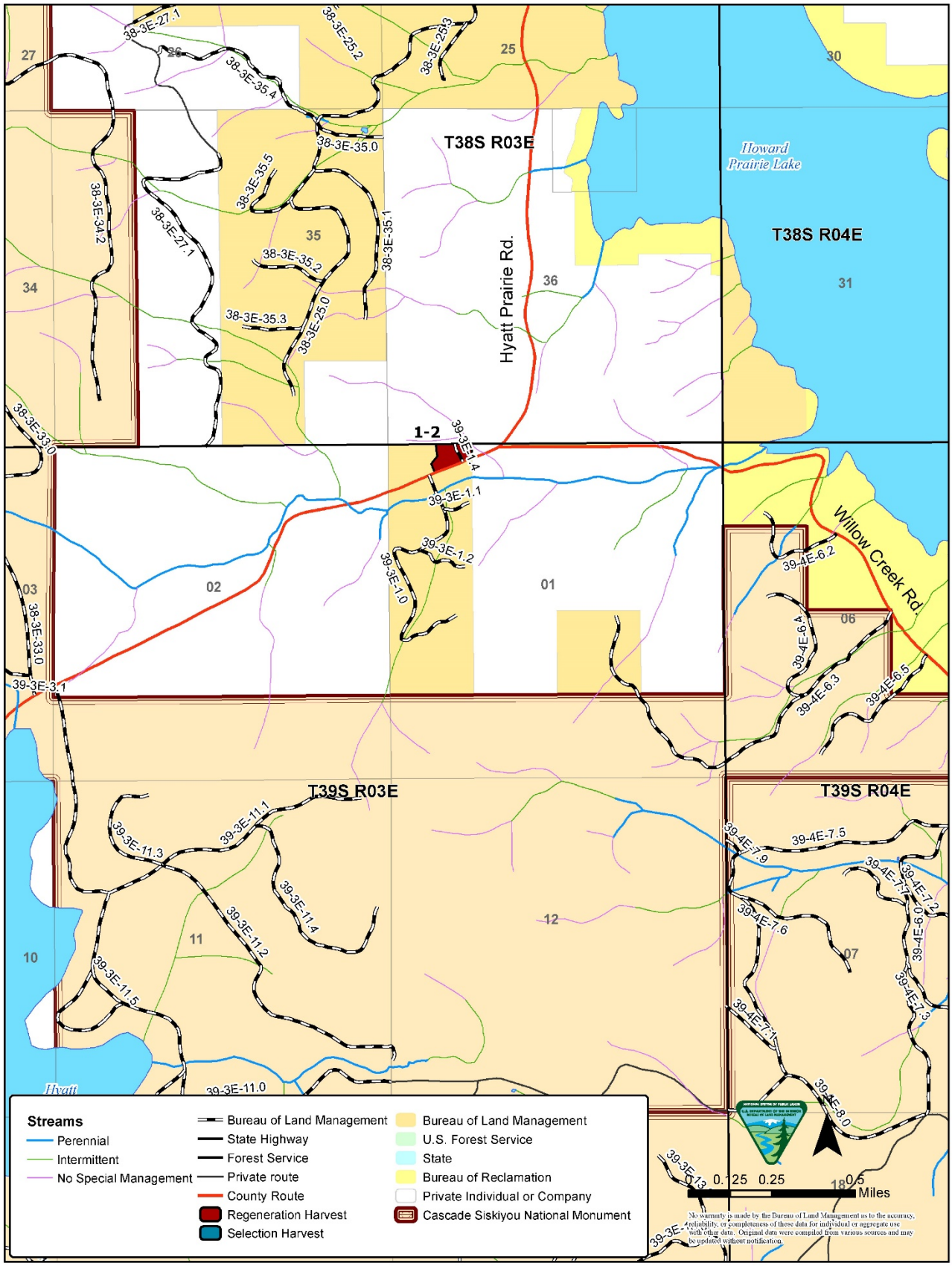
Map 2-1. Griffin Half Moon Vegetation Management Project – Alternative 2 (Map 1 of 3).



Map 2-2. Griffin Half Moon Vegetation Management Project – Alternative 2 (Map 2 of 3).



Map 2-3. Griffin Half Moon Vegetation Management Project – Alternative 2 (Map 3 of 3).



- Species would be favored as leave trees in the following order: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir.

- All trees ≥ 40 inches diameter at breast height (DBH) with a birthdate prior to 1850 would be retained.

Selection Harvest

Selection Harvest (SH) would be applied on the four acres in the mapped LSR land use allocation. This stand is a pine site and does not exhibit the characteristics of an older, structurally complex forest typical of LSR. These stand treatments would generally target low vigor trees for removal over healthy trees to reduce stand density and improve stand resiliency and individual tree health. This prescription would be used to accelerate the growth of remaining trees while promoting desired species that are best adapted to site conditions. Unit 13-3B treated under this prescription would contain the following components.

- The LSR stand treated under SH would be thinned across diameter classes to retain a basal area (BA) range of 100 to 140.

- Within treatment units, areas with a high proportion of healthy pine species would be thinned to the lower range of the basal area retention target (100).

- Canopy cover would be retained between a range of 40-50 percent on average.

- Trees that exhibit the most dominant old-growth characteristics would be retained.

- Typical leave trees would be the most vigorous dominant and codominant trees having the best live crown ratios (≥ 35 percent), straight boles, and healthy conical-shaped crowns.

- A variety of structures (leaning trees, forked top trees, groups of trees, etc.), different age classes, and a wide range of diameter classes would be retained.

- Group selection openings would be created around individual legacy ponderosa and sugar pine trees to encourage the establishment of pine regeneration.

- At least five percent of the harvest unit would be retained in skips.

- Species would be favored as leave trees in the following order: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir.

- All trees ≥ 40 inches DBH with a birthdate prior to 1850 would be retained.

Commercial Harvest/Yarding Methods

Trees designated for removal as a result of application of the forest stand prescriptions described above would be moved from forest stands to landing areas using the following yarding methods:

Ground-Based Yarding

Ground-based yarding is generally limited to slopes of 35 percent or less and limited to when soils are relatively dry and resistant to compaction and displacement. After harvest is complete, skid trails and landings not needed for future management would be decompacted. In upland units, ground-based yarding may occur when the ground is frozen or adequate snow cover exists to prevent soil compaction and displacement.

In conventional ground-based yarding, hand-operated chainsaws are used to fall, de-limb, and buck trees into logs at the stumps. Skidders or crawler tractors (dozers) drag the logs to the landing. The machines used for skidding are diverse and can be wheeled or tracked. Trees and logs are removed from the woods and yarded to the landing by lifting the front end of the logs off the ground.

Cut-to-length harvesting uses a mechanized harvester (tree processor) and a forwarder. The harvester severs, de-limbs, and cuts each tree into logs and stacks them in the forest. The forwarder follows traveling on the slash created by the harvester, picking up the logs and carrying loads to the landing. The harvester is tracked or wheeled and the forwarder is often wheeled. The logs carried by a forwarder do not touch the ground during travel.

Designated Skid Trails and Landings

Designated skid trail routes are those specifically selected by the BLM to facilitate yarding operations outside of unit boundaries (e.g., when necessary for crossing Riparian Reserves). Skidding patterns within a harvest unit are typically selected by the operator and approved by the BLM Contract Administrator. It is preferable to use existing skid trails where possible and locate new ones where needed to facilitate skidding operations. Skid trails would be approximately 9 to 12 feet wide and vary in length.

New log landings would be 0.5 acre or less and would adhere to associated PDFs (see Section 2.4.3). All new landings would be approved by the Contract Administrator prior to construction.

Non-Commercial Treatments

Non-commercial treatments include treatments for annosus root rot; the cutting of small trees (less than 8 inches DBH); treatment of residual fuels; post-harvest planting; and creation of snags in the LSR. The primary objectives of non-commercial treatment prescriptions are to improve, enhance, or maintain ecosystem function and resilience.

Disease Treatments

Within the Project Area, annosus root rot (*Heterobasidion annosum-S group*) is infecting both white fir and Douglas-fir (primarily white fir) in a few select locations. Stand thinning treatments or damage to trees can intensify annosus root rot infections. The treatment of stump surfaces with borax would be

used to prevent spore infection. In areas where annosus root rot is located within treatment units, borax treatments would be used on freshly cut stumps within infection centers to prevent further infection, and slow the spread of the root disease.

Pre-Commercial Thinning

Pre-commercial thinning (PCT) would be applied in the HLB-LITA land use allocation. The primary objectives of PCT would be to reduce the density of understory vegetation and high-stocked small trees (conifers less than 8 inches DBH and hardwoods less than 12 inches DBH) in even and uneven-aged conifer stands. Pre-commercial thinning would also be used in stands where pine and shade-intolerant hardwood species are diminishing in vigor and numbers because of overcrowded, dense conditions. Methods for disposing of the cut material are discussed below.

Fuels Reduction Treatments

The BLM would conduct a fuels assessment within each treatment unit following commercial harvest and/or PCT activities. This assessment would determine the fuel hazard and fire risk based on surface fuel loading, aspect, slope, access, and location of each unit. Treatment of fuels could include lop-and-scatter; hand pile and burn; and underburning. Each of these treatments may be used as a stand-alone treatment or in combination. Most fuels treatments would begin within 90 days after completion of harvest/PCT activities.

Lop-and-Scatter

When the slash (live and dead material 8 inches or less in diameter) remaining in the treatment units after harvest/PCT is less than 11 tons per acre, all stems and branches would be cut from the tree trunk and scattered. Trunks 7 inches in diameter and less would be cut to 3-foot lengths and left on the ground. Slash depth would not exceed 18 inches.

Hand Piling and Pile Burning

Hand piling and hand pile burning would occur when the slash remaining in the treatment units after harvest/PCT is greater than 11 tons per acre. Material between one and seven inches in diameter, and longer than two feet, would be hand piled. The piles would be a minimum of four feet high and six feet in diameter. Piles would be burned in the fall, winter, or spring and would occur within six months to two years of being piled, depending on the period of time needed to cure the slash before burning could take place.

Underburning

Underburning involves the controlled application of fire to understory vegetation and downed woody material when fuel moisture, soil moisture, and weather and atmospheric conditions allow for the fire to be confined to a pre-determined area at a prescribed intensity to achieve the planned resource objectives. Prescribed underburning usually occurs during late winter to spring when soil and duff moisture conditions are sufficient to retain the required amounts of duff, large woody material, and to reduce soil heating. Occasionally, these conditions can be met during the fall season. In compliance with the Oregon Smoke Management Plan, prescribed burning activities on the Medford District require pre-burn registration of all prescribed burn locations with the Oregon State Forester.

Planting, Scalping or Grubbing, and Gopher Trapping

Planting, scalping or grubbing, and gopher trapping would be applied, if needed, after commercial harvest treatments to help reforest a mixture of species appropriate to the site. After regeneration harvest, planting would occur to reforest the site to a stand-level average of at least 130 trees per acre within five years of harvest (USDI BLM 2016b, p. 64) and after Selection Harvest in LSR, created openings would be reforested to at least 75 trees per acre within five years of harvest (USDI BLM 2016b, p. 64). Scalping or grubbing would be implemented, if needed, using hand held tools or chain saws to remove vegetation around seedlings. Treatment units would be monitored after initial planting and gopher trapping would be implemented as needed to achieve reforestation objectives.

Snag Creation in the Late-Successional Reserve

In Unit 13-3B (LSR), if there are less than 64 snags per acres greater than 10 inches DBH and less than 19 snags per acre greater than 20 inches DBH on average across the harvest unit, new snags (one snag greater than 10 inches DBH per acre and one snag greater than 20 inches DBH per acre) would be created within one year of completion of yarding the timber sale. If trees are not available in the size class specified, trees from the largest size class available would be used. Snag creation amounts would be met as an average at the scale of the harvest unit, and would not need to be attained on every acre (USDI BLM 2016b, p. 73).

2.3.2.2 Transportation Management

Proposed transportation management activities would be designed to improve or provide road access to areas in need of vegetation management. Roads throughout the Griffin Half Moon Vegetation Management Project Area are in need of maintenance to restore, repair, or improve road surfaces, culverts, and roadside drainage ditches to reduce road-related erosion and sedimentation to stream courses and to support timber haul.

Some roads that were previously closed are proposed for re-opening for the Griffin Half Moon Project and would be closed either seasonally or long-term after the project work is completed. These roads are not needed in the near future but may be re-opened when needed for BLM administrative purposes. No permanent road construction is proposed. Table 2-1, Table 2-2, and Table 2-3 provide summaries of roadwork proposed for this project.

Haul Routes (Existing Roads), Road Improvements, and Road Renovation

An estimated 33.43 miles of existing roads would be used as haul roads and improved as needed to meet BLM standards (Table 2-1). Select roads were identified for wet season haul (17.92 miles), depending on road surface type, connectivity to fish-bearing streams, and current condition. However, there currently are no roads with adequate rock for wet season haul that directly access the proposed treatment units. Additional roads may be available for wet season haul if adequate rock is added to the roadbed and the roads are not connected to fish-bearing streams.

Table 2-1. Proposed Haul Roads in the Project Area.

Road Number	Approximate Length (miles)	Existing Surface	Control	Possible Road Renovation	Seasonal Restriction (for Log Hauling)	Comments
38-3E-03.00	0.30	NAT	BLM	B	1	
38-3E-09.00	1.37	AGG	BLM	A	2	Roadside brush only.
38-3E-11.01	0.39	NAT	BLM	C	1	
38-3E-11.02	0.09	NAT	BLM	C	1	Closed Long Term. Reopen and close long term after use.
38-3E-11.04	0.80	AGG	BLM	B	1	
38-3E-11.06	0.59	AGG	BLM	B	1	Rock road surface.
38-3E-11.07	0.14	NAT	BLM	C	1	Closed Long Term. Reopen and Close Long Term after use.
38-3E-13.06	0.49	AGG	BLM	B	1	Reopen and barricade at end of road after use.
38-3E-15.00 A	0.24	AGG	BLM	A	2	
38-3E-15.00 B	0.42	AGG	BLM	A	2	
38-3E-15.02	0.30	AGG	BLM	B	1	
38-3E-15.04 A	0.25	AGG	BLM	B	1	
38-3E-15.07	0.57	NAT	BLM	B	1	
38-3E-17.00 A	2.47	BST	BLM	A	0	
38-3E-17.00 B	1.27	BST	BLM	A	0	
38-4E-07.00 A	0.80	AGG	BLM	A	2	Roadside brush only.
38-4E-07.01 A	0.36	AGG	BLM	B	1	
38-4E-07.01 B	0.61	AGG	BLM	B	1	
38-4E-07.02	0.45	NAT	BLM	B	1	
38-4E-07.03	0.27	NAT	BLM	C	1	Closed Long Term. Reopen and Close Long Term after use.
38-4E-07.04	0.14	NAT	BLM	C	1	Closed Long Term. Reopen and Close Long Term after use.
38-4E-07.05	0.48	NAT	BLM	C	1	Closed Long Term. Reopen and Close Long Term after use.
38-4E-32.00 A	0.10	BST	BLM	A	0	
38-4E-32.02 A	0.62	AGG	BLM	A	2	Roadside brush and maintain drainage.
38-4E-32.02 B	1.06	AGG	BLM	A	2	Roadside brush and maintain drainage.

Road Number	Approximate Length (miles)	Existing Surface	Control	Possible Road Renovation	Seasonal Restriction (for Log Hauling)	Comments
38-4E-32.02 C	1.24	AGG	BLM	A	2	Roadside brush and maintain drainage.
38-4E-32.02 D	0.15	AGG	BLM	B	1	
38-4E-35.00 A1	0.09	BST	BLM	A	2	Roadside brush only.
38-4E-35.00 A2	1.50	BST	BLM	A	2	Roadside brush only.
38-4E-35.00 B	0.21	AGG	PVT	B	1	
38-4E-35.00 C	0.27	AGG	BLM	B	1	
38-4E-35.00 D	0.30	AGG	PVT	B	1	
38-4E-35.00 E	0.86	AGG	BLM	C	1	Drainage to be improved to repair diversion.
39-3E-01.04	0.05	NAT	BLM	B	1	
39-4E-01.00	0.45	NAT	BLM	C	1	Close Long Term after use.
39-4E-01.01	0.28	NAT	BLM	C	1	Closed Long Term. Reopen and Close Long Term after use.
39-4E-10.01	2.45	AGG	PVT	B	1	
39-4E-11.01	0.40	NAT	BLM	C	1	
39-4E-14.00	1.08	Red Cinder	PVT	B	1	
39-4E-14.01 A	0.38	AGG	PVT	B	1	
39-4E-14.01 B	0.19	NAT	PVT	C	1	
39-4E-14.01 C	0.25	NAT	BLM	C	1	
39-7E-31.00 B4	1.99	BST	BLM	A	0	
39-7E-31.00 B3	2.49	BST	BLM	A	0	
39-7E-31.00 B2	2.26	BST	BLM	A	0	
USFS 100	0.43	BST	USFS	A	1	
USFS 800	0.11	AGG	USFS	A	1	
USFS 890	1.12	AGG	USFS	B	1	
T38 R3E Spur 13-3	0.07	NAT	BLM	C	1	Existing Closed Non-System Road. Reopen and Close Long Term after
User-Created Lily Glen Equestrian Trail	0.23	NAT	BLM	C	1	Brushed and Graded for Timber Haul. Rehabilitated to trail width after use.
Total Mileage	33.43					

Abbreviations:
Existing Surface: NAT = natural, AGG = Aggregate, BST = Bituminous Surface Treatment
Control: BLM = Bureau of Land Management, USFS = United States Forest Service, PVT = Private
Possible Road Renovations:
A = no road renovation. Road would be maintained to meet BLM standards.

B = spot rocking and/or drainage improvements. Road would be maintained to meet BLM standards.
C = Reshaping road and reestablishing drainage. Road would be maintained to meet BLM standards.

Seasonal Restrictions (for log hauling):

0 = no restrictions
1 = Hauling restricted between 10/15 and 5/15 are based on current surface condition. Restrictions may be waived during extended dry periods, by adding sufficient rock, hauling over snow (R095), or during frozen conditions.
2 = Winter Haul allowed in accordance with 2016 ROD/RMP BMPs (USDI BLM 2016b, p. 181Appendix C): R093, R094, R095, and R097.

Note: Prior to the wet season, October 15th – May 15th, if purchaser elects to furnish and place additional rock as per BLM specifications, road specific seasonal haul restrictions may be modified as approved by the Authorized Officer.

2016 ROD/RMP BMPs:

R 093 - On active haul roads, during the wet season, use durable rock surfacing and sufficient surface depth to resist rutting or development of sediment on road surfaces that drain directly to wetlands, floodplains and waters of the state.

R 094 – Prior to winter hauling activities, implement structural road treatments such as: increasing the frequency of cross drains, installing sediment barriers or catch basins, applying gravel lifts or asphalt road surfacing at stream crossing approaches, and armoring ditch lines.

R 095 - Remove snow on haul roads in a manner that would protect roads and adjacent resources. Retain a minimum layer (4 inches) of compacted snow on the road surface. Provide drainage through the snow bank at periodic intervals to allow for snow melt to drain off the road surface.

R 097 - Maintain road surface by applying appropriate gradation of aggregate and suitable particle hardness to protect road surfaces from rutting and erosion under active haul where runoff drains to wetlands, riparian reserve, floodplains and waters of the state.

Road work on existing roads to access commercial harvest units may include the following activities as needed: grading and shaping roads; road surfacing; spot rocking; brushing; cleaning road drainage ditches and culvert basins; repairing and installing water dips; and replacing and installing culverts that have met or exceeded their lifespan.

Road surfacing is the placing of crushed aggregate along the full width and desired length of the road. Surfacing is done by grading and reshaping the road subgrade, followed by hauling, placing, and compacting the new surfacing material on the prepared subgrade.

Spot rocking involves placing crushed aggregate on sections of inadequately surfaced roads as needed to help control erosion and maintain the road surface. This restores the road surface and road condition making it suitable for driving and hauling.

Existing barricades on BLM roads 38-3E-11.02, 38-3E-11.07, 38-4E-07.03, 38-4E-07.04, 38-4E-07.05, and 39-4E-01.01 would be removed. The roads would be brushed and saplings in the running surfaces would be removed. Grass growing in the roadbeds would not be bladed off unless necessary to reduce fire danger. Road grading would only occur in areas needing drainage improvement or areas for safe passage of vehicles. Once harvest operations are completed, the roads would be left in an erosion-resistant condition and barricades would be replaced. Road entrances would be camouflaged for a distance of approximately 100 feet or as needed to prevent unauthorized vehicle access. Barricades at the beginning of these roads would consist of one or more of the following: placing logs, slash, boulders, earthen berms, or other material.

Road 38-3E-13.06 is an existing rocked road. The barricade at the entrance would be removed. Grass growing in the roadbeds would not be bladed off unless necessary to reduce fire danger. Road grading would only occur in areas needing drainage improvement or areas for safe passage of vehicles. Once harvest operations are completed, this road would remain open for public access. The end of the road would be blocked to prevent unauthorized vehicle access beyond the end of Road 38-3E-13.06. The

barricade at the end of this road would consist of one or more of the following: placing logs, slash, boulders, earthen berms, or other material.

Road 39-4E-01.00 is overgrown with vegetation. This road would be brushed and saplings in the running surfaces would be removed. Road grading would only occur in areas needing drainage improvement or for safe passage of vehicles. After harvest operations are completed, the road would be left in an erosion-resistant condition and an earthen barricade would be constructed. Blockage at the entrance would consist of placing logs, slash, boulders, earthen berms, and other material so the entrance is camouflaged for a minimum distance of 100 feet or as needed to prevent unauthorized vehicle use.

Roads 38-3E-15.07 and 39-3E-01.04 are existing open, non-system roads on BLM-administered lands. Road 39-4E-14.00 is an existing open, non-system road on private lands. These roads would be used for haul and improved as needed to meet BLM standards.

T38 R3E Spur 13-3 road is an existing closed, non-system road on BLM-administered lands. The existing barricade on this road would be removed. The road would be brushed and saplings in the running surface would be removed. Grass growing in the roadbed would not be bladed off unless necessary to reduce fire danger. Road grading would only occur in areas needing drainage improvement or for safe passage of vehicles. After harvest operations are completed, the road would be left in an erosion-resistant condition and an earthen barricade would be replaced. Blockage at the entrance would consist of placing logs, slash, boulders, earthen berms, and other material so the entrance is camouflaged for a minimum distance of 100 feet or as needed to prevent unauthorized vehicle use.

There is a user-created equestrian/hiking trail that runs from the Lily Glen Equestrian Park/Campground along the shores of Howard Prairie Lake, primarily on lands administered by the Bureau of Reclamation (6.5 miles). A section of this user-created trail (1.6 miles) loops back onto BLM-administered lands, 0.23 miles of which is proposed for use as a haul route. The route is currently approximately 10 feet wide. This route would be brushed and graded in areas needing drainage improvement or for safe passage of vehicles. After harvest operations are completed, the route would be rehabilitated to as good or better condition than prior to use, ensuring proper water drainage where necessary.

Temporary Road Construction

Two temporary roads (approximately 0.39 miles total) are proposed to allow access to Unit 13-1 and Unit 13-2 where no previous roads exist (Table 2-2). These roads would be constructed to minimum standards that would facilitate safe and efficient operations. Construction would include clearing, grubbing, removing, and disposing of vegetation and debris from within established clearing limits. Work could also include the construction of a minimum-width subgrade by excavating, leveling, grading, and outsloping.

The two temporary roads would be fully decommissioned at the completion of project-related activities. Fully decommissioning would include subsoiling the surface to a depth of 12 to 18 inches or to a point where 10 inches diameter stones are the dominant substrate (whichever is shallower). Where it is determined by the Authorized Officer that subsoiling the temporary roads would cause unacceptable damage to the root systems of residual trees along a majority of the temporary roads (i.e., within the dripline of trees), subsoiling may be intermittent or scarification may be used instead. Equipment must be able to avoid rocky areas and adapt to changes in rock depth. Slash, boulders, and other debris would be placed along each road's entire length as determined by availability of materials to provide ground

cover and discourage mechanized use. Blockage at the entrance of each road would consist of placing logs, slash, boulders, earthen berms, and other material so the entrance is camouflaged for a minimum distance of 100 feet and vehicle use is precluded. Seeding with approved native seed species and mulching with weed-free straw or approved native materials would occur within 100 feet of each road's entrance. Treatment described may be modified by the Authorized Officer in consultation with appropriate earth scientists or aquatic specialists.

Table 2-2. Temporary Road Construction.

Road Number	Approximate Length (miles)	Surface	Control
T39 R4E Temp 13-1	0.20	NAT	PVT
T38 R3E Temp 13-2	0.19	NAT	BLM
Total mileage:	0.39		

Abbreviations:
Surface: NAT=Natural
Control: BLM = Bureau of Land Management, PVT = Private

Long-Term Closure of Existing Roads

Approximately 1.85 miles of road is proposed for long-term closure under all action alternatives (Table 2-3). Roads proposed for long-term closure would be closed with an earthen barrier or its equivalent for an extended/indefinite period, but could be operated and maintained again in the future.

Table 2-3. Proposed Long-Term Closure of Existing Roads.

Road Number	Approximate Length (miles)	Surface	Control	Long-Term Closure Treatment
38-3E-11.02	0.09	NAT	BLM	Mechanical
38-3E-11.07	0.14	NAT	BLM	Mechanical
38-4E-07.03	0.27	NAT	BLM	Mechanical
38-4E-07.04	0.14	NAT	BLM	Mechanical
38-4E-07.05	0.48	NAT	BLM	Mechanical
39-4E-01.00	0.45	NAT	BLM	Mechanical
39-4E-01.01	0.28	NAT	BLM	Mechanical
Total mileage:	1.85			

Abbreviations:
Surface: NAT = natural, AGG = Aggregate
Control: BLM=Bureau of Land Management

Identified roads would be effectively blocked and winterized prior to the wet season. These roads would be left in an erosion-resistant condition by establishing cross drains, eliminating diversion potential at stream channels, and stabilizing or removing fills on unstable areas. Work may consist of water barring roads, removing culverts (armor, if necessary), seeding with native grasses, and mulching with weed-free mulch. Blockage at the entrance would consist of placing logs, slash, boulders, earthen berms, and other material so the entrance is camouflaged for a minimum distance of 100 feet or as needed to prevent unauthorized vehicle use.

2.3.3 Alternative 3

Alternative 3 was developed to respond to concerns raised during internal and external scoping regarding the effects of Regeneration Harvest treatments on the magnitude and timing of peak flows and past reforestation issues on the Dead Indian Plateau (Minore 1978). Treatments proposed under Alternative 3 are similar to those proposed under Alternative 2 with the exception of the commercial harvest treatments. This alternative proposes a blend of different prescription types including High Retention Regeneration Harvest (400 acres), White Fir Regeneration Harvest (357 acres), Commerical Thin (172 acres), and Selection Harvest (four acres). The following treatments are included as part of Alternative 3 and are shown on Map 2-4, Map 2-5, and Map 2-6.

2.3.3.1 Vegetation Management

Commercial Treatment (Timber Harvest)

Three general prescriptions have been designated for the stands in the Harvest Land Base (HLB) – Low Intensity Timber Area (LITA): High Retention Regeneration Harvest, White Fir Regeneration Harvest, and Commercial Thin. One prescription has been designated for a select stand in Late-Successional Reserve (LSR) within the Project Area: Selection Harvest.

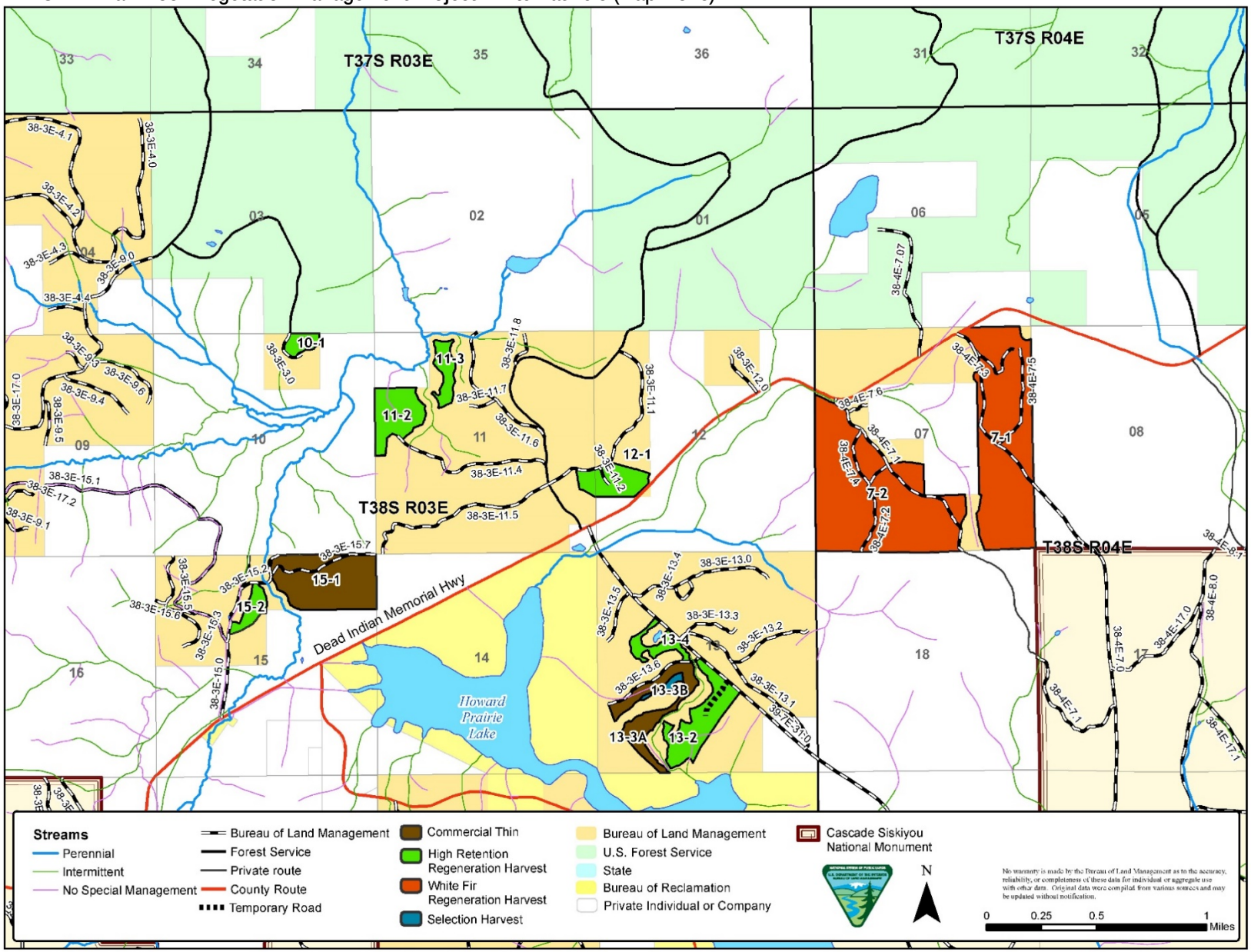
All prescriptions would set aside and enhance "legacy" structures while treating the remainder of stand to promote both vertical and horizontal structural variability in tree sizes and age classes to address forest fuel hazard, growth, and vigor and forest health.

High Retention Regeneration Harvest

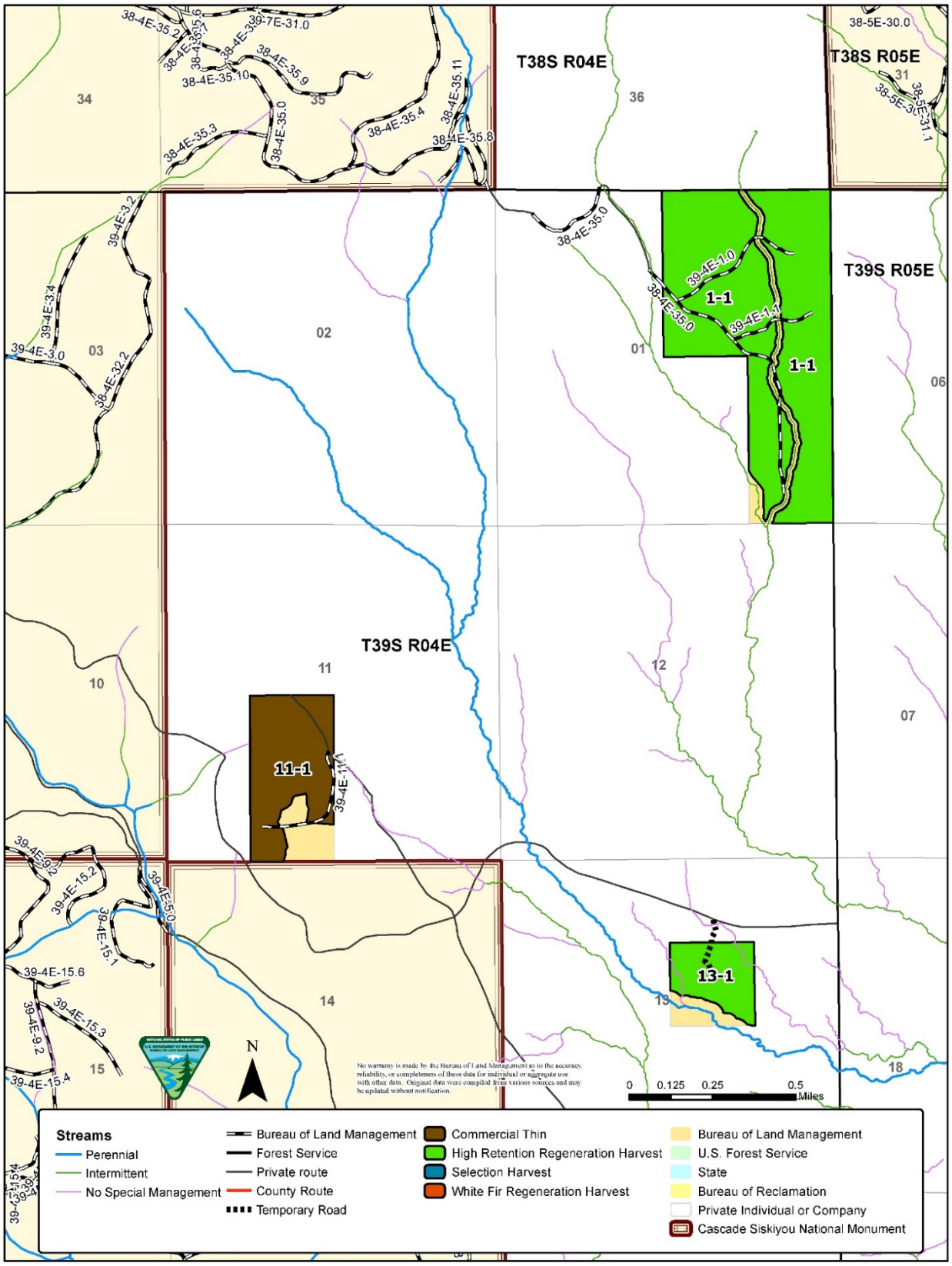
The High Retention Regeneration Harvest (HRRH) prescription applies similar concepts of Regeneration Harvest (above), but the basal area retentions would be higher. Under this alternative, HRRH would be applied on approximately 400 acres (10 units) in the HLB-LITA land use allocation. These stands are comprised of a mix of tree species including Douglas-fir, ponderosa pine, sugar pine, incense cedar, and white fir and possess dense understories as a result of fire exclusion. Stands under this prescription would contain the following components.

- High Retention Regeneration Harvest would retain canopy cover levels between 30-40 percent, which equates to a range of 60-100 ft^2 BA per acre retention. In stands with a dense understory already established, basal area retention would be on the lower end of the range.
- Trees that exhibit the most dominant old-growth characteristics would be retained.
- Typical leave trees would be the most vigorous dominant and codominant trees having the best live crown ratios (≥ 35 percent), straight boles, and healthy conical-shaped crowns.
- A variety of structures (leaning trees, forked top trees, groups of trees, etc.), different age classes, and a wide range of diameter classes would be retained.
- Species would be favored as leave trees in the following order: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir.

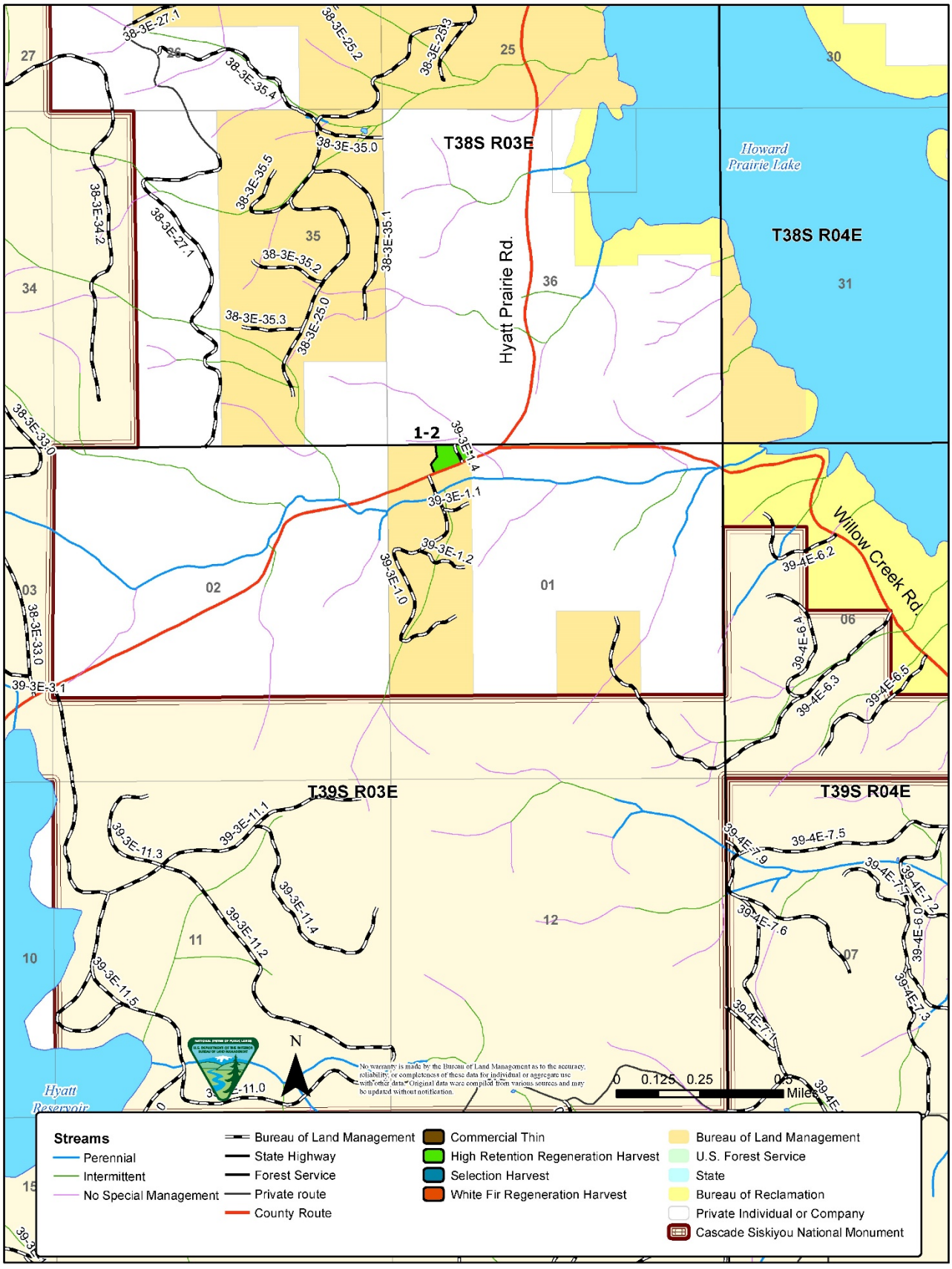
Map 2-4. Griffin Half Moon Vegetation Management Project – Alternative 3 (Map 1 of 3).



Map 2-5. Griffin Half Moon Vegetation Management Project – Alternative 3 (Map 2 of 3).



Map 2-6. Griffin Half Moon Vegetation Management Project – Alternative 3 (Map 3 of 3).



- All trees ≥ 40 inches diameter at breast height (DBH) with a birthdate prior to 1850 would be retained.

White Fir Regeneration Harvest

White fir stands within the Project Area occur on relatively dry sites and moisture is a limiting factor. These stands are primarily composed of white fir and Douglas-fir but also include ponderosa pine, sugar pine, and incense cedar. Pacific yew is common in the understory. The objectives of the White Fir Regeneration Harvest (WFRH) prescription for managing these sites are to reduce stand densities and competition for water and to increase the proportion of early seral drought tolerant species including sugar pine, ponderosa pine, incense cedar, and Douglas-fir. In stands resembling past shelterwood treatments, the WFRH prescription would manage for the release of the Douglas-fir lower crown class layers. Legacy Douglas-fir trees would be promoted by removing competing white fir. The WFRH prescription would be applied on approximately 357 acres (two units) in the HLB-LITA land use allocation. Stands under this prescription would contain the following components.

- The majority of white fir between 12-39 inches DBH would be removed and all healthy Douglas-fir would be retained.
- White Fir Regeneration Harvest would retain 60-80 BA on average, and a range of 30-40 percent canopy cover.
- Pacific yew present would not be removed.
- Understory reduction could take place in these units post-harvest (if needed) with a preference of retaining Douglas-fir over white fir.
- Species would be favored as leave trees in the following order: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir.
- All trees ≥ 40 inches diameter at breast height (DBH) with a birthdate prior to 1850 would be retained.

Commercial Thin

Commercial thinning is defined as "stand thinning in which some or all of the cut trees are removed from the stand for timber" (USDI BLM 2016b, p. 301). The Commercial Thin (CT) prescription would be applied on approximately on 172 acres (three units) in the HLB-LITA land use allocation. The CT prescription would reduce stand average relative densities to levels between 25-45 percent. These stand treatments would generally target low vigor trees for removal over healthy trees to reduce stand density and improve stand resiliency and individual tree health. This prescription would be used to accelerate the growth of remaining trees while promoting desired species that are best adapted to site conditions. Spatial distribution of leave trees should be based on tree condition (live crown ratio and crown form). Untreated areas (skips) would be retained and group selection opening would be created to provide structural complexity. Stands treated under this prescription would contain all of the following components.

- Stands treated under the CT prescription would be thinned across diameter classes to retain a basal area range of 100-140 ft^2 per acre.
- Within treatment units, areas with a high proportion of healthy pine species would be thinned to the lower range of the BA retention target (100 ft^2).
- Canopy cover would be retained within a range of 35-50 percent on average.
- Trees that exhibit the most dominant old-growth characteristics would be retained.
- Typical leave trees would be the most vigorous dominant and co-dominant trees having the best live crown ratios (≥ 35 percent), straight boles, and healthy conical-shaped crowns.
- A variety of structures (leaning trees, forked top trees, groups of trees, etc.), different age classes, and a wide range of diameter classes would be retained.
- Group selection openings would be created around individual legacy ponderosa and sugar pine trees to encourage the establishment of pine regeneration.
- At least five percent of the harvest unit would be retained in skips.
- No more than 10 percent of the planned harvest units would be in group selection openings.
- The extent or amount of openings permitted would range from 5-10 percent of the total treatment unit area.
- Species would be favored as leave trees in the following order: sugar pine, ponderosa pine, incense cedar, Douglas-fir, and white fir.
- All trees ≥ 40 inches diameter at breast height (DBH) with a birthdate prior to 1850 would be retained.

Selection Harvest

Under Alternative 3, Selection Harvest (SH) would be applied on the four acres in the mapped LSR land use allocation as described under Alternative 2.

Non-Commercial Treatments

Same as Alternative 2.

2.3.3.2 Transportation Management

Same as Alternative 2.

2.3.4 Alternative 4

Alternative 4 was developed in response to public scoping comments suggesting that the BLM consider thinning rather than regeneration harvest. Under Alternative 4, commercial harvest treatments include Commercial Thin (929 acres) and Selection Harvest (four acres). No Regeneration Harvest is proposed under this alternative. Other proposed treatments are identical to those proposed under Alternative 2. The following treatments are included as part of Alternative 4 and are shown on Map 2-7, Map 2-8, and Map 2-9.

2.3.4.1 Vegetation Management

Commercial Treatment (Timber Harvest)

One general prescription has been designated for the stands in the Harvest Land Base (HLB) – Low Intensity Timber Area (LITA): Commercial Thin. One prescription has been designated for a select stand in Late-Successional Reserve (LSR) within the Project Area: Selection Harvest.

All prescriptions would set aside and enhance "legacy" structures while treating the remainder of stand to promote both vertical and horizontal structural variability in tree sizes and age classes to address forest fuel hazard, growth, and vigor and forest health.

Commercial Thin

Under Alternative 4, the Commercial Thin (CT) prescription would be applied on approximately on 929 acres (15 units) in the HLB-LITA land use allocation as described under Alternative 3**.**

Selection Harvest

Under Alternative 3, Selection Harvest (SH) would be applied on the four acres in the mapped LSR land use allocation as described under Alternative 2.

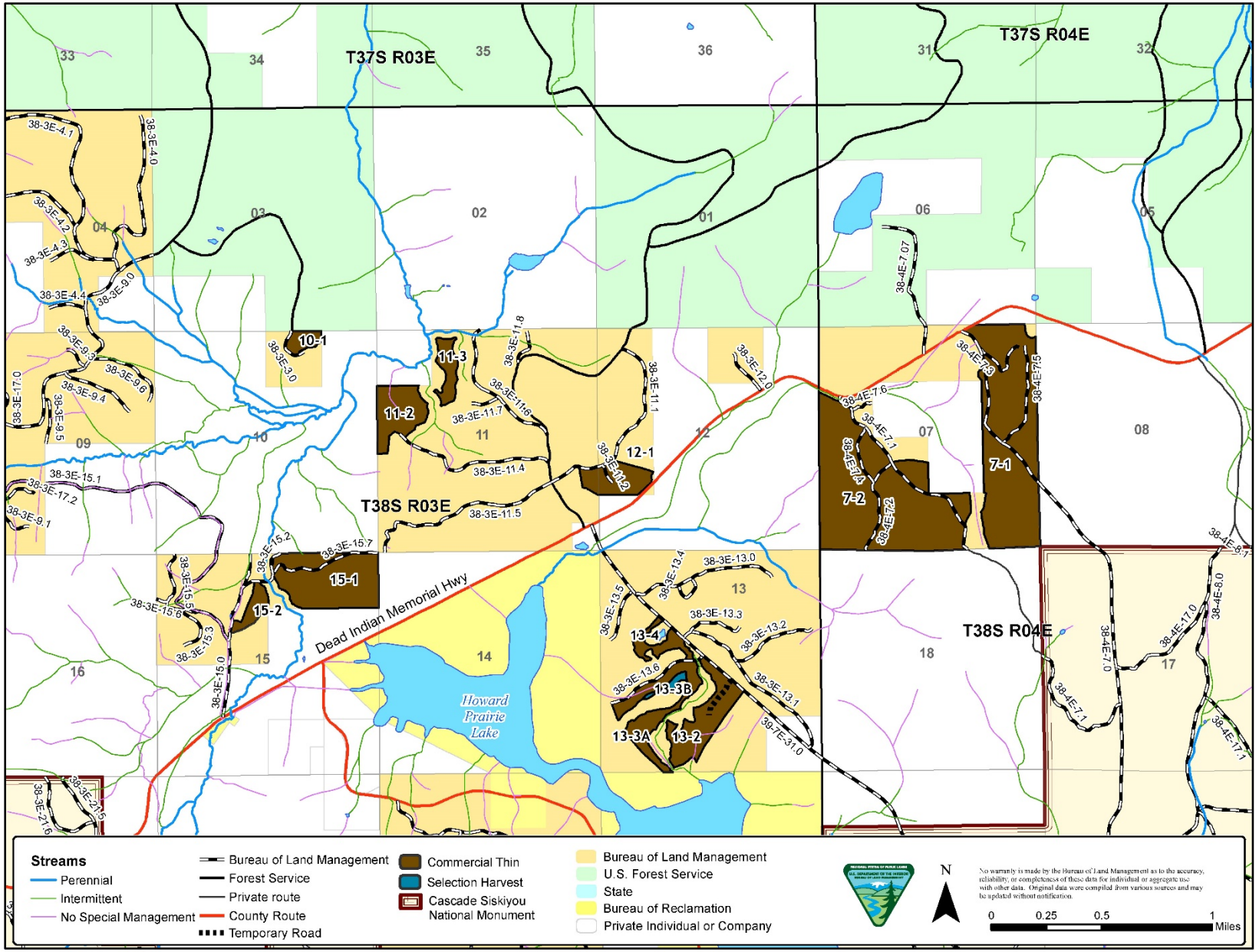
Non-Commercial Treatments

Same as Alternative 2.

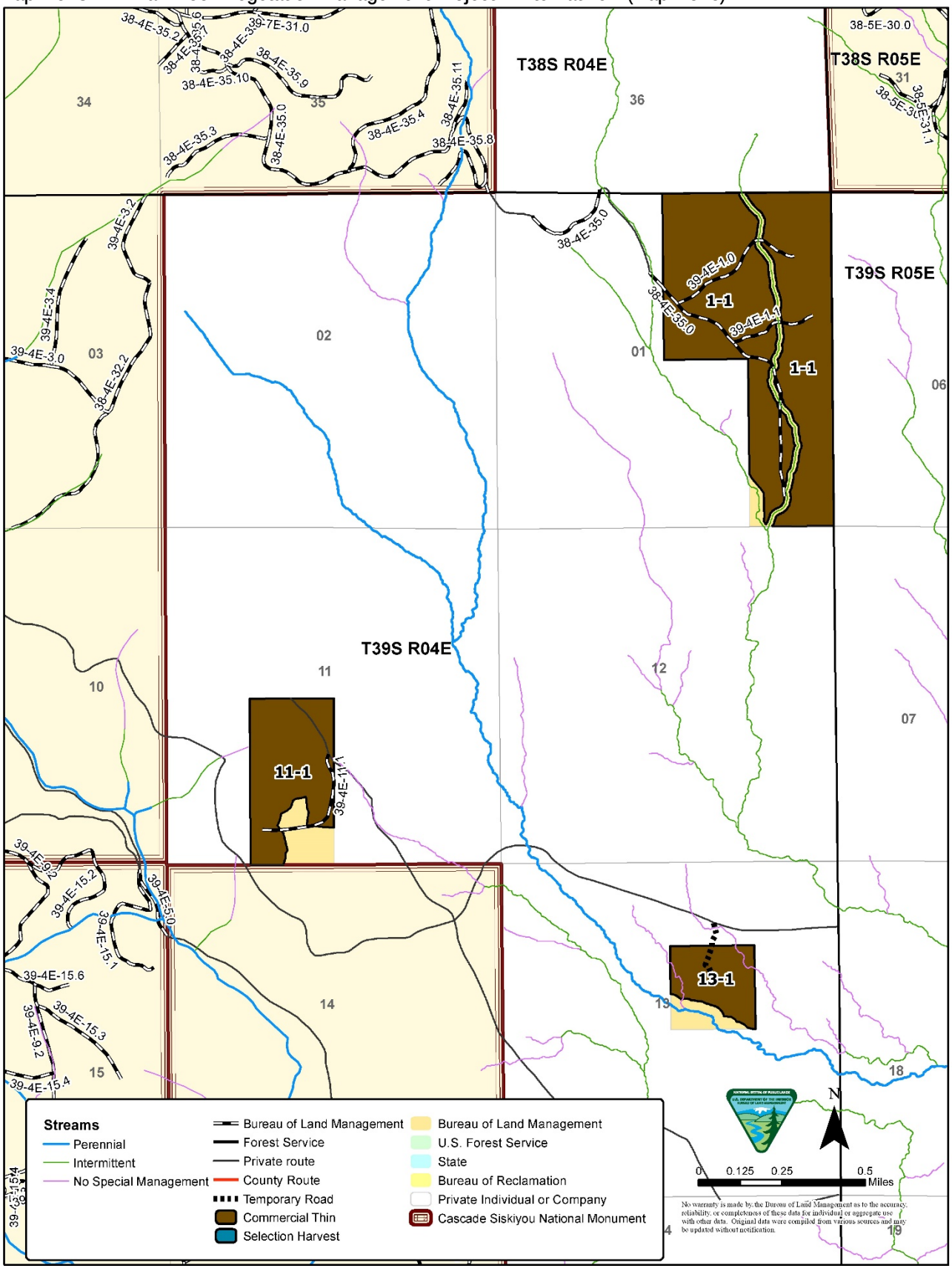
2.3.4.2 Transportation Management

Same as Alternative 2.

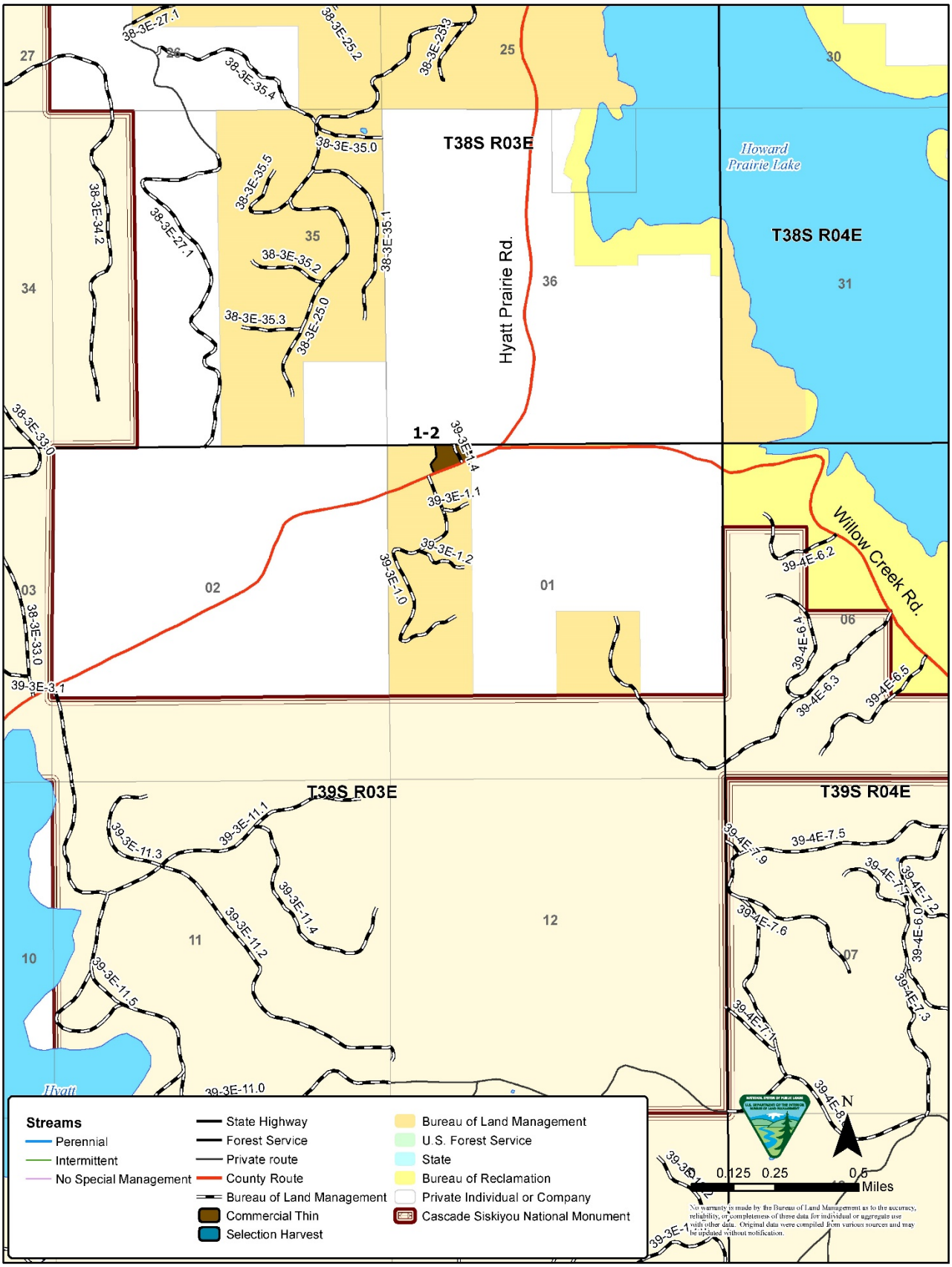
Map 2-7. Griffin Half Moon Vegetation Management Project – Alternative 4 (Map 1 of 3).



Map 2-8. Griffin Half Moon Vegetation Management Project – Alternative 4 (Map 2 of 3).



Map 2-9. Griffin Half Moon Vegetation Management Project – Alternative 4 (Map 3 of 3).



2.4 PROJECT DESIGN FEATURES

Project Design Features **(**PDFs) are an integral part of the action alternatives (Alternatives 2, 3, and 4) and are considered in the analysis of project impacts in Chapter 3. They are developed to avoid or reduce the potential for adverse impacts to resources. PDFs include seasonal restrictions on many activities that help minimize erosion and reduce disturbance to wildlife. PDFs also outline protective buffers for sensitive species, mandate the retention of snags, and delineate many measures for protecting Riparian Reserves throughout the project. Where applicable, PDFs reflect Best Management Practices (BMPs) and standard operating procedures. The applicable BMPs are cited in parentheses; the numbers (e.g., SP 05, TH 08, etc.) correspond to the BMP numbers listed in the tables in Appendix C of the RMP (USDI BLM 2016b, pp. 167-206).

The PDFs listed below would be carried forward into contracts as required contract specifications. BLM contract administrators and inspectors monitor the operations of contractors to ensure that contract specifications are implemented as designed.

BMPs are designed to prevent and reduce nonpoint source pollution and maintain water quality at the highest practicable level to meet water quality standards and Total Maximum Daily Level (TMDL) loads as set by Oregon Department of Environmental Quality (USDI BLM 2016b, pp. 163, 164). PDF implementation, in addition to establishment of Riparian Reserves, would exceed Oregon State Forest Practices Rules. A review of forest management impacts on water quality concluded that the use of BMPs in forest operations was generally effective in avoiding significant water quality problems; the report noted that proper implementation of BMPs was essential to minimizing non-point source pollution (Kattelmann 1996). BMPs would be monitored and, where necessary, modified to ensure compliance with Oregon Water Quality Standards (USDI BLM 2016b, p. 165).

2.4.1 Timber Harvest Activities

Objective 1: Protect Riparian Reserves.

- Riparian Reserves distances are one site-potential tree height (165 feet in the Little Butte Creek Watershed and 170 feet in the Jenny Creek Watershed) distance either side of fish-bearing streams and perennial streams and one site-potential tree height (165 feet) in the Little Butte Creek Watershed and 50 feet in the Jenny Creek Watershed from each side of intermittent, non-fish-bearing streams. Forest management activities would only be conducted outside of Riparian Reserves. Exceptions for the use of ground-based machinery include use of existing roads for haul and designated skid trails over approximately two stable locations in a dry intermittent stream in Unit 1-1 (USDI BLM 2016b, p. 76).

- Vegetation would not be cut within 100 feet of lakes, natural ponds, and reservoirs greater than one acre, and wetlands greater than one acre (USDI BLM 2016b, p. 77).

- Vegetation would not be cut within 25 feet of natural ponds less than one acre (including seeps and springs), and constructed water impoundments (e.g., canal ditches and pump chances of any size) (USDI BLM 2016b, p. 77).

- Trees would be directionally felled away from adjacent Riparian Reserves.

Objective 2: Minimize impacts to water quality and soil productivity from timber skidding operations, hauling, and temporary road and landing construction.

- When operationally feasible, all units would be yarded in such a way that the coarse woody material remaining after logging would be maintained at or greater than current levels in order to protect the soil surface and maintain soil productivity.

- Wherever trees are cut to be removed, directional felling away from dry draws and watercourses would be practiced. Trees would be felled to the lead in relation to skid trails.

- Incorporate existing skid trails and landings as a priority over creating new trails and landings where feasible, into a designated trail network for ground-based harvesting equipment. When new skid trails are needed, limit total (existing and new) designated skid trails to less than 15 percent of the harvest unit area to reduce displacement or compaction to acceptable limits. All tractor skid trail locations would be approved by the BLM Contract Administrator prior to construction. Consider proper spacing (on average 125 feet between skid trails), skid trail direction, and location relative to terrain (TH 8 and TH 12).

- Skid trails are to be located by operators and approved by a BLM Contract Administrator prior to falling timber tributary to the skid trails. The intent is to minimize areas affected by tractors and other mechanical equipment (disturbance, particle displacement, deflection, and compaction) and thus minimize soil productivity loss.

- Restrict ground-based yarding and soil de-compaction operations from October 15th to May 15th, or when soil moisture exceeds 25 percent. Variations in these dates would be permitted dependent upon weather and soil moisture conditions as determined by the Authorized Officer in consultation with aquatic and/or soils scientists. Block skid trails by October 15th of the year of harvest unless a waiver is in place for ground-based yarding to extend the dry season (TH 11 and TH 19).

- When measuring soil moisture, require a minimum of four gravimetric water content samples using the oven dry method. Soil samples must be collected between depths of 4-6 inches. Collect samples in the areas likely to have the highest water content.

- With the exception of the approaches to the two designated stream crossing in Unit 1-1, discontinuously subsoil skid trails as necessary, where the width of the trail permits and no damage to residual trees would occur, within units prescribed for regeneration harvest (RH, HRRH, or WFRH) to a depth of at least 12 to 18 inches, to a point where stones 10 inches or larger diameter are the dominant substrate, or to bedrock (whichever is shallower) as determined by the BLM soil scientist. Subsoiling may be intermittent or scarified instead, where the Authorized Officer determines that subsoiling skid trails would cause unacceptable damage to the root systems of residual trees along a majority of the skid trail, such as where new skid trails are constructed within the dripline of leave trees. Equipment must be able to avoid rocky areas and adapt to changes in rock depth.

- 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 road bed or skid trail (TH 18).

- Apply erosion-control techniques (e.g., waterbar; apply native, site-specific seed (approved by the field office botanist) and certified weed-free straw; scatter chipped material; or scatter limbs and other fine material) on skid trails, forwarder trails, and landings to minimize sediment movement off site (TH 16). Apply native seed, mulch and slash where the skid trail takes off system roads or landing areas as needed or as determined by the Authorized Officer.

- Construct waterbars on skid trails using guidelines from Table C-6 in the 2016 ROD/RMP (USDI BLM 2016b, p. 191) where potential for soil erosion or delivery to waterbodies, floodplains, and wetlands exist (TH 15).

- Install waterbars at the same time as subsoiling (if both are required) unless skid trails are needed to complete harvest the following season. In that case, construct waterbars and apply straw to exposed soil prior to fall rains to reduce sedimentation during winter months. Base waterbar spacing for skid trails on the 2016 RMP erosion-control measures for timber harvest, which considers slope and soil series.

- Allow harvesting operations (cutting and transporting logs) when ground is frozen or adequate snow cover exists to prevent soil compaction and displacement. The Authorized Officer would consult with soil scientist to determine appropriate conditions. Stop operations immediately, if conditions change during operations where detrimental soil compaction and displacement is occurring (TH 20).

- Tractors would be equipped with integral arches to ensure the leading ends of logs are suspended during skidding (TH 10) and equipped with 75 feet of skidding line.

- Restrict tractor and mechanical operations to slopes generally less than 35 percent. In areas where it is necessary to exceed these gradients to access adjacent tractor area, use ridge tops where possible (TH 13).

- Minimize the area where more than half of the depth of the organically-enriched upper horizon (topsoil) is removed when conducting forest management operations (TH 21).

- To minimize soil disturbance, mechanized felling equipment must have an arm capable of reaching at least 20 feet.

- If operators are using feller-bunchers or cut-to-length harvesters off of designated skid trails:

    - Allow mechanized equipment capable of creating and walking on slash (such as a cut-to-length system) to work off designated skid trails for one or two passes on at least eight inches of slash and under dry soil conditions (less than 25 percent soil moisture content).

    - Allow mechanized equipment (feller-buncher systems) to work off designated skid trails during the dry season (soil moisture content less than 20 percent) for one or two passes only (one round-trip);

- Use low ground-pressure equipment off designated skid trails;
- Limit secondary trails to a minimum of 50-foot spacing off designated skid trails;
- Restrict all other use of ground-based equipment to designated skid trails; and
- If indications of detrimental soil disturbance are observed (e.g., surface erosion, soil displacement, loss of soil structure, platiness) off of designated skid trails, the activity shall be suspended until the soil strength is sufficient to resist detrimental compactive forces (Class 1 soil disturbance as defined in Page-Dumroese et al. 2009, pp. 6, 14, 15, 27-33), or as determined by the Authorized Officer.

Objective 3: Prevent unauthorized motorized and OHV use.

- Camouflage and block skid trails leading off system roads or radiating from landings by placing woody debris or other appropriate barriers (e.g., rocks, logs, and slash) on the first 100 feet of the skid trail in all ground-based yarding units upon completion of yarding to block and discourage unauthorized vehicle use (TH 19). Also, where material such as logs and other organic debris exists, this material would be placed along the length of skid trails as determined by the Contract Administrator. The intent is to minimize erosion and routing of overland flow to streams and to protect site productivity to ensure successful reforestation by decreasing disturbance (e.g., unauthorized use by OHVs).

2.4.2 Fuels Management and/or Pre-Commercial Thinning

Objective 1: Minimize disturbance to wildlife during their nesting season.

- Seasonally restrict prescribed burning and site preparation with chainsaws from March 1st to June 30th within 0.25 mile of known NSO sites. The seasonal restriction could be waived if non-nesting status is determined.

Objective 2: Minimize amount of surface fuel loading from harvest/pre-commercial thin activities.

- Conduct a pre-activity fuels assessment in proposed treatment areas. Modifications or additional treatment recommendations would be based on post-activity fuels assessment and the amount of slash created during harvest activities. Treatments including, but not limited to, hand or machine slash piling (at landings only), slash pile burning, underburning, and biomass removal may be needed to further reduce the fuels hazard to an appropriate level within all units.
- To reduce the amount of surface fuel loadings and emissions from prescribed burning, remove slash from the site, when feasible, by using whole tree harvesting, chipping limb slash in the harvest unit, or a combination of both methods. Where whole tree harvesting is permitted, landing slash would be chipped, burned, or moved off site.

Objective 3: Implement measures to contribute towards preventing the introduction and spread of non-native invasive plants.

- When post-harvest slash is piled and burned on landings located along main roads, native, site-specific seed and certified weed-free straw would be applied to the burn pile scars between September 1st and March 30th.

Objective 4: Protect Riparian Reserves

- Do not treat vegetation or stack slash piles within Riparian Reserves.

- No hand piling or pile burning would occur in draw bottom of dry draws.

Objective 5: Conduct fuels reduction to minimize impacts to other resources.

- Provide an approved prescribed fire plan prior to ignition of all prescribed burn units in compliance with the 2017 Interagency Prescribed Fire Planning and Implementation Procedures Guide (PMS 484, NWCG 2017). The prescribed burn plan would contain measurable objectives, a predetermined prescription, and an escape fire plan to be implemented in the event of an escape.

- To prevent fire escape and to minimize damage to residual vegetation and trees, schedule burning to occur when weather and fuel conditions allow for lower fire intensities (typically late fall through spring).

- Conduct prescribed burning in compliance with Oregon Department of Forestry's Smoke Management Plan. Smoke emission control could also include conducting mop-up as soon as possible after ignition is complete, covering hand piles to permit burning during the rainy season, and burning small diameter fuels with lower fuel moistures to facilitate rapid and complete combustion, while burning larger fuels with higher moisture levels to minimize consumption.

- Disperse slash piles across the treatment areas. Burn slash piles when soil and duff moisture content is high.

- In underburning units, 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 (F 06).

- Hand pile smaller materials (1-6 inches in diameter) and leave larger pieces of slash within the unit. Pile size shall be a maximum of 8 feet in diameter and 8 feet in height, and minimum sized of 6 feet in diameter and 5 feet in height. Reduce burn time and smoldering of piles by extinguishment with water and tool use (F 08).

- Machine-constructed piles may only be created on landings. Machine piles should generally be constructed such that organic material would be consumed within the landing and not spread to the adjacent harvest unit.

- Avoid placement of firelines where water would be directed into waterbodies, floodplains, wetlands, headwalls, or areas of instability (F 05).

- Use erosion control techniques such as tilling, waterbarring, or debris placement on hand or tractor firelines when there is potential for soil erosion and delivery to streams, waterbodies, and wetlands (F 05).

- Any containment lines constructed for fuels projects shall be sufficiently blocked to preclude use by motorized vehicles or OHVs. This would include such measures as placing logs and slash, falling trees less than 8 inches DBH or other actions as necessary.

Objective 6: Retain organic materials to reduce frost effects.

- Based on the post-harvest activity fuels assessment, retain some logging slash to ameliorate soil temperatures in regeneration harvest (RH, HRRH or WFRH) units that may be susceptible to frost in order to enhance the likelihood of seedling survival.

2.4.3 Road and Landing Maintenance and Construction

Objective 1: Prevent off-site soil erosion and soil productivity loss.

- Suspend ground-disturbing activity if forecasted precipitation would saturate soils to the extent that there would be potential for movement of sediment from the road to wetlands, floodplains, and waters of the state. Cover or temporarily stabilize exposed soils during work suspension. Upon completion of ground-disturbing activities, immediately stabilize fill material over stream crossing structures. Measures could include, but are not limited to, erosion control blankets and mats, soil binders, soil tackifiers, and slash placement.

- Restrict road closure and decommissioning work from October 15th to May 15th, or when soil moisture exceeds 25 percent.

- Road renovation (e.g., spot rocking, drainage improvements, reshaping) would occur during the dry season (May 15 to October 15). Variations in these dates would be permitted dependent upon weather and soil moisture conditions and with a specific erosion control plan (e.g., rocking, waterbarring, seeding, mulching, barricading) as determined by the Authorized Officer in consultation with aquatic and/or soils scientists. All road work and landing construction activities would be stopped when a storm event resulted in degrading conditions as evidenced by turbid runoff, turbid ditch flow, ponding, or rutting or other displacement in excess of two inches. Watershed specialists would closely monitor storms that result in precipitation and would convey pertinent information to the Authorized Officer. Similarly, the Authorized Officer would convey road, landing, and ditch conditions to the watershed specialists.

- Block or barricade identified roads after use and before beginning of rainy season (generally by October 15th).

- Temporary roads T39 R4E Temp 13-1 and T38 R3E Temp 13-2 would be fully decommissioned upon completion of log haul and within the same season as constructed/opened unless needed for other purposes (e.g., access for firewood, reforestation, etc.). If hauling is not completed in the same year the road is constructed, the road would be storm-proofed and blocked by October 15th or when soil moisture exceeds 25 percent (R 63, R 83, and R 91).

- Place waste stockpile and borrow sites resulting from temporary road construction in a location where sediment-laden runoff can be confined, at least one site-potential tree height from a stream.

- Temporary roads T39 R4E Temp 13-1 and T38 R3E Temp 13-2 (identified for full decommissioning after use) would be treated as follows: The road surface (travelway) would be subsoiled so that the former compacted surface would be rendered loose and friable to a depth of 12 to 18 inches or to a point where 10-inch diameter stones are the dominant substrate (whichever is shallower). Slash, boulders, and other debris would be placed along the road's entire length as determined by availability of materials to provide ground cover and discourage mechanized use. Blockage at the entrance would consist of placing logs, slash, boulders, berms, and other material so the entrance is camouflaged for a minimum distance of 100 feet and vehicle access is precluded. Seeding with approved native seed species and mulching with certified weed-free straw or approved native materials would occur within 100 feet of roads entrances. Treatments described may be modified by the Authorized Officer in consultation with appropriate earth scientists.

- Following proposed treatments, roads identified for long-term closure would be effectively blocked and winterized prior to the wet season. Blockage at the entrance would consist of placing logs, slash, boulders, earthen berms, and other material so the entrance is camouflaged for a minimum distance of 100 feet and vehicle use is precluded. Prior to closure, the road would be left in an erosion-resistant condition. If harvest activities are not completed in the same year as the road is opened, these roads would be storm-proofed and blocked by October 15th of each year or when soil moisture exceeds 25 percent (R 63, R 83, and R 91).

Objective 2: Minimize impacts to water quality and soil productivity from hauling, and temporary road and landing construction.

Timber Haul

- Restrict all timber hauling and landing operations on native surface or inadequately rocked roads whenever soil moisture conditions or rain events could result in road damage or the transport of sediment to nearby stream channels, generally October 15th to May 15th. If the Authorized Officer, in consultation with field office watershed specialists and engineers, determines that hauling would not result in road damage or the transport of sediment to nearby stream channels based on soil moisture conditions or rain events, a conditional waiver for hauling may be granted. The conditional waiver may be suspended or revoked if conditions become unacceptable as determined by the Authorized Officer (R 93).

- Hauling could occur during the wet season (October 16th to May 14th) on roads determined to have adequate surfacing as identified in Table 2-1. In addition, a selection of roads have been identified as available for wet season haul if adequate rock is added to the roadbed (Table 2-1). If the Authorized Officer, in consultation with field office watershed specialists and engineers, determines that hauling would not result in road damage or the transport of sediment to nearby stream channels based on soil moisture conditions or rain events, a conditional waiver for hauling may be granted. The conditional waiver may be suspended or revoked if conditions become unacceptable (where the road surface is deteriorating due to vehicular rutting or standing

water, or where turbid runoff is likely to reach stream channels) as determined by the Authorized Officer (R 93, R 94, and R 97).

- Install protective features such as certified weed-free straw bales, silt fences, geo-fabric rolls, wattles, and waterbars where there is potential for haul-related road sediment to enter the aquatic system. Maintain protective features by removing accumulated sediment and placing sediment in stable location where it cannot enter the aquatic system (R 13, R 64, and R 94).

- Do not apply dust abatement materials, such as lignin sulfonate, during or just before wet weather, and at stream crossings or other locations that could result in direct delivery to a water body (typically not within 25 feet of a water body or stream channel).

- Do not use petroleum-based dust abatement products.

- Do not apply lignin sulfonate at rates exceeding 0.5 gallons per square yard of road surface, assuming a 50-50 solution of lignin-sulfonate to water.

Road and Landing Construction

- Limit landings to 0.5 acre or less for tractor yarding.

- Temporary roads and landings would be located on stable locations, such as ridge tops, stable benches, or flats where topographically feasible. Use existing jeep roads, skid trail, and landing footprints where possible. Locate roads and landings away from slide areas, headwalls, seeps, springs, high landslide hazards locations, and Riparian Reserves, unless there is no practicable alternative. Locate roads in locations to minimize stream crossings. Locations are to be approved by the Authorized Officer before construction (R 01, R 02, and R 03).

- Limit temporary roads and landing construction to the dry season (generally May 15th to October 15th), or when soil moisture does not exceeds 25 percent (R 62).

Objective 3: Minimize disturbance to wildlife during their nesting season.

- Seasonally restrict mechanical roadside brushing activities and heavy equipment use from March 1st through June 30th within 195 feet of known NSO nest sites. This seasonal restriction could be waived if non-nesting status is determined.

Objective 4: Implement measures to contribute towards preventing the introduction and spread of non-native invasive plants.

- Aggregate, including rip rap and borrow material, from a BLM source would be surveyed for invasive plants and approved for use by the field office botanist.

- Aggregate, including rip rap, from a commercial source would be from an accredited weed-free quarry or would have to be crushed between November 1st and June 15th immediately prior to application. Aggregate stockpiled between June 16th and October 31st of the previous year would not be accepted.

- The Contract Administrator would request the field office botanist to inspect sources of soil and borrow material imported from non-BLM sites for use on roads or other areas for invasive plants prior to use. Only weed-free material would be used.

- As needed, the contractor would revegetate disturbed soils with site-specific, locally adapted native seeds and plant materials prescribed by the field office botanist. The Contract Administrator would request the field office botanist to determine such need, based on level of disturbance and the presence of priority non-native invasive plants. Planting would occur between September 1st and March 31st.

2.4.4 Silvicultural Activities

Objective 1: Protect residual leave trees.

- Avoid handpiling slash within the driplines of individual reserve pine trees where operationally feasible.

- Prescribed burns should be performed when moisture conditions are high enough and prescription windows are at a level that minimizes residual pine tree mortality during burning.

- White fir is extremely susceptible to fungal attacks and root rots. Avoid damage to white fir along haul roads, planned skid roads, or adjacent to major landings where heavy mechanical injury can occur during harvest operations.

- Reserve Pacific yew, hardwoods, and conifers less than 8 inches DBH (sub-merchantable) where operationally feasible.

Objective 2: Limit residual stand damage from ground-based yarding activities.

- Fell and skid trees 21 inches DBH and smaller designated for cutting to an approved landing location as either whole trees or log segments. If excessive stand damage occurs from whole tree yarding, as determined by the Authorized Officer, bucking, limbing, or both would be required.

- Fell trees over 21 inches DBH designated for cutting would be cut into log lengths not to exceed 44 feet and completely limbed prior to skidding.

2.4.5 Terrestrial Wildlife

Objective 1: Minimize impacts to wildlife species and special habitat elements.

- Maintain existing snags greater than 20 inches DBH and snags 6-20 inches DBH in decay classes III, IV, and V (see USDI BLM 2010a) except those that need to be felled for safety reasons or for logging systems to minimize impacts to cavity-dependent species. Retain snags felled for safety reasons on site, unless they would also pose a safety hazard as down woody material (USDI BLM 2016b, p. 63).

- Within commercial harvest stands in the Harvest Land Base, retain existing large down woody material greater than 20 inches in diameter at the large end and greater than 20 feet in length; and

down woody material 6-20 inches in diameter at the large end and greater than 20 feet in length in decay classes III, IV, and V (USDI BLM 2016b, pp. 62-63).

- Locate skid trails to minimize disturbance to down woody material. Where skid trails encounter large down woody material, buck out a section for equipment access. Leave the remaining down woody material in place and undisturbed.

- Restrict the use of motorized equipment and vehicles to existing roads within the following naturally occurring special habitats to maintain their ecological function: seeps, springs, wetlands, natural ponds, and natural meadows. Construct new roads and landings outside of these naturally occurring special habitats (USDI BLM 2016b, p. 115).

Objective 2: Protect Bureau Special Status terrestrial wildlife species.

- Implement conservation measures to minimize specific threats to known Bureau Special Status terrestrial wildlife species in the Project Area. Conservation measures are determined based on species, proposed treatment, site-specific environmental conditions, and available management recommendations (Table 2-4). No yarding through buffered wildlife sites.

Table 2-4. Conservation Measures for Known Bureau Special Status Terrestrial Wildlife Species in the Project Area.

Wildlife Species	Status	Protection Measures	Known-Site Seasonal Restrictions
Bald Eagles	BS/EPA	330-foot No-Harvest Nest Tree Buffer	0.5-Mile, February 1 – August 15
Bats	BS	Retain Snags	None
Cavity Nesting Birds	BS	Retain Snags. Create snags in LSR	None
Northern Spotted Owl	FT	300-Meter Nest Patches	0.25-Mile, March 1 – September 30
Fisher	BS	Retain Large Down Wood and Snags* Maintain Habitat within Stands Used for Denning. Retain 80 percent canopy cover within 50 feet of known den sites (USDI BLM 2016b, p. 117).	None†
Other Raptor Species		Retain Nest Trees	0.25-Mile, March 1 – July 15
Gray Wolves	FE	Retain Large Down Wood	1-Mile, April 1 – July 15

* Snags felled for safety reasons or for logging systems (skyline corridors, etc.) would be left on site.

† The original EA said 500 feet in between March 1-June 15. This has been changed as above because the 2016 ROD/RMP directs BLM to protect documented natal and maternal dens with a 50 foot buffer and does not specify a date range (USDI BLM 2016b, p. 117).

Status:

FE – Federally Endangered (ESA) BS – Bureau Sensitive

FT – Federally Threatened (ESA) EPA – Bald and Golden Eagle Protection Act

- If a gray wolf den or rendezvous site is identified prior to or during project activities, implement a seasonal restriction from April 1st to July 15th and suspend project activities located within one mile of a known den or rendezvous site. Assess sites on an ongoing basis throughout the life of this project through annual updates and communication with the USFWS and Oregon Department of Fish and Wildlife, since these sites are difficult to locate and can change from year to year (Table 2-4).

- Seasonally restrict harvest activities from March 1st to September 30th within 0.25 mile of known NSO sites. There are no known NSO sites within 0.25 miles of proposed harvest units. If any new owls are discovered within 0.25 miles of harvest units following the sale date, halt activities until mitigation options are determined.

- Work activities that produce noise above ambient levels would **not** occur within USFWS restriction distances (Table 2-5) of any nest site or activity center of known pairs and resident single between March 1st and June 30th (or until two weeks after the fledgling period) unless protocol surveys have determined the activity center is not occupied, the NSO pair is not nesting or failed in their nesting attempt. The wildlife biologist has the authority to extend the seasonal restriction beyond June 30th if surveys indicate the NSO young have not developed sufficient mobility by June 30th.

Table 2-5. USFWS Restriction Distances to Avoid Disturbance to Northern Spotted Owl Sites.

Type of Activity	Zone of Restricted Operation
Chainsaws	195 feet
Heavy Equipment	105 feet

- Debris piles associated with logging activity (slash and/or cull material piles) adjacent to roads or on landings would not be burned, chipped or made available for firewood cutting between February 1st and September 30th when the pile is mixed with various sized logs (multiple diameters) and there is some open space within the piled logs (not compact). Spring burning, chipping or firewood cutting could take place if a BLM wildlife biologist reviews the pile and determines it is not compatible with fisher denning/resting use.

2.4.6 Protection of Botanical Resources

Objective 1: Implement measures to contribute towards preventing the introduction and spread of non-native invasive plants.

- Require washing of equipment prior to entry onto federally-administered lands. Ensure all dirt, grease, and material that may carry invasive plant parts or seeds are removed from the vehicle.

- Ensure hay, straw, and mulch are certified as free of prohibited noxious vegetative parts or seeds, per 75 FR (Federal Register) 159 (Federal Register 2010, p. 51102). Straw or hay must be obtained from the BLM or purchased from growers certified by the Oregon Department of Agriculture's Weed Free Forage and Mulch Program. If hay is used, it must be from native grasses only.

- As needed, re-vegetate disturbed soils with site-specific, locally adapted native seeds and plant materials prescribed by the field office botanist and soil scientist. Need would be determined by the field office botanist, based on level of disturbance and the presence of priority non-native invasive plants. Plant between September 1st and March 31st.

- If invasive plant sites are detected during project development or implementation, they would be flagged for avoidance by the field office botanist.

- Areas of high traffic within project units (e.g., landings) would be monitored for invasive plant introductions the year following the cessation of harvest activities. Infestations of *Cynoglossum officinale* (houndstongue), *Centaurea diffusa* (diffuse knapweed), *C. stoebe* (spotted knapweed), or *Linaria* spp. (toadflax) would be treated for three years following the cessation of project activities or until the infestation is eliminated, whichever comes first, as funding and other resource considerations permit.

Objective 2: Protect Bureau Special Status plant and fungi species.

- Implement conservation measures to minimize specific threats to Bureau Special Status Species sites in the Project Area. Conservation measures (e.g., no entry buffers) would be determined based on species, proposed treatment, site-specific environmental conditions, and available management recommendation. Use of skid trails and/or skidding logs through plant site buffers is not allowed. Exceptions could be made on a case-by-case basis depending on the specific plant or fungus species as approved by the Authorized Officer.

2.4.7 Protection of Cultural and Paleontological Resources

Objective 1: Protect known and newly identified cultural and paleontological resources.

- Place no-entry buffers around significant cultural resources and paleontological sites located within the Area of Potential Effect (APE). BLM archaeologists would establish buffers sufficient to protect sites from impacts of any proposed management activities. Design buffers to take into account all elements of cultural sites that contribute to the National Register of Historic Places (NRHP) eligibility of those sites. No treatments within this buffer. No fire line construction, prescribed burning, or hand piling and burning within the flagged boundaries of the recorded cultural resources. Fall timber, identified for removal next to a buffer, directionally away from buffers for one site-potential tree length.

- In the event unrecorded paleontological, archaeological, or historical sites or artifacts are discovered during project implementation, stop all work immediately in the area and notify the Contracting Officer's Representative of the finding. The project may be redesigned to protect the cultural and/or paleontological resource values present, or evaluation and mitigation procedures would be implemented based on recommendations from the Field Office cultural specialist and concurrence by the Field Manager and State Historic Preservation Office. Written or verbal start work orders would be given to the contractor by the Contracting Officer's Representative after approval by the District Archaeologist. Cultural sites or objects include historic or prehistoric ruins, graves, grave markers, and prehistoric and historic artifacts and features. Paleontological remains are defined as the fossilized remains or imprints of past organisms.

2.4.8 Recreation Management

Objective 1: Minimize impacts to recreational use of the user-created trail associated with the Lily Glen Equestrian Park/Campground.

- There is a user-created equestrian/hiking trail that runs from the Lily Glen Equestrian Park/Campground along the shores of Howard Prairie Lake, primarily on lands administered by the Bureau of Reclamation (6.5 miles). A section of this user-created trail (1.6 miles) loops back onto BLM-administered lands, 0.23 miles of which is proposed for use as a haul route. Operators would rehabilitate the 0.23 miles of the trail following use to as good or better condition than prior to use, ensuring proper drainage where necessary.

- The portion of the user-created trail utilized for vegetation management activities would be closed during harvest activities.

- The Pacific Crest Endurance Ride is an annual event held around the third week in July on BLM-administered lands under a Special Recreation Permit. The event uses the BLM portion of this user-created trail. The BLM would work with event coordinators to minimize conflict between project implementation and event-related activities. On the day of the ride, no project-related activities would occur on or adjacent to the planned event route to ensure safety of event participants.

2.4.9 Range Management

Objective 1: Protect rangeland improvements.

- During logging operations, use of techniques such as directional falling would be used to prevent damage to fences, cattle guards, livestock watering troughs and other improvements.

- If damage to range improvements does occur, the BLM is to be notified immediately and proper repair or replacement would occur within two weeks. Proper repair of fences and gates includes keeping wire properly attached to posts, splicing or replacing broken wire in kind, repairing structures such as corners, stress panels or gates, and any other work necessary to keep improvements functional. Repair of structures such as stress or corner panels and gates requires pre-approval by BLM staff. Repair or cleaning of cattle guards damaged or filled with sediment by logging activities would require approval of BLM road engineering staff for structural integrity and public safety compliance.

Objective 2: Prevent livestock trespass.

- During logging activities, operators would keep all gates closed and all livestock containment systems functional to keep livestock in authorized areas.

2.4.10 Spill Prevention and Abatement

Objective 1: Prevent and contain hazardous material spills.

- All operators shall develop a Spill Prevention, Control, and Countermeasure (SPCC) plan prior to initiating project work if there is a potential risk of chemical or petroleum spills near waterbodies. The SPCC plan would include the appropriate containers and design of material transfer locations as required under Oregon Administrative Rules (OAR)-340-0030-DEQ (SP 05).

- All operators shall have a Spill Containment Kit (SCK) as described in the SPCC plan on-site during any operation with potential for run-off to adjacent waterbodies. The SCK would be appropriate in size and type for the oil and hazardous material carried by the operator as required under OAR-340-0030-DEQ (SP 06).

- Operators shall be responsible for the clean-up, removal, and proper disposal of contaminated materials from the site (SP 07, OAR-340-102-DEQ, and OAR-340-122-DEQ).

- Maintain and refuel heavy equipment a minimum of 150 feet from streams, ponds, or other wet areas. Store equipment containing reportable quantities of toxic fluids outside of the Riparian Reserve. Ensure hydraulic fluid and fuel lines are in proper working condition in order to minimize leakage into streams (SP 03 and SP 01).

- Check equipment for leaks prior to starting work. Do not allow equipment use until leaks are repaired or leaking equipment is replaced (SP 03).

2.5 COMPARISON OF ALTERNATIVES

Table 2-6 displays the unit stand age, acreage, and commercial prescription by alternative. Table 2-7 compares the action alternatives considered for the Griffin Half Moon Vegetation Management Project. The three action alternatives (Alternative 2, 3, and 4) vary in response to the issues identified in Chapter 1. The action alternatives explore a range of options for vegetation management in the Project Area.

Table 2-6. Unit Stand Age, Acreage, and Proposed Commercial Harvest Prescription by Alternative.

Unit	Stand Age	Acres	Alternative 2 Prescription	Alternative 3 Prescription	Alternative 4 Prescription
1-1	90	225.5	RH	HRRH	CT
1-2	110	4.6	RH	HRRH	CT
7-1	170	162.0	RH	WFRH	CT
7-2	140	194.9	RH	WFRH	CT
10-1	130	8.1	RH	HRRH	CT
11-1	90	65.9	RH	CT	CT
11-2	110	31.2	RH	HRRH	CT
11-3	110	13.1	RH	HRRH	CT
12-1	110	24.9	RH	HRRH	CT
13-1	110	31.0	RH	HRRH	CT
13-2	110	39.0	RH	HRRH	CT
13-3A	110	34.5	RH	CT	CT
13-3B	110	3.5	SH	SH	SH
13-4	110	12.5	RH	HRRH	CT
15-1	110	71.1	RH	CT	CT
15-2	100	10.5	RH	HRRH	CT

RH – Regeneration Harvest; HRRH – High Retention Regeneration Harvest; WFRH – White Fir Regeneration Harvest; CT – Commercial Thin; SH – Selection Harvest.

Table 2-7. Summary of Proposed Activities in Alternatives 2, 3, and 4.

Vegetation Management	Alternative 2	Alternative 3	Alternative 4
Commercial Prescriptions	Est. Acres	Est. Acres	Est. Acres
Regeneration Harvest	929	0	0
High Retention Regeneration Harvest	0	400	0
White Fir Regeneration Harvest	0	357	0
Commercial Thin	0	172	929
Selection Harvest	4	4	4
Total	933	933	933
Estimated Volume[1]	Est. MMBF	Est. MMBF	Est. MMBF
Estimated Volume[1] Contribution to ASQ	9.5 to 15.8	5.5 to 9.1	3.1 to 5.2
Non-Commercial Prescriptions	Est. Acres	Est. Acres	Est. Acres
Fuels – Hand Piling and Burning[2]	933	933	933
Fuels – Underburning[2]	933	933	933
Pre-Commercial Thinning	392	392	392
Planting	933	767	0
Scalping, Grubbing and Gopher Treatments[3]	933	767	0
Timber Harvest Method	Est. Acres	Est. Acres	Est. Acres
Ground-Based Yarding	933	933	933
Designated Skid Trails	0.26 (0.18 mi.)	0.26 (0.18 mi.)	0.26 (0.18 mi.)
Potential Landings (new and existing)	22.5	22.5	22.5
Transportation Management	Est. Miles	Est. Miles	Est. Miles
Temporary Road Construction	0.39	0.39	0.39
Road Stabilization and Drainage Improvements	14.92	14.92	14.92
Timber Haul	33.43	33.43	33.43
Wet Season Haul[4]	17.92	17.92	17.92
Decommissioning (Long-Term Closure)	1.85	1.85	1.85

[1] Preliminary estimate of volume each alternative will yield in million board feet (MMBF). Actual volumes will be determined following cruising.

[2] These acres reflect the potential acres where either treatment may be applied depending on the post-harvest assessment. Post-harvest assessment would likely recommend a combination of lop and scatter, hand piling and pile burning, and underburning.

[3] These acres reflect the potential acres where either treatment may be applied depending on post-harvest assessment and monitoring.

[4] Of these 17.92 miles of roads that are available for wet season haul, none of them have continual wet-season connection to project units.

2.6 ALTERNATIVES AND ACTIONS CONSIDERED BUT NOT ANALYZED IN FURTHER DETAIL

In the development of the Proposed Action, the BLM considered numerous ways to meet the purpose and need. Public requests within the purpose and need for this project were evaluated for project modification. Public requests integrated into the design of the Proposed Action are not discussed further in this section. Requests that would not fully meet the purpose and need; would be outside the scope for the project; or were not analyzed in further detail are discussed below.

2.6.1 The BLM's requirement to manage its Harvest Land Base under the principles of sustained yield can only be met if the implementation of the plan adheres to what was modeled in the vegetation modeling analysis done in the Proposed RMP/Final EIS for Western Oregon (USDI BLM 2016a).

The BLM recognizes that public lands are to be managed in accordance with the applicable land use plan (FLPMA, Section 302 (a)). The Griffin Half Moon Project is consistent with the 2016 ROD/RMP (USDI BLM 2016b).

Rationale for Elimination: The appropriate standard for determining conformance of an action with the RMP is to review whether the action is specifically provided for in the RMP, or if not specifically mentioned, clearly consistent with the terms, conditions, and decisions of the RMP. 43 CFR 1601.0-5(b). The management direction in the 2016 ROD/RMP constitutes the terms, conditions, and decisions of the RMP and is the appropriate standard for determining RMP conformance. The ROD/RMP clearly states that management direction "… identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM-administered lands and resources" (USDI BLM 2016b, p. 3).

The BLM used the vegetation modeling to analyze environmental effects and to estimate the Allowable Sale Quantity (ASQ) for each alternative in the PRMP/FEIS. The FEIS analysis indicates that over time, the silvicultural system applied to a specific area determines the sustained yield, and not the order/intensity of specific harvest through time. Many different approaches would lead to similar outcomes and would be allowed by management direction.

The vegetation modeling in the PRMP/FEIS is not itself management direction, but provides reference to guide landscape-level implementation of the RMP in order to meet the RMP direction of "conduct(ing) silviculture treatments to contribute timber to volume to the Allowable Sale Quantity." (USDI BLM 2016b, p. 62). As such, it is inappropriate to use the vegetation modeling to evaluate the conformance of a resource management action with the RMP.

The BLM has maintained the discretion to select the order in which individual stands in the Harvest Land Base (HLB) will be harvested and the appropriate harvest type to apply (regeneration harvest and commercial thinning), based on site-specific and project-specific information and the applicable management direction (USDI BLM 2016b, p. 126). The majority of the Griffin Half Moon proposed treatment areas are all located in HLB, Low Intensity Timber Area (LITA). The management direction in the 2016 ROD/RMP for HLB-LITA directs the BLM to conduct regeneration harvest or commercial

thinning, such as in this project, as well as restrictions and conditions for such timber harvest. The Griffin Half Moon Project is consistent with all applicable management direction.

The BLM will conduct plan evaluations at 5-year intervals to assess whether changed circumstances or new information have created a situation in which the expected impacts or environmental consequences of the RMP are significantly different than those anticipated in the FEIS. Through these evaluations, the BLM will make a finding of whether or not a plan amendment or plan revision is warranted (USDI BLM 2016b, p. 34). Consistent with the strategic nature of the sustained-yield calculation, the vegetation modeling in the Proposed RMP/Final EIS characterized forest condition and timber harvest outputs in 10-year increments based on a set of modeling assumptions and projections (USDI BLM 2016a, pp. 1163-1228). The BLM used that analytical information to declare an ASQ of timber in the 2016 ROD/RMP (USDI BLM 2016b, pp. 5-7). The sustained-yield calculation in the PRMP/FEIS and the declaration of the ASQ in the 2016 ROD/RMP are based on each entire sustained-yield unit. Therefore, the appropriate scale to consider whether the implementation of timber harvest is within the scope of the vegetation modeling is over a 10-year period across the sustained-yield unit. The strategic nature and broad temporal and spatial scale of the vegetation modeling render meaningless any determination of whether an individual project adheres to the vegetation modeling in the PRMP/FEIS. In the first scheduled plan evaluation, the BLM will need to consider many individual actions summarized across the sustained-yield unit over the first five years of implementation to draw even preliminary conclusions about whether the implementation of timber harvest is on a trend to be within the scope of the vegetation modeling. The BLM will not be able to make any definitive conclusions about whether the implementation of timber harvest has been within the scope of the vegetation modeling until the second scheduled plan evaluation. Therefore, this request was not considered in further detail.

2.6.2 Proactively manage Riparian Reserves through thinning the entire width of the Riparian Reserve to accelerate attainment of large trees to provide future large instream wood.

Rationale for Elimination: Within the Project Area, forest stands in both upland and riparian areas were initially considered for treatment consistent with the applicable land use allocation objectives for Riparian Reserves. Thinning in RRs was considered if a need was identified for thinning to promote the development of large, open grown trees, develop layered canopies and multi-cohort stands, develop diverse understory plant communities, and allow for hardwood vigor and persistence. Fuels reduction treatments were considered if needed to reduce the risk of stand-replacing, crown fires (USDI BLM 2016b, pp. 82-84). On-the-ground field review did not identify any need for vegetative treatments in RRs within the Project Area, and therefore, RRs adjacent to existing units were not proposed for treatment at this time.

Scoping comments requested that no-cut Riparian Reserve buffers be reduced based on the findings of Murphy and Koski (1989), McDade et al. (1990), Johnson et al. (2000), and Minor (1997) which indicate that most of the wood that naturally recruits to streams comes from within the first 65 feet of the stream channel. Scoping comments suggests that thinning adjacent to the stream would foster positive changes to large wood supplies to streams. Scoping comments also suggested that RRs be thinned utilizing gap cuts to promote early seral habitat based on the findings of Janisch et al. (2012) and Warren et al. (2013). Appendix B, *Scientific Literature Submitted during Scoping* discusses consideration of submitted scientific literature. These requests are not consistent with the management direction in the 2016 RMP (USDI BLM 2016b, pp. 84-87); therefore, this alternative was not analyzed in further detail.

2.6.3 Consider a citizen's alternative that focuses on restoration thinning of small young trees that are accessible from existing roads and other science-based restoration activities that result in clear net ecological benefits.

Rationale for Elimination: A comment letter was received during scoping that suggested the BLM consider an alternative that thins dense young stands instead of harvesting in mature stands of timber to contribute to the attainment of ASQ as well as conduct other science-based restoration activities from existing road systems. The commenter is unclear as to what they consider young stands and what other science-based restoration activities they are suggesting. Typically, stands less than 80 years old are considered young. Within the area considered for treatment, there were very few stands that met this criteria. How the BLM selected the proposed treatment area is described in detail in Section 2.2.1, *Treatment Area Selection*.

While new road construction would not be avoided, road construction would be limited and proposed as temporary. The 2016 ROD/RMP directs the BLM to provide a road transportation system that serves resource management needs (administrative/commercial) and to construct roads where needed to meet resource management objectives (USDI BLM 2016b, pp. 93, 95). The economic feasibility of vegetation management actions is affected by the ease of access from the forest road system.

Two temporary roads (0.39 miles) are proposed to access Units 13-1 and 13-2. Upon completion of vegetation management activities, these temporary roads would be fully decommissioned. No permanent road construction is being proposed under the Griffin Half Moon Project.

2.6.4 Develop an alternative that would avoid heavy thinning or regeneration harvest in treatment units that were previously deferred to protect known great gray (GGO) owl sites.

Rationale for Elimination: The Griffin Half Moon Project proposes to treat units under the 2016 ROD/RMP that were previously analyzed for a different project under the 1995 Medford District RMP (USDI BLM 1995b). Some of these units were deferred from treatment at that time to protect known GGO sites to conform to Survey and Manage measures, a part of the Northwest Forest Plan's goal of ensuring viable, well-distributed populations of all species associated with late-successional and old-growth forests. The 2016 ROD/RMP does not include these measures. Instead, the RMP allocates a larger Late-Successional Reserve network than the previous plan. This accomplishes the goal of protecting older and more structurally-complex forests, and continues to provide management for many of the formerly Survey and Manage species as Bureau Sensitive species. The 2016 RMP responds to BLM's statutory authorities and mandates without the Survey and Manage measures (USDI BLM 2016b, pp. 27-28). The BLM is proposing to implement the management direction for the HLB-LITA land use allocation (USDI BLM 2016b, pp. 62-65).

2.6.5 Consider an alternative that retains mature forests and large diameter trees (greater than 20 inches DBH) by implementing a diameter limit.

Rationale for Elimination: During the RMP revision process, an alternative that would only harvest small diameter trees was considered but not analyzed in detail as it would not be a reasonable alternative because it would not meet the purpose and need to provide a sustained yield of timber (USDI BLM

2016a, p. 103). The same logic can be applied to this project. If the Griffin Half Moon Project was limited to only harvesting trees less than 20 inches DBH, it would preclude producing a given volume of timber in perpetuity at a given intensity of management, as required by the O&C Act and specifically described in the purpose for the action. Therefore, the BLM did not analyze this alternative in detail.

All commercial prescriptions for the Griffin Half Moon Project would set aside and enhance legacy structures while treating the remainder of stands to produce a mix of species and age classes and multiple canopy layers.

2.6.6 Consider an alternative that avoids commercial logging and road building in unroaded areas larger than 1,000 acres.

Rationale for Elimination: Scoping comments suggested that Unit 10-1 (T38S R3E, Section 10) is adjacent to an unroaded area on Forest Service lands. The area indicated in the scoping comments is not an existing inventoried roadless area on the Rogue River-Siskiyou National Forest.

Additionally, as part of the RMP revision process, beginning in the summer of 2012, the Medford District BLM began the Lands with Wilderness Characteristics (LWC) Inventory, as required by the Federal Land Management Policy Management Act (FLPMA) and current BLM policy. The inventories were completed in 2013. The BLM documented existing conditions as opposed to potential future conditions, as per BLM policy and guidelines. The BLM utilized maps, photos, records, GIS, and monitoring data. Field checks were conducted to verify the data for accuracy. The BLM conducted the inventory process using the criteria from Section 2(c) of the Wilderness Act to determine the presence of wilderness characteristics, such as: sufficient size, naturalness, outstanding opportunities for either solitude or primitive and unconfined recreation, and supplemental values such as ecological, geological, or other features of scientific, educational, scenic or historical value.

To be eligible under sufficient size criteria, the following must apply:

1) Roadless areas with over 5,000 acres of contiguous BLM lands. State or private lands are not included in making this acreage determination.
2) Roadless areas of less than 5,000 acres of contiguous BLM lands where any one of the following apply:
    a. They are contiguous with lands which have been formally determined to have wilderness or potential wilderness values, or any federal lands managed for the protection of wilderness characteristics. Such lands include:
        i. designated Wilderness,
        ii. BLM Wilderness Study Areas,
        iii. U.S. Fish and Wildlife Service areas Proposed for Wilderness Designation,
        iv. U.S. Forest Service Wilderness Study Areas or areas of Recommended Wilderness, and
        v. National Park Service areas Recommended or Proposed for Designation.
    b. It is demonstrated that the area is of sufficient size as to make practicable its preservation and use in an unimpaired condition.
    c. Any roadless island of the public lands.

Based upon field data collected, and all other inventory standards used, the BLM concluded there were no inventoried areas that would meet these criteria for LWC in the vicinity of the Griffin Half Moon Project Area. There are no activities associated with Griffin Half Moon Project proposed within any other LWC inventoried area, nor are there any adjacent Forest Service inventoried roadless areas and therefore, this alternative was not analyzed in further detail.

2.7 MONITORING

Much of implementation monitoring is accomplished in the day-to-day work by BLM employees. Project supervisors, contract inspectors, and timber sale administrators review the work being done and assure compliance with the regulations and stipulations in the applicable administrative documents. The majority of actions described under the alternatives are implemented through a timber sale or service contract. In the case of contracts, implementation monitoring is accomplished through BLM's contract administration process. PDFs included in the project description are carried forward into contracts as required contract specifications. BLM contract administrators and inspectors monitor the daily operations of contractors to ensure that contract specifications are implemented as designed. The inspection reports would be shared with the Field Manager and Project Lead. If work is not being implemented according to contract specifications, contractors are ordered to correct any deficiencies. If unacceptable work continues, suspension of contracts and/or monetary penalties can be applied. Coordination with resource specialists to develop workable solutions would occur when site-specific difficulties arise.

The BLM would monitor the extent of NSO habitat affected by the proposed Griffin Half Moon Project to ensure that those effects are consistent with the analysis in this EA and in relevant consultation documents. The Medford District has developed a *Guide for Planning and Implementing Vegetation Management Projects* (USDI BLM 2015b) to establish six steps and five checkpoints to ensure that projects are consistent with National Environmental Policy Act (NEPA) documents and with Endangered Species Act (ESA) Section 7 consultation requirements. Included in these steps are habitat evaluations and NSO surveys. Silviculturists work with wildlife biologists to develop forest treatment prescriptions. The Biological Assessment and Biological Opinion are reviewed by the planning team, and the interdisciplinary team and the marking crew lead are informed of the consultation requirements prior to on-the-ground delineation of treatment units and tree marking. The silviculturist, in consultation with the wildlife biologist and other specialists, monitors the mark as it is completed to ensure it meets the consultation requirements and stand management objectives. Modifications to the mark would be applied as needed. The Contract Administrator monitors harvesting activities and ensures contract stipulations are met. Lastly, the wildlife biologist monitors a sub-set of units post-treatment to evaluate consistency between implementation, NEPA analysis, and ESA consultation requirements; this includes evaluating canopy cover. The BLM would report the results to the Service through annual monitoring reporting requirements. Implementation of Project Design Criteria (PDC) is monitored through the BLM sale-contracting program in coordination with the field office wildlife biologist.

At a broader level, the BLM has an approved implementation monitoring plan outlined in the 2016 ROD/RMP (USDI BLM 2016b, Appendix B, pp. 137-162) and the BLM will continue to rely on the existing interagency effectiveness monitoring modules to address key questions about whether implementing actions consistent with the RMP is effectively meeting RMP objectives (USDI BLM 2016b, p. 137). Sampling at the administrative unit level (e.g., Medford District) will occur and management actions proposed under this project may be included in the sampling. For example, under

the RMP monitoring plan, monitoring question M14 requires that at least one completed timber sale per field office shall be evaluated to answer whether the number of snags have been created in the appropriate size classes as described in the management direction (USDI BLM 2016b, p. 145). The monitoring plan includes a wide range of monitoring questions to address management direction for land use allocations and resources. Refer to Appendix B of the 2016 ROD/RMP for more information (USDI BLM 2016b, pp. 137-162).

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION

This chapter describes the present conditions of each affected resource, followed by a comparison of the estimated environmental effects of implementing the No Action Alternative (Alternative 1), the Proposed Action (Alternative 2), Alternative 3, and Alternative 4. The Environmental Effects portion of this chapter provides the analytical basis for the comparisons of the alternatives (40 CFR § 1502.16) and the reasonably foreseeable environmental consequences to the human environment of each alternative on the relevant resources. Impacts can be beneficial, neutral, or detrimental. The affected environment is described to the level of detail needed to determine the significance of impacts to the environment of implementing the action alternatives. The analysis of the direct, indirect, and cumulative effects is organized by Issue, and the Analysis Areas for actions proposed under this EA vary by resource. Analyses for all resources include the Project Area, which encompasses the areas where actions are proposed for the Griffin Half Moon Vegetation Management Project.

3.1.1 Project Area and Analysis Area

The terms **Project Area** and **Analysis Area** are used throughout this chapter. The following defines each term:

The terms **Project Area** and treatment area are used interchangeably to describe where action is proposed, such as units where vegetation management actions are proposed and where road improvements or temporary road construction are proposed.

The term **Analysis Area** varies by resource and includes those areas that could potentially be affected by the proposed activities. In some cases, the Analysis Area is confined to the Project Area and in others, the Analysis Area extends beyond the Project Area.

3.1.2 Consideration of Past, Ongoing, and Reasonably Foreseeable Actions in Effects Analysis

The current condition of the lands in the Griffin Half Moon Project Area is the result of a multitude of natural processes and human actions that have taken place over many decades. A catalogue and analysis, comparison, or description of all individual past actions and their effects which have contributed to the current environmental conditions would be practically impossible to compile and unduly costly to obtain.

It is possible to implement simpler, more accurate, and less costly ways to obtain the information concerning the effects of past actions, which is necessary for an analysis of the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions." (See the definition of "cumulative impact" in 40 CFR § 1508.7.) 43 CFR § 46.115 states that when considering cumulative effects analysis, the agency must analyze the effects in accordance with relevant guidance issued by the Council on Environmental Quality (CEQ). As the CEQ points out in guidance issued on June 24, 2005, the "environmental analysis required under NEPA is forward-looking," and review of past actions is required only "to the

extent that this review informs agency decision-making regarding the Proposed Action." Use of information on the effects of past action may be useful in two ways according to the CEQ guidance: for consideration of the proposal's cumulative effects, and as a basis for identifying the proposal's direct and indirect effects.

The CEQ stated in this guidance that "[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions." This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions." The importance of "past actions" is to set the context for understanding the incremental effects of each of the alternatives. This context is determined by combining the current conditions with available information on the expected effects of other present and reasonably foreseeable future actions. For the Griffin Half Moon Project, aerial photograph analysis, LiDAR, and GIS databases were utilized in helping to determine past actions on both federal and private lands.

Effects analyses completed for resources potentially affected by the Griffin Half Moon Vegetation Management Project describe indicators of importance along with the spatial (Analysis Area) and temporal scale of importance for determining the effects of multiple actions (past, current, and reasonably foreseeable) on affected resources. As discussed above, the current condition assessed for each affected resource inherently includes the effects of past actions. How each resource analysis uses information concerning other ongoing or reasonably foreseeable activities is, however, dependent on the geographic scale of concern and attributes considered during each resource analysis.

The following listing of activities is presented to provide an overview of land management activities occurring or that are reasonably foreseeable within or directly adjacent to the Griffin Half Moon Project Area or associated Analysis Areas.

3.1.2.1 Timber Harvest on Private Lands

The landscape pattern in the Griffin Half Moon Project Area is largely determined by the checkerboard ownership. Blocks of BLM-administered lands intermingle with privately owned lands. Under reasonably foreseeable future actions, it is assumed that private industrial forest lands would continue to be intensively managed for timber production on approximately a 40- to 60-year rotation (USDI BLM 2016a, p. 173). The actual timing of any private industrial forest lands timber harvest is dependent on many factors, including valuations based on supply/demand, ownership, etc. Most areas that could be harvested on private lands are accessible by existing roads, so no new road construction is included in the reasonably foreseeable future scenario.

3.1.2.2 Forest Management on BLM-Administered Lands

Past forest management activities on BLM-administered lands in the past ten years within two miles of the Project Area include primarily selective thinning harvest on 1,250 acres as part of the Swinning, MC Thin, Howard, and South Fork Little Butte Timber Sales. In that same period of time, approximately 634 acres have been reforested through planting. Approximately 585 acres are expected to be replanted in the foreseeable future within two miles of the Project Area.

A small amount of commercial timber harvest and non-commercial thinning on BLM-administered lands is anticipated to occur. Approximately 235 acres in commercial units remain to be treated in the Howard and South Fork Little Butte Timber Sales.

The Klamath Falls Field Office is in the process of planning the North Landscape Environmental Assessment east of the Griffin Half Moon Project Area. Up to 9,498 acres would be treated over a very large geographic area. Unit level prescriptions are not described at this point, although the majority of the project is proposing uneven-aged silvicultural prescriptions. The EA is expected to be published in mid-June 2018.

3.1.2.3 Fuels Reduction on BLM-Administered Lands

Numerous non-commercial fuels treatments have occurred in the past ten years within two miles of the Project Area, including approximately 947 acres of the Swinning, MC Thin, and Howard-Hyatt Timber Sales. Approximately 227 acres of non-commercial fuels treatments remain to be completed under the Howard-Hyatt Timber Sale and 183 acres under the South Fork Little Butte Timber Sale within two miles of the Project Area.

3.1.2.4 BLM Grazing Leases

Portions of three active grazing allotments are in the Project Area: Howard Prairie, Conde Creek, and Deadwood (BLM). All three may be evaluated for a ten-year lease renewal in the foreseeable future. Within the BLM allotments, there are four grazing leases, authorizing 590 cow/calf pairs for 1,410 animal unit months (AUMs). There is also an adjacent allotment, Deadwood (USFS), nearby. Within this allotment, there are two leases, authorizing 457 cow/calf pairs for 917 AUMs. The authorized use (cow/calf pairs and AUMs) is calculated using the entire allotment acreage, which includes use outside the Project Area. The forested portions of these grazing allotments are seldom accessed by livestock, resulting in utilization levels that are generally none-to-slight (0 to 10 percent) within the forested communities.

3.1.2.5 Forest Service Projects

There are no reasonably foreseeable future actions proposed for Forest Service lands within the Analysis Area.

3.1.2.6 Invasive Plant Management Activities

It is reasonable to assume that treatments under Environmental Assessment and Decision Record for Integrated Invasive Plant Management for the Medford District (USDI BLM 2018b) may occur in and near the Project Area. Treatments would be limited to BLM-administered lands and would consist of various physical or chemical treatments to control invasive plants.

3.1.2.7 Aquatic Restoration Activities

Aquatic restoration activities under the Aquatic and Riparian Enhancement Environmental Assessment (USDI BLM 2014) are expected to occur in summer/fall of 2018 at two locations in the upper Dead Indian Creek drainage. Both projects would involve placement of large wood in streams to promote sediment capture and channel development for benefit to aquatic habitat.

3.2 FISHERIES, AQUATIC HABITAT, AND WATER QUALITY

Issue 1: How would erosion rates, sediment transport, and turbidity from ground disturbance associated with the proposed forest management (i.e., felling and ground-based yarding of timber, fuels treatments, landing construction and use, and timber haul) and transportation management activities (i.e., road renovation, temporary road construction, long-term closure, and decommissioning) affect fish, aquatic habitat, and water quality?

3.2.1 Introduction

Ground-disturbing activities have the potential to bare ground, displace soil, break down soils or aggregate, and increase compaction, all of which could result in increased rates of erosion. Increased erosion in or directly adjacent to stream channels could result in direct inputs of sediment into aquatic habitat, and displaced soils (fine sediment) in upland areas could be indirectly conveyed downslope towards aquatic habitat during precipitation events or when snow pack is rapidly melting off. On compacted surfaces such as roads, run-off capable of transporting fine sediment is much more likely to occur than from undisturbed ground. Where disturbances, and in particular those coupled with compacted ground, are connected to aquatic features (hydrologic connectivity) there is a high probability for fine sediment to be input into aquatic habitat. Sediment transported to aquatic habitats may either settle out into the aquatic substrate or result in increased turbidity, depending on the sediment particle size, stream gradient and flow velocity, and nature and timing of the inputs. Both sediment and turbidity can be detrimental to aquatic organisms and their habitats in excessive amounts or durations (Meehan Meehan 1991).

Ground-disturbing activities proposed in this project include felling and yarding of timber, follow-up slash and re-planting treatments, temporary new road and landing construction and use, road maintenance, and log haul. Of these activities, road maintenance, log haul, and yarding across one intermittent channel in Unit 1-1 would have direct hydrologic connectivity with aquatic habitats. All other disturbance would occur in upland areas outside of Riparian Reserves.

3.2.2 Methodology

The Analysis Area includes all drainages (USGS Hydrologic Unit Code (HUC) 7) where any harvest-related ground-disturbing activities, including timber haul, are proposed. Analysis of effects to aquatic habitat from ground-disturbing activities is focused on those activities that have hydrological connectivity to aquatic habitat and assumes that Riparian Reserves are effective at precluding off-site sediment transport from ground disturbance in upland areas from reaching aquatic habitat. Upland (i.e., outside of Riparian Reserves) ground-disturbing activities that are hydrologically disconnected such as harvest and timber yarding (with the exception of the designated skid trails across the intermittent stream in Unit 1-1); temporary road construction; and construction and use of proposed landings would have little potential to contribute sediment to aquatic habitat (see Section 3.2.3, *Assumptions* below).

In the Griffin Half Moon Project, only the following proposed activities have direct hydrological connectivity to aquatic habitats and therefore, the greatest potential to contribute sediment to streams: two designated skid trails proposed to cross the Riparian Reserve of Unit 1-1, portions of the haul routes, and roads proposed for maintenance.

Analysis of sediment from haul utilizes a study conducted in the coast range of Oregon (Luce and Black 2001) which quantified sediment production from winter season haul. Haul routes for this project were identified in GIS, and all paved routes discounted as there is no probability that hauling on paved surfaces would result in increased erosion or sediment/turbidity transport to aquatic environments. The number of stream crossings that each unpaved haul route would cross were calculated, and the area of hydrologically-connected road and number of truck crossings were then estimated for each stream crossing within each HUC 7 to provide an estimate of the potential volume of sediment contributed to aquatic habitat from haul under each of the alternatives.

Analysis of the designated skid trails in the RR in Unit 1-1 incorporates erosion rates described by the BLM soil scientist expected within Unit 1-1 based on the soil series and topography, estimate of disturbed area resulting from mechanized passes, season of disturbance, and PDFs designed to mitigate impacts to aquatic habitat.

3.2.3 Assumptions

This analysis assumes that RR buffers are effective at precluding sediment transport to aquatic habitat from upland sources of disturbance. Rashin et al. (2006) found that sediment delivery to streams is unlikely when erosion features (i.e., yarding corridors) are greater than 10 meters from the channels. In this project, RRs range in size from 50 feet either side of the stream (intermittent streams in the Jenny Creek Watershed) to 165 feet either side of the stream (all streams in the Middle South Fork Little Butte Creek Subwatershed). For this project, only timber haul and two designated skid trails are proposed in RRs. The buffer widths incorporated into this project are in excess of the 10 meters reported by Rashin et al. (2006) as being effective at protecting aquatic habitat from sediment inputs. This analysis also assumes that the potential for sediment to mobilize from upland areas and transport to stream channels from disturbed ground in the Analysis Area is low, as the Analysis Area is typified by very gentle topography. Water carrying fine sediment is more likely to become ponded at some point rather than travel long distances, even on compacted surfaces, due to the prevalence of low gradients common throughout the area.

The analysis of sediment contribution associated with timber haul makes the following assumptions:

- all timber haul would occur during the wet season;
- an average log truck load is 4,500 board feet of timber;
- there is hydrological connectivity at every point the haul route crosses aquatic habitats;
- the portion of road most likely to deliver sediment to the stream is the 150 feet of road uphill of and adjacent to the stream crossing point;
- there is a constant rate of aggregate break down; and
- all sediment generated by timber haul within 150 feet of each crossing is conveyed to the stream.

Unit volume estimates were based on Oregon Growth Analysis and Projection System (ORGANON) modeling results, and are indicated by the project forester to be overestimates of anticipated actual volumes due to model limitations. The assumptions in this analysis will, therefore, tend to over-estimate

the actual haul volume that would occur project-wide. Furthermore, the analysis assumes wet season haul only, and the study which it relies on was conducted in a much wetter climate with much steeper topography, which will also tend to result in overestimation of sediment transport to aquatic habitat. Although this analysis may overestimate sediment production or contribution to aquatic habitats from this project, it does, however, serve to show the potential differences in magnitude between the alternatives.

3.2.4 Affected Environment

The Analysis Area for sediment is shown on Map 3-1 and includes the following.

Jenny Creek Watershed (HUC 5) in the Klamath River Basin:

- two drainages in the Johnson Creek Subwatershed;
- three drainages in the Upper Jenny Creek Subwatershed below Howard Prairie Reservoir; and
- three drainages in the Upper Jenny Creek Subwatershed which drain into Howard Prairie Reservoir.

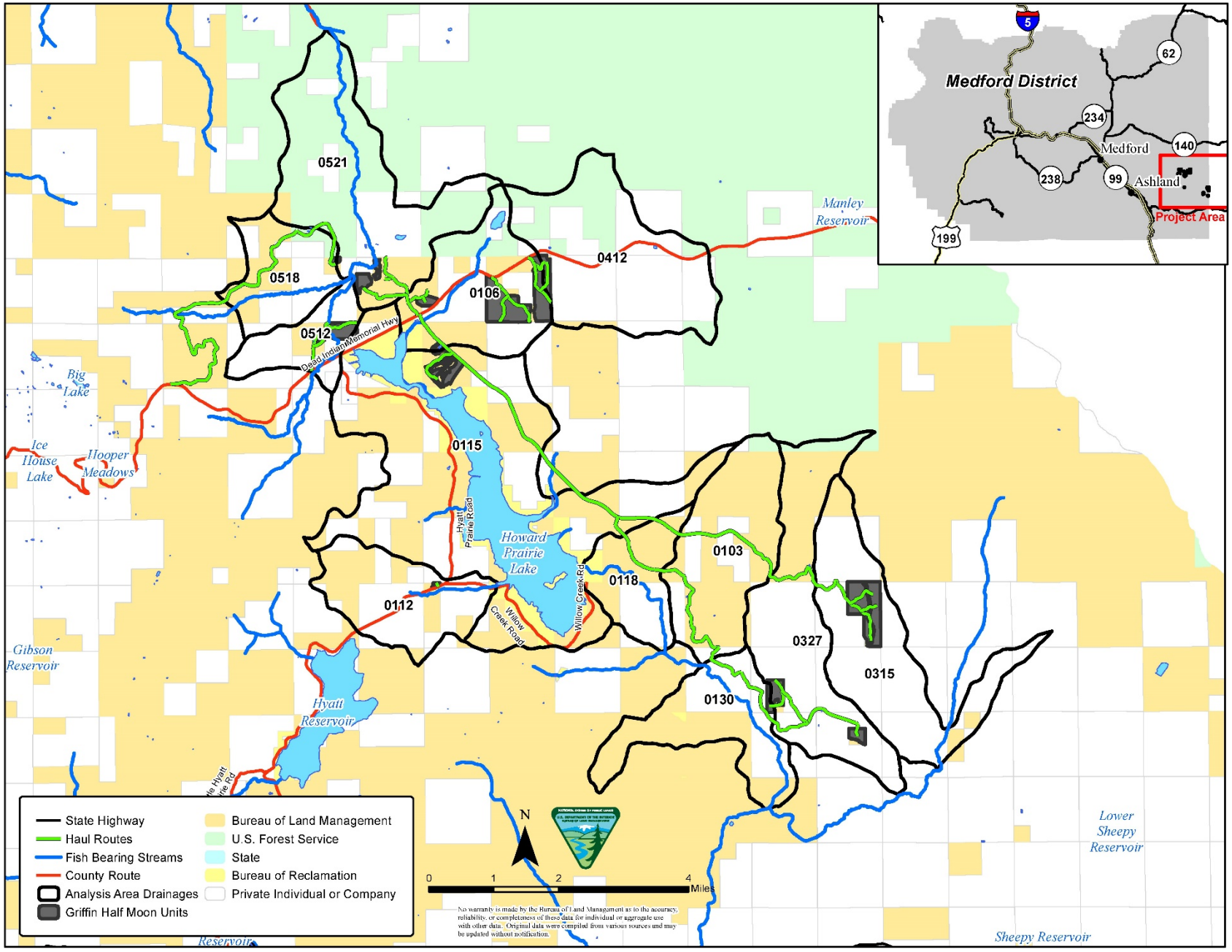
South Fork Little Butte Creek (HUC 5) Watershed in the Rogue River Basin:

- three drainages to Dead Indian Creek in the Middle South Fork Little Butte Subwatershed; and
- one drainage in the Beaver Dam Creek Subwatershed.

Major tributaries (or portions of them) included in this Analysis Area include Dead Indian Creek and its principle tributary Conde Creek, Grizzly Creek, Willow Creek, and several small tributaries to Johnson Creek, including Green Creek which is a fish-bearing stream.

The Analysis Area drainages are very different in nature, with the streams in the southern portion of the area (south of Howard Prairie Reservoir) generally characterized as being very small and intermittent in nature, exhibiting surface flow only during very wet periods or following run-off from snow melt. Jenny Creek itself is a large perennial stream with regulated flow by Howard Prairie Reservoir, but Johnson Creek, which in its entirety is a very large subwatershed, is intermittent in its lower reaches and typically goes dry by early July save for upper reaches that receive some spring inputs. Willow and Grizzly creeks, tributaries to Howard Prairie Reservoir, are both perennial streams, as are Conde and Dead Indian creeks in the Middle South Fork Little Butte Subwatershed. One thing all the streams have in common within the Analysis Area is that they are all relatively low gradient as the Analysis Area straddles a high flat plateau. Slopes are gentle, and mesic meadow systems are common features in Jenny, Johnson, Willow, Grizzly, Conde, and Dead Indian creeks. The dominant land use for all streams in the area is forestry and grazing.

Map 3-1. Sediment Analysis Area (Issue 1)



Fish-bearing streams in the Analysis Area include Dead Indian and several of its tributaries (Conde, Ellick, and an unnamed seasonal creek), Grizzly, and Willow creeks north of Howard Prairie Reservoir. These streams all provide habitat for resident trout, and the reservoir frontals probably provide some spawning habitat for hatchery originated migratory rainbow trout from the reservoir. Speckled dace have also been observed in Dead Indian Creek. South of the reservoir, Jenny Creek provides habitat for native redband trout, speckled dace, and a unique dwarfed form of the Klamath small scale sucker, the Jenny Creek sucker. The mainstem of Johnson Creek (not in the Analysis Area) is also a fish bearing stream, and supports migratory and resident (in its upper reaches) redband trout and its lower reaches are thought to be an important sucker spawning area. Speckled dace have been observed in Green Creek near Unit 13-1. Though not observed recently, redband trout are also probably present in Green Creek.

No streams within the Analysis Area are listed as water quality limited for sediment on the Oregon Department of Environmental Quality (DEQ) 303(d) list (DEQ 2012). The nearest 303(d) sediment listed stream to the Project Area is the mainstem of the South Fork Little Butte Creek. Units 11-2 and 11-3 (HUC 0521) are the closest and are over six miles away.

Aquatic habitat in the Analysis Area varies considerably from the seasonal fishless streams found in much of the Johnson Creek Subwatershed to the perennial fish-bearing streams found elsewhere, and between the meadow reaches and the forested reaches. Some of the meadow reaches, in particular adjacent to upper portions of Conde and Dead Indian Creeks, have been impacted by a long history of grazing and associated infrastructure failures or abandonments (e.g., fences, waterholding facilities), which has resulted in areas of browsed riparian corridors, trampled banks, and down-cut and incised stream channels that are no longer connected with adjacent floodplains. In general, forested reaches are less impacted, as these reaches tend to be armored by rockier banks and mature trees, and there is large wood in and adjacent to channels to help provide stable grade control.

Although not listed for sediment on the Oregon 303(d) list, sediment levels have been observed to be above desirable in Conde and Dead Indian creeks, which chronically run turbid during high flow events; the Oregon Department of Fish and Wildlife considers sediment levels in low gradient streams desirable when fine sediment makes up less than 12 percent of all instream substrate. Aquatic inventories conducted on selected perennial reaches in the Analysis Area streams indicated that silt, sand, and clay size particles were the most dominate substrate size classes in the meadow reaches of both Dead Indian and Conde Creeks (USDI BLM 1995d).

Much of this sediment likely results from increased erosion and sediment deposition into aquatic habitats resulting from grazing, high road densities, and forestry practices on adjacent private lands which under state rules are not required to leave large riparian buffers adjacent to non-fish bearing channels. Excessive sediment is less of an issue in the Jenny Creek Watershed; aquatic inventories in the watershed are limited, especially below Howard Prairie, but casual observations of Jenny and Johnson creek mainstems suggest that cobbles, gravels, and in some cases, boulders are the dominant substrates. The Jenny Creek Watershed is more impacted by the operation of a series of large impoundments which divert water out of the watershed, regulate stream flows, create aquatic organism passage barriers, reduce flood flows, and allow for heating of ponded water (USDI BLM 2011a). Water diversions out of upper Conde and Dead Indian creeks into Howard Prairie Reservoir also impact aquatic habitat, as reaches of Conde Creek may be dewatered for periods when active diversion is occurring, stranding fish and leading to direct mortality.

3.2.5 Environmental Consequences

3.2.5.1 Alternative 1 – No Action

Direct and Indirect Effects

Under the No Action Alternative, there would be no direct or indirect effects to aquatic habitat from increased erosion rates, sediment transport, or turbidity resulting from haul, road building, or any related timber sale activities, as there would be no timber sale, and hence no associated ground-disturbing activities. Therefore, there would be no causal mechanism to increase erosion rates. Aquatic habitat would continue to be impacted from non-natural sediment and turbidity inputs from past and ongoing disturbances, notably grazing in sensitive riparian areas and from certain segments of hydrologically connected roads. Of note, road maintenance activities as proposed under the action alternatives may not occur under the No Action Alternative. This would maintain the sediment inputs currently ongoing from poorly drained roads, and in particular Road 35-4E-35.0, which has captured and diverted stream flow for approximately 700 feet down the road, resulting in chronic erosion and sediment input to a small intermittent tributary to Johnson Creek. This problem, unless addressed through other means, would continue, and could perhaps worsen over time if the rut becomes more confined.

Cumulative Effects

Because there would be no direct or indirect effects to erosion and sediment/turbidity transport rates, there would be no cumulative effects to aquatic habitat resulting from selection of the No Action Alternative. An instream large wood restoration project is planned during the instream work window (mid- to late-summer) of 2018 on two selected reaches of Upper Dead Indian Creek. The project would add large wood to down-cut sections of the channel with the intent to encourage sediment capture, storage, and eventual channel aggradation, which would allow portions of the stream to become re-connected with its flood plain. This could potentially reduce downstream transport of sediment, but the reduction would be slight in comparison to the sediment loading from numerous point and non-point sources present in the Dead Indian catchment, and would not likely result in measurable reductions in sediment beyond the short reach scales proposed for treatment.

3.2.5.2 Common to All Action Alternatives

Direct and Indirect Effects

The footprint of proposed actions would be the same under each of the action alternatives; only harvest prescriptions and volume of timber harvested, yarded, and hauled would be different. All action alternatives propose varying levels of harvest across 933 acres of project units; post-harvest treatment activities; tractor yarding; log haul; construction, use, and decommissioning of two new temporary spur roads; road maintenance; long-term road closures; and use and construction of existing and new skid trails and landings as described in Chapter 2 of this EA. All harvest and most yarding; new spur road construction, use, and decommissioning; and construction and use of landings would occur outside of Riparian Reserves; these activities would be hydrologically disconnected from aquatic habitats. Given this, and considering the flat topography of the project area, sediment mobilization to aquatic habitat is unlikely to occur from ground-disturbing activities proposed in upland areas.

Project elements proposed under all alternatives either within Riparian Reserves, or with hydrological connectivity with aquatic habitats include road maintenance, two skid trails across the Riparian Reserve

and its associated small intermittent channel in Unit 1-1, and log haul. Effects from these project elements are detailed below.

Road Maintenance

Road maintenance is proposed to occur on certain road segments to be utilized for haul, as described in Chapter 2. Ground disturbing road maintenance activities would be restricted to the dry season and all activities would be suspended during precipitation events (i.e., rare thunderstorms).

There is no probability that opening and closing roads would contribute sediment to streams. Roads proposed for this type of treatment are in upland areas and hydrologically disconnected from the stream system and all disturbed surfaces would be stabilized prior to the wet season. There is no probability that spot rocking road surfaces would contribute sediment to streams. Addition of rock to roads should reduce the potential for erosion stemming from haul, thereby resulting in less sediment production. There is no probability that adding additional rock and repairing pot holes for general maintenance to upkeep roads used for haul would contribute sediment to streams, as these activities would not generate additional sediment.

There is little probability that repairing drainage of existing roads would contribute sediment to streams. Although reshaping the road surfaces (i.e., installation of water bars or rolling dips, or creating outslopes or crowns) would involve disturbance to the road surface, the intent of these activities is to disconnect the road from the stream system, yielding an overall reduction in sediment transport to streams. Of note, one particular road (38-4E-35.0) which accesses Unit 1-1, captures and diverts a small intermittent stream down the running surface of the road for approximately 700 feet, at which point captured water is diverted back towards the natural channel. This has resulted in substantial rutting of the road surface and chronic sediment transport to the small stream. Road maintenance activities as proposed for this project would seek to fix this problem. A rolling dip would be constructed at the road diversion point, which would keep water in the historic stream channel and prevent it from running down the road. This would result in a reduction in long-term sediment inputs into the channel, as chronic erosion of the road surface would be considerably reduced.

Grading has potential to increase sediment production, because grading can break up armor layers on the road surface, temporarily increasing road surface erosion. However, Luce and Black (1999) noted that blading of only the travel-way yielded no increase in sediment production whereas blading of ditches, which often occurs during grading operations, substantially increased sediment yield. BLM is proposing only spot treatments in ditchlines as necessary to improve drainage, and ditch approaches to stream crossings would not be treated. Furthermore, this work would occur during the dry season, and disturbed ground would be stabilized prior to the onset of the wet season. For these reasons, road maintenance activities as proposed are not likely to result in detectable inputs of sediment to aquatic habitats. These activities should, as indicated, result in less sediment input to streams as the roads are improved in regards to increased armoring and capacity to shed water.

Unit 1-1 Skid Trails

Two designated skid trails are proposed in a Riparian Reserve. These skid trails would cross the small intermittent stream in HUC 0315, which bisects proposed Unit 1-1. These trails would have direct hydrological connectivity with aquatic habitat, as they would involve ground disturbance in and adjacent to the channel. While the volume of timber yarded across these two trails would vary by alternative,

anticipated effects to erosion rates and sediment input to the channel would be similar under each alternative, because the majority of disturbance to the channel and adjacent banks would likely be achieved during the first several passes by mechanized equipment, and because PDFs to re-habilitate the yarding corridors would seek to stabilize all disturbed ground within the Riparian Reserve after completion of yarding operations. It is therefore anticipated that the yarding trails would be left in a similar state after harvest and yarding, regardless of which action alternative is considered.

Use of these two designated skid trails would result in contributions of sediment to the stream channel. However, contributions would be minimized due to several factors. Soil series in this area are classified as Pokegema-Woodcock complex, which have a low erosion potential (rated as slight, the lowest possible rating, and an indication that erosion is unlikely under normal climatic conditions). These soils are relatively resilient to disturbances. Additionally, the stream is a short-duration intermittent stream, exhibiting surface flow for less than 30 days a year, and all skidding operations across the channel would be limited to the dry season, when there would not be any water in the channel. Therefore, there would be no potential for direct sediment contributions to wetted habitats during yarding operations. All disturbed ground within the Riparian Reserve would be seeded, mulched, and covered with coarse organic material to help stabilize exposed soils and preclude movement of displaced soils prior to the onset of wet weather; the topography of the unit in the vicinity of the stream is flat, reducing the likelihood of sediment mobilization. For these reasons, contributions of sediment to the channel are most likely to come from the channel itself and its adjacent banks at the location of the two trail crossings.

The disturbance footprint would be similar to a culvert removal or replacement; past experience with road obliteration projects which included removal of culverts over perennial streams suggest that less than one cubic yard of sediment is likely to be input into the channel at any given crossing point. Due to the intermittent nature of the stream, and lack of fill in the channel (as compared with a culvert removal), actual sediment contributions to the channel at the two skid trail crossing points would likely to be much less than observed for culvert removals, and are estimated to be no more than 0.5 cubic yards for any given skid trail crossing. Use of these skid trails under any of the action alternatives could therefore result in direct and indirect contributions of fine sediment totaling up to an estimated one cubic yard into the short-duration intermittent channel in HUC 0315. This sediment would remain in the dry channel until freshets manifested surface flow to the stream, at which point the sediment could be mobilized and transported downstream. Sediment contributed to the downstream reaches would either settle out and assimilate into natural substrates in stream reaches above fish habitat, which in the meadow reaches naturally include higher amounts of fines, or would remain entrained as turbidity and quickly flush through the system undetectable beyond background levels, which would be naturally elevated during the first significant freshet of the season. In either case, the small one-time contribution of sediment would be off-set by proposed road maintenance activities which propose to fix a road/stream capture point that allows for chronic contributions of sediment to aquatic habitat in a tributary to Johnson Creek.

Log Haul

Haul is known to accelerate erosion rates on roads through the breakdown of surface material and creation of erosion features, such as ruts. Roads are more susceptible to disturbance when they become saturated. During such periods, they are more likely to develop ruts which can expose the subgrade. Dry-season use is less damaging, as ruts are unlikely to result, but heavy use (even in the dry season) would result in increased erosion of the road surface through the breakdown of aggregate or native

surfaces. Because haul increases erosion rates, portions of haul routes with connectivity to streams would be expected to contribute some amount of sediment to the aquatic system.

Weathering of road surfaces can lead to chronic sediment and turbidity contributions to aquatic habitats, and haul can accelerate rates of erosion, particularly during the wet season (Luce and Black 1999; Reid and Dunne 1984). Where roads are hydrologically connected to streams, eroded sediment from road surfaces can be input directly to the channel. Hydrological connectivity is present at any point where roads and streams interface. Connectivity changes in response to climatic conditions, with the greatest road-stream hydrological connectivity occurring during the wettest period of the year, when soil moisture contents are high, groundwater tables elevated, and runoff more likely (Furniss et al. 2000). For this reason, wet season use of a given road system has a much higher potential to contribute impacts to aquatic habitat than dry season use.

The heavier the timber haul volume, the greater the potential for breakdown of the road surfaces to occur. Small direct contributions of fine sediment could occur if dust mobilized by haul should settle out in perennial stream channels crossing or adjacent to the haul route. PDFs include the use of dust abatement which would minimize the likelihood of airborne contributions occurring. The more likely method of sediment contribution from haul would be indirectly, as the fine sediment that remains on the road prism would be available to be transported off of the road during the first significant rain events following a season of haul. Properly engineered roads are capable of shedding the majority of mobilized sediment off of the road (or road ditch) downslope and into vegetation. However, the road/ditch distance from the last cross drain located on any uphill side of a channel crossing would directly contribute captured water and mobilized sediment into the stream channel. Therefore, use of the roads for haul would increase the risk of road derived sediment transport to stream channels, particularly in the vicinity of road/stream crossings. As discussed above, wet season haul has the highest likelihood of contributing sediment to streams, so the following analysis focuses on wet season use.

Under each of the action alternatives, it is estimated that there would be up to 23.86 miles of unpaved haul routes spread amongst the Analysis Area drainages (Table 3-1). Unpaved haul routes would be the same spatially under all alternatives, and would include crossings over 23 stream channels, most of which (14) would be over intermittent streams. One crossing would occur over each of the following fish-bearing streams: Green Creek (HUC 0327), Dead Indian Creek (enter HUC 0512), Ellick Creek (HUC 0521), and an intermittent tributary to Dead Indian Creek (HUC 0512). Direct and indirect effects from haul would vary in magnitude by alternative, as each alternative proposes different levels of haul, and therefore different levels of use and correlated erosion of road surfaces. Sediment delivery potential would be limited in each of the action alternatives due to the relatively low amount of hydrological connectivity between the unpaved haul routes and aquatic habitat, and would be concentrated in the drainages of Dead Indian and Johnson Creeks as these catchments include 17 of the 23 stream crossings.

It is difficult to accurately quantify how much sediment may be generated on any given road surface from haul, as there are many variables that influence erosion rates, transport potential, and subsequent deposition into aquatic habitat. Luce and Black (2001) found that a volume of haul equivalent to 12 daily truck loads per work day for one month (240 total truck loads) on rocked roads during the wet season in the coast range of Oregon increased sediment production from the road surface by approximately 380 kg/km of road. Note that the study did not attempt to quantify how much of this increased sediment production was likely to find its way to aquatic habitat, and that it was conducted in the coast range, which receives approximately three times the average annual precipitation as the

Analysis Area, and that haul was allowed to continue during precipitation events. Also note that the authors did not offer a quantitative comparison of wet season vs. dry season haul erosion rates, but they did note that proscription of wet weather haul is an effective BMP for reducing sediment production stemming from haul.

Table 3-1. Haul Analysis. Miles of non-paved haul routes, number of stream crossings, estimated number of loaded truck/stream crossings, and estimated amount of sediment contributed to aquatic habitat within the Analysis Area drainages (HUC 7) by each alternative. Under all action alternatives, up to an additional one cubic yard (~ 2,106 lbs.) of sediment is predicted to be input into HUC 0315 as a result of use of two riparian skid trails in Unit 1-1.

		Haul Routes		No. of Loaded Truck Crossings Over Streams			Estimated Sediment Contributed to Streams (lbs.)		
Drainage Area	HUC #	Miles	# Stream Crossings	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4
Beaver Dam Creek	0412	0.45	0	0	0	0	0	0	0
Dead Indian Creek	0512 0518 0521	1.65 2.28 2.08	3 3 2	1014 75 104	309 45 73	253 33 57	183 14 19	56 8 13	46 6 10
Dead Indian Creek Total		6.01	8	1193	427	343	215	77	62
Howard Prairie	0112 0106 0115	0 4.02 0.70	0 1 1	0 698 170	0 422 74	0 116 74	0 126 31	0 76 13	0 21 13
Howard Prairie Total		4.72	2	868	496	190	156	89	34
Jenny Creek	0103 0118 0130	4.1 0.89 1.65	4 0 0	1752 0 0	924 0 0	848 0 0	315 0 0	166 0 0	153 0 0
Jenny Creek Total		6.64	4	1752	924	848	315	166	153
Johnson Creek	0315 0327	2.3 3.74	7 2	3681 814	2805 606	1976 436	663 147	505 109	356 78
Johnson Creek Total		6.04	9	4495	3411	2412	809	614	434
GRAND TOTAL		23.86	23	8308	5258	3793	1495	946	683

A very rough estimate of the potential magnitude of sediment produced by haul may be obtained by incorporating the erosion rates reported by Luce and Black (2001) and calculating the number of truck loads anticipated to result from this sale. Within the haul Analysis Area drainages, the 23 stream crossings would equate to an estimated 1,150 meters of hydrologically-connected routes spread across the entire Analysis Area. Utilizing erosion rates described by Luce and Black, one truck load would equate to approximately 1.6 kg of sediment production per kilometer of road, or 0.18 lbs. of sediment per log truck crossing. Each crossing in GIS was assigned an estimated haul volume value (number of truck crossings) based on the estimated unit volume accessed by each particular crossing. The result of

the analysis estimates pounds of sediment contributed to channels in Analysis Area streams from haul, which in turn can be expressed volumetrically as cubic yards, assuming that 2,106 lbs. of wet soil is equal to one cubic yard. As indicated, these estimates are likely overstated due to overestimation of unit volume, and assumptions of haul during the wet season only. Inputs were estimated site specifically for each Analysis Area drainage and as indicated in the discussion above are a function of both the number of stream crossings, which act as an effect multiplier, and with the estimated haul volume, and are presented by alternative below.

Alternative 2 – Proposed Action

Direct and Indirect Effects Associated with Log Haul

An estimated 3,508 log truck loads would be required to haul off harvested timber as proposed under Alternative 2. Using the methodology described above, this would equate to an estimated 1,495 lbs. of sediment production within the assumed hydrologically connected portion of the haul routes to the 23 stream crossings bisected by the haul routes, or roughly 0.7 cubic yards of sediment. Almost half of this would be input into one HUC 7 drainage (HUC 0315), a small intermittent fishless tributary to Johnson Creek (Table 3-1).

Alternative 3

Direct and Indirect Effects Associated with Log Haul

An estimated 2,010 log truck loads would be required to haul off harvested timber as proposed under Alternative 3. Using the methodology described above, this would equate to an estimated 946 lbs. of sediment production within the assumed hydrologically connected portion of the haul routes to the 23 stream crossings bisected by the haul routes, or roughly 0.4 cubic yards of sediment. As in Alternative 2, much of this total (505 lbs. of sediment, or 53 percent of the total for this alternative) would be input into one HUC 7 drainage (HUC 0315) (Table 3-1).

Alternative 4

Direct and Indirect Effects Associated with Log Haul

An estimated 1,150 log truck loads would be required to haul off harvested timber as proposed under Alternative 4. Using the methodology described above, this would equate to an estimated 683 lbs. of sediment production within the assumed hydrologically connected portion of the haul routes to the 23 stream crossings bisected by the haul routes, or roughly 0.3 cubic yards of sediment. As under Alternatives 2 and 3, much of this total (356 lbs. of sediment, or 52 percent of the total for this alternative) would be input into one HUC 7 drainage (HUC 0315) (Table 3-1).

3.2.5.3 Summary of Direct and Indirect Effects of the Action Alternatives

Selection of any of the action alternatives would result in small inputs of fine sediment/turbidity to aquatic habitats in certain Analysis Area streams resulting from log haul and use of two designated skid trails across a Riparian Reserve. Effects to aquatic habitat are similar by alternative; only the magnitude of sediment anticipated to be contributed by haul would vary by alternative.

Table 3-1 displays the differences in expected sediment contributions from log haul by alternative. Sediment/turbidity inputs would be highest under Alternative 2, and lowest under Alternative 4, reflective of the lower volume of timber harvest and associated hauling proposed under Alternative 4. Alternative 3 would be very similar to Alternative 4 in regards to sediment input to aquatic habitat. Under each of the action alternatives, sediment inputs would be concentrated in one small intermittent fishless tributary to Johnson Creek (HUC 0315), a result of two designated skid trails which would cross the channel and the greater amount of haul that would occur within the drainage.

Sediment resulting from this project is not expected to result in measurable impacts to aquatic habitat beyond the site scale (e.g., a single pool for most Analysis Area streams or short reach in HUC 0315) and site scale detectable inputs would likely not persist longer than one season. Sediment inputs to the Little Butte Creek Watershed would occur over a period of time (a typical timber sale contract is for three years) and be spread apart spatially; hence the amount of sediment input into any one stream in any given year would likely be less than reported above. Inputs to Jenny Creek may potentially occur in a single season. In Johnson Creek, sediment resulting from this project would most likely be input into tributaries in a single season, as activities are concentrated in two small areas. There could potentially be considerably more sediment contributed to aquatic habitat in the Johnson Creek Analysis Area streams than in the Little Butte or Jenny Creek streams by this project, but overall magnitude would still be small, estimated to be up to only 1.4 cubic yards (Alternative 2). Throughout the Analysis Area, most of the streams are intermittent. This means that the potential for most sediment transport to wetted aquatic habitats would occur during the first significant rainstorms of the fall/winter following ground disturbing project activities. Sediment input to aquatic habitat would either settle out and be assimilated into the natural substrates of the Analysis Area streams upstream of fish habitats, or be transported downstream as particulates entrained in the water column (turbidity). During such flushes, the small amounts of sediment/turbidity contributed by this project would be undetectable in downstream fish bearing stream reaches, and would have no biologically meaningful impact to aquatic habitat.

3.2.5.4 Cumulative Effects

Under each action alternative, it is assumed that grazing, private forest harvest operations, and high road densities would continue to affect aquatic habitat at similar rates as in the past and present, and as reflected in the current conditions described under in Section 3.2.4, *Affected Environment*, resulting in elevated inputs of non-naturally derived sediment and turbidity to Analysis Area streams.

An instream large wood restoration project is planned during the instream work window (mid- to late-summer) of 2018 on two selected reaches of Upper Dead Indian Creek within the Analysis Area. The project would add large wood to down-cut sections of the channel with the intent to encourage sediment capture, storage, and eventual channel aggradation, which would allow portions of the stream to become re-connected with its flood plain. Though this project may disturb existing sediment in-channel through log placement, it would not add additional sediment to the channel; all equipment would operate outside of the wetted channel, and machinery would not encroach upon the channel adjacent banks. The project would occur during the dry season, and any disturbed ground created by transport and placement of logs would be mulched upon project completion. Over time, this project could potentially slow downstream transport of sediment as the wood captures and stores sediment from upstream sources, but the reduction would be slight in comparison to the sediment loading from numerous point and non-point sources present in the Dead Indian catchment, and would not likely result in measurable reductions in sediment in the Analysis Area. Therefore, this restoration project would not add cumulative sediment impacts to the Analysis Area.

Specific fine sediment input into aquatic habitat is described above. Sediment input into Analysis Area channels is anticipated to result from log haul and skidding across one channel. Selection of any of the action alternatives would result in cumulative additions of sediment on top of those currently occurring from all other sources. Inputs resulting from this project are estimated to range from 1.7 cubic yards under Alternative 2, to 1.3 cubic yards under Alternative 4. Most (from 75-88 percent, depending on alternative) of the sediment from log haul and the two designated skid trails is predicted to be input into one small intermittent channel in HUC 0315. Other contributions would be spread spatially and temporally across the rest of the Analysis Area drainages, and are estimated to total less than 0.4 cubic yards. These small contributions would be spread across a large landscape and over a period of years and would be undetectable in aquatic habitat above background sources beyond the site scale (e.g., single pool below a haul crossing).

The sediment contributed to HUC 0315 would be more focused in both time and space, as it is probable that both the yarding and the log hauling would occur in this unit during the same season. This sediment would likely be detectable in the stream channel within Unit 1-1, at least until surface stream flows returned to the stream, at which time the sediment could be mobilized and flushed downstream as elevated turbidity. This one time contribution would be less sediment than is contributed chronically to the stream from the road which currently captures the stream. Road maintenance as proposed would seek to ensure the stream is no longer captured by the road, and ultimately, this would lead to a reduction in sediment input to aquatic habitat in HUC 0315.

3.2.6 Summary of Effects to Fisheries, Aquatic Habitat, and Water Quality

Although the implementation of any of the action alternatives would have a high likelihood of contributing additional sediment to aquatic habitat, given the small overall magnitude and the spatial and temporal distribution of the inputs, and the seasonal timing of inputs, sediment and turbidity contributed to aquatic habitats by this project would be undetectable behind background levels in downstream fish habitat, and therefore would not result in adverse effects to fish, fish habitat, or water quality.

3.3 WATER QUANTITY

Issue 2: How would the reduction in canopy cover from the proposed timber harvest and openings created from temporary roads and landings affect water quantity (peak flows)?

3.3.1 Introduction

Water quantity in the Analysis Area is a function of natural and human-caused factors. Natural site factors include climate, geology, and geographic location. Natural processes that have influenced water quantity include floods, wildfires, and drought. Past human activities that have altered water quantity in the Analysis Area include: land clearing (for agricultural and residential use), timber harvest, road operations, water withdrawals, and fire suppression. These past actions and their effects on hydrologic processes and water quantity (peak flows) are described in this section.

3.3.2 Methodology

This analysis focuses on effects of timber harvest and related activities on peak flows. Effects to low flows can be found in Appendix C, *Issues Considered but not Analyzed in Detail*.

The climate in the Analysis Area is characterized by mild wet winters and hot dry summers. Average annual precipitation is approximately 33 inches. Within the Analysis Area, rain predominates in the lower elevations (generally below 3,500 feet in the Little Butte Creek Watershed and below 3,000 feet in the Jenny Creek Watershed). Winter precipitation in the higher elevations (generally above 5,000 feet in Little Butte Creek Watershed and above 4,000 feet in the Jenny Creek Watershed) usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. In this area, the transient snow zone (TSZ), a mixture of snow and rain occurs between approximately 3,500 and 5,000 feet elevation in the Little Butte Creek Watershed and between approximately 3,000 and 4,000 feet elevation in the Jenny Creek Watershed (USDI BLM 2006, 2011b). The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. Historically, geomorphic processes that shape landscape and channel geometry are triggered by large, infrequent storm events. In recent times, these events can be characterized by warm moist storms that result in high intensity, long duration rainfall. The results can be intensified when rainfall occurs on shallow snow packs in this elevation range, and then are quickly melted by rain and warm winds (rain-on-snow event).

The percent of a watershed in the TSZ can indicate elevated risk of adverse impacts. These impacts can be accelerated by modifications to forest canopy cover and roads and other disturbance features. Drainages where the TSZ comprises greater than 25 percent of the area are of hydrologic concern, particularly where large openings such as clearcuts exist. The degrees to which hydrologic processes are affected by vegetation canopy reduction (e.g., land clearing or timber harvest) are summarized based on the extent and location. Extent refers to the amount of a drainage area that is below critical thresholds, and therefore at risk. Location refers to whether or not canopy reduction occurs within the TSZ. Openings in the TSZ and potential risk for peak flow increases are analyzed using the Oregon Watershed Assessment Manual (OWAM) (WPN 1999, pp. IV-9 through IV-11) risk assessment method. This method indicates that drainages with more than 25 percent of the area in the TSZ may be at risk for possible peak flow increases.

Large areas of vegetation removal in the TSZ are of particular concern due to alterations of the streamflow regime and the potential for resultant increased peak flow magnitudes (Christner and Harr 1982). Different levels of harvest in watersheds have demonstrated variable effects on peak flows (Harr et al. 1979; Wemple et al. 1996). When less than 25 percent of a watershed is harvested, no detectible change in peak flows have been observed (Stednick 1996). It should be noted the majority of literature available regarding the relationship between harvest and flow have focused on clearcut harvesting, many in areas that removed close to 100 percent of the overstory canopy.

3.3.3 Assumptions

For this analysis, any area where 30 percent or greater of the forested acres is less than 30 percent canopy cover is assumed to be hydrologically altered and responds similar to a clearcut. This is particularly true if a large percentage of the drainage is located within the TSZ.

Information on the hydrology of the Analysis Area was compiled using the following sources:

- Geographic Information System (GIS) data helped provide environmental baseline information and project information, including LiDAR (Light Detection and Ranging) data collected in 2015 to estimate the area with less than 30 percent canopy cover in the Analysis Area.

- Resource specialists used LiDAR canopy cover data as recommended by guidance from the Oregon Watershed Assessment Manual (OWAM) (WPN 1999) to assess risk of increased peak flows.

- Aerial photography interpretation from recent BLM vegetation management projects was used to determine the age of forested stands on private lands to estimate potential foreseeable harvest within the drainage areas.

- Field visits to proposed haul routes, timber sale units, and Riparian Reserves provided site-specific information.

- The 2016 PRMP/FEIS already analyzed for the potential effect of timber harvest and road construction on peak stream flows within the rain-on-snow dominated hydro-region. On the sub-watershed scale, none of the sub-watersheds in the Griffin Half Moon Project Area were classified as susceptible to peak flow enhancement (2016 PRMP/FEIS, p. 391). This EA's site-specific analysis tiers to and incorporates the analysis from the 2016 PRMP/FEIS by reference.

For the cumulative effects to peak flows discussion, we assume that all stands on private lands over 60 years old are scheduled for harvest within the next ten years.

3.3.4 Affected Environment

The Analysis Area for peak flows includes 20 drainages (HUC 7s) within the Little Butte Creek and Jenny Creek 5th field (HUC 5) watersheds and was chosen at this scale because it is large enough to assess the potential for cumulative effects for changes in peak flows. The drainages are small enough to avoid diluting the evidence of adverse effects. As the size of the Analysis Area increases, there is an increasing possibility of potential effects becoming undetectable at the larger scale; therefore, the analysis was set at the drainage scale to ensure proper detection of any potential impacts.

Portions of the Beaver Dam Creek, Middle South Fork Little Butte Creek, and the Upper Jenny Creek, and the entire Johnson Creek subwatersheds (HUC 6s) are included in the Analysis Area (Map 3-2).

The Analysis Area includes all drainages (HUC 7s) where project-related ground-disturbing activities are proposed, the surrounding drainages whose condition could influence peak flows, and those drainages downstream of the ground-disturbing activities that could be hydrologically affected. The total size of the Analysis Area is 58,476 acres or 91.4 square miles. These drainages range in size from 120 acres to 9,170 acres (Table 3-2).

Map 3-2. Peak Flow Analysis Area (Issue 2).

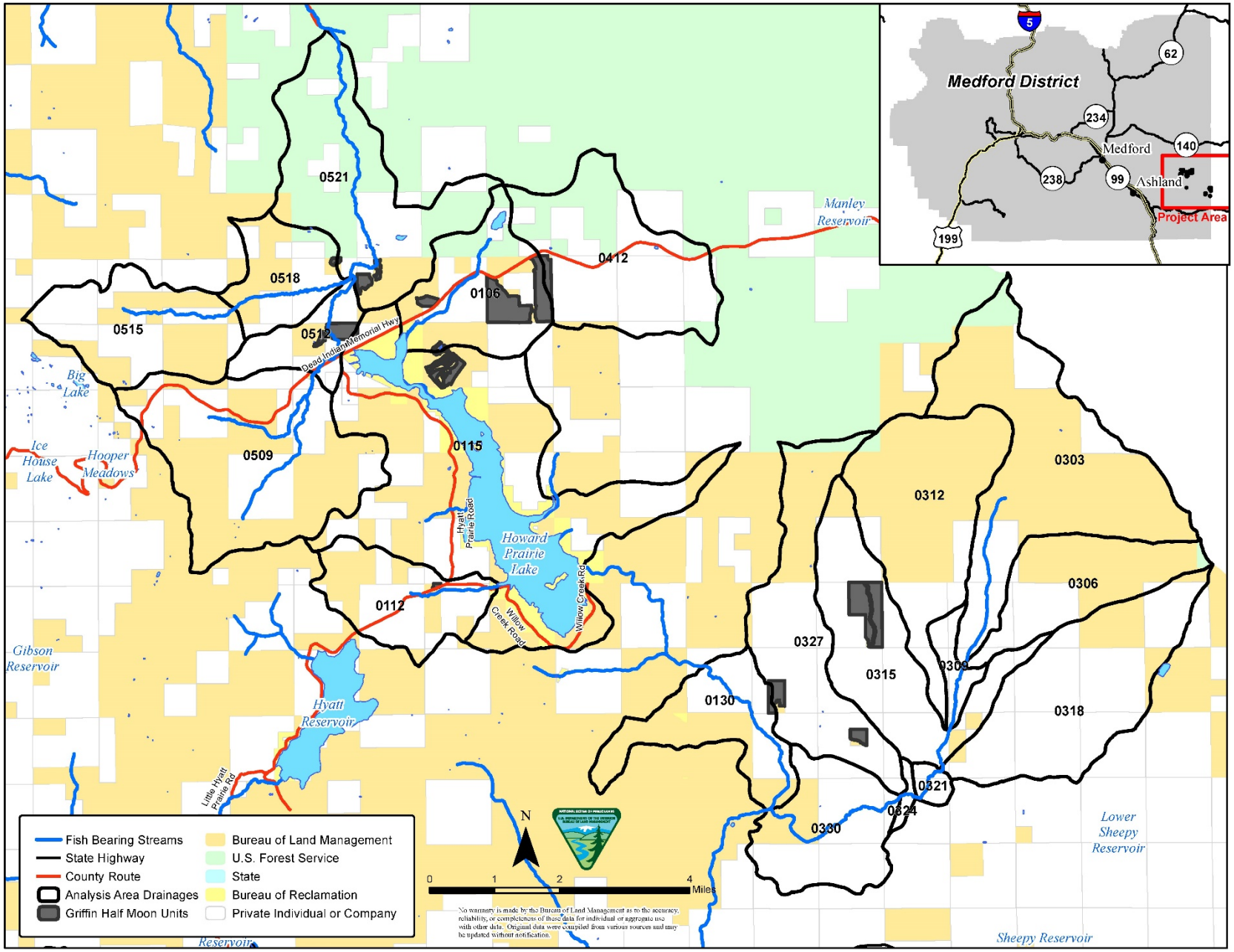


Table 3-2. Class Type, Acreage, and Ownership of HUC 7 Drainages within the Analysis Area.

HUC 6 (Subwatershed)	HUC 7 (drainage)	2016 ROD/RMP Class Type	Acres	BLM (percent)	Private/Other (percent)
Beaver Dam Creek	0412		3,575	3	97
Middle South Fork Little Butte	0509	2	5,025	58	42
	0512		1,032	24	76
	0515		2,616	46	54
	0518		1,463	41	59
	0521		4,050	13	87
Upper Jenny Creek	0106	3	2,435	40	60
	0112		1,968	36	64
	0115		9,170	43	57
	0130		2,085	54	46
Johnson Creek	0303	3	5,466	72	28
	0306		2,215	63	37
	0309		426	0	100
	0312		3,838	74	26
	0315		3,219	15	85
	0318		3,968	16	84
	0321		203	0	100
	0324		120	0	100
	0327		3,317	31	69
	0330		2,284	19	81
Total			***58,476***	***39 (average)***	***61 (average)***

The Analysis Area is within Jackson County and includes a mix of public and private land (Map 3-2 and Table 3-2). BLM-managed lands make up a minority (39 percent) of the Analysis Area. The BLM parcels are scattered throughout the Analysis Area, most of which is a plateau that defines the boundary between the Rogue and Klamath basins in the southern Cascade Range. Private lands within the Analysis Area are generally used for ranching, commercial timber harvest, and recreational residences. Public lands are almost entirely managed by the BLM and are primarily used for timber harvest, grazing, and summer and winter recreation.

The affected drainages either flow into the headwaters of the South Fork Little Butte Creek (via Conde, Upper Dead Indian, or Beaver Dam Creek), Howard Prairie Reservoir (Upper Jenny Creek), and Johnson Creek. Throughout much of the year, Conde Creek, portions of Upper Dead Indian Creek, and Beaver Dam Creek flow to Howard Prairie Reservoir, diverting water from the Rogue River Basin to the Klamath River Basin. All the water draining the Upper Jenny Creek HUC 7 drainages in the Analysis Area is impounded in Howard Prairie Reservoir. A portion of this water is diverted to Keene Creek Reservoir, ultimately resulting in a transfer from the Klamath Basin to the Rogue Basin. Elevations range between approximately 2,600 feet to 6,000 feet at Brush Mountain. The headwater areas of these drainages range from moderately steep to gentle and are largely forested with numerous meadow complexes.

The TSZ occupies 87 percent of the Beaver Dam Creek drainage (the only drainage from this subwatershed used in this analysis), 66 percent of the Middle South Fork Little Butte Subwatershed, four percent of the Upper Jenny Creek Subwatershed, and 19 percent of the Johnson Creek Subwatershed. In total, the TSZ occupies 31 percent of the Analysis Area (Table 3-3).

The transient snow zone occupies more than 25 percent in 11 of the 20 drainages associated with the proposed project (Table 3-3). In addition, the peak flow risk assessment method uses the percent of rain-on-snow area that currently has less than 30 percent canopy cover. LiDAR data collected in 2015 was used to estimate the area with less than 30 percent canopy cover in the TSZ (Table 3-3). For the purposes of this exercise, areas with 30 percent canopy cover or greater are considered hydrologically recovered (averaged over larger areas). Using the LiDAR tree heights returns, only trees taller than five meters (16.5 ft.) can contribute to the measure of canopy cover.

Table 3-3. Percent of Transient Snow Zone (TSZ) with Less than 30 Percent Canopy Cover.

Subwatershed	HUC 7 (drainage)	Percent Forested Area Less Than 30% CC[1]	Percent of Analysis Area within TSZ[2]	Percent Forested Area Less Than 30% CC within TSZ[1,2]
Beaver Dam Creek	0412	32	87	33
Total		*32*	*87*	*33*
Middle South Fork Little Butte	0509	30	43	26
	0512	38	93	39
	0515	37	44	30
	0518	27	100	27
	0521	16	89	17
Total		*27*	*66*	*24*
Upper Jenny Creek	0106	27	0	0
	0112	44	0	0
	0115	27	0	0
	0130	19	24	14
Total		*28*	*4*	*14*
Johnson Creek	0303	30	<1	85
	0306	35	<1	74
	0309	91	52	90
	0312	30	4	87
	0315	73	39	81
	0318	71	24	77
	0321	91	100	91
	0324	60	98	60
	0327	56	22	81
	0330	62	52	46
Total		*50*	*19*	*72*
All		*38*	*31*	*39*

[1]Includes existing disturbance features such as roads and landings.
[2]Bold values in both columns represent drainages at risk for altered timing and increased potential for peak flows.

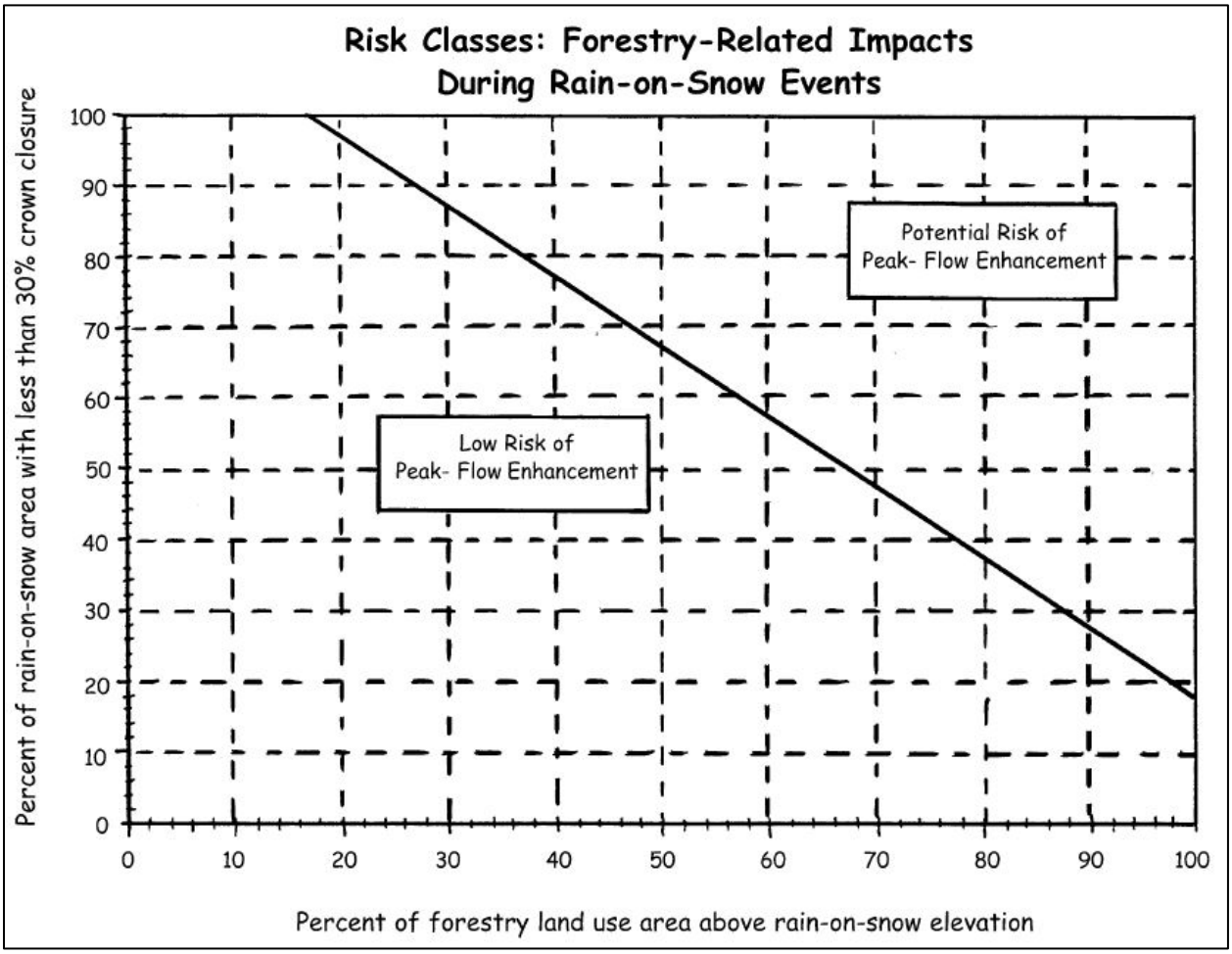
The risk of peak-flow enhancement is estimated from the OWAM (WPN 1999) risk assessment graph (Figure 3-1) which uses the percent of the Analysis Area that is within the TSZ and the percent of the TSZ with less than 30 percent canopy cover (Table 3-3).

Table 3-3 and Figure 3-1 were used to determine the percent of rain-on-snow zone with less than 30 percent crown closure that represents the boundary between the two risk classes for each Analysis Area that has more than 25 percent in the rain-on-snow zone (Table 3-3). Thirteen of the 20 drainages in the Analysis Area have higher percentages of reduced canopy cover. When combined with values exceeding 25 percent within the TSZ (bold highlight), eight drainages (0412, 0512, 0515, 0309, 0315, 0321, 0324, and 0330) reflect values that may indicate altered timing and increased potential for peak flows.

On the subwatershed scale in the Analysis Area, the Beaver Dam Creek Subwatershed has the highest percentage of TSZ acreage and with 33 percent of the forested area in the TSZ having 30 percent or less canopy cover, the subwatershed exceeds the threshold for an increased risk of peak flow enhancement. (However, there is only one drainage area from this subwatershed in the Analysis Area, so the summary for this subwatershed is actually at the drainage area scale.) The Middle South Fork Little Butte Subwatershed has 24 percent of the forested area in the TSZ having 30 percent or less canopy cover and the subwatershed is approaching the threshold for an increased risk of peak flow enhancement. The Johnson Creek Subwatershed has a high percentage of forested area with less than 30 percent canopy cover within the TSZ, but the subwatershed has a relatively small percentage of TSZ acreage (most of the subwatershed is in the snow zone) and thus has a lower risk of peak flow enhancement than the Middle South Fork Little Butte Creek Subwatershed. Within the Analysis Area, the Upper Jenny Creek Subwatershed has the least risk of peak flow enhancement since it is almost entirely within the snow zone.

It should be noted that recent research indicates that effects from peak flows, although of concern, should be confined to a relatively discrete portion of the network where channel gradients are less than approximately 2.0 percent and streambeds are composed of gravel and finer material. In the Griffin Half Moon Analysis Area most, if not all, of the streams channels are less than two percent gradient, and thus potentially more vulnerable to increased peak flows. Data supports the interpretation that if peak flow increases do occur, they can only be detected in flows of moderate frequency and magnitude. Beyond that, they are likely not detectable (Grant et al. 2008). Also, peak flows are only detectable in smaller storm events with return periods of six years or less, where channel forming processes are minor in effect.

Figure 3-1. Graph for Estimation of the Risk of Peak-Flow Enhancement from Forestry-Related Impacts during Rain-on-Snow Events (WPN 1999, p. IV-11). Values that fall below the diagonal line represent a low risk of peak-flow enhancement, while values above the diagonal line indicate a potential risk of peak-flow enhancement. The diagonal line roughly represents peak-flow increases of 8 to 10 percent, which represents the lower boundary of detectability.



3.3.5 Environmental Consequences

As no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management, natural processes, and other land uses and events. Discussion for Alternatives 2, 3, and 4 reflect the direct and indirect impacts of the proposed activities. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to past, present, and reasonably foreseeable actions. Short-term effects are defined as those lasting ten years or less and long-term effects last greater than ten years.

As part of the assessment of cumulative effects, a discussion of reasonably foreseeable future activities is included in this section. See Section 3.1.2, *Consideration of Past, Ongoing, and Reasonably Foreseeable Actions in Effects Analysis* for an overview of land management activities occurring or that are reasonably foreseeable within or directly adjacent to the Griffin Half Moon Project Area or associated Analysis Areas.

3.3.5.1 Alternative 1 – No Action

Direct and Indirect Effects

No actions are proposed under Alternative 1 (No Action); therefore, direct and indirect effects of choosing this alternative would be that the current conditions in the Analysis Area, which are the result of past actions not related to the Griffin Half Moon Project, would persist. Alternative 1 describes the anticipated effects of not implementing an action at this time.

Under Alternative 1, there would be no changes in percent of BLM-administered forest lands with canopy cover less than the historic level and areas of compacted soil. Therefore, there would be no change to the potential of increasing the magnitude and frequency of peak flows from BLM-administered lands.

Future harvest on private timber lands would likely occur within the Analysis Area and it is assumed that it will continue at a similar rate as has occurred in the past, some of which may be harvested within the next ten years. The actual timing of any timber harvest on private land is dependent on many factors, including valuations based on supply/demand, ownership, etc. It is assumed that canopy cover would be zero percent after the reasonably foreseeable future timber harvest on private lands. Private lands are governed under state forestry regulations, and as such receive a different level of protection than federal lands. Analysis of effects from private timber harvest generally considers the worst case scenario (i.e., all suitable forested lands would be logged at about 60 year tree-growing rotations) with clearcut harvest and road building as the predominate effects. As derived from air photo interpretation for recent BLM projects, approximately 1,977 acres of private timberland within the Analysis Area is predominantly 60 years old or older and may be available for harvest in the Middle South Fork Little Butte and Upper Jenny Creek Subwatersheds of the Analysis Area. The drainages with the highest percentage of those acres are 0515, 0521, 0112, and 0115; containing 488 acres (19 percent of drainage), 639 acres (16 percent of drainage), 431 acres (22 percent of drainage) and 407 acres (4 percent of drainage), respectively. There are no stands of timber in the Johnson Creek or Beaver Dam Creek subwatersheds identified in this analysis with stands over 60 years, and therefore, no foreseeable timber harvest on private land in these two subwatersheds.

The North Landscape EA from the Klamath Fall Field Office, Lakeview District BLM, is nearing completion. This project proposes implementation over the next ten years. Some of North Landscape proposed harvest areas are within some of the same drainages as the Griffin Half Moon Project: 0306 (227 acres); 0315 (90 acres); and 0318 (565 acres). Specific prescriptions for this project within these drainages have not yet been finalized, making it difficult to determine potential cumulative effects from this project to peak flows. However, the majority of the acres are in the HLB-UTA LUA and are proposed (in the scoping notice for this project) for uneven-aged silvicultural treatments with some thinning (less than 20 inches DBH), some no treatment areas, and a small amount of aspen restoration.

Cumulative Effects

As there are no treatments proposed under Alternative 1, there would be no contribution to cumulative effects. Alternative 1 would not contribute to reducing existing canopy cover on BLM-administered land in the Analysis Area and would not contribute to any cumulative effect in conjunction with harvest on private lands in the Middle South Fork Little Butte Creek, Upper Jenny Creek, and Johnson Creek Subwatersheds.

Of the 1,977 private acres available for harvest, approximately 880 acres are in the TSZ, all of which are in the Middle South Fork Little Butte Creek Subwatershed. All available private acres 60 years or older in the Upper Jenny Creek Subwatershed are above the TSZ (in the snow zone); their harvest, therefore, would have little to no effect on peak flows. At the drainage scale, private timber harvest would cause increases in three drainages (0521, 0106, and 0115) where values currently below the threshold of 30 percent would be exceeded**,** though the increases in 0106 and 0115 would have little to no effect because the harvest is all above the TSZ. There could be potential negative effects to aquatic habitat in drainage 0521, assuming all private land is clear cut within the next decade. At the subwatershed scale both the Middle South Fork Little Butte Creek Subwatershed and Upper Jenny Creek Subwatershed have an increased potential for increased peak flows. However, Middle South Fork Little Butte Creek Subwatershed has a higher risk of cumulative effects and increased peak flows than Upper Jenny Creek Subwatershed because the harvest in Middle South Fork Little Butte Creek Subwatershed is within the TSZ (even though the increase in subwatershed total percentage is less in Middle South Fork Little Butte Creek than Upper Jenny Creek).

3.3.5.2 Alternative 2 – Proposed Action

Direct and Indirect Effects

The activities proposed in Alternative 2 that potentially affect peak flows through reductions in canopy cover include timber harvest, landing construction, and temporary road construction. Alternative 2 proposes 929 acres of Regeneration Harvest which would retain between 10-20 percent canopy cover and four acres of Selection Harvest which would retain 40-50 percent canopy cover. An estimated 21 new landings, up to one-half acre in size could be constructed within the harvest units. Two temporary roads would be constructed (0.39 miles); one is located within Unit 13-2 and the other crosses private land to access Unit 13-1.

Where fuel treatments occur, small diameter tree thinning and hand pile burning would retain a mix of hardwoods and conifers and would likely occur over a period of years, distributing activity over time. Proposed fuel treatments would not appreciably decrease canopy cover as only small diameter vegetation (that does not provide meaningful canopy cover) would be cut and piled.

Alternative 2 would not reduce canopy cover below critical threshold (raising the percent of forested area with less than 30 percent canopy cover) in the TSZ in any drainages that do not already exhibit elevated percentages (Table 3-4). The reductions to canopy cover that would occur in the project in the TSZ would occur in drainages 0412, 0512 and 0521.

Drainage 0412 and 0512 currently exceed the canopy cover threshold of 30 percent in the TSZ and Alternative 2 would increase the amount of exceedance beyond the threshold by an additional one percent in drainage 0412 and 10 percent in drainage 0512. By contrast, despite a reduction in canopy cover in 0521 (increases from 17 percent to 19 percent of forested area with less than 30 percent canopy cover in the TSZ), the drainage remains below the threshold for concern under Alternative 2. The largest potential for increased peak flows would be in drainage 0512, but would likely only be detectable as a result of smaller storm events with return periods of six years or less, where channel forming processes are minor in effect.

Proposed harvest units in drainage 0412 are on ridge tops, far from any stream channels; these units are not hydrologically connected, and therefore, would not contribute to peak flows. These small relative

increases to flood flows are unlikely to result in detectable changes to aquatic habitat. Any excess run-off that reached Deadwood Creek would be intercepted by a diversion canal that takes water from Beaver Dam Creek to Howard Prairie Reservoir, at which point any peak flow increases to natural stream channels and aquatic habitat would be negligible.

In drainage 0512, proposed harvest units would be adjacent to Dead Indian Creek upstream of a very large meadow complex. Aquatic habitat in this reach has already been compromised due to downcutting that occurred following the failure of a storage dam which formerly stored water for cattle. The resulting head cut has migrated upstream to a slope/gradient change where bedrock and boulders provide natural grade control. Any small increases in peak flows to this drainage would manifest themselves downslope/downstream of the degraded reach, in the large meadow complex. The meadow is very low gradient and includes multiple braided channels capable of dispersing small extra amounts of water, and functions as an inundated wetland during flood events. Therefore, it is highly unlikely that any detectable adverse changes to aquatic habitat would occur as a result of increased peak flows.

Canopy cover would also be reduced in drainage 0106 and 0315, though the harvest units are above the TSZ (in the snow zone); there is little evidence that timber harvest activities can elevate peak flows in the snow zone (Grant et al. 2008). Despite the potential for increased peak flows, flows are much more affected in both of the drainages by the numerous currently-existing diversions which transfer significant quantities of water outside of the watershed.

Table 3-4. Percent of drainages with less than 30 percent Canopy Cover: Current Conditions Compared to Alternative 2.

Analysis Area (HUC 7)	Percent Canopy Cover within Entire Analysis Area		Percent Canopy Cover within TSZ portion of the Analysis Area Only	
	Current Percent Canopy Cover Less Than 30%[1]	Percent Canopy Cover Less Than 30%[2] with BLM harvest under Alt 2	Current Percent Forested Area Less Than 30% CC within TSZ [1]	Percent Forested Area Less Than 30% CC within TSZ[2] with BLM harvest under Alt 2
0412*	32	34	33	34
Beaver Dam Creek Total	32	34	33	34
0509	30	30	26	26
0512*	38	47	39	49
0515	37	37	30	30
0518	27	27	27	27
0521	16	18	17	19
Middle South Fork Little Butte Total	27	28	24	26
0106*	27	43	0	0
0112	44	45	0	0
0115	27	28	0	0
0130	19	20	14	14
Upper Jenny Creek Total	28	32	14	14
0303	30	30	85	85
0306	35	35	74	74
0309	91	91	90	90
0312	30	30	87	87
0315*	73	81	81	81
0318	71	71	77	77
0321	91	91	91	91
0324	60	60	60	60
0327	56	59	81	81
0330	62	62	46	46
Johnson Creek Total	50	52	72	72
Aggregate Total	38	40	39	40

[1] Includes all ownerships and existing disturbances such as roads and landings

[2] Includes all ownerships and existing disturbances such as roads and landings as well as proposed new landings

* Bold indicates drainages that may be at elevated risk after harvest, excluding drainages already exceeding prior to harvest.

Cumulative Effects

Drainages that may be at an elevated risk of experiencing adverse cumulative effects typically have large percentages of canopy cover less than 30 percent. Drainages with large percentages of private land with forested stands greater than 60 years old were also included in this analysis. Although unlikely, if all those acres were reduced below 30 percent canopy cover within ten years, some drainages would be at levels where potential cumulative impacts may be magnified. This alternative slightly elevates the potential for cumulative effects beyond those that may be currently occurring at the drainage scale.

Although there are both natural and human induced risk factors for cumulative effects, this alternative has the potential to slightly increase the effect of increased peak flow within the Analysis Area drainage 0521 when added to the potential effects associated with harvest on private lands (Table 3-5). This effect is much less at the subwatershed scale, the scale at which peak flows are addressed in the PRMP/FEIS (USDI BLM 2016a, p. 386).

Should all private lands be clearcut in the next decade in drainage 0521, there could potentially be impacts to aquatic habitat resulting from peak flow increases, as the amount of non-hydrologically recovered ground could potentially double within this drainage, resulting in exceeding the threshold for potential peak flow increases. As indicated, the magnitude of impacts are anticipated to be relatively light, as measurable changes to peak flows are only expected during relatively small events (six year return interval or less). Drainage 0521 includes the mainstem channel of Dead Indian Creek which is a very low gradient stream adjacent to proposed harvest units. This low gradient reach continues for approximately 0.5 miles downstream/downslope, at which point Dead Indian Creek exits the plateau through a steep and rocky canyon. Any channel adjustments that would potentially occur resulting from increased peak flows would be limited to the upper 0.5 mile low gradient reach, as the downstream canyon reach is well armored by rock and the channel would be resilient to small increases at low-end peak flow events. Channel adjustments in the low gradient reaches could potentially include channel widening or downcutting as the stream adjusted to increased flow volumes. However, this is unlikely to occur, because as indicated above, the absolute magnitude of flow increases are anticipated to be slight and only detectable during small events. Channel adjustments are unlikely to be observed during these small flood events. This drainage would be at the same risk regardless of any BLM actions, as the great majority (16 percent) of potential future non-hydrologically recovered ground is on private lands as compared to the relatively small amount (two percent) on BLM-administered lands.

Table 3-5. Canopy Cover Comparisons with BLM harvest in Alternative 2 and with Reasonably Foreseeable Future Timber Harvest on Private Forest Lands.

Analysis Area	Alt. 2 + Reasonably Foreseeable Future Harvest on Private Forest Lands		
	Current Percent Canopy Cover Less Than 30%[1]	Percent Canopy Cover Less Than 30%[1] with BLM harvest under Alt 2	Percent Canopy Cover Following Harvest under Alt. 2 and Private Harvest[2]
0412	32	34	34
Beaver Dam Creek Total	32	34	34
0509	30	30	30
0512	38	47	47
0515	37	37	57
0518	27	27	27
0521	16	18	34
Middle South Fork Little Butte Total	27	28	37
0106	27	43	44
0112	44	45	67
0115	27	28	34
0130	19	20	20
Upper Jenny Creek Total	28	32	38
0303	30	30	30
0306	35	35	35
0309	91	91	91
0312	30	30	30
0315	73	81	81
0318	71	71	71
0321	91	91	91
0324	60	60	60
0327	56	59	59
0330	62	62	62
Johnson Creek Total	50	52	52
total	38	40	44

[1] Includes all ownerships.

[2] Assuming all private forestland greater than 60 years is harvested close to the same time.

[3] Bold indicates drainages that may be at elevated risk after private harvest and BLM harvest under Alternative 2, excluding drainages already exceeding 30 percent

3.3.5.3 Alternative 3

Direct and Indirect Effects

The treatments proposed in Alternative 3 would not cause significant effects to water quantity (peak flows). Under this alternative, all harvest units would retain 30 percent canopy cover or more, reducing the potential for increased peak flows at both the drainage area scale and subwatershed scale of analysis.

Under this alternative, the new landings (all of which are in units) and temporary road construction would be the only reductions in canopy cover below 30 percent. As in Alternative 2, this alternative would reduce canopy cover below 30 percent on 11 acres across the Analysis Area associated with the landing and temporary road construction. These 11 acres constitute an extremely small percentage of the Analysis Area and would not result in potential to alter the timing and magnitude of peak flows in the Analysis Area under this alternative.

Because treatments in this alternative would not reduce canopy cover to below 30 percent and because of the relatively small amount of landings and temporary roads, the potential risk to increased peak flows would be nearly identical to those described in Section 3.3.4, *Affected Environment* (i.e., the baseline conditions).

Cumulative Effects

Alternative 3 would not contribute to reducing existing canopy cover on BLM-administered land in the Analysis Area, and therefore, would not contribute to cumulative effects of harvest on private lands in the Middle South Fork Little Butte Creek, Upper Jenny Creek, and Johnson Creek Subwatersheds. The cumulative effects of implementing Alternative 3 on peak flows would be the same as the cumulative effects for Alternative 1 – No Action (see Section 3.3.5.1, *Alternative 1 – No Action*).

3.3.5.4 Alternative 4

Direct and Indirect Effects

Under this alternative, treatments would not cause significant effects to water quantity (peak flows).

As in Alternative 3, all harvest units under Alternative 4 would retain 30 percent canopy cover or more (35-50 percent on average). This reduces the potential for harvest on BLM-administered lands to increase peak flows at both the drainage area scale and subwatershed scale of analysis. As in Alternative 3, new landings and temporary road construction would not result in potential to alter the timing and magnitude of peak flows in the Analysis Area for this alternative.

Because treatments in this alternative would not reduce canopy cover to below 30 percent and because of the relatively small amount of landings and temporary roads, the potential risk to increased peak flows would be nearly identical to those described in Section 3.3.4, *Affected Environment* (i.e., the baseline conditions).

Cumulative Effects

Since there would be no harvest in Riparian Reserves, there are no anticipated effects of implementing Alternative 4 on stream temperatures and therefore no contribution to cumulative effects. In the short term, there could be increases in sediment and turbidity from haul and associated road maintenance under Alternative 4. These minor effects could combine with other existing sources of sediment such as grazing, road use, private timber harvest, and timber haul from private lands.

Alternative 4 would not contribute to reducing existing canopy cover on BLM-administered land in the Analysis Area, and thereby would not contribute to cumulative effects of harvest on private lands in the Middle South Fork Little Butte Creek, Upper Jenny Creek, and Johnson Creek Subwatersheds. The cumulative effects of implementing Alternative 4 on peaks flows would be the same as the cumulative effects for Alternative 1 – No Action (see Section 3.3.5.1, *Alternative 1 – No Action*).

3.3.6 Summary of Effects on Water Quantity (Peak Flows)

The reduction in canopy cover from proposed timber harvest and openings created from temporary roads and landings could potentially affect peak flows under Alternative 2. At the drainage scale, Alternative 2 raises the percent of acreage in the TSZ with less than 30 percent canopy cover in drainages 0412 and 0512. These two drainages are already above the threshold in the existing condition; the potential for increased peak flows in these drainages would likely only be detectable in their lower reaches as a result of smaller storm events with return periods of six years or less. Effects are not anticipated to result in measurable changes to aquatic habitat in these drainages. There are potential cumulative impacts that could result in negative effects to aquatic habitat in drainage 0521, assuming all private land is clearcut within the next decade. However, these effects may potentially occur irrespective of any BLM actions. Under Alternative 3 and 4, there would be no reduction in canopy cover below 30 percent and thus no effect to peak flows or aquatic habitat following harvest or thinning activities in either alternative.

3.4 NORTHERN SPOTTED OWL HABITAT

Issue 3: How would the proposed timber harvest, pre-commercial thinning, fuels treatments, and associated transportation management activities affect constituent elements (canopy cover, snags and down wood, large trees, mistletoe brooms, stand structure, and prey availability) within stands used by northern spotted owls for nesting, roosting, and foraging?

3.4.1 Introduction

This section analyzes the potential impacts from the proposed timber harvest, fuels reduction, pre-commercial thinning, and new route and landing construction on northern spotted owl (NSO) habitat. Projects that would not have the potential to affect the function of NSO habitat were not analyzed in further detail, such as road renovation, road improvements, and long-term road closures.

3.4.2 Methodology

The Analysis Area for evaluating impacts to NSOs includes all areas of NSO habitat on federal lands (BLM) within the home range circles (1.2 miles) for the three known owl sites affected by, or in the

vicinity of, the proposed activities; and includes all areas of NSO habitat on federal lands within the provincial home range radius (1.2 miles) of proposed treatment units.

The 2016 PRMP/FEIS analyzed for NSO habitat connectivity at the landscape level (western Oregon) and found that over the next 50 years the Proposed RMP "would contribute to a landscape that supports large blocks of nesting, roosting, and foraging habitat" (USDI BLM 2016a, p. 938) in accordance with NSO conservation needs. The Griffin Half Moon EA tiers to and incorporates that analysis by reference and therefore does not analyze effects of this project at the landscape level.

The process for conducting biological evaluations and assessments includes a review of existing records, field reconnaissance, field surveys, and analysis of potential impacts. The BLM Ashland Field Office wildlife biologist conducted a review of potential wildlife habitat using field assessments, maps, aerial photographs, LiDAR, GIS software, wildlife survey data, and stand exam records for the Analysis Area.

The BLM wildlife biologist classified NSO habitat in the Analysis Area by habitat type using Forest Operations Inventory (FOI), TPCC, and on-site habitat analysis. The FOI gives a detailed description of age classes on BLM-administered lands based on field data as well as aerial photo inventories. The combined data allows the vegetation to be grouped into the early, mid-, and late seral age classes for comparison purposes, although these data sources have differing degrees of detail and resolution. The TPCC refers to the suitability of the soil to produce timber.

RA 32 Habitat Evaluation Methodology 1.3 was used to determine the presence or absence of high quality, structurally-complex NSO nesting habitat in all project units under consideration in this analysis.

The BLM is conducting NSO surveys around proposed project units and historic NSO sites which have proposed project units within their provincial home ranges following the 2011 Protocol for Surveying Proposed Management Activities that May Impact Northern Spotted Owls (USDI USFWS 2012). The first year of survey took place in 2017 and the second year of survey was completed in 2018.

Privately owned lands are not included in the analysis because habitat classification data is generally unavailable for these lands and a large proportion of privately owned lands are managed on a timber harvest rotation schedule that precludes the development of late-successional forest habitat.

Conservation measures for the Griffin Half Moon Vegetation Management Project include:

- Incorporation of Riparian Reserve buffers, which provide habitat for terrestrial wildlife species associated with late-successional forest habitat (USDI BLM 2016b, p. 77);
- Project design that incorporates historic owl survey data; and
- None of the proposed treatments would occur within a NSO nest patch or 0.5 mile core area.

3.4.3 Assumptions

- Snags which do not need to be felled for safety reasons would be retained within the harvest units to the extent possible.

- No project-related vegetation management activities would occur within the 100-acre NSO activity centers or 0.5-mile core area of known NSO nest sites.

- During treatment, coarse wood already on the ground would be retained and protected from disturbance to the greatest extent possible.

- NSO habitat is specifically rated for suitability for NSOs, while late-successional habitat not rated as suitable NSO habitat may provide habitat for other species.

3.4.4 Affected Environment

The NSO, listed as threatened under the Endangered Species Act, is associated with the existing habitats found within the Analysis Area. NSOs prefer coniferous forest with multiple vertical layers of vegetation; a variety of tree species and age classes; and the presence of large logs and large diameter live and dead trees (snags) for nesting/roosting/foraging (NRF) habitat. They may also be found in younger stands with multi-layered, closed canopies, large diameter trees, and abundance of dead and down woody material. 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 four components: nesting, roosting, foraging, and dispersal (Thomas et al. 1990) (Table 3-6).

The present-day composition and distribution of vegetation in the NSO Analysis Area is influenced by site characteristics (soil types, aspect, and topography), natural disturbance (wildfires, insects, disease, etc.), rural residential development, agricultural activities, timber harvest, fuels reduction projects, fire suppression, and road building. Common forest types include Douglas-fir, ponderosa pine, white fir, and mixed-conifer forest series.

Fire suppression, road building, and timber harvest throughout the Analysis Area have resulted in habitat modification and fragmentation and have changed the distribution and abundance of wildlife species surrounding the NSO Analysis Area. Timber harvest has occurred on BLM-administered lands in the Analysis Area for decades. The associated habitat modification has negatively affected late-successional forest habitat-dependent species by reducing stand seral stage and changing habitat structure. However, species associated with younger forested conditions have benefited from these changes due to the increased availability of young stands within the watershed.

Table 3-6. Medford District NSO Habitat Types.

Habitat Type	Description
High-quality habitat (RA 32) Subset of Nesting habitat	Older, multilayered, structurally-complex forests characterized as having overstory trees greater than 17 to 21 inches in diameter (depending on annual precipitation), high canopy cover (greater than 60 percent), large trees present (at least 30 inches DBH), and quantifiable decadence components such as broken-topped live trees, mistletoe, cavities, large snags, and fallen trees. RA 32 habitat may vary due to climatic gradients across the range. This habitat type does not occur in the Project Area.
Nesting/Roosting/Foraging (NRF)	These forests have a high canopy cover (greater than 60 percent), a multi-layered structure, and large overstory trees greater than 21 inches DBH. Deformed, diseased, and broken-top trees, as well as large snags and down logs, are also present. NRF habitat meets all NSO life cycle requirements.
Roosting/Foraging (RF)	Canopy cover greater than 60 percent and canopy structure generally single-layered. Overstory trees are generally greater than 16 inches in diameter. Snags and down wood not considered a requirement.
Dispersal	This habitat is not suitable for nesting, but provides requirements believed important for NSO dispersal. Canopy cover is generally between 40 and 60 percent. In stands with greater than 60 percent canopy cover, overstory tree diameters are generally between 11 and 16 inches DBH. Deformed trees, snags, and down wood are absent or less prevalent than in Type 1 habitat.
Capable	Does not presently meet NSO needs but has the potential to grow into NRF or dispersal habitats.
Non-habitat	Does not have the potential to develop into late-successional forest or supporting old-growth dependent species.

Private lands within Analysis Area are made up of early, mid-, and late-seral forests, agricultural fields, and barren land. Most private forest lands are managed as tree farms for production of wood fiber on forest rotations. It is expected that any remaining late-seral forests on private timber lands would be converted to early-seral forest over the next one or two decades. Private industrial forest lands are managed for timber production and would typically be harvested between 40 and 60 years of age, in accordance with State Forest Practices Act standards. The BLM anticipates some loss of NSO habitat on private lands, but cannot predict the rate of loss, or the specific location of harvest.

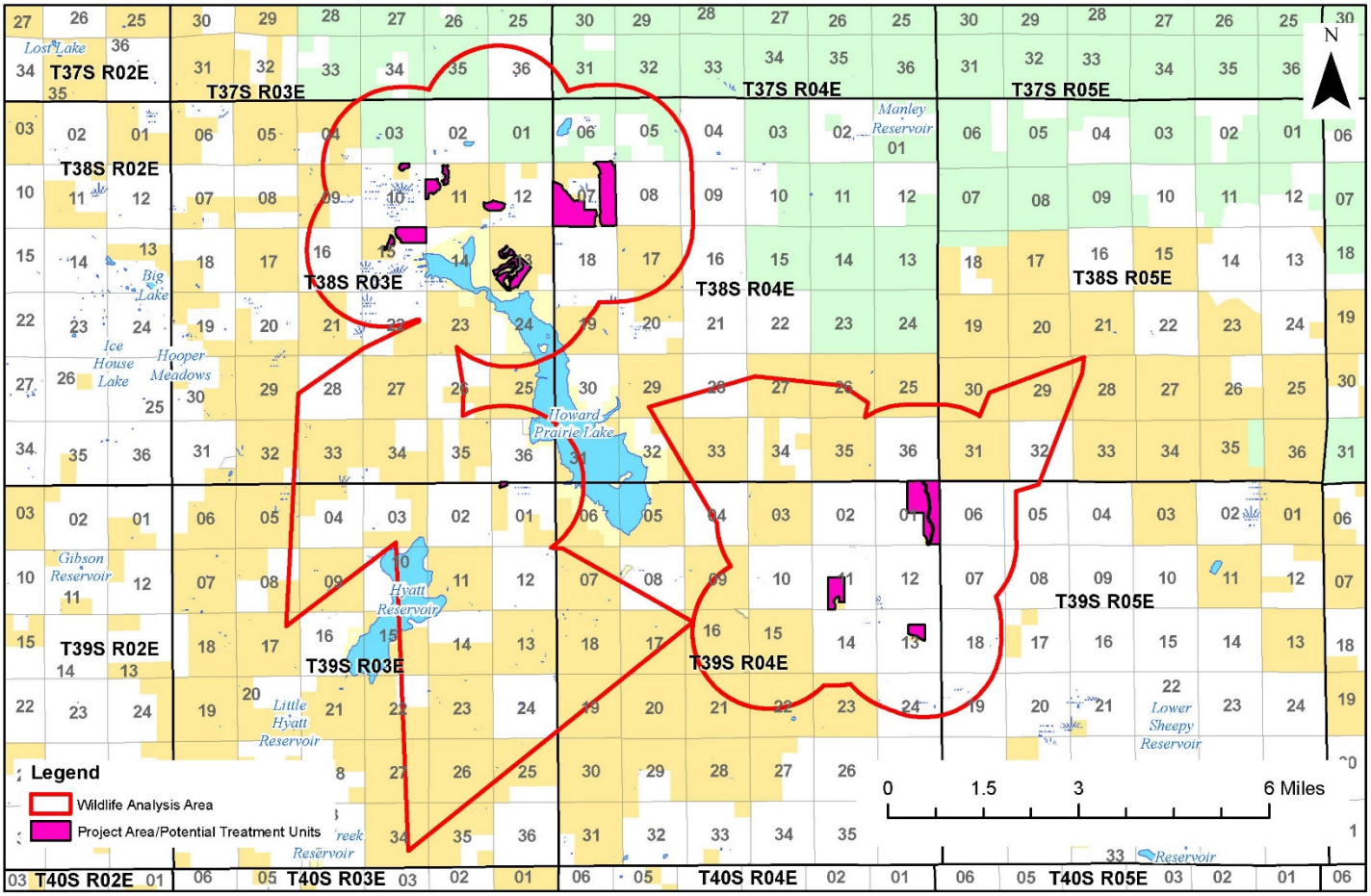
NRF habitat in southwest Oregon is typified by mixed-conifer habitats with recurrent fire history, patchy habitat components, and higher incidences of woodrats. A review of current habitat ratings of 25,105 acres of federal lands (BLM, BOR, USFS) within the NSO Analysis Area indicates that 40 percent (10,166 acres) of federal lands provide NRF habitat; 14 percent (3,591 acres) provide dispersal-only habitat; 11 percent (2,804 acres) provide capable habitat; and 34 percent (8,544 acres) is non-habitat. NRF and roosting/foraging habitat also functions as dispersal habitat.

The Griffin Half Moon Vegetation Management Project proposes to treat up to 410 acres of nesting, roosting, and foraging (NRF) habitat, 508 acres of dispersal habitat, 10 acres of capable habitat, and one

acres of NSO non-habitat. The amount of acres treated would be the same for each action alternative. No actions are proposed in the nest patches or home ranges of historic NSO sites.

The NSO Analysis Area encompasses an aggregate of the following polygons: proposed treatment units buffered by 1.2 miles (provincial home range of the NSO in the Oregon West Cascades Physiographic Province – where the project is located), provincial home range circles of three documented NSO sites in which proposed treatment units occur, and convex polygons generated from radio telemetry locations of male and female fisher known to occur in this area as fisher use similar habitat to NSOs (Map 3-3). The NSO Analysis Area encompasses approximately 46,652 acres (73 square miles). The BLM-administered lands comprise 45 percent of this area. Total acres of federal ownership including BLM, Bureau of Reclamation (BOR), and USFS is approximately 25,105 acres or 54 percent.

Map 3-3. NSO Analysis Area.



3.4.5 Environmental Consequences

Impacts to NSOs from the proposed actions are best measured by the predicted potential changes in stand structure within different NSO habitat types that would result from the activities proposed under each alternative. Quantifying the predicted changes in NSO habitat is the best method to evaluate the potential effects to this species because they reflect the resulting functionality of the residual stand after treatment. Impacts to NSO habitat may be caused by timber harvest, LSR treatments, fuels reduction treatments, and temporary road construction. Indirectly, NSOs may be impacted by alteration of prey

species composition and abundance which is affected by these same habitat modifying actions. Noise disturbance from mechanized activities is a more transitory, but still a potential impact associated with many of these same activities.

3.4.5.1 Alternative 1 – No Action

Direct and Indirect Effects

Under the No Action Alternative, no vegetation management would be implemented and there would be no direct or indirect effects to NSOs on BLM-administered lands. Habitat conditions would remain generally unchanged at the unit scale in the short-term unless a major disturbance such as a wildfire, wind event, ice storm, insect infestation, or disease-induced mortality occurred.

Cumulative Effects

Private lands surrounding the NSO Analysis Area are made up of early, mid-, and late- seral forests, agricultural fields, and barren land. Most private forest lands are managed as tree farms for production of wood fiber on relatively short forest rotations. It is expected that any remaining late-seral forests on private timber lands would be converted to early seral forest over the next one or two decades.

3.4.5.2 Common to All Action Alternatives

Direct and Indirect Effects

Northern Spotted Owl Habitat

The action alternatives (Alternatives 2, 3, and 4) may affect NSOs to some degree and therefore, require consultation with the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act (ESA). Consultation with the USFWS is underway for the activities proposed under this EA. A Biological Opinion will be received from USFWS prior to implementation of any of the proposed actions. Modifications required by the USFWS in their Biological Opinion would take place prior to implementation.

When discussing changes to NSO habitat, the following definitions are used to describe the anticipated effects of the activities associated with the proposed action to the NSO habitat types within the NSO Analysis Area. Canopy closure is used as one of the critical habitat thresholds because it is highly important to NSO nest site selection and general habitat use, because increased levels of canopy afford protection from predators, and regulate temperature extremes (Courtney et al. 2004). The proposed treatments can be assigned into the following general effect types:

A **Treat and Maintain** of NRF or dispersal habitat means an action or activity would occur within NRF or dispersal habitat but would not change the habitat classification post-treatment (Table 3-7). The NRF stand would retain an average of 60 percent canopy cover post-treatment, large trees, multi-storied canopy, standing and down dead wood, diverse understory adequate to support prey, and may have some mistletoe or other decay. Dispersal habitat would continue to provide at least 40 percent canopy, flying space, and trees 11 inches DBH or greater, on average. The post-treatment habitat classification of the stand would be the same as the pre-treatment habitat classification. Four acres of dispersal-only Treat and Maintain within the LSR would occur under all action alternatives.

Treatments that **Remove NRF** or **Remove Dispersal** alter known NSO NRF habitat so that the habitat no longer functions as nesting, roosting, foraging, or dispersal. Removal generally reduces the canopy cover to less than 40 percent, alters the structural diversity (such as mistletoe broom presence) and dead wood in the stand, or otherwise changes the stand so that it no longer supports NSOs for the nesting, roosting, foraging, or dispersal phases of their life cycle. It is anticipated that 410 acres of NRF Removal and 508 acres of dispersal Removal would occur under all action alternatives.

Table 3-7. Effects to NSO Habitat from Implementing Proposed Treatments under All Action Alternatives in the NSO Analysis Area.

Habitat Type	Pre-Project Acres	Treat and Maintain	Removal	Post-Project Acres	Percent Change
NRF	13,152	0	410	12,742	3.1
Dispersal-only	10,939	0	508	10,431	4.6
Dispersal-only LSR		4	0		No change

Alternatives 3 and 4 would be expected to maintain more canopy cover than Alternative 2; however, quantification of acres of NRF and dispersal treated and maintained under Alternatives 3 and 4 is not possible due to the varied distribution of forest habitat in the NSO Analysis Area. The outcome in terms of effects to NSO habitat would be similar under all alternatives.

When analyzing the impacts to NSOs from timber harvest, the amount, intensity, and duration of the harvest are not the only factors to consider. A critical factor to consider is the spatial distribution of the habitat found across the landscape and where the proposed treatments would occur in relation to known NSO nest sites. These areas of use are defined as follows:

- **Nest Patch** is the 300-meter (984-foot) radius area around a known or likely nest site; it is included in the core area (USDI USFWS et al. 2008).

- **Core Area** is a 0.5-mile radius circle (approximately 500 acres) from the nest or center of activity to delineate the area most heavily used by NSOs during the nesting season; it is included in the provincial home range circle. Core areas represent the areas which are defended by territorial NSOs and generally do not overlap the core areas of other NSO pairs (USDI USFWS et al. 2008).

- **Provincial Home Range** is defined by a circle located around an NSO activity center and represents the area NSOs are assumed to use for nesting and foraging in any given year. For the Oregon West Cascade Province the home range is a 1.2 mile radius circle (approximately 2,894 acres) (USDI USFWS et al. 2008). The home ranges of several NSO sites may overlap.

These three areas represent how NSOs utilize the forest environment around their nest sites, and the importance of the habitat located within each spatial scale to a given NSO pair. They also provide a better understanding of how habitat altering treatments may affect NSO life functions depending on where the treatment would occur in relation to known NSO nest sites. A more detailed description of the scientific rationale for the development of these three scales is provided in the *Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions* (USDI USFWS et al. 2008).

No treatments are proposed in the nest patch of any NSO sites. Research has shown that the habitat quality within 300 meters (984 feet) of a nest site (known as the nest patch) is critically important to determining nest site positioning across the landscape (Perkins 2000).

No treatments are proposed in the core area of any NSO sites. Research has shown that the core area is most heavily used by NSO during the nesting season (Anthony and Wagner 1998; Bingham and Noon 1997).

Portions of the proposed activities would take place within the Provincial Home Range of three historic NSO sites. Under all action alternatives, 30 acres of proposed treatments exist within these NSO home ranges: seven acres of NRF and 23 acres of dispersal would be treated and would be removed. Across the NSO Analysis Area, more than 97 percent of existing suitable (NRF) NSO habitat would remain untreated. Therefore, only minimal negative effects are anticipated as a result of the proposed treatments.

While Alternatives 2, 3, and 4 propose a variety of silvicultural prescriptions, the outcome in terms of effects to NSO would be similar.

Effects to Northern Spotted Owl Prey

Timber harvest and associated activity fuels reduction projects could impact foraging by changing habitat conditions for prey. Some disturbance of habitat (removal of some tree canopy cover) can improve forage conditions by stimulating new growth of forbs, shrubs, and other herbaceous sources of forage for prey species.

While some reports suggest negative impacts of thinning on flying squirrels (Holloway and Smith 2011; Wilson 2008), there exists counter information as to these effects (Gomez et al. 2005; Ransome et al. 2004; Waters and Zabel 1995). Flying squirrel densities are correlated with high tree cavity density, large amounts of hypogeous fungi, and crown-class differentiation (Carey 2000; Carey et al. 1999). Gomez et al. (2005) noted that commercial thinning in young stands of Coastal Oregon Douglas-fir (35-45 years in age) did not have a measurable short-term effect on density, survival, or body mass of northern flying squirrels. Similarly, Waters and Zabel (1995) compared squirrel densities and body mass in shelterwoods, old, and young stands in the northern Sierras and found no difference in body mass or recapture rates between young and old stands in northern, more mesic forest habitats. However, they did conclude that heavy logging site preparation (burning) in the shelterwoods negatively affected flying squirrels. Ritchie et al. (2009) found negative landscape effects on flying squirrels when harvesting stands resulted in open conditions.

Treatments proposed under all action alternatives would remove NSO habitat and may impact foraging by changing habitat for NSO prey species. Residual trees, snags, and down wood retained in the treated stands would provide cover for prey species and would help minimize harvest impacts to prey species, such as dusky-footed woodrats. Treatment implementation would be spread out temporally and spatially within the NSO Analysis Area, which would provide areas for NSO foraging during project implementation and reduce the impact of these short-term effects at the project level.

Edges created from harvest can be areas of good prey availability and potentially increased prey vulnerability (i.e., better hunting for NSOs) (Zabel et al. 1995). Prey animals may be more exposed in the disturbed area or could move away from the disturbed area for the short-term. Changes in prey

availability occur as cover is disturbed and prey species move around in the understory. As a result, they can become more exposed and vulnerable to predation. This disturbance could attract other predators such as hawks, owls, and mammalian predators. This may increase foraging competition for NSOs in the treatment area, but the reduced cover across all action alternatives for prey would be anticipated to improve prey availability for NSOs.

Bingham and Noon (1997) reported that NSO core areas (0.5 mile radius around a nest location) provide important habitat elements such as nest sites, roost sites, and access to prey, benefiting NSO survival and reproduction. Rosenberg and McKelvey (1999) reported that NSOs are "central place" animals with the core area being the focal area. Several studies (Anthony and Wagner 1998; Bingham and Noon 1997; Dugger et al. 2005; Zabel et al. 2003) indicate the core area size for the West Cascades province is 0.5 miles from the nest site (or 500 acres). Therefore, effects to prey species for each alternative would be assessed by the amount of habitat treated within the core area. Because no treatments are proposed within nest patches or core areas and due to the spatial distribution of the proposed treatments, sufficient prey habitat would remain within the core areas to continue to provide suitable foraging opportunities.

Additionally, implementation of PDFs (Section 2.4.5, *Terrestrial Wildlife* [PDFs]) would retain and/or place large down wood while also retaining snags in the treatment units which would provide cover for prey species and would help minimize harvest impacts to prey habitat. In general, snags would be retained post-harvest. However some snags may felled due to safety concerns, and some snags would be removed to achieve silvicultural prescription objectives.

Because there would be no treatment in nest patches or core areas, implementation of PDFs, and proposed treatments would be spatially and temporally distributed, there would be no adverse impact to NSO prey species with the implementation of any of the action alternatives.

Effects of Noise Disturbance to Northern Spotted Owls

Nesting NSOs are confined to an area close to the nest, but once the young fledge, they can move away from noise and activities that might cause them harm. Since all project activities would follow mandatory PDFs that restrict activities to outside of the critical breeding season (March 1st to June 30th) and beyond recommended disturbance distance thresholds (see Table 2-5), as established by the USFWS, no harm to nesting NSOs, or their young, is expected from project-related noise.

Effects of Fuels Reduction Treatments to Northern Spotted Owls

All action alternatives propose the treatment of slash created from harvest treatments. The fuels reduction treatments as proposed in Chapter 2 would not alter the overstory forest structure or remove additional key habitat components related to NSO habitat.

Large down woody debris, patches of unburned vegetation in draws and on cooler aspects, and some unburned slash piles would continue to provide ground cover habitat during and after proposed treatments. These untreated areas and residual habitat features, along with the spatial and temporal staggering of treatments across the landscape would ameliorate the potential negative effects (e.g., removal of cover; disruption of normal feeding, breeding, and sheltering activities) of these fuels treatments on prey species at the landscape level.

Effects of Road Construction to Northern Spotted Owls

Trombulak and Frissell (2000) conducted a literature review on the ecological effects of roads. These effects range from direct mortality to alteration of the chemical environment. The magnitude of these effects from implementing the proposed project is discussed in this analysis. Implementation of PDFs, including (but are not limited to) seasonal restrictions and the retention of large woody material, would limit some of the described negative effects.

There are a number of ways roads affect NSOs (in addition to habitat removal), including vehicular noise disturbance (which affects behavior patterns), and microclimatic changes to the habitat adjacent to roads.

Under all action alternatives, the BLM proposes to utilize and maintain (as needed) about 33.43 miles of existing roads. Road maintenance has the potential to impact wildlife species through noise and displacement, but would be of short duration and subject to seasonal restriction PDFs (Section 2.4, *Project Design Features*).

The two proposed temporary road segments (0.39 miles constructed under all action alternatives would be constructed in areas that are not NSO habitat, and therefore, would have little potential to affect NSOs.

The long-term closure of approximately 1.85 miles of road under all action alternatives would have a beneficial effect to NSOs because there would be less vehicular disturbance following road closures.

Effects of LSR Treatment to Northern Spotted Owls

The four acres of mapped LSR proposed for treatment under all action alternatives does not possess late-successional characteristics at present nor is it likely to develop these characteristics in the future. Tree species composition on site indicates that the four acres is best suited to growing pine species. By thinning out white fir and Douglas-fir that are present due to fire suppression over the past decades on these four acres, the vigor of the pines on site would be improved. This forest would continue to serve as NSO dispersal habitat post-treatment by retaining 40-50 percent canopy cover; therefore there would be no adverse impacts to NSO.

Cumulative Effects

Cumulative effects are environmental changes that are affected by more than one land use activity and include beneficial changes. Cumulative effects for NSO and their habitat are reviewed at the NSO Analysis Area level to capture the varying habitats, species home ranges, and varying degrees of species mobility. Technical issues that complicate analysis of cumulative effects include the large spatial and temporal scales involved, the wide variety of processes and interactions that influence cumulative effects, and the lengthy lag-times that often separate a land use activity and the landscape's response to that activity.

The proposed action alternatives, in conjunction with other ongoing and reasonably foreseeable actions in the NSO Analysis Area (see Section 3.1.2, *Consideration of Past, Ongoing, and Reasonably Foreseeable Actions in Effects Analysis* and Section 3.4.4, *Affected Environment* [for NSOs]), would not preclude the NSO from nesting, foraging, or dispersing within the Analysis Area, but would diminish

the NSO's NRF by 410 acres and dispersal habitat by 508 acres.

All proposed treatment units for the BLM's North Landscape Project (Klamath Falls Field Office) lie outside the NSO Analysis Area. Therefore, the North Landscape Project is not expected to add to cumulative effects for NSO and their habitat.

3.4.5.3 Alternative 2

Alternative 2 would reduce canopy cover in 918 acres to below the 40 percent threshold required for classification as NSO dispersal habitat (Table 3-8). These units would be expected to be classified as NSO capable habitat post-treatment. Selection Harvest in LSR would Treat and Maintain four acres of dispersal habitat.

Table 3-8. Proposed Treatments by NSO Habitat Type for Each Action Alternative.*

	Alternative 2				Alternative 3				Alternative 4			
NSO Habitat Type	NRF	Dispersal	Capable	Non-Habitat	NRF	Dispersal	Capable	Non-Habitat	NRF	Dispersal	Capable	Non-Habitat
Regeneration Harvest	410	508	10	1								
Commercial Thin					70	102			410	508	10	1
High Retention Regeneration Harvest					239	150	10	1				
White Fir Regeneration Harvest					101	256						
Selection Harvest (LSR)		4				4				4		

*Refer to Table 3-7 for a summary of pre-and post-treatment acres of NSO habitat.

3.4.5.4 Alternative 3

Alternative 3 would be expected to leave a higher canopy cover across portions of the treated units when compared to Alternative 2. While this could leave some treated acres still meeting the 40 percent threshold for classification as NSO dispersal habitat, quantification of acres expected to meet this threshold is not possible due to the variable nature of the existing stands and the commensurate application of silvicultural prescriptions. Therefore, for the purposes of this analysis, it is assumed that all treatments except for the dispersal maintain proposed for the four acres of LSR would remove habitat (Table 3-7). Implementation of Alternative 3 would be expected to have a lesser effect on NSO habitat than would implementation of Alternative 2 due to the retention of more trees and higher canopy cover.

3.4.5.5 Alternative 4

Alternative 4 would be expected to leave a higher canopy cover than all of Alternative 2 and the HRRH and WFRH units of Alternative 3. As with Alternative 3, quantification of acres expected to meet the NSO dispersal 40 percent canopy cover threshold is not possible due to the natural variability of existing

forest stands and the need to tailor the silvicultural prescription application to this variability. Therefore, it is assumed that all treatments except for the dispersal maintain proposed for the four acres of LSR would remove habitat (Table 3-7). Alternative 4 would be expected to have the least effect on NSO habitat of all action alternatives being considered.

3.4.6 Summary of Effects to Northern Spotted Owl Habitat

The proposed action alternatives, in conjunction with other ongoing and reasonably foreseeable actions in the NSO Analysis Area (see Section 3.1.2, *Consideration of Past, Ongoing, and Reasonably Foreseeable Actions in Effects Analysis* and Section 3.4.4, *Affected Environment* [for NSOs]), would not preclude the NSO from nesting, foraging, or dispersing within the Analysis Area, but would diminish the NSO's NRF by 410 acres and dispersal habitat by 508 acres, totaling approximately seven percent of NRF/RF/dispersal habitat on federal lands in the Analysis Area[2] in the short-term (Table 3-9).

Table 3-9. Northern Spotted Owl Habitat Pre- and Post-Treatment and Cumulative Effects[3]

Habitat Type	NRF/RF	Dispersal	Capable	Non-Habitat
Analysis Area (Current)	40%	14%	11%	34%
Analysis Area (Post-Treatment)	39%	12%	15%	34%

Available evidence suggests that the presence and distribution of barred owls may affect habitat quality for NSOs (Wiens 2012; Yackulic et al. 2013). Additionally, many studies suggest that the two species compete for resources and that maintaining older, high quality forest habitat may help NSOs persist, at least in the short-term. There are no known forest conditions that give NSOs a competitive advantage over barred owls. While not common, Wiens (2012) did find spotted owls and barred owls occupying the same territories concurrently.

In the Revised Recovery Plan for the NSO, the USFWS recommends that land managers maintain and restore older and more structurally-complex, multi-layered conifer forests on federal lands in order to not further exacerbate the competitive interactions between NSOs and barred owls (USDI USFWS 2011, pp. III-67 to III-68, Recovery Action 32). The land use allocations constitute the BLM's contribution to Recovery Action 32 (USDI BLM 2016b, p. 127). Since the BLM is not proposing any treatments within RA 32 habitat, and a very limited amount in LSR (four acres) would be treated and maintained as dispersal habitat in the Harvest Land Base, the likelihood that inter-species competition would be exacerbated as a result of this project is negligible. Some competitive interactions are still anticipated to occur since barred owls have been observed in the Analysis Area.

[2] Total NRF, RF, and dispersal habitat on federal lands in the Analysis Area equals 13,757 acres.
[3] Percent lands by habitat type compared to total federal lands in the Analysis Area (25,105 acres).

3.5 REFORESTATION

Issue 4: How would the proposed activities affect the ability to successfully reforest the harvest units as required by the 2016 ROD/RMP considering previously documented reforestation issues associated with frost, pocket gophers, and competing vegetation on the Dead Indian Plateau (Minore 1978)?

3.5.1 Introduction

The Griffin Half Moon Project Area is on the Dead Indian Plateau, which is known to have reforestation issues primarily due to competing vegetation, pocket gophers, and frost. Three research papers go into detail about reforestation issues on the Dead Indian Plateau (Minore 1978; Stein 1981; Williamson 1977).

Research conducted on the Dead Indian Plateau thus far involves comparing regeneration survival in clearcuts versus partial cuts. Varying observations and tests had been completed, with several unknowns, but the primary results showed retaining some overstory canopy is important for reforestation. "Absence of overstory canopy cover was related to seedling mortality. … largely due to a combination of growing season frosts and gophers. Damage from these factors was limited under canopy cover" (Williamson 1977, p. 1). "Presence of an overstory canopy is the single most important factor contributing to plantation success" (Minore 1978, p. 12). "Frost occurrence varies by topographic location and is much less frequent under forest canopy than in the open" (Stein 1981, p. 27).

Canopy cover would help protect seedlings and would avert grasses from growing. Average survival under the canopy (88.8 percent) was significantly better than survival in the open (36.4 percent) (Williamson 1977). Although an overstory canopy of 60 percent probably is optimum for natural regeneration, the minimum overstory canopy cover required to prevent frost damage to underplanted seedlings is unknown (Minore 1978, p. 21).

Reducing canopy cover through commercial and non-commercial treatments would subject seedlings to effects from competitive vegetation, pocket gophers, and frost damage. When the canopy is opened up following vegetation removal, grasses colonize part of the new growing space. Competition to seedlings from grasses can be severe. Scalping the top layer of soil to remove forest litter and competitive vegetation can increase the survival and persistence of newly planted seedlings by reducing competition for moisture and sunlight that seedlings need to grow.

Following canopy cover removal, newly-colonized grasses and other herbaceous growth act as a breeding ground for the pocket gopher which feeds on roots, bulbs, and other fleshy parts of plants (Link 2005, p. 1). Canopy that limits vegetative competition deters gophers from entering a stand. Douglas-fir and white fir seedling and sapling roots, stems, and branches are more likely to be gnawed by gophers than other tree species (e.g., sugar pine, ponderosa pine, and incense cedar).

Additionally, when canopy cover is reduced, planted seedlings are subject to lower temperatures and the potential of succumbing to frost damage increases. There is much less growing season frost damage to seedlings that are underplanted (i.e., planting young trees under an existing canopy); in one study, temperatures under the canopy were nine degrees Fahrenheit warmer than those in adjacent open areas (Minore 1978). Adverse effects from frost are 1) greater on flat sites as compared to sites with more

slope, 2) greater on sites where there is a high Douglas-fir component and lack of species diversity, and 3) more likely at higher elevations.

3.5.2 Methodology

This analysis evaluates the differences in the proposed alternatives by considering the following:

- the proposed silvicultural treatments and their effects on canopy cover; and
- the environmental factors associated with each proposed treatment unit that, based on literature, appear to influence reforestation success (i.e., slope, species composition, species diversity, and elevation).

3.5.3 Assumptions

- The site conditions and environmental conditions used in analysis for the literature reviewed is consistent with conditions in Griffin Half Moon treatment units.
- Regeneration harvest prescriptions (RH, HRRH, and WFRH) for Griffin Half Moon will retain approximately 10-40 percent canopy cover on average.
- Commercial thinning prescriptions (CT) for Griffin Half Moon will retain approximately 35-50 percent canopy cover on average.
- Selection Harvest prescriptions (SH) for Griffin Half Moon will retain approximately 40-50 percent canopy cover on average in the four acres proposed for treatment in LSR.

3.5.4 Affected Environment

The Analysis Area used to evaluate the effects of the proposed treatments on successful reforestation is where site-specific harvest treatments are proposed. The stands proposed for both commercial and non-commercial treatment include 933 acres in the Project Area. All 933 acres would be considered for commercial harvest and non-commercial treatments would be conducted within the footprint of the commercial harvest units and include approximately 392 acres of pre-commercial thinning (PCT) and 933 acres of activity fuels reduction. In general, the stands proposed for treatment are spread out across the landscape with a moderate continuity in some areas (see Map 1-1). The size of stands proposed for treatment range from approximately four to 226 acres (see Table 2-6).

Table 3-10 displays site-specific environmental conditions associated with each of the proposed treatment units.

Table 3-10. Site-Specific Environmental Conditions within Each Treatment Unit.

Unit	Unit Conditions
1-1	High tree species diversity (e.g., sugar pine, ponderosa pine, incense cedar) Varying slope throughout the unit (i.e., not flat) Low elevation

Unit	Unit Conditions
1-2	High proportion Douglas-fir and white fir Relatively flat
7-1	High proportion of white fir and Pacific yew Contains middle and lower tree layers Relatively flat
7-2	High proportion of white fir and Pacific yew Contains middle and lower tree layers Relatively flat
10-1	High proportion Douglas-fir and white fir Varying slope
11-1	High proportion of Douglas-fir and white fir Relatively flat
11-2	High pine component Flat with some gradient High elevation
11-3	High proportion of white fir Relatively flat High elevation
12-1	High proportion of white fir Flat with some gradient High elevation
13-1	High pine component Very flat Lower range of elevation
13-2	High pine component with white fir and Douglas-fir pockets Very flat High elevation
13-3A	High pine component with white fir and Douglas-fir pockets Very flat High elevation
13-3B	High pine component with white fir and Douglas-fir pockets Open site Very flat High elevation
13-4	High proportion of Douglas-fir and white fir Flat High elevation
15-1	High proportion Douglas-fir and white fir with pockets of pine Flat High elevation
15-2	High proportion of white fir with Douglas-fir and Pacific yew pockets Contains advance regeneration Higher slope gradient

3.5.5 Environmental Consequences

3.5.5.1 Alternative 1 – No Action

Direct and Indirect Effects

Under this alternative, no proposed activities would take place on BLM-administered lands in the Analysis Area at this time. As existing stands change through environmental processes and vegetation dies, natural regeneration may occur. Naturally regenerated trees would be subject to competing vegetation, gopher damage, and frost.

Cumulative Effects

There would be no cumulative effects to reforestation challenges associated with selecting Alternative 1 (No Action). Most private forest lands adjacent to the Analysis Area are managed as tree farms for production of wood fiber on relatively short forest rotations. It is expected that any remaining private industrial forest over 60 years old would be harvested in the next one or two decades. If clearcutting is implemented on these stands, it is likely that intensive management efforts will be required to ensure successful reforestation.

The proposed treatments for the BLM's North Landscape Project (Klamath Falls Field Office) are not expected to add to reforestation challenges adjacent to the Analysis Area because the majority of the acres are in the HLB-UTA LUA and are proposed (in the scoping notice for this project) for uneven-aged silvicultural treatments with some thinning (less than 20 inches DBH), some no treatment areas, and a small amount of aspen restoration.

3.5.5.2 Common to All Action Alternatives

Across all alternatives, canopy cover in the LSR unit would be retained at 40-50 percent following Selection Harvest. The percent canopy cover would be only 10-20 percent less than the amount thought to be optimum for natural regeneration on Dead Indian Plateau (60 percent) (Minore 1978, p. 21) and the stand (Unit 13-3B) would be artificially regenerated (planted). Unit 13-3B is currently less than 60 percent canopy cover, 40-50 percent canopy cover would be retained, and the underplanted trees would have a better competitive advantage because of site preparation prior to planting, therefore, no adverse effects to reforestation would be expected.

Non-commercial treatments (borax treatments, PCT, and fuels treatments) would also be implemented the same across all the action alternatives with the exception of the amount of acreage of planting, grubbing or scalping, and the use of gopher trapping, which would occur in Alternatives 2 and 3, but not in Alternative 4.

Hand-piling of slash could provide shade for planted seedlings for the six months to two years that the piles remain on site prior to pile burning; therefore; improving the potential for reforestation success. The eventual burning of the slash piles would create localized small openings (growing space) that could allow for natural regeneration in the small openings, potentially minimally aiding reforestation results in the harvest units. Where underburning occurs within treatment units, competitive vegetation would be reduced and nutrients returned to the soil that could eventually be available to the seedlings (planted after the underburning), therefore having a minimal, but positive effect on reforestation efforts.

PCT would have a minor effect on reforestation because densely-stocked non-commercial trees would be thinned which could improve soil moisture and increase growing space for conifers retained and natural regeneration. However, the thinning of the densely-stocked non-commercial trees would have negligible impact on the percent canopy cover because they are generally not tall enough to contribute towards canopy cover.

PDFs include leaving some logging slash in harvest units which could decrease the potential for frost damage to newly planted trees in higher elevations and also provide shade for seedlings on hot, dry sites where no living shrubs or trees exist. Additonally, grubbing or scalping the soil would minimize competitive vegetation which would reduce moisture stress on the seedlings.

3.5.5.3 Alternative 2 – Proposed Action

Direct and Indirect Effects

Alternative 2 would result in the largest reduction in canopy cover and the highest potential for adverse effects of the three action alternatives on successful reforestation because all of the HLB unit treatments would be RH. Canopy cover retention would range between 10-20 percent on average under this alternative, which could pose challenges with regeneration due to competitive vegetation, gophers, and frost. However, grubbing or scalping would occur prior to planting, which would reduce the competitive vegetation around the seedlings. The reduction in competitive vegetation would increase moisture availability for seedlings and also make the area less favorable to gophers (i.e., less vegetation to attract gophers to the site) which would improve reforestation efforts. Residual trees would provide shade to planted seedlings when needed and cover during times of potential frost, contributing to reforestation success. Activity slash left in the units could improve the microclimate for newly planted seedlings, thereby potentially increasing reforestation success. Gopher trapping would also help alleviate potential gopher damage, thereby increasing the potential for reforestation success.

Additionally, individual stand characteristics would aid in reforestation success. Units that are at the lower elevations on the Dead Indian Plateau; have high species diversity; have higher slope gradient; contain a middle or lower tree layer; or have advanced regeneration have been shown to successfully reforest. Units 1-1, 7-1, 7-2, 11-2, 13-1 and 15-2 possess characteristics that may enhance reforestation success (Table 3-10).

Cumulative Effects

Alternative 2 applies Regeneration Harvest to 929 acres, reducing the canopy cover to 10-20 percent on average. The implementation of PDFs, site preparation (grubbing or scalping), and the inherent stand characteristics in some of the harvest units should ameliorate the planting microsite and aid in reforestation success. Monitoring units following initial planting would determine the need for gopher trapping to achieve reforestation objectives. This alternative has the potential to incrementally add to the reforestation challenges documented on the Dead Indian Plateau, particularly in Units 1-2, 10-1, 11-1, 11-3, 12-1, 13-2, 13-3A, 13-3B, 13-4, and 15-1 where individual stand characteristics are less favorable for reforestation (Table 3-10).

The effects associated with future harvest on private lands and the North Landscape Project would be the same as those identified in Alternative 1 (No Action).

3.5.5.4 Alternative 3

Direct and Indirect Effects

The commercial treatments under Alternative 3 (HRRH, WFRH, and CT) address concerns with reforestation issues associated with gophers and frost by leaving additional canopy cover. Under Alternative 3, canopy cover retention would be at least 30 percent in all units on average. CT treatments would not create as much growing space as regeneration harvest would, although the prescription includes gap creation as well as retention skips. The gaps would create opportunities for natural regeneration, especially around healthy shade-intolerant species. Skips would not create opportunities for regeneration, but would create a mosaic of stand structure throughout the stand. As mentioned above, the minimum threshold for canopy cover to minimize gopher and frost issues for reforestation is unknown, but retaining canopy covers 30 percent and greater could help reduce the risk of reforestation issues.

Additionally, the white fir stands selected for WFRH are dry sites where moisture is a limiting factor. Because overstory white fir would be removed, moisture would then be available for remaining desireable trees (Douglas fir). When seedlings are underplanted, they would also have access to the newly-available water as well as shelter from the canopy cover, therefore, there would be a positive effect on reforestation.

Under Alternative 3, there would be adequate natural regeneration opportunities in the HRRH and WFRH prescriptions, but underplanting would also occur. There would be some natural regeneration opportunities in the CT prescription due to the creation of gaps and some reduction in canopy cover, but these opportunities would be limited in comparison to the other prescriptions.

Individual stand characteristics and effects from non-commercial treatments of planting and grubbing or scalping and gopher trapping would be the same as described under Alternative 2.

Cumulative Effects

Alternative 3 applies HRRH and WFRH to 757 acres within the Analysis Area. Both prescriptions would retain between 30-40 percent canopy cover on average. CT treatment on 172 acres would retain canopy cover between 35-50 percent on average. The higher canopy cover retained, coupled with the non-commercial treatments, implementation of PDFs, and inherent stand characteristics in some stands that favor successful regeneration, would increase the likelihood of successful reforestation following harvest. This alternative would likely not incrementally add to the reforestation challenges documented on the Dead Indian Plateau.

The effects associated with future harvest on private lands and the North Landscape Project would be the same as those identified in Alternative 1 (No Action).

3.5.5.5 Alternative 4

Direct and Indirect Effects

For all stands treated under the CT prescription in Alternative 4 (929 acres), retained canopy cover would range between 35-50 percent on average, which would provide the highest levels of canopy cover

on average of all the action alternatives. No trees would be underplanted under this alternative in CT units. However, natural regeneration would have less competitive vegetation, would be less likely to be subjected to gopher damage, and would have fewer frost issues because of the higher percentage of canopy cover that would remain under this alternative.

Cumulative Effects

The higher cover retained (35-50 percent), coupled with the non-commercial treatments, implementation of PDFs, and inherent stand characteristics in some stands that favor successful regeneration, would increase the likelihood of successful reforestation following harvest. This alternative would likely not incrementally add to the reforestation challenges documented on the Dead Indian Plateau.

The effects associated with future harvest on private lands and the North Landscape Project would be the same as those identified in Alternative 1 (No Action).

3.5.6 Summary of Effects to Successful Reforestation

The action alternatives propose harvest on 933 acres creating opportunities for regeneration (natural and artificial) and promoting shade-intolerant, early-seral species in the Griffin Half Moon Project Area. Proposed harvest prescriptions, non-commercial treatments, PDFs, and inherent stand conditions mitigate the level of risk for reforestation efforts under all alternatives to varying degrees.

Alternative 2 retains the lowest canopy cover of the action alternatives (10-20 percent) on 929 acres and would likely require the highest degree of management efforts (planting, grubbing or scalping, and gopher trapping) to achieve successful reforestation. SH would be applied to four acres and retain 40-50 percent canopy cover.

Alternative 3 retains 30-40 percent canopy cover on 757 acres and 35-50 percent canopy cover on 172 acres. SH would be applied to four acres and retain 40-50 percent canopy cover. There would be natural regeneration opportunities in the HRRH and WFRH prescriptions, but underplanting would also occur. The higher canopy cover retained, coupled with the non-commercial treatments, implementation of PDFs, and inherent stand characteristics in some stands that favor successful regeneration, would increase the likelihood of successful reforestation following harvest.

Alternative 4 applies CT to 929 acres and would retain canopy cover between 35-50 percent on average. SH would be applied to four acres and retain 40-50 percent canopy cover. As in Alternative 3, the higher cover retained, coupled with the non-commercial treatments, implementation of PDFs, and inherent stand characteristics in some stands that favor successful regeneration, would increase the likelihood of successful reforestation following harvest. This alternative relies on natural regeneration to achieve successful reforestation.

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CHAPTER 4 - CONSULTATION AND COORDINATION

This Chapter describes any public participation and consultation or coordination with agencies and organizations that occurred during the preparation of this project.

4.1 INTERAGENCY COORDINATION

4.1.1 US Fish and Wildlife Service and NOAA Fisheries

Section 7 of the Endangered Species Act (ESA) requires the BLM to work with the U.S. Fish and Wildlife Service (USFWS) (T&E plant and wildlife species) and NOAA Fisheries (T&E fish species) for actions the BLM funds, authorizes, or proposes to ensure the project is not likely to jeopardize the continued existence of listed plant, wildlife, or fish species, or destroy or adversely modify their designated critical habitat.

Before requesting consultation, the BLM determines whether the project may affect the listed species or critical habitat. If the project would affect the species, but the effect would be relatively minor, consultation is informal and the BLM submits a written request for informal consultation. If the USFWS or NOAA Fisheries agrees with the BLM's determination, then informal consultation concludes with the USFWS or NOAA Fisheries issuing a letter of concurrence.

If the BLM determines a project is likely to adversely affect a listed species or critical habitat, then formal consultation is required and the BLM submits a written request, or biological assessment, for formal consultation to USFWS or NOAA Fisheries. During formal consultation, the USFWS or NOAA Fisheries reviews the project to determine if the project is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The agencies submit the results of the review to the BLM in a biological opinion.

4.1.1.1 T&E Wildlife

The federally threatened northern spotted owl and the endangered gray wolf are the only threatened and endangered wildlife species within or near the Griffin Half Moon Project Area. The BLM has determined that this project is likely to adversely affect the northern spotted owl. The Medford District BLM met with the Level 1 Team on December 19, 2017 to provide an overview of the project and discuss potential effects to northern spotted owls. The BLM hosted a field trip on November 15, 2017 for the Level 1 Team to review proposed units in the field. Formal consultation with the USFWS for the northern spotted owl began when the Medford District BLM sent the Biological Assessment (BA) to the USFWS on April 30, 2018 (USDI BLM 2018a). The BLM received a Biological Opinion (BO) from the USFWS on June 21, 2018 (USFWS Reference Number 01EOFW00-2018-F-0476). The USFWS concluded that implementation of the Griffin Half Moon Project is not likely to jeopardize the continued existence of the NSO or to destroy or adversely modify critical habitat, (USDI USFWS 2018, pp. 2 and 90).

The Medford District and the Rogue River-Siskiyou National Forest submitted a Biological Assessment (USDI BLM and USDA USFS 2017) to the USFWS and received a Letter of Concurrence

(USDI USFWS 2017) to assess potential effects from proposed federal land management activities on the endangered gray wolf.

4.1.1.2 T&E Plants

The Griffin Half Moon Vegetation Management Project is not within the identified range of any threatened or endangered plants.

The BLM has completed botanical surveys and zero sites of listed species were found in the Project Area. Therefore, the BLM determined that the actions proposed under Alternatives 2, 3, and 4 would have "no effect" to T&E plants or their critical habitat because no populations or critical habitat occur in or near project action areas.

4.1.1.3 T&E Fish

The Griffin Half Moon Vegetation Management Project is outside the range of the federally-listed Southern Oregon Northern California Coast Coho (SONCC) Salmon. The BLM Fisheries Biologist determined that the Griffin Half Moon Project would have "no effect" to SONCC Coho Salmon, CCH, and EFH in the Analysis Area catchments. Therefore, consultation on this project is not necessary.

4.2 TRIBAL COORDINATION

Letters describing the preliminary scoping proposal initiating consultation with the local federally-recognized Native American Tribes were sent in November 2017. Further consultation at the quarterly meeting took place and did not identify any concerns.

4.3 STATE HISTORIC PRESERVATION OFFICE

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.

4.4 DOCUMENT AVAILABILITY

A letter or email announcing the availability of the Griffin Half Moon Vegetation Management Project EA for public review was mailed to those who submitted an Interest Response Form or provided scoping comments, and to grazing lessees, tribes, Rogue River-Siskiyou National Forest, Jackson County Commissioners, Association of O&C Counties, Oregon Department of Forestry, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and the library at Southern Oregon University.

The Griffin Half Moon Vegetation Management Project EA is available on the BLM ePlanning website at: https://go.usa.gov/xQwyz.

A notice of the EA availability published in the *Medford Mail Tribune* newspaper will begin the 30-day comment period for the Griffin Half Moon Vegetation Management Project EA.

CHAPTER 5 - LIST OF PREPARERS

This chapter lists the BLM staff involved in the development of the Griffin Half Moon Vegetation Management Project and the preparation of this document.

Name	Position	Responsibility
Kristi Mastrofini	Ashland Field Office Manager	Authorized Officer / Management Direction / NEPA Compliance
Kathy Minor	Assistant Field Manager	Lead Planner / NEPA Compliance
Brian Lawatch	Planning and Environmental Specialist	ID Team Leader / NEPA Compliance
Shanna McCarty	Planning and Environmental Specialist	NEPA Compliance
Lisa Meredith	Forester / Silviculturist	Silviculture
Eric Siemer	Forester	Logging Systems
Jerry Serabia	Fire and Fuels Specialist	Fire and Fuels
Jena Volpe	District Fire Ecologist	Fire and Fuels
Jon Larson	Fire and Fuels Specialist	Fire and Fuels
Steven Godwin	Wildlife Biologist	Wildlife
Tim Montfort	Hydrologist	Hydrology
Chris Volpe	Fisheries Biologist	Fisheries
Forest Gauna	Botanist	Botany
Josh Robeson	Engineering Technician	Transportation
Darin Bartholomew	Range Technician	Livestock Grazing
Lisa Rice	Archeologist	Cultural and Paleontological Resources
Christine Beekman	Recreation/Interpretive Specialist	Recreation / Visual Resources
Ryan Snider	Geographic Information Systems Specialist	Mapping and Spatial Data Management

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APPENDIX A - Scoping Summary for the Griffin Half Moon Vegetation Management Project

Written comments received in response to the Griffin Half Moon public scoping notice were reviewed by the Interdisciplinary (ID) Team and Ashland Field Office Field Manager (Responsible Official), and substantive comments were identified.

Substantive comments are those that:

- Provide new information pertaining to the Proposed Action or an alternative;
- Identify a new relevant issue or expand on an existing issue;
- Identify a different way (alternative) to meet the purpose and need;
- Identify a specific flaw in the analysis;
- Ask a specific relevant question that can be meaningfully answered or referenced; and/or
- Identify an additional source of credible research, which if utilized, could result in different effects.

Non-substantive comments are those that:

- Primarily focus on personal values or opinions;
- simply provide or identify a preference for an alternative considered;
- Restate existing management direction laws or policies that were utilized in the design and analysis of the project (or provide a personal interpretation of such);
- Provide comment that is considered outside of the scope of the analysis (not consistent or in compliance with current laws and policies, is not relevant to the specific project proposal, or is outside of the Responsible Officials decision space); and/or
- Lack sufficient specificity to support a change in the analysis or permit a meaningful response, or are composed of general or vague statements not supported by real data or research.

Some comments may have been expressed by one person or organization, while other comments may have been received from more than one person or organization. The central points of comments, questions, and suggested actions/alternatives received are summarized below (Table A-1) to form one comment whether it was received from one or more sources. The table below provides a reference to a location in the Griffin Half Moon Vegetation Management EA where information is provided regarding each comment, question, or suggested action/alternative. Commenters raised issues, posed questions, suggested actions/alternatives, or commented on the process. A comment is categorized as an issue when the comment expressed concern for effects to resources or human values, whether it is expressed

as a statement or question. This process captures those comments/questions received in regards to how the public is involved in the planning process, flow of information, access to units during winter, having units laid out and marked timely to allow the public to view prior to commenting, and concern for how the project is developed for consistency/compliance with existing land use plans, policies, regulations and laws.

Table A-1. Comments Received on the Griffin Half Moon Vegetation Management Project during Scoping.

	Comment	EA Reference
1	Implement vegetation management on lands surrounding Howard Prairie Lake.	Chapter 2
2	BLM needs to be mindful and respectful regarding property lines on neighboring property.	Chapter 1
3	BLM needs to consider the vegetative modeling done during the analysis for the PRMP/FEIS.	Chapter 2
4	Regeneration harvest would affect the quiet use and enjoyment of adjacent private parcels.	Appendix C
5	BLM must meet the HLB objective to "Manage forest stands to achieve continual timber production that can be sustained through a balance of growth and harvest."	Chapter 1, Chapter 2
6	Incidental take should be the only reason why treatment areas are deferred for northern spotted owl considerations.	Chapter 3
7	BLM should proactively manage riparian areas to accelerate the trajectory of stand development to produce large conifer trees for future instream and down wood recruitment.	Chapter 2, Appendix B
8	The timber sale should be economically viable. BLM should be flexible in allowing operations that focus on descriptive end results rather than firm restrictions (e.g., allow winter logging). Allow a variety of equipment in the sale area such as feller bunchers and processors.	Chapter 2
9	BLM should consider a citizens alternative that emphasizes thinning small trees accessible from nearby existing roads.	Chapter 2
10	BLM should consider alternate way to achieve ASQ such as thinning dense young stands instead of logging in mature forests.	Chapter 2
11	BLM should disclose alternatives to regeneration harvesting to achieve complex early seral habitat such as relying on wildfire and prescribed fire, extending early seral condition of existing early seral stands on BLM lands, and relying on the vast amounts of early seral on non-federal lands.	Outside the scope of this project.
12	Harvesting to promote large, open-grown trees should not be the goal in Riparian Reserves and Late-Successional Reserves. BLM should meet the underlying purpose of the LUAs.	Chapter 1, Chapter 2
13	Tree tipping and using trees from the outer RRs for fish restoration is a short-term fix; better to focus on ecological processes that produce and recruit large wood over the long term.	Chapter 1, Chapter 2 (Not proposed in this project).
14	Logging in riparian reserves will have modest and transitory effects on vegetative diversity while causing a long-term shorting of dead wood in streams and uplands.	Chapter 1, Chapter 2 (Not proposed in this project).

	Comment	EA Reference
15	BLM should avoid commercial logging and road building in unroaded areas larger than 1,000 acres.	Chapter 2
16	BLM should complete an EIS because they are proposing timber harvest in units that were previously deferred to protect GGO sites.	Chapter 2
17	BLM should analyze the KS Wild-submitted citizens' alternative that avoids regeneration harvest and group selection, retains trees greater than 20 inches DBH, and thins small trees in overly dense stands.	Chapter 2
18	BLM must consider the TPCC of the areas in which it proposes logging activities.	Chapter 1, Chapter 2, Appendix C
19	BLM must quantify the cumulative impacts of sediment production and turbidity from timber haul and the effects to 303(d) listed streams in the Analysis Area.	Chapter 3
20	BLM must analyze the cumulative effects of its proposed logging and road activities on the hydrological and terrestrial health of the Project Area considering other federal and private logging activities, road construction, and OHV use.	Chapter 3, Appendix C
21	BLM must acknowledge and analyze the effects of logging on creating edge effect and blowdown.	Appendix C
22	BLM should analyze the effects of conifer thinning and brush removal on neotropical migratory bird population trends.	Appendix C
23	Regeneration harvest followed by artificial regeneration (planting) will increase fire hazard necessitating completion of an EIS.	Appendix C
24	Riparian reserve treatments should exclude commercial logging treatments and instead focus on treatments benefitting fish populations.	Chapter 1, Chapter 2 (Not proposed in this project).
25	BLM should identify specific problem roads for decommissioning.	Chapter 2
26	Prescribed fire and fuels reduction should focus on the Wildland Urban Interface and near homes to create defensible space under wildfire conditions. Fuels reduction work should be conducted in the fall to reduce impacts to native plant communities, spring nesting birds, and native pollinator species during the spring.	Chapter 2, Appendix C
27	Commercial fuels reduction thinning adjacent to homes, human infrastructure, and in plantation stands with the following design features is supported: 21 inch DBH harvest limit, retention of NSO habitat, retention of all GGO habitat, no riparian thinning, and no logging in old growth forests.	Chapter 1, Chapter 2 (Not proposed in this project).
28	BLM must analyze the effects of the proposed activities on climate resilience and stability.	Appendix C
29	BLM should analyze the effects of project activities on the ecological connectivity between the neighboring Cascade-Siskiyou National Monument (east, west and south) and the Rogue River-Siskiyou National Forest which provides connectivity between the Siskiyou and Cascade mountain ranges.	Appendix C
30	Regeneration harvest down to 15 percent of pre-harvest stand basal area will degrade habitat connectivity habitat quality for late-successional dependent species, such as Pacific fisher, NSO, GGO, northern goshawk and others.	Chapter 3, Appendix C

	Comment	EA Reference
31	In Unit 15-1, BLM should retain 40-60 BA, remove white fir, thin small trees. BLM should retain large trees, except hazard trees. BLM should retain at least 40 percent of the pre-harvest basal area. BLM should treat the nearby stream riparian area by placing large woody debris in the stream, riparian planting of aspen trees, and fencing out cattle.	Chapter 2 (Riparian treatments not proposed in this project).
32	In Unit 13-3, BLM should retain 40-50 percent basal area, retain large trees that are 40 inch DBH or greater, and thin from below, and remove most white fir.	Chapter 2
33	In Unit 7-2, BLM should retain as many yew trees as possible, remove most white fir between 12-39 inches DBH, some Douglas-fir under 40 inch DBH, and small diameter ponderosa pine.	Chapter 2
34	BLM must analyze the current amount and spatial distribution of late-successional forest in and adjacent to the Project Area, determine where and how much of this habitat is currently located within LSRs, and fully disclose how any proposed actions will influence or change late-successional habitat conditions.	Chapter 3
35	BLM must analyze effects to great gray owls.	Appendix C
36	BLM should disclose project-related road impacts to species such as NSO, Pacific fisher, large carnivores, aquatic species (e.g., aquatic mollusks), and rare plants.	Appendix C
37	BLM should disclose effects of project activities on barred owl encroachment into NSO territories.	Appendix C
38	If BLM conducts artificial regeneration (planting), they will increase fire hazard and degrade stand composition.	Appendix C
39	Salvage logging will cause cumulative impacts to wildlife, aquatic habitat, and connectivity.	Appendix B (Not proposed in this project).
40	BLM should disclose the effects of the proposed activities on the Pacific fisher.	Chapter 3
41	BLM should consider the effects of the proposed activities on gray wolves.	Appendix C
42	BLM should disclose the effects of the proposed activities on northern spotted owls.	Chapter 3
43	What are the project-related effects to the yellow-legged frog, Pacific tree frog, Jenny Creek redband trout, and endemic mollusk species of the genus *Fluminicula* and *Juga*?	Appendix C
44	How do the proposed activities affect aquatic connectivity in relation to the cumulative effects of roads, logging, water quality, OHVs, livestock, and fish passage barriers?	Chapter 3
45	How would the proposed harvest units be successfully reforested within five years as by the 2016 ROD/RMP considering previously documented reforestation issues associated with frost and pocket gophers on the Dead Indian Plateau (Minore 1978)?	Chapter 3
46	What are the project effects on Bureau Sensitive species?	Appendix C
47	How would the proposed activities affect connectivity of native plant communities?	Appendix C

	Comment	EA Reference
48	What effect would proposed forest management activities have on the potential for the spread of non-native invasive species into the Project Area?	Appendix C
49	How would proposed forest management activities affect the persistence of *Asarum wagneri*, *Gilia sinistra*, and *Lathyrus lanszwertii* within the Project Area?	Appendix C
50	How would proposed forest management activities affect the persistence of *Hackelia bella*, a Bureau Sensitive vascular plant, within the Project Area?	Appendix C
51	How would proposed forest management activities affect the persistence of geophyte plant communities, which GGOs depend on for food?	Appendix C
52	How would the proposed activities affect native plant pollinator life cycles?	Appendix C
53	How would the proposed fuels reduction treatments and commercial logging affect fire behavior and fire severity?	Appendix C
54	BLM should describe the effects of proposed activities on peak flows during storm events.	Chapter 3
55	BLM should describe the effects of proposed activities on summer low flows.	Appendix C
56	How would regeneration harvest impact slope stability (including erosion and landslide potential) in uplands and near streams?	Appendix C
57	How would proposed prescriptions, ground-based yarding, activity and hazardous fuels reduction treatments, and temporary route construction affect soil productivity (compaction, displacement, burning, and change in organic matter and soil chemistry)?	Appendix C
58	What effect would salvage harvest have on the retention and recruitment of snags and down woody debris (for wildlife habitat) in complex early seral habitat?	Appendix C
59	What effects would the proposed activities have on scenic views, recreation, and quality of life?	Appendix C

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APPENDIX B - Scientific Literature Submitted During Scoping

Approximately 103 articles, presentations, or websites were submitted or referenced for BLM review during the public scoping period. Of these 103 references, approximately 14 of them were either not provided by the scoping commenter or did not include enough information for BLM to locate the material. The BLM reviewed the available documents and considered the information in developing the alternatives. A list of the literature submitted can be found at the bottom of this Appendix under *List of Scientific Literature Submitted During Scoping*. The BLM strives to apply the most current, geographically relevant science that represent actions similar in scale and scope to the BLM proposal in its analysis and management considerations. A summary of the BLM's review and evaluation of these documents is provided below.

Scoping comments provided literature regarding reforestation challenges on the Dead Indian Plateau related to pocket gophers, frost, and vegetative competition (Minore 1978; USDI BLM 1995a). The BLM was aware of this publication and used it and other internally generated literature to evaluate the issue Section 1.8.1, Section 3.5). Alternative 3, in particular, was developed partially to respond to potential reforestation challenges (Section 2.3.3).

One scoping comment provided science about sediment and erosion rates related to timber haul on unpaved roads (Raines 1998; quoted in USDA USFS 2001, p. 5-4). The analysis area in Raines (1998), the South Fork Trinity River Basin, has geomorphology, geology, and topography that are unlike the Griffin Half Moon Project Area. Sedimentation and erosion rates discussed in Raines (1998) are not geographically relevant to this project. Sediment and erosion rates related to forest management and associated activities for this project were analyzed in Section 3.2 of this EA.

Scoping comments referred to articles suggesting that logging increases risk of windthrow (Lohmander and Helles 1987; Steil et al. 2005). The two articles study landscape and tree species attributes that are unlike those of the Griffin Half Moon Project Area. Additionally, one of the studies discusses windthrow in riparian reserves; no riparian treatments are proposed in the Griffin Half Moon Project. Therefore, the information presented in these articles is not applicable to this project. While there is a level of risk for blowdown events, depending on many biotic and abiotic influences, predicting blowdown would be speculative. As a general rule, the prescriptions for the Griffin Half Moon Project focus on removing low vigor trees, and leaving the structural elements in the stand, which would allow the "stronger" retained trees to respond physiologically to the decrease in stand density. This issue is considered but not analyzed in further detail (Appendix C, Issue C-38).

Commenters submitted literature in support of the argument that a greater wildfire risk exists for plantations as opposed to naturally occurring stands (Bradley et al. 2016; Countryman 1955; DellaSala and Frost 2001; DellaSala et al. 1995; Frost and Sweeney 2000; Hann et al. 1997; Huff et al. 1995; Odion et al. 2004; Perry 1995; Sapsis and Brandow 1997; USDA USFS 2003; USDI BLM 2013a, 2013b; Van Wagtendonk 1996; Weatherspoon and Skinner 1995). This project does not propose clearcutting and the creation of even-aged plantations. Stands treated with the RH prescription would retain 15-30 percent of the pre-harvest basal area in live trees. RH under the 2016 ROD/RMP uses a two-aged management system with variable retention producing stands in a mix of age classes with legacy structures and multiple canopy layers (USDI BLM 2016a, p. 307). Each alternative proposed in Chapter 2 describes a variety of silviculture prescription objectives meant to ensure achievement of post-

treatment structural complexity (such as leaning trees, forked top trees, groups of trees, different age and diameter classes, and retention of dominant old-growth trees). This would help ensure that stands in the Project Area develop complex early-successional characteristics with a variety of stand densities, snag levels, and tree species – helping to reduce overall fire risk. Post-treatment fuels reduction work would also decrease overall fire risk in the Project Area.

Scoping comments quote Spies et al. (2006): an article that summarizes some of the challenges regarding wildfire risk as it relates to implementation of the Northwest Forest Plan. However, the comment provides no context and does not state why or if the literature applies to this project. The BLM Medford District's management actions are now guided by the 2016 ROD/RMP.

Commenters submitted literature in support of an argument that commercial fuels reduction treatments on BLM public lands contribute to insect and disease and other mortality (Ruediger 2017). This work is not yet peer-reviewed, and draws on anecdotal observations about the BLM's thinning treatments in the Applegate Valley.

Scoping comments referred to articles in support of thinning in riparian reserves as it relates to recruitment of large and small woody debris into streams, stream temperature, canopy gaps, and providing complex habitat (Dolloff and Warren Jr. 2003; Janisch et al. 2012; Johnson et al. 2000; Keim et al. 2002; McDade et al. 1990; Minor 1997; Murphy and Koski 1989; Naiman et al. 2002; Rashin et al. 2006; Warren et al. 2013; Welty et al. 2002). Other scoping commenters submitted science to support their assertion against thinning in riparian reserves (Agee 1988; Bisson et al. 1987; Gregory 2010; Gregory et al. 1991; Harmon et al. 1986; Heiken 2013; House and Boehne 1987; Maser et al. 1988; Pollock and Beechie 2014; Sedell and Beschta 1991; Sedell and Froggatt 1984; Sedell and Luchessa 1982; Sullivan et al. 1987; Swanson et al. 1982; USDA USFS 2011; Vannote et al. 1980). Thinning in Riparian Reserves was initially considered to meet land use allocation objectives, but no need was identified by the IDT. Riparian Reserves near the Project Area would not benefit from commercial thinning, as they are not overstocked. Additionally, streams near the Project Area currently have an adequate amount of stable large wood and therefore there is no need for Riparian Reserve thinning or tree cutting/tipping for restoration at this time. The BLM has not proposed vegetation treatments in Riparian Reserves in the Griffin Half Moon Project Area as this time, and therefore, the information presented in these articles is not applicable to this project.

Commenters submitted science that argues against thinning mature stands because thinning often doesn't meet management objectives of creating understory diversity (Anderson 2007; McIntosh et al. 2009); instead they recommend thinning well-stocked understory and retaining canopy trees to encourage midstory development (Taylor 2016). Commercial thinning proposed in Alternatives 3 and 4 would be designed to retain a variety of species of different age and diameter classes, targeting low-vigor trees, and leaving untreated areas (skips) and group selection openings (gaps) to provide structural complexity and encourage the establishment of pine regeneration (Sections 2.3.3 and 2.3.4). Canopy cover would be retained between a range of 35-50 percent on average. This would help ensure the development of a healthy and diverse understory, midstory, and canopy.

Other commenters submitted science that argues against thinning for fire resiliency in late successional habitat because its benefits may not outweigh the potential reduction in NSO habitat (Odion et al. 2014b). BLM is not proposing thinning for fire resiliency as a part of this project.

Scoping commenters submitted literature about the potential effects of land management influencing barred owl encroachment onto NSO habitat (Dugger et al. 2016). This literature was considered during the development of the 2016 PRMP/FEIS, to which this EA tiers; in its analysis of barred owl effects on NSO, the 2016 PRMP/FEIS incorporated the NSO fecundity and survival and barred owl encounter rate data from Dugger et al. (2016) into the NSO population simulations (USDI BLM 2016a, p. 929). They also referred to the *Revised Recovery Plan for the Northern Spotted Owl* (USDI USFWS 2011), stating that BLM needs to explain how it complies with RA-10 and RA-30. The EA explains BLM's compliance with RA-10 (Section 1.7, *Relevant Assessment and Plans*). Compliance with RA-30 is accomplished through avoiding the incidental take of NSOs from timber harvest until implementation of a barred owl management program has begun (USDI BLM 2016b, p. 23).

Commenters submitted literature to support the argument against post-fire logging (salvage harvest) (Donato 2016; Lindenmayer et al. 2008; DellaSala et al. 2015c). The Griffin Half Moon Project does not propose salvage harvest, and therefore the information presented in these articles is not applicable to this project.

Scoping comments referred to articles in support of the assertion against timber harvest to create complex early-seral stands (Baker 2012, 2015; DellaSala et al. 2013; DellaSala et al. 2014; Franklin et al. 2000; Swanson et al. 2011) and articles that support their disagreement with BLM's large tree retention standards (O'Neil et al. 2011; Henjum et al. 1994; Leiberg 1903). These arguments express disagreement with BLM management direction under the 2016 ROD/RMP and are outside the scope of this project.

Scoping commenters submitted literature to support the importance of small roadless areas (Korol et al. 2002; Soule et al. 1997; USDI BLM 1995c). Roadlessness is a wilderness characteristic consistent with the DDR – Lands Managed for their Wilderness Characteristics (LWC) LUA (USDI BLM 2016b, p. 56) which does not occur in the Project Area. The commenter identified part of Unit 10-1 as adjacent to an unroaded area on Forest Service lands. Although the commenter considers the area "roadless," there are no inventoried areas that would meet criteria for LWC in the Griffin Half Moon Project Area and no inventoried roadless areas on Forest Service lands. This topic was considered but not analyzed in further detail (see Section 2.6.6).

Scoping commenters submitted information related to climate change, arguing that NSOs can decline based on an altered climate regime (Franklin et al. 2000). Effects of proposed vegetation management activities' potential contributions to the effects of climate change on NSOs and their habitat were considered but not analyzed in detail (see Appendix C, Issue C-26) because the action alternatives are not expected to have significant effects beyond those already analyzed in the PRMP/FEIS (USDI BLM 2016a, pp. 165-212). Projecting climate change effects on most terrestrial species is limited by current inability of vegetation models to project changes in stand structure in response to climate changes, and the lack of knowledge of how climate directly influences the presence, absence, and fecundity of a given species (USDI BLM 2016a, p. 198). Science on land use impacts on climate change and biodiversity was submitted during scoping (DellaSala et al 2015b). This article advocates for late-seral reserves as refugia during climate change. The 2016 ROD/RMP incorporates a large system of reserves partially to "provide flexibility in addressing the uncertainties associated with climate change" (USDI BLM 2016b, p. 23).

Articles describing tradeoffs related to competing uses of public lands (Jain et al. 2012; Kline and Mazzotta 2012) were considered in the development of this project. Project activities are consistent with the LUAs as analyzed in the PRMP/FEIS. Tradeoffs related to competing uses of public lands are part of the nature of BLM's multiple use mandate, as Section 103(c) of FLPMA requires that the BLM manage public lands and their various resource values so that they are utilized in the combination that will best meet multiple use and sustained yield. BLM considered the tradeoffs relating to competing uses of public lands through the designation of LUAs during the RMP process; such a process is outside the scope of the Griffin Half Moon Vegetation Management Project.

The BLM considered several articles related to social and economic theory as they relate to ecosystem services (Arrow et al. 2004; Arrow et al. 2012; Cavender-Bares et al. 2015; Ewing and Runck 2015; Mastrangelo and Laterra 2015; Yang et al. 2015). The allocation of resources on public lands is an RMP-level decision and is outside the scope of the Griffin Half Moon Vegetation Management Project. The BLM analyzed socioeconomics in its PRMP/FEIS (USDI BLM 2016a, pp. 585-744), which this project conforms to; an analysis of socioeconomics is outside the scope of the Griffin Half Moon Vegetation Management Project.

Numerous articles related to the management of great gray owls (GGO) and their habitat were submitted to BLM (Beck and Winter 2000; Bryan and Forsman 1987; Bull and Henjum 1990; Bull et al. 1988, 1989; Duncan 1997; Duncan and Hayward 1994; Fetz et al. 2003; Franklin 1988; Hinam and Duncan 2000; Janes 2006; O'Donnell 2004; Quintana-Coyer et al. 2004; Rohner 1997; Sears 2006; Sulkava and Huhtala 1997; USDA USFS 1994). Several of these studies describe how GGOs exhibit high site fidelity, the importance of old-growth and mature forests for nesting, the GGO knowledge gap, and threats from timber harvest. 929 acres of this project are located in HLB-LITA and BLM is proposing to conduct vegetation management in accordance with sustained yield timber management, including in units that were previously deferred to protect known GGO sites to conform to Survey and Manage measures. BLM considered, but ultimately chose not to fully analyze, an alternative that avoids regeneration harvest in those previously deferred units (see Section 2.6.4). Though timber harvest can threaten GGO habitat, the 2016 ROD/RMP allocates a large LSR Network that accomplishes the goal of protecting older and more structurally-complex forests, and provides management for species such as the GGO (USDI BLM 2016b, pp. 27-28). Four acres of LSR do exist in the Project Area, however these four acres of LSR do not exhibit the characteristics of an older, structurally-complex forest, but instead have pine-site characteristics. Selective thinning proposed in this unit would not degrade habitat for GGOs.

Articles describing the values for which the Cascade-Siskiyou National Monument was established were submitted to the BLM (DellaSala et al. 1999; Frost et al. 2011). The BLM is not proposing vegetation management activities in the monument and therefore the information presented in these articles is not applicable to this project.

Lastly, commenters submitted literature regarding the effects of timber harvest and road building on forest fragmentation and biological diversity in Oregon (Ibisch et al. 2016; Olson et al. 2012; Richards et al. 2002; Rochelle 1998) in support of analyzing project-related impacts on habitat connectivity between the Cascade-Siskiyou National Monument to the south and the Rogue River-Siskiyou National Forest to the north. The BLM considered issues related to habitat connectivity, but ultimately chose not to analyze them in detail because the project conforms to 2016 ROD/RMP direction for managing habitat in HLB-LITA LUA, the vast majority of the Project Area (Appendix C, Issues C-6, C-16, and C-39).

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APPENDIX C -
Issues Considered but not Analyzed in Detail

The following questions, concerns, or comments were raised by the public or the interdisciplinary team (IDT) during the development of the project. The Bureau of Land Management (BLM) considered these issues but did not analyze them in further detail, often because the project's design or implementation of Project Design Features (PDFs) would eliminate or reduce effects on the resource. In some cases, issues raised by the public or the IDT were not considered in greater detail as they were determined to be beyond the scope of this project. These issues, along with a rationale for not analyzing them further in this EA, are listed below.

WATER RESOURCES, FISHERIES, AND AQUATIC HABITAT

Issue C-1: How would riparian thinning treatments and associated activities (reduction in canopy cover, road building) affect transpiration, water quality, water quantity, and peak flows?

Background Information: The Griffin Half Moon Project proposes vegetation management treatments consisting of both commercial and non-commercial treatments, including regeneration harvest, commercial thinning, pre-commercial thinning, and fuels treatment. The only 303d listed parameter for streams in the Peak Flow Analysis Area (issue 2) is water temperature in Conde Creek, Dead Indian Creek, Jenny Creek, and Johnson Creek. None of the alternatives analyzed for the Griffin Half Moon Project propose thinning in any Riparian Reserve.

Rationale: The Griffin Half Moon Project does not propose thinning treatments in Riparian Reserves. There will be no removal of primary or secondary shade in Riparian Reserves that would increase water temperatures, utilizing passive restoration measures in the Water Quality Restoration Plans for Jenny Creek and South Fork Little Butte (USDI BLM 2006, p. 37; p. 2011b, p. 22). Therefore, there will be no effects to transpiration, water quality, water quantity, and peak flows from riparian thinning. Effects to water quality, water quantity and peak flows from harvest activities are addressed in Chapter 3.

Issue C-2: How would construction of new roads affect small roadless areas' role as an important refugia for salmonids?

Background Information: It is well documented that roads can negatively impact aquatic habitat, including habitat for salmonids. Impacts can be far-ranging and persist for decades. Examples include creating passage barriers for all or certain life stages of aquatic organisms at road/stream crossings (i.e., perched culverts, culverts installed at steep grades, non-stream simulation culverts, etc.). These same crossings can also obstruct passage of native substrates and large wood, concentrate flood flows, increase downstream scouring and erosion, and serve as hydrological connection points for road derived sediment to be input into streams, increasing sediment deposition. Roads may also disrupt natural flow paths, which can have negative impacts to both peak and base flows. Roads that closely parallel stream channels are at risk of failure during large flood events, and can capture stream flows, resulting in rapid erosion and subsequent deposition of sediment into aquatic habitat. Road clearings act to allow more sunlight to penetrate riparian corridors, which in turn can lead to increases in summertime stream temperatures. Roadless watersheds can serve as refugia for aquatic organisms, as these areas usually function in a much more natural state.

Rationale: This issue was considered but not analyzed in detail because this project does not propose to build any new permanent roads and the two temporary roads (see Table 2-2) proposed for construction under all the action alternatives would be constructed in a flat, stable, up-land location well removed from any riparian area. Because the roads would have no hydrological connectivity with streams, they would have no causal mechanism to impart any negative impacts to aquatic habitat. The roads would be fully decommissioned after use (Section 2.3.2.2), and therefore, would not result in a long term-increase in road densities.

Issue C-3: What effects to aquatic ESA or ISSSP listed species or their habitats would result from this project?

Background Information: The Little Butte Creek Watershed provides important spawning and rearing habitat for Coho salmon, an ESA listed fish. South Fork of Little Butte and many of its tributaries, including low elevation reaches of Dead Indian Creek, are designated as Coho Critical Habitat (CCH). This project proposes activities in headwater areas of Dead Indian Creek located over 3.5 miles upstream/upslope from CCH. In the Jenny Creek Watershed, there are no ESA listed fish present. One special status species, the Jenny Creek Sucker (listed as Bureau Sensitive) is endemic to the watershed, and is known to spawn and rear in Jenny Creek downstream of Howard Prairie Reservoir, and is seasonally present in several of its larger tributaries, including Johnson Creek. This project proposes activities in upper portions of both Jenny and Johnson Creeks. Much of the proposed work in Jenny Creek would occur above Howard Prairie Reservoir, and the work in the Johnson Creek Subwatershed would be limited to small headwater tributary drainages, ranging from one to two miles distant from sucker-bearing habitat in the mainstem of Johnson Creek.

Rationale: Analysis of effects to aquatic habitat anticipated to result from this project suggest that small amounts of sediment, primarily resulting from log haul and use of riparian designated skid trails, would likely be input into aquatic habitats located well upstream from listed/sensitive species. Sediment contributed to the portion of the Jenny Creek Watershed that drains to Howard Prairie Reservoir would have no potential to affect listed or sensitive fish species, as they are not present in the reservoir, and sediment would settle out of suspension in the large pool behind the dam, precluding it from being transported to downstream listed/sensitive species habitats.

Under Alternative 2 (the most potentially impactful alternative), it is estimated that up to 215 lbs. (approximately 0.11 cubic yards) of sediment could potentially be input into small streams that eventually drain into Dead Indian Creek. In Jenny Creek, up to 315 lbs. (approximately 0.16 cubic yards) may result; and in Johnson Creek, up to 2,915 lbs. (approximately 1.4 cubic yards) (Table 3-1). These potential inputs are almost certainly over-estimated due to assumptions and modeling errors built into the analysis, and therefore represent the high end of what is likely to be input into aquatic habitat. Additionally, PDFs common to all the action alternatives including (but not limited to) dry season-only skidding through the Riparian Reserve in Unit 1-1, suspension of haul on sensitive roads during wet periods, and mulching and stabilizing of disturbed ground, would be implemented which would minimize sediment inputs into stream channels that could potentially affect aquatic ESA or ISSSP listed species or their habitats.

Sediment inputs to the Little Butte Creek Watershed would occur over a period of time (typical timber sale contract is for three years) and be spread apart spatially; hence the amount of sediment input into any one stream in any given year would likely be less than reported above. Inputs to the Jenny Creek

Watershed may potentially occur in a single season. For both watersheds, most of the streams in the Analysis Area are intermittent. This means that the potential for most sediment transport to downstream habitat, including CCH and sucker habitat, would occur during the first significant rainstorm of the fall or winter following hauling activities. Sediment input to aquatic habitat would either settle out and be assimilated into the natural substrates of the Analysis Area streams upstream of fish habitats, or be transported downstream as particulates entrained in the water column (turbidity). During such flushes, the small amounts of sediment/turbidity contributed by this project would be undetectable in downstream fish bearing stream reaches, and would have no biologically meaningful impact to Coho, CCH, Jenny Creek Suckers, or their habitat, which have evolved in environments that naturally experience periods of elevated turbidity.

In Johnson Creek, sediment resulting from this project would most likely be input into tributaries in a single season, as activities are concentrated in two small areas. There could potentially be considerably more sediment contributed to aquatic habitat in Johnson Creek than in Little Butte Creek or Jenny Creek by this project, but overall magnitude would still be small, estimated to be up to only 1.4 cubic yards. Most streams in the Johnson Creek portion of the Analysis Area are intermittent, again meaning that all transport would occur during the first few large flushes following high rain events in the fall or winter. Sediment contributed to the tributaries in Johnson Creek would either settle out and assimilate into natural substrates in stream reaches above fish habitat, which in the meadow reaches naturally include higher amounts of fines, or remain entrained as turbidity and quickly flush through the system undetectable beyond background levels, which would be naturally elevated during the first significant freshet of the season. In either case, the small one-time contribution of sediment would be off-set by proposed road maintenance activities which would fix a road/stream capture point that allows for chronic contributions of sediment to aquatic habitat in Johnson Creek.

Although this project would have a high likelihood of contributing additional sediment to aquatic habitat, given the small overall magnitude and the spatial and temporal distribution of the inputs, and the seasonal timing of inputs, sediment and turbidity contributed to aquatic habitats by this project would be undetectable behind background levels in downstream fish habitat, and therefore, would not result in adverse effects to ESA or ISSSP-listed fish species or their habitat.

Issue C-4: What effect would proposed activities have on summer low flows?

Background Information: Summer low water flows can be increased in magnitude where riparian vegetation has been harvested (USDI BLM 2016a, p. 409).

Rationale: This issue was considered but not analyzed in detail in the PRMP/FEIS because none of alternatives proposed to remove stands located along streams (USDI BLM 2016a, pp. 408-409). This project tiers to that analysis. Additionally, this project does not propose riparian thinning treatments. As such, there would be no effects to summer low flows.

Issue C-5: What effect would proposed activities have on Jenny Creek redband trout and endemic mollusk species of the genus *Fluminicula* and *Juga*?

Background Information: Redband trout are present in the Jenny Creek Watershed, including in Johnson Creek, and are suspected to be in Green Creek, a large Johnson Creek tributary included in the sediment analysis area. *Fluminicula* are a genus of small endemic pebble snails which typically occupy small headwater perennial springs and seeps. Numerous populations are known to exist within the

Analysis Area drainages. *Juga* are a genus of larger aquatic snails and are typically found in larger perennial streams. They have been observed in the mainstem of Jenny Creek, but BLM records do not indicate *Juga* presence in other Analysis Area drainages. However, surveys were not comprehensive and they are likely present in some of the other analysis area streams as well. Redband trout may seasonally utilize intermittent streams, such as Johnson Creek, but the aquatic mollusks require perennial water and are found only in streams with year round flow.

Rationale: This issue was considered but not analyzed in detail because with regards to *Fluminicula* there are no headwater springs or seeps present within any of the proposed units and there are no activities related to this project which would directly impact these specific habitats. There is one known population identified in Green Creek located upstream of the 38-4E-35.0 road proposed for use by haul, but as it is located upslope/upstream of the crossing, it would not be affected by any sediment input from haul. Effects to other aquatic organisms and their habitats were described in Chapter 3 of this EA, and encompass effects to redband trout and *Juga*. The analysis indicated that this project would have a high likelihood of inputting small amounts of sediment to aquatic habitat as a result of use of two skid trails across an intermittent tributary to Johnson Creek and across the entire Analysis Area resulting from haul. However, the majority of these inputs would occur in seasonal streams well upstream of fish and other aquatic organism habitats. Sediment would only transport through wetted habitats during periods of elevated flow, as a brief one-time pulse of elevated turbidity. Given the small overall magnitude and the spatial and temporal distribution of the inputs, and the seasonal timing of inputs, sediment and turbidity contributed to aquatic habitats by this project would be undetectable behind background levels in downstream aquatic habitats which include those potentially used by redband and *Juga*, and therefore would not result in adverse effects to aquatic organisms, their habitat, or water quality.

BOTANY – SPECIAL STATUS SPECIES, NON-NATIVE INVASIVE PLANTS, AND NOXIOUS WEEDS

Issue C-6: What effect would proposed regeneration harvest or canopy reduction to below 60 percent have on habitat connectivity for native plant communities?

Background Information: The Southwestern Oregon ROD/RMP has designated Land Use Allocations (LUAs). Native plant community management may differ from one LUA to another.

Rationale: The project as planned conforms to 2016 ROD/RMP direction for managing plant communities in the various LUAs, particularly for the HLB-LITA LUA, the vast majority of the Project Area, which directs the maintenance or increase of vegetative species diversity by producing complex early-seral ecosystems. A large network of LSR LUA exists on BLM lands in southwestern Oregon that maintains "Mature and Structurally-complex stands" for additional habitat development, an overall benefit for habitat connectivity for native plant communities (USDI BLM 2016a, p. 542).

Issue C-7: How would proposed forest management activities affect the persistence of *Andreaea nivalis*, a Bureau Strategic moss within the Project Area?

Background Information: *Andreaea nivalis*, a rock dwelling moss, had tentatively been identified in three small (less than 0.1 acre) sites within proposed harvest units, but a bryophyte taxonomy expert later identified the specimens as a different, non-special status species of *Andreaea*.

Rationale: The sites were misidentified and the mosses are actually a common bryophyte species, therefore this issue was eliminated from further consideration.

Issue C-8: How would proposed forest management activities affect the persistence of *Hackelia bella*, a Bureau Sensitive vascular plant, within the Project Area?

Background Information: Environmental analysis of direct and indirect effects to *Hackelia bella* resulting from this project's implementation are considered possible only within treatment units where ground disturbance will take place. Surveys for special status plants undertaken by qualified botanical professionals have taken place throughout the areas proposed for ground-disturbing activities, in accordance with management direction to conduct pre-disturbance surveys for special status botanical species.

Rationale: No occurrences of *Hackelia bella*, or any other Bureau Sensitive Status botanical species, have been discovered within areas proposed for project-related ground-disturbing activities, and the closest known sites are over two miles distant from the nearest treatment unit. Therefore, effects to persistence of individuals or populations of this species are quite unlikely to result from implementation of any alternative, and the issue was not carried forward for further analysis.

Issue C-9: What effect would proposed forest management activities have on the potential for the spread of non-native species into the Project Area?

Background Information: Disturbance generally promotes early-successional plant species including many non-native and invasive species that are adapted to take rapid advantage of increased resource availability (sunlight, water, soil minerals, and nutrients) in the aftermath of disturbances. The proposed forest management activities under all action alternatives would cause ground disturbance, increase light availability to the forest floor, and diminish competition for soil moisture by removing some trees.

Some State-listed noxious weeds are known to occur along proposed haul routes (Table C-1). None are known to occur within proposed units, but one site of diffuse knapweed is recorded from immediately outside a unit boundary.

Table C-1. Non-Native Species of Concern Recorded from Project Units and Haul Routes.

Invasive Plant Species	Infestation Location(s)	Concern Level	Concern Level Rationale
Diffuse knapweed (CEDI3)*	One site located next to a water-filled quarry a few feet outside the boundary of Unit 13-4.	High	Adaptable to wide range of conditions, easily dispersed by vehicles, detrimental ecological effects (Cal-IPC 2006, ODA 2018).
Spotted knapweed (CESTM)*	Two sites recorded from private lands along Keno Access Road (39-7E-31) haul route. (The northwestern site could not be relocated in April 2018.)	High	Severe detrimental ecological impacts, easily spread by vehicles, ODA T-rated weed (Cal-IPC 2005, ODA 2018).

Invasive Plant Species	Infestation Location(s)	Concern Level	Concern Level Rationale
Canada thistle (CIAR4)*	Three sites, one along Owens Road (38-3E-9) haul route, one along Shell Peak B Spur (38-3E-11.4) haul route, and one along Keno Access Road.	Moderate	Adverse ecological impacts (Cal-IPC 2003) but of less concern away from riparian habitats and continual disturbances such as tilling (ODA 2018).
Houndstongue (CYOF)*	Four sites along Keno Access Road, two on private land along haul route.	High	Potentially tolerant of shade (Cal-IPC 2005, ODA 2018) after introduction.
St. Johnswort (HYPE)*	One site recorded from Owens Road, although this roadside nonnative may be present elsewhere along haul routes.	Limited	Rangeland weed (Cal-IPC 2004) found mostly along roadsides, suggesting a need for full sun and frequent disturbance. Unlikely to persist as the forest canopy re-grows following implementation of action alternatives.
Dalmatian toadflax (LIDA)*	Four sites along Keno Access Road, two on private land.	Moderate	This rangeland plant prefers sunlight and is unlikely to thrive away from road margins as canopy regrows (Cal-IPC 2005, ODA 2018).

* These USDA NRCS PLANT codes are used to identify invasive non-native plant infestations on project maps.

Early-seral plant species, including non-native plant species, would benefit from implementation of the action alternatives. Most of these early-seral non-natives are expected to wax with disturbance and wane as forest succession proceeds. The BLM is primarily concerned about those non-native plant species which have been listed as noxious weeds by the State as risks for persistence, rate of spread, and ecological impacts. The Concern Level column in Table C-1 provides the professional judgement of the Ashland Field Office botany staff about the risks posed by infestations associated with the project based on information from the Oregon Department of Agriculture, California Invasive Plant Council, other published sources, and professional local experience in view of the proposed activities and their location.

Rationale: The action alternatives include PDFs to prevent the introduction of novel non-native (particularly invasive or noxious) plant species via vehicle washing and the use of certified weed-free materials, conforming to 2016 ROD/RMP direction for invasive species. Implementing these preventative measures for the action alternatives would reduce the risk of novel non-native plant introduction approximately to the baseline rate of the no-action alternative.

Houndstongue and Dalmatian toadflax infestations occurring on public lands along haul routes have been treated in the past and are scheduled for continued treatment in 2018 and likely beyond, as funding permits. However, infestations of high-concern species also occur along haul routes traversing private lands, where treatments cannot be predicted. The haul route along which high-concern invasive plant sites on private lands are documented is the Keno Access Road, a paved road. Because this paved road

is not likely to be muddy, the edges of the paved road are well-defined, and invasive plants are less likely to grow in the direct path of a vehicle because of the pavement, this haul route presents a lower risk of spreading invasive plant seeds compared to an unpaved road. However, since the risk cannot be entirely ruled out, this project includes a PDF to monitor high-traffic areas of project units for knapweed, houndstongue, or toadflax infestation the year after active work on the project has ended, and to treat any newly discovered infestations of these species discovered for the three years following the end of harvest activities. This PDF, combined with concurrent routine implementation of the Medford Integrated Invasive Plant Management Revised EA (USDI BLM 2018b) throughout the Ashland Field Office, is projected to reduce the risk of spreading known nonnative species of high concern along haul routes to the baseline levels expected under the No Action Alternative.

Since there is not a foreseeable difference in the risk of non-native plant spread between the action alternatives, and since implementing PDFs for action alternatives would approximate the baseline effects expected of the No Action Alternative, additional analysis of this issue is not expected to help make a reasoned choice between alternatives, and it was not carried forward for further analysis.

Issue C-10: How would proposed forest management activities affect the persistence of *Asarum wagneri*, *Gilia sinistra*, and *Lathyrus lanszwertii* within the Project Area?

Background Information: The Interagency Sensitive and Special Status Species Program (ISSSSP) relies upon the work of the Oregon Biodiversity Information Center (ORBIC) to determine whether and which special status rank to assign to a given taxon. *Asarum wagneri*, *Navarretia sinistra* (syn. *Gilia s*.), and *Lathyrus lanszwertii* are locally native plants that have all been placed on ORBIC List 4, the 'Watch' list. Plants on this list, though of conservation concern, are currently considered secure in Oregon, or are considered still too common to be proposed as threatened or endangered (ORBIC 2016). ORBIC List 4 species do not meet ISSSSP criteria for special status (i.e., Bureau Sensitive or Strategic) designation (USDI BLM 2015a).

Rationale: This issue was considered but not analyzed in detail because these species are not special status species. ORBIC considers them either sufficiently secure or sufficiently common not to warrant the same active management attention as List 1, 2, or 3 taxa.

Issue C-11: How would proposed forest management activities affect the persistence of geophyte plant communities, which great gray owls depend on for food?

Background Information: Geophytes – plants which grow subterranean energy storage structures, such as onions or potatoes – are a food source for rodents, which in turn are food sources for the great gray owl.

Rationale: This issue was considered but not analyzed in detail because the pocket gopher, which is the primary prey of GGOs in the NSO Analysis Area (see Section 3.4, *Northern Spotted Owl Habitat*), occurs in large numbers throughout the southern Cascades, and are especially common in areas where forest management activities have recently occurred. The proposed activities would not affect their numbers in any meaningful way.

Issue C-12: What effect would proposed riparian treatments have on native plant communities along rivers and streams?

Rationale: This issue was considered but not analyzed in detail because riparian treatments are not proposed in this project.

Issue C-13: How would the proposed activities affect native plant pollinator life cycles?

Rationale: This issue was considered but not analyzed in detail because vegetation management activities typically promote early-successional flowering plants, many of which are insect-pollinated forbs. The 2016 ROD/RMP management objectives for HLB-LITA include provision of complex early-successional ecosystems and development of diverse late-successional ecosystems for a portion of the rotation (USDI BLM 2016b, p. 64). Increased ecological complexity and plant species diversity is expected to promote pollinator life cycles by increasing foraging opportunities in a variety of niches.

PDFs such as seeding with native species is expected to take place in areas sufficiently disturbed to require it, such as landings. According to Bureau policy, seed mixes are expected to employ at least one pollinator-friendly species (USDI BLM 2016c).

TERRESTRIAL WILDLIFE RESOURCES

Issue C-14: How would proposed vegetation management activities affect the persistence of fishers in the project area?

Background Information: The West Coast Distinct Population Segment (DPS) of fisher (*Pekania pennanti*) is a BLM Bureau Sensitive Species. In the southern Oregon Cascade Mountains the home range of a non-breeding male fisher averages 24 mi^2 (15,320 acres) while home range of a female fisher averages 9.6 mi^2 (6,177 acres) (Aubry and Raley 2006).

Rationale: A preliminary analysis was conducted to determine potential effects to fisher and whether or not this issue warranted detailed analysis. The PRMP/FEIS describes the fisher's range, the habitat it uses, and the effects of vegetation management as described in the RMP on fisher and their habitat (USDI BLM 2016a, pp. 871-872). The PRMP/FEIS analysis describes that under the RMP there would be a 10-15 percent loss in total fisher habitat and resting habitat in the first two decades; however, additional habitat would develop in subsequent decades that would surpass current conditions by 2043 (USDI BLM 2016a, p. 879). The PRMP/FEIS also found that the Proposed RMP would lead to a slight decrease of one fisher in the first decade and an eventual increase of 60 fishers within 50 years across the landscape (USDI BLM 2016a, p. 879).

Initial analysis of the Griffin Half Moon Proposed Action uses the same NSO Analysis Area as defined in the EA, Section 3.4.4. NSO NRF habitat has been determined to be a reasonable proxy for fisher habitat (*KS Wild v. US BLM*, Case No. 06-3076-PA, Order and Judgment 9/10/2007). Fisher home ranges in the NSO Analysis Area averaged 6,833 acres for males and 3,565 acres for females (derived from a subset of data from the Klamath Plateau Study). The NSO Analysis Area has two known resident female fishers and two known resident male fishers. Based on the overall size of the NSO Analysis Area, it has the potential to contain at least seven female home ranges and three or more male home ranges, depending on their home range juxtaposition on the landscape.

Proposed commercial treatments under all action alternatives would have negative effects to habitat suitable for use by fisher for denning and resting and for some fisher prey species due to the removal of trees and other vegetation. As described above these effects were anticipated under the RMP. For the Griffin Half Moon Project Area, some of these effects would be relatively short-term, as understory vegetation typically returns within five years and some of the fishers' prey species take advantage of early-seral stages. Additionally, treatments would retain key habitat characteristics such as large snags and coarse woody debris (CWD) to maintain existing and provide for future habitat for fishers. However, in all action alternatives, 410 acres of NSO NRF habitat (a proxy for fisher denning and resting habitat) would be reduced in canopy cover and would no longer be considered suitable for use by fisher for these life history activities. This would reduce the amount of habitat in the NSO Analysis Area available to fishers for denning, resting, and foraging by approximately three percent. Approximately 97 percent of the habitat within the Analysis Area would remain.

Treatment of NSO Dispersal habitat and treatment proposed in four acres of LSR would impact fisher by removing some hiding cover. Fisher are known to travel through NSO Dispersal habitat as they cross the landscape and likely forage opportunistically in this habitat while they move through it. While there are slight variations among the action alternatives in the amount of canopy cover retention among the alternatives, the difference in terms of post-harvest habitat function for fishers would be minimal. The immediate effects to fisher of all proposed treatments would also be minimal, because more than 97 percent of habitat suitable for denning and resting would remain untreated within the NSO Analysis Area.

Disturbance from treatment activities would likely be the principal effect to fisher within the NSO Analysis Area. However, fishers are highly mobile and, with large home ranges, they would likely move to another part of their home range while the activity is taking place.

Under all action alternatives, the implementation of PDFs would minimize impacts to fishers. These include the retention of key structural elements such as mature and decadent trees (including mistletoe-infected trees and trees with cavities and platforms), snags, CWD, and large hardwoods for denning. While three percent of the denning and foraging habitat (i.e., NRF) in the NSO Analysis Area is proposed for treatment, areas such as Riparian Reserves, NSO RA 32 habitat, NSO Nest Patches, NSO 0.5-mile core areas, and other designated reserves would continue to provide undisturbed habitat for fishers. Adjoining the NSO Analysis Area to the northeast is a large Late-Successional Reserve (LSR) that is located on USFS-administered land, which would also continue to provide habitat for fishers. Similarly, to the south, east, and west, the Cascade-Siskiyou National Monument and 2016 RMP Late-Successional Reserve provides large areas with habitat suitable for fisher life history purposes. Because of the retention of these habitat features in and adjacent to the NSO Analysis Area, effects to fishers from implementation of this project are expected to be minor, and would not trend this species towards further listing.

The decision to implement regeneration harvest was made under the 2016 ROD/RMP and its effects to fisher were analyzed at an appropriate scale in the PRMP/FEIS. The Griffin Half Moon Project is designed consistent with the RMP decision. Furthermore, since there is not a foreseeable difference in effects to fisher between the action alternatives, additional analysis of this issue is not expected to help make a reasoned choice between alternatives, and it was not carried forward for further analysis.

Issue C-15: How would proposed forest management activities impact the possibility of barred owl encroachment onto NSO habitat?

Background Information: Barred owls have been moving into the range of the northern spotted owl since the early 1990s. They have been detected on a regular basis on the Medford District BLM and within the boundary of the Ashland Field Office since the early 2000s. Detections of barred owls within the Griffin Half Moon NSO Analysis Area have been a regular occurrence over the last decade.

Rationale: This issue was considered but not analyzed in further detail because the 2016 ROD/RMP directs BLM to meet RA 32 by protecting structurally complex forests in the LSR LUA to provide NSOs with high-quality refugia habitat from the negative competitive interactions with barred owls (USDI BLM 2016b, p. 127); BLM would not remove such habitat in the LSR LUA as a result of this project. The 918 acre reduction in canopy cover to below the 40 percent threshold required for NSO dispersal habitat that would happen in the HLB-LITA LUA as a result of implementing the action alternatives is consistent with direction in the 2016 ROD/RMP to not defer or forego timber harvest of stands in the HLB to contribute to RA 32.

Barred owls are already present across the landscape upon which the Griffin Half Moon Project is located. Available evidence suggests that the presence and distribution of barred owls may affect habitat quality for spotted owls (Wiens 2012; Yackulic et al. 2013). The proposed vegetation management activities are almost entirely outside the home range of historic NSO sites, hence there is very low-likelihood of vegetation management activities contributing to barred owl encroachment onto NSO habitat. Post treatment, the project footprint is not expected to provide habitat suitable for NSO nesting, roosting, foraging or dispersing. Barred owls select habitat that is generally similar to that used by NSO. The proposed forest management activities would be likely to render the project footprint unsuitable for use by barred owls as well. It is not known if forest habitat removal directly results in a range expansion of barred owls (USDI USFWS 2013).

Issue C-16: How would regeneration harvest impact the Project Area's role as an important north/south (between the CSNM and USFS lands) connectivity corridor, contributing to habitat fragmentation across the landscape?

Background Information: Connectivity between the CSNM to the south and USFS-managed land to the north is provided by BLM-administered lands between the two areas.

Rationale: BLM's RMP includes Late-successional Reserves comprised of structurally-complex forest and Large Block Forest Reserves to provide large habitat blocks needed for northern spotted owl conservation (USDI BLM 2016a, p. 928). These Large Block Reserves also provide for other species including late-successional associated species. A Large Block Reserve is located to the west of the Griffin Half Moon Project area running in a north-south direction. The southern portion of this Large Block Reserve is now included in the CSNM expansion area and then runs north abutting the western boundary of the USFS Late-successional Reserve to the north of the Griffin Half Moon Project Area. Landscape scale connectivity is provided by designation Large Block Reserves.

Additionally, the areas proposed for treatment occur across a landscape that presents high variability in vegetative habitat distribution. The relatively small footprints of the proposed treatment units would not create barriers to connectivity for wildlife species. In addition, more contiguous expanses of BLM-managed conifer forest habitat occur only a few miles to the east and are likely the more important

corridor for wildlife movement. NSO are easily able to move across or around openings on this landscape. Fisher telemetry data shows that openings on the landscape do not impede movement of this species.

The PRMP/FEIS analyzed the effects of forest management on landscape scale forest conditions. When compared to average historic conditions, the combined amount of Mature and Structurally-complex forests in the decision area was about 51 percent, which is below the average historic condition of 58-80 percent. In 50 years under the RMP, the amount of Mature and Structurally-complex is expected to be within the range of historical conditions at 68 to 80 percent.

This issue was not analyzed in further detail under the Griffin Half Moon EA because the 2016 ROD/RMP decided the distribution of land use allocations; a decision that was analyzed at a much broader and more appropriate scale in the PRMP/FEIS. Further analysis would not provide for a reasoned choice among alternatives as the decision to allocate lands in the Griffin Half Moon Project Area to HLB-LITA LUA has already been made. The RMP directs BLM to conduct forest management in HLB-LITA to produce complex early-successional ecosystems.

Issue C-17: What effect would salvage harvest have on the retention and recruitment of snags and down woody debris (for wildlife habitat) in complex early seral habitat?

Rationale: This issue was considered but not analyzed in detail because no salvage harvest is proposed as part of this project.

Issue C-18: How would removing mature trees from outer riparian reserves for use in streams (tree tipping) affect wildlife habitat availability?

Rationale: This issue was considered but not analyzed in detail because no tree tipping is proposed as part of this project.

Issue C-19: How would proposed thinning and brush removal affect population trends for neotropical migratory birds in the Project Area?

Background Information: Some migratory bird individuals may be disturbed or displaced during project activities. Some nests may be destroyed from timber harvest occurring during active nesting periods. However, there would be no perceptible shift in species composition the following breeding season because of the limited scale of habitat modifications in relation to the NSO Analysis Area (Section 3.4.4). Adequate undisturbed areas within and adjacent to the NSO Analysis Area would maintain habitat for displaced individuals. Overall, populations in the region would be unaffected due to this small amount of habitat and/or reproduction loss. These effects would not be measurable at the regional scale. Analyzing bird populations at this scale is supported by Partners in Flight (Zack et al. 2002).

Rationale: This issue was considered but not analyzed in detail because populations of neotropical migratory birds in the region would be unaffected due to the small amount of habitat and/or reproduction loss. These effects would not be measurable at the regional scale.

Issue C-20: How would proposed forest management activities affect the persistence of gray wolves in the Project Area?

Background Information: Gray wolves have recently migrated back into the southern Oregon Cascades, becoming a more common sight on the landscape around the Project Area.

Rationale: This issue was considered but not analyzed in detail because no den or rendezvous sites for gray wolves are known within the Project Area. Proposed vegetation management activities would provide more early-seral habitat, benefitting gray wolf prey species such as deer and elk. Gray wolf persistence would not be expected to be affected by the proposed actions.

Issue C-21: How would proposed forest management activities affect the persistence of bald eagles in the Project Area?

Background Information: On average, six pairs of bald eagles nest on the periphery of Howard Prairie Reservoir each year. Bald eagles choose the largest, tallest legacy trees in a stand for their nest sites, placing their nest at or near the top of these trees, above the surrounding forest canopy.

Rationale: The proposed vegetation management activities are not expected to affect the persistence of bald eagles in the Project Area. Large legacy trees ≥40 inches DBH and established prior to 1850 would not be selected for harvest under the 2016 ROD/RMP in either LUA that vegetation management treatments are proposed (USDI BLM 2016b, pp. 64, 71).

Issue C-22 How would proposed regeneration harvest impact species that depend on late-successional habitat (other than those already addressed)?

Background Information: Some late-successional associated species are known to occur in the NSO Analysis Area (Section 3.4.4). Some late-successional habitat would be removed if proposed regeneration harvest is implemented.

Rationale: This issue was considered but not analyzed in detail because this project as planned conforms to the 2016 ROD/RMP direction for managing habitat in HLB-LITA LUA, the vast majority of the Project Area, which directs BLM to produce complex early-successional ecosystems. Effects of the proposed actions to the Northern Spotted Owl are analyzed in detail in Section 3.4, *Northern Spotted Owl Habitat*.

Also see response to Issue C-16 above in regards to the establishment of Large Block Reserves under the RMP.

Issue C-23: How would proposed activities affect the foothill yellow-legged frog?

Background Information: The foothill yellow-legged frog is a Bureau Sensitive Species. Associated with aquatic habitat, they are protected by Riparian Reserves under the 2016 ROD/RMP.

Rationale: This issue was considered but not analyzed in detail because this species is not known to occur, nor does suitable habitat exist, within the Project Area. Additionally, riparian treatments are not proposed in this project.

Issue C-24: How would proposed activities affect the Pacific tree frog?

Rationale: This issue was considered but not analyzed in detail because this species is not on any Special Status Species list. This species is very common to a wide variety of habitats throughout the northwest, and the proposed activities would not impact their overall populations.

Issue C-25: How would proposed activities affect Bureau Sensitive Wildlife Species?

Rationale: This issue was considered but not analyzed in detail because this project implements PDFs for the protection of Bureau Sensitive wildlife species that "alter the type, timing, location, and intensity of management actions" as required under the 2016 ROD/RMP (USDI BLM 2016b, p. 115).

Issue C-26: How would proposed vegetation management activities contribute to the effects of climate change on northern spotted owl habitat?

Background: The effects of this project on the contribution to the effects of climate change on NSO habitat tiers to the analysis in the PRMP/FEIS addressing the effects of climate change on NSO habitat that would occur from implementing the Proposed RMP (USDI BLM 2016a, pp. 190-191, 198-199). The information available on project-specific and site-specific conditions, while more specific, is not fundamentally different from the information used in the PRMP/FEIS analysis of effects of climate change on NSO habitat, and thus cannot reveal any fundamentally different effects than that broader analysis.

Rationale: This issue was considered but not analyzed in further detail because the Griffin Half Moon Project is consistent with, and is not expected to have significant effects beyond those already analyzed in, the PRMP/FEIS. Nearly all vegetation management activities are proposed in HLB-LITA LUA (with the exception of treatment in four acres of LSR), which are dedicated to long-term sustained yield timber management. The PRMP/FEIS analysis provided for NSO habitat refugia against climate change through the designation of designated Wilderness areas, District-Designated Reserve – Lands Managed for the Wilderness Characteristics, structurally complex Late-Successional Reserves, and Riparian Reserves (USDI BLM 2016a, p. 202).

Issue C-27 How would proposed vegetation management activities affect the northern goshawk (*Accipiter gentilis*)?

Background: The 2016 ROD/RMP directs the BLM to manage habitat for species that are ESA-listed, or are candidates for listing. BLM is also directed to implement conservation measures to mitigate specific threats to Bureau Sensitive species during the planning of activities and projects. An objective of the 2016 ROD/RMP is to conserve or create habitat for species addressed by the Migratory Bird Treaty Act (MBTA) and the ecosystems on which migratory birds depend (USDI BLM 2016b, p. 115). The northern goshawk is included in the MBTA.

Rationale: This issue was considered but not analyzed in further detail because the northern goshawk is not ESA-listed, is not a candidate for listing, nor is it a Bureau Sensitive species.

PDFs for the protection of known raptor nests (which would include goshawks) are in place. PDFs include the seasonal restriction of timber harvest activities within 0.25 miles of raptor nests (other than NSOs or bald eagles) from March 1st through July 15th.

CULTURAL AND PALEONTOLOGICAL RESOURCES

Issue C-28: How would ground disturbance from proposed project activities affect cultural resources such as archaeological, and historical sites, artifacts, and features which are listed, eligible, or potentially eligible for the National Register of Historic Places?

Background Information: The Griffin Half Moon Project proposes vegetation management treatments which have the potential to effect cultural resources. In accordance with the National Historic Preservation Act of 1966, as amended, and the guidance in the 2015 State Protocol for managing cultural resources on lands administered by the BLM, a Class III cultural resource survey was conducted for the Griffin Half Moon Project.

Rationale: This issue was considered but not analyzed in further detail. The project archaeologist conducted archival research, a site files search, and a field survey to identify cultural resources that are located in the Project Area, with the results detailed in a cultural resource inventory report. This report discusses all prehistoric and historic archaeological sites and isolated finds identified in the Project Area, and assesses them in terms of their National Register of Historic Places (NRHP) eligibility. Non-eligible sites and isolated finds do not require further consideration. Impacts to NRHP-listed or eligible prehistoric or historic archaeological sites will be avoided by the establishment of buffers, within which no project activities would take place. Therefore, this project would have no effect on historic properties.

Issue C-29: How would ground-disturbing activities from the project affect traditional cultural resources or sites of religious significance to tribes, by altering accessibility or use?

Background Information: Tribal consultation was undertaken in order to identify places of traditional religious or cultural significance to tribes who take interest in the Project Area. This consultation did not result in the identification of any sites of concern to tribes.

Rationale: This issue was considered but not analyzed in further detail because no sites of traditional cultural or religious significance to tribes were identified in the Project Area.

The project would not result in restricting access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites. No sites have been identified in the Project Area. Executive Order 13007 (Indian Sacred Sites).

This project would have no effect on Indian Trust Resources as none exist in the Project Area.

Issue C-30: How would ground disturbance from proposed project activities affect paleontological resources?

Background Information: The BLM paleontology program works to preserve and protect paleontological resources for the benefit of current and future generations; assess for the presence and significance of paleontological resources prior to making land use decisions; facilitate insightful research into the geology and paleobiomes that preserve extinct organisms; and produce programs that increase the public's awareness and appreciation of paleontological resources.

Paleontological resources are protected under the Paleontological Resources Preservation Act of 2009 (PRPA).

Rationale: This issue was considered but not analyzed in further detail. Data about regional and local fossil localities is limited. Research of available information suggested a low probability for paleontological resources within the Project Area. During project survey no paleontological resources were located.

FIRE AND FUELS

The Fire and Fuels Analysis Area is 11,257 acres in size and was delineated to follow administrative boundaries during the initial scoping phase for this project. The BLM manages 3,519 acres of the Analysis Area. The stands proposed for fuels treatments account for less than 27 percent of BLM-administered lands in the Analysis Area at 933 acres and approximately 8.3 percent of all acreage in the Analysis Area. The Analysis Area used for this Fire and Fuels analysis may be different than other analysis areas used for this project.

Issue C-31: How would prescribed fire treatments in the spring impact native plant communities, spring nesting bird species, and native pollinator species active during the spring?

Background Information: Historically spring prescribed burning on the Dead Indian Plateau has not typically occurred due to fine dead fuel moisture and herbaceous fuel moisture remaining high into the early summer and not allowing for objective attainment during application of fire.

Rationale: The issue was considered but not analyzed in further detail because prescribed burning would be planned in the fall and winter due to weather parameters to meet burning objectives in the project location.

Issue C-32: How would smoke from proposed prescribed fire treatments (handpile burns, underburn) affect air quality?

Background Information: Section 3.5 of the Medford District BLM Fire Management Plan (USDI BLM 2017b, pp. 25-26) describes the measures BLM takes to reduce smoke impacts to air quality:

> All Medford District BLM prescribed fire activities will comply with the Oregon State Implementation Plan of the Clean Air Act and the EPA's Interim Air Quality Policy on Wildland and Prescribed Fires. Section C of the Policy requires that all Prescribed Fire Plans address the four Smoke Management Components. Components include: actions to minimize fire emissions, evaluate smoke dispersion, public notification and exposure reduction procedures, and air quality monitoring. Interstate transport of smoke will be monitored and mitigations measures will be addressed in site specific Prescribed Fire Plans.
>
> Wildland fire managers must consider the effects of their actions on visibility in critical areas including Class 1 air sheds, Smoke Sensitive Receptor Area, and non-attainment areas. Prescribed Fire Plans need to identify sensitive areas and provide operational guidance to minimize the impact from smoke.

Burn registration and smoke emissions from prescribed fire activities are entered in the Fuels Analysis Smoke Tracking and Report Access Computer System (FASTRAX) with the information transmitted to Oregon Department of Forestry. An Oregon Department of Forestry Smoke Management forecast will be obtained for every prescribed burn that may affect communities.

The Medford District BLM will assist air quality regulatory agencies in the siting and operation of emergency episode air quality monitoring stations, when necessary, to assess smoke impacts from prescribed fire or wildfire. In the event of a severe smoke episode caused by a large or long duration wildfire under the jurisdiction of Medford District BLM, additional protocol guidance is provided in the Oregon Wildfire Response Protocol for Severe Smoke Episodes, June 2014.

For the Griffin Half Moon Project, approximately 933 acres may be evaluated and considered for prescribed fire, pending post-harvest fuel loading assessments.

Rationale: Smoke from proposed prescribed fire treatments related to the Griffin Half Moon Project would not have a significant effect on air quality. PDFs would ensure that smoke impacts are minimized to an acceptable level (Section 2.4.2) by requiring compliance with the 2017 Interagency Prescribed Fire Planning and Implementation Procedures Guide (PMS 484) and with the Oregon Department of Forestry's Smoke Management Plan.

Additional PDFs, such as seasonal restrictions and handpile size limitations would help ensure reduced fire intensities of the sort that could contribute increased smoke into the atmosphere. Project activities would also be in compliance with Best Management Practices for Fire and Fuels Management outlined in the 2016 ROD/RMP (USDI BLM 2016b, Table C-5, pp. 186-191), several of which would help reduce smoke output.

With required measures applied to all action alternatives to meet the Oregon State Implementation Plan of the Clean Air Act and the EPA's Interim Air Quality Policy on Wildland and Prescribed Fires, further analysis of this issue is not warranted for making a reasoned choice among alternatives, and therefore was not carried forward for further analysis.

Issue C-33: What effects would vegetation management activities and artificial regeneration (planting) have on fuel loading, fuel structure, fire behavior, and fire hazard?

Background Information: Fuel loading is a term describing the amount of available fuel in a stand measured in tons per acre including live and dead vegetation. Fuel structure refers to the arrangement and size of the vegetative fuels within a stand. Fire behavior describes how a wildland fire burns based on environmental characteristics such as surface fuels, vegetation, canopy base height, density or closure, slope, aspect, weather, and elevation. The identification of fuel models helps to describe the fuels available to a fire based on the amount, distribution, and continuity of the vegetation and wood. Fuels combined with inputs such as weather and slope are used to predict potential surface fire behavior characteristics such as rate of spread, flame length, and fireline intensity.

Timber management activities, including planting, generally increase the surface fuels within a stand. However, whole tree harvesting with disposal of the tops at the landings is the most effective method of preventing surface fuel increases within the residual stand (Agee and Skinner 2005). At the landings,

slash would be piled, chipped, sold for firewood, or prescribe burned. Slash remaining within the stands would be lopped and scattered or hand piled and burned. Prescribed underburning would be implemented in selected stands where conditions indicate a low intensity burn could be achieved. These fuel reduction treatments would help create stand conditions that would be more resilient to future wildland fire and other environmental stress agents.

Rationale: This issue was considered but not analyzed in further detail because planned post-harvest fuels reduction in units would minimize the short-term effects to fuel loading, fuel structure, and fire behavior. The increase of fire hazard in stands proposed for Regeneration Harvest would be negligible at the Analysis Area scale (933 acres or 8.3 percent).

All the action alternatives include units proposed for pre-commercial thinning treatments that would create multi-aged and multi-layered stands, leaving them more resilient to environmental stressors such as fire, drought, and insects. Commercial thinning (CT) in Alternatives 3 and 4 would do the same. Isolated unthinned areas could exhibit isolated and group torching of trees during a wildland fire; however, the reduced canopy bulk density of the stand and openings would limit large-scale crown fire potential. Because of such structural diversity, these stands would still represent timber understory and timber litter fuel types but with reduced surface fuel loading. Stands would exhibit a decrease in overall potential fire behavior and an increase in fire suppression capability. Coupled with post-harvest fuels reduction work, treated stands would experience a decrease in fire hazard and risk for up to 20 years or until vegetation density returned to existing levels.

Alternatives 2 and 3 include units proposed for regeneration harvest (RH, HRRH, and WFRH) that would reset the stands to early seral conditions (for specific prescription information, see Section 2.3, *Alternatives Analyzed in Detail*). Post-harvest, natural regeneration is expected and artificial regeneration (planting) would occur as needed, to reforest the site to the required 130 trees per acre or greater within five years after harvest. Artificial regeneration would favor fire-tolerant species appropriate to the site. These trees would be inter-planted to encourage a mixed, discontinuous fuel profile less susceptible to high-severity fire. For the first one to five years after harvest, these stands would remain a slash fuel type until the shrubs, grasses, and planted trees become established. After establishment of regeneration, these stands would move into a brush fuel type. Brush fuel types are more volatile and are susceptible to high rates of fire-caused mortality. Stands could exhibit higher flame lengths, rates of spread, and fire intensity during this time. Fires started within these stands could be difficult to initially attack and control. However, lower density stands with retained legacy structural components would have greater discontinuity of vertical and horizontal fuel profile, resulting in relatively lower canopy bulk densities, moderate fire hazard, and moderate resistance to replacement fire within both the younger and structural legacy components of the stand (USDI BLM 2016a, p. 1320).

For five to 20 years following planting, the overall fire hazard would increase in these stands, resulting in young high density, stand establishment structure that has a relatively higher fire hazard (USDI BLM 2016a, p. 1320). However given the relative lack of historic ignitions, the relatively lower fire probability, and the small scale of treatment units (8.3 percent of the Analysis Area), the potential increase in fire hazard would be localized to the stand, affecting a small area, resulting in negligible effects.

Immediately following harvest activities and prior to fuels reduction treatments (i.e., pile burning or underburning), fire behavior potential would increase from the current condition due to increased

surface fuels. Following fuel reduction and removal treatments, a reduction in potential fire behavior would occur due to the reduction in surface fuel loading and change in horizontal and vertical fuel arrangement.

The BLM fuels management specialist would conduct a fuels assessment within each treatment unit following timber harvest activity. This assessment would determine the fuel hazard and fire risk based on surface fuel loading, aspect, slope, access, and location of each unit. The fuels management specialist would treat remaining slash concentrations within the stands by a lop-and-scatter or hand pile and pile burn treatment. Where conditions allow, a prescribed underburn may be implemented to further reduce fuel loading and increase stand resilience. At the landings, slash would be piled, chipped, sold for firewood, or prescribe burned. Post-treatment surface fuel loading would be reduced because the majority of the slash would be removed from the unit.

Lopping and scattering the activity slash would reduce the vertical height and horizontal continuity of the fuel bed. However, it would temporarily increase the surface fuel loads. This would put the stand into a slash fuel model resulting in higher predicted flame lengths, fire duration, and intensity. In 10 to 15 years after lopping and scattering, the effect of the slash on fire behavior would be diminished by the effects of decomposition and young vigorous vegetation growth (McIver and Ottmar 2007).

Hand piling and pile burning would decrease fuel loading of material one to six inches in diameter by 85 percent to 95 percent. Fuels greater than six inches in diameter would be left on the surface and would contribute to the coarse woody debris load. This treatment would move stands from a slash fuel type into a timber fuel type, which would result in a reduced rate of fire spread and average flame length.

SOIL STABILITY AND PRODUCTIVITY

Issue C-34: How would regeneration harvest impact slope stability (including erosion and landslide potential) in uplands and near streams?

Rationale: This issue was considered but not analyzed in further detail because there are no soils designated as fragile for mass movement or surface erosion in the Project Area from TPCC. In the Project Area, soils do not show indicators of being prone to either surface erosion or mass movement. Terrain in the Project Area is relatively flat, reducing the potential for impacts to slope stability in the uplands. There is no potential for impacts to slope stability near streams because treatments are not proposed in Riparian Reserves.

Issue C-35: How would proposed prescriptions, ground-based yarding, activity and hazardous fuels reduction treatments, and temporary route construction affect soil productivity (compaction, displacement, burning, and change in organic matter and soil chemistry)?

Background Information: Many factors can affect soil productivity such as compaction, displacement, erosion, organic matter loss and more. The 2016 ROD/RMP provides management direction to apply BMPs as needed to maintain or restore soil functions and soil quality and limit detrimental soil disturbance (USDI BLM 2016b, p. 109).

The RMP also provides direction to limit detrimental soil disturbance from forest management operations to a total of less than 20 percent of the harvest unit area (*Id.*). 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 less than 20 percent 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 (*Id*.).

Rationale: This issue was considered but not analyzed in further detail because the potential for impacts to soil productivity beyond what was anticipated and analyzed in the PRMP/FEIS for the 2016 ROD/RMP is negligible. The Griffin Half Moon Project incorporates the applicable BMPs from the 2016 ROD/RMP (Table C-2, pp. 183-185) as PDFs (Section 2.4.3, Objectives 1 and 2) in each of the action alternatives. Additionally, since the PDFs are applied equally among the action alternatives, further analysis of this issue would not help to make a reasoned choice between alternatives, and therefore it was not carried forward for further analysis.

Impacts to soils and soil productivity were evaluated where ground-disturbing actions are proposed (treatment units, road and route construction, pre-designated skid trails, fuels treatments, etc.). Proposed actions that affect soil productivity and have the potential of creating detrimental disturbance close to the 20 percent of the harvest unit area threshold include timber harvest and yarding, activity and hazardous fuels reduction treatments, new road, temporary route, and landing construction, and non-motorized trail construction. An evaluation of the proposed treatment areas, in the field and via office review, determined that the detrimental soil disturbance does not currently exceed 20 percent in proposed treatment areas. Implementation of the PDFs described above eliminates the potential for detrimental impacts over 20 percent to occur from implementation of the proposed actions. For this reason, the Griffin Half Moon Project would meet the required detrimental disturbance threshold after implementation. Road construction that would occur within treatment units counts towards the 20 percent threshold. BMPs, such as limiting skid trails to 15 percent of the unit area, were designed in part to account for the potential of road construction in these areas.

The remainder of proposed actions, identified in Sections 2.3.3 and 2.3.4, would not have the potential to impact soil productivity and were not evaluated further. These actions include road decommissioning (long-term closure), renovation, and reconstruction, and timber haul. These actions would either not cause soil disturbance or they occur where soil productivity is already considered detrimental and would not cause additional soil compaction, displacement, erosion or organic matter loss beyond what has already occurred.

Timber Harvest – Ground-Based Yarding

For timber harvest that would apply ground-based yarding, PDFs such as utilizing existing skid trails where possible, limiting the area of skid trails to under 15 percent of the area, and spacing skid trails an average of 125 feet apart would limit compaction and soil displacement to within the acceptable limit (below 20 percent of the area with compaction being no higher than 15 percent of that area). In an Oregon State University study on partial cutting (using designated skid trails), four percent of the treatment area was occupied by designated skid trails, compared to 22 percent for conventional logging (Bradshaw 1979). In a study of thinning and partial-cutting utilizing ground-based yarding systems, skidding logs caused soil disturbance on approximately 21 percent of the site, resulting in 13 percent displacement and eight percent compaction (Landsberg et al. 2003). Observations during field review of the proposed treatment units reveal many existing footprints of skid trails. Tree and brush vegetation

has re-established in some of the skid trails that were previously compacted from past harvesting but some are still fairly open and compacted. These existing footprints would be prioritized to be used first in order to avoid additional damage, if new skid trails are needed, they would be placed in distances that would meet the less than 15 percent detrimental soil compaction requirement.

Soil erosion from ground-based yarding would be localized to skid trails and would not be displaced off-site because of the gentle slope, low degree of soil erodibility, and the adjacent undisturbed soils. The duff organic horizon and vegetation adjacent to ground disturbance would catch displaced soil particles. PDFs such as waterbarring, seeding, mulching, and dry condition haul would limit the amount of soil erosion and, if it were occurring, limit the distance soil particles would be displaced.

There are two proposed skid trails on existing footprints that would cross a Riparian Reserve in Unit 1-1. These skid trails are in soils that have slight risk for surface erosion (NRCS 2017). Additionally, these skid trails would only be used in dry conditions with minimal passes and would be covered after use before the wet season. Very little soil erosion is expected to occur here and there is a thick enough organic horizon, down woody material, and vegetation downslope of the skid trails that soil particles that are eroded from the skid trail are unlikely to move far before being intercepted.

Timber Harvest- Regeneration Harvest Prescriptions

There would be more intense use of skid trails in regeneration harvest treatments due to the increased amount of volume removed from a single stand. PDFs assure the area of detrimental disturbance to soils would be under the acceptable threshold and if not, soil restoration activities would occur to meet the threshold. There would be an increase in the amount of slash remaining in order to address soil productivity issues as well as other resource issues. Slash material left onsite is beneficial to soil productivity because it contains nutrients that would stay in the system and eventually return to the soil, it can be a source of organic material as well. In regeneration harvests, there may be more overall soil recovery in the skid trails due to the long rotation length. These skid trails likely have over 30 years with no machinery use. During that time, freeze-thaw actions, biological activities and other soil forming factors would be occurring and working to improve the detrimentally disturbed soils. Thinning in general, involves a much shorter rotation time where the soil in the skid trails likely never recover past detrimental conditions.

Fuels and Understory Reduction Treatments

The burning of activity fuels and natural hazardous fuels, including pile burning has the potential to impact soil productivity through detrimental heating of the soil and increasing erosion potential. These impacts count toward the overall impact of detrimental soil disturbance. However, PDFs, such as dispersing hand piles across the unit into small piles and burning when soil moistures are high (Section 2.4.2, Objective 5), would minimize the intensity and extent of the burn.

Road and Landing Construction

The construction of new roads has a direct effect on soil productivity on that site. The soils in these locations would be bladed and compacted. The impacts from road construction vary depending on whether the road or route would be temporary or permanent. Whether the road is located within or outside of a treatment unit also affects how soil disturbance is calculated.

Temporary Route Construction

Alternatives 2, 3, and 4 propose to construct two temporary routes (approximately 0.39 miles total); which equates to about 0.95 acres of detrimental disturbance. Approximately 0.33 miles (or 0.8 acres) would be constructed within treatment units (Unit 13-1 and 13-2). The rest of the proposed routes would be on private land.

The effects of temporary routes and permanent road construction are the same both during construction and use. However, differences in effects to soil productivity between the two occur once a project is completed, as temporary routes would be fully decommissioned at the close of project activities. Soil erosion caused by road construction and decommissioning would be avoided or minimized due to the incorporation of PDFs. For example, seasonal restrictions during all road construction activities would reduce the potential for runoff and off-site erosion from intensive winter storms and saturated soil conditions.

Temporary route construction would result in a temporary (less than 10 years) full loss of soil productivity. Decommissioning would likely not return the soil to the original bulk density in the short-term. However, seeding and mulching would discourage soil displacement, surface sealing, reintroduce organic material and rooting systems into the soil, and facilitate the vegetative recovery of the soil. Soil productivity is expected to return in the long-term (10+ years). However, studies (Rice et al. 1972) and local observations by BLM soil scientists reveal that vegetation recovery and erosion rates can return to near-normal levels within approximately five years.

Soil erosion from road construction would be avoided or minimized due to the incorporation of PDFs, such as limiting construction to between May 15th and October 15th or during dry soil conditions (less than 25 percent soil moisture) and locating routes on stable locations, such as ridgetops and stable benches, or flats where topographically feasible. These PDFs, and other PDFs identified in Chapter 2, would reduce the potential for runoff and off-site erosion from intensive winter storms and saturated soil conditions.

User-Created Lily Glen Equestrian Trail

There is a user-created equestrian/hiking trail that runs from the Lily Glen Equestrian Park/Campground along the shores of Howard Prairie Lake, primarily on lands administered by the Bureau of Reclamation (6.5 miles). A section of this user-created trail (1.6 miles) loops back onto BLM-administered lands, 0.23 miles of which is proposed for use as a haul route. The route is currently approximately 10 feet wide and ruts in some sections. This route would be brushed and graded in areas needing drainage improvement or for safe passage of vehicles. After use, he route would be rehabilitated to as good or better condition than prior to use, ensuring proper water drainage where necessary. The effects on the soil that is decommissioned would be similar to the effects of temporary routes after project activities are completed. The restored trail footprint would be left in better shape than it currently is in, which would encourage users to stay on the existing trail, reducing the potential for widening the user-created trail.

Landings

Most landings are within existing footprints of previous disturbance, while some may be new construction. The anticipated effects of landing construction would be the same as temporary route

construction as the soil would be detrimentally disturbed but would be de-compacted, seeded and mulched in order to aid the recovery of the soil towards natural productivity.

Issue C-36: How would proposed activities contribute to the cumulative effects on soil productivity?

Rationale: This issue was considered but not analyzed in detail because detrimental soil conditions, when added together, would remain under a threshold of 20 percent of the unit area. If there are detrimental conditions from a cumulative impact such as grazing, that area would be counted for in the 20 percent threshold. If it were to go over 20 percent, restoration work (such as, but not limited to, decompacting skid trails, landings, or temporary roads where needed) would be done to improve the soil. This restoration work would set the soil on an escalated recovery time frame. The amount of time it would take for the soil to be considered in a non-detrimental state depends on the current condition of the soil, from immediately to more than ten years after restoration is complete. Additionally, PDFs are in place to keep timber harvest activities to within the threshold (Section 2.4.1, Objective 2).

SILVICULTURE

Issue C-37: What effect would commercial thinning have on snag and coarse woody debris (CWD) recruitment important as wildlife habitat?

Background Information: Within the Harvest Land Base (where commercial treatments are proposed in the Griffin Half Moon Project) the 2016 ROD/RMP directs BLM to retain existing:

- Snags greater than 20” diameter at breast height (DBH);
- Snags 6-20” DBH in decay classes III, IV, and V;
- Down woody material greater than 20” in diameter at the large end and greater than 20’ in length; and
- Down woody material 6-20” in diameter at the large end and greater than 20’ in length in decay classes III, IV, and V.

The ROD/RMP also directs BLM to retain snags ≥ 6” DBH cut for safety or operational reasons as down woody material, unless they would also pose a safety hazard as down woody material (USDI BLM 2016b, p. 63). There is, however, no requirement to create snags within the Harvest Land Base after a timber sale (USDI BLM 2016b, p. 63, Table 3).

Rationale: This issue was considered but not analyzed in further detail because this project follows direction within the 2016 ROD/RMP for down woody debris recruitment in the Harvest Land Base. Additionally, project-specific PDFs would be in place to maintain or increase coarse woody material after harvest operations (Section 2.4.1, Objective 2)

Issue C-38: How would blowdown associated with proposed forest management activities affect wildlife habitat?

Background Information: Blowdown (i.e., windthrow) is defined by a tree or trees uprooted or felled by the wind. While there is a level of risk for blowdown events, depending on many biotic and abiotic influences, predicting blowdown would be speculative. It has been documented that post-logging blowdown or windthrow can be an undesirable side effect of thinning, especially during the first 3-5 years following treatment (Cremer et al. 1982). Two of the main factors that predispose stands to windthrow include high height to diameter ratios (large/long canopies) and the topographic position (ridge, mid slope, valley bottom) (Mitchell 2000). The residual stand's spatial arrangement of trees and where they sit on the landscape as well as the crown condition of leave trees can both be incorporated into a prescription and logging operation implementation to decrease the probability of a damaging wind event that could potentially lengthen the time for canopy cover to recover to the desired condition. Smith et al. (1997) notes that larger trees, because of their strength, "are often the least likely to be blown down in a normal windstorm" (p. 111). The 2016 ROD/RMP direction to retain all trees ≥ 40 inches DBH that were established before 1850 ensures that some larger trees would be retained on the landscape, helping to reduce instances of blowdown.

Rationale: This issue was considered but not analyzed in further detail because wind events of sufficient magnitude to substantially modify the post-treatment stands are inherently random in nature and occur chaotically across the landscape. As a general rule, the prescriptions designed for the Griffin Half Moon Project focus on removing low vigor trees, and leaving the structural elements in the stand, which would allow the "stronger" retained trees to respond physiologically to the decrease in stand density. Therefore, the project design minimizes the potential impact to windthrow in the event of such a windstorm. Further analysis would not provide additional predictability or provide additional clarity on effects to wildlife habitat or contribute to the decision making process.

Issue C-39: How would proposed forest management activities impact ecological values of the neighboring Cascade-Siskiyou National Monument?

Background Information: In January 2017, President Obama expanded the Cascade-Siskiyou National Monument (CSNM) by presidential proclamation under the Antiquities Act of 1906. The land use plan for the expansion area is the 2016 ROD/RMP as amended by the presidential proclamation. Griffin Half Moon Project units are outside the CSNM expansion area.

Rationale: This issue was considered but not analyzed in further detail because no project units are located inside the monument. Some haul would occur on existing BLM roads within the expansion area. On those same roads, road maintenance would occur, improving their overall condition. Such activity would be of a short duration and would not cause noise or other disturbance beyond previously-established background levels.

Issue C-40: How would proposed forest management treatments conform to modeling associated with the 2016 RMP?

Background Information: The appropriate standard for determining conformance of an action with the RMP is to review whether the action is specifically provided for in the RMP, or if not specifically mentioned, clearly consistent with the terms, conditions, and decisions of the RMP. 43 CFR 1601.0-5(b). The management direction in the 2016 ROD/RMP constitutes the terms, conditions, and decisions

of the RMP and is the appropriate standard for determining RMP conformance. The ROD/RMP clearly states that management direction "identifies where future actions may or may not be allowed and what restrictions or requirements may be placed on those future actions to achieve the objectives set for the BLM-administered lands and resources" (USDI BLM 2016b, p. 3). The BLM used the vegetation modeling to analyze environmental effects and to estimate the Allowable Sale Quantity (ASQ) for each alternative in the Proposed RMP/Final EIS. The vegetation modeling in the Proposed RMP/Final EIS is not a part of the ROD/RMP and is not included in the management direction. As such, it is inappropriate to use the vegetation modeling to evaluate the conformance of a resource management action with the RMP.

Rationale: This issue was considered but not analyzed in further detail because BLM maintains the discretion to select the order in which individual stands in the Harvest Land Base will be harvested and the appropriate harvest type to apply (commercial thinning, selection harvest, or regeneration harvest), based on site-specific and project-specific information and the applicable management direction. As stated in the ROD/RMP, "The BLM will determine which harvest practice, regeneration harvest or commercial thinning, to apply to any individual stand in the Harvest Land Base by evaluating stand conditions present at the time for harvest. The selection of appropriate harvest practices is at the discretion of the BLM, consistent with the management direction" (USDI BLM 2016b, p. 126). The management direction for timber harvest in the ROD/RMP contains direction to conduct the commercial timber harvest, such as in the Griffin Half Moon Vegetation Management Project, as well as restrictions and conditions for such timber harvest. The Griffin Half Moon Project is consistent with all applicable management direction.

The BLM will conduct plan evaluations at 5-year intervals to assess whether changed circumstances or new information have created a situation in which the expected impacts or environmental consequences of the RMP are significantly different than those anticipated in the Final EIS. Through these evaluations, the BLM will make a finding of whether or not a plan amendment or plan revision is warranted (USDI BLM 2016b, p. 34). Consistent with the strategic nature of the sustained-yield calculation, the vegetation modeling in the Proposed RMP/FEIS characterized forest condition and timber harvest outputs in 10-year increments based on a set of modeling assumptions and projections (USDI BLM 2016a, pp. 1163-1228). The BLM used that analytical information to declare an Allowable Sale Quantity of timber in the ROD/RMP (USDI BLM 2016b, pp. 5-7). The sustained-yield calculation in the Proposed RMP/Final EIS and the declaration of the Allowable Sale Quantity in the ROD/RMP are based on each entire sustained-yield unit. Therefore, the appropriate scale to consider whether the implementation of timber harvest is within the scope of the vegetation modeling is over a 10-year period across the sustained-yield unit. The strategic nature and broad temporal and spatial scale of the vegetation modeling render meaningless any determination of whether an individual project "adheres" to the vegetation modeling in the Proposed RMP/Final EIS. In the first scheduled plan evaluation, the BLM will need to consider many individual actions summarized across the sustained-yield unit over the first five years of implementation to draw even preliminary conclusions about whether the implementation of timber harvest is on a trend to be within the scope of the vegetation modeling. The BLM will not be able to make any definitive conclusions about whether the implementation of timber harvest has been within the scope of the vegetation modeling until the second scheduled plan evaluation.

RECREATION / VISUAL RESOURCES

Issue C-41: How would proposed forest management activities affect the visual landscape and the quiet use and enjoyment of public lands for public land users and adjacent landowners?

Background Information: For the purposes of visual resource management, the 2016 Southwestern Oregon ROD/RMP designated BLM-administered lands into four Visual Resource Management (VRM) Classes: Class I, II, III, and IV. The Griffin Half Moon Project Area includes only VRM Class IV lands. VRM Class II lands are located near the Griffin Half Moon Project Area associated with the Pacific Crest National Scenic Trail (PCNST) corridor. The closest treatment unit (Unit 1-2) is approximately 0.33 miles from the PCNST corridor. See the descriptions below for allowable levels of modification within these classes (USDI BLM 2016b, p. 114).

- VRM Class II – manage areas for low levels of change to the characteristic landscape. Management activities would be seen but would not attract the attention of the casual observer.

- VRM Class IV – management activities may dominate the view and would be the major focus of viewer attention.

No timber harvest or associated roadwork activities are proposed on lands managed as VRM Class II. All timber harvest activities are proposed on VRM Class IV lands.

Rationale: This issue was considered but not analyzed in further detail because proposed timber harvest activities and associated roadwork would not hinder attainment of VRM Class II or IV objectives. Timber harvest units are proposed along near Dead Indian Memorial Highway, the Keno Access Road, and other mainline gravel roads that would be visible and would attract attention from the casual observer through increased light entering the forest floor as well as logging activity and slash. However, impacts would be short-term, as woody vegetation cover would return within five years or less. Timber harvest activities in VRM Class IV would be consistent with management direction that allows activities to "dominate the view" and "be the major focus of viewer attention" (USDI BLM 2016b, p. 114). All proposed projects proposed in the VRM Class IV landscape would meet all visual objectives for this VRM Class.

In addition to the short-term impacts to VRM resources, this project has the potential to cause short-term noise impacts to public land users and nearby private landowners, associated with chainsaws, heavy machinery, and timber haul. Noise disturbances were also considered but not analyzed in further detail because they would be a short-term effect.

Issue C-42: How would proposed forest management activities affect the recreational setting on the user-created equestrian/hiking trail (Lily Glen)?

Background Information: There is a user-created equestrian/hiking trail that runs from the Lily Glen Equestrian Park/Campground along the shores of Howard Prairie Lake, primarily on lands administered by the Bureau of Reclamation (6.5 miles). A section of this user-created trail (1.6 miles) loops back onto BLM-administered lands, 0.23 miles of which is proposed for use as a haul route.

Rationale: This issue was considered and not analyzed in further detail because the user-created equestrian/hiking trail is not a BLM designated trail. The location of the trail to be used by BLM is not located in either a Special Recreation Management Area (SRMA) or an Extensive Recreation Management Area (ERMA) as designated in the 2016 ROD/RMP (USDI BLM 2016b, p. 259). However, trail users may experience short-term effects from noise disturbance and a short-term (one to three weeks) trail closure (for the 0.23 mile section) to provide for public safety. The section that would be used under Griffin Half Moon Project is a loop route off of the main trail located along the lake shore; the primary Lily Glen trail route would remain open during project activities. The trail would be left in current or better condition post project.

Issue C-43: How would proposed forest management activities affect recreation opportunities at nearby recreation sites?

Background Information: Nearby recreation sites include Willow Point County Park, Grizzly Creek County Park, and Howard Prairie County Park. Recreation activities also occur on Bureau of Reclamation managed lands surrounding Howard Prairie Reservoir, in USFS land adjacent to the northernmost project units, and on nearby BLM managed lands.

Vegetation management and associated roadwork operations have the potential to disrupt recreational activities in the following ways:

- During harvest, noise from trucks could discourage recreational use of some areas;
- Timber harvest and fuels treatment activity during the fall hunting seasons may negatively affect hunters' experiences;
- Treatments occurring adjacent to trails may negatively affect the experience of users; and
- Treatments on flat, or gentle gradient, ground have the potential to 'open up' land to off-highway vehicle intrusions.

Rationale: This issue was considered but not analyzed in further detail due to the dispersed nature of proposed treatments and to the incorporation of PDFs that would limit unauthorized OHV use. Therefore, there is no potential for significant effects (beneficial or adverse) to recreational opportunities within the Griffin Half Moon Project Area and nearby recreation sites.

CLIMATE CHANGE

Issue C-44: How would proposed regeneration harvest impact carbon storage, thereby contributing to global climate change?

Background Information: The effects of the Griffin Half Moon Project on greenhouse gas emissions, carbon storage, and climate change tiers to the analysis in the PRMP/FEIS (USDI BLM 2016a, pp. 165-211).

The analysis in the PRMP/FEIS addressed the effects on carbon storage and greenhouse gas emissions of implementing the entire program of work in the timber and fuels program based on high quality and detailed information (USDI BLM 2016a, pp. 165-180, 1295-1304). The information available on

project-specific and site-specific conditions, while more specific, is not fundamentally different from the information used in the PRMP/FEIS analysis of effects on carbon storage and greenhouse gas emissions, and thus cannot reveal any fundamentally different effects than that broader analysis.

Rationale: This issue was considered but not analyzed in further detail because the Griffin Half Moon Project is consistent with the 2016 ROD/RMP and is not expected to have significant effects beyond those already analyzed in the PRMP/FEIS. Project activities that would affect carbon storage and greenhouse gas emissions are commercial and non-commercial timber harvest, activity fuels treatments, and hazardous fuels treatments. 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.

RANGE

Issue C-45: How would ground disturbance and changes in canopy cover from proposed timber harvest and associated activities (i.e., timber haul, road construction) affect grazing and rangeland management in the Project Area?

Background Information: The Analysis Area for this issue question is 11,257 acres in size and was delineated to follow administrative boundaries during the initial scoping phase for this project. The BLM manages 3,519 acres of the Analysis Area. Of these 3,519 acres, 2,380 acres of BLM–administered lands are available for grazing. The Analysis Area contains portions of the Howard Prairie, Conde Creek and Deadwood grazing allotments. The 2,380 acres of BLM-administered lands available for grazing in the Analysis Area is approximately 18 percent of the total BLM allotment acreages (Table C-2).

There are three lessees who have a total of four grazing leases within the Analysis Area for authorization to graze 590 cattle, utilizing 1,410 animal use months (AUMs). The 590 cattle authorized to graze 1,410 AUM's is calculated using entire allotment acreage, which includes use outside of the Project Area boundary. The authorized cattle numbers, authorized AUMs, and the season of use listed in Table C-2 are calculated for the whole grazing allotment. An AUM is the amount of forage required to sustain a cow/calf pair for one month. The seasons of use range from June 16th to November 15th annually.

Table C-2. Grazing Allotments in the Griffin Half Moon Vegetation Management Project Area

Allotment Name	Total Allotment Acres	BLM Allotment Acres in Project Area (% BLM Allotment Acres)	Total BLM Allotment Acres	Current Authorized AUMs	Current Authorized (# of cattle)	Season of Use
Deadwood	11,824	2,114 (27%)	7,967	789	393	6/16 - 8/15 odd years 8/16 - 10/15 even years
Conde	11,083	242 (4%)	5,491	591	168	6/16 - 9/30
Howard Prairie	638	24 (100%)	24	30	29	10/16 - 11/15
Total	23,545	2,380 (18%)	13,482	1,410	590	6/16 - 11/15

The forested portions of these grazing allotments are seldom accessed by livestock resulting in utilization levels that are generally none to slight (0-10 percent) within the forest plant community. The

AUM rates/carrying capacities that are approved in a grazing lease account for the 0-10 percent use in forested areas.

Rationale: This issue was considered but not analyzed in further detail because providing additional information would not contribute to a more informed decision. Proposed timber harvest would decrease stand density, increasing forage production by allowing more light to the forest floor for understory growth of herbaceous vegetation in the three allotments where timber harvest is proposed (Table C-2). Harvest, road construction, and hauling activities could influence known patterns of grazing use and distribution, but is not likely due to treatment locations and the amount of acres treated in comparison to the amount of acres that are available for grazing use. Annual compliance and utilization monitoring occurs within the allotments and would occur where timber harvest and hauling is proposed.

SOUND QUALITY

Issue C-46: How would proposed forest management activities affect sound quality for adjacent landowners?

Background Information: Vegetation management activities and associated roadwork have the potential to disrupt sound quality because of the use of chainsaws, heavy equipment, and log trucks.

Rationale: This issue was considered but not analyzed in further detail because the dispersed nature and the limited intensity of proposed treatments eliminates the potential for significant effects to sound quality for adjacent landowners.

APPENDIX D - Acronyms & Glossary

APE – Area of Potential Effect
ARPA – Archaeological Resources Protection Act
ASQ – Allowable Sale Quantity
AUM – Animal Unit Month
BA – Basal Area
BLM – Bureau of Land Management
BMP – Best Management Practice
BOR – Bureau of Reclamation
BS – Bureau Sensitive
CAA – Clean Air Act
CC – canopy cover
CCH – Coho Critical Habitat
CEQ – Council on Environmental Quality
CFR – Code of Federal Regulations
CSNM – Cascade-Siskiyou National Monument
CT – Commercial Thinning
CWA – Clean Water Act
CWD – coarse woody debris
DBH – diameter at breast height
DDR – District Designated Reserve
DEQ – Department of Environmental Quality (Oregon)
DPS – Distinct Population Segment
DR – Decision Record
EA – Environmental Assessment
EIS – Environmental Impact Statement
EPA – Environmental Protection Agency
ERMA – Extensive Recreation Management Area
ESA – Endangered Species Act
FEIS – Final Environmental Impact Statement
FLPMA – Federal Land Policy Management Act
FMP – Fire Management Plan
FOI – Forest Operations Inventory
FONSI – Finding of No Significant Impact
FR – Federal Register
FRN – Federal Register Notice
FVS – Forest Vegetation Simulator
GGO – great gray owl
GHM – Griffin Half Moon
GIS – Geographic Information System
HLB – Harvest Land Base
HRRH – High Retention Regeneration Harvest
HUC – hydrologic unit code
IDT – interdisciplinary team
ISSSP – Interagency Special Status / Sensitive Species Program
LiDAR – Light Detection and Ranging
LITA – Low Intensity Timber Area
LSR – Late Successional Reserve
LUA – Land Use Allocation
LWC – Lands with Wilderness Characteristics
MBTA – Migratory Bird Treaty Act
MITA – Medium Intensity Timber Area
MMBF – million board feet (of timber)
NEPA – National Environmental Policy Act
NHPA – National Historic Preservation Act
NMFS – National Marine Fisheries Service
NRCS – National Resource Conservation Service
NRF – nesting, roosting, and foraging habitat
NRHP – National Register of Historic Places
NSO – northern spotted owl
NWCG – National Wildfire Coordinating Group
OAR – Oregon Administrative Rules
OHV – off-highway vehicle
OM – organic matter
ORGANON – ORegon Growth ANalysis and ProjectiON System
OWAM – Oregon Watershed Assessment Manual
PAG – Plant Association Group
PCT – pre-commercial thinning
PDC – Project Design Criteria
PDF – Project Design Feature
PLSS – Public Land Survey System
PRMP – Proposed Resource Management Plan
PRPA – Paleontological Resources Protection Act
QMD – quadratic mean diameter
RA-10 – Recovery Action 10
RA-32 – Recovery Action 32
RD – relative density
RH – regeneration harvest
RMP – Resource Management Plan
ROD – Record of Decision
RR – Riparian Reserve
SCK – Spill Containment Kit
SDI – Stand Density Index
SDWA – Safe Drinking Water Act
SH – Selection Harvest

SPCC – Spill Prevention, Control, and Countermeasure plan
SRMA – Special Recreation Management Area
SVS – Stand Visualization System
SWO – Southwestern Oregon
SYU – sustained yield unit
TMDL – total maximum daily load
TPA – trees per acre
TPCC – Timber Production Capability Class
TSZ – transient snow zone
USDA – United States Department of Agriculture
USDI – United States Department of the Interior
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
UTA – Uneven-Aged Timber Area
VRM – visual resource management
WFRH – White Fir Regeneration Harvest
WPN – Watershed Professionals Network
WQMP – Water Quality Management Plan
WQRP – Water Quality Restoration Plan

Glossary of Terms

A

Abiotic: Non-living elements of an environment.

Activity Fuel: The combustible material resulting from or altered by forestry practices such as timber harvest or thinning, as opposed to naturally created fuels.

Affected Environment: The area impacted by the Proposed Action.

Allowable Sale Quantity: The timber volume that a forest can produce continuously under the intensity of management described in the RMP for those lands allocated for permanent timber production.

Alternative: Management options by which the BLM can meet its purpose and need.

Analysis Area: Varies by resource and includes those areas that could potentially be affected by an alternative. In some cases the Analysis Area is confined to the Project Area and in others the Analysis Area extends beyond the Project Area.

Animal Unit Month (AUM): The amount of forage necessary for the sustenance of one cow or its equivalent (cow/calf pair) for one month.

Area of Potential Effect (APE): The geographic area or areas in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.

Aquatic: Living or growing in or near the water.

B

Basal Area: The cross-sectional area of a single plant stem, of all stems of a species in a stand, or of all plants in a stand (including the bark) that is measured at breast height (4.5 ft. up from the ground) for larger plants (like trees) or measured at ground level for smaller plants.

Baseline: The starting point for analysis of environmental consequences.

Best Management Practices (BMPs): Methods, measures, or practices designed to prevent or reduce water pollution. Usually, BMPs are applied as a system of practices rather than a single practice.

Biotic: Living elements of an environment.

Brush: To remove shrubby undergrowth.

Bryophyte: A type of nonvascular plant including mosses, liverworts, and hornworts.

C

Canopy Cover: A measure of the percentage of ground covered by a vertical projection of the tree crowns.

Commercial thinning: means stand thinning in which some or all of the cut trees are removed from the stand for timber volume and a monetary value assessed. Commercial thinning in this context does not include the following: Individual tree falling; stand thinning in which all of the cut trees are left in the stand for restoration purposes or the cut trees are removed for firewood, other special forest products, or non-commercial harvest; fuels reduction treatments in which cut trees are burned, chipped, or otherwise disposed of without removal from the stand for timber.

Commercial thinning may be implemented through a variety of mechanisms, including timber sale contracts, stewardship agreements, or other types of contracts.

Cultural Resources: Locations of human activity, occupation, or use. Cultural resources include

archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and locations of traditional cultural or religious importance to specified social or cultural groups.

Cumulative Effects: Those effects on the environment that result from the incremental effect of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency or person(s) undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

D

Diameter at Breast Height (DBH): The diameter of a tree measured at 4.5 feet above the ground level on the uphill side of the stem.

Dispersal: The movement of an individual from their origin to a new site.

Dispersal Habitat (northern spotted owl): Forest stands with average tree diameters of greater than 11 inches, and conifer overstory trees having closed canopies (greater than 40 percent canopy cover) with open space beneath the canopy to allow owls to fly.

District Designated Reserve (DDR): Those lands that are managed to maintain the values and resources for which the BLM has reserved them from sustained-yield timber production.

Diversity: The aggregate of species assemblages (communities), individual species, the genetic variation within species, and the processes by which these components interact within and among themselves. The elements of diversity are: 1) community diversity (habitat, ecosystem), 2) species diversity, and 3) genetic diversity within a species. All three change over time.

Duff: The partially decomposed organic material of the forest floor beneath the litter of freshly fallen twigs, needles, and leaves.

E

Ecosystem: A system made up of a community of animals, plants, and micro-organisms and its interrelated physical and chemical environment.

Effects Analysis: Predicts the degree to which the environment will be affected by an action.

Endangered Species: Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range, and published in the Federal Register.

Endemic: A species that is unique to a specific locality.

Environmental Assessment (EA): A concise, public document containing a federal agency's analysis of the significance of potential environmental consequences of a proposed action. The EA need not contain the level of analysis contained in an Environmental Impact Statement (EIS). An EA is used to determine whether an EIS is needed or a "finding of no significant impact" (FONSI) is warranted.

Environmental Impact Statement (EIS): A detailed statement prepared by the responsible official in which a major federal action that significantly affects the quality of the human environment is described, alternatives to the proposed action are provided, and effects are analyzed.

Ephemeral Stream: A stream that flows only in direct response to precipitation, and whose channel is at all times above the water table.

Erosion: The detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

F

Finding of No Significant Impact (FONSI): A finding that explains that an action will not have a significant effect on the environment and, therefore, an EIS will not be required.

Fire Hazard: A fuel complex, defined by volume, type condition, arrangement, and location that determines the degree of ease of ignition and of resistance to control.

Fire Regime: Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites.

Fire Resiliency: Ability of a forest to readily recover from a fire event.

Fire Risk: The probability of when a fire will occur within a given area.

Freshet: Water returning to a dry channel following spring runoff or storm events.

Fuel loads: The amount of combustible material present per unit area.

Fully Decommission: Roads removed from the landscape. These roads may be subsoiled (or tilled), seeded, mulched, and planted to reestablish vegetation. Cross drains, fills in stream channels, and unstable areas will be removed, if necessary, to restore natural hydrologic flow. Cuts and fills may be pulled back into the road bed to restore the natural slope. The road may be closed with an earthen barrier or its equivalent. The road will not require future maintenance. This category includes roads that have been closed due to a natural process (abandonment) and where hydrologic flow has been naturally restored.

G

Ground-Based Yarding: A moving vehicle (skidder) travels to the logs and pulls (i.e., skids) them to the landing; skidders can be wheeled or tracked. Trees and logs are removed from the woods and yarded to the landing by lifting the front end of the logs off the ground.

Grubbing: Utilization of hand held tools, such as hazel hoes, pulaskis, or chain saws to remove vegetation up to three inches in diameter for up to a four-foot radius around newly planted seedlings for the purpose of reducing competition.

H

Habitat: A specific set of physical conditions in a geographic area(s) that surrounds a single species, a group of species, or a large community. In wildlife management, the major components of habitat are food, water, cover, and living space.

Habitat Fragmentation: The breakup of extensive habitat into small, isolated patches which are too limited to maintain their species stocks into the indefinite future.

Harvest Land Base: Those lands on which the determination and declaration of the Annual Productive Capacity/Allowable Sale Quantity (ASQ) is based. The ASQ is based on implementing a set of specific timber management activities and assumes those practices will be repeated over time and results in a sustainable harvest level.

HUC 5: Fifth-field (5^{th}-field) hydrologic unit code, or watershed. The Griffin Half Moon Project lies within two HUC 5 watersheds.

HUC 6: Sixth-field (6^{th}-field) hydrologic unit code, or subwatershed. The Griffin Half Moon Project lies within four HUC 6 watersheds.

HUC 7: Seventh-field (7^{th}-field) hydrologic unit code or tributary to a subwatershed (Also known as

the drainage-scale). The Griffin Half Moon Project lies within 20 HUC 7 watersheds.

Hydrology: The science dealing with the properties, distribution, and circulation of water.

I

Impact: Synonymous with "effects." Includes ecological, aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Impacts may also include those resulting from actions which may have both beneficial and detrimental (adverse) effects. Impacts may be considered as direct, indirect, or cumulative.

Indicators: Parameters of ecosystem function that are observed, assessed, measured, or monitored directly or indirectly to determine attainment of a standard(s).

Intermittent Stream: A seasonal drainage with a dry period, normally for three months or more. Flowing water forms a channel feature with well-defined bed and banks, and bed-forms showing annual scour or deposition, within a continuous channel network.

K

L

Landing: A cleared area in the forest to which logs are yarded for loading onto trucks for transport.

Late-successional Forest: Forest seral stages which include mature and old-growth age classes.

Late Successional Reserve: Those lands managed to maintain and/or promote nesting-roosting habitat for the northern spotted owl and to achieve the characteristics of a late-successional forest.

Lichen: A composite organism formed from the symbiotic association of a fungus and an alga.

Long-duration Intermittent Stream: A stream that flows seasonally, usually dry up during the summer.

Low Intensity Timber Area (LITA): A subset of Harvest Land Base in which forest stands are managed to: achieve continual timber production that can be sustained through a balance of growth and harvest; offer for sale the declared Allowable Sale Quantity of timber; provide complex early-successional ecosystems; develop diverse late-successional ecosystems for a portion of the rotation; and provide a variety of forest structural stages distributed both spatially and temporally.

M

Mitigating Measures: Constraints, requirements, or conditions imposed to reduce the significance of or eliminate an anticipated impact to environmental, socioeconomic, or other resource value from a proposed land use.

Mixed-Conifer Forest: A mix of tree species that include Douglas-fir, ponderosa pine, sugar pine, incense cedar, and white fir.

Monitoring: The review, on a sample basis, of management practices to determine how well objectives are being met, as well as the effects of those management practices on the land and environment.

N

Nonpoint Source Pollution: Pollution that arises from an ill-defined and diffuse source, such as runoff from cultivated fields, agricultural lands, urban areas, or forests and wildlands.

Nonvascular: Plants with specialized methods of transporting water and nutrients without xylem or phloem (e.g. mosses, hornworts, liverworts, algae).

Noxious Weeds: A subset of invasive plants that are County, State, or federally listed as injurious to public health, agriculture, recreation, wildlife, or any public or private property.

O

O&C Lands: Public lands granted to the Oregon and California Railroad Company and subsequently revested to the United States.

Off-Highway Vehicles (OHV): Any motorized track or wheeled vehicle designed for cross-country travel over any type of natural terrain.

Organic Matter: Plant and animal residues accumulated or deposited at the soil surface; the organic fraction of the soil that includes plant and animal residues at various stages of decomposition; cells and tissues of soil organisms, and the substances synthesized by the soil population.

P

Perennial Stream: A stream that typically has running water on a year-round basis. Their base level is at, or below, the water table.

Point Source Pollution: Pollution that arises from a well-defined origin, such as discharge from an industrial plant or runoff from a feedlot.

Prescribed Fire: A wildland fire originating from a planned ignition to meet specific objectives identified in a written, approved, prescribed fire plan for which NEPA requirements have been met prior to ignition.

Project Area: Interchangeable with treatment area, used to describe where action is proposed, such as units where forest thinning is proposed and where construction or road improvements are proposed.

Project Design Feature (PDF): Specific activities incorporated into the design of a project that reduces, mitigates, or avoids environmental impacts.

Public Lands: Any lands administered by a public entity, including (but not limited to) the Bureau of Land Management and the US Forest Service.

Q

Quadratic Mean Diameter: The diameter of the tree of average basal area in a stand at breast height.

R

Record of Decision (ROD): The decision document associated with an environmental impact statement.

Regeneration Harvest (RH): The removal of trees intended to assist regeneration already present or make regeneration possible.

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

Relative Density Index: The ratio of actual stand density to the maximum stand density attainable or expected for that stand, which is dependent upon the species composition.

Resource Management Plan (RMP): A land use plan as prescribed by the Federal Land Policy and Management Act (FLPMA) that establishes, for a given area of land, land-use allocations, management objectives, and management direction.

Right-of-Way (ROW): Authorization to use public lands for certain specified purposes, commonly for pipelines, roads, telephone lines, electric lines, reservoirs, and so on; also, the lands covered by an easement or permit.

Riparian Area: A geographic area containing an aquatic ecosystem and adjacent upland areas that directly affect it.

Riparian Habitat: The living space for plants, animals, and insects provided by the unique character of a riparian area.

Riparian Reserve (RR): A federally designated buffer around streams, springs, seeps, ponds, lakes, reservoirs, fens, wetlands, and areas prone to slumping, on federal lands only. RR widths vary by watershed class and stream type.

S

Scalping: Utilization of hand held tools, such as hazel hoes and pulaskis, to remove all vegetation up to one inch in diameter for up to a two-foot radius around planted seedlings for the purpose of reducing competition.

Scope: The extent of an analysis in a NEPA document.

Scoping: The process by which BLM solicits internal and external input on the issues and effects that will be addressed in planning, as well as the degree to which those issues and effects will be analyzed in the NEPA document.

Sediment Yield: The quantity of soil, rock particles, organic matter, or other dissolved or suspended debris which is transported through a cross-section of stream during a given period.

Selection Harvest (SH): A method of uneven-aged management involving the harvesting of single trees from stands (single-tree selection) or in groups up to four acres in size (group selection) without harvesting the entire stand at any one time.

Sensitive Species: Those species that (1) have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, or (2) are on an official state list, or (3) are recognized by a land management agency as needing special management to prevent their being placed on Federal or state lists.

Seral Stages: The series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage.

Short-duration Intermittent Stream: A stream that flows only during storm or heavy precipitation events. These streams can also be described as ephemeral streams.

Silviculture: The science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet diverse needs.

Silvicultural Prescriptions: A planned series of treatments designed to change current stand structure to one that meets management goals.

Site Potential Tree Height: The average maximum height of the tallest dominant trees (200 years or older) for a given site class. Site-potential tree heights generally range from 140 feet to 240 feet across the decision area, depending on site productivity.

Skid: To drag a log from within a harvest unit to a collection point (landing).

Slash: The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging has been completed.

Soil Series: The lowest or most basic category of the U.S. system of soil classification.

Special Status Species (SSS) – plants or animals in any of the following categories:

> **Proposed species** – species that have been officially proposed for listing as threatened or endangered by the Secretary of the Interior. A proposed rule has been published in the Federal Register.

Listed Species – species officially listed as threatened or endangered by the Secretary of the Interior under the provisions of the ESA. A final rule for the listing has been published in the Federal Register.

Endangered Species – any species which is in danger of extinction throughout all or a significant portion of its range.

Threatened Species – any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Candidate Species – species designated as candidate for listing as threatened or endangered by the USFWS and/or NMFS. A list has been published in the Federal Register.

Stand Density Index (SDI) – Reineke's (1933) stand density index is a function of quadratic mean diameter and number of trees per unit area. SDI can be interpreted as the number of 10 inch trees that would experience approximately the same level of inter-tree competition as the observed number of trees with the observed mean diameter. See also *relative density*.

State Listed Species: Plant or animal species listed by the State of Oregon as threatened or endangered pursuant to ORS 496.004, ORS 498.026, or ORS 564.040.

Subwatershed: The sixth level in the hydrologic unit hierarchy. A subwatershed is a subdivision within a fifth level watershed. See *HUC 6*.

Succession: A series of dynamic changes by which one group of organisms succeeds another through stages leading to potential natural community or climax.

Sustained Yield Forestry: The yield that a forest can produce continuously at a given management intensity; the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources without impairment of the land's productivity.

T

Tiering: Using the coverage of general matters in broader NEPA documents in subsequent, narrower NEPA documents, allowing the tiered NEPA document to narrow the range of alternatives and concentrate solely on the issues not already addressed.

Topography: The configuration of a surface area including its relief, or relative elevations, and position of its natural and anthropogenic features.

Total Maximum Daily Loads (TMDLs): Pollution load limits calculated by DEQ for each pollutant entering a water body. TMDLs describe the amount of each pollutant a waterway can receive and still not violate water quality standards. Both point and non-point source pollution are accounted for in TMDLs as well as a safety margin for uncertainty and growth that allows for future discharges to a water body without exceeding water quality standards.

Transient Snow Zone (TSZ): The area where a mixture of snow and rain occurs, sometimes referred to as the rain-on-snow zone. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. Rain-on-snow events originate in the transient snow zone.

Turbidity: The cloudiness exhibited by water carrying sediment; the degree to which suspended sediment interferes with light passage through water.

U

Understory: That portion of trees or other woody vegetation which forms the lower layer in a forest stand which consists of more than one distinct layer.

V

Vascular: Plants having phloem- and xylem-conducting elements that facilitate the moving of water and nutrients.

Vertebrate Species: Any animal with a backbone or spinal column.

W

Watershed: An area in which all surface waters flow to a common point.

Wetlands: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Wildland-Urban Interface (WUI): The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetation fuels.

Y

Yarding: The act or process of conveying logs or whole trees to a landing, particularly by cable, ground-based or helicopter yarding systems.

APPENDIX E - References

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