United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Eugene District Office
3106 Pierce Parkway, Suite E
Springfield, OR 97477
www.blm.gov/or/districts/eugene

The Upper Willamette Field Office of the Eugene District Bureau of Land Management has completed the Lost Creek Environmental Assessment (EA). This EA analyzes the environmental effects of up to approximately 420 acres of commercial thinning, 140 acres of regeneration harvest, and 300 acres of density management in Riparian Reserves. The project area is located approximately 5 to 8 miles south of Lowell, Oregon and almost entirely within the Lost Creek 5th Field Watershed.

This EA considers in detail three action alternatives and a no action alternative. The alternatives were developed to meet the purpose and need of the project including producing a sustainable supply of timber, promote development of understory vegetation, and develop structural complexity within Riparian Reserves. Alternatives have been developed as a result of interdisciplinary review of the project area to identify management options and opportunities and comments received during public scoping.

Public notice of this proposed action will be published in the Eugene Register Guard on September 23, 2015. The EA is also available on the internet at http://www.blm.gov/or/districts/eugene/plans/plans.php. The public comment period will end on October 23, 2015. Please submit comments via email to BLM_OR_EU_Mail@blm.gov Attn: Kristine Struck or through standard postal or personal delivery to:

Eugene District Office
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Springfield, OR, 97477

As you are aware, annual finding for the Government expires on September 30th, 2015. The Administration strongly believes that a lapse in funding should not occur and that there is enough time for Congress to prevent a lapse in appropriations. However in the event that such a funding lapse were to occur and the Government were to shut down, the websites hosting the EA may not be available. We suggest that you download the documents available for 30 day public review prior to September 30th, 2015.

Comments, including names and street addresses of respondents, will be available for public review at the Eugene District Office, 3106 Pierce Parkway, Springfield, Oregon, during regular business hours (8:00AM to 4:30 PM), Monday through Friday, except holidays, and may be published as part of the EA or other related documents. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses and from individuals identifying themselves as representatives or officials of organizations or businesses will be made available for public inspection in their entirety.

Sincerely,

William O'Sullivan,
Field Manger
Upper Willamette Field Office

Lost Creek
Environmental Assessment

DOI-BLM-060-2015-0002-EA

Upper Willamette Field Office
Eugene District
Bureau of Land Management

Table of Contents

1.0 Introduction 1

1.1 Purpose and Need 2
1.2 Conformance 4

1.2.1 Survey and Manage 4

1.3 Scoping and Public Involvement 5
1.4 Acres Removed from the Project 5
1.5 Issues 5
1.6 Alternatives Considered but Eliminated from Detailed Analysis 6

1.6.1 Only conduct regeneration harvest in young (<30 years) stands. 6
1.6.2 Do not construct any new roads. 6
1.6.3 Commercially thin stands planned for regeneration harvest. 7

2.0 Alternatives 7

2.1 No Action 7
2.2 Alternative 2: Preferred Alternative 7

2.2.1 Thinning Treatments in Uplands (Matrix) 8
2.2.2 Thinning Treatments in Riparian Reserves 8
2.2.3 Regeneration Harvest 8
2.2.4 Road Construction, Renovation, and Maintenance 9
2.2.5 Reforestation and Fuels Management 9

2.3 Alternative 3 9

2.3.1 Thinning Treatments in Uplands (Matrix) 10
2.3.2 Thinning Treatments in Riparian Reserves 10
2.3.3 Regeneration Harvest 10
2.3.4 Road Construction, Renovation, and Maintenance 11
2.3.5 Reforestation and Fuels Management 11

2.4 Alternative 4 11

2.4.1 Thinning Treatments in Uplands (Matrix) 11
2.4.2 Thinning Treatments in Riparian Reserves 11
2.4.3 Regeneration Harvest 12
2.4.4 Road Construction, Renovation, and Maintenance 12
2.4.5 Reforestation and Fuels Management 12

2.5 Comparison of Action Alternatives 20

3.0 Affected Environment and Environmental Consequences 21

3.1 Issues Not Presented in Detail 21

3.1.1 What are the effects of proposed timber harvest and associated activities on suitability for Lands with Wilderness Characteristics of John's Last Stand (T20S R01E Sec 29)? 21
3.1.2 What are the effects on game species such as deer and elk and Special Status Species other than Red Tree Voles (RTVs) and northern spotted owls (NSOs)?? 22
3.1.3 What are the effects to soil productivity in the Uplands (Matrix), erosion, and potential mass wasting (landslide)? 22
3.1.4 What are the effects on historic/cultural resources? 23

3.1.5 What are the effects from road construction, improvement, maintenance, and use (haul) on sediment input on fish-bearing streams and hydrological function? 24

3.2 Issue 1: What are the effects of timber harvest and associated activities on northern spotted owl habitat quantity and quality, and the suitability of affected home ranges? 24

3.2.1 Affected Environment 25
3.2.2 Alternative 1: No Action 31
3.2.3 Alternative 2: Preferred Alternative 34
3.2.4 Alternative 3 42
3.2.5 Alternative 4 45

3.3 Issue 2: What are the effects of proposed timber harvest and associated activities on red tree voles? 49

3.3.1 Affected Environment 49
3.3.2 Alternative 1: No Action 50
3.3.3 Alternative 2: Preferred Alternative 50
3.3.4 Alternative 3 51
3.3.5 Alternative 4 52

3.4 Issue 3: What are the effects of timber harvest and associated activities on stand structure and terrestrial habitat, soil compaction and sensitive soils, and stream temperature in the Riparian Reserves? 53

3.4.1 Affected Environment 54
3.4.2 Alternative 1: No Action 58
3.4.3 Alternative 2: Preferred Alternative 61
3.4.4 Alternative 3 68
3.4.5 Alternative 4 71

3.5 Issue 4: What would be the effects on sustained yield management from proposed activities? 73

3.5.1 Affected Environment 73
3.5.2 Alternative 1: No Action 75
3.5.3 Alternative 2: Preferred Alternative 75
3.5.4 Alternative 3 75
3.5.5 Alternative 4 76

3.6 Issue 5: What are the effects on recreation opportunities on federal lands, including hiking opportunities and visitor experience, on federal lands in area? 76

3.6.1 Affected Environment 76
3.6.2 Alternative 1: No Action 80
3.6.3 Alternative 2: Preferred Alternative 80
3.6.4 Alternative 3 85
3.6.5 Alternative 4 86

3.7 Issue 6: What are the effects on carbon storage and greenhouse gas emissions? 86

3.7.1 Affected Environment 86
3.7.2 Environmental Effects 88
3.7.3 Cumulative Affects 90

4.0 Consultation 91

5.0 List of Preparers 92
6.0 Citations 93
7.0 Appendices 100
7.1 Appendix A: Project Design Features A-1
7.2 Appendix B: Glossary B-1
7.3 Appendix C: Road Construction, Improvement, and Renovation C-1
7.4 Appendix D: Cumulative Effects Actions D-1
7.5 Appendix E: Special Status Species E-1
7.6 Appendix F: Maps F-1

Tables, Figures, and Images

Table 1: Project Summary 1
Table 2: Proposed Harvest Summary for Alternative 2 7
Table 3: Proposed Harvest Summary for Alternative 3 10
Table 4: Proposed Harvest Summary for Alternative 4 11
Table 5: Comparison of Action Alternatives 20
Table 6: Average CWD and Snag Levels in Proposed Thinning Units 26
Table 7: Average CWD and Snag Levels in Proposed Regeneration Harvest Units 26
Table 8: Acres of Spotted Owl Habitat in Lost Creek Project Area by Alternative 30
Table 9: Current Habitat Availability in Spotted Owl Sites that Intersect the Lost Creek Project Area 31
Table 10: Current Habitat Availability in Affected Spotted Owl Sites 32
Table 11: Habitat Availability in 40 years in Affected Spotted Owl Sites 33
Table 12: Habitat Availability in 80 years in Affected Spotted Owl Sites 33
Table 13: Proposed Harvest Shown by Harvest Type and Habitat Type in Affected Spotted Owl Sites 37
Table 14: Immediate Post-Harvest Habitat Availability in Affected Spotted Owl Sites under Alternative 2 37
Table 15: Habitat Availability 40 years Post-Harvest in Affected Spotted Owl Sites 38
Table 16: Habitat Availability 80 years Post-Harvest in Affected Spotted Owl Sites 38
Table 17: Acres/Percent of non-BLM Managed Lands, Proposed Harvest, and Foreseeable Actions in Affected Spotted Owl Home Ranges and Core Areas. 39
Table 18: Watershed-Scale Ownership, Federal Forest Age Classes, and Action Alternatives. 41
Table 19: Immediate Post-harvest Availability in Affected Spotted Owl Sites, Alternative 3. 42
Table 20: Habitat Availability 40 years Post-harvest in Affected Spotted Owl Sites, Alternative 3. 43
Table 21: Habitat Availability 80 years Post-harvest in Affected Spotted Owl Sites, Alternative 3. 43
Table 22: Immediate Post-harvest Habitat Availability in Affected Spotted Owl Sites, Alternative 4 46
Table 23: Habitat Availability 40 years Post-harvest in Affected Spotted Owl Sites, Alternative 4 47
Table 24: Habitat Availability 80 years Post-harvest in Affected Spotted Owl Sites, Alternative 4 47
Table 25: Acres of Ownership, Proposed Actions, and Foreseeable Actions in RTV Cumulative Effects Analysis Area. 51
Table 26: Acres of Ownership, Proposed Actions, and Foreseeable Actions in RTV Cumulative Effects Analysis Area. 52
Table 27: Acres of Ownership, Proposed Actions, and Foreseeable Actions in RTV Cumulative Effects Analysis Area. 53
Table 28: Current Riparian Stand Conditions 55
Table 29: Sensitive Soils Found in the Riparian Reserves 58
Table 30: Current Stand Conditions and 50-year projection in T19S R01E Sec. 31 59
Table 31: Alternative 2 Common Landings in the Riparian Reserves 64

Table 32: Sensitive Soils in Riparian Reserves Proposed for Ground-Based Harvest under Alternative 2 65
Table 33: Logging Corridors over Streams 67
Table 34: Sensitive Soils in Riparian Reserves Groundbased Harvest under Alternative 3 70
Table 35: Alternative 3 Logging Corridors over Streams 71
Table 36: Sensitive Soils in Riparian Reserves GroundBased Harvest under Alternative 4 72
Table 37: Alternative 4 Logging Corridors over Streams 73
Table 38: Federal trails located within and adjacent to the project area. 78
Table 39: Stand Level Stored Carbon in Metric Tonnes for Alternative 2. 89
Table 40: Stand Level Stored Carbon in Metric Tonnes for Alternative 3. 89
Table 41: Stand Level Stored Carbon in Metric Tonnes for Alternative 4. 90

Figure 1: Harvest Areas and Spotted Owl Habitat Types on BLM-Managed Land in the Lost Creek Watershed. 29
Figure 2: Old Growth coniferous forest with structural complexity. 54
Figure 3. Photos of Gosage Incline T20S R01W Sec. 7 56
Figure 4: Current Stand Condition Compared to Stand Conditions in 50 years under Alternative 1 60
Figure 5: Percent of Total Riparian Reserves in Project Area Treated by Alternative 61
Figure 6: Current Stand Condition Compared to Alternative 2 50 years Post-Harvest 63
Figure 7: Visual depiction of stands over 30 years after regeneration harvest. 81
Figure 8: Visual depiction of stands over 30 years after thinning harvest. 83

Image 1: View including John's Last Stand harvest area from atop Eagles Rest peak. 77
Image 2: Obstructed view looking towards the proposed harvest area from Sawtooth Trail (#1401). 82

1.0 Introduction

The Upper Willamette (UW) Field Office, Eugene District, Bureau of Land Management (BLM) is proposing a mix of regeneration and commercial thinning harvests primarily within the Lost Creek sub-basin of the Lookout Point Reservoir-Middle Fork Willamette River Fifth Field Watershed. The units are within Matrix and Riparian Reserve land use allocations (LUA) under the 1995 Eugene District Resource Management Plan/Final Environmental Impact Statement (RMP/FEIS) and Record of Decision (ROD). Harvests are proposed in both General Forest Management Area (GFMA) and Diversity/Connectivity blocks within the Matrix LUA.

Table 1: Project Summary

Sale Name	Location	Harvest Type	Stand Ages	Total Acres[1] (Harvest & Reserve)	Harvest Acres
Anthony Access	T19S R01W Sec 31; T19S R02W Sec 1 & 25	Regeneration & Thinning	86 – Regeneration 56-66 – Thinning	213	73 - 161
Gosage Incline	T20S R01W Sec 7 & 17; T20S R02W Sec 13	Regeneration & Thinning	76 – Regeneration 30-74 – Thinning	411	129 - 223
Guileless	T20S R01W Sec 15 & 21	Thinning	53 – 69	171	86 - 108
John's Last Stand	T20S R01E Sec 29	Regeneration *or* Thinning	116	90	0 or 49
Missing Links	T20S R01E Sec 19; T20S R01W Sec 13 & 23	Thinning	56	325	237 - 279

The project area is located approximately 5 to 8 miles south of Lowell, Oregon. Approximately 45 acres of the project area is within the Dorena Lake-Row River sub-basin of the Row River 5th Field Watershed. Approximately 120 acres of the project area are located within the Dexter Reservoir-Middle Fork Willamette River sub-basin of the Lookout Point Reservoir-Middle Fork Willamette River 5th Field Watershed. The rest of the project area (approximately 1,050 acres) is within the Lost Creek sub-basin of the Lookout Point Reservoir-Middle Fork Willamette River Watershed. The Lost Creek sub-basin is approximately 34,500 acres. The Lookout Point Reservoir-Middle Fork Willamette River 5th Field Watershed is over 102,000 acres.

The Oregon and California Railroads (O&C) Act requires the lands in the project area to be managed for permanent forest production and the timber to be sold, cut, and removed in accordance with the principle of sustained yield. The project was designed to meet BLM's obligation to implement the 1995 Eugene Resource Management Plan and to address the primary objectives of the land use allocation. The 1995 Eugene Resource Management Plan established an allowable sale quantity (ASQ) to manage timber production at sustainable levels. Since the institution of the 1995 Eugene Resource Management Plan, changes to environmental regulations and increased controversy has resulted in timber management focusing almost exclusively on thinning in recent years to achieve ASQ.

Some comments received from the public expressed an opinion that the effects of regeneration harvest warranted the completion of an Environmental Impact Statement (EIS). These scoping comments regarding the preparation of an Environmental Assessment cited a perception of regeneration harvesting resulting in significant effects and the actions being controversial.

There will always be some disagreement about the nature of the effects for land management actions. However, when determining if these disagreements indicate a need for elevation of analysis to an EIS,

[1] Acres and mileages throughout document are approximate and provided for comparison purposes only.

CEQ regulations (40 CFR 1502) clearly outline the need for context and intensity to be measured in determining significance.

The significance of an action must be analyzed in the appropriate context. Both short-term and long-term effects are relevant. Intensity refers to the severity of the effect, which is done by looking at direct, indirect, and cumulative effects of an action (40 CFR 1508.27(b)). Controversy means disagreement about the nature of the effects, not expressions of opposition to the proposed action. Substantial dispute within the scientific community about the effects of the proposed action would indicate that the effects are likely to be highly controversial. There is currently no scientific dispute about the effects of regeneration timber harvesting.

EAs can also be used as a tool in the process to determine if the action would have significant effects. If so, an EIS is then prepared. If not, a Finding of No Significant Impact (FONSI) is prepared.

Ultimately, this EA serves to explore the CEQ requirements to determine context and intensity of effects to identify whether an EIS or FONSI should be prepared.

1.1 Purpose and Need

Need for Action

The Eugene District Record of Decision and Resource Management Plan (ROD/RMP, USDI 1995; hereafter the 1995 RMP) provides management direction for forest habitat and for forest products (FEIS, p. 1-4). The RMP addressed these dual needs through designations of land use allocations (LUAs) in conformance with applicable laws including the O&C Act, the Clean Water Act, and the Endangered Species Act, as well as applicable rules, regulations, and policies. In addition to this, the 1995 Eugene RMP established an allowable sale quantity (ASQ) to address the need for timber production at sustainable levels, which is to be derived entirely from the Matrix LUA.

Uplands (Matrix)

Within the Lost Creek project area, stands are dense, overstocked, and uniform in structure, which has resulted in reduced tree growth and stand vigor in some Matrix LUA stands. Thinning is needed to promote increased tree growth, canopy growth, stand vigor, and species diversity. Thinning these stands would contribute to long-term timber production and the current established ASQ for the Eugene District along with more desirable wildlife habitat. In addition the over-dense stands with closed canopies result in little light penetration for understory growth or the growth of minor tree species. Current stand conditions interfere with the development of large, well-developed crowns desirable for many wildlife species including northern spotted owls. Overall, the current stand conditions proposed for thinning in the project area provide less desirable habitat for wildlife in both the short and long-term than more complex stands.

The Culmination of Mean Annual Increment (CMAI) refers to the tree age range that produces maximum average annual growth over the lifetime of a timber stand within a specific area. Within the Eugene District planning area culmination usually occurs between 70 and 90 years of age but varies due to stand conditions and previous treatments. Stands within the planning area being considered for regeneration harvest have reached CMAI. To maximize growth and yield on lands within the matrix land use allocation the Eugene District RMP directs us to schedule regeneration harvests to assure that, over time, harvest will occur in stands at or above the age of volume growth culmination (i.e., Culmination of Mean Annual Increment). (RMP p 85, 200).

Riparian Reserves

Riparian Reserves in the project area are predominantly densely-stocked, even-aged stands that show

very little of the stand diversity or complexity goals identified by the Aquatic Conservation Strategy Objectives. These younger managed stands are in the stem exclusion stage and are competing for sunlight, water, and nutrients, causing reduced tree growth and vigor as well as limiting understory vegetation. Increased tree growth and vigor, canopy growth, and species diversity are needed for both wildlife habitat and to manage the stand for sustained timber harvest.

Purpose of Actions

The Eugene District ROD/RMP (USDI 1995) specifies management objectives and direction to be accomplished in managing lands in the project area. These purposes may be given different weight, depending on the objectives for the particular LUA. For example, timber production would be given greater emphasis in Matrix LUA stands and forest habitat purposes would be emphasized in Riparian Reserve lands. A reasonable action alternative must respond to the needs described above, and meet the objectives outlined below to be considered and analyzed in detail for this project. The following are the purposes for the Lost Creek project, in conformance with the 1995 RMP:

Uplands (Matrix)

- produce a sustainable supply of timber
- maintenance of valuable structural components, such as down logs and snags
- produce, over time, forests that have desired species composition, structural characteristics, and distribution of seral or age classes.
- schedule regeneration harvests to assure that, over time, harvest will occur in stands at or above the age of volume growth culmination (i.e., Culmination of Mean Annual Increment)

Specifically, for thinning in General Forest Management Areas (GFMA):

- increase the proportion of merchantable volume
- promote development of desired understory vegetation
- maintain good diameter growth rates

Specifically, for density management in Diversity/Connectivity Blocks:

- accelerate growth of trees to provide large-diameter snags and down logs
- promote development of understory vegetation and multiple canopy layers
- produce larger, more valuable logs
- harvest mortality of small trees as the stand develops
- maintain good crown ratios and stable, windfirm trees
- manage species composition

Specifically, for regeneration harvests in GFMA:

- provide for maintenance of long-term site productivity and forest health

Riparian Reserves

The purpose of treatment in riparian reserves is to provide accelerated development of the following in Riparian Reserves as per the Aquatic Conservation Strategy Objectives: 1) structural complexity representative of those that would result from natural disturbance patterns, 2) vegetation diversity, 3) understory development, and 4) increased growth rates of residual live green trees.

- Provide for the conservation of and habitat for Special Status Species as well as other terrestrial species.
- Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

1.2 Conformance

This proposed forest management project is in conformance with, and tiers to, the objectives, land use allocations, and management direction in the 1995 ROD/RMP.

The project also conforms to the following:

- Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan 1994)
- Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (2001 Survey and Manage).

The Lost Creek Environmental Assessment (EA) is a site-specific analysis that tiers to the broader analyses found in the Eugene District RMP/FEIS. The RMP/FEIS includes the analysis from the Northwest Forest Plan Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl (NWFP).

All actions considered in this EA are consistent with applicable laws, regulations, and policies including, but not limited to, the following: O&C Act, Federal Land Policy and Management Act (FLPMA), Endangered Species Act (ESA), National Environmental Policy Act (NEPA), Archaeological Resources Protection Act (ARPA), Clean Air Act (CAA), and Clean Water Act (CWA).

1.2.1 Survey and Manage

The project is consistent with the 2001 ROD and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines, as incorporated into the Eugene District Resource Management Plan.

This project utilizes the December 2003 species list. This list incorporates species changes and removals made as a result of the 2001, 2002, and 2003 Annual Species Reviews (ASR) with the exception of the red tree vole. For the red tree vole, the Ninth Circuit Court of Appeals in KSWC et al. v. Boody et al., 468 F3d 549 (9th Cir. 2006) vacated the category change and removal of the red tree vole in the mesic zone, and returned the red tree vole to its status as existed in the 2001 ROD Standards and Guidelines, which makes the species Category C throughout its range.

Previously, in 2006, the District Court for the Western District of Washington (Judge Pechman) had invalidated the agencies' 2004 RODs eliminating Survey and Manage due to NEPA violations. Following the District Court's 2006 ruling, parties to the litigation had entered into a stipulation exempting certain categories of activities from the Survey and Manage standard (the "Pechman Exemptions").

Judge Pechman's Order from October 11, 2006 directs:

> "Defendants shall not authorize, allow, or permit to continue any logging or other ground-disturbing activities on projects to which the 2004 ROD applied unless such activities are in compliance with the 2001 ROD (as the 2001 ROD was amended or modified as of March 21, 2004), except that this order will not apply to:
> A. Thinning projects in stands younger than 80 years old;
> B. Replacing culverts on roads that are in use and part of the road system, and removing culverts if the road is temporary or to be decommissioned;
> C. Riparian and stream improvement projects where the riparian work is riparian planting, obtaining material for placing in-stream, and road or trail decommissioning; and where the stream

improvement work is the placement large wood, channel and floodplain reconstruction, or removal of channel diversions; and

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

Areas under 80 years of age only being considered for thinning under all action alternatives met Exemption A of the Pechman Exemptions. These areas were: T19S R02W Sec 25, T19S R01W Sec 31, T20S R02W Sec 1 (north), T20S R01W Sec 7 (south), T20S R01W Sec 17, T20S R002W Sec 13, T20S R01W Sec 15, T20S R01W Sec 21, T20S R01W Sec 13, T20S R01W Sec 23, and T20S R01E Sec 19.

1.3 Scoping and Public Involvement

A public scoping letter was mailed to landowners near the project area as well as individuals and organizations who had previously requested to be informed of District activities on December 11, 2014. It was also posted in the Eugene District's Planning Website on the same day. Scoping comments were received from the Oregon Department of Fish and Wildlife (ODFW), four organizations, and five individuals. Comments primarily expressed general opposition to regeneration harvests or timber harvest on federal lands. Most commenters expressed opposition to any harvest activities in John's Last Stand. Some commenters expressed support for all harvest activities on federal lands. As a result of internal and external scoping comments, a broad range of alternatives was developed that included analysis of no regeneration harvests (Alternatives 3 and 4), no harvest in the John's Last Stand sale unit (Alternative 4), reduced road construction (Alternative 4), and additional coarse woody debris/snag creation in Riparian Reserves (Alternative 3). In part, Alternative 3 serves to consider the trade-offs between adverse impacts from operations with the beneficial impacts from treatment.

1.4 Acres Removed from the Project

During the development of the project, nearly 700 acres were dropped from current consideration for a variety of site-specific reasons including the presence of northern spotted owls (including nest patches, RA32 habitat, and/or RA10 habitat. See Issue 1 for discussion of RA32 and RA10.), Survey and Manage Species including red tree voles and *Megomphix hemphilli*, cultural resources, lack of need for treatment in Riparian Reserves, and logging systems feasibility.

1.5 Issues

In the context of an environmental analysis, an issue is a point of disagreement, debate, or dispute with a proposed action based on some anticipated environmental effect. An issue:

- has a cause and effect relationship with the proposed action or alternatives;
- is within the scope of the analysis;
- has not been decided by law, regulation, or previous decision; and
- is amenable to scientific analysis rather than conjecture.

Issues presented in detail in this analysis are:

- What are the effects of timber harvest and associated activities on northern spotted owl habitat quantity and quality, and the suitability of affected home ranges?
- What are the effects of proposed timber harvest and associated activities on red tree voles (RTV)?

- What are the effects of timber harvest and associated activities on stand structure and terrestrial habitat, soil compaction and sensitive soils, and stream temperature in the Riparian Reserves?
- What are the effects on sustained yield management from proposed activities?
- What are the effects on recreation opportunities on federal lands, including hiking opportunities and visitor experience, on federal lands in area?
- What are the effects on carbon storage and greenhouse gas emissions?

1.6 Alternatives Considered but Eliminated from Detailed Analysis

1.6.1 Only conduct regeneration harvest in young (<30 years) stands.

Some commenters suggested that while high-quality early-successional habitat is valuable, regeneration harvests should only be conducted in young stands (<30 years). However, regeneration harvests on stands less than 30 years of age would not be consistent with the Eugene District RMP. The RMP states, on, p. 203, that "Regeneration harvests will not be planned for stands less than 56 years of age." The Eugene RMP, p. 85, further directs regeneration harvests to occur at or above the age of volume growth culmination (typically 70 to 90 years of age in the planning area).

1.6.2 Do not construct any new roads.

Internal and external comments received during scoping suggested that the BLM should consider an alternative to include no new road construction. A minimal roads alternative (Alternative 4) is being considered.

Guiding principles for new road construction include the following:

- Provide access to current and future forest management projects and maintain transportations systems for the management of BLM lands to produce timber and special forest products and other commodities. (Transportation Management Plan, p. 5)
- Select logging systems based on the suitability and economic efficiency of each system for the successful implementation of the silvicultural prescription, for protection of soil and water quality, and for meeting other land use objectives (RMP, p. 85).

To harvest units most efficiently, some level of road construction would need to occur. Without construction of new roads, many harvest units would either be left untreated or helicopter only operations would be prescribed. Helicopter-only harvest method limits the purchasers able to bid and depending on the timber prices at the time of sale, may result in no-bid sales and foregone forest treatments.

New roads under all alternatives would be located primarily on ridge tops. Log landing locations would be placed to promote adequate deflection (suspension of logs) for yarding and protection of soil and water quality. In most places within the project area, primary road access to the units already exists. Proposed new road construction would be principally located within unit boundaries allowing landings to be moved off of through-roads and/or placed in areas that provide adequate reach and deflection to minimize yarding impacts.

Stand exam data indicates that approximately 820 forested acres are in need of treatment in the project area. Without new road construction, approximately 23% of the acres would not be treated or would need to be helicopter yarded. Using representative appraisal criteria, helicopter yarding would be three to four times more expensive than traditional cable yarding or ground-based harvest methods. This along with the small unit size, small log diameters, and market fluctuations would make harvest economically inefficient or not implementable.

In addition, some roads were evaluated for temporary construction as part of a no roads alternative were found to not lend themselves to being decommissioned due to factors such as full-bench construction and would need to be permanent if constructed. These roads and others are part of Alternative 4, which has low permanent road construction.

1.6.3 Commercially thin stands planned for regeneration harvest.

The BLM evaluated the units analyzed in Alternative 2 for regeneration harvest in Anthony Access T20S R02W Sec 1 and Gosage Incline T20S R01W Sec 7 for suitability for commercial thinning. These stands were previously commercially thinned in 2001 and 1991 (respectively). Current stand exams indicated they are not currently suitable for another commercial thinning because if a 40% canopy cover were to be maintained, the volume removed would be so low it would not meet the purpose and need of the project.

2.0 Alternatives

Project Design Features (PDFs) for all action alternatives (Alternatives 2 – 4) are located in Appendix A. Project Design Features are operating procedures developed by the interdisciplinary team used to avoid or reduce adverse environmental impacts and ensure conformance with regulations, laws, and polices including Best Management Practices from the Eugene District RMP, BLM handbooks and manuals, and Instruction Memorandums.

See Appendix F: Maps for logging systems and roadwork associated with each action alternative.

2.1 No Action

The No Action Alternative is the only alternative that may be analyzed which does not conform to the purpose and need for action. This alternative provides a baseline for comparison of the environmental effects. Under this alternative, no harvest of these stands would occur at this time. This would not, however, constitute a decision to reallocate the lands to non-commodity uses. No road construction would occur as part of this project. Road renovations and improvements to improve drainage and reduce sedimentation would not be undertaken at this time.

2.2 Alternative 2: Preferred Alternative

See Appendix F: Maps for logging systems and roadwork associated with this Alternative.

Table 2: Proposed Harvest Summary for Alternative 2

	Total Acres	Anthony Access	Gosage Incline	Guileless	John's Last Stand	Missing Links
Upland (Matrix) Acres Harvested Thinning	378	50	77	48	0	203
Riparian Reserve Acres Harvested Thinning	299	58	106	59	0	75
Upland (Matrix) Acres Harvested Regeneration	141	52	40	0	49	0
Cable or Cable-Preferred Logging	562	89	223	76	0	174
Ground-based or Ground-based Preferred Logging	187	72	0	32	0	83
Helicopter Logging	70	0	0	0	49	22

2.2.1 Thinning Treatments in Uplands (Matrix)

The thinning prescription would reduce stand density by thinning from below (removing small, supressed, less-vigorously growing trees) to a Curtis Relative Density between 30 and 37 (or 130-170 sq.ft of Basal Area). Relative Density is a means of describing the relative degree of inter-tree competition in stands of differing average tree size and stand density of conifers over 8'' DBH (Curtis 1982). Relative Density is calculated by dividing the Basal Area by the square root of the Quadratic Mean Diameter. Basal Area is the cross sectional area of a single stem, including the bark measured at breast height (4.5 ft.) above the ground. Basal Area is described in square feet and of all conifers ≥ 8" DBH. The thinning would generally retain the largest and most vigorous trees, which would decrease tree to tree competition. Trees selected for harvest would generally be the suppressed, intermediate, co-dominant conifer trees, releasing the larger trees. All hardwoods and Pacific yew would be retained, except where necessary to accommodate logging systems and for safety. In all units except for the Guileless units, minor species (hemlock and cedar) would be favored for retention. In the Guileless units, western hemlock and western redcedar would not be favored due to the existing higher presence of those species in the stand coupled with the existing mistletoe. In all units, the prescription would result in a stand with uneven spacing between remaining conifers and hardwoods.

2.2.2 Thinning Treatments in Riparian Reserves

Harvest treatments would be the same prescription as the uplands (Matrix). Areas of no harvest, in close proximity to streams and wetlands, would generally be 75' from intermittent and perennial streams. Two stretches of fish-bearing streams (one in Anthony Access and one in Gosage Incline) would be treated to within 25' of the stream channels to study light penetration on fish productivity. Where appropriate due to terrain, slope stablity, erosion potential, or other factors, the no cut buffer would be extended to 100' or the slope break (PDF 83).

Dr. Warren of Oregon State University is working with the BLM and the U.S. Forest Service to document the effects of light penetration on fish productivity. Light availability is arguably the fundamental constraint on aquatic primary production – as well as on terrestrial primary production. Drastic changes in the amount of light in a stream can influence primary and secondary production (Murphy et al. 1981; Hawkins et al. 1982; Noel et al. 1986; Bilby and Bisson 1992; Wootton 2012) and temperature in streams (Johnson 2004; Moore et al. 2005). However, our understanding of how moderate and/or patchy changes in riparian forest cover influence stream ecosystems remains surprisingly limited. The few studies that have explored this have found that increases in primary and indeed secondary production can occur with fairly small changes in riparian forest cover. The two study reaches in the stream would be monitored closely by Dr. Warren on a suite of factors including canopy cover, periphyton (a food source for fish and invertebrates), invertebrate abundance, fish abundance, and stream temperatures both upstream and downstream.

2.2.3 Regeneration Harvest

The regeneration harvest would remove merchantable trees (greater than 8 inches in diameter at breast height (DBH)). The dispersed retention would generally focus on retention of the larger and more vigorous dominant and co-dominant trees, some of which would be expected to provide for snags and large down wood within the harvested area. Hardwoods would be retained where possible and would not count towards green tree retention or retention for CWD/snags.

Tree retention accounts for total retention of the project area including grouped and dispersed retention. Tree retention at harvest would provide for green tree retention and for snag and coarse woody debris (CWD) recruitment. In both Connectivity and GFMA LUAs, 3.4 snags per acre and 240 linear feet (lf) of CWD per acre would be reserved at harvest and would be created within 5 years post-harvest. After

snags and CWD are created, the final green tree retention would be 12-18 green conifer trees per acre in the connectivity land use allocation and 6-8 green conifer trees per acre in the GFMA land use allocation. The final green tree retention prescription would be targeted toward the middle of these retention levels but would be expected to vary slightly during implementation due to inherent variability in the stands.

2.2.4 Road Construction, Renovation, and Maintenance

Under Alternative 2, 0.13 miles of temporary native surface road, 0.38 miles of optional permanent rock or temporary native surface road, and 2.58 miles of permanent rocked roads would be constructed. Spur 13A in Gosage Incline (0.05 miles) would be improved to a rocked road. Renovations would occur on 38.17 miles of existing roads. Between 20 and 42 culverts[2] would be replaced. There would be one temporary new stream crossing installed on Spur 15C (Guileless, T20S R01W Sec 15). See Appendix C for Roads Tables.

2.2.5 Reforestation and Fuels Management

Thinning Units

At the completion of harvest operations, fuels surveys would be conducted and project locations identified as containing hazardous fuel loads may be targeted for hand or machine slash piling and burning. Hand or machine piles may be constructed along roads or property lines and at landings. Slash pullback may be incorporated as the desired fuels treatment based on evaluation of post-harvest conditions. See Appendix A Project Design Features, PDF 63 through 75.

Regeneration Units

Post-harvest site-preparation would be done as necessary to reduce residual harvest slash levels to allow planting to occur within the harvest units identified for regeneration harvest. Such activities may include a combination of mechanical and or hand piling of slash, jackpot, pile burning, or broadcast burning. See Appendix A Project Design Features, PDF 63 through 75. Whole-tree yarding may be authorized on all regeneration harvest units to minimize slash within the units. Post-harvest exams would be conducted in each unit to determine the appropriate mix of site preparation and planting needs.

Regeneration harvested stands would be replanted at a density of approximately 400 TPA (approximately 11 ft. spacing). Reforestation density and species composition would be favored towards Douglas fir with some western hemlock and western redcedar. The composition of the natural regeneration component would depend on tree species adjacent to harvested areas, seedbed conditions, timing and abundance of seed crops, seed predation, weather conditions, and tree seedling species availability.

2.3 Alternative 3

See Appendix F: Maps for logging systems and roadwork associated with this Alternative.

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[2] The actual number of culverts replaced as part of the project would be determined based on costs of replacement and other operational costs relative to the value of the timber sale. At a minimum, all (20) culverts with a high or very high need for replacement as determined by hydrology and engineering staff would be replaced. If funding allows, even culverts that are a comparatively low priority for replacement would be completed (an additional 22).

Table 3: Proposed Harvest Summary for Alternative 3

	Total Acres	Anthony Access	Gosage Incline	Guileless	John's Last Stand	Missing Links
Upland (Matrix) Acres Harvested Thinning	419	48	71	48	49	203
Riparian Reserve Acres Harvested Thinning	265	52	83	55	0	75
Upland (Matrix) Acres Harvested Regeneration	92	52	40	0	0	0
Cable or Cable-Preferred Logging	525	87	194	71	0	174
Ground-based or Ground-based Preferred Logging	181	66	0	32	0	83
Helicopter Logging	70	0	0	0	49	22

2.3.1 Thinning Treatments in Uplands (Matrix)

Treatments would be the same as described in Alternative 2 except John's Last Stand (T20S R01E Sec 29) would be thinned rather than regeneration harvested. See Appendix F: Maps for logging systems.

2.3.2 Thinning Treatments in Riparian Reserves

Treatments would be the same as described in Alternative 2 except for the following differences.

The minimum no-harvest buffer on all perennial and intermittent streams would be 75' (e.g. the study stretches would be harvested to within 75', not the 25' proposed under Alternative 2). Streams with larger buffers such as those in PDF 83 would remain the same. An additional 5 TPA on average would be retained at time of harvest within treated Riparian Reserves. Based on post-harvest stand conditions, the 5 TPA would be used for snag and CWD creation activities within 5 years post-harvest. No travel off of designated skid trails (e.g. no feller-bunchers) would be authorized in ground-based Riparian Reserves to reduce potential soil compaction. Riparian Reserve units accessible only by a single skid trail would not be harvested (see Appendix F: Maps Alternative 3) to eliminate the impacts from concentrated travel. The area within Gosage Incline (T20S R01 W Sec 7) requiring a large common landing within Riparian Reserves on Spur 7B would not be harvested (common landing would not occur) and larger no-harvest buffers would be left on some streams within the same unit to provide undisturbed connectivity areas for spotted owls and other species. (See Appendix F: Maps) Areas requiring corridors over perennial and intermittent streams would generally not be treated.

2.3.3 Regeneration Harvest

Treatments would be the same as described in Alternative 2 except John's Last Stand (T20S R01E Sec 29) would be thinned rather than regeneration harvested. See Appendix F: Maps for logging systems.

2.3.4 Road Construction, Renovation, and Maintenance

Road construction, improvement, and renovation would be the same as under Alternative 2. See Appendix C for Roads Tables.

2.3.5 Reforestation and Fuels Management

Treatments would be the same as described in Alternative 2 except John's Last Stand (T20S R01E Sec 29) would be thinned rather than regeneration harvested and would therefore not receive any reforestation treatment.

2.4 Alternative 4

See Appendix F: Maps for logging systems and roadwork associated with this Alternative.

Table 4: Proposed Harvest Summary for Alternative 4

	Total Acres	Anthony Access	Gosage Incline	Guileless	John's Last Stand	Missing Links
Upland (Matrix) Acres Harvested Thinning	345	40	66	48	0	192
Riparian Reserve Acres Harvested Thinning	182	33	63	39	0	45
Upland (Matrix) Acres Harvested Regeneration	0	0	0	0	0	0
Cable or Cable-Preferred Logging	407	61	129	60	0	156
Ground-based or Ground-based Preferred Logging	119	12	0	26	0	81
Helicopter Logging	0	0	0	0	0	0

2.4.1 Thinning Treatments in Uplands (Matrix)

Thinning treatments would be the same as described in Alternative 2 except for the following differences.

The areas proposed for helicopter harvest under Alternative 2 in Missing Links (T20S R01W Sec 23) would not be harvested. Areas accessible only by construction of a full-bench road (Spur 32A) in Anthony Access (T19S R01W Sec 31) would not be treated as Spur 32A would not be constructed. Areas in Gosage Incline (T20S R01W Sec 7) accessed from Spur 7A would not be treated as that Spur would not be constructed. Gosage Incline (T20S R02W Sec 13) Spur 13B would not be constructed and that unit would be harvested as downhill cable. John's Last Stand (T20S R01E Sec 29) would not be harvested.

2.4.2 Thinning Treatments in Riparian Reserves

Thinning treatments would be the same as described in Alternative 2 except for the following differences. The minimum no-cut buffer on all perennial and intermittent streams would be 120'. The areas proposed for helicopter harvest under Alternative 2 in Missing Links (T20S R01W Sec 23) would not be harvested. Areas accessible only by construction of a full-bench road (Spur 32A) in Anthony Access (T19S R01W Sec 31) would not be treated as Spur 32A would not be constructed. No-harvest buffers and the removal of the large common landing on Spur 7B would be the same as Alternative 3 in Gosage Incline (T20S R01W Sec 7) except that locations with a 75' no-harvest buffer under Alternative 3 would have a 120' no-harvest buffer. Areas in Gosage Incline (T20S R01W Sec 7) accessed from Spur 7A would not be treated as Spur 7A would not be constructed. Gosage Incline (T20S R02W Sec 13) Spur 13B would not be constructed and that unit would be harvested as downhill cable.

2.4.3 Regeneration Harvest

No regeneration harvest would occur under this alternative. Units in Anthony Access (T20S R02W Sec 1), Gosage Incline (T20S R01W Sec 7), and John's Last Stand (T20S R01E Sec 29) would not receive any harvest treatment under this alternative.

2.4.4 Road Construction, Renovation, and Maintenance

Under Alternative 4, 1.01 miles of temporary native surface roads and 0.36 miles of permanent rocked roads would be constructed. Spur 13A in Gosage Incline (0.05 miles) would be improved to a rocked road. Renovation would occur on 31.79 miles of existing roads. Between 16 and 33 culverts would be replaced. There would be one temporary new stream crossing installed on Spur 15C (Guileless, T20S R01W Sec 15). The following roads would not be constructed: Spurs 7A and 13B (Gosage Incline T20S R01W Sec 7 and T20S R02W Sec 13), Spurs 1A and 32A (Anthony Access T20S R02W Sec 1 and T20S R01W Sec 31). See Appendix C for Roads Tables.

2.4.5 Reforestation and Fuels Management

Same as Alternative 2 except no activities would occur in areas proposed for regeneration harvest under Alternative 2 as they would not be harvested.

2.5 Comparison of Action Alternatives

Table 5: Comparison of Action Alternatives

	Alternative 2	Alternative 3	Alternative 4
Total Acres Lost Creek 6th Field Watershed	34,500 acres		
Total Acres (includes harvested, grouped retention, treated and untreated riparian areas)	1,200	1,193	884
Upland (Matrix) Acres Harvested Thinning	378	419	345
Riparian Reserve Acres Harvested Thinning	299	265	182
Upland (Matrix) Acres Harvested Regeneration	141	92	0
Thinning in GFMA Blocks	611	637	496
Thinning in Connectivity Blocks	72	53	35
Cable or Cable-Preferred Logging	562	525	407
Ground-based or Ground-based Preferred Logging	187	181	119
Helicopter Logging	70	70	0
Riparian Treatment	Same prescription as Uplands	Same prescription as Uplands with an additional 5 TPA retained for creation of CWD & Snags within 5 yrs post-harvest	Same prescription as Uplands
Projected Number of Corridors over Perennial and Intermittent Streams	27	4	14
Seasonal Restrictions for Wildlife Protection	T20S R01W Sec 23 and T20S R01E Sec 19 seasonally restricted from March 1 to July 15	Same as Alt 2	Same as Alt 2
Roads	• 35.60 miles Renovation • 0.05 miles Improvement • 1.59 miles Construction (Permanent) • 0.51 miles Construction (Temporary) • 26-68 Culverts Replaced • 20-42 Stream Crossings Replaced	• 35.60 miles Renovation • 0.05 miles Improvement • 1.59 miles Construction (Permanent) • 0.51 miles Construction (Temporary) • 26-68Culverts Replaced • 20-42 Stream Crossings Replaced	• 31.79 miles Renovation • 0.05 miles Improvement • 0.36 miles Construction (Permanent) • 1.01 miles Construction (Temporary) • 19-51 Culverts Replaced • 16-33 Stream Crossings Replaced
Total Estimated Volume (mbf)	17,755	14,019	9,927
Total Approximate Gross Value	$9,165,834	$7,183,971	$4,846,912
Total Approximate Net Value	$4,937,976	$3,873,932	$2,772,475

3.0 Affected Environment and Environmental Consequences

The direct and indirect effects analysis considers the impacts, both beneficial and adverse, which are caused by the action(s).

The cumulative effects analysis considers past, present, and reasonably foreseeable future actions that would affect the issue of concern within the geographic scopes and the timeframes of the analysis by Issue. Appendix D includes a detailed explanation of what a cumulative effects analysis is and a list of the actions BLM considered while developing the cumulative effects analysis. Not all actions listed in Appendix D are applicable to all Issues.

3.1 Issues Not Presented in Detail

3.1.1 What are the effects of proposed timber harvest and associated activities on suitability for Lands with Wilderness Characteristics of John's Last Stand (T20S R01E Sec 29)?

As required under FLPMA and current BLM policy, the Bureau recently updated Lands with Wilderness Characteristics inventories for western Oregon. The impetus for this update was the need for accurate information for the ongoing revision of the BLM's RMPs for western Oregon. In conducting these inventories, all western Oregon Districts followed the guidance provided in BLM Manual 6310—Conducting Wilderness Characteristics Inventory on BLM Lands. This manual provides a process for identifying BLM lands that meet the following criteria: a) encompass at least 5,000 acres of roadless, contiguous BLM lands[3]; b) appear to be in a natural condition; c) provide outstanding opportunities for solitude or primitive and unconfined recreation.

To launch this inventory update, the BLM held a two-day workshop in Roseburg, OR, during August 2012. The workshop focused on an initial screening of the planning area to identify all areas that could potentially meet the minimum size criteria. Geographic Information System (GIS) data was used to (1) identify BLM-administered lands that met the size criteria and (2) screen areas that met the size criteria for the absence of roads as identified as part of the BLM's Ground Transportation Network. Based on the outcomes of this screening, western Oregon districts began inventories during the summer of 2012. No areas were found to meet the minimum criteria for having wilderness characteristics on the Eugene District.

Upon receiving scoping comments on the Lost Creek EA regarding the potential for wilderness characteristics in John's Last Stand, area staff conducted a simple review of the area utilizing GIS and confirmed that the contiguous acreage not bisected by permanent roads does not approach 5,000 acres even when considered with adjacent National Forest System lands.

As the area does not currently meet the minimum criteria for Lands with Wilderness Characteristics, the proposed action will not change that fact, and therefore the impacts to wilderness characteristics were not further analyzed.

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[3] Areas of less than 5,000 acres may meet the size criterion under the following circumstances: a) the area is contiguous with lands that have been formally determined to have wilderness or potential wilderness values or are managed for the protection of wilderness characteristics; b) it is demonstrated that the area is of sufficient size to make practicable its preservation and use in an unimpaired condition; c) the area is a roadless island (i.e. an area of BLM land surrounded by water).

3.1.2 What are the effects on game species such as deer and elk and Special Status Species other than Red Tree Voles (RTVs) and northern spotted owls (NSOs)??

The potential for the Lost Creek Project to affect deer and elk arose as a potential issue with two elements during external scoping. Black-tailed deer (Odocoileus hemionus columbianus, "deer") and Roosevelt elk (Cervus canadensis roosevelti, "elk") are the two cervid species endemic to the project area. Both are forest-dwelling species that use early-successional stands for foraging and mid-successional and older stands for hiding and thermal cover. The Oregon Department of Fish and Wildlife (ODFW) is responsible for deer and elk management, and sets demographic targets for the Wildlife Management Units (WMUs) it has established. The Lost Creek project area falls within the Indigo WMU, where deer and elk metrics are below ODFW's targets. For this reason, ODFW commented in favor of regeneration harvest in the Lost Creek Project because it believes that the amounts and distribution of early-successional habitat in the Indigo WMU is limiting deer and elk populations. However, analyzing any effects to deer and elk at this scale would not be relevant to making a reasoned choice among the alternatives because even the greatest amount of change in early-successional habitat that could be achieved in the Lost Creek Project (141 acres) could not be detected at the WMU scale (50,294,258 acres).

Deer and elk are important game species and a member of the public commented that the BLM should not regeneration harvest the John's Last Stand unit because they hunt deer and elk in it. However, analyzing any effects to deer and elk hunting opportunities at this scale would not be relevant to making a reasoned choice among the alternatives because thousands of acres providing similar hunting opportunities are also accessed from the same road system, and therefore any change due to the Lost Creek Project would be negligible at this scale. Additionally, any of the Lost Creek Project alternatives would provide habitat in which deer and elk could be hunted, and therefore would not preclude this use in any specific area regardless of the alternative chosen.

For Special Status Species other than northern spotted owl and red tree vole, and relevant migratory birds (see Appendix E), all of the Lost Creek Project alternatives would meet the requirements of the Endangered Species Act, the Survey and Manage Program, BLM Sensitive Species policy, and/or BLM migratory bird policy, as applicable. Therefore, analyzing any effects to these species would not be relevant to making a reasoned choice among the alternatives.

3.1.3 What are the effects to soil productivity in the Uplands (Matrix), erosion, and potential mass wasting (landslide)?

This issue was determined not require detailed analysis because harvest systems and harvest unit boundaries were designed to: avoid high risk areas, apply standard practices that prevent long-term soil damage, and apply unit specific project designs to keep detrimental soil impacts within Eugene District Resource Management Plan thresholds.

Field inspections during sale planning verified the Lane County Soil Survey and Linn County Soil Survey. Proposed harvest areas were surveyed to update and verify the District's existing Timber Production Capability Class (TPCC) TPCC is a soil based classification system designed to identify sites that are incapable of sustained intensive timber production without loss of long-term productivity potential. New data and TPPC adjustments were incorporated in the proposal and withdrawn from the project if determined to be too fragile to tolerate timber management. Shallow skeletal (rocky) soils with low inherent productivity and resiliency, saturated soils (hydric/wetlands), and landslide prone sites are the primary categories withdrawn under the TPCC system. Soil series maps with TPCC information are provided in the soil analysis file.

None of the action alternatives would increase the risk of mass wasting beyond existing levels for the project units and associated haul road system. Haul road system renovation and drainage systems would be improved resulting in a lowering of risk for mass wasting events because fewer road failures would occur with improved drainage (additional culverts and failing culverts replaced). The potential for localized slope failure would continue at existing low levels in areas that exhibit past mass movement, especially during large storm events. Soils with high sensitivity incudes shallow rocky soils and wet and slow to dry soils either were excluded from harvest areas or had site-specific design criteria established to minimize risk of erosion, protect site stability, and protect long-term productivity. Where long-term production would be lost permanently (e.g. permanent road construction), impacts were quantified for all alternatives the area permanently converted to road is within the range analyzed under the Eugene District RMP/EIS.

Concerns were raised internally regarding site reforestation (John's Last Stand) and legacy compaction (Anthony Access Sec 01) in regeneration harvest areas. If Anthony Access unit 1E is harvested with ground-based systems, measures would be implemented to use existing skid trails to the greatest extent possible (PDF 7) and all skid trails with severe compaction would be decompacted (PDF 46). Other measures to minimize severe compaction (PDFs 43-45) and site preparation restrictions on fuels treatment and slash placement on erodible exposed soils would alleviate concerns for soil productivity and seedling plantability (PDFs 63-71). Although soils in the John's Last Stand regeneration harvest area have moderate sensitivity to harvest activities, project design features were developed to maintain soil stability and productivity. These include special cautionary measures for site preparation (PDF 66 - burning restrictions to protect duff and organic litter cover, limit burning effects to 5% aerial extent), helicopter logging (minimizes soil displacement and compaction), and buffering on sensitive soil classifications and withdrawn areas (provides an undisturbed forested wind break for shallow rocky soil areas).

Other potential areas of concern for soils impacts include streams with steep side slopes, soils prone to raveling and gullying, and erosion and compaction on slow to dry soils. Where stream sides or stream initiation points had headwalls >60% slope, no-harvest buffers were extended from 75' to the slope break or 100' where that distance would remove the risks of sedimentation and slumping directly to streams(PDFs 82 and 83). Logging systems were designed to minimize impacts on the slow to dry soils and steep slopes (e.g. cable versus ground-based systems).

There is the potential for whole tree yarding systems using ground-based equipment (i.e. feller-bunchers) to result in compaction and displacement, leading to erosion and loss of productivity. Measures designed to utilize legacy skid trails followed by decompaction (tillage of skid trails and temporary roads) would reduce the potential for long-term productivity losses (longer than 60 years). However, 5% to 15% of the area could have short-term productivity losses due to compacted and disturbance on non-designated skid trails (expected area traveled off of designated trails when a feller-buncher is used).

3.1.4 What are the effects on historic/cultural resources?

In compliance with Section 106 of the National Historical Preservation Act, inventories were conducted on all harvest units for historic and cultural resources. Cultural surveys completed for the project identified historic railroad trestles and grades in the initial project area. As a result of these findings, some project boundaries, roads, and logging systems were modified to exclude historic and cultural resources identified during surveys. As these features will remain intact and undamaged by project activities, there will be no effect to historic or cultural resources. PDF 1 would avoid risk of damage any historic/cultural resources which were not discovered during surveys, if they exist in the project area.

3.1.5 What are the effects from road construction, improvement, maintenance, and use (haul) on sediment input on fish-bearing streams and hydrological function?

This issue was not presented in detail because it would not lead to a more informed decision. There are only minor differences in the amount of sediment per alternative (road renovation/stream culvert replacements) that would occur and the amount of new material added to the local stream networks is insignificant compared to background levels.

Under the No Action Alternative, some roads or road segments within the project area would continue to be chronic sediment sources until they are properly repaired, maintained, or removed as part of another (unplanned) project. Lack of maintenance on area roads (cleaning ditch lines, culvert replacements and maintenance, rocking, grading, etc.) would continue to produce sediment off poorly drained roads.

Under the Action Alternatives, the installation, renovation, and maintenance of stream crossings culverts would be the primary sediment impact and would occur as brief, short-term pulses during construction activity. These small, short-term increases of sediment from culvert replacements are all above fish habitat and are not expected to cause effects to fish. Conversely, adding cross drains and rendering existing cross drain culverts functional would improve road drainage and limit the amount of material from the forest entering area streams over the long term. New cross drains would improve road drainage and disconnect ditchlines from area streams, alleviating chronic sediment sources. Ditchlines that flow to streams currently allow sediment from the road to be transported directly to the streams. Placing new cross drains would allow the ditchlines to transport water and material washed off the road system onto forested areas away from streams. New culverts for small streams and seeps would be added to prevent ditchlines from re-routing streams.

Increased road use from timber hauling and related activities would result in minor short-term increases in sedimentation. This project allows for year-round timber haul, with the greatest potential for sedimentation occurring during winter haul. However, proposed haul routes are predominately gravel surfaced roads leading to paved roads which have lower potential for sedimentation than native surface roads would. Roads would be renovated (add rock, blading, etc.) before winter haul would be authorized (PDF 29). Therefore, the potential for increases in sedimentation in fish-bearing streams is expected to be insignificant and likely undetectable compared to existing background levels.

Across all action alternatives, road related activities would have some short term increases in sediment delivery to area streams due to disturbance of the road bed, ditch lines and stream crossings; however, long term sediment inputs should be reduced due to improved road drainage from the addition of aggregate, crowning of roads, and ditch lines being disconnected to streams (new cross drains).

3.2 Issue 1: What are the effects of timber harvest and associated activities on northern spotted owl habitat quantity and quality, and the suitability of affected home ranges?

Multiple scales are appropriate for analyzing the effects to spotted owls: site effects at the unit and spotted owl site (see below) scale that may affect individual spotted owl sites, general habitat effects at the watershed scale, and cumulative effects at the Provincial Scale that may affect the spotted owl population as a whole. Project effects would last approximately 80 years, which is the time required for regeneration harvested stands to develop into habitat of similar quality to current conditions.

3.2.1 Affected Environment

General Stand Conditions

Thinning

Proposed units have regenerated following clear-cut harvest or fire (see Introduction for stand ages); overstory trees are generally densely stocked. The stands are dominated by Douglas fir, with varying amounts of western redcedar and Western hemlock; Pacific yew and grand fir are present but uncommon. Hardwoods are represented by bigleaf maple, red alder, and scattered chinkapin and madrone. These stands are in stem exclusion stage, in which the dense overstory trees prevent the establishment of new trees. The understories are of varying densities that are dominated by typical shrubs like hazel, oceanspray, and vine maple. Advanced regeneration of conifer species is not prevalent in these stands, and is comprised primarily of western hemlock and western redcedar. Twenty-six remnant trees that survived the previous harvest are present in Gosage Incline Sec. 17.

Regeneration Harvest

The proposed regeneration harvest units have vegetation similar to the proposed thinning units. Two of the units, Anthony Access Sec. 01 and Gosage Incline Sec. 07, were commercially thinned in the late 1990s. This thinning treatment, along with their slightly greater age, has resulted in larger diameter overstory trees with deeper crowns and larger branches, better-developed understory vegetation, and additional conifer reproduction compared to the proposed thinning units. The proposed John's Last Stand unit was naturally regenerated and has not been previously managed, yielding a dense overstory and overall stand conditions that are similar to the proposed thinning units, with pockets of larger, less dense trees. Additionally, scattered large remnant trees and snags are present in and adjacent to Gosage Incline Sec. 07 and John's Last Stand.

Coarse Woody Debris and Snags

Coarse Woody Debris (CWD) is an important habitat feature for many wildlife species. CWD provides refugia, foraging sites, and travel corridors for species with low mobility and small home ranges (e.g. invertebrates, small mammals, and amphibians). Additionally, CWD provides important basic ecological functions such as moisture retention, nutrient cycling, and microclimate buffering. These characteristics vary with the size and Decay Class of snag and CWD pieces (Maser et al. 1979.) Amounts of CWD and snags are generally low (see Tables 6 and 7) compared to typical unmanaged stands of similar age (average of 8.8 snags/acre greater than 18" DBH in Decay Class 1 and 2; 383 linear feet/acre of CWD greater than 19" diameter in Decay Class 1 or 2; reviewed in Middle McKenzie Landscape Design 2002). Due to previous harvest, site preparation, previous thinning, and low subsequent tree mortality, the CWD present is generally either large-diameter/high decay class residue from the initial harvest or small diameter/low decay class from suppression mortality. Small-diameter snags occur in the project primarily due to suppression mortality, and large-diameter snags are uncommon. Field review of the proposed units indicates that CWD is more regularly distributed in Riparian Reserves and irregularly distributed in upland (Matrix) areas; with the greatest amounts present in Riparian Reserves. Three proposed units, Gosage Incline 07 Regeneration, Gosage Incline 17, and John's Last Stand, have higher large snag and CWD levels due to their origins and past management history.

In the late 1990s and early 2000s, snags were created in riparian areas around Anthony Access Sec. 31, Gosage Incline Sec. 07 and 17, and Guileless Sec. 15 and 21. Some of these snags occur within the proposed units in Riparian Reserves.

Table 6: Average CWD and Snag Levels in Proposed Thinning Units

Decay Class	CWD (linear ft/acre)				Snags (number/acre)			
	4-15"	16-19"	20"+	Total	4-15"	16-19"	20"+	Total
1	18.6	15.9	0.1	34.6	0.3	0.2	0.0	0.5
2	74.5	38.3	5.3	118.1	0.2	0.1	0.0	0.3
3	261.6	143.0	13.3	417.8	0.2	0.7	0.0	0.9
4	38.8	104.1	32.8	175.8	0.0	0.0	0.0	0.1
5	13.2	48.6	5.7	67.5	0.0	0.0	0.0	0.0
Total	406.7	349.9	57.2	813.8	0.7	1.1	0.1	1.8

Table 7: Average CWD and Snag Levels in Proposed Regeneration Harvest Units

Decay Class	CWD (linear ft/acre)				Snags (number/acre)			
	4-15"	16-19"	20"+	Total	4-15"	16-19"	20"+	Total
1	5.1	15.2	3.1	23.4	0.3	0.1	0.0	0.4
2	71.9	59.3	3.3	134.6	0.2	0.3	0.1	0.5
3	249.8	163.3	31.4	444.5	0.5	0.0	0.2	0.7
4	66.0	60.3	12.8	139.1	0.0	0.0	0.1	0.1
5	19.9	56.2	6.5	82.6	0.0	0.0	0.0	0.0
Total	412.7	354.3	57.2	824.2	0.9	0.4	0.4	1.7

Northern Spotted Owls

The northern spotted owl (*Strix occidentalis caurina*; spotted owl) is a long-lived owl species that ranges from northern California to British Columbia. Spotted owls prey on a variety of small mammals and typically nest and forage in older forest stands (USFWS 2011).

The northern spotted owl is the only federally threatened or endangered wildlife species which occurs within the project area.

Species Status and Recovery Guidance

The species was listed as 'Threatened' by the Fish and Wildlife Service in 1990 because of its decreasing numbers, with habitat loss from timber harvest considered the greatest risk at that time. Since 1990, removal of habitat has slowed, but spotted owl populations have continued to decline and it is now believed that competition from barred owls (*S. varia*) is an equally pressing concern (USFWS 2011). The USFWS has initiated experimental removal of barred owls to explore the possibility of controlling barred owl numbers and reducing competition with spotted owls (USFWS 2013a), and revised their Recovery Plan (USFWS 2011) to provide additional direction for habitat management to Federal land managers such as the BLM.

The spotted owl Recovery Plan identified Recovery Actions intended to help conserve the species and of these, Recovery Actions 10 and 32 apply to the Lost Creek Project. Recovery Action 10 (RA10) calls for the conservation of spotted owl sites and high-value habitat in the quantity and spatial configuration necessary for the species' recovery. The Willamette Province Level 1 Team used the interim guidance for RA10 implementation found in the Recovery Plan to develop a site prioritization method (USDA/USDI 2015, Appendix H). This method is being used for Section 7 consultation for the Lost Creek Project to ensure consistency with RA10 by avoiding adverse effects to spotted owl sites with recent occupation

and/or high levels of suitable habitat. Recovery Action 32 (RA32) calls for reserving high-quality spotted owl habitat to serve as a refuge from negative interactions with barred owls. The Eugene District developed a method for identifying RA32 habitat based on office and field evaluation (Eugene BLM 2012). Units within the Lost Creek project area that were identified as RA32 habitat or would have caused adverse effects to high-ranked RA10 spotted owl sites were eliminated from the project (Data on file).

Northern Spotted Owl Critical Habitat

Critical Habitat for a species is defined by the U.S. Fish and Wildlife Service as the areas containing the physical or biological features (Primary Constituent Elements or PCEs) essential to the conservation of the species. PCEs of Critical Habitat for the spotted owl generally correspond with those described above for suitable, foraging, and dispersal habitat. Critical Habitat for the spotted owl was revised in 2012, and was delineated to meet the most current assessment of the species' conservation needs as described in the 2011 Recovery Plan (USFWS 2011). Similar to Threatened and Endangered species, effects to Critical Habitat are regulated under the Endangered Species Act. Approximately 70 total acres of northern spotted owl Critical Habitat occur in the Lost Creek Watershed, but the Lost Creek project area does not occur within any Critical Habitat. The nearest Critical Habitat located approximately 0.25 miles from the project area. As there is no Critical Habitat within or adjacent to the project area, there is no potential for effects to Critical Habitat and it will not be considered further.

Northern Spotted Owl Area of Concern

The Lost Creek project area is within the South Willamette-North Umpqua Area of Concern (AOC), a corridor of federal land in the Eugene and Roseburg BLM districts that facilitates movement of spotted owls between the Coast Range and Cascade Mountains. The AOC was informally identified by the Interagency Scientific Committee in 1990 (Thomas et al. 1990) because of concerns that habitat losses within it could disrupt genetic exchange within the spotted owl population. Beginning in 1997, the BLM Eugene District in association with the interagency Level 1 Team for the Willamette Province formally delineated and has evaluated its portion of the AOC in Section 7 consultation with the USFWS to determine if proposed management actions would affect habitat conditions and owl movement through the corridor.

The AOC has continued to be considered during larger-scale planning efforts such as the 2008 and 2012 revisions to spotted owl Critical Habitat (USFWS 2008b and 2012), and the 2008 and ongoing 2015 Western Oregon BLM Resource Management Plan revisions (USDI 2008 and 2015).

Northern Spotted Owl Habitat

Suitable habitat for spotted owls provides for all the species' life history requirements, and is also called Nesting/Roosting/Foraging (NRF) habitat. In the Upper Willamette Resource Area, this habitat is generally described as conifer forest greater than 80 years old with mature or late-successional characteristics such as large-diameter trees with nesting structure (broken tops, cavities, or platforms), multiple canopy layers, large down logs and snags, and a somewhat open understory. Stands that show most of these characteristics except nesting structure, and that provide roosting and hunting opportunities, are called foraging habitat. Stands without nesting, roosting, and foraging components but with sufficient canopy cover and sub-canopy space for spotted owl movement are referred to as dispersal habitat. These stands are used to facilitate owl movement at both the site and landscape scale, and may also provide foraging opportunities if the habitat supports prey species. Dispersal habitat is generally found in stands 40 to 80 years old. Forested areas that currently provide no function for spotted owls due to small, dense trees are called unsuitable habitat, and areas that will never provide for spotted owl life history needs (e.g. rock outcrops or water bodies) are called non-habitat. The stands proposed for

management in the Lost Creek project area (Table 8) are both dispersal habitat (maximum of 730 acres or 89% of proposed units) and suitable habitat (maximum of 89 acres or 11% of proposed units). Figure 1 shows the relationship of spotted owl habitat and potential Lost Creek Project harvest areas in the Lost Creek watershed.

Figure 1: Harvest Areas and Spotted Owl Habitat Types on BLM-Managed Land in the Lost Creek Watershed.

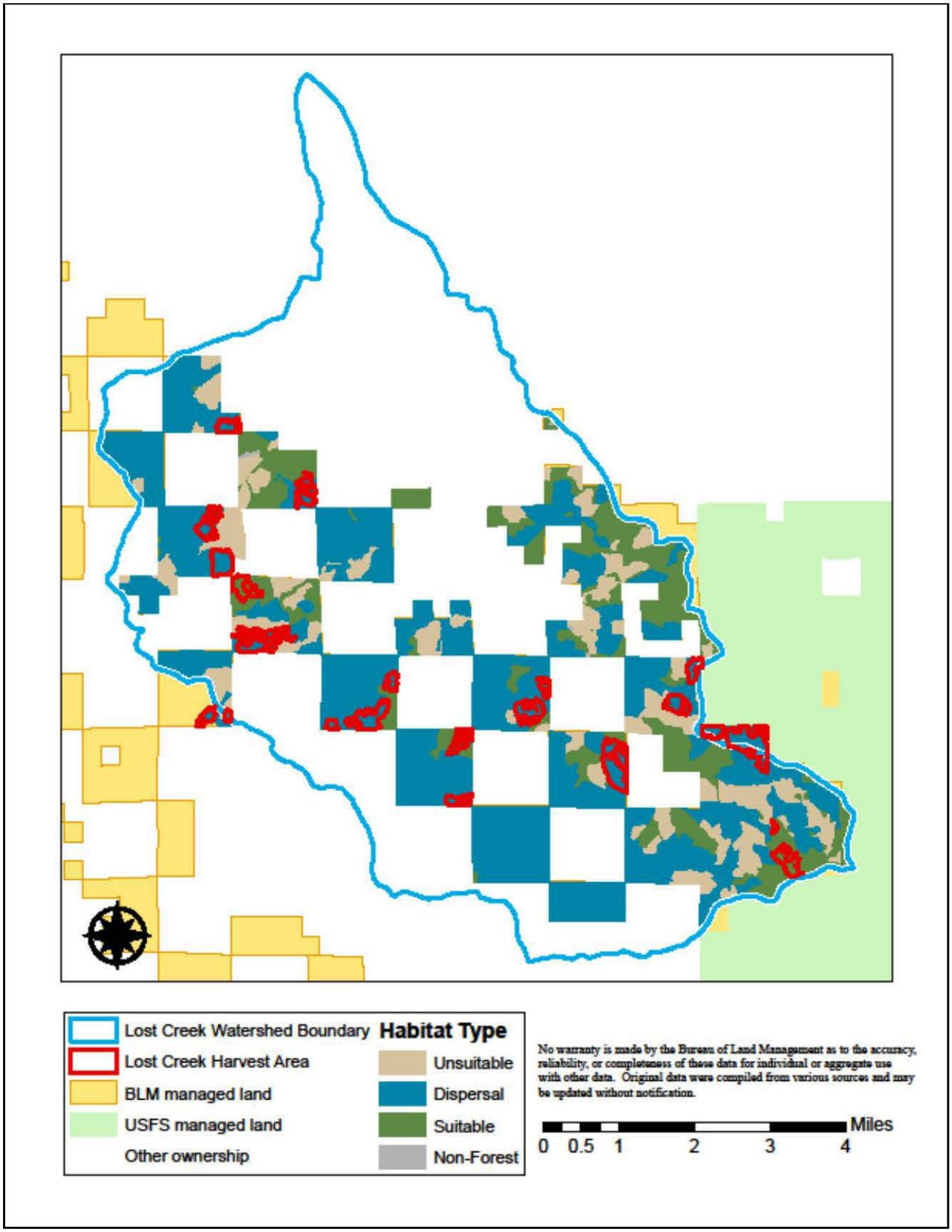

Table 8: Acres of Spotted Owl Habitat in Lost Creek Project Area by Alternative

Sale Name	Spotted Owl Sites Intersecting Project Area	Project Area Spotted Owl Habitat Type	Alt 2 Acres	Alt 3 Acres	Alt 4 Acres
Anthony Access: Regeneration Harvest	Anthony Creek	Dispersal	52	52	0
Anthony Access: Thinning	Anthony Creek	Dispersal	108	101	73
Gosage Incline: Regeneration Harvest	None	Suitable	40	40	0
Gosage Incline: Thinning	60NEWITS	Dispersal	183	153	129
Guileless: Thinning	66NEWITS	Dispersal	108	103	86
John's Last Stand: Regeneration Harvest	Lost Creek, East Buckhorn	Suitable	49	49	0
Missing Links: Thinning	Lost Creek, Lost Guiley, East Buckhorn	Dispersal	279	279	237
Total Dispersal Habitat			730	688	526
Total Suitable Habitat			89	89	0

Northern Spotted Owl Sites

Known spotted owl sites include areas where spotted owls are or have been known to occupy; information on the location and status of known spotted owl sites in the Lost Creek project area is available from surveys conducted beginning in the 1990s (data on file), but staffing constraints have prevented surveying every site during every year. The effects of habitat modification to spotted owl sites in the Lost Creek project area are assessed by assigning generalized Nest Patches, Core Areas, and Provincial Home Ranges (PHRs) with radii of 300 meters, 0.5 miles, and 1.2 miles respectively (reviewed in USFWS 2013, USDA/USDI 2015). The quality, amount, and spatial distribution of habitat within the three areas described above are analyzed in combination with survey data to determine the pre-harvest habitat conditions and analyze treatment effects to site occupation and reproductive capability.

As recommended in the Recovery Plan, areas without definitive survey information that could support resident spotted owls have also been identified and any effects to them evaluated in this document. These are known as potential sites and were delineated by the Willamette Planning Province Level 1 Team using the method detailed in Appendix F of the BA (USDA/USDI 2015). Effects to the two potential sites that could be affected by the Lost Creek project are evaluated in this document. These potential sites share names with those generated in a similar previous effort (Methodology for Estimating the Number of Northern Spotted Owls Affected by Proposed Federal Actions) in order to facilitate effects tracking with the USFWS through time. However, the potential sites evaluated in this document arose from a completely distinct process based on recent survey history and the best available science regarding habitat conditions and spotted owl habitat use and behavior.

The PHRs of five known sites (Anthony Creek, East Buckhorn, East Gosage Creek, Lost Creek, and Lost Guiley) and two potential sites (60NEWITS and 66NEWITS) overlap the Lost Creek project area, as do the Core Areas of two known sites (Lost Creek, Lost Guiley) and two potential sites (60NEWITS, 66NEWITS). The nest patches of the affected PHRs do not overlap the project area. Existing habitat conditions for these sites are detailed in Table 9. These overlapping sites currently have low amounts of suitable habitat due to previous harvest on BLM and adjacent private lands. None of these PHRs, and only one Core Area (Anthony Creek), meet the Level 1 Team thresholds for site viability (40% suitable habitat in PHR and 50% in Core Areas (USFWS 2013; Table 9). Additionally, the sites were ranked as suitable for treatment during RA10 evaluation and no spotted owls were detected at any of the sites during surveys in 2013, 2014, or 2015.

Table 9: Current Habitat Availability in Spotted Owl Sites that Intersect the Lost Creek Project Area.

		Habitat Type					
		Dispersal (40-79 yrs)		Suitable (80+ yrs)		All Habitat	
Site Name	Scale	Acres	Percent	Acres	Percent	Acres	Percent
60NEWITS	Nest Patch	0	0%	0	0%	0	0%
	Core Area	48	10%	0	0%	48	10%
	PHR	525	18%	56	2%	581	20%
66NEWITS	Nest Patch	0	0%	0	0%	0	0%
	Core Area	171	34%	0	0%	171	34%
	PHR	1047	36%	67	2%	1114	38%
Anthony Creek	Nest Patch	0	0%	34	49%	34	49%
	Core Area	35	7%	265	53%	300	60%
	PHR	403	14%	334	12%	737	25%
East Buckhorn	Nest Patch	31	44%	32	46%	63	90%
	Core Area	238	47%	108	22%	346	69%
	PHR	1261	44%	557	19%	1818	63%
East Gosage Creek	Nest Patch	36	51%	0	0%	36	51%
	Core Area	127	25%	5	1%	132	26%
	PHR	682	24%	20	1%	701	24%
Lost Creek	Nest Patch	10	14%	60	86%	70	100%
	Core Area	268	53%	158	31%	426	85%
	PHR	1367	47%	605	21%	1972	68%
Lost Guiley	Nest Patch	4	6%	57	81%	61	87%
	Core Area	267	53%	97	19%	364	73%
	PHR	888	31%	186	6%	1074	37%
Only habitat on federal lands is reported. Private lands are not included due to the lack of information on habitat conditions and typical land management practices. Therefore private lands are assumed to not contribute towards spotted owl conservation.							

3.2.2 Alternative 1: No Action

3.2.2.1 Direct and Indirect Effects

No direct effects to spotted owls or their habitat would occur under this Alternative. Stands would not be modified through timber harvest and no potential for noise disturbance from timber harvest or associated actions would occur. In the near-term, the project area would continue to provide for spotted owl use at current levels.

Habitat would continue to develop along current trajectories. Portions of the project area that are already suitable habitat would continue to provide for all spotted owl life history needs while individual habitat components such as large-diameter trees with nesting structure (broken tops, cavities, or platforms), multiple canopy layers including hardwoods and shade-tolerant conifers, and large down logs and snags would increase in quantity and quality. Dispersal habitat in the project area would continue to develop these suitable habitat components as growing space is created through suppression mortality and small-scale disturbances like wind-throw or disease. These disturbance processes would occur more slowly

compared to the Action Alternatives; for example overstory tree growth modeling (Forest Vegetation Simulator, data on file) predicts that in 40 years thinning would result in approximately 50% more trees greater than 28" DBH, a size threshold that the USFWS uses in the Recovery Plan (2011) to identify high-quality habitat. Therefore, untreated dispersal habitat would still develop into suitable habitat at approximately age 80, but would be of lesser quality than that which would develop after thinning. Tables 10-12 detail current habitat availability and project future habitat availability in 40 and 80 years under Alternative 1 at affected sites

Table 10: Current Habitat Availability in Affected Spotted Owl Sites

		Alternative 1							
		Non-Forest		Unsuitable		Dispersal		Suitable	
Site Name	Scale	Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	48	10%	0	0%
	PHR	0	0%	0	0%	525	18%	56	2%
66NEWITS	Core	0	0%	0	0%	171	34%	0	0%
	PHR	0	0%	0	0%	1047	36%	67	2%
Anthony Creek	Core	15	3%	89	18%	35	7%	265	53%
	PHR	15	1%	273	9%	403	14%	334	12%
East Buckhorn	Core	0	0%	78	16%	238	47%	108	22%
	PHR	0	0%	402	14%	1261	44%	557	19%
East Gosage Creek	Core	0	0%	46	9%	127	25%	5	1%
	PHR	0	0%	161	6%	682	24%	20	1%
Lost Creek	Core	0	0%	34	7%	268	53%	158	31%
	PHR	8	0%	470	16%	1367	47%	605	21%
Lost Guiley	Core	0	0%	76	15%	267	53%	97	19%
	PHR	0	0%	162	6%	888	31%	186	6%

Table 11: Habitat Availability in 40 years in Affected Spotted Owl Sites

Site Name	Scale	Alternative 1							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	89	18%	301	60%
	PHR	15	1%	0	0%	273	9%	737	25%
East Buckhorn	Core	0	0%	0	0%	104	21%	321	64%
	PHR	0	0%	0	0%	446	15%	1774	61%
East Gosage Creek	Core	0	0%	0	0%	46	9%	132	26%
	PHR	0	0%	0	0%	161	6%	701	24%
Lost Creek	Core	0	0%	0	0%	61	12%	399	80%
	PHR	8	0%	0	0%	539	19%	1903	66%
Lost Guiley	Core	0	0%	0	0%	76	15%	364	73%
	PHR	0	0%	0	0%	162	6%	1074	37%

Table 12: Habitat Availability in 80 years in Affected Spotted Owl Sites

Site Name	Scale	Alternative 1							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	0	0%	390	78%
	PHR	15	1%	0	0%	0	0%	1010	35%
East Buckhorn	Core	0	0%	0	0%	0	0%	425	85%
	PHR	0	0%	0	0%	0	0%	2220	77%
East Gosage Creek	Core	0	0%	0	0%	0	0%	178	35%
	PHR	0	0%	0	0%	0	0%	863	30%
Lost Creek	Core	0	0%	0	0%	0	0%	460	92%
	PHR	8	0%	0	0%	0	0%	2442	84%
Lost Guiley	Core	0	0%	0	0%	0	0%	441	88%
	PHR	0	0%	0	0%	0	0%	1236	43%

3.2.2.2 Cumulative Effects

Cumulative effects are the consideration of incremental impacts of the proposed actions when considered with other present and reasonably foreseeable future actions. Since no project actions are proposed under this Alternative, there are no actions upon which to consider any incremental impacts.

3.2.3 Alternative 2: Preferred Alternative

3.2.3.1 Direct and Indirect Effects

General Spotted Owl Habitat

Alternative 2 would thin approximately 677 acres of dispersal habitat, and would remove approximately 52 acres of dispersal habitat and 89 acres of suitable habitat through regeneration harvest. Tables 14-16 detail the immediate habitat availability and project future habitat availability in 40 and 80 years under Alternative 2 at affected sites.

Thinning would result in direct impacts to dispersal habitat from vertical and horizontal cover reduction in thinned areas through tree removal. Thinning would also damage existing shrub and herb layers, and may also damage or destroy some coarse woody debris and snags. The shrub and herb component would be expected to recover within 10 years (see section 3.3.3.1 for detailed discussion of stand dynamics). Because no snags or CWD would be created in uplands (Matrix) or Riparian Reserves, this Alternative would also contribute to the continued lack of these habitat features in the project area. Post-thinning canopy closure and horizontal cover would continue to allow spotted owls to effectively use the treated area for dispersal. Canopy cover after treatment would be 50% or greater, meeting or exceeding the threshold for dispersal habitat function (Thomas et al. 1990, USFWS 2011, p. G-1). Despite meeting or exceeding canopy closure levels, spotted owls would likely utilize these thinned stands in the project area less than unthinned stands for approximately 15-20 years while other elements of habitat quality (e.g., shrub/understory, prey base) recover, because thinning has been shown to have negative consequences for spotted owls in the short-term by reducing or precluding use of thinned stands (Forsman et al. 1984, Meiman et al. 2003) and their prey (Maser et al. 1981, Waters et al. 1994, Luoma et al. 2003, Wilson 2010, Wilson and Forsman 2013.) The thinning would leave untreated riparian buffers that would provide a narrow network of denser canopy cover (approximately 40 acres or 6% of the proposed units) that could also facilitate spotted owl movement through the treated areas.

Thinning would accelerate the development of habitat features used by both spotted owls and their prey, such as large (≥30” DBH) trees and snags, deep crowns with large branches, multiple canopy layers, and herbaceous and shrub vegetation (Bailey and Tappeiner 1998, Harrington et al. 2005, Kuehne and Puettmann 2008, Ares et al. 2009, Davis and Puettmann 2009). These features would develop in varying time frames; for example response from understory vegetation would take only a few years, while development of suitable nesting structure could take hundreds of years. Implementation of Project Design Features 2, 5, and 6 would protect existing late-successional features in the thinned area (e.g. large snags/CWD, large hardwoods, remnant conifer trees, and conifer species diversity). Therefore, the proposed thinnings would result in direct short-term (approximately 15-20 years) reduction in spotted owl habitat quality and indirect long-term (approximately 20-50 years) improvement in spotted owl habitat quality.

Regeneration harvest would remove dispersal and suitable habitat, leaving the affected forest stands in an early-successional state and as unsuitable spotted owl habitat (Table 13). Harvest would remove spotted owl habitat features such as overstory trees, canopy layers, canopy cover and horizontal and vertical structural complexity. Harvested areas would remain unsuitable habitat for approximately 40 years until canopies of the replacement stands close to provide sufficient cover for spotted owl dispersal; after approximately 80 years the stands would provide suitable habitat (Table 16). Dispersed retention of 6-8 green trees per acre in Anthony Access and John’s Last Stand, and 12-18 green trees per acre in Gosage Incline would slightly accelerate the development of the structural characteristics of suitable habitat in the harvested areas as compared to clear-cuts or lower retention levels.

Early-successional habitat may support increased populations of secondary spotted owl prey species such as woodrats or brush rabbits. Additionally, studies in the California Klamath and Coast Range provinces, such as Dugger et al. (2005), have found that spotted owl home ranges that were almost exclusively suitable habitat did not support spotted owls as well as those with some early-successional habitat. The Draft Environmental Impact Statement (DEIS) for the Western Oregon BLM Resource Management Plan revision (USDI 2015) considered this and concluded: "…other studies have not supported that conclusion. Given the checkerboard land ownership pattern in much of the planning area, the BLM did not consider excessive homogeneity of older forests to be a management issue." Therefore, conversion of spotted owl dispersal and suitable habitat in the Lost Creek project area to unsuitable, early-successional habitat that would take decades to regain functionality would have entirely negative direct and indirect effects on spotted owl habitat quality.

This alternative would alter habitat conditions for both barred and spotted owls. Although barred owls and spotted owls use the same forest types and both appear to prefer older forests, barred owls appear to use forest stand types in proportion to their availability, while spotted owls are reliant on older forest (Dugger et al 2011, Weins et al. 2014). The relative effect on barred owls may be lesser because they do not appear as dependent on older forests as spotted owls, but there is no evidence that the proposed action would facilitate barred owl invasion into the project area as they do not appear to select disproportionately for young or low density stands (Wiens et al. 2014).

Modeling of landscape-scale habitat development and simulated spotted owl dispersal completed for the Western Oregon BLM Resource Management Plan revision (USDI 2015) showed that the project area does contribute to east-west connectivity between the Coast Range and Western Cascades. When the BLM applied the same modeling method to simulated harvest of the proposed Lost Creek project regeneration harvest units, the area continued to provide east-west spotted owl movement.

A finer-scale analysis of habitat availability in the Area of Concern, which includes the Lost Creek project area, was included in the most recent USFWS Biological Opinion for actions "*Likely to Adversely Affect"* the spotted owl in the Willamette Planning Province. It concluded that approximately 2000 acres of dispersal and/or suitable could be removed in this 5th Field watershed (Middle Fork Willamette/Lookout Point) while maintaining east-west dispersal function in the AOC (USFWS 2013c). Because no other removal of spotted owl habitat is proposed in the AOC, the maximum of 141 acres of habitat removal proposed under the Lost Creek project would fall well within these anticipated effects and the AOC function would be maintained.

Spotted Owl Sites

No direct effects to spotted owls from noise disruption would be expected because project activities within the disruption distances (65 yards for chainsaw use and 265 yards for helicopter use) of high-use areas in 20S-01W-23 (Lost Guiley) and 20S-01E-19 (Lost Creek) would be seasonally restricted during the critical breeding season (March 1 to July 15) (PDF 81).

Habitat alteration from thinning and regeneration harvest would affect spotted owl sites; while spotted owls can survive or remain productive in areas with varying levels of suitable habitat, at some threshold home ranges cease to be viable. Based on previous research, 50 percent suitable habitat within a Core Area and 40 percent suitable habitat within a PHR is considered a conservative viability threshold for a reproductive spotted owl pair and these thresholds are used by the USFWS in Section 7 consultation (USDA/USDI 2015). Additionally, any commercial forest management within approximately 300 meters (Nest Patch) of a spotted owl nest is likely to cause negative effects by altering the overstory canopy and coarse woody debris dynamics of the stand (Glenn et al. 2004, Meiman et al. (2003). All of the affected home ranges are below this standard and spotted owl reproduction at them would be unlikely due to existing habitat conditions; however enough dispersal habitat is present that these sites could currently

support non-reproductive resident owls or owl dispersal across the landscape. Types and amounts of proposed harvest at each site are shown in Table 13 and the effects determinations presented to the USFWS in a Biological Assessment for sites and the rationales are detailed below:

Anthony Creek: This site has contiguous suitable habitat above threshold value in the Core Area, and no harvest would occur there. The Proposed Action would be *Likely to Adversely Affect* the site because the PHR is below the threshold value and thinning would cause a further temporary reduction in habitat quality. Alternative 2 would not cause "take"[4] because most of the proposed thinning is low-quality Dispersal Habitat that does not provide foraging opportunities.

East Buckhorn: The Proposed Action would be *Likely to Adversely Affect* the site because both the Core Area and PHR are below the threshold values and thinning would cause a further temporary reduction in habitat quality and regeneration harvest would remove suitable habitat. The Proposed Action would not cause "take" due to the removal of suitable habitat due to the relatively low amount and location at the periphery of the PHR.

East Gosage Creek: There is a low probability of occupation or reproduction at this site due to high private ownership and extensive recent harvest. The Proposed Action would be *Not Likely to Adversely Affect* the site because of these habitat conditions, when considered with the low amount of proposed thinning at the periphery of the PHR.

Lost Creek: The Proposed Action would be *Likely to Adversely Affect* the site because both the Core Area and PHR are below the threshold values and thinning would cause a further temporary reduction in habitat quality. "Take" would not occur because sufficient Suitable and Dispersal habitat would remain in the Core Area and PHR to support spotted owl use and the orientation of the proposed thinning would not preclude spotted owl movement through the Core Area or PHR. Additionally, regeneration harvest would remove only 4 acres of suitable habitat at the extreme periphery of the PHR.

Lost Guiley: The Proposed Action would be *Likely to Adversely Affect* the site because both the Core Area and PHR are below the threshold values and thinning would cause a further temporary reduction in habitat quality. "Take" would not occur because the orientation of the proposed thinning would not preclude NSO movement through the Core Area or PHR and because the proposed thinning in the Core Area is low-quality Dispersal Habitat that does not provide foraging opportunities.

60NEWITS: Spotted owl presence in this area is considered probably based on the amount and configuration of habitat and relevant nearest neighbor distance between owl activity centers (Cite your BA) This site has no history of occupation and has/has not been surveyed. there is a low probability of future occupation or reproduction due to high private ownership and extensive recent harvest. The Proposed Action would be *Not Likely to Adversely Affect* the site because of these habitat conditions, when considered with two consecutive years of survey producing no spotted owl detections.

66NEWITS: This site has no history of occupation and there is a low probability of future occupation or reproduction due to little suitable habitat in PHR and none in the Core Area. The Proposed Action would be *Not Likely to Adversely Affect* the site because of these habitat conditions, when considered with three consecutive years of survey producing no spotted owl detections.

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[4] From Section 3(18) of the Endangered Species Act: "The term 'take' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

Table 13: Proposed Harvest Shown by Harvest Type and Habitat Type in Affected Spotted Owl Sites

		Proposed Harvest											
		Alt. 1			Alt. 2			Alt. 3			Alt. 4		
		Dispersal Habitat		Suitable Habitat	Dispersal Habitat		Suitable Habitat	Dispersal Habitat		Suitable Habitat	Dispersal Habitat		Suitable Habitat
Site	Scale	Thin	Regen	Regen	Thin	Regen	Regen	Thin	Regen	Regen	Thin	Regen	Regen
60NEWITS	Core	0	0	0	11	0	0	10	0	0	9	0	0
	PHR	0	0	0	71	0	0	66	0	0	61	0	0
66NEWITS	Core	0	0	0	18	0	0	14	0	0	15	0	0
	PHR	0	0	0	43	0	0	39	0	0	34	0	0
Anthony Creek	Core	0	0	0	0	0	0	0	0	0	0	0	0
	PHR	0	0	0	109	1	0	101	1	0	73	0	0
East Buckhorn	Core	0	0	0	0	0	0	0	0	0	0	0	0
	PHR	0	0	0	59	0	15	75	0	0	57	0	0
East Gosage Creek	Core	0	0	0	0	0	0	0	0	0	0	0	0
	PHR	0	0	0	17	0	0	14	0	0	13	0	0
Lost Creek	Core	0	0	0	71	0	0	71	0	0	67	0	0
	PHR	0	0	0	172	0	4	176	0	0	159	0	0
Lost Guiley	Core	0	0	0	49	0	0	49	0	0	27	0	0
	PHR	0	0	0	160	0	0	160	0	0	119	0	0

Table 14: Immediate Post-Harvest Habitat Availability in Affected Spotted Owl Sites under Alternative 2

		Alternative 2							
		Non-Forest		Unsuitable		Dispersal		Suitable	
Site Name	Scale	Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	48	10%	0	0%
	PHR	0	0%	0	0%	525	18%	56	2%
66NEWITS	Core	0	0%	0	0%	171	34%	0	0%
	PHR	0	0%	0	0%	1047	36%	67	2%
Anthony Creek	Core	15	3%	89	18%	35	7%	265	53%
	PHR	15	1%	274	9%	402	14%	334	12%
East Buckhorn	Core	0	0%	78	16%	238	47%	108	22%
	PHR	0	0%	417	14%	1261	44%	542	19%
East Gosage Creek	Core	0	0%	46	9%	127	25%	5	1%
	PHR	0	0%	161	6%	682	24%	20	1%
Lost Creek	Core	0	0%	34	7%	268	53%	158	31%
	PHR	8	0%	474	16%	1367	47%	601	21%
Lost Guiley	Core	0	0%	76	15%	267	53%	97	19%
	PHR	0	0%	162	6%	888	31%	186	6%

Table 15: Habitat Availability 40 years Post-Harvest in Affected Spotted Owl Sites

Site Name	Scale	Alternative 2							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	89	18%	301	60%
	PHR	15	1%	0	0%	274	9%	736	25%
East Buckhorn	Core	0	0%	0	0%	104	21%	321	64%
	PHR	0	0%	0	0%	461	16%	1759	61%
East Gosage Creek	Core	0	0%	0	0%	46	9%	132	26%
	PHR	0	0%	0	0%	161	6%	701	24%
Lost Creek	Core	0	0%	0	0%	61	12%	399	80%
	PHR	8	0%	0	0%	543	19%	1899	66%
Lost Guiley	Core	0	0%	0	0%	76	15%	364	73%
	PHR	0	0%	0	0%	162	6%	1074	37%

Table 16: Habitat Availability 80 years Post-Harvest in Affected Spotted Owl Sites

Site Name	Scale	Alternative 2							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	0	0%	390	78%
	PHR	15	1%	0	0%	0	0%	1010	35%
East Buckhorn	Core	0	0%	0	0%	0	0%	425	85%
	PHR	0	0%	0	0%	0	0%	2220	77%
East Gosage Creek	Core	0	0%	0	0%	0	0%	178	35%
	PHR	0	0%	0	0%	0	0%	863	30%
Lost Creek	Core	0	0%	0	0%	0	0%	460	92%
	PHR	8	0%	0	0%	0	0%	2442	84%
Lost Guiley	Core	0	0%	0	0%	0	0%	441	88%
	PHR	0	0%	0	0%	0	0%	1236	43%

3.2.3.2 Cumulative Effects

Spotted Owl Site Scale

No reasonably foreseeable future BLM timber management would occur in any affected spotted owl PHRs. One PHR would be affected by a proposed USFS project, the Outlook Landscape Diversity

Project. This project would thin approximately 403 acres of dispersal habitat in the Lost Creek PHR, with effects similar to those described for thinning above (see Table 17).

Private lands comprise approximately 16-80% of the affected PHRs and currently offer little northern spotted owl habitat of any type. It is reasonably foreseeable that private lands will be managed for industrial timber production on 40 to 60 year rotations. As a result, these private lands would not be expected to contribute meaningful amounts of habitat in the affected home ranges and the cumulative effect of private land management would be a continued lack of spotted owl habitat in the affected PHRs.

The cumulative effects of the Alternative 2 on spotted owl sites, when considered with private timber harvest and the Outlook Landscape Diversity Project, would be an ongoing lack of spotted owl suitable habitat on private land, a decrease in the amount of suitable habitat available in proposed regeneration harvest areas for approximately 80 years, and a short-term (15-20 year) decrease and long-term (20+ year) increase in habitat quality in proposed thinning areas on BLM and USFS land (see Table 17). These cumulative effects will not be significant because the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule would not be appreciably diminished.

Table 17: Acres/Percent of non-BLM Managed Lands, Proposed Harvest, and Foreseeable Actions in Affected Spotted Owl Home Ranges and Core Areas.

Site	Private Ownership		USFS Management		Acres of Proposed Harvest							USFS Outlook Project	
						Alt. 2		Alt. 3		Alt. 4			
	Acres	%	Acres	%	Scale	Thin	Regen	Thin	Regen	Thin	Regen	Thin	Regen
60NEWITS	2312	80%	0	0%	Core	11	0	10	0	9	0	0	0
					PHR	71	0	66	0	61	0	0	0
66NEWITS	1869	65%	0	0%	Core	18	0	14	0	15	0	0	0
					PHR	43	0	39	0	34	0	0	0
Anthony Creek	2025	70%	0	0%	Core	0	0	0	0	0	0	0	0
					PHR	109	1	101	1	73	0	0	0
East Buckhorn	1656	57%	21	1%	Core	0	0	0	0	0	0	0	0
					PHR	59	15	75	0	57	0	0	0
East Gosage Creek	1780	61%	0	0%	Core	0	0	0	0	0	0	0	0
					PHR	17	0	14	0	13	0	0	0
Lost Creek	677	23%	639	22%	Core	71	0	71	0	67	0	0	0
					PHR	172	4	176	0	159	0	403	0
Lost Guiley	452	16%	0	0%	Core	49	0	49	0	27	0	0	0
					PHR	160	0	160	0	119	0	0	0

5th-Field Watershed Scale

No reasonably foreseeable future BLM forest or facility management activities are planned to occur in the Lost Creek watershed that would affect spotted owls through either habitat modification or noise disturbance. One reasonably foreseeable future action is planned to occur on USFS land in the watershed, the Outlook Landscape Diversity Project. This project would thin approximately 403 acres of dispersal habitat in the extreme upper reaches of the watershed, with effects similar to those described for thinning above that would not affect the function of the AOC.

Private industrial forestlands comprise approximately 53% of the watershed and currently offer little northern spotted owl habitat of any type. It is reasonably foreseeable that private industrial forestlands will continue to be managed for industrial timber production on 40 to 60 year rotations and are not currently expected to contribute meaningful amounts of habitat in the watershed. Small-owner private forest lands are similarly not expected to provide spotted owl habitat because they are generally small parcels in the lower reaches of the watershed that are subject to diverse uses and high levels of ongoing noise disruption. Therefore, the cumulative effect of private forestland management in the watershed would be a continued lack of spotted owl habitat.

The cumulative effects of Alternative 2 on spotted owl habitat in the watershed, when considered with private land management and the Outlook Landscape Diversity Project, would be an ongoing lack of spotted owl suitable habitat on private land, a decrease in the amount of suitable habitat available in proposed regeneration harvest areas for approximately 80 years, and a short-term (15-20 year) decrease and long-term (20+ year) increase in habitat quality in proposed thinning areas on BLM and USFS land. These cumulative effects will not be significant because only 1.7% of the existing habitat in the watershed would be removed, which would not appreciably diminish the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule. Table 18 details ownership, habitat types, and proposed actions in the watershed.

Willamette Planning Province Scale

The effects to spotted owls are from the Lost Creek project were assessed in the 7.2-million acre Willamette Planning Province by the BLM and USFWS in a Biological Assessment (BA) as a part of Section 7 consultation under the Endangered Species Act (USDA/USDI 2015). The Willamette Planning Province is one of twelve planning provinces managed under the Northwest Forest Plan (USDA & USDI 1994 pp. E17-19).

There are approximately 5,675,017 acres of privately owned land within the Willamette Planning Province. These non-federal lands:

> "…usually only support marginal habitats, and do not notably contribute to the viability of the spotted owl. These lands, however, support some dispersal habitat for spotted owls and may contribute to the reproduction, health, and condition of spotted owls on adjacent Federal land. Habitat conditions on these lands are not expected to improve significantly within the foreseeable future and, as a result, are not expected to contribute to the survival and recovery of the spotted owl" (BA p. 90).

Along with the 141 acres of habitat removal proposed under Alternative 2, other known Federal land management projects in the Willamette Planning Province would remove approximately 386 additional acres of spotted owl habitat. Altogether, these projects would remove approximately 527 acres or 0.00039 percent of the currently available suitable habitat at this scale. This habitat removal would not have significant effects on spotted owls because it would not appreciably diminish the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule.

Table 18: Watershed-Scale Ownership, Federal Forest Age Classes, and Action Alternatives.

Owner	Age Class	Existing		Prev. Thin within 15 yrs.[3]		USFS Outlook Project		Alternatives											
								Alt. 2				Alt. 3				Alt. 4			
						Thinning		Thinning		Regeneration		Thinning		Regeneration		Thinning		Regeneration	
		Acres	Percent of Watershed	Acres	Percent of Existing	Acres	Percent of Existing	Acres	Percent of Existing	Acres	Percent of Existing	Acres	Percent of Existing	Acres	Percent of Existing	Acres	Percent of Existing	Acres	Percent of Existing
Federal[1]	Non-Forest	30	0.1%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	0-39	2267	6.5%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	40-79	8709	25.1%	1680	19.3%	403	4.6	677	7.8%	40	0.5%	635	7.3%	40	0.5%	526	6.0%		
	80+	2796	8.1%	0	0%	0	0%	0	0%	101	1.2%	49	0.6%	52	0.6%	0	0%	0	0%
Industry Private[2]	Forest	15429	44.5%	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk
Small Private[2]	Forest	2968	8.6%	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk
	Non-Forest	2471	7.1%	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk	Unk
Total		34670	100%	1680	19.3%	403	4.6	677	7.8%	141	1.7%	684	7.9%	92	1.1%	526	6%	0	0%

1: Data taken from GIS, July 2015. 2. Data taken from Lost Creek Watershed Analysis. 3. These stands are degraded spotted owl habitat due to short-term effects from thinning.

3.2.4 Alternative 3

3.2.4.1 Direct and Indirect Effects

Effects to spotted owls would be similar to those described for Alternative 2, with the following exceptions:

General Spotted Owl Habitat

- 49 fewer acres of suitable spotted owl habitat would be removed; instead John's Last Stand would be thinned and the direct and indirect effects for this area would be as described above for thinning under Alternative 2.
- 5 TPA of snags and CWD would be created in treated Riparian Reserves, which would improve habitat conditions for spotted owl prey species and improve short and long-term habitat quality compared to Alternatives 2 and 4.
- Wider untreated riparian buffers and the elimination of a large common cable yarding landing in the Gosage Incline 07 thinning unit would provide better habitat connectivity for spotted owl use because this unit is surrounded by early-successional habitat on both BLM and adjacent private lands, and an additional 40 acres of regeneration harvest is proposed in the same section in the Lost Creek project. Therefore untreated riparian buffers would provide increased connectivity through the thinning unit and into older habitat in the interior of the section.

These changes would result in substantially improved short- and long-term spotted owl habitat conditions in the affected units and in the project area as a whole compared to Alternative 2.

In addition, approximately 43 fewer acres would be thinned in the project area by eliminating cable yarding across streams, larger buffers on some streams and the deletion of the stream study areas. This would reduce both the short-term decrease in spotted owl habitat quality from thinning and the long-term increase in habitat quality in these areas. Tables 19-21 detail the immediate habitat availability and project future habitat availability in 40 and 80 years under Alternative 3 at affected sites.

Table 19: Immediate Post-harvest Availability in Affected Spotted Owl Sites, Alternative 3.

		Alternative 3							
		Non-Forest		Unsuitable		Dispersal		Suitable	
Site Name	Scale	Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	48	10%	0	0%
	PHR	0	0%	0	0%	525	18%	56	2%
66NEWITS	Core	0	0%	0	0%	171	34%	0	0%
	PHR	0	0%	0	0%	1047	36%	67	2%
Anthony Creek	Core	15	3%	89	18%	35	7%	265	53%
	PHR	15	1%	274	9%	402	14%	334	12%
East Buckhorn	Core	0	0%	78	16%	238	47%	108	22%
	PHR	0	0%	402	14%	1261	44%	557	19%
East Gosage Creek	Core	0	0%	46	9%	127	25%	5	1%
	PHR	0	0%	161	6%	682	24%	20	1%
Lost Creek	Core	0	0%	34	7%	268	53%	158	31%
	PHR	8	0%	470	16%	1367	47%	605	21%
Lost Guiley	Core	0	0%	76	15%	267	53%	97	19%
	PHR	0	0%	162	6%	888	31%	186	6%

Table 20: Habitat Availability 40 years Post-harvest in Affected Spotted Owl Sites, Alternative 3.

Site Name	Scale	Alternative 3							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	89	18%	301	60%
	PHR	15	1%	0	0%	274	9%	736	25%
East Buckhorn	Core	0	0%	0	0%	104	21%	321	64%
	PHR	0	0%	0	0%	446	15%	1774	61%
East Gosage Creek	Core	0	0%	0	0%	46	9%	132	26%
	PHR	0	0%	0	0%	161	6%	701	24%
Lost Creek	Core	0	0%	0	0%	61	12%	399	80%
	PHR	8	0%	0	0%	539	19%	1903	66%
Lost Guiley	Core	0	0%	0	0%	76	15%	364	73%
	PHR	0	0%	0	0%	162	6%	1074	37%

Table 21: Habitat Availability 80 years Post-harvest in Affected Spotted Owl Sites, Alternative 3.

Site Name	Scale	Alternative 3							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	0	0%	390	78%
	PHR	15	1%	0	0%	0	0%	1010	35%
East Buckhorn	Core	0	0%	0	0%	0	0%	425	85%
	PHR	0	0%	0	0%	0	0%	2220	77%
East Gosage Creek	Core	0	0%	0	0%	0	0%	178	35%
	PHR	0	0%	0	0%	0	0%	863	30%
Lost Creek	Core	0	0%	0	0%	0	0%	460	92%
	PHR	8	0%	0	0%	0	0%	2442	84%
Lost Guiley	Core	0	0%	0	0%	0	0%	441	88%
	PHR	0	0%	0	0%	0	0%	1236	43%

Spotted Owl Sites

Effects to the East Buckhorn and Lost Creek spotted owl sites from the removal of suitable habitat through regeneration harvest would not occur. Instead, these areas would be thinned with effects similar as described for other proposed thinning units above. However this Alternative would remain “Likely to

Adversely Affect" both sites due to the existing habitat conditions and amounts and orientation of other harvest units.

3.2.4.2 Cumulative Effects

Spotted Owl Site Scale

No reasonably foreseeable future BLM timber management would occur in any affected spotted owl PHRs. One PHR would be affected by a proposed USFS project, the Outlook Landscape Diversity Project. This project would thin approximately 403 acres of dispersal habitat in the Lost Creek PHR, with effects similar to those described for thinning above (see Table 17).

Private lands comprise approximately 16-80% of the affected PHRs and currently offer little northern spotted owl habitat of any type. It is reasonably foreseeable that private lands will be managed for industrial timber production on 40 to 60 year rotations. As a result, these private lands would not be expected to contribute meaningful amounts of habitat in the affected home ranges and the cumulative effect of private land management would be a continued lack of spotted owl habitat in the affected PHRs.

The cumulative effects of the Alternative 3 on spotted owl sites, when considered with private timber harvest and the Outlook Landscape Diversity Project, would be an ongoing lack of spotted owl suitable habitat on private land, a decrease in the amount of suitable habitat available in proposed regeneration harvest areas for approximately 80 years, and a short-term (15-20 year) decrease and long-term (20+ year) increase in habitat quality in proposed thinning areas on BLM and USFS land (see Table 17). These cumulative effects will not be significant because the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule would not be appreciably diminished.

5th-Field Watershed Scale

No reasonably foreseeable future BLM forest or facility management activities are planned to occur in the Lost Creek watershed that would affect spotted owls through either habitat modification or noise disturbance. One reasonably foreseeable future action is planned to occur on USFS land in the watershed, the Outlook Landscape Diversity Project. This project would thin approximately 403 acres of dispersal habitat in the extreme upper reaches of the watershed, with effects similar to those described for thinning above that would not affect the function of the AOC.

Private industrial forestlands comprise approximately 53% of the watershed and currently offer little northern spotted owl habitat of any type. It is reasonably foreseeable that private industrial forestlands will continue to be managed for industrial timber production on 40 to 60 year rotations and are not currently expected to contribute meaningful amounts of habitat in the watershed. Small-owner private forest lands are similarly not expected to provide spotted owl habitat because they are generally small parcels in the lower reaches of the watershed that are subject to diverse uses and high levels of ongoing noise disruption. Therefore, the cumulative effect of private forestland management in the watershed would be a continued lack of spotted owl habitat.

The cumulative effects of Alternative 3 on spotted owl habitat in the watershed, when considered with private land management and the Outlook Landscape Diversity Project, would be an ongoing lack of spotted owl suitable habitat on private land, a decrease in the amount of suitable habitat available in proposed regeneration harvest areas for approximately 80 years, and a short-term (15-20 year) decrease and long-term (20+ year) increase in habitat quality in proposed thinning areas on BLM and USFS land. These cumulative effects will not be significant because only 1.1% of the existing habitat in the watershed would be removed, which would not appreciably diminish the effectiveness of the conservation efforts

established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule. Table 18 details ownership, habitat types, and proposed actions in the watershed.

Willamette Planning Province Scale

The effects to spotted owls are from the Lost Creek project were assessed in the 7.2-million acre Willamette Planning Province by the BLM and USFWS in a Biological Assessment (BA) as a part of Section 7 consultation under the Endangered Species Act (USDA/USDI 2015). The Willamette Planning Province is one of twelve planning provinces managed under the Northwest Forest Plan (USDA & USDI 1994 p. E-19).

There are approximately 5,675,017 acres of privately owned land within the Willamette Planning Province. These non-federal lands:

> "…usually only support marginal habitats, and do not notably contribute to the viability of the spotted owl. These lands, however, support some dispersal habitat for spotted owls and may contribute to the reproduction, health, and condition of spotted owls on adjacent Federal land. Habitat conditions on these lands are not expected to improve significantly within the foreseeable future and, as a result, are not expected to contribute to the survival and recovery of the spotted owl" (BA p. 90).

Along with the 92 acres of habitat removal proposed under Alternative 2, other known Federal land management projects in the Willamette Planning Province would remove approximately 386 additional acres of spotted owl habitat. Altogether, these projects would remove approximately 478 acres or 0.00036 percent of the currently available suitable habitat at this scale. This habitat removal would not have significant effects on spotted owls because it would not appreciably diminish the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule.

3.2.5 Alternative 4

3.2.5.1 Direct and Indirect Effects

Effects to spotted owls would be similar to those described for Alternative 2, with the following exceptions:

General Spotted Owl Habitat

- No spotted owl suitable or dispersal habitat would be removed because regeneration harvest would not occur and the direct and indirect effects for these areas would be as described above for Alternative 1.
- Increased stream buffers would provide a wider network of denser canopy cover that would facilitate spotted owl movement through the treated areas.
- The elimination of a large common cable-yarding landing in the Gosage Incline 07 thinning unit would provide better habitat connectivity for spotted owl use in an area surrounded by unsuitable habitat.

These changes would result in substantially improved short- and long-term spotted owl habitat conditions in the affected units and in the project area as a whole compared to Alternative 2.

However, 152 fewer acres of upland (Matrix) and Riparian Reserves would be thinned in the project area by eliminating several proposed roads, increased stream buffers, and elimination of some common landings. This would reduce both the short-term decrease in spotted owl habitat quality from thinning and the long-term increase in habitat quality in these areas. Tables 22-24 detail the immediate habitat availability and project future habitat availability in 40 and 80 years under Alternative 2 at affected sites.

Spotted Owl Sites

No effects to the Anthony Creek, East Buckhorn, and Lost Creek spotted owl sites from regeneration harvest would occur. Instead, the regeneration harvest areas would not be treated and the effects in these areas would be as described for Alternative 1. However, this Alternative would still be "Likely to Adversely Affect" these sites due to the existing habitat conditions and amounts and orientation of the thinning harvest units.

Table 22: Immediate Post-harvest Habitat Availability in Affected Spotted Owl Sites, Alternative 4

		Alternative 4							
		Non-Forest		Unsuitable		Dispersal		Suitable	
Site Name	Scale	Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	48	10%	0	0%
	PHR	0	0%	0	0%	525	18%	56	2%
66NEWITS	Core	0	0%	0	0%	171	34%	0	0%
	PHR	0	0%	0	0%	1047	36%	67	2%
Anthony Creek	Core	15	3%	89	18%	35	7%	265	53%
	PHR	15	1%	273	9%	403	14%	334	12%
East Buckhorn	Core	0	0%	78	16%	238	47%	108	22%
	PHR	0	0%	402	14%	1261	44%	557	19%
East Gosage Creek	Core	0	0%	46	9%	127	25%	5	1%
	PHR	0	0%	161	6%	682	24%	20	1%
Lost Creek	Core	0	0%	34	7%	268	53%	158	31%
	PHR	8	0%	470	16%	1367	47%	605	21%
Lost Guiley	Core	0	0%	76	15%	267	53%	97	19%
	PHR	0	0%	162	6%	888	31%	186	6%

Table 23: Habitat Availability 40 years Post-harvest in Affected Spotted Owl Sites, Alternative 4

Site Name	Scale	Alternative 4							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	89	18%	301	60%
	PHR	15	1%	0	0%	273	9%	737	25%
East Buckhorn	Core	0	0%	0	0%	104	21%	321	64%
	PHR	0	0%	0	0%	446	15%	1774	61%
East Gosage Creek	Core	0	0%	0	0%	46	9%	132	26%
	PHR	0	0%	0	0%	161	6%	701	24%
Lost Creek	Core	0	0%	0	0%	61	12%	399	80%
	PHR	8	0%	0	0%	539	19%	1903	66%
Lost Guiley	Core	0	0%	0	0%	76	15%	364	73%
	PHR	0	0%	0	0%	162	6%	1074	37%

Table 24: Habitat Availability 80 years Post-harvest in Affected Spotted Owl Sites, Alternative 4

Site Name	Scale	Alternative 4							
		Non-Forest		Unsuitable		Dispersal		Suitable	
		Acres	%	Acres	%	Acres	%	Acres	%
60NEWITS	Core	0	0%	0	0%	0	0%	48	10%
	PHR	0	0%	0	0%	0	0%	581	20%
66NEWITS	Core	0	0%	0	0%	0	0%	171	34%
	PHR	0	0%	0	0%	0	0%	1114	38%
Anthony Creek	Core	15	3%	0	0%	0	0%	390	78%
	PHR	15	1%	0	0%	0	0%	1010	35%
East Buckhorn	Core	0	0%	0	0%	0	0%	425	85%
	PHR	0	0%	0	0%	0	0%	2220	77%
East Gosage Creek	Core	0	0%	0	0%	0	0%	178	35%
	PHR	0	0%	0	0%	0	0%	863	30%
Lost Creek	Core	0	0%	0	0%	0	0%	460	92%
	PHR	8	0%	0	0%	0	0%	2442	84%
Lost Guiley	Core	0	0%	0	0%	0	0%	441	88%
	PHR	0	0%	0	0%	0	0%	1236	43%

3.2.5.2 Cumulative Effects

Spotted Owl Site Scale

No reasonably foreseeable future BLM timber management would occur in any affected spotted owl PHRs. One PHR would be affected by a proposed USFS project, the Outlook Landscape Diversity

Project. This project would thin approximately 403 acres of dispersal habitat in the Lost Creek PHR, with effects similar to those described for thinning above (see Table 17).

Private lands comprise approximately 16-80% of the affected PHRs and currently offer little northern spotted owl habitat of any type. It is reasonably foreseeable that private lands will be managed for industrial timber production on 40 to 60 year rotations. As a result, these private lands would not be expected to contribute meaningful amounts of habitat in the affected home ranges and the cumulative effect of private land management would be a continued lack of spotted owl habitat in the affected PHRs.

The cumulative effects of the Alternative 4 on spotted owl sites, when considered with private timber harvest and the Outlook Landscape Diversity Project, would be an ongoing lack of spotted owl suitable habitat on private land and a short-term (15-20 year) decrease and long-term (20+ year) increase in habitat quality in proposed thinning areas on BLM and USFS land (see Table 17). These cumulative effects will not be significant because the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule would not be appreciably diminished.

5th-Field Watershed Scale

No reasonably foreseeable future BLM forest or facility management activities are planned to occur in the Lost Creek watershed that would affect spotted owls through either habitat modification or noise disturbance. One reasonably foreseeable future action is planned to occur on USFS land in the watershed, the Outlook Landscape Diversity Project. This project would thin approximately 403 acres of dispersal habitat in the extreme upper reaches of the watershed, with effects similar to those described for thinning above that would not affect the function of the AOC.

Private industrial forestlands comprise approximately 53% of the watershed and currently offer little northern spotted owl habitat of any type. It is reasonably foreseeable that private industrial forestlands will continue to be managed for industrial timber production on 40 to 60 year rotations and are not currently expected to contribute meaningful amounts of habitat in the watershed. Small-owner private forest lands are similarly not expected to provide spotted owl habitat because they are generally small parcels in the lower reaches of the watershed that are subject to diverse uses and high levels of ongoing noise disruption. Therefore, the cumulative effect of private forestland management in the watershed would be a continued lack of spotted owl habitat.

The cumulative effects of Alternative 4 on spotted owl habitat in the watershed, when considered with private land management and the Outlook Landscape Diversity Project, would be an ongoing lack of spotted owl suitable habitat on private land and a short-term (15-20 year) decrease and long-term (20+ year) increase in habitat quality in proposed thinning areas on BLM and USFS land. These cumulative effects will not be significant because none of the existing habitat in the watershed would be removed, and the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule would not be diminished. Table 18 details ownership, habitat types, and proposed actions in the watershed.

Willamette Planning Province Scale

The effects to spotted owls are from the Lost Creek project were assessed in the 7.2-million acre Willamette Planning Province by the BLM and USFWS in a Biological Assessment (BA) as a part of Section 7 consultation under the Endangered Species Act (USDA/USDI 2015). The Willamette Planning Province is one of twelve planning provinces managed under the Northwest Forest Plan (USDA & USDI 1994 p. E-19).

There are approximately 5,675,017 acres of privately owned land within the Willamette Planning Province. These non-federal lands:

> "…usually only support marginal habitats, and do not notably contribute to the viability of the spotted owl. These lands, however, support some dispersal habitat for spotted owls and may contribute to the reproduction, health, and condition of spotted owls on adjacent Federal land. Habitat conditions on these lands are not expected to improve significantly within the foreseeable future and, as a result, are not expected to contribute to the survival and recovery of the spotted owl" (BA p. 90).

Although no spotted owl habitat removal is proposed under Alternative 4, other known Federal land management projects in the Willamette Planning Province would remove approximately 386 acres of spotted owl habitat. Altogether, these projects would remove approximately 0.00029 percent of the currently available suitable habitat at this scale. This habitat removal would not have significant effects on spotted owls because it would not appreciably diminish the effectiveness of the conservation efforts established under the spotted owl Recovery Plan, the Northwest Forest Plan, or the Critical Habitat Rule.

3.3 Issue 2: What are the effects of proposed timber harvest and associated activities on red tree voles?

The spatial boundary for effects to red tree voles would be the project area plus a 200-foot outside buffer. According to the red tree vole Management Recommendations (USDA/USDI 2000), this buffer represents the distance required to protect red tree vole nests from the effects of overstory removal. Project effects would last approximately 60 years, which would be the time required for the regeneration harvested stands to develop habitat features such as canopy volume, branch size, and suitable nesting structures with similar quality to current conditions for red tree voles.

3.3.1 Affected Environment

The red tree vole is an arboreal microtine rodent generally found in mature and late-successional conifer forest, and is a Survey and Manage Category C species, meaning that while uncommon, surveys for it are practical (USDA/USDI 2001). They consume conifer needles and twig bark, and are a major component of the northern spotted owl's diet across much of its range. The proposed thinning units did not require RTV surveys under "Pechman Exemption A"[5] to the Survey and Manage program. Habitat conditions in all three of the potential regeneration harvest units triggered red tree vole surveys based on the current protocol (Version 3.0, Huff et al. 2012). Line transect surveys were conducted by BLM staff in the spring of 2014, after which BLM contractors climbed potential nest trees and performed 100-meter searches as described in the survey protocol. No RTV nests were found in Anthony Access 01. In Gosage Incline Sec 07, eight active and 26 inactive RTV nests were found, with the status of 12 additional trees undetermined but assumed to be active for management purposes. In John's Last Stand, 15 active and 17 inactive RTV nests were found, with the status of 32 additional trees undetermined but assumed to be active for management purposes. Habitat Areas, which are reserved areas around known RTV sites, were established in Gosage Incline 07 and John's Last Stand according to the Management Recommendations for the Red Tree Vole, v2.0 (USDA/USDI 2000); these areas are no longer considered parts of the proposed units and no treatment or habitat disturbance would occur within them.

[5] "Pechman Exemption A" refers to the court's order in *Northwest Ecosystem Alliance et al. v. Rey et al.*, Case No. 04-cv-844-MJP (W.D. Wash. 2006), in which Judge Pechman identified four circumstances in which habitat disturbing projects potentially affecting Survey and Manage species could occur. Exemption A refers to thinning projects in stands younger than 80 years old.

3.3.2 Alternative 1: No Action

3.3.2.1 Direct and Indirect Effects

No direct or indirect effects to RTV or their habitat would occur under this Alternative. Stands would not be modified and the project area would continue to provide for RTV use at current levels and habitat development would continue along current trajectories. RTVs would be able to expand their populations into areas proposed for regeneration harvest under the Action Alternatives and therefore Alternative 1 would best meet the Survey and Manage goal of a reasonable likelihood of species persistence.

Habitat in the project area would continue to develop along current growth trajectories. Portions of the project area that are already suitable RTV habitat would continue to provide for all of the species' life history needs while individual habitat components such as large-diameter trees with nesting structure (forked tops, large branches, cavities), large crowns, and interlocking canopy layers would increase in quantity and quality. Habitat in the project area that currently does not meet "persistence quality" as defined by the RTV Survey Protocol (Huff et al. 2012) would continue to develop these suitable habitat components as growing space is created through suppression mortality and small-scale disturbances like wind-throw or disease. These disturbance processes would occur more slowly compared to the Action Alternatives under which these areas would be thinned (see the Silviculture Specialist Report for details about stand structure development).

3.3.2.2 Cumulative Effects

Cumulative effects are the consideration of incremental impacts of the proposed actions when considered with other present and reasonably foreseeable future actions. Since no project actions are proposed under this Alternative, there are no actions upon which to consider any incremental impacts.

3.3.3 Alternative 2: Preferred Alternative

3.3.3.1 Direct and Indirect Effects

Surveys for RTV were not conducted in the proposed thinning units because they fall under the "Pechman Exemption" to the Survey and Manage Program requirements and are not required. Therefore it is unknown if RTV are present. The direct effects to any red tree voles present from the 683 acres of proposed thinning would be a short-term (10-15 years) reduction in habitat quality due to overstory tree removal resulting in increased exposure to predation (Forsman et al. 2004), increased energy expenditure during foraging (Swingle and Forsman 2009), reduction of suitable nesting structure (Wilson and Forsman 2013), and reduction in dispersal ability (Maser et al. 1981). Thinning would cause an indirect long-term (20+ years) increase in habitat quality due to the acceleration of suitable habitat features such as large crowns, nesting structure, large branches, and multiple canopy layers.

The proposed regeneration harvest would not affect the Habitat Areas established where the species was found during pre-project surveys. The Habitat Areas were delineated as described in the species' Management Recommendations (USDA and USDI 2000). The Habitat Areas would "maintain the physical integrity of habitat at active sites" and "maintain red tree vole populations at sites where they currently occur;" additionally, they would be of sufficient size to allow for an increase in the number of active nests at the sites (USDA and USDI 2000). Two of the Habitat Areas are contiguous with the Riparian Reserve network, while the other is contiguous with an older unmanaged stand that is itself contiguous with Riparian Reserves. This spatial arrangement would provide connectivity to a land use allocation where suitable late-successional habitat will be maintained or developed and would improve the viability of the sites by allowing for expansion and reducing isolation.

Protection of the Habitat Areas would prevent effects to known nests and associated red tree voles from the proposed regeneration harvest and allow the species as a whole to persist (USDA and USDI 2000). Regeneration harvest would, however, remove suitable red tree vole habitat and preclude the species' use of harvested areas until minimally suitable habitat develops in 40-60 years.

3.3.3.2 Cumulative Effects

The spatial boundary for effects to red tree voles is the project area plus a 200-foot outside buffer. According to the red tree vole Management Recommendations (USDA/USDI 2000), this buffer represents the distance required to protect red tree vole nests. Within this boundary no reasonably foreseeable future BLM actions are planned to occur that would affect red tree voles, while approximately 26 acres of thinning would occur on USFS land under the Outlook Landscape Diversity Project with direct and indirect effects similar to those described above for thinning. It is reasonably foreseeable that private lands in this spatial boundary will be managed for industrial timber production on 40 to 60 year rotations. As a result, these private lands would not be expected to ever contribute high-quality red tree vole habitat and the cumulative effect of private land management would be a continued lack of red tree vole habitat.

The incremental effects of the action alternatives, when considered with the effects of the Outlook Landscape Diversity Project thinning, would be a short term (10-15 year) reduction in RTV habitat quality on 709 thinned acres, and reduced habitat availability for 40-60 years on the 141 regeneration harvest acres, in addition to the continued lack of RTV habitat on 135 acres of private land. However, the extent of active red tree vole sites would be protected, and would be connected to untreated red tree vole habitat into which the species could expand. Therefore, although habitat conditions for the red tree vole would be negatively impacted under all Action Alternatives, the cumulative effects would not decrease the likelihood of red tree vole persistence in the analysis area, or contribute to a need to list the species under the Endangered Species Act. Table 25 details the ownership and proposed actions in the cumulative effects analysis area for this alternative.

Table 25: Acres of Ownership, Proposed Actions, and Foreseeable Actions in RTV Cumulative Effects Analysis Area.

Alternative	Acres by Ownership in Cumulative Effects Analysis Area				Acres of Proposed Actions		Acres of USFS Outlook Landscape Diversity Project Thinning
	BLM	USFS	Private	Total	Thin	Regeneration	
2	1500	38	135	1673	683	141	26

3.3.4 Alternative 3

3.3.4.1 Direct and Indirect Effects

Effects to red tree voles would be similar to those described for Alternative 2, with the following exceptions:

- 43 fewer acres would be thinned in the project area due to wider riparian buffers and the elimination of some types of logging systems. As a result, RTV habitat on these acres would be affected as described under Alternative 1.

Forty-nine acres in the John's Last Stand sale would be thinned instead of regeneration harvested, and these acres would be affected as the described for the areas proposed for thinning under Alternative 2. Habitat value for RTV would be reduced, but in the long term (20+ years) this unit would provide increased area for the expansion of the adjacent known RTV population.

3.3.4.2 Cumulative Effects

The spatial boundary for effects to red tree voles is the project area plus a 200-foot outside buffer. According to the red tree vole Management Recommendations (USDA/USDI 2000), this buffer represents the distance required to protect red tree vole nests. Within this boundary no reasonably foreseeable future BLM actions are planned to occur that would affect red tree voles, while approximately 26 acres of thinning would occur on USFS land under the Outlook Landscape Diversity Project with direct and indirect effects similar to those described above for thinning. It is reasonably foreseeable that private lands in this spatial boundary will be managed for industrial timber production on 40 to 60 year rotations. As a result, these private lands would not be expected to ever contribute high-quality red tree vole habitat and the cumulative effect of private land management would be a continued lack of red tree vole habitat.

The incremental effects of the action alternatives, when considered with the effects of the Outlook Landscape Diversity Project thinning, would be a short term (10-15 year) reduction in RTV habitat quality on 666 thinned acres, and reduced habitat availability for 40-60 years on the 92 regeneration harvest acres, in addition to the continued lack of RTV habitat on 98 acres of private land. However, the extent of active red tree vole sites would be protected, and would be connected to untreated red tree vole habitat into which the species could expand. Therefore, although habitat conditions for the red tree vole would be negatively impacted under all Action Alternatives, the cumulative effects would not decrease the likelihood of red tree vole persistence in the analysis area, or contribute to a need to list the species under the Endangered Species Act. Table 26 details the ownership and proposed actions in the cumulative effects analysis area for this alternative.

Table 26: Acres of Ownership, Proposed Actions, and Foreseeable Actions in RTV Cumulative Effects Analysis Area.

Alternative	Acres by Ownership in Cumulative Effects Analysis Area				Acres of Proposed Actions		Acres of USFS Outlook Landscape Diversity Project Thinning
	BLM	USFS	Private	Total	Thin	Regeneration	
3	1300	38	98	1608	640	92	26

3.3.5 Alternative 4

3.3.5.1 Direct and Indirect Effects

Effects to red tree voles would be similar to those described for Alternative 2, with the following exceptions:

- 152 fewer acres would be thinned in the project area due to wider riparian buffers and the elimination of some road construction and logging systems. As a result, RTV habitat on these acres would be affected as described under Alternative 1.
- None of the proposed regeneration harvest would occur and as a result RTV habitat on these 141 acres would be affected as described under Alternative 1. Therefore, the known adjacent RTV populations in Gosage Incline 07 and John's Last Stand would be less isolated and could expand into the untreated areas.

3.3.5.2 Cumulative Effects

The spatial boundary for effects to red tree voles is the project area plus a 200-foot outside buffer. According to the red tree vole Management Recommendations (USDA/USDI 2000), this buffer represents the distance required to protect red tree vole nests. Within this boundary no reasonably foreseeable

future BLM actions are planned to occur that would affect red tree voles, while approximately 26 acres of thinning would occur on USFS land under the Outlook Landscape Diversity Project with direct and indirect effects similar to those described above for thinning. It is reasonably foreseeable that private lands in this spatial boundary will be managed for industrial timber production on 40 to 60 year rotations. As a result, these private lands would not be expected to ever contribute high-quality red tree vole habitat and the cumulative effect of private land management would be a continued lack of red tree vole habitat.

The incremental effects of the action alternatives, when considered with the effects of the Outlook Landscape Diversity Project thinning, would be a short term (10-15 year) reduction in RTV habitat quality on 557 thinned acres, in addition to the continued lack of RTV habitat on 104 acres of private land. However, the extent of active red tree vole sites would be protected, and would be connected to untreated red tree vole habitat into which the species could expand. Therefore, although habitat conditions for the red tree vole would be negatively impacted under all Action Alternatives, the cumulative effects would not decrease the likelihood of red tree vole persistence in the analysis area, or contribute to a need to list the species under the Endangered Species Act. Table 27 details the ownership and proposed actions in the cumulative effects analysis area this alternative.

Table 27: Acres of Ownership, Proposed Actions, and Foreseeable Actions in RTV Cumulative Effects Analysis Area.

Alternative	Acres by Ownership in Cumulative Effects Analysis Area				Acres of Proposed Actions		Acres of USFS Outlook Landscape Diversity Project Thinning
	BLM	USFS	Private	Total	Thin	Regeneration	
4	1205	34	104	1347	531	0	26

3.4 Issue 3: What are the effects of timber harvest and associated activities on stand structure and terrestrial habitat, soil compaction and sensitive soils, and stream temperature in the Riparian Reserves?

The spatial bounds for analysis of direct and indirect effects for this Issue are the project area's Riparian Reserves plus one Site Potential Tree Height as this is the maximum distance light and microclimate effects from other actions such as timber harvest would reasonably travel. While total acres of Riparian Reserves treated may vary by alternative, the actions and inactions present relevancy to the discussion of the impacts to stand structure and riparian function. As such, the spatial bounds for analysis do not vary by alternative, but the total acres on which actions would or would not occur are discussed specific to each alternative with anticipated effects. Identifying the Riparian Reserves within the project area as the spatial bounds for this Issue is appropriate for the effects analysis because this is the landscape on which actions are considered.

The temporal bounds for analysis of effects for this Issue is 50 years. This timeframe encompases impacts that could occur in both short-term and long-term, which could have differing effects to the same resource or location. Where these differences exist, they are discussed with the specifics of the short or long-term timeframes being discussed. This timeframe is appropriate because 50 years post-harvest the development of the understory and overall Riparian stand complexity declines. At 50 years, overstory tree growth and crown expansion declines, limiting sunlight reaching the forest floor and restricting photosynthesis.

3.4.1 Affected Environment

Stand Structure and Terrestrial Habitat

The Eugene RMP (p. 24) provides direction on management of Riparian Reserves to: Apply Silvicultural practices to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives. This IDT has identified that at the watershed scale, these stands lack structure and diversity in the understory. Franklin and Spies (1991a) describe the composition and structure of old growth forests as having large trees in the overstory, smaller trees of varying sizes and species in the lower and middle story, large standing and fallen dead trees, and patchy shrub and herb communities. A highly diverse understory is another characteristic of the old-growth stands. Understories in old-growth stands tend to be much patchier than in younger forest stands. This variability is partially a response to varied overstory conditions.

Figure 2 is an example of a diverse understory with complex structure. This figure shows large woody debris, species complexity, and horizontal and vertical heterogeneity. This heterogeneity shown through an irregular horizontal distribution of structures, gaps of varying sizes where light can penetrate the understory, and dense clumps of saplings and poles (Franklin and Van Pelt 2004). In order to create this complex structure, it is very important to understand how these old growth forests developed. Tappeiner et al (1997) and Poage and Tappeiner (2002) suggest that many old growth Douglas Fir forests in western Oregon developed over long time periods with low densities of dominant trees. This developmental pathway produced forests with multi-aged, multi-storied canopies with low overstory tree densities. This developmental trajectory is very different from the current trajectory of the high-density stands proposed for thinning. Active management can be used to guide stands towards this trajectory and enhance structural diversity. Tappeiner et al (1997) and Poage (2001) support the idea that development of late successional attributes in young stands can be accelerated with various thinning practices (Franklin and Spies 1999b). Tappeiner (1997) found that when the objective of forest management is to grow stands with old growth characteristics, it appears that density management (e.g. one or more thinnings to low densities) will be required.

Figure 2: Old Growth coniferous forest with structural complexity.

Forested stands adjacent to streams and wetlands serve to provide habitat for terrestrial species including invertebrates, amphibians, birds, and small mammals. Currently, the Riparian Reserve stands in the project area provide low quality, mid-successional wildlife habitat due to the stand conditions described below.

The stands proposed for commercial thinning treatment in the Riparian Reserves are second growth, even-aged, largely closed canopy; 50-70 year old stands (Table 26). Some stands do not have a complete stand history and were most likely naturally regenerated post-harvest. Stands are composed mostly of Douglas fir (>80%), with smaller components of western hemlock, western redcedar, and

incense cedar. Hardwoods such as golden chinquapin, madrone, big leaf maple, and red alder exist in varying amounts on the landscape primarily in the Riparian Reserves and generally comprise less than 20% of the total species composition. The dominant understory vegetation consists of salal, hazel, vine maple, Oregon grape, and sword fern.

The following stand metrics in Table 28 were derived from stand exam data that was collected in the fall of 2013. The data was processed using the Forest Vegetation Simulator (FVS). FVS is a computer model that projects growth and yield of forested stands. The Forest Vegetation Simulator (FVS) is a family of forest growth simulation models. It is a system of highly integrated analytical tools that is based upon a body of scientific knowledge developed from decades of natural resources research and experience. The data was collected in the uplands and the Riparian Reserves.

Table 28: Current Riparian Stand Conditions

Sale Name	Township – Range - Section	Age in 2016	Treatment history	BA	TPA	QMD	RD	CC
Anthony Access	T19S R02W Sec. 25	64	no history	211	191	14	56	78
	*T19S R01 W Sec. 31	56	PCT	268	198	15	69	79
	T20S R02W Sec.1	66	PCT	257	184	16	64	79
Gosage Incline	T20S R01W Sec. 7	74	PCT	274	174	17	66	77
	T20S R01W Sec. 17 south unit	69	no history	262	150	17	64	73
	T20S R01W Sec. 17 north unit	69	no history	312	151	20	70	77
	T20S R002W Sec. 13	30 and 71	PCT	200	180	14	53	80
Guileless	T20S R01W Sec. 15	64	PCT	289	208	15	75	86
	T20S R01W Sec. 21 north unit	53	PCT	243	226	14	65	78
	T20S R01W Sec. 21 south unit	69	no history	206	133	16	52	70
Missing Links	T20S R01W Sec. 13 south unit	56	PCT	243	179	15	63	80
	T20S R01W Sec. 13 north unit	56	no history	240	215	14	64	81
	T20S R01W Sec. 23	56	PCT	200	167	14	53	76
	T20S R01E Sec. 19	56	PCT	274	200	16	69	80

Basal Area (BA), Trees per acre (TPA), Quadratic Mean Diameter (QMD), Relative Density (RD) , Canopy Cover (CC), Pre-commercially thinned (PCT)
*T19S R01W Section 31 (Anthony Access) was chosen as a representative unit to be used throughout this analysis to depict changes in growth and management. This unit is representative of the structure and composition of all these units and will be described under each Alternative.

All values in Table 28 are on a per acre basis. Table 28 uses five stand metrics to describe Riparian Stand complexity which are Basal Area, Trees per acre, Quadratic Mean Diameter, Relative Density, and Canopy Cover. Basal Area is the cross sectional area of a single stem, including the bark measured at breast height (4.5 ft.) above the ground. Basal Area is described in square feet and of all conifers ≥ 8" DBH. Trees per acre describes the conifers per acre of all conifer trees ≥ 8" DBH. Quadratic Mean Diameter is a measure of the average diameter of all conifers ≥ 8" DBH in the stand. It was used as a measure in this analysis because tree size is an important attribute of stand complexity. Relative Density is a means of describing the relative degree of inter-tree competition in stands of differing average tree size and stand density of conifers over 8'' DBH (Curtis 1982). Relative Density is calculated by dividing the Basal Area by the square root of the Quadratic Mean Diameter. Relative Density helps define the forest condition in different zones of ecological condition. At Relative Densities above 55, some trees become suppressed and die because of competition (Hayes et al. 1997). Relative Density and Trees per acre can provide insight into the degree of suppression mortality and amount of dead wood that is created which is a facet of stand complexity. Canopy Cover is a measure of the cover created by the overstory

tree canopies. It is measured in percentage form of all species ≥8'' DBH. The greater the cover, the less sunlight is available for vegetation development in the understory and forest floor.

The exception to the above description of stand conditions within project area Riparian Reserves proposed for treatment is Gosage Incline Sec. 7. This unit is an even aged stand with a component of shade tolerant species present in the understory. At the current density (Relative Density of 66 and Canopy cover of 77) the stand is experiencing suppression based mortality in some areas. This stand is located on an ancient landscape-scale debris flow which resulted in extremely heterogeneous soils ranging from large boulder fields to deep clays. It also has unique (to this project area) hydrology including relatively large natural ponds and wetlands. Snags were previously created in portions of the Riparian Reserves in this section as well. The heterogeneity of the soils and hydrology resulted in patchy stand development with some areas being dense, homogenous stands and other patches being open and more diverse. This unit is older than other proposed thinning units (74 years) and due to the stand conditions and age it offers higher quality habitat features. It is also isolated by recent regeneration harvest on adjacent private land, and an 18-year old regeneration harvest on BLM land to the north and east. Because of its unique character compared to other Riparian Reserves proposed for treatment, it will be discussed separately throughout this Issue. The following are pictures of the Gosage Incline T20S R01W Sec. 7 stand. The left hand picture is an example of one of the dense, homogenous parts of the stand while the right hand picture shows an example of the boulder field from the landslide.

Figure 3. Photos of Gosage Incline T20S R01W Sec. 7

CWD and snags are important habitat features for many riparian dependent terrestrial wildlife species. CWD provides refugia, foraging sites, and travel corridors for species with low mobility and small home ranges (e.g., invertebrates, small mammals, and amphibians). Additionally, CWD provides important basic ecological functions like moisture retention, nutrient cycling, and microclimate buffering. These characteristics vary with the size and Decay Class of snag and CWD pieces. Larger snags and CWD can provide more ecological functions for a longer period and are valuable in previously harvested stands, as most of the project area is, due to their rarity and the time required for their development. However, smaller diameter snags and CWD are also valuable habitat components, for example by serving as substrates for fungi and invertebrates and contributing to food webs for species like woodpeckers and flying squirrels (Spies et al. 2013). Amounts of CWD and snags in Riparian Reserves are generally low (Tables 6 and 7, Issue 1 Affected Environment) compared to typical unmanaged stands of similar ages, which average 8.8 snags per acre greater than 18" DBH in Decay Class 1 and 2 and 383 linear feet per acre of CWD greater than 19" diameter in Decay Class 1 or 2 ; these figures were taken from the Middle McKenzie Landscape Design (2002), which reviewed and reported snag and CWD levels for stands of different ages in similar forest types in western Oregon. Due to previous harvest, site preparation,

previous thinning, and low subsequent tree mortality the CWD present is generally either large-diameter/high decay class residue from the initial harvest or small diameter/low decay class from suppression mortality. Small-diameter snags occur in the project area primarily due to suppression mortality, and large-diameter snags are uncommon. One proposed unit, Gosage Incline Sec. 17, has higher large snag and CWD levels due to higher retention levels during previous entries. See Tables 6 and 7 (Issue 1 Affected Environment) for average snag and CWD levels in areas proposed for riparian treatment.

In the late 1990s and early 2000s, snags were created in riparian areas adjacent to Anthony Access Sec. 31, Gosage Incline Sec. 07 and 17, and Guileless Sec. 15 and 21. Some of these snags occur within the proposed units in Riparian Reserves. Three ponds and two wetlands occur in the Gosage Incline Sec. 07 thinning unit. These are uncommon habitat features in the Lost Creek watershed that occur on average only once per approximately 1278 acres, while the density in this unit is once per 23 acres.

Soils

Sensitive Soils

Riparian Reserve soils in the project area fall into two general categories of sensitivity to management actions. They include soils that are shallow and rocky and soils that are wet and/or slow to dry. Riparian Reserve soils in the project area were grouped to a 5-category sensitivity rating and a high, medium, and low resiliency level based on Lane County Soils Survey Unit mapping and series descriptions. Field inspections during sale planning verified the Lane County Soil Survey and were then refined within proposed harvest units based on field reconnaissance. Where proposed units were not mapped in the county soil survey (Sections 19 and 29), soils series and mapping units were interpreted during field reviews by the area soil scientist and assigned to a sensitivity group and resiliency level, if applicable. (See Table 29 and Sensitivity group descriptions below.) Category/Group 2 (excessively wet) and Category/Group 1 and 4 (excessively rocky) soil units were excluded from the proposed harvest areas because impacts cannot be effectively ameliorated with Best Management Practices and harvest would lead to reduced site productivity in the short and long term. Areas identified as at risk for mass wasting were also withdrawn from project harvest areas.

All of the units except John's Last Stand (T20S R01E Sec. 29) show varying levels of legacy compaction and disturbance in the Riparian Reserves from previous harvest.

The area proposed for harvest in John's Last Stand (T20S R01E Sec. 29) had a stand replacing fire approximately 120 years ago and was naturally regenerated. Legacy effects of this fire include gullying evident on south and west aspects, low organic content throughout, and slow tree growth (on ridges and rocky soils). These areas have shallow skeletal soils and are in the cryic temperature zone. These soil types are excessively drained, droughty in summer, and prone to reforestation problems due to dryness and cold soil temperatures. They have low inherent nutrient capacity. Areas with shallow skeletal soils) are also prone to wind-throw, particularly on south and west aspects and ridge tops.

Sensitivity Group Descriptions:

Group 1. Rock outcrop group. These areas were field verified and withdrawn from the project area.

Group 2. Hydric soils/wetlands. These areas were field verified and withdrawn from the project area.

Group 3. Seasonally high water table soils. These sites have seasonal high water tables at depth of two to three feet and moderately slow permeability. Root growth tends to be more horizontal than vertical because of the saturated subsoil which makes trees highly susceptible to windthrow. These are poorly drained sites, usually depressions adjacent to streams or unstable areas where the water table is near the surface much of the year. The narrow window for dry soils on these sites presents a high risk for

impacts, especially deep compaction. The sites may or may not contain water tolerant species, but removal of trees can reduce transpiration rates. Yarding may disrupt surface water flows. This can raise the water table and increase the time soils are wet, which could reduce production and change the adapted species.

Group 4. Soils with excessive coarse content. Stone and cobble content can exceed 60% throughout the soil profile. Vegetative recovery is very slow for existing routes. Compaction of soils with excessive coarse content cannot be effectively ameliorated with standard tillage equipment.

Group 5. Soils that are slow to dry. These areas have deep soil types with high clay content throughout, often greater than 50% in the subsoil, and few coarse fragments. Due to moderate slow permeability, these soils are generally dry less than 45 days between July and October in six out of ten years. Soil moisture content on these sites often will not draw down to recommended soil moistures (25%) that provide resistance to compaction. Gradual slopes, broad ridges, and north and east aspects are particularly slow to dry.

Table 29: Sensitive Soils Found in the Riparian Reserves

	Sensitivity Group*			
Section	Group 3 (acres)	Group 4 (acres)	Group 5 (acres)	Total (acres)
T19S R1W Sec 31	--	0.3	38.4	38.7
T19S R2W Sec 25	0.0	--	--	0.0
T20S R1E Sec 29	--	48.4	--	48.4
T20S R1W Sec 13	0.4	21.6	--	22.0
T20S R1W Sec 15	23.8	12.4	--	36.2
T20S R1W Sec 17	51.6	8.6	6.1	66.2
T20S R1W Sec 21	13.8	--	21.6	35.3
T20S R1W Sec 23	--	60.6	--	60.6
T20S R1W Sec 7	79.4	4.1	41.5	125.0
T20S R2W Sec 1	23.9	1.3	--	25.3
T20S R2W Sec 13	--	0.1	--	0.1
Total (acres)	192.8	157.4	107.5	457.8
*Group 3 and 5 have high resiliency and Group 4 (high course content) has intermediate resiliency				

Stream Temperature

Numerous streams in the project area have summer temperatures that exceed the Oregon Department of Environmental Quality water quality standard of 64.4^{o}F for fish bearing streams. Lost Creek, Guiley Creek, Middle Creek, and Anthony Creek are all listed as temperature limited. Within the lower reaches of Lost Creek (below Guiley Creek at RM 10.3), high water temperatures have been documented, which have been attributed to excessive withdrawals for uses such as agriculture (Lost Creek WA, 1997). These withdrawals are assumed to be by residential and agricultural uses.

3.4.2 Alternative 1: No Action

3.4.2.1 Direct and Indirect Effects

Stand Structure and Terrestrial Habitat

In the short term, shrub density and cover would be expected to remain stable (Chan et al. 2006). Shading would continue to suppress or eliminate any light-dependent understory plants, thereby reducing available food for herbivores. Overstocked stands would continue to grow, but at slower rates as trees compete with each other for growing space. Canopy Cover and Relative Density would increase and the crowns of individual trees would continue to recede (Chan et al. 2006) resulting in increased suppression mortality and decreasing diameter growth as trees compete for water, nutrients, and sunlight (Oliver and Larson, 1990).

Due to the lack of sunlight reaching the forest floor, there would be little to no complex understory development and species diversity. Hardwoods would decline within the stands through suppression mortality. Natural pruning of shaded branches would lower the live crown ratios of the overstory trees and foliage would become concentrated high on the boles (Franklin et al. 2002). As the canopy cover increases, sunlight would be more restricted from the forest floor and thus understory growth and species diversity would decline.

Self-thinning or density dependent mortality would continue to occur at the lower end of the diameter distribution. Over time, natural canopy gaps would be created and pulses of CWD would be created. Within these naturally created canopy gaps, shrubs and tolerant tree species (e.g., hemlock) would gradually increase as understory light increases due to receding overstory tree crowns and tree mortality (Oliver and Larson, 1990). This process would be slow and it is unlikely that understory tree development would be sufficient to cause a shift from single-storied to a two-storied or layered structure within 50 years (Oliver and Larson, 1990).

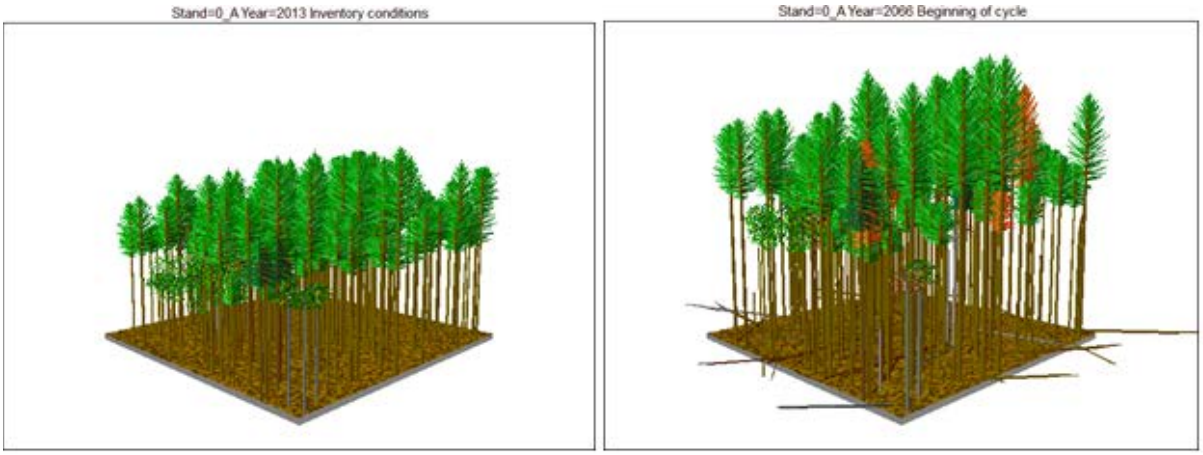
Table 30 and Figure 4 below are a projection of the stand conditions of T19S R01E Section 31 in 50 years. Figure 4 is a visual representation of T19S R01E Section 31. In Figure 4, on the left hand image, represents the current stand condition and the right hand image projects what the stand would look like in 50 years under the No Action Alternative. Currently, the stand has entered the zone of imminent suppression and mortality due to the overstocking in the stand (current Relative Density of 69) (Table 30). Modeling projects that in 50 years, the following stand conditions would occur:

- The Relative Density would remain above 55. This signifies that some trees in the stand will soon become suppressed and die because of competition (Hayes et al. 1997). When stands are left at this high of a Relative Density, they generally do not develop a diverse understory (Bailey 1996).
- TPA would decrease to 112 due to the natural suppression mortality.
- The QMD would slightly increase from 15 to 20 because some of the smaller trees would die and become CWD.
- The continued high canopy cover would characterize a dense stand condition which prevents sunlight from reaching the forest floor restricting the development of species and structural diversity.

Table 30: Current Stand Conditions and 50-year projection in T19S R01E Sec. 31

T-R-S	Current Condition						50 years projection				
	BA	TPA	QMD	RD	CC		BA	TPA	QMD	RD	CC
19-1W-31	268	198	15	69	79		264	112	20	59	69

Figure 4: Current Stand Condition Compared to Stand Conditions in 50 years under Alternative 1



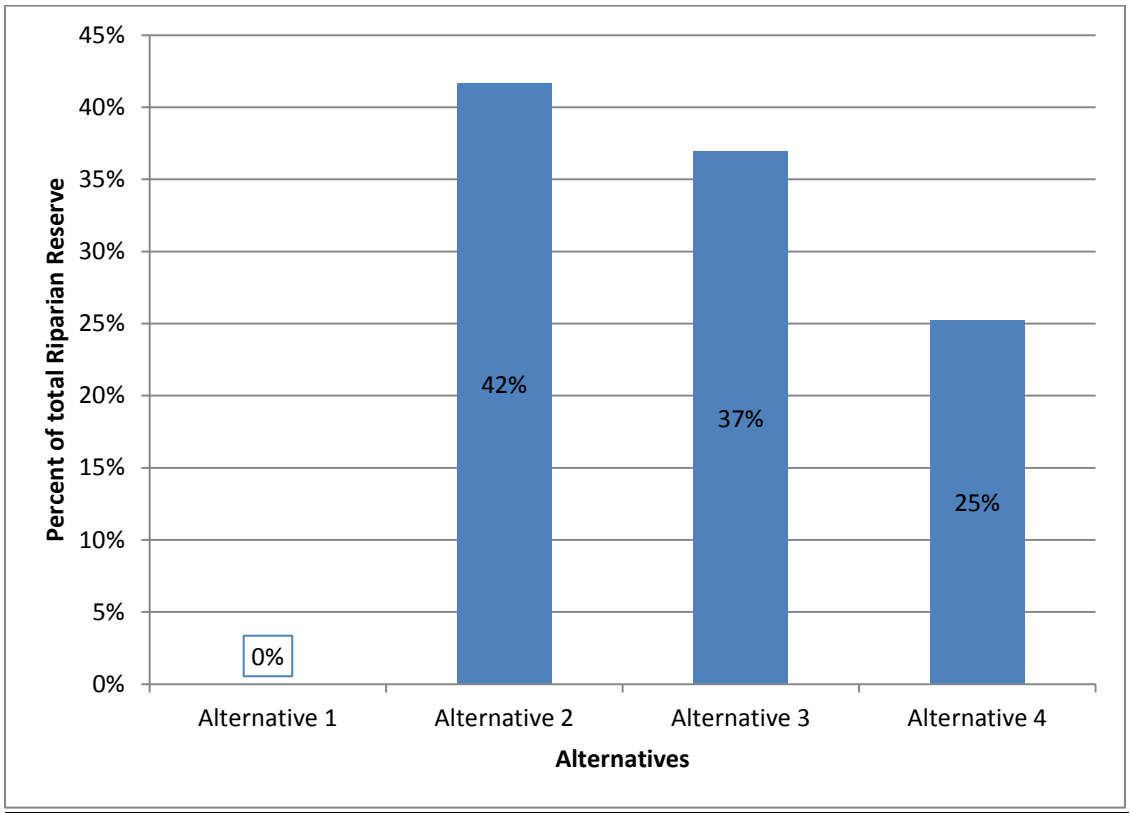
Alternative 1 would result in the longest time requirement (50 years) for the development of high-quality habitat for terrestrial riparian dependent wildlife. However, in the short-term this Alternative would continue to provide the following benefits compared to the Action Alternatives:

- Riparian areas would not experience the temporary reduction in canopy cover from thinning, which would decrease habitat suitability for approximately 15-20 years under the action alternatives.
- Existing snags and CWD would not be disrupted, and levels would remain at current conditions and trajectories.

In the Gosage Incline Sec. 07 thinning unit, undisturbed canopy cover for riparian dependent wildlife species would be preserved. This proposed unit is surrounded by young (<20 yrs.) stands on adjacent BLM land, and adjacent private land has been or would likely soon be regeneration harvested, making the main stream channel important as a refuge and connectivity corridor through the unit and into this section due to its older age and higher-quality existing habitat conditions and the presence of uncommon pond and wetland features. Maintaining undisturbed conditions in the Riparian Reserves of this unit would therefore provide increased benefits for terrestrial habitat compared to the remaining units.

Figure 5 is a comparison of the alternatives showing how the much of the total Riparian Reserves within the project area each alternative would treat expressed as a percentage. Percent of total Riparian Reserves treated can be used to define the extent of the Riparian Reserve area conducive to the development of diverse species composition and structural diversity as a result of silvicultural treatment. Alternative 1 would not treat any areas, thus not improving stand complexity from the current trajectory.

Figure 5: Percent of Total Riparian Reserves in Project Area Treated by Alternative



Soils

There would be no effect to sensitive soils, existing levels of compaction, erosion potential, or windthrow risk under this alternative.

Stream Temperature

There would be no effects to stream temperatures as no existing shade would be removed.

3.4.2.2 Cumulative Effects

No actions would occur from the proposed Lost Creek project under the No Action Alternative. Cumulative effects are the consideration of incremental impacts of the proposed action when considered with other present and reasonably foreseeable future actions. Since no project action is proposed under this alternative, there are no actions upon which to consider the incremental impacts, and thus, BLM does not address cumulative impacts for the No Action Alternative.

3.4.3 Alternative 2: Preferred Alternative

3.4.3.1 Direct and Indirect Effects

Stand Structure and Terrestrial Habitat

Alternative 2 follows the recommendation in the Lost Creek Watershed Analysis on page (p. 109) to *"Give high priority to thinning in connectivity blocks and Riparian Reserves on federal lands to accelerate development of large trees and other desired conditions."* Thinning prescriptions were developed so that the treatment would, to the extent possible; increase the development of stands to resemble the

historic conditions in the area that which include a diverse species composition and structural diversity. Management towards these conditions would impact herbaceous vegetation and shrubs, stand structure and vigor, snags and CWD, and have localized impacts to specific locations resulting from a need to accommodate logging systems.

While thinning initially would cause short-term reductions in the cover of shrub and herbaceous plants from harvesting disturbance including road construction, landing construction, corridors, skid trails, and covering or damaging of existing understory by slash or limbs. Herbaceous plant diversity would be expected to increase in the first few years following thinning activities to levels exceeding pre-treatment conditions until canopy recloses (Chan et al, 2006; Bailey et al, 1998). Bailey et al 1998 found that species richness for herbaceous species and total species richness across trees, shrubs, and herbaceous vegetation was greater in thinned stands than in unthinned and old-growth stands. The Young Stand Thinning and Diversity Study (2013) found that while shrub layers showed initial declines, they recovered strongly 5-7 years post-harvest and by 10 years post-harvest, it was higher in all thinning treatments relative to un-thinned controls. While the stands in the Lost Creek project are older than those in the Young Stand Thinning and Diversity Study (ages in young stand thinning are 35 to 50 years old and Lost Creek ages are 50 to 70 years old), it is expected that the response of the shrub component would be the same as those described in the Young Stand Thinning and Diversity Study.

Shatford et al (2009) found that the growth and survival of the understory saplings is dependent on the interplay of their tolerance to understory conditions, especially light and soil water availability, as regulated by the density and continuity of the overstory and its rate of development. Shatford et al (2009) studied the growth of understory saplings in 50-70 year old western Oregon Douglas fir forests and found that repeated density management treatments in these Douglas fir forests can accelerate growth of understory saplings, resulting in the development of two or more canopy layers over time.

Chan et al (2006) found that seedling survival 8 years post-harvest was very high in the thinned stands. Understory conifer and hardwood tree and shrub vigor and survival diminish as the overstory canopy closes (Chan et al, 2006). As the crowns grow, light declines and understory species are unable to compete.

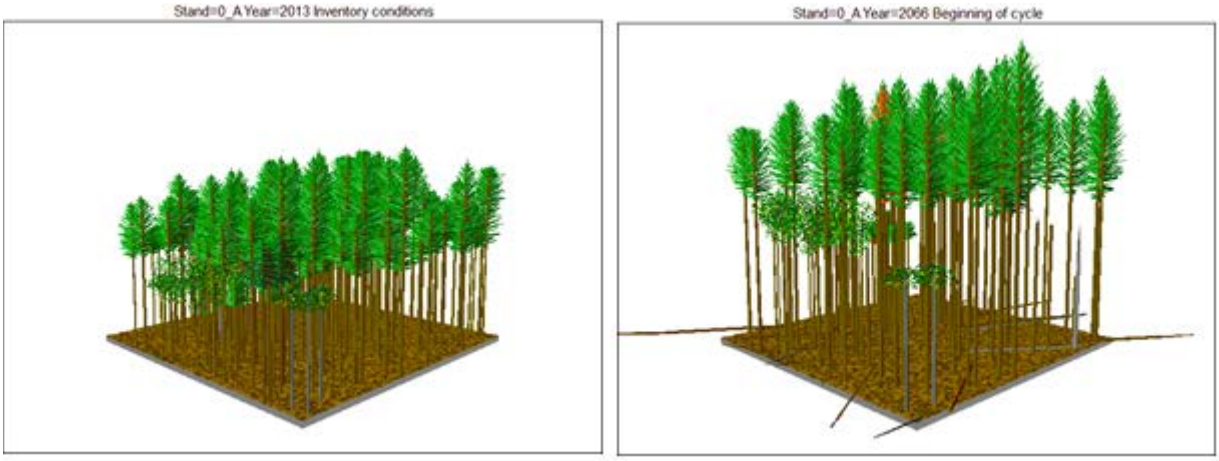
Thinning can maintain and increase live crown ratios (Oliver and Larson 1990 and Chan et al 2006). The live crown ratio is the ratio of crown length to total tree height. Chan et al (2006) found that the live crown ratios of un-thinned trees decreased indicating crown recession whereas trees in both moderately and heavily thinned stands maintained their existing live crown ratios. Chan et al (2006) found that thinning increased overstory stem growth and crown expansion.

Figure 6 is a visual representation of T19S R01E Section 31. In the left hand image, the current stand condition in shown and the right hand image projects what the stand would look like 50 years in the future under Alternative 2. Modeling projects that 50 years post-harvest, the following conditions would occur:

- The Relative Density is below 55 indicating that the canopy has been opened to a sufficient amount to allow sunlight to reach the forest floor.
- The TPA decreases because the intermediate suppressed trees would be removed in the thinning. Little to no suppression mortality would occur under Alternative 2.
- The QMDs in Alternative 2 would be higher than Alternative 1 which would improve the development of late successional forest characteristics including larger diameter trees. More open stand conditions allow the stand to develop more epicormic branching and more diverse branch structure, which is a facet of stand complexity.
- In Alternative 2, after harvest, the canopies would return to a closed canopy condition in roughly 30 years and Relative Densities would then reach the point of suppression mortality where further pulses of CWD would occur. Therefore, Alternative 2 would also delay the recruitment of snags

and CWD in treated portions of the Riparian Reserves for several decades compared to Alternative 1 and would exacerbate the ongoing lack of these habitat features for terrestrial riparian dependent wildlife.

Figure 6: Current Stand Condition Compared to Alternative 2 50 years Post-Harvest



Trees that would die from suppression mortality and remain in the stands as CWD and snags under Alternative 1 would be harvested and removed from the stand under Alternative 2 and decrease the number of green trees in the short-term.

Most of the Riparian Reserves proposed for thinning would realize habitat improvements for terrestrial riparian dependent wildlife species through the stand development dynamics described above due to their relatively young ages, lack of existing late-successional features, and overstory homogeneity. As described above, thinning would accelerate the development of late-successional characteristics used by these species like fissured/sloughing bark, deep crowns, large branches, multiple canopy layers, and cavities. Additionally, thinning would ensure that hardwood and minor conifer species would be retained and persist in the units. (Minor species would be harvested in Guileless due to the presence of mistletoe and abundance of those species but would still persist after harvest.)

The Riparian Reserve in Gosage Incline Sec. 07 thinning is an exception because it is a relatively mature stand (74 years) with some existing larger trees (approximately 10 TPA greater than 24" DBH), includes heterogeneity in the overstory and understory densities, and features several large ponds and wetlands that are uncommon features in the project area. These conditions provide for better habitat conditions for terrestrial riparian dependent wildlife than typical of the Riparian Reserves of other proposed units. Therefore, thinning Riparian Reserves to within 75' of water features in this unit would not produce the same level of benefit as in other proposed riparian thinning areas while the loss of current and future snags and CWD would be greater.

Additionally, this unit is bordered by young stands on adjacent BLM land, and adjacent private land has been or would likely soon be clear-cut. Therefore, thinning along the main stream channel in this unit would reduce refuge areas of high canopy cover and connectivity through the unit and adjacent to pond and wetlands for riparian dependent wildlife species in this section.

Logging corridors are used during implementation to remove felled trees. Corridors are 12' in width and generally intersect stream channels at a 45-90 degree angle. Under Alternative 2, an estimated 300[6] corridors would be created in the Riparian Reserves to facilitate the treatment.

Within the no-harvest buffers, all trees within the logging corridor would be left on site except as necessary for safety. Outside of the no-harvest buffers, trees felled within the logging corridor would be removed from the unit, except those exceeding 25" DBH (PDF 18). The more corridors that come to a landing, the larger the opening that would be created. For large common landings (considered to be four or more corridors for the purpose of this analysis), it is expected that these openings would be approximately 0.25 to 0.33 of an acre in size adjacent to the landings, depending on the final arrangement and number of corridors at a given landing.

Table 31 below shows the projected large common landings (10) which would occur in Alternative 2 in the Riparian Reserves by sale. Landings with fewer than four corridors are not shown due to the comparatively small openings created in those situations.

Table 31: Alternative 2 Common Landings in the Riparian Reserves

Sale name	Section	Number of corridors at Landing in Riparian Reserves (minimum of 4)
Anthony Access	1	4
Anthony Access	1	4
Gosage Incline	7	5
Gosage Incline	7	7
Gosage Incline	7	4
Gosage Incline	17	5
Gosage Incline	17	6
Missing Links	23 (yarded from Sec. 24)	5
Missing Links	23	11
Missing Links	19	5
		61 Total

Landings with multiple corridors generally become more disturbed due to a larger number of logs decked, sorted, and more traffic to haul logs out. This also creates more disturbance of the forest floor and road network around these landings where the potential for sediment transport from the road network is higher. However, landings would be designed to slope away from streams and streams would be disconneted from adjacent ditchlines. Other areas have multiple corridors that are outside of Riparian Reserves, but could affect the Riparian Reserves if they are close by. Increased light could improve the Riparian Reserves directly adjacent to these openings, by producing young conifer growth and starting a secondary canopy. These areas with multiple corridors would leave small openings that would have the

[6] Logging corridors would be located at the purchaser's discretion with approval of the Authorized Officer. Therefore the numbers and locations of corridors and landings in this document are estimates only and provided for comparison purposes.

existing brush or ground cover removed. These areas would re-vegetate with brush and young conifers (5-10 years out) allowing for differences (small openings) in stand structure and diversity in the future.

Alternative 2 would treat 42% of the total Riparian Reserves within the project area (Figure 5). This alternative would have the largest effect on the Riparian Reserves relative to the other alternatives.

Soils

Sensitive Soils

The potential impacts of harvest activities on soils vary by soil sensitivity grouping as described below. Acres of sensitive soils that would be treated under Alternative 2 are presented in Table 32.

Group 3. *Seasonally high water table soils*. The narrow window for dry soils on these sites presents a high risk for rutting and compaction impacts, especially deep compaction. The sites may or may not contain water tolerant species, but removal of trees can reduce transpiration rates, increasing moisture content. Yarding may disrupt surface water flows. This can raise the water table and increase the time soils are wet, which could reduce production and change the adapted species.

Group 4. *Soils with excessive coarse content*. Vegetative recovery is very slow for existing routes. Compaction of soils with excessive coarse content cannot be effectively ameliorated with standard tillage equipment. The soils in this group have moderate resiliency to disturbance and compaction due to lack of effectiveness using standard tillage equipment.

Group 5. *Soils that are slow to dry*. Due to moderate to slow permeability, these soils are generally dry less than 45 days between July and October in six out of ten years. Soils that are wet when ground based harvest occurs are subject to severe compaction, rutting, and displacement which can lead to erosion, reduced productivity, and reduced water infiltration. Table 32 shows the acres that would be harvested potentially with ground-based equipment including tracked feller-buncher harvest equipment. Soil moisture content on these sites often will not draw down to recommended soil moistures (25%) that provide resistance to compaction. Gradual slopes, broad ridges, and north and east aspects are particularly slow to dry.

Table 32: Sensitive Soils in Riparian Reserves Proposed for Ground-Based Harvest under Alternative 2

	Sensitivity Group*				
Section	Group 3 (acres)	Group 4 (acres)	Group 5 (acres)	Total (acres)	% of Sensitive soils in harvest boundary proposed for ground-based harvest
T19S R1W Sec 31	--	--	5.4	5.4	14%
T20S R1W Sec 13	--	1.0	--	1.0	5%
T20S R1W Sec 15	--	2.6	--	2.6	7%
T20S R1W Sec 17	--	1.2	0.0	1.2	2%
T20S R1W Sec 21	0.9	--	8.5	9.4	27%
T20S R2W Sec 1	4.9	--	--	4.9	19%
Total	5.7	4.9	13.9	24.5	5%
*Groups 3 and 5 have high resiliency and Group 4 (high course content) has intermediate resiliency					

Soil Productivity, Compaction, and Windthrow

Soils that have high rock content are difficult to ameliorate following harvest if compaction has occurred. Soils that are wet when ground based harvest occurs are subject to severe compaction, rutting, and displacement which can lead to erosion, reduced productivity, and reduced water infiltration. Table 32 shows the acres that would be harvested potentially with ground-based equipment including tracked feller-buncher harvest equipment.

Limited research has been conducted on the degree of detrimental soil impacts caused by feller-bunchers but field monitoring conducted by Eugene District BLM (BLM 2014) indicates that they have the potential to exceed thresholds for detrimental soil impacts for loss of productivity. Studies were conducted only in thinning units and areal extent of detrimental impacts ranged from 17-37% including compaction and displacement leading to mixing of soil horizons. Use of Feller-bunchers are a concern on sensitive soils in Riparian Reserves because the tracked machine must travel throughout the units rather than remaining on designated skid trails which would be ameliorated after harvest. In steeper Riparian Reserve units, the machine generally must enter perpendicular to the Riparian Reserve boundary and then reverse in an uphill direction to carry logs to within reach of designated skid trails. Although compaction generally is not as deep and persistent as would be caused by a rubber-tired skidder, monitoring studies have indicated high amounts of compaction and displacement on fine-grained soil types including category 3 and 5 sensitivity groups.

For cable-operated units, detrimental soil impacts (especially compaction) are less likely and would primarily occur from gouging and rutting from dragging logs on steep slopes without adequate lift over slope breaks, and sidehill yarding. Additionally common landings for cable lays can create concentrated disturbance in the vicinity of the landing. PDFs included for this project would minimize these effects. Measures to reduce risk of disturbance and compaction include full suspension when crossing streams and increased no-cut distances from waterways. Greater than 75 foot no-harvest buffers would be implemented where steep (>60%) slopes have a topographic slope change from between 75 and 125 feet (PDF 83). Where stream initiation points have >60% slope and associated headwalls or rotational slumps, no harvest buffers would be 100' (PDF 82).

There are tradeoffs for logging systems impacts that vary by alternatives, implementation details, and purchaser discretion. For example, a unit previously harvested by ground-based machinery would have some existing compaction. Cable systems add less new compaction and disturbance to the existing conditions than ground-based harvests would. However, if ground-based systems operated on the same skid trails used in previous entries, those skid trails would be decompacted and the net compaction post-harvest may be less than with cable systems.

Although soils in the John's Last Stand (T20S R01E Sec. 29) regeneration harvest area present some risk for blow-down, no harvest would occur in Riparian Reserves. However, there would be increased risks of blowdown in sensitive (Group 4) Riparian Reserve soils where regeneration harvest occurs adjacent to shallow skeletal or rocky soils. A large rock outcrop within the unit was withdrawn from harvest. Although the withdrawn area will itself be more susceptible to blow-down, it may also provide some protection to nearby Riparian Reserves with steep shallow soils on the east side of the unit.

Road construction in Riparian Reserves

Approximately 0.25 miles (~1,300') of new permanent road construction in the Riparian Reserves would occur under this alternative. These small spurs are all on the outer edges of the Riparian Reserves. This amount of road construction would remove approximately 1 acre of Riparian Reserves and convert it to road under this alternative. Under this alternative, no temporary roads would be built in the Riparian Reserve and no new stream crossings would be constructed. Due the small amount of proposed road construction and no stream crossings, there would be no effect from road construction on riparian function other than the 1 acre of Riparian Reserve habitat that would be removed.

Stream Temperature

There would be minimum 75' no-harvest buffers (except where larger buffers were appropriate due to terrain, soils, or other factors and 25' on two study stretches) to maintain shade cover and both small and

large wood recruitment over the short term and long-term. No-harvest buffers would protect bank stability, litter inputs, and shade, and prevent harvest-related sediment delivery to streams (PDF 7).

Study reaches with minimum 25' no-harvest from stream channels are expected to allow some new direct solar radiation into the relatively short reaches where these study buffers would be placed (C-4 of ROD, USDI 1994). The increase in sunlight would be studied to assess the increase in primary production and increased productivity of the stream on fish and other aquatic species. Due to the limited area of these study reaches (approximately 300' long per reach, approximately 600' total), the topographic shading by stream banks and small channel size (10-12'), only small increases in direct solar radiation would occur. Approximately 0.28 acres of primary shade would be thinned on each study reach, with 25 feet from the stream bank being untreated to provide some shade. Stream temperature would be maintained due to stream flow through substrate within the channel (hyporheic flow), limited increases in solar radiation from small buffers on one side of the stream, and minimum canopy cover of 50% in the thinning units.

Approximately 27 corridors would be expected to cross perennial stream channels and would remove approximately 0.9 acres of primary shade zone across the project area (Table 33). Trees felled within no-harvest buffers would be left on site as CWD. This would provide a pulse of CWD to the Riparian Reserves and to the stream network. An average of 6 trees per stream crossing (approximately 165 trees total) would likely be felled within the no-harvest buffers. Felling of these trees also has the potential to allow more direct solar radiation to reach the stream channel and cause increased stream temperatures until the canopy recloses in approximately 30 years.

The table below displays the Sale unit, the stream crossed, distance between corridors at stream crossings, and the amount of primary shade zone that would be removed.

Table 33: Logging Corridors over Streams

Sale Name / Section	# of corridors	Stream ID Number crossed	Perennial/ Intermittent	Distance between corridors*	Area opened in primary shade zone (total)
Gosage Incline Sec. 7	10	5	intermittent	15 -90'	15,840 ft^2
	1	8	Intermittent	-	1,584 ft^2
	10	22	perennial	40-116'	15,840 ft^2
	1	23	perennial	-	1,584 ft^2
Gosage Incline Sec. 17	4	10	perennial	60-65'	9,504 ft^2
	3	11	perennial	37-60'	4,752 ft^2
	3	15	perennial	100-150'	4,752 ft^2
	1	14	perennial	-	1,584 ft^2
Gosage Incline Sec. 13	4	1	perennial	95-110'	3,168 ft^2
Guileless Sec. 21	2	1	perennial	200'	3,168 ft^2
Anthony Access Sec. 25	3	3	perennial	120-150'	4,752 ft^2
*Corridors are spaced an average of 150' apart at their farthest reach from the landing. Ranges provided here are estimates of distances between corridors where they cross streams.					

As stated above, corridor crossings over streams would leave behind trees felled within the corridor and open up currently closed canopies to additional light. These areas where shade is being removed from the stream (primary shade zone) have the potential to increase stream temperatures. Stream #22 in Gosage Incline Sec. 7 would have approximately 0.36 acres (17%) of primary shade removed directly on either side of the stream for approximately 700'. Of the primary and secondary shade zone (200' from stream edge) removed, this would be a loss of 1.1 acres (48,000 ft^2) out of 6.4 acres in this reach (17% of the primary and secondary shade zones). This reach would also be thinned with a canopy cover maintained above 50%. This increase in direct solar radiation has the potential to increase stream temperature at this location. However, due to hyporheic flows (water flowing through the stream substrate regulates stream temperatures) (Burkholder et al. 2008), intact riparian areas with high levels of shade and approximately half the flow entering the stream channel 500 ' down from the corridors, it is not anticipated that there would be a measurable difference in stream temperatures downstream of the unit.

The potential slight increase in direct solar radiation would last for approximately 10 to 20 years until the remaining over story crowns close and understory vegetation develops. Other areas are not expected to have as large of increases of direct solar radiation due to smaller number of corridors and smaller increases in direct solar radiation, and therefore are not expected to have stream temperature increases.

3.4.3.2 Cumulative Effects

Approximately 10 acres of adjacent private industrial timberlands could affect the Riparian Reserves in the project area if they are clear-cut at 40 to 60 years, as has been the typical rotation in this area. The effect of the adjacent clear-cuts, should they occur, on Riparian Reserve stand complexity would include increased light penetration to the forest floor thus improving understory growth and development. Other effects could include risk of blow-down in the Riparian Reserves causing within-stand gaps. There is also the potential for trees within the Riparian Reserves to be used as guy backs/anchors from other harvest operations. Sufficient damage from such activities could kill the trees, converting them into snags. Historically, there have been non-discretionary rights-of-ways issued for new road construction by private timber industry across BLM lands. Minimal if any requests are anticipated within the project area as it is already a heavily roaded watershed.

As stated above, the slight localized increase in stream temperatures that is expected as a result of yarding corridors over Stream 22 is not expected to be measurable downstream when this stream flows onto private land. Therefore there would be no cumulative effect from this action on stream temperature.

3.4.4 Alternative 3

3.4.4.1 Direct and Indirect Effects

<u>Stand Structure and Terrestrial Habitat</u>

In Alternative 3, an additional 5 TPA would be retained by the prescription in the Riparian Reserves to increase the quantity of CWD and snags. Once the snags and CWD are created in Alternative 3, the overstory conditions in treated areas would be the same as Alternative 2. Snag and CWD creation would help to establish amounts of these features that are more typical of similar age unmanaged conifer stands in western Oregon. Snag and CWD creation would occur as a single pulse of tree mortality within 5 years of harvest as compared to natural processes (Alternative 1) that would generate gradual and more prolonged inputs of snags and CWD. These snags and CWD would be larger in size than those in Alternative 1 as they would be created from co-dominates and dominates vs. suppressed and overtopped trees. Over the next few decades, these created snags and CWD would begin to decay and provide benefits to the greatest diversity of riparian dependent wildlife species. Alternative 3 would provide higher

quality habitat for terrestrial riparian dependent wildlife than Alternatives 2 or 4 while also retaining the long-term habitat improvements from thinning.

Wider stream buffers would be established in the Gosage Incline Sec. 07 thinning unit under this alternative than Alternative 2, and a large common cable-yarding landing originating off of Spur 7B would be eliminated. Because this unit contains a higher order, low gradient stream, ponds and wetlands that are valuable, unusual features on the landscape, and the stand is relatively old (74 years), it currently provides higher quality habitat for riparian dependent wildlife species than the other Riparian Reserves in the project area. This unit design would provide several benefits:

- This buffer would capture some existing overstory and understory heterogeneity present, especially on the south side of Stream 22 due to rockiness. Also in some areas with high canopy cover, there are dominant trees that are sufficiently differentiated to continue growing relatively vigorously.
- It would retain dense cover near the pond and wetland areas in the unit. Ponds and wetlands of this size and number are unusual features, and maintaining microclimate and undisturbed habitat conditions would benefit species like wood ducks and amphibians.
- This unit is bordered by young stands on adjacent BLM land, and adjacent private land has been or would likely soon be clear-cut. Therefore, maintaining an untreated area along the main stream channel would provide a refuge and connectivity corridor of continued high canopy cover for riparian dependent wildlife species in this section.
- Shade-tolerant conifer reproduction already exists in some areas, some of which would likely persist to be released by natural disturbance in the future even if thinning does not occur.
- Trees above 24” DBH are present at about 10 TPA. Although not targeted for harvest some would be removed by corridors, basal area requirements, etc. The increased buffer would preserve these features. Even if such trees stagnate and die, they would be valuable as snags/CWD.
- Alternative 3 would treat 37% of the total Riparian Reserves (Figure 5) in the project area. This alternative would have the second largest set of effects of the action alternatives on the Riparian Reserves. Unthinned areas would maintain their current habitat value and development trajectory as described under Alternative 1 and would take longer than thinned areas to reach the desired late-successional habitat condition for riparian dependent wildlife species.

Soils

Sensitive soils

The potential impacts of harvest activities on soils vary by soil sensitivity grouping as described above for Alternative 2. Acres of sensitive soils that would be treated under Alternative 2 are presented in Table 34.

Table 34: Sensitive Soils in Riparian Reserves Groundbased Harvest under Alternative 3

	Sensitivity Group				
Section	**Group 3 (acres)**	**Group 4 (acres)**	**Group 5 (acres)**	**Total (acres)**	**% of Sensitive soils in harvest boundary proposed for ground-based harvest**
T19S R1W Sec 31	--	--	4.1	4.1	11%
T20S R1W Sec 13	--	1.0	--	1.0	5%
T20 SR1W Sec 15	--	2.6	--	2.6	7%
T20S R1W Sec 17	--	1.2	0.0	1.2	2%
T20S R2W Sec 1	4.9	--	--	4.9	19%
Total	4.9	4.9	4.1	13.8	3%
*Group 3 and 5 have high resiliency and group 4 (high course content) have intermediate resiliency					

Soil Productivity, Compaction, and Windthrow

As described in Alternative 2, the primary skid trails with severe compaction would be decompacted under PDF 46. Feller-bunchers would not be used in Riparian Reserves under Alternative 3 (PDF 43). The shallow compaction, displacement, and loss of duff layer caused by feller-buncher travel off of designated skid trails would not occur under this alternative and therefore soil health would be better protected in the Riparian Reserve outside of designated skid trails. A small unit in Anthony Access (Unit 31C would not be harvested under this alternative because it would require multiple entries on a single skid trail within the Riparian Reserve due to limited access points. This would eliminate or avoid severe compaction and loss of productivity on a skid trail paralleling the nearby stream (Unit 31C Anthony Access).

The potential for increased susceptibility to wind-throw would be greatly reduced for the John's Last Stand (T20S R01E Sec. 29) regeneration harvest area because this unit would be thinned rather than regeneration harvested. Soils that become saturated have high clay content, or support only shallow rooted trees (high water table soils) are also more susceptible to wind-throw. Approximately 5 acres of headwater Riparian Reserve adjacent to regeneration harvest in Gosage Incline Sec 7 would be susceptible to increased wind-throw.

Road construction in the Riparian Reserves

Road construction would be identical to Alternative 2. (0.25 miles of permanent road construction, approximately 1 acre of Riparian Reserve), and therefore Alternative 3 would have the same effects.

Stream Temperature

Yarding Corridors over streams

Alternative 3 would have far fewer corridors crossing streams than Alternative 2. Table 35 shows the number of streams crossed by corridors that would occur under this alternative. These corridor crossings are not expected to increase stream temperature due to the limited amount of shade removed and limited increase in direct solar radiation.

Table 35: Alternative 3 Logging Corridors over Streams

Sale Name / Section	# of corridors	Stream Number Crossed	Perennial/ Intermittent	Distance between corridors	Area opened in primary shade zone
Gosage Incline Sec. 7	4	5	intermittent	90-120	0.14 ac (6,336 ft^2)
Gosage Incline Sec. 7	1	8	Intermittent	-	0.04 ac (1,584 ft^2)
Gosage Incline Sec. 7	4	22	perennial	110-130	0.14 ac (6,336 ft^2)

3.4.4.2 Cumulative Effects

Effects would be the same as Alternative 2 except that John's Last Stand would not be regeneration harvested but thinned resulting in less wind and blowdown potential and more microclimate protection in the Riparian Reserve due to shade and wind breaks provided by the retained trees in the thinned stand.

3.4.5 Alternative 4

3.4.5.1 Direct and Indirect Effects

Stand Structure and Terrestrial Habitat

In the areas not receiving treatment due to larger no-harvest buffers than Alternatives 2 and 3 and reduced road construction, the effects and stand metrics would be the same as Alternative 1. Effects in treated areas would be the same as Alternative 2. Under Alternative 4 (182 acres treated within the Riparian Reserve), 119 fewer acres would be thinned in Riparian Reserves due to the widening of no harvest stream buffers to 120', and the elimination of some roads, and not treating all areas proposed for helicopter harvest under Alternative 2. These areas would maintain their current habitat value and development trajectory as described under Alternative 1 and would take longer than thinned areas to reach the desired late-successional habitat condition for terrestrial riparian dependent wildlife.

Gosage Incline Sec. 07 thinning unit would have the similar harvest boundaries (minimum no-harvest buffer of 120' instead of 75'; larger buffers remain the same as Alternative 3. With the exception of CWD and snag creation, effects would be the same as described for Alternative 3.

Percentage of total Riparian Reserves treated

Alternative 4 would treat 25% of the total Riparian Reserves (Figure 5). This alternative would contribute moderately to overall Riparian stand complexity

Soils

Sensitive Soils

The potential impacts of harvest activities on soils vary by soil sensitivity grouping as described above for Alternative 2. Acres of sensitive soils that would be treated under Alternative 4 are presented in Table 36.

Table 36: Sensitive Soils in Riparian Reserves GroundBased Harvest under Alternative 4

	Sensitivity Group*				
Section	Group 3 (acres)	Group 4 (acres)	Group 5 (acres)	Total (acres)	% of Sensitive soils in harvest boundary proposed for ground-based harvest
T19S R1W Sec 31	--	--	3.7	3.7	10%
T20S R1W Sec 13	--	0.9	--	0.9	4%
T20S R1W Sec 15	--	1.7		1.7	5%
T20S R1W Sec 17	--	0.9	0.0	0.9	1%
T20S R2W Sec 1	3.4	--	--	3.4	13%
Total	3.4	3.5	3.7	10.5	2%
*Group 3 and 5 have high resiliency and group 4 (high course content) have intermediate resiliency					

Soil Productivity, Compaction, and Windthrow

Effects to soil compaction, amount of detrimental soil impacts, and changes in soil productivity would be the same as described under Alternative 2, except that slightly fewer acres of Riparian Reserve would be treated.

The potential for increased susceptibility to wind-throw would be eliminated because there would be no regeneration harvest under this alternative.

Road construction in the Riparian Reserves

Alternative 4 would have no new permanent road construction or stream crossings in the Riparian Reserves but includes 0.1 miles (475') of temporary road which would be decommissioned following harvest. This amount of road construction would not cause any measurable effects to riparian function or change stand complexity.

Stream Temperature

Alternative 4 would have more corridors crossing streams than Alternative 3, but fewer than Alternative 2. The table below shows the number of streams crossed by corridors that would occur under this alternative. These corridor crossings are not expected to increase stream temperatures due to the limited amount of shade removed and limited increase in direct solar radiation.

Table 37: Alternative 4 Logging Corridors over Streams

Sale Name / Section	# of corridors	Stream crossed	Perennial/ Intermittent	Distance between corridors	Area opened in primary shade zone
Gosage Incline 7	4	5	intermittent	15 -90'	0.36 ac (15,840 ft^2)
	1	8	Intermittent	-	0.04 ac (1,584 ft^2)
	4	22	perennial	40-116'	0.36 ac (15,840 ft^2)
Gosage Incline 17	2	10	perennial	60-65'	0.23 ac (9,504 ft^2)
	2	11	perennial	37-60'	0.11 ac (4,752 ft^2)
	3	15	perennial	100-150'	0.11 ac (4,752 ft^2)
	1	14	perennial	-	0.04 ac (1,584 ft^2)
Gosage Incline 13	3	1	perennial	95-110'	0.07 ac (3,168 ft^2)
Guileless 21	2	1	perennial	200'	0.07 ac (3,168 ft^2)

3.4.5.2 Cumulative Effects

Cumulative effects would be essentially the same as Alternative 3.

3.5 Issue 4: What would be the effects on sustained yield management from proposed activities?

3.5.1 Affected Environment

The 1995 Eugene Resource Management Plan (RMP) established an allowable sale quantity (ASQ) from Matrix and Connectivity land use allocations to manage timber production at sustainable levels. Analysis for the 1995 Eugene RMP included an assumption that almost half (44%) of the acres of harvested timber on the District would be from regeneration harvest during the first decade of implementation (RMP, p. 8). The 1994 FEIS projected that the Eugene District would harvest 570 acres (p. xix and Appendix F p. 224) annually during the first decade through regeneration harvest methods. Since the institution of the 1995 Eugene RMP, changes to environmental regulations, along with increased controversy over regeneration harvesting, have resulted in timber management focusing almost exclusively on thinning to achieve ASQ. Between May 22, 1995 and July 2015, the District has sold for regeneration harvest 3,167[7] acres, or 31% of the total 10,260 acres projected for that timeframe under the 1995 RMP.

Using the Eugene District's Forest Operations Inventory data, the Lost Creek Watershed contains approximately 13,436 total acres of BLM administered land. Of those, 13,407 acres are forested with stand ages ranging from 14-210 years old. The bulk of the acres (60%) are in the 50-90 year age classes, with the 70-year age class occupying 30% of the forested acres of the watershed.

Of 570 acres projected to be regeneration harvested on the Eugene District annually, the Lost Creek Watershed could contribute an average of approximately 440 acres per decade, based on available Harvest Land Base acres. Lost Creek Watershed's 5,969 harvest land base acres represent 7.7% of the

[7] Includes salvage sales but does not include sales for right-of-ways such as roads and power lines.

district harvest land base (77,563 acres). Of the annual district regeneration acres (570), Lost Creek could be expected to contribute approximately 7.7% (an average of 44 acres annually, or 440 acres per decade). Between 1995 (the inception of the current RMP) and 2015, approximately 880 acres in the Lost Creek Watershed could have been regeneration harvested. Considering that operators would have three years in which to harvest, and that tree planting could occur as early as the first winter following completion of harvest activities, approximately 880 acres could potentially now have been in stands ranging in age from 0-18 years and therefore could be contributing to a greater representation of the early seral stage (0-15 years) in the watershed. Since the inception of the 1995 RMP, approximately 297 acres in the Lost Creek Watershed have been regeneration harvested (Long Lost Sue (2000), Middle Trestle (1997), Lost Creek (1996), and Mt. June (1996) timber sales). Of these, approximately 17 acres (0.1% of the forested BLM acres in the watershed) from the Long Lost Sue timber sale are young enough to be considered in the early seral stage (14 years old). The remaining post-1995 RMP regeneration harvest acres are in stands aged 16 and 17 years old and are considered mid seral. The mid seral stage occupies approximately 2,356 of the 13,407 total forested acres in the watershed (approximately 18%).

Pulses of temporally spaced regeneration harvests would provide a more balanced age class distribution across the harvest land base of the Lost Creek Watershed. This would provide opportunities for commercial thinning entries over time, followed by regeneration harvests and stand re-establishment, contributing to a sustained yield of timber.

Lost Creek Watershed BLM Management Seral Stage and Age Class Distribution		
Seral Stage	Age Class	Current Acres
Early	0 (ages 0-4)	0
	10 (ages 5-14)	17
	20 (age 15)	0
Total Early		17
Mid	20 (ages 16-24)	493
	30 (ages 25-34)	974
	40 (ages 35-40)	889
Total Mid		2,356
Late	40 (ages 41-44)	784
	50 (ages 45-54)	1,356
	60 (ages 55-64)	1,620
	70 (ages 65-74)	4,034
Total Late		7,794
Mature	80 (ages 75-84)	632
	90 (ages 85-94)	442
	100 (ages 95-104)	5
	110 (ages 105-114)	317
	120 (ages 115-124)	726
	130 (ages 125-134)	79
	140 (ages 135-144)	81
	150 (ages 145-154)	65
	160 (ages 155-164)	4
	170 (ages 165-174)	8
	180 (ages 175-184)	0
	190 (ages 185-194)	0
	200 (ages 195-199)	0
Total Mature		2,359
Old Growth	200 (200+)	880

Early-seral is considered the period from disturbance to crown closure of conifer stands, usually occurring from 0-15 years.

Mid-seral is considered the period in the life of a forest stand from crown closure to ages 15-40.

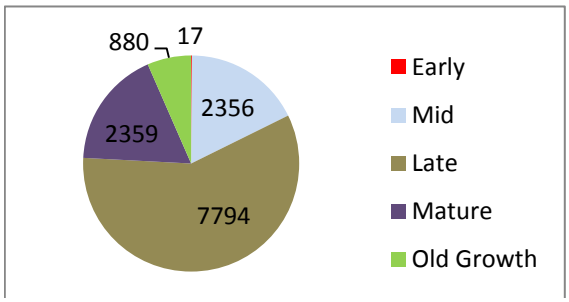
Late-seral is the period in the life of a forest stand from first merchantability to culmination of mean annual increment.

Mature-seral is the period in the life of a forest stand from culmination of mean annual increment to an old growth stage or to 200 years.

Old growth constitutes the potential plant community capable of existing on a site given the frequency of natural disturbance events. For forest communities, this stage exists from approximately age 200 until when stand replacement occurs and secondary succession begins again.

(RMP 1995, pp. 128-129).

Acres per seral stage in the Lost Creek Watershed



3.5.2 Alternative 1: No Action

3.5.2.1 Direct and Indirect Effects

Under Alternative 1, the project areas would receive no timber management. No actions would be implemented to address the small number of stands in early seral age classes or projected future sustained yield trajectories in the Lost Creek Watershed at the current time.

3.5.2.2 Cumulative Effects

No actions would occur at this time. Cumulative effects are the consideration of incremental impacts of the proposed action when considered with other present and reasonably foreseeable future actions. Since no project action is proposed under this alternative, there are no actions upon which to consider the incremental impacts.

3.5.3 Alternative 2: Preferred Alternative

3.5.3.1 Direct and Indirect Effects

Selection of Alternative 2 would result in regeneration harvest of approximately 150 acres of forested BLM lands. The regeneration harvest areas are contained in three separate units, Anthony Access Sec. 1, Gosage Incline Sec. 7 north, and John's Last Stand. Regeneration harvested areas would receive site preparation and would be planted with seedlings of an appropriate species mix. Regeneration harvest and replanting of 150 acres would promote the attainment of a more balanced distribution of seral stages in the watershed. Planted stands would eventually provide areas to commercially thin and regeneration harvest in the future, contributing to a sustained yield of timber from the harvest land base of the Lost Creek Watershed.

The proposed regeneration harvest of approximately 150 acres represents 1.1% of the forested BLM acres in the watershed, 2.5% of the BLM's harvest land base in the watershed, and 17% of the potential regeneration harvest in the watershed since 1995 projected under the RMP. Regeneration harvest of 150 acres, along with the subsequent stand establishment activities, would re-distribute approximately 150 acres from the mature seral stage to the early seral stage.

3.5.3.2 Cumulative Effects

The only two actions that generally affect the age class distribution on BLM lands within the watershed are commercial timber harvest and stand replacing wildfires. BLM currently has no other projects planned which would affect stand age distribution within the Lost Creek watershed. Stand replacing wildfires have historically occurred at intervals greater than 100 years.

3.5.4 Alternative 3

3.5.4.1 Direct and Indirect Effects

Selection of Alternative 3 would result in regeneration harvest of approximately 100 acres of forested BLM lands (Anthony Access Sec. 1 and Gosage Incline Sec. 7 north). Post-harvest stand establishment activities of site preparation and tree planting would be similar to Alternative 2. Regeneration harvest and replanting of 100 acres would promote the attainment of a more balanced distribution of seral age classes in the watershed, but to a slightly lesser extent than Alternative 2. Alternative 3's contribution to a sustained yield of timber from the harvest land base of the Lost Creek Watershed would be 50 acres less than that of Alternative 2, a difference of about 0.8% of the harvest land base of the watershed.

The proposed regeneration harvest of 100 acres represents 0.75% of the forested BLM acres in the watershed, 1.7% of the BLM's harvest land base in the watershed, and 11% of the potential regeneration harvest in the watershed since 1995. Regeneration harvest of 100 acres, along with subsequent stand establishment activities, would re-distribute approximately 100 acres from the mature seral stage to the early seral stage.

3.5.4.2 Cumulative Effects

The only two actions that generally affect the age class distribution on BLM lands within the watershed are commercial timber harvest and stand replacing wildfires. BLM currently has no other projects planned which would affect stand age distribution within the Lost Creek watershed. Stand replacing wildfires have historically occurred at intervals greater than 100 years.

3.5.5 Alternative 4

3.5.5.1 Direct and Indirect Effects

Selection of Alternative 4 would result in no regeneration harvest of forested BLM lands at this time. Like Alternative 1, no actions would be implemented to address the unbalanced age class distribution or projected future sustained yield trajectories in the Lost Creek Watershed.

3.5.5.2 Cumulative Effects

The only two actions that generally affect the age class distribution on BLM lands within the watershed are commercial timber harvest and stand replacing wildfires. BLM currently has no other projects planned which would affect stand age distribution within the Lost Creek watershed. Stand replacing wildfires have historically occurred at intervals greater than 100 years.

3.6 Issue 5: What are the effects on recreation opportunities on federal lands, including hiking opportunities and visitor experience, on federal lands in area?

The spatial bounds for analysis for effects of this Issue are portions of the project area with legal public access, project areas visible from Key Observation Points (KOP)[8] within 4 miles, and the 21.4 miles of the proposed Lost Creek Back Country Byway potentially impacted. The temporal bounds for analysis incorporate the length of time encompassing the duration of all activities and the time for those activities to no longer be reasonably noticeable on the landscape. This is estimated to be approximately 60 years.

3.6.1 Affected Environment

Located less than 1 hour from the Eugene/Springfield metropolitan area, and easily reached by Interstate Highway 5 (I-5) and State Highway 58, the project area, located south of Highway 58, offers a "Backyard–to-Backcountry" opportunity that is the strategic focus of BLM's current effort to capitalize on its unique recreation brand of public lands that are "…uniquely positioned, close to both rural and urban communities and intermingled with lands managed by state and local governments and others," (BLM Recreation Strategy: Connecting with Communities, 2014).

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[8] Key Observation Point is one or a series of points on a travel route or at a use area or a potential use area, where the view of a management activity would be most revealing.

While the project area is reached via paved county and BLM roads south of Highway 58, much of the project area lands do not have legal public access. Lost Creek Road/Eagles Rest Loop, and BLM Roads 19-1-33.1, 20-1-14, 20-1-10.3, and 20-1-10.1 do have legal public access. Of the five proposed timber harvest sales, only Missing Links and John's Last Stand have section boundaries intersected by those BLM roads that allow for legal public access. Public lands included within the remaining three sales (Anthony Access, Guileless, and Gosage Incline) do not have legal public access. Legal public access is determined by terms and conditions established under right-of-way agreements, and access to BLM lands is often segmented due to the checkerboard ownership pattern. Temporary public access to these lands for hunting and other dispersed recreational activities may be granted by the private landowner at their discretion. The BLM holds administrative rights to access these lands or to permit a timber sale, but this does not grant the BLM rights to permit public access across roads owned by others. (See Appendix C for a complete list of access rights.)

With its varied recreation resources and opportunities, portions of the project area include characteristics consistent with the Bureau's desire "…to manage recreation resources and visitor services to offer the greatest benefits possible to individuals and communities and to better enable communities to achieve their own desired social, economic, and environmental outcomes," (USDI BLM, 2014).

Motorized and non-motorized recreational activities are linked to 21.4 miles of paved roads that are included in the proposed Lost Creek Back County Byway (BCB) (RMP, 1995). This loop begins in a rural area approximately 2 miles south of the community of Dexter where small farms and rural residences dot the landscape (T19S R01W Sec 33). As one progresses east and south along the travel corridor before looping back to the point of origin, however, the rural backdrop shifts to a Roaded Modified setting[9] where alternate sections of industrial forest and BLM lands form a checkerboard pattern upon the landscape. Here, a patchwork design of relative co-dominance resulting from past timber harvest activities on Federal, State, and industrial timber lands can be viewed including thinnings, clear-cuts, rock quarries, and gravel stockpile sites. (Image 1: A view of the John's Last Stand harvest area located below Mount June from atop Eagles Rest peak (elev. 3022) looking southeast towards Hardesty Mountain (left), Sawtooth Rock (middle), and Mount June (right).) Additionally, federal trails managed by the BLM and Forest Service are accessed by way of established trailheads located along the paved roads.

Image 1: View including John's Last Stand harvest area from atop Eagles Rest peak.

Driving-for-pleasure, road bicycling, and running characterize casual recreational uses common to the proposed BCB.

Outside of recreational pursuits involving direct use of the proposed BCB, recreation activities associated with the project area's non-motorized trails linking, in part, to the proposed BCB include hiking, horse riding mountain biking, scenic viewing, photography, and wildflower viewing.

[9] The Roaded Modified setting is a substantially modified natural environment. It is the direct result of intensive timber harvest, mining, or some other such activity.

There are 10 trails managed by the Eugene BLM, Willamette National Forest, and Umpqua National Forest that form a 30-mile system of connected, non-motorized recreational opportunity adjacent to the project area (Table 38). One of those trails, Eagles Rest (#3461) provides access to the Ash Swale Shelter (T20S R01E Sec 20), originally constructed in 1930 to provide overnight respite for the pack trains which supplied the Eagles Rest and Hardesty Mountain lookouts. None of the trails are within 200' of the proposed harvest boundary creating a safety and visual buffer between future harvest activity and trail visitors, a separation adopted during the project design phase.

Table 38: Federal trails located within and adjacent to the project area.

Trail Name	Responsible Agency	Length (miles)
Eagles Rest	BLM	0.7
Eagles Rest (#3461)	Forest Service	1.5
Goodman Creek (#3461.1)	Forest Service	4.0
Lost Creek (#3462)	Forest Service	2.5
South Willamette (#3465)	Forest Service	5.0
Sawtooth (#1401)	Forest Service	4.0
Mt. June (#1400)	Forest Service	1,1
Hardesty Way (#1402)	Forest Service	2.2
Hardesty (#3469)	Forest Service	6.0
Eula Ridge (#3463)	Forest Service	4.2

Evidence of four-wheeling, social gathering, and target shooting can be found in rock quarries and gravel storage sites. There are three rock quarries and three gravel storage sites within the project area. Of these six areas, four have legal public access.

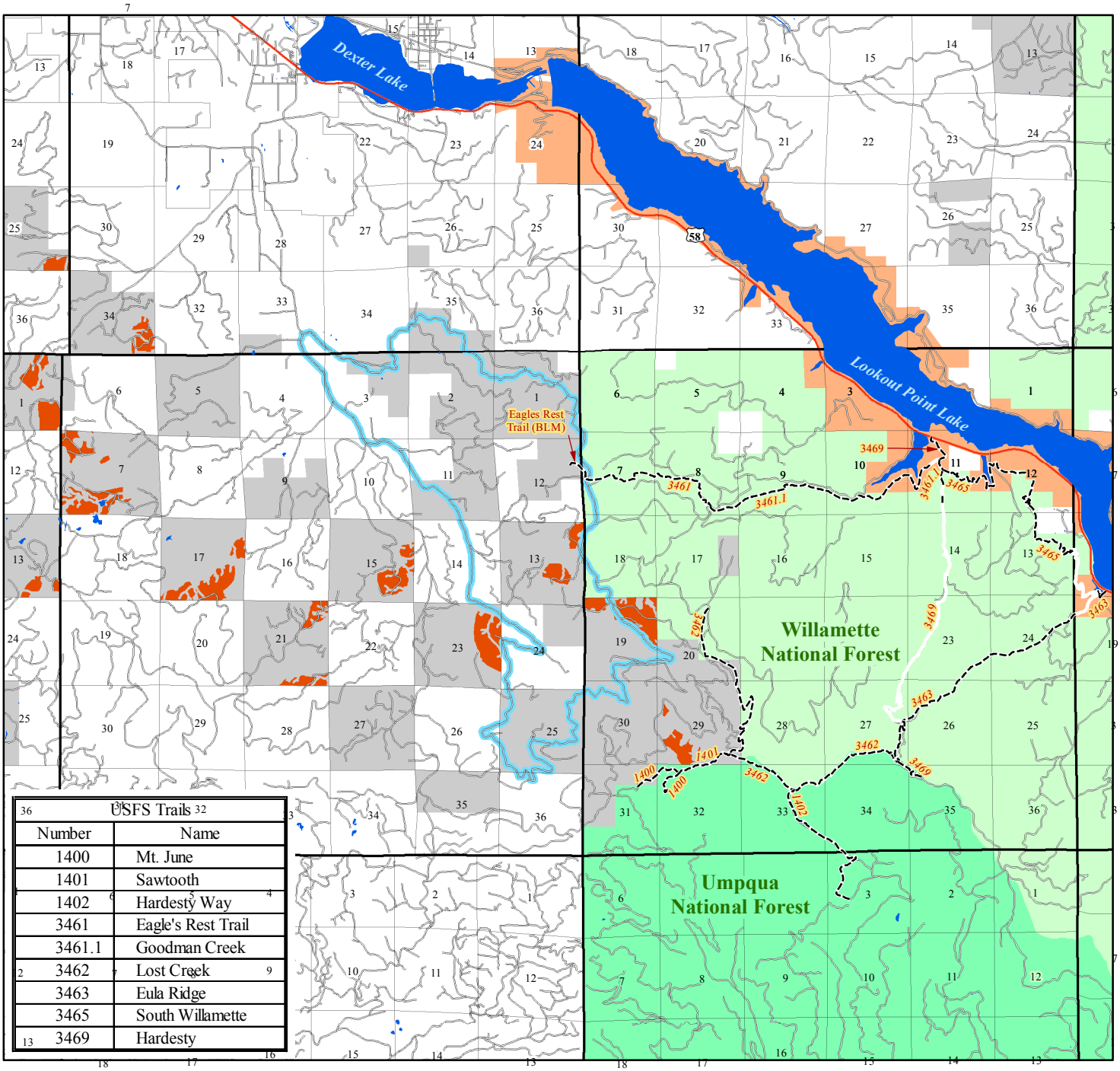
Anecdotal stories received during scoping and in informal conversations indicate some of the project area, especially John's Last Stand, is popular with hunters and recreational mushroom collectors despite access limitations. While the BLM does not track dispersed recreational activities such as hunting and mushroom picking, the Lost Creek drainage is not ranked among the most popular mushroom picking areas within the Eugene District based upon commercial permits issued (Koester, 2015). Signs of high levels use such as hunt camps and heavily used vehicle pull-outs seen in other parts of the District have not been observed in the project area. As such, use is likely low or moderate.

The majority of recreational activities are day-use in nature. No developed recreation sites or facilities are located within the project area.

The Visual Resource Management (VRM) classification within the project area is VRM Class IV. The visual quality objective for VRM IV areas is to allow major modification of the existing character of landscapes.

Lost Creek EA

Federal Trails



USFS Trails

Number	Name
1400	Mt. June
1401	Sawtooth
1402	Hardesty Way
3461	Eagle's Rest Trail
3461.1	Goodman Creek
3462	Lost Creek
3463	Eula Ridge
3465	South Willamette
3469	Hardesty

N

Miles

0 1 2 3

Lost Cr Timber Sale Unit

Bureau of Land Management

Corp of Engineers

USFS - Umpqua NF

USFS - Willamette NF

Trail

Road

Highway

Backcountry Byway (Proposed)

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

3.6.2 Alternative 1: No Action

3.6.2.1 Direct and Indirect Effects

This alternative would provide for continuation of the current trajectory of forest growth within the project area. Views of previously harvested BLM lands from surrounding trails and mountain viewpoints would reflect the transition from early seral forests (less than 15 years) through mid-seral (15-40) and greater. Visually, this would result in reduced visual contrast within the surrounding forests managed by the BLM. VRM IV allows for modification from the existing character of the landscape and a change such as this would be in conformance with VRM IV.

Trails and dispersed sites (e.g., gravel stockpiles and rock quarries) would remain available and unchanged for non-motorized trail pursuits, and other dispersed recreational activities common to the area. Recreational use of the proposed Lost Creek BCB would also continue unchanged, interrupted only temporarily due to seasonal storm events that might result in road damage and/or wind throw of trees onto the road prism.

Motorized public access to those areas would be limited to the portions of Missing Links and John's Last Stand with legal public access. Dispersed recreation (hunting, mushroom picking) in these areas would remain unchanged. Occasional non-motorized recreational activity (e.g., hiking, bicycling, and horseback riding) would continue to occur within project area lands located behind locked gates especially in areas located closest to rural residences.

The Roaded Modified ROS setting associated with the project planning area would not change.

3.6.2.2 Cumulative Effects

Cumulative effects are the consideration of incremental impacts of the proposed actions when considered with other present and reasonably foreseeable future actions. Since no project actions are proposed under this Alternative, there are no actions upon which to consider any incremental impacts. As such, there are no cumulative effects of Alternative 1.

3.6.3 Alternative 2: Preferred Alternative

3.6.3.1 Direct and Indirect Effects

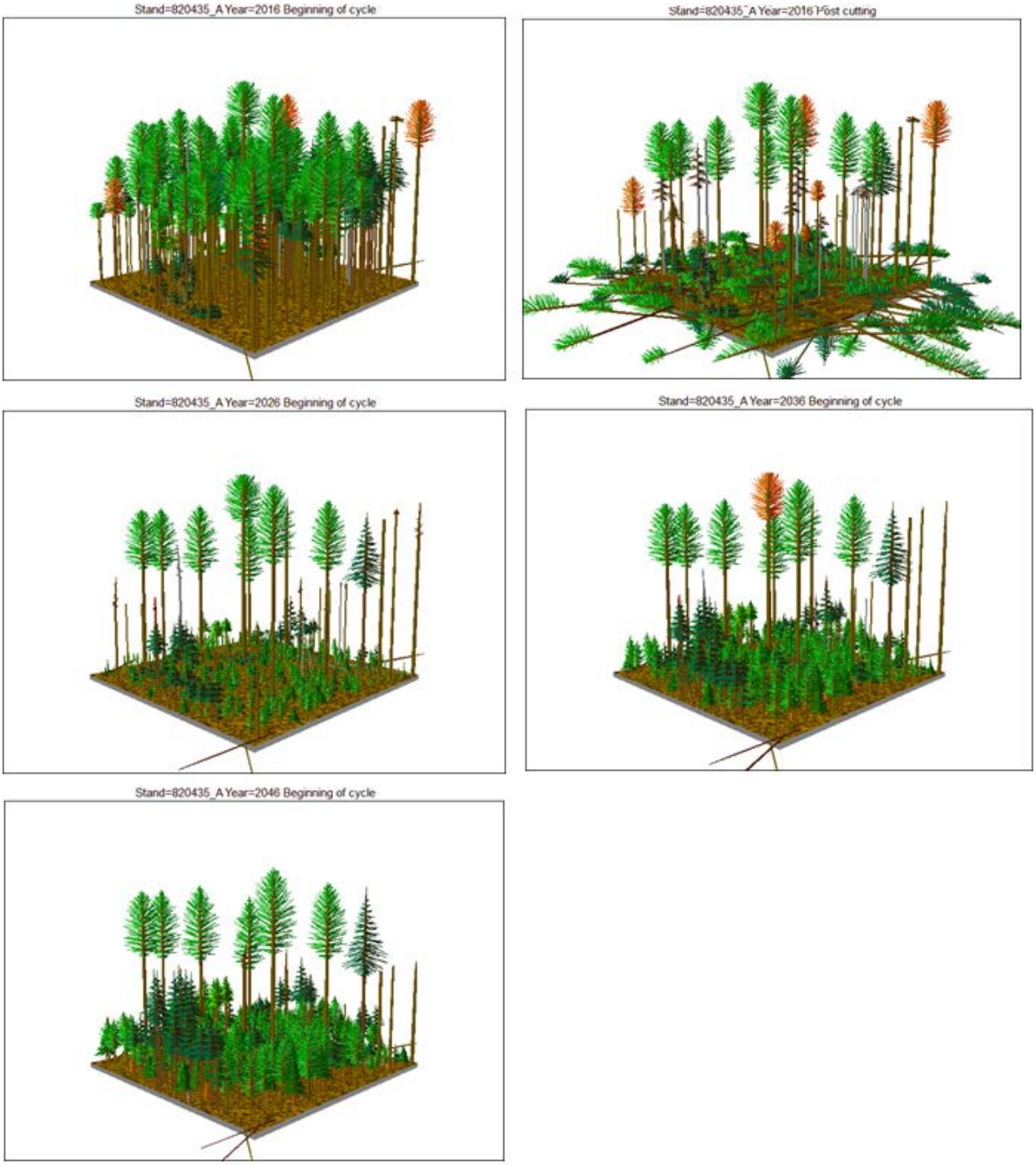
Effects would vary by location and are therefore discussed by area.

<u>John's Last Stand</u>

This alternative results in the greatest reduction of trees within John's Last Stand and the highest level of visual modification to the existing landscape, spatially and temporally, due to the proposed regeneration harvest. The following models show renditions of how the harvest units look/would look pre-harvest, immediately post-harvest, and during decadal periods 30 years out (Figure 7).

Nearby peaks favored by trail enthusiasts for the panoramic views afforded of the vast lands below, would render a different experience for recreationists. Atop the closest peaks, Mount June and Eagles Rest, visitors would see the 2 harvested units of the proposed John's Last Stand timber sale to varying degrees due to the area's natural topographical features. From Eagles Rest peak, approximately 16.1 acres of the proposed regeneration harvest area would be visible within the viewer's background distance zone. It is estimated that the greater visual impact, in terms of acres (33.0), would be realized by those viewing the landscape from atop Mount June. In which case, the subject acres would be within the viewer's foreground-middleground distance zone and appear more prominent. In either case, forest visitors would see a newly opened, occasionally tree-dotted pattern upon the landscape after harvest.

Figure 7: Visual depiction of stands over 30 years after regeneration harvest.



The Sawtooth Trail (#1401), located along the ridge top south of the proposed harvest boundary, is the nearest trail to John's Last Stand. With an established no-harvest buffer of 200' between the trail and the harvest boundary, visual impacts to trail visitors would be minimized (Image 2). Moreover, the actual footprint of the trail closest to the proposed harvest boundary is largely present below the ridge top on the southeast side where filtered views of the Umpqua National Forest are predominant. This additional visual separation, coupled with the natural topographical undulations in the vicinity, further decrease visual impacts to trail visitors closest to the harvest boundary.

Image 2: Obstructed view looking towards the proposed harvest area from Sawtooth Trail (#1401).

Site preparation for replanting would be expected to require pile burning, which would alter color composition on the landscape. The site would be evaluated post-harvest and the Burn Plan developed would include designs to minimize smoke production. However, some smoke production would be expected and could interfere with views until it dissipates. John's Last Stand is within VRM IV. Both of these management strategies permit the level of modification described and that would be expected from a regeneration harvest and associated actions.

Regeneration harvest would alter existing microclimates that currently create habitat for mushrooms recreationists collect. The sunnier and drier microclimates would result in fewer to no mushrooms until canopy closure re-establishes cooler, wetter microclimates. Conversely, hunting opportunities would benefit in this same short-term timeframe from the increase in forage and clear sightlines.

Other dispersed recreational opportunities (e.g., hiking, horseback riding) would be unchanged in availability, but the visual setting within John's Last Stand for those opportunities would be changed. Some improvements to opportunities within the stand would be anticipated for wildlife viewing, as a longer range-of-sight would be available from the removal of the forested vegetation.

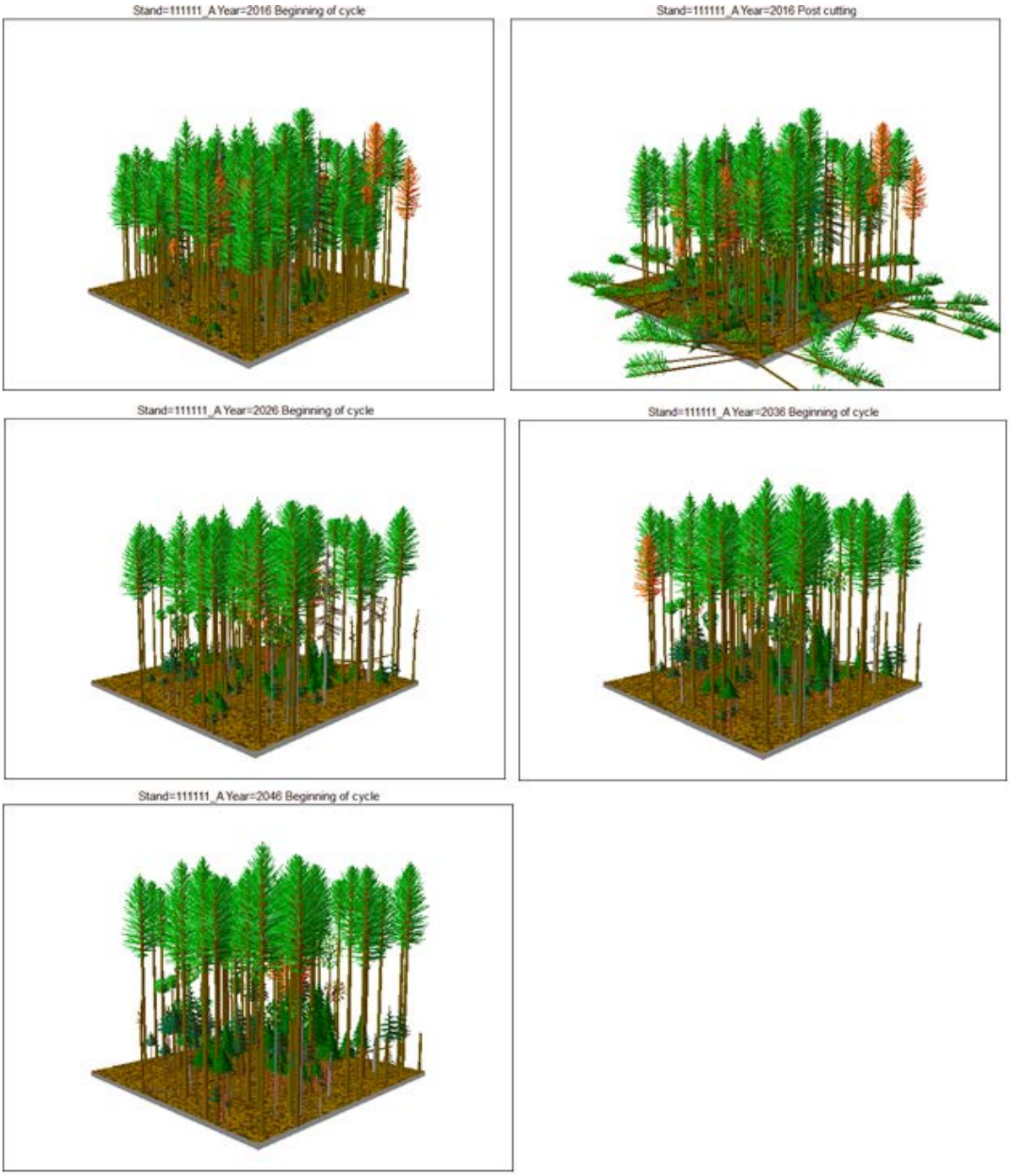
No managed hiking trails occur within John's Last Stand. As such there would be no effects to the opportunities to utilize or navigate along any trails in the area.

Overall, there would be both beneficial and adverse effects to the varying ranges of recreational opportunities resulting from regeneration harvest of John's Last Stand as proposed under Alternative 2. These effects vary by opportunity, and in the short- and long-term. However, no actions proposed would permanently alter the availability of any existing recreational opportunities nor permanently create new opportunities.

Missing Links

The thinning prescription for the Missing Links timber sale would result in minimal visual impact from the thin-from-below direction resulting in the biggest, most vigorous trees remaining on the affected landscape. To aid the reader develop a visual perception of anticipated impacts associated with the proposed harvest action, the following models are included to show renditions of how the harvest units look/would look pre-harvest, immediately post-harvest, and during decadal periods 30 years out (Figure 8).

Figure 8: Visual depiction of stands over 30 years after thinning harvest.



Travelers along paved BLM Roads 20-1-14 and 20-1-10.3 would experience a more open forest setting where harvested areas could be viewed immediately adjacent to the roads.

The dispersed recreational activities associated with the BLM stockpile site in T20S R01W Sec 13 would be displaced indefinitely due to the planned road construction coincident with that site and the resulting removal of physical features (e.g., hill climb) that support activities known to occur at that location. However, this type of dispersed recreation is not managed for and the removal of this recreational opportunity from within the project area would not result in any effects to managed recreation opportunities within the project area.

Proposed Lost Creek Backcountry Byway

Short-term road access limitations ranging from approximate 30-minute to 1-2 day delays would result during road-related (e.g., culvert replacements) and timber harvest activities along the proposed Lost Creek Backcountry Byway. Under Alternative 2, approximately 21.4 miles of the BCB are within or adjacent to the project area, or would receive road management to facilitate haul. Planned agency efforts to provide advance public notification of anticipated delays via media releases, website updates, and on-site signage would minimize negative impacts to visitors wanting to access the project planning area by allowing the public to anticipate area restrictions and adjust their plans accordingly, if desired (PDF 76-79). Where road improvements associated with timber harvest (i.e., culvert replacements) would be realized along the proposed BCB, the traveling public utilizing the paved roads would benefit from improved road surface conditions.

Anthony Access, Guileless, and Gosage Incline

As there is no legal public access to these portions of the project area, there would be no direct or indirect effects to recreational opportunities resulting from actions proposed under Alternative 2. Proposed actions would modify the visual landscape, but modifications such as those that result from thinning and regeneration harvest timber sales and associated roadwork are within the management allowances for VRM IV.

3.6.3.2 Cumulative Effects

Evidence of past BLM timber harvest immediately east, south, and west of the proposed John's Last Stand timber sale can be readily seen from points along BLM Roads 20-1-14, 20-1-10.1, and nearby mountain peaks. These areas, which reflect predominantly clear-cut or regeneration harvest prescriptions, include the 1996 Mount June Timber Sale and older sales ranging in age from 25 to 50 years, with the majority of harvested acres (79.4) in the 40-year age class. From the road, these areas are filtered by vegetative buffers in some cases; however, except for topographical relief, aerial views from the surrounding peaks remain unobstructed and present an increased mosaic of harvested patches upon the landscape when coupled with visible harvest units on private timberlands and other federally managed lands. The visual impact, spatially and temporally, would lessen to the degree matching the growth of the replanted units.

Views of the subject lands from Eagles Rest Peak and Mount June would be minimally interrupted from harvest of Missing Links due to the prevalence of tree canopy remaining post-harvest and topographical relief within the area.

The Willamette National Forest, Middle Fork Ranger District is conducting a landscape-scale planning effort that includes vegetative modification of its lands located immediately adjacent to the eastern boundary of the proposed project area. The Outlook Landscape Diversity Project, as currently mapped, shows harvest units identified for commercial thinning located adjacent to the portion of the Lost Creek Trail (#3462) that intersects BLM lands in T20S R01E Sec 20, on both sides of the proposed Lost Creek

BCB in T20S R01E Sec 18 and, likewise, along BLM Road 20-1-14 which provides access to popular trailheads located to the south.

The Forest Service's proposed action in T20S R01E Sec 17, 18, 20 would alter the appearance of the forest to create a more open setting, visible from BLM's paved road network in that area. When combined with BLM's proposed harvest in T20S R01E Sec 19 (Missing Links), an even larger block of commercially thinned acres across federal lands would result. To a lesser degree, the same would be true for the area of harvest adjacent to the portion of the Lost Creek Trail (#3462) located on BLM land. Here, filtered views of the harvested acreage would result due to vegetative buffer remaining on BLM lands.

Visitor access to trails south of Eagles Rest Trail would likely be impacted as a result of the proposed FS harvest activity (e.g., temporary access delays). Vehicular traffic along Eagles Rest Road (BLM19-1-33.1) and the paved portion of BLM Road 20-1-14 would also increase as a result of timber haul traffic should it be incorporated as part of timber haul routes.

Continued harvest on private timberlands within the project area is expected to continue with resulting vegetative openings interspersed throughout the landscape, adding to the existing patchwork of visual interruption of the forest visible from roads, trails, and nearby peaks accessed by trails.

Additionally, similar traffic increase would result with continued harvest of private timberlands as described above.

3.6.4 Alternative 3

3.6.4.1 Direct and Indirect Effects

John's Last Stand

This alternative renders modification to the existing landscape at a reduced level compared to Alternative 2. Although the proposed harvest acreage would remain unchanged, the harvest prescription (i.e., commercial thin) would be less visually intrusive due to relatively more remaining trees per acre post-harvest that would be spatially dispersed to create a more open, park-like setting containing the largest, most vigorous trees upon the landscape. The thinning would visually mimic that shown under Alternative 2 (Figure 8).

The setting considerations (e.g., trail layout, topographical features) influencing anticipated visual impacts from the Sawtooth Trail (#1401), as described in Alternative 2, would be similar under this alternative; however, reduced visual effects would be realized to the degree that fewer trees would be harvested leaving a more intact forest composition to effect change of the existing form, line, color, and texture of the subject lands. Additionally, while aerial views of the subject lands would remain prominent from atop Eagles Rest Peak and Mount June, reduced visual impacts for like reasons would be realized from those vantage points. Because the unit is proposed for helicopter harvest, linear logging corridors common in cable or ground-based logging operations would not be created.

Minimal, if any, pile burning for fuels control would be necessary under this alternative for John's Last Stand, resulting in less potential smoke production.

Missing Links

Effects would be the same as Alternative 2.

Proposed Lost Creek Backcountry Byway

Effects would be the same as under Alternative 2.

Anthony Access, Guileless, and Gosage Incline

As there is no legal public access to these portions of the project area, there would be no direct or indirect effects to recreational opportunities resulting from actions proposed under Alternative 2. Proposed actions would modify the visual landscape, but modifications such as those that result from thinning sales and associated roadwork are within the management allowances for VRM IV.

3.6.4.2 Cumulative Effects

Cumulative Effects would be the same as described under Alternative 2.

3.6.5 Alternative 4

3.6.5.1 Direct and Indirect Effects

John's Last Stand

Impacts to recreation would be the same as those described under Alternative 1.

Missing Links

Under this alternative, effects would remain similar to those described under Alternative 2. Although Alternative 4 prescribes fewer acres to be thinned in T20S R01W Sec 23, viewing distance from main roads and/or remaining vegetative screening from those roads would render negligible difference to the effects described under Alternative 2.

Proposed Lost Creek Backcountry Byway

Effects would be the same as under Alternative 2 except there would be no impacts from activities in John's Last Stand.

Anthony Access, Guileless, and Gosage Incline

As there is no legal public access to these portions of the project area, there would be no direct or indirect effects to recreational opportunities resulting from actions proposed under Alternative 4. Proposed actions would modify the visual landscape, but modifications such as those that result from thinning harvest timber sales and associated roadwork are within the management allowances for VRM IV.

3.6.5.2 Cumulative Effects

Cumulative effects would be the same as described under Alternative 2.

3.7 Issue 6: What are the effects on carbon storage and greenhouse gas emissions?

3.7.1 Affected Environment

Secretarial Order No. 3289 (2001, amended 2009) directs all Departments to "consider and analyze potential climate change impacts when undertaking long-range planning exercises." (USDI, 2009) The 1994 PRMP FEIS (USDA-FS & USDI-BLM, 1994, pp. 217, Appendix V.) considered climate change effects as part of long-term planning efforts at the Plan- scale (western Oregon). Although the 1994 PRMP FEIS recognized the possibilities of increased incidence of wildfire, insect outbreaks, shifting range of species including Douglas-fir, and forest species composition, it found "no scientific consensus about the extent or rate of global warming nor the probable effect on forest ecosystems in western Oregon" (p.217).

Forster et al. 2007 (pp. 129-234), reviewed scientific information on greenhouse gas emissions and climate change, and concluded that human-caused increases in greenhouse gas emissions have likely exerted a substantial warming effect on global climate. Literature, however, has not yet defined any specifics on the nature or magnitude of any cause and effect relationship between greenhouse gases and climate change.

The U.S. Geological Survey, in a May 14, 2008, memorandum (USDI-USGS, 2008) to the U.S. Fish and Wildlife Service, summarized the latest science on greenhouse gas emissions and concluded that it is currently beyond the scope of existing science to identify a specific source of greenhouse gas emissions or sequestration and designate it as the cause of specific climate impacts at a specific location. Although it is not speculative that changes in the affected environment will occur due to climate change, it is not possible to reasonably foresee the specific nature or magnitude of the changes (USDI/BLM 2008, p. 488). Given this uncertainty, this analysis is focused on calculating gas emissions and storage, in the context of carbon release and sequestration.

Forests fix and store carbon through photosynthesis and release carbon through respiration and decay, affecting atmospheric concentrations of carbon dioxide which thereby affect global climate. Values in this analysis, in terms of carbon stored and released, are generally expressed as tonnes, the unit of measure most commonly used in scientific literature to express carbon storage and release. One tonne of carbon is equivalent to 3.67 tons of carbon dioxide (U.S. EPA 2005).

The 2008 FEIS (pp. 488-490), incorporated by reference, described current information on predicted changes in regional climate, concluding that the regional climate has become warmer and wetter with reduced snowpack, and that continued change is likely.

Even though a causal link between the Lost Creek project and specific climate change effects cannot be assigned, the amount of carbon released or stored under the alternatives analyzed can be estimated. Site specific data from stand exams was input into the Forest Vegetation Simulator model (Dixon 2002). The outputs from the model were then used to calculate amounts of carbon that would be released or sequestered, and the resulting net carbon balance that would result under the alternatives.

Modeling was conducted for intervals extending out 50 years. The net carbon balance for this project was analyzed by calculating: the amount of carbon held in live trees and other components of the forest stands (snags, down wood, soil carbon, etc.), the amount of carbon held in wood products and logging slash that gradually release carbon over time, and the amount of carbon released by the burning of fossil fuels and slash under the proposed action alternatives.

The action alternatives would result in a cumulative 50 year flux of greenhouse gasses (GHGs) to the affected environment on the average order of 1 thousand metric tons (megagrams (MG)) of CO2 by 2066: at the scale of western Oregon, carbon stores are predicted to increase by 169 million MG under the NWFP by 2106 (USDI-BLM 2008). Action area carbon flux estimates are quantified and described fully below. However, it is not possible with current science to estimate the effects of these GHG fluxes on the local affected environment. The USGS summarized science regarding the effects of local actions on climate change and concluded “Difficulties remain in simulating and attributing observed temperature changes at smaller than continental scales…It is currently beyond the scope of existing science to identify a specific source of CO2 emissions and designate it as the cause of specific climate impacts at an exact location” (USDI-USGS 2008). This memorandum (No. 2008435-DO) is incorporated by reference.

Greenhouse Gasses: Carbon Stores and Carbon Flux

As an aid to decision-making, this analysis estimates carbon flux to the analysis area associated with the action alternatives. Carbon flux is the rate of exchange of carbon between pools, the net difference between carbon removal and carbon addition to a system. For the atmosphere, this refers to carbon

removed by plant growth, mineralization, dissolving in the ocean and other processes, balanced by carbon added through plant respiration, harvest/volatilization, concrete production, fossil fuel burning, volcanic activity, and other processes. Forest harvest may lead to flux of GHGs in addition to CO2, principally N2O and CH4 (Jassal et al., 2008, Sonne 2006). Due to lack of scientific information and lack of adequate models on the effects of forest activities in the Pacific Northwest on non-carbon GHGs, and the (presumably) minor contribution of these other gases to GHG flux associated with the action alternatives in relation to total flux estimation error, they are not addressed here. The indirect effects of carbon flux following timber harvest have been addressed below. Indirect effects of this carbon flux on climate change and the affected environment is also addressed below.

Carbon Flux of the Proposed Action

Estimates of carbon stores in the analysis area as a whole would be fraught with error, could complicate contrast between the alternatives, and would not facilitate decision-making. Instead, this analysis quantifies the net effect of the action alternatives on greenhouse gas levels by comparing changes in carbon storage that would occur under the action alternatives to the carbon storage that would occur under the no action alternative, as suggested in IM-2010-012 (USDI 2010). Specifically, this analysis estimates the carbon flux associated with implementation of the action alternatives roughly fifty years from the present, incorporating: a) differences in carbon storage in live, dead, and organic soil carbon pools; b) the intermediary flux from wood products produced by the Proposed Action through this period; and c) “secondary” C fluxes associated with logging and hauling systems.

Analysis of carbon flux associated with changes in live and dead pools attributable to the Proposed Action (“a”, above) used relatively simple tree-/stand-scale models available with FVS. This method considers changes due to succession and forest management in all major live and dead carbon pools within the action area (treated units). This FVS model does not directly incorporate microclimatic effects, dynamics of herb and shrub understory layers, stable soil pools, or the C flux associated with actual harvest equipment. Herb and shrub carbon pools are relatively small compared to total stores, and are similar between young and mature stands (USDI-BLM 2008, p. App-29). Soil carbon represents 9-20% of total site carbon but is the most stable C store and the least likely to respond to disturbance. For example, 60-year old forests and 450- year old forests have similar soil carbon storage (Harmon, et al. 1990). Flux of carbon from merchantable wood products (“b”, in previous paragraph) produced from the action alternatives during the 50 year analysis window was estimated following synthesis in USDI-BLM (2008, p. App-30). GHG emissions from forestry activities necessary to harvest these units (“secondary emissions”, “c” in previous paragraph) were estimated following (WRI 2010), and added to FVS estimates (see below).

3.7.2 Environmental Effects

The action alternatives would impact approximately 511-813 acres of forest, volatilizing some carbon, moving carbon from live tree pools to detritus and wood products pools, and storing some carbon in forest products while leaving some residual trees and growing replacement trees. Making a set of very broad assumptions and using the FVS model and assumptions similar to those developed in the 2008 RMP FEIS (USDI-BLM 2008); compared to the no action alternative, the action alternatives would result in a C flux of, 11,617 MG, 4,717 MG, and 4,004 MG for Alternatives 2, 3, and 4 respectively over the 50 year time period from harvest until approximately 2066. The sum of forest treatment and harvest system flux is between 4 and 12 thousand metric tons. Calculations are summarized below (Tables 39-41).

Table 39: Stand Level Stored Carbon in Metric Tonnes for Alternative 2.

	Present Stored Carbon	Alternative 2 50 years Post-Harvest	Wood Products Derived from Alternative 50 Years Post-Harvest	No Action in 50 years	50 Year Flux (NA-A2+C in Wood Products)
Anthony Access	10,564	4,689	3,212	22,864	1,477
Gosage Incline	20,155	29,504	13,806	29,504	6,349
Guileless	7,926	10,982	2,004	12,159	921
John's Last Stand	4,264	2,737	2,180	5,028	1,003
Missing Links	8,992	38,136	4,059	21,160	1,867
Total	51,901	86,048	25,261	90,715	11,617

Table 40: Stand Level Stored Carbon in Metric Tonnes for Alternative 3.

	Present Stored Carbon	Alternative 3 50 years Post-Harvest	Wood Products Derived from Alternative 50 Years Post-Harvest	No Action in 50 years	50 Year Flux (NA-A2+C in Wood Products)
Anthony Access	10,564	11,113	1,500	22,864	690
Gosage Incline	20,155	18,941	2,454	29,504	1,129
Guileless	7,926	10,725	1,746	12,159	803
John's Last Stand	4,264	4,455	916	5,028	421
Missing Links	8,992	38,901	3,640	21,160	1,674
Total	51,901	84,135	10,256	90,715	4,717

Table 41: Stand Level Stored Carbon in Metric Tonnes for Alternative 4.

	Present Stored Carbon	Alternative 4 50 years Post-Harvest	Wood Products Derived from Alternative 50 Years Post-Harvest	No Action in 50 years	50 Year Flux (NA-A2+C in Wood Products)
Anthony Access	10,564	8,209	1,222	22,864	562
Gosage Incline	20,155	15,520	2,540	29,504	1,168
Guileless	7,926	7,680	1,364	12,159	627
John's Last Stand	4,264	n/a	n/a	5,028	n/a
Missing Links	8,992	33,007	3,581	21,160	1,647
Total	51,901	64,416	8,707	90,715	4,004

GHG emissions from forestry activities necessary to harvest these units ("secondary emissions" including emissions from vehicles and equipment) have been estimated for all alternatives at 0.1411 MG CO2/MBF (WRI 2010). Applying this equation to the action alternatives suggests an additional 700 and 4 metric tons (MG) CO2 release attributable to the action alternatives; this is consistent with Sonne (2006) predicted a relatively small C flux associated with harvest equipment.

The difference in carbon between the action and no action alternatives would continue to decrease through time because the rate of carbon storage decelerates after a stand reaches the age of culmination of mean annual increment.

3.7.3 Cumulative Affects

Cumulative effects are considered at a scale of western Oregon for 50 years. Global climate change and carbon sequestration are difficult discussions at smaller scales, such as the project area, because the actions are too polarized in scale to give accurate context. Conversely, using larger scales, such as the world, continent, or even state, shrinks the impacts from the actions to be indistinguishable. The scale of western Oregon allows for a discussion of effects, without distorting or diluting the analysis. Effects were modeled for 50 years through analysis in the 1994 FEIS (3-9 and 4-9) and 2008 FEIS (4-537 to 4-543), which is hereby incorporated by reference as summarized below.

The total 50-year carbon flux of the action alternatives compared to the no action would not produce measurable change in global climates considering current detection and modeling technologies. To place this carbon flux in context, the total 50-year carbon flux associated with the action alternatives would represent approximately:

- 0.01% of carbon stored on BLM-managed lands in western Oregon (USDI-BLM 2008). BLM-managed lands in western Oregon support approximately 1% of the carbon stored in the western U.S., and 0.02% of global carbon stores in vegetation, soil, and detritus (USDI-BLM 2008).
- Below the indicative threshold (25,000 metric tons) set by the EPA under a mandatory reporting rule for non-forestry regulated entities (74 FR 56373).

This EA is tiered to the 1994 PRMP FEIS that considered carbon flux and climate change at the Plan scale. The 1994 PRMP FEIS considered speculative and did not consider the indirect effects of carbon

flux associated with the Plan on aspects of the affected environment including wildlife, economies, human health, and other resources (Appendix V, p. 217). The 1994 PRMP FEIS concluded that with implementation of any of the alternatives at the Plan level, “the overall impact on the global atmospheric carbon dioxide balance would be much less than 0.01 percent of the total” (p. 4-1). Based on the small estimated permanent flux of carbon that would be associated with the cumulative effects of the action alternatives following the 1994 PRMP FEIS, the high uncertainty in any such estimate of carbon flux (and other sources of GHGs), and the response of global climate to these GHG’s, conclusions in the 1994 PRMP FEIS remain valid and applicable to the cumulative effects of the action alternatives.

At the scale of western Oregon, considering the cumulative effects of both forest succession (a carbon sink) and harvest (a carbon source) under the NWFP in the Plan Area, carbon stores would be predicted to increase by 2106, from 427 to 596 million MG. This sequestration is less than under a “No Harvest” scenario, but does represent a gain in carbon storage. U.S. annual CO2 emissions (circa 2008) were approximately 6 billion MG. The flux of approximately 5 thousand metric tons of carbon associated with the action alternatives (over 50 years) would represent far less than 0.00002% of this yearly flux. The difference in carbon storage in 50 years between alternatives would be too small to lead to a detectable change in global carbon storage, and existing climate models do not have sufficient precision to reflect the effects on climate from such a small fractional change in global carbon storage (USDI-BLM 2008, p. 543). Currently, federal thresholds for carbon flux related to individual actions have not been established. Uncertainty associated with all estimates of carbon flux in this analysis would be predicted to be quite high (circa 30%: USDI-BLM 2008, p. 538). However, estimates of the magnitude and direction in carbon response are probably accurate, and these results may be instructive for comparing the effects of the alternatives on local (watershed-scale) carbon stores.

4.0 Consultation

Northern Spotted Owl

The project was submitted as part of the batched consultation document "Willamette Planning Province FY2016/17 Biological Assessment of LAA Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls.” Anticipated ESA Effects determinations to NSO are described in Issue 1. A BO is anticipated from the FWS in October 2015

Upper Willamette River Spring Chinook Salmon

Although there are fish-bearing streams within the project area, no listed fish species occur within those streams. Upper Willamette River Spring Chinook salmon have critical habitat downstream approximately ½ mile from the closest timber sale unit. Most timber sale units are much further upstream (1-3 miles). Only imperceptible effects at the site scale are predicted to occur from any action alternative, therefore, these effects at the site scale would have no effect further downstream on Chinook salmon or their critical habitat. Due to lack of proximity of proposed harvest areas and haul routes being disconnected from Critical Habitat, this project would have *No Effect* on Upper Willamette River Spring Chinook salmon or their Critical Habitat.

5.0 List of Preparers

Name	Title	Contributions
Elizabeth (Liz) Aleman	Outdoor Recreation Planner	Recreation, Visual Resources Management
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Robert Titcomb	Silviculturist	Silviculture, Climate Change, ACS
Heather Ulrich	Archaeologist	Archaeology
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Janet Zentner	Forester	Forestry

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7.0 Appendices

7.1 Appendix A: Project Design Features

Project Design Features (PDFs) are operating procedures developed by the interdisciplinary team used to avoid or reduce adverse environmental impacts and ensure conformance with regulations, laws, and polices including Best Management Practices from the Eugene District RMP, BLM handbooks and manuals, and Instruction Memorandums. Site-specific waiver of PDFs during implementation would be infrequent and require review by specialists for the affected resource(s) to determine that single or aggregated extent of the site-specific waiver would not produce effects outside of those analyzed. Review results would be reported to the Authorized Officer to implement through contracts. Unless otherwise noted, all PDFs apply to all action alternatives.

All Areas and Activities

1. Cultural Resources surveys have been completed for all units. If any cultural and/or paleontological resource (historic or prehistoric site or object) is discovered during project activities, all operations in the immediate area of such discovery shall be suspended until an evaluation of the discovery can be made by a professional archaeologist to determine appropriate actions to prevent the loss of significant cultural or scientific values.
2. Retain all hardwoods, yew, and vigorous redcedar and hemlock to the extent possible, except where necessary to accommodate safety and logging systems and BA/TPA targets. In Guileless (T20S R01W Sec 15 and 21), retain all hardwoods and yew to the extent possible, except where necessary to accommodate safety and logging systems and BA/TPA targets. Redcedar and hemlock would not be preferentially reserved in Guileless.
3. Consistent with Instruction Memorandum OR-99-036 (E-4 Special Provisions), apply seasonal restrictions, or suspension of harvest and road activities within 1/4 mile (or as determined by resource specialist) of: known nesting great blue herons, peregrine falcons, bald eagles, spotted owls, great grey owls, accipiter hawks, and other owls, hawks, or raptors if they are located at any time during project activities. If required, apply mitigations for Survey and Manage species detected in or near the project.
4. Seasonal restrictions to operations at BLM quarries would be applied when quarry use would disrupt ESA or BLM special status wildlife species. If utilized, the quarry operations in T20S R02W Sec13 and T20S R02W Sec 01 would not require restriction unless new wildlife sites were discovered in the area.
5. Retain all Wildlife Trees marked with a painted “W”, and where possible place landings, skid trails, guyline trees, cable corridors, etc. to avoid these habitat features. If Wildlife Trees are cut they would be left on site as coarse woody debris, and such CWD may be cut into sections and/or moved to facilitate operations or safety. Wildlife Trees would be marked in Gosage Incline T20S R01W Sec 7 (regeneration Alternatives 2 and 3) and 17 (thinning all action Alternatives.) and John’s Last Stand T20S R01E Sec 29 (regeneration Alternative 2 and thinning Alternative 3).
6. All Decay Class 3,4, and 5 snags and down wood, and existing rootwads would be retained undamaged when possible and/or would not be cut, except in road construction rights of way, landings, yarding corridors, and those posing a safety hazard. Where possible, cable corridors would be placed to avoid these habitat features. If such snags are felled, they would be left on site for CWD; CWD may be cut into sections and moved to facilitate operations or safety and could be counted towards any post-treatment CWD requirement.
7. New landings and skid trails would be located a minimum of 50' from stream and wetland no cut boundaries. Maximize winching distance within Riparian Reserves. Use existing skid trails where appropriate (as determined by AO).
8. Cable corridors and skid trails would be placed on the landscape to minimize the amount of residual trees cut to implement logging systems and log yarding, and would be limited to 12 feet in width.
9. Except during winching (ground-based) or skyline lateral yarding, skidding and yarding systems shall require at least one end suspension of all logs above the ground during in-haul.

10. If streams must be crossed, keep corridors as perpendicular to stream as possible (45-90 degrees). Fully suspend logs above the ground when yarding over water, stream banks, riparian vegetation, and sensitive soils. Restrict corridors to the minimum number feasible.
11. Harvest activities during sap flow season would be minimized and monitored to ensure residual stand damage is not occurring. Additional protections to trees (i.e. plastic barreling) during sap flow would be required if damage to tree cambium is occurring.
12. Fuel and other petroleum products must be stored and refueling must occur at least 150 feet from any stream or forested wetland.
13. A Spill Containment Kit (SCK) must be kept on-site during any operation within the project area; prior to starting work each day, all machinery would be checked for leaks and necessary repairs would be made.
14. Removal, notification, transport, and disposal of any diesel, hydraulic fluid, or other petroleum product released into soil and/or water would be accomplished in accordance with all applicable laws and regulations.
15. Operators shall be responsible for the clean-up, removal, and proper disposal of contaminated materials from the site.
16. All logging, tilling and road construction equipment must be washed and be free of dirt and plant debris prior to arrival on BLM lands.
17. After harvest activities are complete, assess openings in Riparian Reserves created during harvest activities for potential replanting of a mixture of hemlock, Douglas fir, and western redcedar.
18. All trees cut for yarding corridors in the Riparian Reserve no-harvest buffer, shall be left on site as CWD to meet ACS objectives. Within treated riparian reserves, any trees greater than 25" DBH felled within corridors would be left for CWD. If trees greater than 25" DBH exceed 10% of the trees cut in a riparian reserve yarding corridor, the AO may authorize removal of the trees in excess of 10%. Where necessary for safety and as approved by the AO, trees left may be bucked into shorter lengths, moved within the unit, or removed.
19. Erosion control measures such as slash placement and hand water-barring would be required by the AO in consultation with watershed specialists on corridors in treated riparian reserve areas 25'-75' from streams.

<u>Roads</u>

Road Decommissioning and Closure

20. Compacted surface of native surface spur roads, landings, and other compacted areas such as turnouts, truck turnarounds, and log decking areas shall be subsoiled (broken up, loosened, decompacted) with an excavator or other effective equipment:
    a. All decompaction equipment shall be inspected and approved by AO in consult w/ soil scientist before tillage begins.
    b. Subsoiling shall be completed to a minimum depth of 18" below the ground surface and span the entire width of compacted surface.
    c. At least 80% of compacted soil profile shall be shattered, except within a five foot radius of the boles of residual trees where major roots can be cut or mangled or in areas where equipment is prohibited from operations (i.e., on slopes in excess of 35% or crossing streams).
    d. Drainage features (lead-offs, water bars, daylight, etc.) may be required as necessary to effectively remove surface water accumulation.
    e. To restore soil productivity and prevent soil erosion, pull sidecast or discarded topsoil and slash debris generated during road or trail construction as available back onto decompacted surface. Use of slash that would otherwise be piled may also be used. Slash debris should cover at minimum 70% of bare surfaces. Equipment should be capable of grabbing large woody debris

(rootwads/logs) and fine woody debris (slash) for distribution of debris across decommissioned surfaces.

f. If insufficient material is available to cover and protect exposed soil (>70% cover), seeding would be required.

21. All heavy equipment used for logging, road construction, and road decommissioning must be washed and be free of dirt and plant debris prior to arrival on BLM lands.
22. Road prism would be rendered erosion resistant by combination of techniques that may include construction of water bars, drain dips, fill, pull back, and seeding and mulching at cross drain removal and waste disposal sites. Seeding and mulching to be completed simultaneous with equipment work. Waterbar spacing to follow guidelines set forth in RMP.
23. Employ all of the following design features for all stream crossing removals/rehabilitation at time of stormproofing/closure. Remove all fill material down to original channel bottom. Excavate channel to bank full width and natural gradient. Shape newly excavated channel sideslopes to facilitate erosion control (approximately 1:1 slope). Seeding and mulching with BLM-supplied materials to be accomplished promptly after machine operations. Work would occur during the ODFW in-stream work period (July 1 – August 31). Position waste to avoid direct sediment delivery to stream channel.

Road Construction and Culvert Replacements

24. All culverts scheduled for removal and/or replacement shall be removed and disposed of in a lawful manner off of BLM land in conformance with BMPs.
25. Design roads to the minimum width needed for the intended use. Right-of-way stumps shall be grubbed out only within the road prism (road surface, ditch line, and cut/fill areas) and not within other portions of the posted right-of-way unless necessary to facilitate intended function of the road (i.e. turnarounds, curve widening).
26. All landings would be shaped to direct surface water away from water features and directed onto well-vegetated forest floor
27. To protect fish species during critical life cycle functions, apply the ODFW in-stream guidelines for all stream culvert installation and removal. The in-stream work window for the Lost Creek watershed is July 1 – August 31.
28. Require the following for culvert installation and/or replacements:
    a. Stream flow would be routed around the construction activity as much as possible (i.e., temporary flow diversion structure).
    b. Sediment containment structure placed across the channel below the work section (i.e., weed free mulch, booms) as needed.
    c. Work site would be pumped free of standing water as applicable.
    d. If present, fish and other aquatic species would be removed from the project area and block nets placed above and below the worksite by Area fisheries biologist.
    e. Install new culverts at the natural stream grade.
    f. Promptly after installation, disturbed ground would be stabilized with appropriate BLM-provided seed and straw mulch.
    g. Countersink culverts in fish bearing streams at least 6-8 inches below the streambed to minimize scouring.
29. Non-functional cross drains would be rendered functional and cross drains to be added would be installed prior to log haul beginning. Roads would be renovated (add rock, blading, etc.) before winter haul would be allowed.
30. Construction of roads, landings etc. would not occur when soils are saturated, in order to minimize soil degradation, erosion, and sedimentation.
31. Design all roads to be constructed to move water rapidly (quickly and frequently) off the road surface and minimize water concentration.

32. To minimize excavation, maintain hydrologic function, and reduce water concentration in ditch lines, outslope temporary and permanent low volume/ short term use roads to provide surface drainage on road gradients up to 8% where appropriate.
33. At time of installation, provide energy dissipaters (i.e. splash pads/armoring) below cross drain outlets where water is discharged onto bare soil from construction activities.
34. Revegetate select (Criteria: for cutbanks > 6 feet height for > 200 square feet.) cut and fill slopes by seeding native grass, planting shrubs, hydromulching, terracing, and/or mulching with native straw. Keep erosion control measures current with ground disturbing activities and apply promptly after construction.
35. To reduce the potential for sediment delivery and down cutting of ditchlines, erosion control would be applied to select (>8% grade, within 200' of stream crossing or first cross drain whichever is closer) non-vegetated ditch segments immediately adjacent to new cross drains and new stream crossing culverts. Techniques could include: coir logs, jaw run check dams and/or armor.

Road Maintenance

36. Implement the following combination of methods year round to maintain drainage and minimize sedimentation from roads into stream channels:
    a. Keep ditch line, cross drains, and leadoff ditches clean and free to flow, while minimizing disturbance to existing ditch line vegetation.
    b. Sediment traps, rock armor, or other devices may be installed in ditch lines lacking vegetation and having the potential to deliver sediment to streams.
    c. Prior to and during haul operation, rock surfacing and road maintenance would be assessed for road damage, drainage, and erosion throughout the project and haul route to determine if haul may continue or if any damage has occurred that would require corrective actions (e.g., grading, crowning, adding rock, re-establish functional ditchlines) before haul may resume.
    d. If erosion and road degradation occurs during or after freeze and thaw or rainy periods, log haul operations may be discontinued.
37. Gravel, fill, and borrow material would need to be weed free and/or approved by BLM botanist. Gravel from pits known to be weedy should not be used.
38. Prior to use, areas used for borrow, fill, and waste piles need to be reviewed for special status plants by area Botanist.

<u>Ground-based Units (Regeneration and Thinning)</u>

39. Logs would be skidded only to approved landings, with landing size up to 60' X 80' (except as necessary for safety and approved by the AO) adjacent to log haul truck roads.
40. To prevent soil degradation, ground-based equipment operations would be suspended during and after periods of significant or prolonged rain as determined by the Authorized Officer in consultation with watershed specialists.
41. To minimize soil compaction and increase in bulk density, limit ground disturbing activities and ground-based skidding and yarding to the annual dry season (typically July 1 to Oct. 1) when soils provide the most resistance to compaction. Soil moisture determinations would be conducted prior to start of all ground based operations.
42. Skid trail locations would be approved by the BLM prior to use. Skid trail design shall keep a skid trail pattern to keep within 10% of the ground-based unit by restricting operations to 12' wide trails spaced at least 150 feet apart. Skidding/yarding equipment (does not include mechanized harvest equipment such as feller-bunchers) would remain on designated skid trails at all times.
43. *Alternative 3:* Within ground-based Riparian Reserves, hand-fall only and no travel off of designated skid trails would be authorized. (e.g. feller-bunchers would not be authorized within ground-based Riparian Reserves.)

44. *Alternatives 2 and 4:* Mechanized harvest equipment (excluding feller-bunchers) would only be approved for travel off of designated skid trails when all of the following are met:
    a. A unit has been analyzed for ground-based systems.
    b. On slopes less than 35%.
    c. Restrict operations to conditions when soils are dry and provide the most resistance to compaction, typically July 1 to Oct. 1. Soil moisture measurements would be taken prior to entry of tracked ground-based machines.
    d. Operate from a prepared slash mat that the machine creates of sufficient depth to prevent severe compaction.
    e. Limit equipment movement to one pass over the same ground.
45. Design ground-based units with skid trail pattern on up to 35% favorable skidding to downhill ground-based landings, and a skid trail pattern with up to 20% adverse skidding to uphill ground-based landings.
46. All severely compacted skid trails would be decompacted promptly after specific unit has been harvested. Excavator modified for tillage or other equipment capable of lateral shatter of the compacted layer, usually less than 18 inch depth. Excavator to be equipped with thumb or clamp to scatter woody debris on top of tilled surface. To occur when soils are dry and provide the most resistance to compaction, typically July 1 through Oct. 1.

Cable Units (Regeneration and Thinning)

47. Corridors for independent cable settings would be spaced 150 feet apart on average.
48. Minimize sidehill yarding by limiting lateral yarding to 75 feet.
49. Yard only to approved landings, with landing size average being 60' X 40' except as necessary for safety.
50. After use, hand water-bar or lop and scatter slash on cable corridors that are prone to accelerated erosion.

Regeneration Units

51. In regeneration harvest units, retain sufficient trees during marking and harvest to provide for specified snag/CWD levels (3.4 snags and 240 linear feet per acre) while meeting green tree requirements. Monitor snag and CWD levels within 5 years post-harvest; create snags and CWD if specified levels are not met.
52. Whole tree yarding, or yarding with tops attached may be authorized in the Regeneration Harvest Areas.
53. Felling trees, guybacks, yarding through, or otherwise disturbing the canopy of Red Tree Vole Habitat Areas is prohibited. Equipment anchors may be used in the areas as long as no damage to trees or canopy occurs.
54. Avoid yarding through grouped retention areas, and minimize the number of yarding corridors if it is necessary.

Thinning Units

55. Where operationally feasible, falling techniques would be utilized for the protection of retention trees and other reserve areas. Falling techniques include falling to lead towards yarding corridors, skid trails, and areas where residual tree damage would be minimized, and falling away from reserve areas.
56. Limit log lengths to 40' in length where excessive damage is occurring to residual trees, snags and coarse woody debris, and soil disturbance is occurring as determined by the AO.
57. Alternative 3: An additional 5 trees per acre would be retained at time if harvest within treated Riparian Reserves and turned into snags and CWD within 5 years post-harvest.
58. Design yarding corridors so as to limit canopy loss in Riparian Reserves.
59. Anthony Access: On Road 19-1-21.0 no log decks or log sorting shall take place in special sorting area near stream 1 (see map).

Helicopter Landings

60. Helicopter-log landings require a cleared area sloped to no less than 2% to provide for adequate drainage and not in excess of 6% for safe operations. The area cleared should not exceed approximately 80' x 250', except as necessary for OSHA compliance.
61. Fuel storage landings would be located 200 feet from all water features.
62. Seasonal restrictions to operations would be applied when helicopter operations would disrupt ESA or BLM special status wildlife species.

Site Preparation and Fuels Management (General)

63. Prescribed fire would be applied (where needed; including, pile, jackpot, and/or broadcast burning) on all of the harvest units except for those where the high proportion of Category 1 (Highly Sensitive) soils would pose a high risk for soil damage and loss of site productivity
64. Prescribed burning would only be permitted with an approved burn plan and smoke management plan. The prescription for prescribed burning would be based on treatment objectives with the timing parameters developed in the burn plan to meet the objectives. Prescribed fire may also be used to remove cut and piled vegetation (pile burning).
65. Pile burning prescription would be designed such that detrimental soil conditions resulting from severe burn would occupy no more than 10% of the treated area.
66. To minimize loss of soil productivity (consumption of duff and litter resulting in soil nitrogen losses) during all prescribed site prep activities, burning would occur when soil moistures and duff moistures are high.
67. Where appropriate landings would be burned in the first wet season (late-autumn or early-winter) following completion of harvest.
68. When hand, machine, or landing piles are identified by the Authorized Officer as the specified fuels treatment the following requirements would apply:
    a. Hand piling of fuels intended for burning would be prohibited closer than 100 feet from any stream channel.
    b. Mechanical fuels treatment would be prohibited closer than 200 feet from any stream channel.
    c. Piles would be located as far as possible from large snags, green trees, and other reserved trees to minimize damage.
    d. Woody debris greater than six inches in diameter would be retained on site and not piled. Piles would not be constructed on top of stumps or existing coarse woody debris (CWD).
    e. In skyline yarding areas, machine and landing piles would only be constructed within 25 feet of designated roads and landings.
    f. Equipment would only be authorized for travel off of roads/landings in units operated as ground-based.
    g. Equipment used in the construction of machine piles at landings would remain on the roads or landings during the construction.
    h. In ground-based yarding areas, machine piles would not be constructed within fifty (50) feet of property lines or unit boundaries.
    i. Piles would be covered with 4 mm thick, black, polyethylene plastic. The plastic shall adequately cover the pile to ensure ignition, and would be placed and anchored to help facilitate the consumption of fuels during the high moisture fall/winter burning periods.
    j. Lopping and scattering of slash and/or slash pullback of fuels may be incorporated in areas where the fuel load is light (generally along roads, property lines) instead of piling and burning.
    k. Utilization of small-diameter slash for firewood or energy production from biomass would be incorporated where appropriate.
    l. Post-harvest treatment monitoring would be implemented with results used to reevaluate the fuels strategy and adapt future treatments.

Site Preparation and Fuels Management (Regeneration Harvest only)

69. Where broadcast burning would be used to remove/decrease vegetative cover and woody debris by greater than 90 percent of 10 hour fuels and smaller. Units being broadcast burned would utilize hand ignition methods in order to control the rate of fire spread, selectively burning some areas, and excluding others.
70. Avoid all burning in John's Last Stand due to prevalence of Category 1 (Highly Sensitive) soils. Only hand-piling would be authorized if burning is determined necessary during post-harvest evaluations conducted by fuels specialist, silviculturist, and soils scientist.
71. When using tracked equipment for site preparation, limit the use of such equipment to harvest units analyzed and operated with ground-based logging systems where slopes are <35%. Low ground pressure track-type equipment would be required for site prep to minimize the extent and severity of compaction.
72. Where prescribed slash up to six inches in diameter would be hand- piled and burned within 100 feet of through-roads and within 50 feet of secondary roads.
73. Restrict in unit machine piling operations to dry conditions when soils provide the most resistance to compaction, typically July 1 through Oct. 1. Soil moisture measurements would be taken prior to onset of machine piling.
74. Category 2 (Moderately Sensitive) soils would be given the first priority for a cool spring burn. Category 2 soils would not be broadcast burned.
75. Where prescribed fire is applied existing snags of any size and height would be retained where operationally practicable and where they do not pose a safety hazard. Snags that are felled for operational or safety purposes would be reserved on site as down logs.

Miscellaneous and Unit-Specific

76. BLM Roads 19-1-33.1 (Eagles Rest Road), 20-1-14, and 20-1-10.1 would not be blocked more than 30 minutes at a time during harvest operations. Caution signage would be placed warning the public of potential logging traffic.
77. Signage notifying the public of temporary road closure would be placed at the junction of Lost Creek and Eagles Rest Roads; and BLM Roads 20-1-10.3 and 20-1-14.1 if the paved corridor loop and/or BLM Road 20-1-14 requires longer closure periods (e.g., culvert replacements).
78. Caution signage would be placed at the junction of Lost Creek and Eagles Rest Roads and BLM Roads 20-1-10.3 and 20-1-14.1 warning the public of potential logging traffic during active harvest operations.
79. The Eugene District public website would be updated, as needed, to provide similar public safety and access information electronically under the Recreation Activities tab. Project updates would be shared with the Willamette and Umpqua National Forests to encourage similar action specific to their websites.
80. All operations must prevent disturbance or damage to historic railroad trestles in Gosage Incline T20S R01W Sec 7 and historic railroad trestles and grade in Gosage Incline T20S R01W Sec 17.
81. Disruption to spotted owls would be minimized through seasonal restrictions. Project activities in T20S R01W Sec 23 and T20S R01E Sec 19 (including road construction/decommissioning, timber falling, and yarding) would be seasonally restricted from March 1 to July 15. Other project activities, such as renovation of existing roads and timber hauling, would not be restricted. The above restrictions may be waived or modified (reduced or extended) by the Area wildlife biologist based on relevant survey information regarding occupation or nesting activity
82. No-cut boundary 100 feet from stream initiation points to avoid harvest and corridors on headwalls of rotational slumps associated with stream initiation points (for headwalls >60% slope above stream initiation point), for the following, streams: Anthony Access T19S R01W Sec 31 stream numbers 1, 2, and 8; Missing Links T20S R01E Sec19 stream numbers 3, 4, 8, 9, 10, 11, 12, and 13 and T20S R01W Sec 23, stream numbers 2, 3; Guileless T20S R01W Sec 15, stream numbers 11 and 8; Gosage Incline T20S

R01W Sec 17, stream numbers 1 and 15. Corridors may be permitted in the outer 25' of the no-cut buffer if necessary as determined by the AO.

83. No cut boundaries would be adjusted to 100 feet slope distance from streams with side slopes >60% and extending to the stream, or to the inner gorge slope break, whichever is less (Anthony Access Sec 31, Missing Links Sec 23; Gosage Incline Sec 13, 17; Guileless Sec 15)

7.2 Appendix B: Glossary

Glossary

Unless otherwise indicated, definitions are from the 1995 Eugene RMP.

Basal Area - The area of the cross section of a tree stem near its base, generally at breast height, 4.5 feet above the ground and inclusive of bark.

Baseline - The starting point for Analysis of Environmental Consequences; may be the conditions at a point in time (e.g., when inventory data is collected) or may be the average of a set of data collected over a specified period of years

Biological Corridor - A habitat band linking areas reserved from substantial disturbance.

Broadcast Burn - Allowing a prescribed fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard or as a silvicultural treatment, or both.

Bureau Sensitive Species - Plant or animal species eligible for Federal Listed, Federal Candidate, State Listed, or State Candidate (plant) status, or on List 1 in the Oregon Natural Heritage Data Base, or approved for this category by the State Director.

Canopy Cover – Proportion of the forest floor covered by the vertical projection of tree crowns. (BLM 2009)

Clear-Cut Harvest - A timber harvest method in which all trees are removed in a single entry from a designated area, with the exception of wildlife trees or snags, to create an even-aged stand.

Commercial Thinning - The removal of merchantable trees from an even-aged stand to encourage growth of the remaining trees.

Core Area - That area of habitat essential in the breeding, nesting, and rearing of young, up to the point of dispersal of the young.

Cover - Vegetation used by wildlife for protection from predators, or to mitigate weather conditions, or to reproduce. May also refer to the protection of the soil and the shading provided to herbs and forbs by vegetation.

Critical Habitat - Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a Federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species when it is determined that such areas are essential for the conservation of the species.

Culmination of Mean Annual Increment (CMAI) - The peak of average yearly growth in volume of a forest stand (total volume divided by age of stand).

Cumulative Effect - The impact that results from identified actions when they are added to other past, present, and reasonably foreseeable future actions regardless of who undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

Diameter At Breast Height (DBH) - The diameter of a tree 4.5 feet above the ground on the uphill side of the tree.

Endangered Species - Any species 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.

Environmental Assessment (EA) - A systematic analysis of site-specific BLM activities used to determine whether such activities have a significant effect on the quality of the human environment; and whether a formal Environmental Impact Statement is required; and to aid an agency's compliance with NEPA when no EIS is necessary.

Environmental Impact - The positive or negative effect of any action upon a given area or resource.

Environmental Impact Statement (EIS) - A formal document to be filed with the Environmental Protection Agency that considers significant environmental impacts expected from implementation of a major Federal action.

Even-Aged Management - A silvicultural system that creates forest stands, which are primarily of a single age or limited range of ages.

Forest Canopy - The cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth.

Forest Health - The ability of forest ecosystems to remain productive, resilient, and stable over time and to withstand the effects of periodic natural or human-caused stresses such as drought, insect attack, disease, climatic changes, flood, resource management practices and resource demands.

Forest Succession - The orderly process of change in a forest as one plant community or stand condition is replaced by another, evolving towards the climax type of vegetation.

Green Tree Retention - A stand management practice in which live trees as well as snags and large down wood, are left as biological legacies within harvest units to provide habitat components over the next management cycle.

High Level -A regeneration harvest designed to retain the highest level of live trees possible while still providing enough disturbance to allow regeneration and growth of the naturally occurring mixture of tree species. Such harvest should allow for the regeneration of intolerant and tolerant species. Harvest design would also retain cover and structural features necessary to provide foraging and dispersal habitat for mature and old growth dependent species.

Low Level - A regeneration harvest designed to retain only enough green trees and other structural components (snag, coarse woody debris, etc.) to result in the development of stands, which meet old growth definitions within 100-120 years after harvest entry, considering overstory mortality.

Habitat Fragmentation - The breaking up of habitat into discrete islands through modification or conversion of habitat by management activities.

Home Range - The area that an animal traverses in the scope of normal activities; not to be confused with territory, which is the area an animal defends.

Landing - Any place on or adjacent to the logging site where logs are assembled for further transport.

Land Use Allocations - Allocations that define allowable uses/activities, restricted uses/ activities, and prohibited uses/activities. They may be expressed in terms of area such as acres or miles, etc. Each allocation is associated with a specific management objective.

Log Decomposition Class - Any of 5 stages of deterioration of logs in the forest; stages range from essentially sound (class 1) to almost total decomposition (class 5).

Mitigating Measures - Modifications of actions that (a) avoid impacts by not taking a certain action or parts of an action; (b) minimize impacts by limiting the degree or magnitude of the action and its implementation; (c) rectify impacts by repairing, rehabilitating or restoring the affected environment; (d)

reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or (e) compensate for impacts by replacing or providing substitute resources or environments.

Old Growth - This stage constitutes the potential plant community capable of existing on a site given the frequency of natural disturbance events. For forest communities, this stage exists from approximately age 200 until when stand replacement occurs and secondary succession begins again. Depending on fire frequency and intensity, old growth forests may have different structures, species composition, and age distributions. In forests with longer periods between natural disturbances, the forest structure will be more even-aged at late mature or early old growth stages.

Prescribed Fire - A fire burning under specified conditions that will accomplish certain planned objectives.

Quadratic Mean Diameter (QMD) the measure of the average diameter of all conifers ≥ 8" DBH in the stand.

Reforestation - The natural or artificial restocking of an area with forest trees; most commonly used in reference to artificial stocking.

Regeneration Harvest - Timber harvest conducted with the partial objective of opening a forest stand to the point where favored tree species will be reestablished. [A cutting procedure by which a new age class is created. The major methods are clear-cutting, seed-tree, and shelterwood. (Dictionary of Forestry).]

Relative Density: the means of describing the relative degree of inter-tree competition in stands of differing average tree size and stand density of conifers over 8'' DBH (Curtis 1982). Relative Density is calculated by dividing the Basal Area by the square root of the Quadratic Mean Diameter. Relative Density helps define the forest condition in different zones of ecological condition.

Resource Management Plan (RMP) - A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act.

Rotation - The planned number of years between establishment of a forest stand and its regeneration harvest.

Seed Tree Regeneration Method - the cutting of all trees except for a small number of widely dispersed trees retained for seed production and to produce a new age class in fully exposed microenvironment. (SAF, 2014).

Seral Stages -The series of relatively transitory plant communities that develop during ecological succession from bare ground to the climax stage. There are five stages:

> **Early-Seral Stage** - The period from disturbance to crown closure of conifer stands usually occurring from 0-15 years. Grass, herbs, or brush are plentiful.
>
> **Mid-Seral Stage** - The period in the life of a forest stand from crown closure to ages 15- 40. Due to stand density, brush, grass, or herbs rapidly decrease in the stand. Hiding cover may be present.
>
> **Late-Seral Stage** - The period in the life of a forest stand from first merchantability to culmination of mean annual increment. This is under a regime including commercial thinning, or to 100 years of age, depending on wildlife habitat needs. During this period, stand diversity is minimal, except that conifer mortality rates will be fairly rapid. Hiding and thermal cover may be present. Forage is minimal.

Mature-Seral Stage - The period in the life of a forest stand from Culmination of Mean Annual Increment to an old growth stage or to 200 years. This is a time of gradually increasing stand diversity. Hiding cover, thermal cover, and some forage may be present.

Shelterwood Regeneration Method - some or all of the shelter trees are retained after regeneration has become established to attain goals other than regeneration (SAF, 2014)

Site Class – A classification of site quality, usually expressed in terms of ranges of dominant tree height at a given age or potential mean annual increment at culmination. (Dictionary of Forestry)

Site Potential Tree height: A site- potential tree height is the average maximum height of the tallest dominant trees (watershed analysis)

Site Preparation - Any action taken in conjunction with a reforestation effort (natural or artificial) to create an environment that is favorable for survival of suitable trees during the first growing season. This environment can be created by altering ground cover, soil, or microsite conditions, using biological, mechanical, or manual clearing, prescribed burns, herbicides, or a combination of methods.

Skid Trail - A pathway created by dragging logs to a landing (gathering point).

Slash - The branches, bark, tops, cull logs, and broken or uprooted trees left on the ground after logging.

Snag - Any standing dead, partially-dead, or defective (cull) tree at least 10 inches in diameter at breast height (DBH) and at least 6 feet tall. A hard snag is composed primarily of sound wood, generally merchantable. A soft snag is composed primarily of wood in advanced stages of decay and deterioration, generally not merchantable.

Soil Compaction - An increase in bulk density (weight per unit volume) and a decrease in soil porosity resulting from applied loads, vibration, or pressure.

Soil Displacement - The removal and horizontal movement of soil from one place to another by mechanical forces such as a blade.

Soil Productivity - Capacity or suitability of a soil for establishment and growth of a specified crop or plant species, primarily through nutrient availability.

Stand (Tree Stand) - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.

Stand Density - An expression of the number and size of trees on a forest site. May be expressed in terms of numbers of trees per acre, basal area, stand density index, or relative density index.

Stem exclusion: As the trees grow, their crowns and roots expand. As resources become limited, there is strong competition among trees, and self-thinning occurs.

Trees per acre: The conifers per acre of all conifer trees ≥ 8" DBH.

Stocked/Stocking - Related to the number and spacing of trees in a forest stand.

Sustained Yield - The yield that a forest can produce continuously at a given intensity of management.

Wildlife Tree - A live tree retained to become future snag habitat.

Yarding - The act or process of moving logs to a landing.

7.3 Appendix C: Road Construction, Improvement, and Renovation

Appendix C Table 1 - Alternative 2 Roads

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Administrative-Only)
					X-Drain	Stream			
Anthony Access									
19-1-21	Renovation	1.86	Perm	Rock	0-1	1	None		Administrative-Only
19-1-31	Renovation	1.28	Perm	Rock			None	0-6 inches rock	Administrative-Only
19-1-31.1	Renovation	0.27	Perm	Rock	1-3		None	0-6 inches rock	Administrative-Only
19-1-31.7	Renovation	0.06	Perm	Rock			None	0-6 inches rock	Administrative-Only
19-2-24.1 Seg D	Renovation	0.31	Perm	Rock	1-3	1-2	None	0-6 inches rock	Administrative-Only
19-2-24.1 Seg I	Renovation	1.04	Perm	Rock	1-3	1-2	None	0-6 inches rock	Administrative-Only
19-2-36.3	Renovation	0.05	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-6.2	Renovation	0.55	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-2-1.6	Renovation	0.29	Perm	Optional	1-3	1	None or Block & Waterbar	0-12 inches rock	Administrative-Only
20-2-12.1	Renovation	0.90	Perm	Rock			None	0-6 inches rock	Administrative-Only
Spur 1A	Renovation	0.16	Temp or Perm	Optional			None or Block & Till	0-14 inches rock	Administrative-Only
Spur 32A	Construction	0.27	Perm	Rock	3-5		Block & Waterbar		Administrative-Only
Spur 32A2	Construction	0.01	Perm	Rock			Block & Waterbar	Optional Build/Locate	Administrative-Only
Gosage Incline									
19-2-24.1 Seg O & Q	Renovation	0.60	Perm	Rock	0-2	0-1	None	0-6 inches rock	Administrative-Only
20-1-16.7	Renovation	0.11	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-18	Renovation	0.81	Perm	Rock	1-3	2	None	0-6 inches rock	Administrative-Only
20-1-18.1	Renovation	0.17	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-4.1 Seg C	Renovation	0.07	Perm	Rock	0-1	0-1	None	0-6 inches rock	Administrative-Only
20-1-7	Renovation	0.96	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-7.4	Renovation	0.20	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-7.6	Renovation	0.28	Perm	Rock		1-3	None	0-6 inches rock	Administrative-Only
20-1-7.7	Renovation	0.28	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
20-1-7.8	Renovation	0.16	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-2-12.5	Renovation	0.05	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
20-2-13	Renovation	0.16	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Administrative-Only)
					X-Drain	Stream			
Spur 13A	Improvement	0.05	Perm	Rock			None	0-14 inches rock	Administrative-Only
Spur 13B	Construction	0.14	Perm	Rock	1-3		Block & Waterbar		Administrative-Only
Spur 17A	Construction	0.09	Perm	Rock	1-2		Block & Waterbar		Administrative-Only
Spur 17B	Construction	0.11	Perm	Rock	1-2		None		Administrative-Only
Spur 17C	Construction	0.06	Perm	Rock	1-2		None		Administrative-Only
Spur 17D	Construction	0.05	Perm	Rock	0-1		None		Administrative-Only
Spur 7A	Construction	0.18	Perm	Rock	2-4		Block & Waterbar		Administrative-Only
Spur 7B	Construction	0.09	Perm	Rock	0-2		Block & Waterbar		Administrative-Only
Guileless (see also Missing Links/Guileless)									
20-1-10 Seg C1, D, & E	Renovation	2.23	Perm	Rock	1-3		None	0-6 inches rock	Administrative-Only
20-1-14.2	Renovation	0.24	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
20-1-15	Renovation	0.68	Perm	Rock		1-3	None	0-6 inches rock	Administrative-Only
20-1-15 ext.	Construction	0.13	Perm	Rock	0-2		None		Administrative-Only
20-1-21	Renovation	0.11	Perm	Rock	0-1	0-1	None	0-6 inches rock	Administrative-Only
20-1-21.2	Renovation	0.08	Perm	Native			Block & Waterbar		Administrative-Only
20-1-22	Renovation	1.86	Perm	Rock			None		Administrative-Only
Spur 15A	Renovation	0.07	Perm	Rock			None	0-6 inches rock	Administrative-Only
Spur 15C	Renovation	0.13	Temp	Native	1-3	1	Block & Till		Administrative-Only
Spur 21B	Construction	0.10	Perm	Rock	0-2		None		Administrative-Only
John's Last Stand (see also Missing Links/John's Last Stand)									
20-1-10.1 Seg N	Renovation	0.15	Perm	Rock	1		None	0-6 inches rock	Public
20-1E-29.1	Renovation	0.61	Perm	Rock	1-2		None	0-6 inches rock	Public
Missing Links									
20-1-10.3 (por.)	Renovation	4.55	Perm	Paved	2-4	1-4	None		Public until junction with Road No. 20-1-24.2, then the road becomes Administrative-Only
20-1-13.0	Renovation	0.57	Perm	Rock	1-3	1	None	0-6 inches rock	Public
20-1-24	Renovation	0.21	Perm	Rock	0-1	0-1	None		Administrative-Only
20-1-25	Renovation	0.80	Perm	Rock	1-2	1	None	0-6 inches rock	Administrative-Only
20-1-25 Ext.	Construction	0.02	Perm	Rock			None		Administrative-Only

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Administrative-Only)
					X-Drain	Stream			
20-1E-19.0	Renovation	0.38	Perm	Rock	1-2	1-2	None	0-6 inches rock	Public
20-1E-19.3	Renovation	0.25	Perm	Rock	1-2	1-2	None	0-6 inches rock	Public
Landing Spurs Access Sec 13	Renovation	0.04	Perm	Rock	1		None	0-6 inches rock	Public
Landing Spurs Sec 13	Construction	0.11	Perm	Rock			None	Construct 3 roadside landings on old stockpile site	Public
Spur19A	Construction	0.38	Temp or Perm	Optional	1-3		None or Block & Till	Decomm work depends on surfacing	Public
Spur 20A	Renovation	0.09	Perm	Native			None		Public
Spur 23A	Construction	0.23	Perm	Rock	1-3		Block & Waterbar		Administrative-Only
Missing Links/Guileless									
20-1-10.1 Seg B & D	Renovation	0.26	Perm	Rock			None	0-6 inches rock	Administrative-Only
Missing Links/John's Last Stand									
19-1-33.1	Renovation	6.82	Perm	Paved	2-6	1-4	None		Public
20-1-14.0 (por)**	Renovation	1.60	Perm	Rock	2-5	2-5	None	0-6 inches rock	Public
20-1-14.0 (por)	Renovation	3.25	Perm	Paved	2-5	2-5	None		Public

* Temporary or Permanent
** Portion

Appendix C Table 2 - Alternative 3 Roads

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Administrative-Only)
					X-Drain	Stream			
Anthony Access									
19-1-21 (por)	Renovation	1.86	Perm	Rock	0-1	1	None		Administrative-Only
19-1-31	Renovation	1.28	Perm	Rock			None	0-6 inches rock	Administrative-Only
19-1-31.1	Renovation	0.27	Perm	Rock	1-3		None	0-6 inches rock	Administrative-Only
19-1-31.7	Renovation	0.06	Perm	Rock			None	0-6 inches rock	Administrative-Only
19-2-24.1 Seg D	Renovation	0.31	Perm	Rock	1-3	1-2	None	0-6 inches rock	Administrative-Only
19-2-24.1 Seg I	Renovation	1.04	Perm	Rock	1-3	1-2	None	0-6 inches rock	Administrative-Only
19-2-36.3	Renovation	0.05	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-6.2	Renovation	0.55	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-2-1.6	Renovation	0.29	Perm	Optional	1-3	1	None or Block & Waterbar	0-12 inches rock	Administrative-Only
20-2-12.1	Renovation	0.90	Perm	Rock			None	0-6 inches rock	Administrative-Only
Spur 1A	Renovation	0.16	Temp or Perm	Optional			None or Block & Till	0-14 inches rock	Administrative-Only
Spur 32A	Construction	0.27	Perm	Rock	3-5		Block & Waterbar		Administrative-Only
Spur 32A2	Construction	0.01	Perm	Rock			Block & Waterbar	Optional Build/Locate	Administrative-Only
Gosage Incline									
19-2-24.1 Seg O & Q	Renovation	0.60	Perm	Rock	0-2	0-1	None	0-6 inches rock	Administrative-Only
20-1-16.7	Renovation	0.11	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-18	Renovation	0.81	Perm	Rock	1-3	2	None	0-6 inches rock	Administrative-Only
20-1-18.1	Renovation	0.17	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-4.1 Seg C	Renovation	0.07	Perm	Rock	0-1	0-1	None	0-6 inches rock	Administrative-Only
20-1-7	Renovation	0.96	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-7.4	Renovation	0.20	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-7.6	Renovation	0.28	Perm	Rock		1-3	None	0-6 inches rock	Administrative-Only
20-1-7.7	Renovation	0.28	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
20-1-7.8	Renovation	0.16	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-2-12.5	Renovation	0.05	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
20-2-13	Renovation	0.16	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
Spur 13A	Improvement	0.05		Rock			None	0-14 inches rock	Administrative-Only
Spur 13B	Construction	0.14	Perm	Rock	1-3		Block &		Administrative-

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Administrative-Only)
					X-Drain	Stream			
							Waterbar		Only
Spur 17A	Construction	0.09	Perm	Rock	1-2		Block & Waterbar		Administrative-Only
Spur 17B	Construction	0.11	Perm	Rock	1-2		None		Administrative-Only
Spur 17C	Construction	0.06	Perm	Rock	1-2		None		Administrative-Only
Spur 17D	Construction	0.05	Perm	Rock	0-1		None		Administrative-Only
Spur 7A	Construction	0.18	Perm	Rock	2-4		Block & Waterbar		Administrative-Only
Spur 7B	Construction	0.09	Perm	Rock	0-2		Block & Waterbar		Administrative-Only
Guileless (see also Missing Links/Guileless)									
20-1-10 Seg C1, D, & E	Renovation	2.23	Perm	Rock	1-3		None	0-6 inches rock	Administrative-Only
20-1-10.1 Seg. B	Renovation	0.20	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-14.2	Renovation	0.24	Perm	Rock	1-3		None	0-6 inches rock	Administrative-Only
20-1-15	Renovation	0.68	Perm	Rock		1-3	None	0-6 inches rock	Administrative-Only
20-1-15 ext.	Construction	0.13	Perm	Rock	0-2		None		Administrative-Only
20-1-21	Renovation	0.11	Perm	Rock	0-1	0-1	None	0-6 inches rock	Administrative-Only
20-1-21.2	Renovation	0.08	Perm	Native			Block & Waterbar		Administrative-Only
20-1-22	Renovation	1.86	Perm	Rock			None	0-6 inches rock	Administrative-Only
Spur 15A	Renovation	0.07	Perm	Rock			None	0-6 inches rock	Administrative-Only
Spur 15C	Renovation	0.13	Temp	Native	1-3	1	Block & Till		Administrative-Only
Spur 21B	Construction	0.10	Perm	Rock	0-2		None		Administrative-Only
John's Last Stand (see also Missing Links/John's Last Stand)									
20-1-10.1 Seg N	Renovation	0.15	Perm	Rock	1		None	0-6 inches rock	Public
20-1E-29.1	Renovation	0.61	Perm	Rock	1-2		None	0-6 inches rock	Public
Missing Links									
20-1-10.3	Renovation	4.55	Perm	Paved	2-4	1-4	None		Public until junction with Road No. 20-1-24.2, then the road becomes Administrative-Only
20-1-13.0	Renovation	0.57	Perm	Rock	1-3	1	None	0-6 inches rock	Public
20-1-24	Renovation	0.21	Perm	Rock	0-1	0-1	None		Administrative-Only
20-1-25	Renovation	0.80	Perm	Rock	1-2	1	None	0-6 inches rock	Administrative-Only
20-1-25 Ext.	Construction	0.02	Perm	Rock			None		Administrative-Only

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Administrative-Only)
					X-Drain	Stream			
20-1E-19.0	Renovation	0.38	Perm	Rock	1-2	1-2	None	0-6 inches rock	Public
20-1E-19.3	Renovation	0.25	Perm	Rock	1-2	1-2	None	0-6 inches rock	Public
Landing Spurs Access Sec 13	Renovation	0.04	Perm	Rock	1		None	0-6 inches rock	Public
Landing Spurs Sec 13	Construction	0.11	Perm	Rock			None	Construct 3 roadside landings on old stockpile site	Public
Spur 19A	Construction	0.38	Temp	Optional	1-3		Block & Waterbar or Block & Till	Decomm work depends on surfacing	Public
Spur 20A	Renovation	0.09	Perm	Native			None		Public
Spur 23A	Construction	0.23	Perm	Rock	1-3		Block & Waterbar		Administrative-Only
Missing Links/John's Last Stand									
19-1-33.1	Renovation	6.82	Perm	Paved	2-6	1-4	None		Public
20-1-14.0 (por)**	Renovation	1.60	Perm	Rock	2-5	2-5	None	0-6 inches rock	Public
20-1-14.0 (por)	Renovation	3.25	Perm	Paved	2-5	2-5	None		Public

* Temporary or Permanent
** Portion

Appendix C Table 3 - Alternative 4

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Adminstrative-Only)
					X-Drain	Stream			
Anthony Access									
19-1-21	Renovation	1.86	Perm	Rock	0-1	1	None		Administrative-Only
19-1-31	Renovation	1.26	Perm	Rock			None	0-6 inches rock	Administrative-Only
19-1-31.1	Renovation	0.27	Perm	Rock	1-3		None	0-6 inches rock	Administrative-Only
19-1-31.7	Renovation	0.06	Perm	Rock			None	0-6 inches rock	Administrative-Only
19-2-24.1 Seg. D	Renovation	0.31	Perm	Rock	1-3	1-2	None	0-6 inches rock	Administrative-Only
19-2-24.1 Seg. I	Renovation	1.04	Perm	Rock	1-3	1-2	None	0-6 inches rock	Administrative-Only
19-2-36.3	Renovation	0.05	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-6.2	Renovation	0.55	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-2-1.6	Renovation	0.29	Temp	Native	1-3	1	Block & Till		Administrative-Only
20-2-12.1	Renovation	0.58	Perm	Rock			None	0-6 inches rock	Administrative-Only
Gosage Incline									
19-2-24.1 Seg. O & Q	Renovation	0.60	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-16.7	Renovation	0.11	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-18	Renovation	0.81	Perm	Rock	1-3	2	None	0-6 inches rock	Administrative-Only
20-1-18.1	Renovation	0.17	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-4.1 Seg. C	Renovation	0.07	Perm	Rock	0-1	0-1	None	0-6 inches rock	Administrative-Only
20-1-7	Renovation	0.81	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-7.4	Renovation	0.20	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-7.6	Renovation	0.28	Perm	Rock		1-3	None	0-6 inches rock	Administrative-Only
20-2-13	Renovation	0.16	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
Spur 13A	Improvement	0.05	Perm	Rock			None	0-14 inches rock	Administrative-Only
Spur 17A	Construction	0.09	Temp	Native	1-2		Block & Till		Administrative-Only
Spur 17B	Construction	0.11	Temp	Native	1-2		Block & Till		Administrative-Only
Spur 17C	Construction	0.06	Temp	Native	1-2		Block & Till		Administrative-Only
Spur 17D	Construction	0.05	Temp	Native	0-1		Block & Till		Administrative-Only
Spur 7B	Construction	0.09	Temp	Native	0-2		Block & Till		Administrative-Only
Guileless									
20-1-10	Renovation	3.36	Perm	Rock	1-3		None	0-6 inches rock	Administrative-Only

Road and Segment/ Spur Name	Proposed Work	Length Miles	Temp or Perm*	Proposed Surface Type	Culvert Replace/New		Post-Harvest Decomm Plan	Comments	Access Type (Public or Adminstrative-Only)
					X-Drain	Stream			
20-1-14.2	Renovation	0.24	Perm	Rock	1-2		None	0-6 inches rock	Administrative-Only
20-1-15	Renovation	0.68	Perm	Rock		1-3	None	0-6 inches rock	Administrative-Only
20-1-15 ext.	Construction	0.13	Temp	Native	0-2		Block & Till		Administrative-Only
20-1-21	Renovation	0.11	Perm	Rock			None	0-6 inches rock	Administrative-Only
20-1-21.2	Renovation	0.08	Perm	Native			Block & Waterbar		Administrative-Only
20-1-22	Renovation	1.86	Perm	Rock			None	0-6 inches rock	Administrative-Only
Spur 15A	Renovation	0.07	Perm	Rock			None	0-6 inches rock	Administrative-Only
Spur 15C	Renovation	0.13	Temp	Native	1-3	1	Block & Till		Administrative-Only
Spur 21B	Construction	0.10	Temp	Native	0-2		Block & Till		
Missing Links									
20-1-10.3	Renovation	4.55	Perm	Paved	2-4	1-4	None		Public until junction with Road No. 20-1-24.2, then the road becomes Administrative-Only
20-1-13.0	Renovation	0.57	Perm	Rock	1-3	1	None	0-6 inches rock	Public
20-1-24	Renovation	0.21	Perm	Rock	0-1	0-1	None		Administrative-Only
20-1-25	Renovation	0.80	Perm	Rock	1-2	1	None	0-6 inches rock	Administrative-Only
20-1-25 Ext.	Construction	0.02	Perm	Rock			None		Administrative-Only
20-1E-19.0	Renovation	0.38	Perm	Rock			None	0-6 inches rock	Public
20-1E-19.3	Renovation	0.25	Perm	Rock			None	0-6 inches rock	Public
Landing Spurs Access Sec 13	Renovation	0.04	Perm	Rock	1		None	0-6 inches rock	Public
Landing Spurs Sec 13	Construction	0.11	Perm	Rock			None	Construct 3 roadside landings on old stockpile site	Public
Spur 19A	Construction	0.38	Temp	Native	1-3		Block & Till		Public
Spur 20A	Renovation	0.09	Perm	Native			None		Public
Spur 23A	Construction	0.23	Perm	Rock	1-3		Block & Waterbar		Administrative-Only
Missing Links/Guileless									
20-1-10.1 Seg. B	Renovation	0.20	Perm	Rock			None	0-6 inches rock	
Missing Links/John's Last Stand									
19-1-33.1	Renovation	6.82	Perm	Paved	2-6	1-4	None		
20-1-14.0 (por)**	Renovation	0.45	Perm	Rock	1-2	1-2	None	0-6 inches rock	
20-1-14.0 (por)	Renovation	1.42	Perm	Paved	1-4	1-2	None		

* Temporary or Permanent
** Portion

7.4 Appendix D: Cumulative Effects Actions

The cumulative effects analysis considers past, present, and reasonably foreseeable future actions that would affect the issue of concern within the geographic scopes and the timeframes of the analysis by Issue.

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. Current conditions, or the affected environments, reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. The Affected Environment sections for each Issue summarize past actions to describe the present conditions. As such, this discussion of cumulative effects utilizes present conditions to identify the aggregate impact of past actions, and specific past actions are only identified where their aggregate impact is still applying direct impacts to the project environment relevant to each Issue.

The cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at current conditions, we capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality (CEQ) issued an interpretive memorandum on June 24, 2005, regarding analysis of past actions, which states, “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”.

Ongoing management and other present actions are considered where the management and actions have relevance under each Issue. Not all ongoing management, public uses, or projects-in-progress have relevance to each Issue; some ongoing actions (i.e., collection of special forest products, dispersed pedestrian recreation) do not contribute to incremental impacts under any Issue, but are listed to recognize the occurrence of the use or action presently. Where current actions have relevance and influence on an Issue, the actions and uses are discussed in the analysis.

Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.

In some circumstances, past actions may need to be described in greater detail when they bear some relation to the proposed action. For example, past actions that are similar to the proposed action might have some bearing on what effects might be anticipated from the proposed action or alternatives. Known past projects of particular importance to analysis conducted for the Lost Creek EA have been listed below (Table D-1), along with all known present and reasonably foreseeable future actions, and have been considered as appropriate in conducting cumulative affects analysis for the project.

Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable based on known opportunities or trends. In addition to the actions listed below, BLM land management in the Eugene District would continue to occur for timber production, habitat management, or riparian management. In March 2012, the BLM published a Notice of Intent to revise the Resource Management Plans for western Oregon. The types of future

management on the landscape considered for cumulative effects under this project cannot be predicted beyond these generalizations because the ongoing land use plan revision could identify land use allocations of differing management direction.

The tables cover an area of the largest cumulative effects analysis area identified, excepting carbon and greenhouse gasses. Not all actions are considered by each issue or resource, as each issue identified the appropriate boundary for temporal and spatial activities, and relevant actions to include in their consideration of cumulative impacts.

The list of the activities in the following tables does not in and of itself amount to a disclosure of cumulative effects. The information in the tables is supported with relevant cumulative effects discussions by Issue.

Table D-1: Specific Projects within the Considered Cumulative Effects Analysis Area

Project Name	Project Description	Location/Acreage	Decision Date
Round Up Timber Sale	Commercial thinning with associated road work	T19S R02W Sec 23, 25, 27 & T20S R2W Sec 1 & #; 372 acres	June 2013
Middle Guiley Timber Sale	Commercial thinning with associated road work	T20S R1W Sec 9, 11, & 15; 300 acres	April 2013
Bear Ridge Timber Sale	Commercial thinning with associated road work	T19S R02W Sec 23, 25, 27 & T20S R2W Sec 1 &3; 398 acres	February 2013
Lucky Harms Timber Sale	Commercial thinning with associated road work	T20S R02W Sec 13 & 23; 225 acres	expected 2017
Ad Meyer Timber Sale	Commercial thinning with associated road work	T20S R02W Sec 19 & T20S R03W Sec 1 & T19S R02W Sec 3; 215 acres	expected 2016
Big Blow Quarry	Development of a rock quarry	T20S R02W Sec 13; 25 acres	expected 2016
Anthony Creek Road Crossing	Replacement of a failing fish-barrier culvert with a bridge allowing fish passage	T19S R01W Sec 31	May 2015
Anthony Creek Large Woody Debris	Placement of large woody debris in Anthony Creek tributaries to enhance fish habitat and restore stream function	T19S R01W Sec 31	May 2015
USFS Outlook Project[10]	Commercial thinning timber sale(s), fuels reduction, road maintenance, road closures, early seral habitat creation, noxious weed treatments	Planning area includes the Lookout Point Reservoir 5th Field Watershed; approx. 5,000 acres of thinning proposed	expected 2015
Culvert replacement	Road 20-1-4.1, Private Industry	T20S R01W Sec 9	unknown
** Italicized projects are past projects*			

[10] [10] http://www.fs.usda.gov/project/?project=40122

Table D-2: Ongoing BLM Management within the Considered Cumulative Effects Analysis Area

Ongoing BLM Management
Routine road maintenance
Routine trail maintenance
Routine manual/mechanical weed/invasive plant management
Hazard tree management
Unilateral permits (rights-of-ways, easements)
Fire suppression (if wildfires occur)

Table D-3: Ongoing Public Uses within the Considered Cumulative Effects Analysis Area

Ongoing Public Uses
Special Forest Products collection
Hunting
Developed hiking trails
Dispersed pedestrian recreation

Table D-4: Predominant non-BLM Landowners and Primary Uses within the Considered Cumulative Effects Analysis Area

Landowner	Primary Use	Notes
Weyerhaeuser Company	Industrial timber management (includes construction and maintenance of roads)	Timber management on private industrial timber lands historically has occurred on 40-60 year rotations.
Lost Creek Timber	Industrial timber management (includes construction and maintenance of roads)	Timber management on private industrial timber lands historically has occurred on 40-60 year rotations.
Giustina Resources Limited Partnership	Industrial timber management (includes construction and maintenance of roads)	Timber management on private industrial timber lands historically has occurred on 40-60 year rotations.
Giustina Land & Timber Company	Industrial timber management (includes construction and maintenance of roads)	Timber management on private industrial timber lands historically has occurred on 40-60 year rotations.
US Forest Service	Managed in accordance with Forest Plans for a variety of purposes including recreation, commercial timber, habitat, and special status species	
Private homeowners	Residential/Agricultural	Residences and agricultural use including grazing, hay, and crop production.

7.5 Appendix E: Special Status Species

Wildlife Special Status Species other than northern spotted owl and red tree vole, Survey and Manage wildlife species, and relevant migratory birds that are known or suspected to occur on the Eugene District BLM.

Special Status Species are defined by BLM Manual section 6840, Survey and Manage species are identified in the 2001 Survey and Manage Record of Decision, and relevant migratory birds are identified as described in BLM Instruction Memorandum OR-2008-050.

Common Name	Scientific Name	Status[1]	Occurrence on District[2]	Potential Presence in Project Area and Potential Effects
FENDER'S BLUE BUTTERFLY	PLEBEJUS ICARIOIDES FENDERI	FE	D	Associated strongly with Kincaid's Lupine in meadow and prairie habitat, which is not present. No potential for effects.
MARBLED MURRELET	BRACHYRAMPHUS MARMORATUS	FT, BCC	D	Within 50 miles of coast, project area is out of range. No potential for effects.
STREAKED HORNED LARK	EREMOPHILA ALPESTRIS STRIGATA	FT, BCC	S	Uses areas with low grassy vegetation: prairies, dunes, beaches, pastures, which are not present. No potential for effects.
TAYLOR'S CHECKERSPOT	EUPHYDRYAS EDITHA TAYLORI	FE	S	Used grassland, prairie habitats, which are not present. No potential for effects.
OREGON RED TREE VOLE: North Oregon Coast DPS	ARBORIMUS LONGICAUDUS	FC, SM-C, SEN	D	Project area is not in this Distinct Population Segment. No potential for effects.
PACIFIC FISHER: West Coast DPS	PEKANIA PENNANTIA	FPT	D	Uses large contiguous blocks of mature forest with structural complexity, which is not present. No potential for effects.
CRATER LAKE TIGHTCOIL	PRISTILOMA ARCTICUM CRATERIS	SEN, SM-B	S	Uses perennially wet habitats above 2000 feet, which would be protected by riparian buffers. No potential for effects.
HADDOCK'S RHYACOPHILAN CADDISFLY	RHYACOPHILA HADDOCKI	SEN	S	Uses small, cool mountain streams and adjacent riparian areas, which would be protected by riparian buffers. No potential for effects.
WESTERN BUMBLEBEE	BOMBUS OCCIDENTALIS	SEN	S	Uses diverse habitats that provide nectar, pollen, and suitable colony sites. Unlikely to occur in the project areas, but habitat availability could be increased by regeneration harvest.
COASTAL GREENISH BLUE BUTTERFLY	PLEBEJUS SAEPIOLUS LITTORALIS	SEN	S	Project area is outside the extremely restricted coastal range. No potential for effects.
JOHNSON'S HAIRSTREAK	CALLOPHRYS JOHNSONI	SEN	D	Uses mistletoe on western hemlock in late-successional forest, which is not present. No potential for effects.

Common Name	Scientific Name	Status[1]	Occurrence on District[2]	Potential Presence in Project Area and Potential Effects
MARDON SKIPPER	POLITES MARDON	SEN	S	Uses grassland or prairie, which is not present. No potential for effects.
FOOTHILL YELLOW-LEGGED FROG	RANA BOYLII	SEN	D	Uses large, low-gradient streams with bedrock or gravel substrate, which are not present. No potential for effects.
WESTERN POND TURTLE	ACTINEMYS MARMORATA	SEN	D	Uses ponds, lakes, larger streams with emergent vegetation and basking sites and nearby nesting habitat, which are not present. No potential for effects.
PAINTED TURTLE	CHRYSEMYS PICTA	SEN	S	Uses slow water; rivers, marshes, large ponds with abundant vegetation and basking sites, which are not present. No potential for effects.
ALEUTIAN CANADA GOOSE	BRANTA HUTCHINSII LEUCOPAREIA	SEN	S	Uses pasture, harvested agricultural fields, and marshes, which are not present. No potential for effects.
AMERICAN PEREGRINE FALCON	FALCO PEREGRINUS ANATUM	SEN	D	Uses cliffs and other sheer vertical structure, which are not present. No potential for effects.
BALD EAGLE	HALIAEETUS LEUCOCEPHALUS	SEN, BCC	D	Uses large nest trees and snags near large water bodies, which are not present.
BLACK SWIFT	CYPSELOIDES NIGER	SEN	S	Nests under large waterfalls, which are not present. No potential for effects.
DUSKY CANADA GOOSE	BRANTA CANADENSIS OCCIDENTALIS	SEN, GBBDC	D	Uses Willamette Valley agricultural fields and wetlands, which are not present. No potential for effects.
CALIFORNIA BROWN PELICAN	PELECANUS OCCIDENTALIS CALIFORNICUS	SEN	S	Uses coastal and estuarine habitats, which are not present. No potential for effects.
GRASSHOPPER SPARROW	AMMODRAMUS SAVANNARUM	SEN	D	Uses grassland and prairie, which are not present. No potential for effects.
HARLEQUIN DUCK	HISTRIONICUS HISTRIONICUS	SEN, GBBDC	D	Uses high-flow, fast-flowing streams with boulders and logs and adjacent riparian habitat, which are not present.
LEWIS' WOODPECKER	MELANERPES LEWIS	SEN	D	Uses open woodlands with ground cover and snags, which are not present. No potential for effects.
OREGON VESPER SPARROW	POOECETES GRAMINEUS AFFINIS	SEN, BCC	D	Uses dry, open habitat with moderate herb and shrub cover, which is not present. No potential for effects.

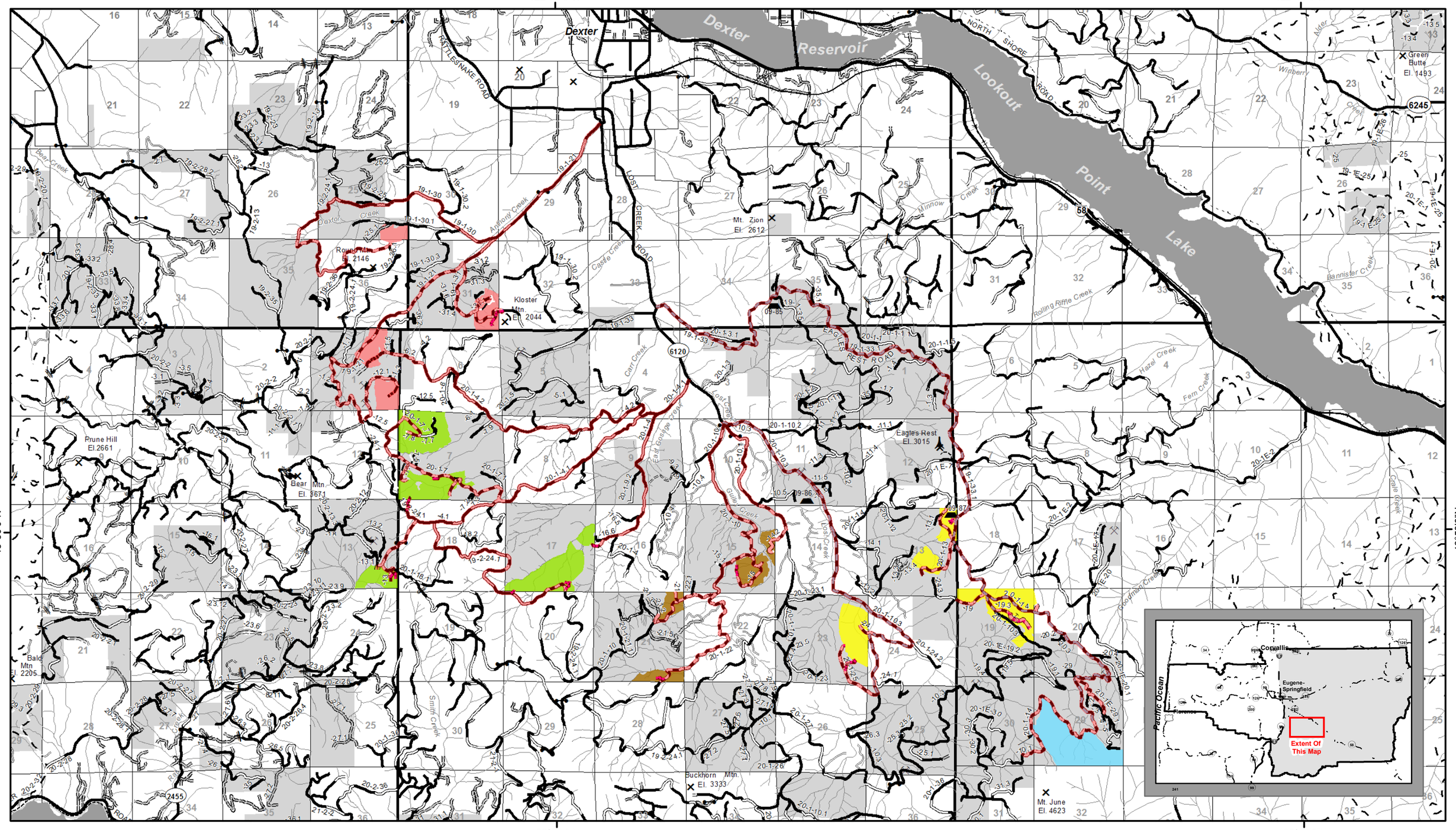
Common Name	Scientific Name	Status[1]	Occurrence on District[2]	Potential Presence in Project Area and Potential Effects
PURPLE MARTIN	PROGNE SUBIS	SEN	D	Uses snags and trees with suitable nest cavities, typically in open areas. Species is widespread and any effects would be insignificant at the population scale, and therefore would not contribute to the need to list it under the ESA.
WHITE-TAILED KITE	ELANUS LEUCURUS	SEN	D	Uses low-elevation grassland, farmland or savannah and nearby riparian areas, which are not present. No potential for effects.
FRINGED MYOTIS	MYOTIS THYSANODES	SEN	D	Known hibernacula and roosts include caves, mines, buildings and large snags; forages in variety of habitats. Species is widespread and any effects would be insignificant at the population scale, and therefore would not contribute to the need to list it under the ESA.
PALLID BAT	ANTROZOUS PALLIDUS	SEN	S	Uses arid or semi-arid habitat with rock, brush, or forest edge; roosts in caves, mines, bridges, buildings, and hollow trees or snags. These habitats are not present and there would be no potential for effects.
TOWNSEND'S BIG-EARED BAT	CORYNORHINUS TOWNSENDII	SEN	D	Roosts in mines, caves, and occasionally buildings, which are not present. No potential for effects.
GREAT GRAY OWL	STRIX NEBULOSA	SM-C	D	Uses mature or late-successional forest adjacent to large natural meadows or openings, which is not present. No potential for effects.
OREGON MEGOMPHIX	MEGOMPHIX HEMPHILLI	SM-F_5	D	Uses moist sites in conifer forest; especially leaf litter, ferns, stumps, coarse woody debris. No known sites occur in the project area. Species is widespread on the Eugene District and any effects would be insignificant at the population scale.
NORTHERN GOSHAWK	ACCIPTER GENTILIS	BCC	D	Uses mature and late-successional forest. No known sites in the project area. Species is widespread and any effects would be insignificant at the population scale.
OLIVE-SIDED FLYCATCHER	CONTOPUS COOPERI	BCC	D	Uses edge habitats, tall snags and trees important. Project would preserve or create habitat. Species is widespread and any effects would be insignificant at the population scale.
PURPLE FINCH	CARPODACUS PURPUREUS	BCC	D	Uses moist conifer forest. Thinning would improve habitat. Species is widespread and any effects would be insignificant at the population scale.

Common Name	Scientific Name	Status[1]	Occurrence on District[2]	Potential Presence in Project Area and Potential Effects
RUFOUS HUMMINGBIRD	SELASPHORUS RUFUS	BCC	D	Uses shrubby, early-successional habitat; nectar-producing plants important for food. Project would preserve or create habitat. Species is widespread and any effects would be insignificant at the population scale.
WILLOW FLYCATCHER	EMPIDONAX TRAILLI	BCC	D	Uses brushy or forested habitat in riparian areas, which would be protected or improved. Species is widespread and any effects would be insignificant at the population scale.
BAND-TAILED PIGEON	COLUMBA FASCIATA	GBBDC	D	Nests in mature forest, feeds in a variety of habitats. Thinning would improve habitat. Species is widespread and any effects would be insignificant at the population scale.
MOURNING DOVE	ZENAIDA MACROURA	GBBDC	D	Uses forest and shrub habitats. Thinning would improve habitat. Species is widespread and any effects would be insignificant at the population scale.
WOOD DUCK	AIX SPONSA	GBBDC	D	Uses nest cavities near water and riparian areas, which would be protected or improved. Species is widespread and any effects would be insignificant at the population scale.

1: FE = Federal Endangered, FT = Federal Threatened, FC = Federal Candidate, FPT = Federal Proposed Threatened, SEN = BLM Sensitive, SM = Survey and Manage, BCC = Bird of Conservation Concern, GBBDC = Game Bird Below Desired Condition

2: D = Detected on District, S = Suspected on District

7.6 Appendix F: Maps



Haul Routes - Alternative 2
Lost Creek Timber Sales

Legend

Salename

- Anthony Access
- Gosage Incline
- Guileless
- John's Last Stand
- Missing Links
- HaulRoute

0 0.5 1 2 3 4 Miles

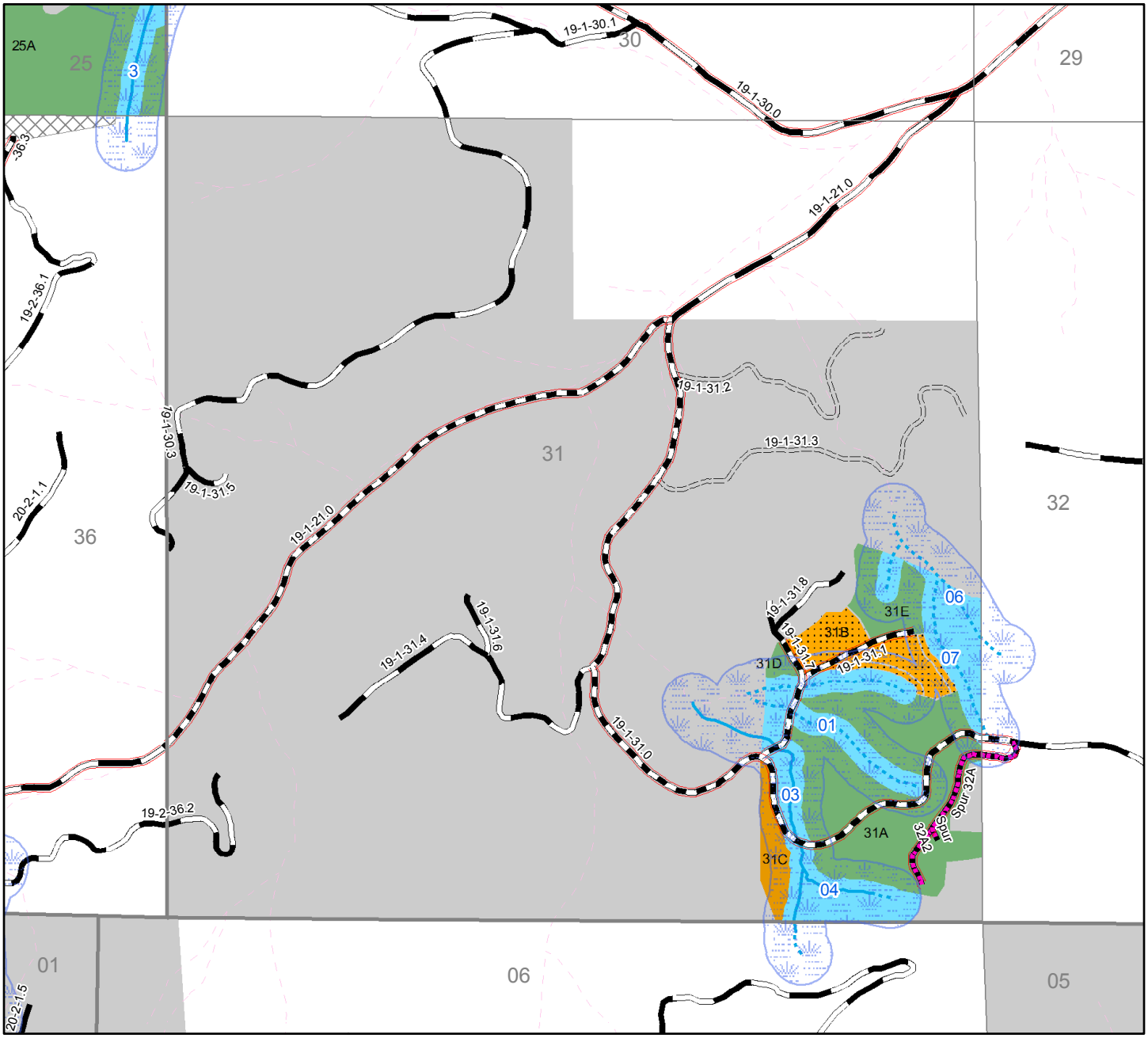
Current Date: 07/24/2015 08:24:22 AM

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 2

Anthony Access

T19S-R01W SEC. 31



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Cable
- Ground-based
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- HaulRoute

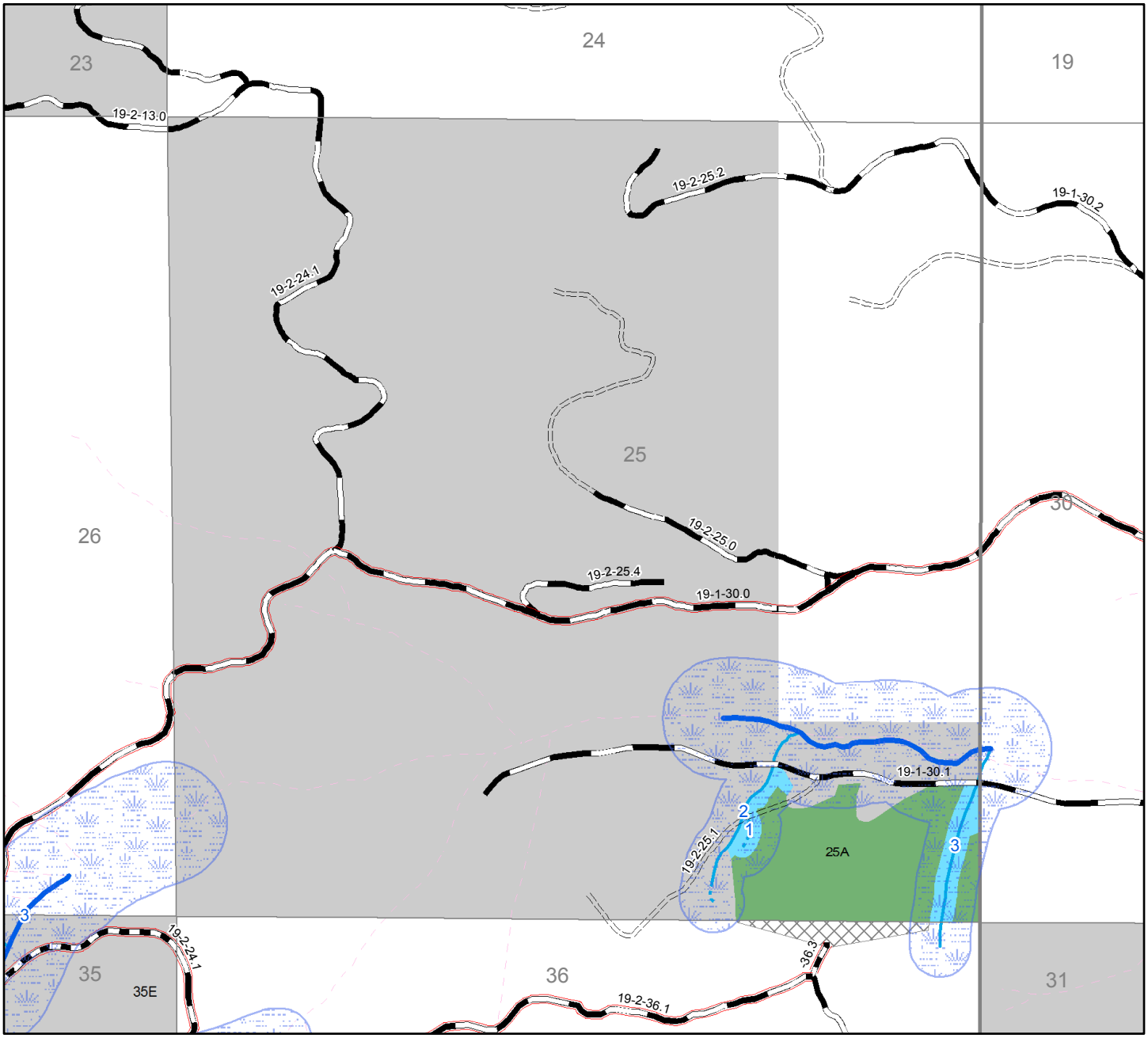
Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 2

Anthony Access

T19S-R02W SEC. 25



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Cable
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

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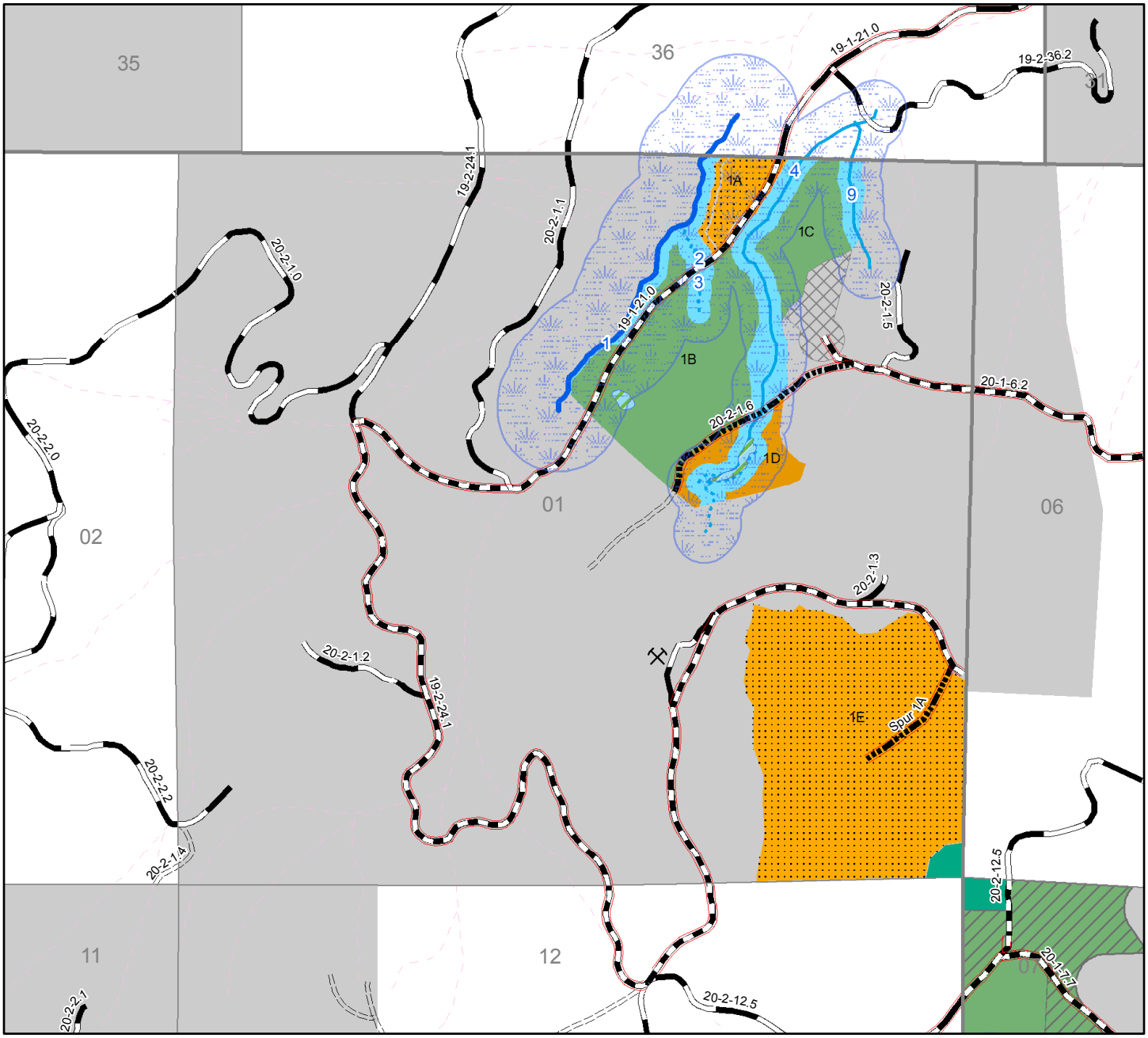
Lost Creek EA - Alt 2

Anthony Access

T20S-R02W SEC. 01



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Grouped Retention
- Cable
- Optional Prefer Cable
- Ground-based
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- Renovation, Optional Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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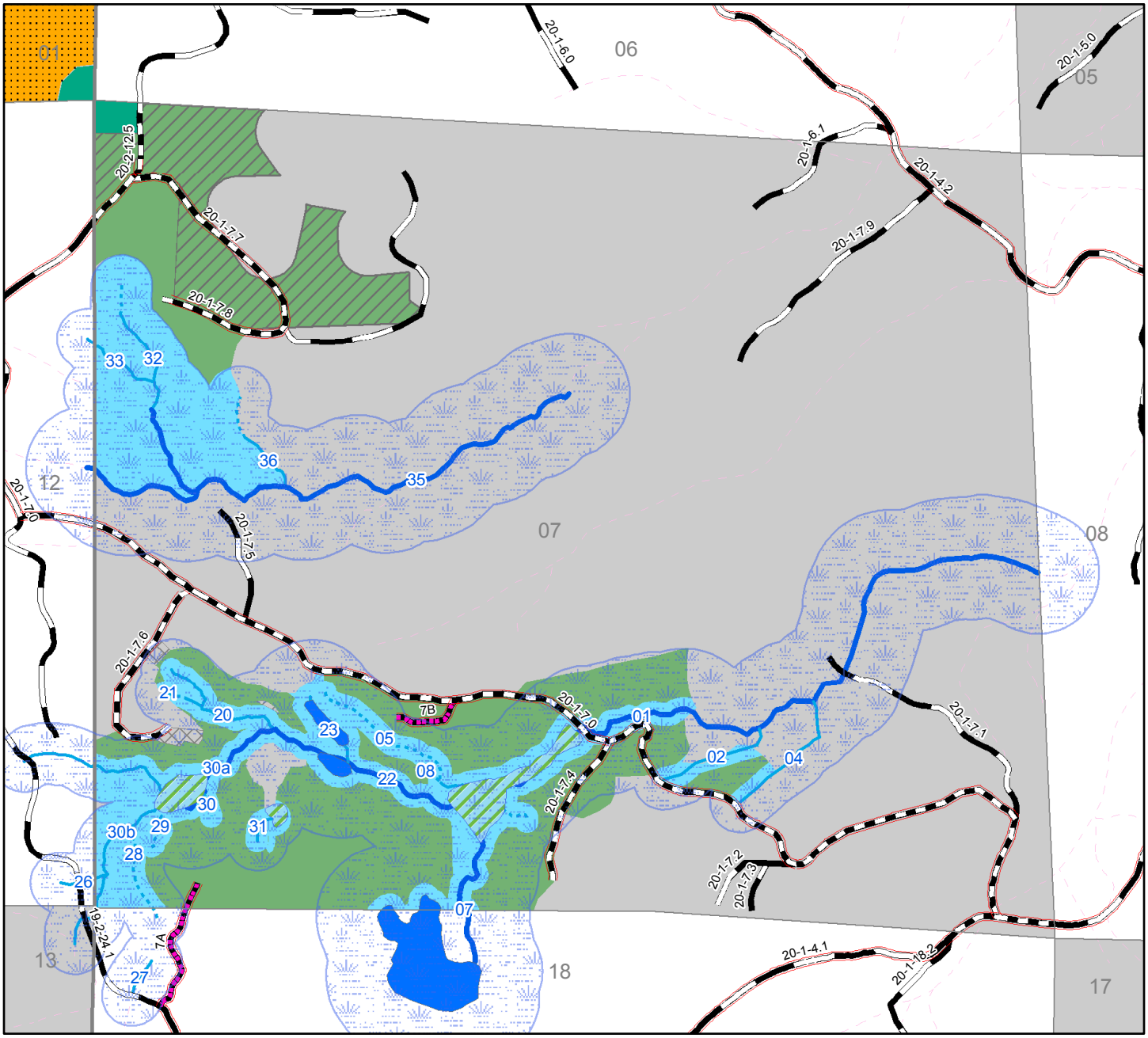
Lost Creek EA - Alt 2

Gosage Incline

T20S-R01W SEC. 07



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Grouped Retention
- Cable
- Optional Prefer Cable
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Pond
- Wetland
- Riparian Reserve

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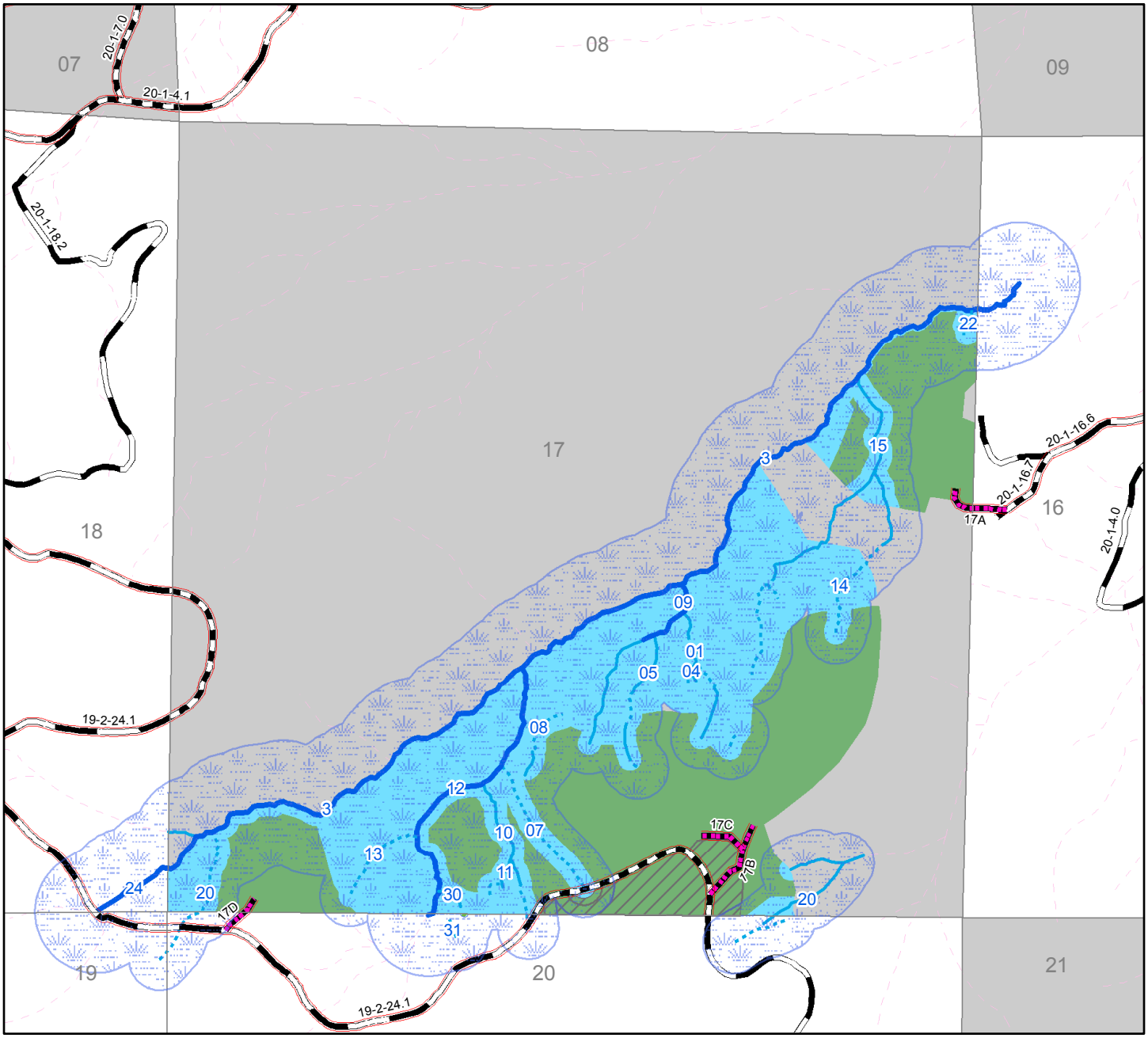
Lost Creek EA - Alt 2

Gosage Incline

T20S-R01W SEC. 17



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Cable
- Optional Prefer Cable
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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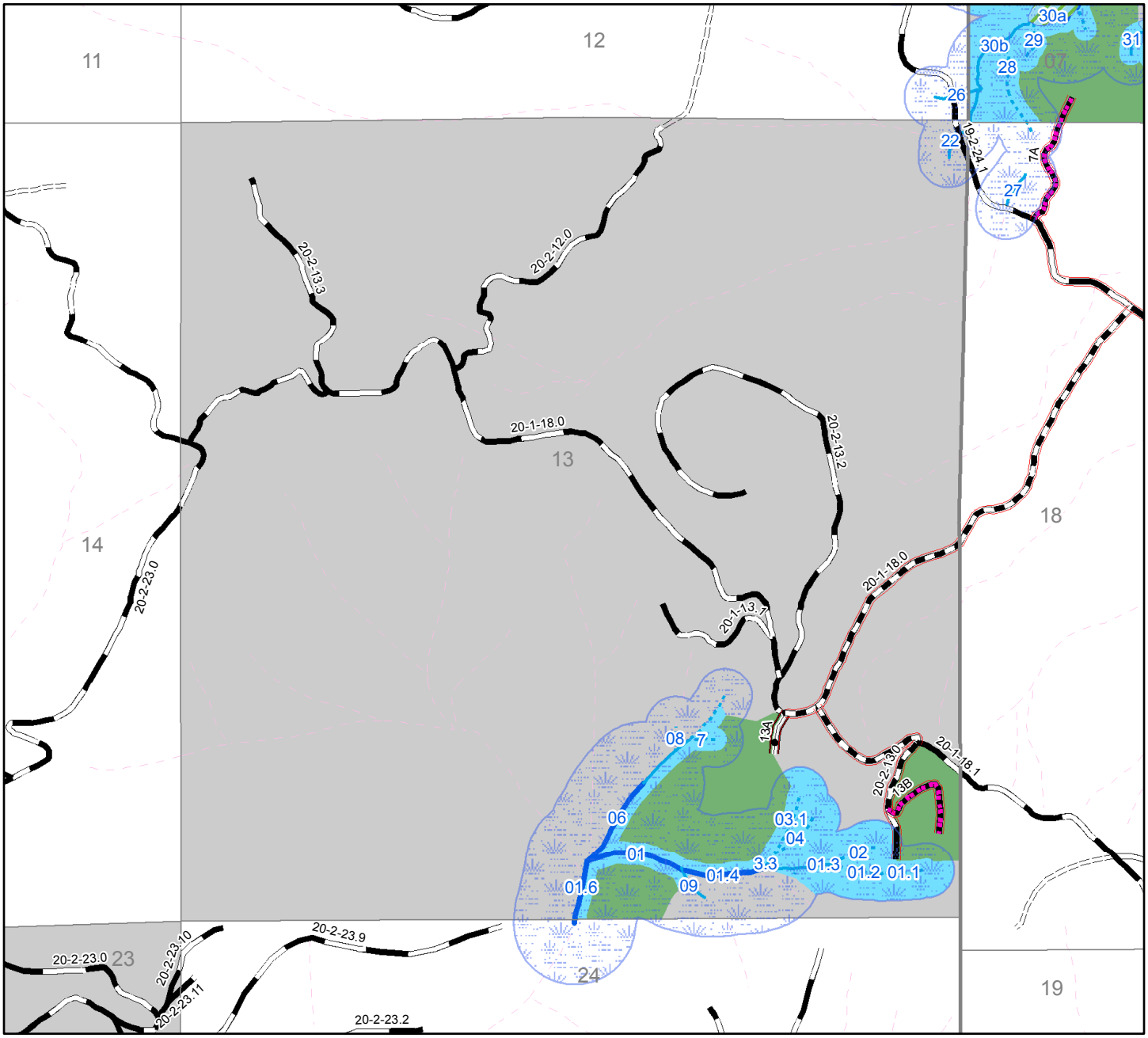
Lost Creek EA - Alt 2

Gosage Incline

T20S-R02W SEC. 13



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Cable
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- Improvement, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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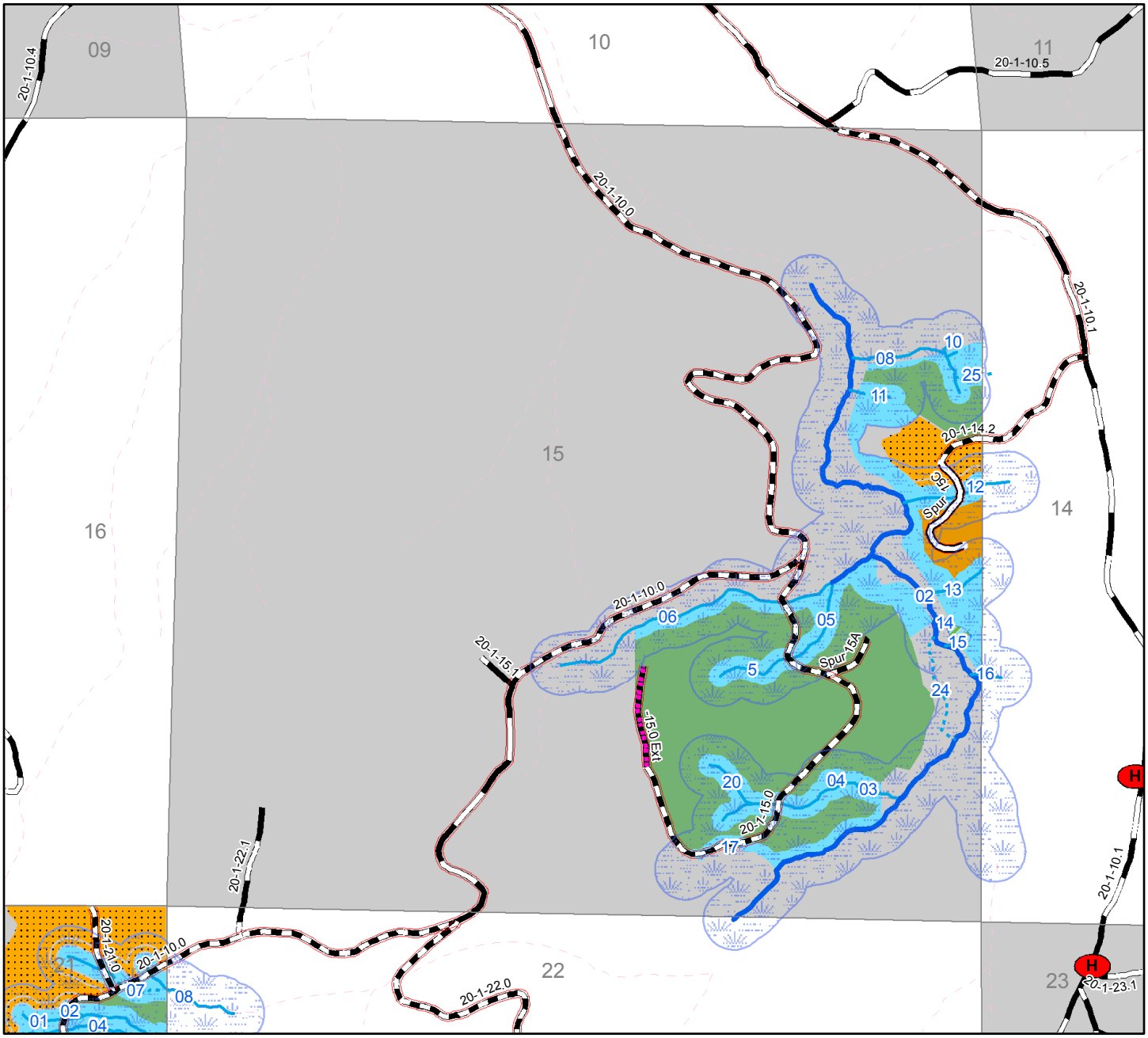
Lost Creek EA - Alt 2

Guileless

T20S-R01W SEC. 15



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Cable
- Ground-based
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Helo_Landings
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Rock
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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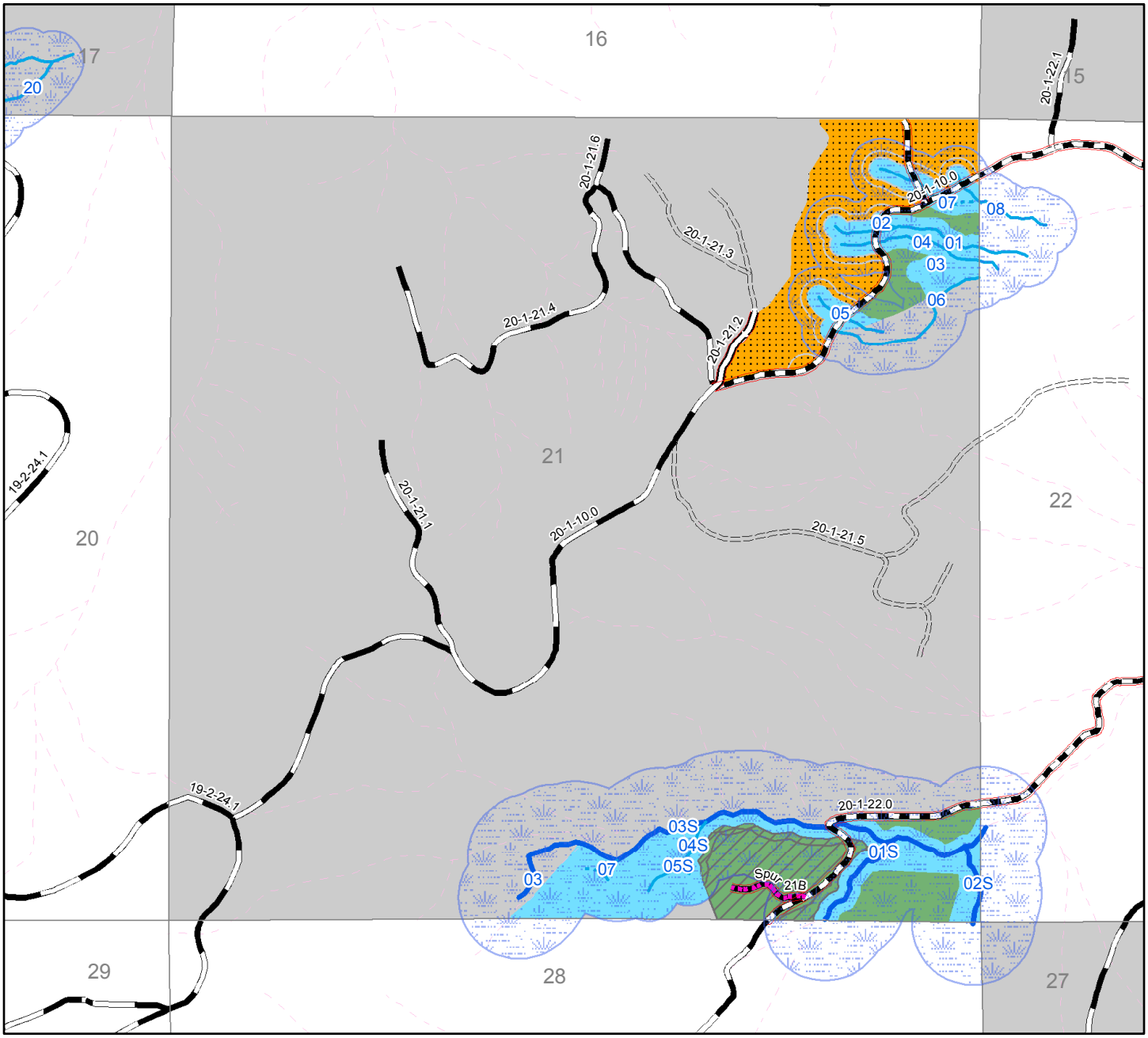
Lost Creek EA - Alt 2

Guileless

T20S-R01W SEC. 21



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Cable
- Optional Prefer Cable
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

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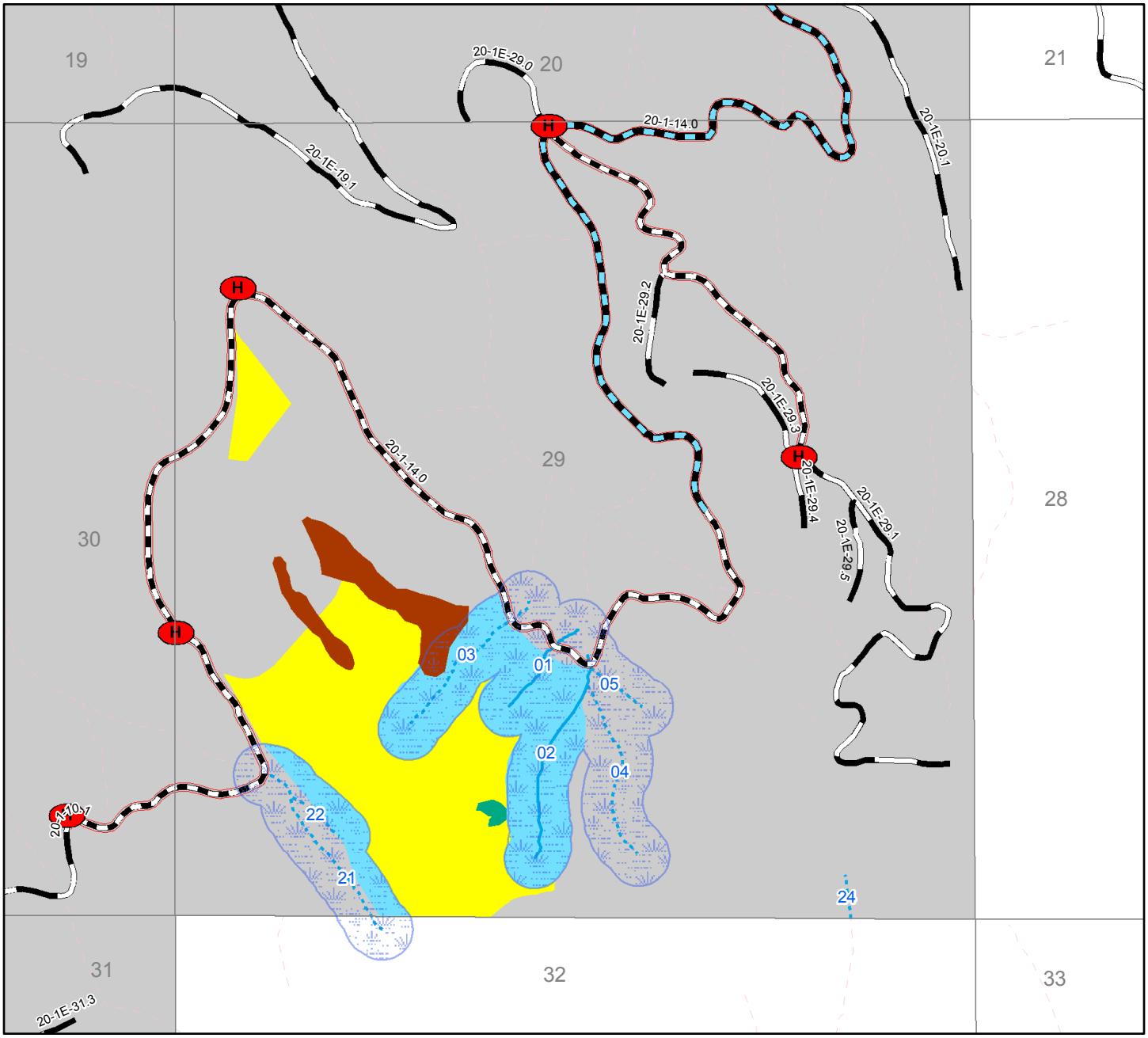
Lost Creek EA - Alt 2

John's Last Stand

T20S-R01E SEC. 29



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- TPCC Withdrawn
- Grouped Retention
- Helicopter
- No Cut Hydro Buffer
- Helo_Landings
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

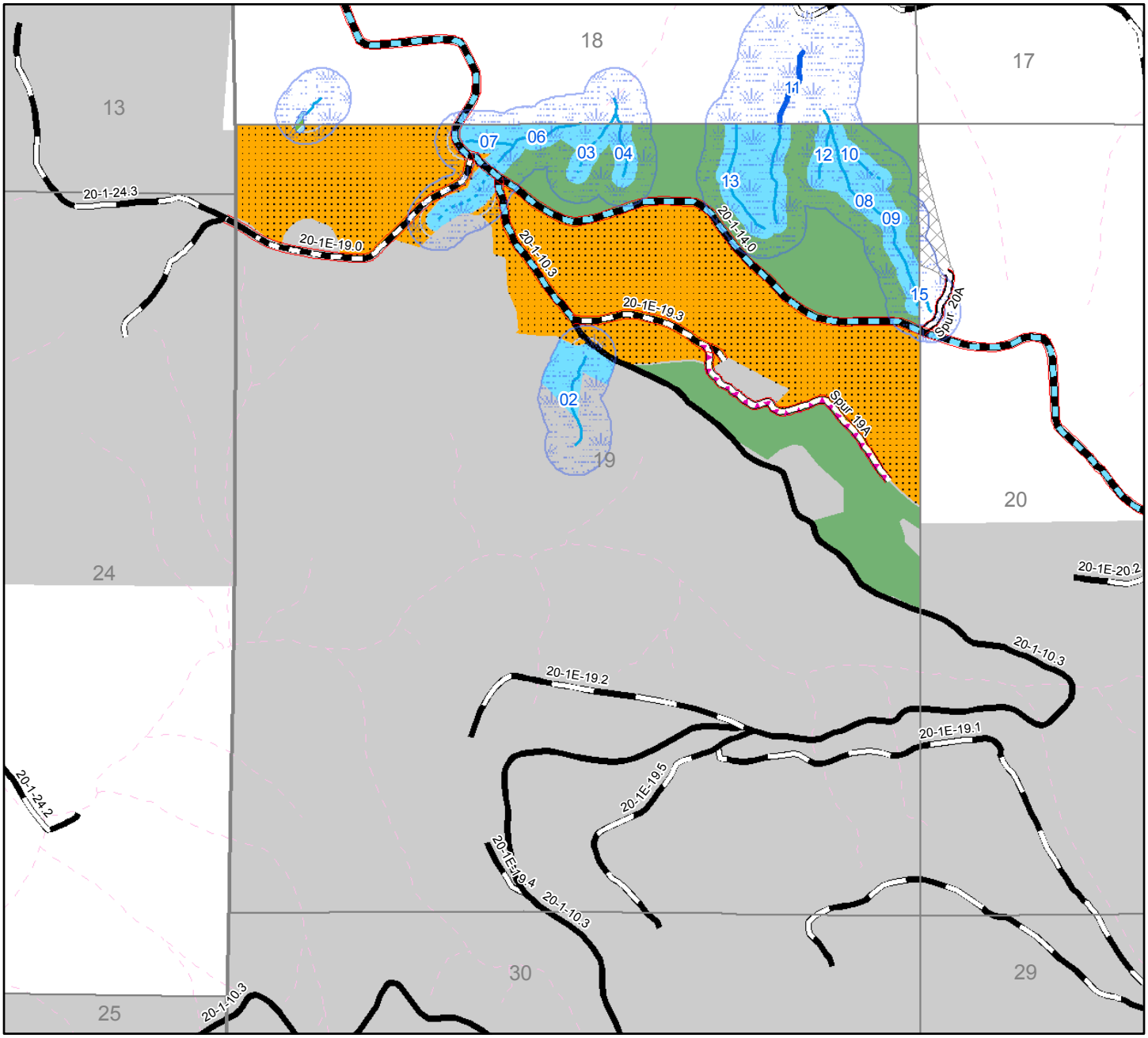
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 2

Missing Links

T20S-R01E SEC. 19



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Cable
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Paved
- Construction, Optional Rock
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

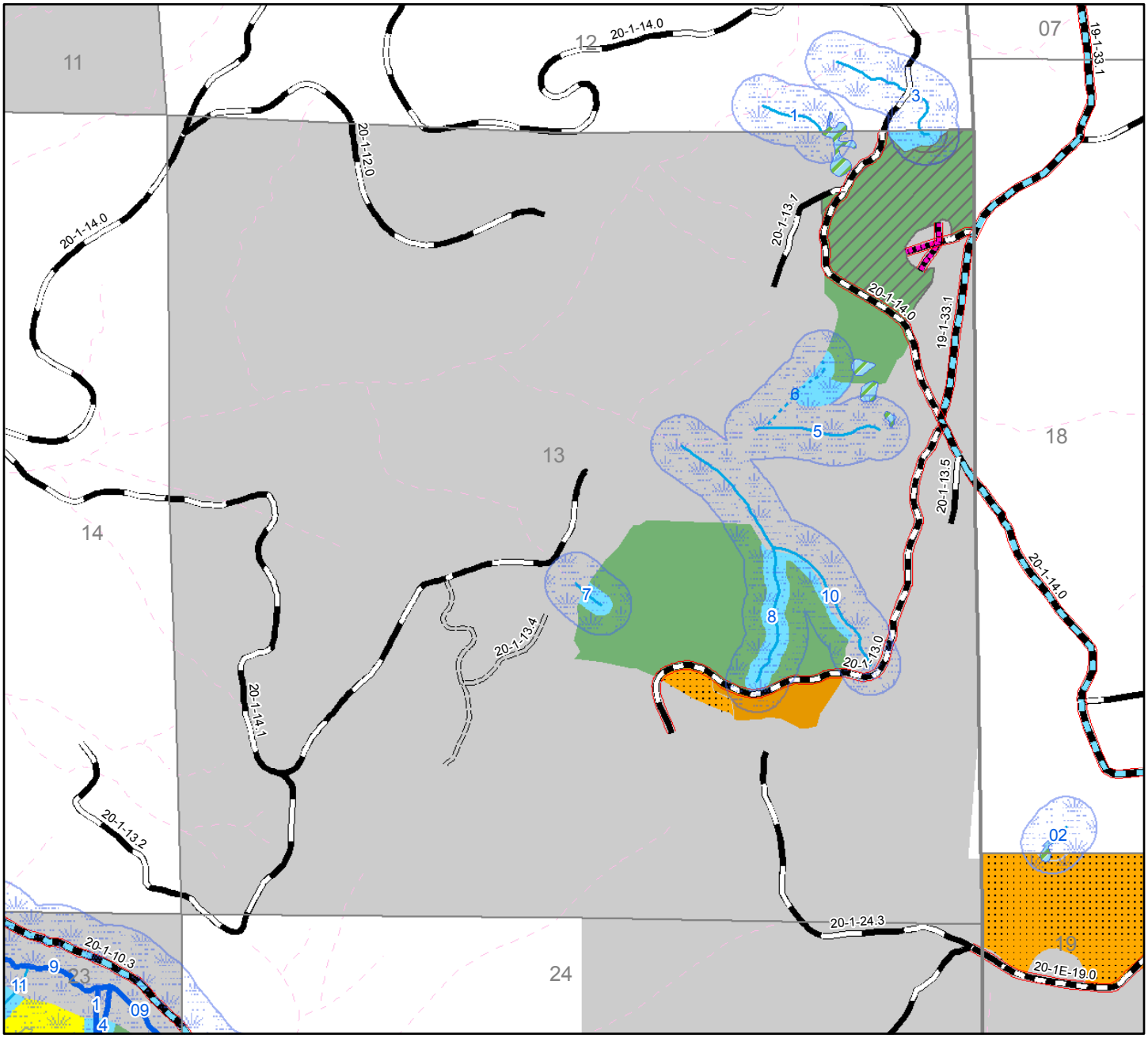
Water Bodies
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 2

Missing Links

T20S-R01W SEC. 13



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Helicopter
- Cable
- Optional Prefer Cable
- Ground-based
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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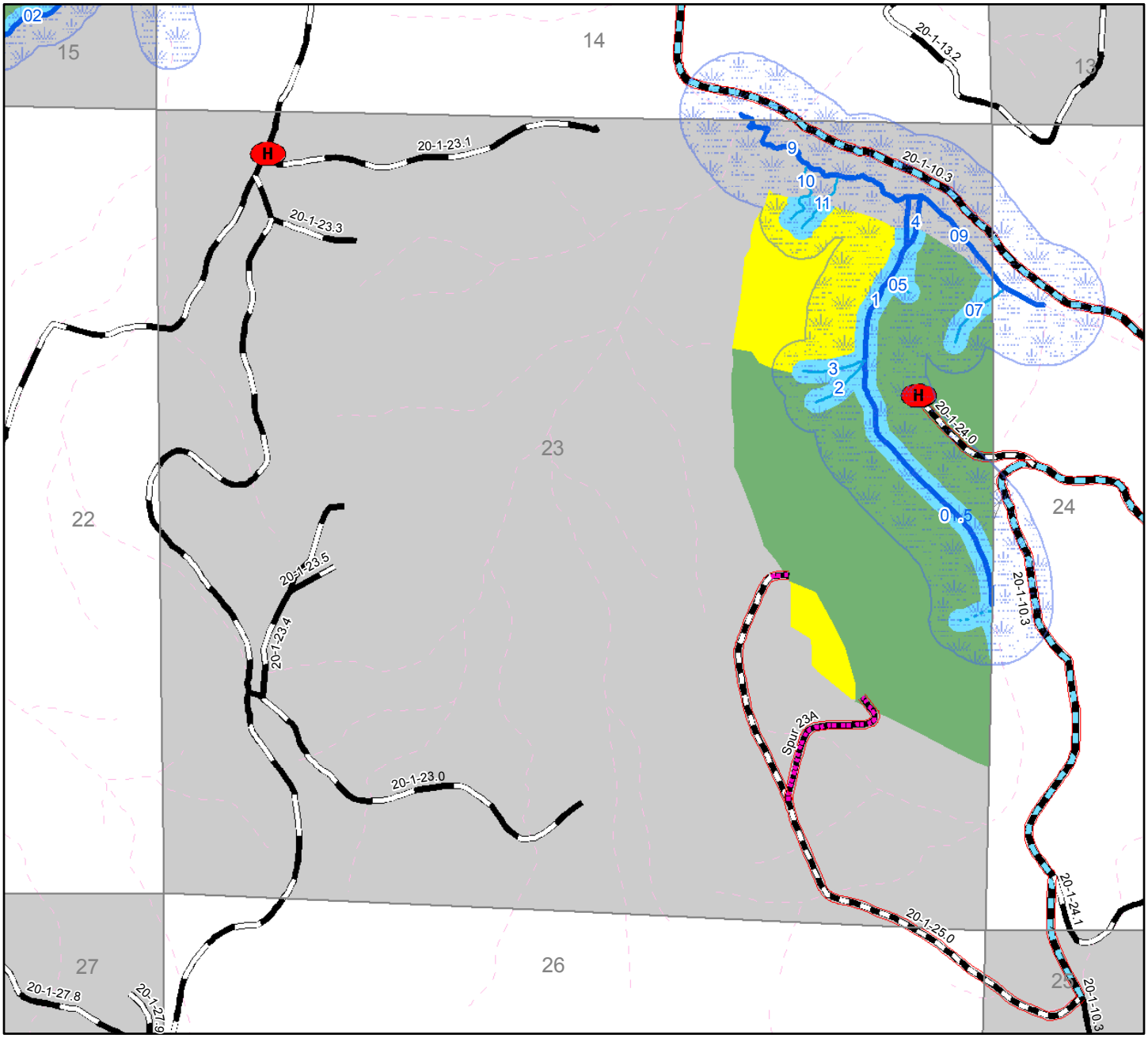
Lost Creek EA - Alt 2

Missing Links

T20S-R01W SEC. 23



N

0 500 1,000 1,500 Feet

Alt2 Yarding Method
- Helicopter
- Cable
- Special Yarding Area
- No Cut Hydro Buffer
- Helo_Landings
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Paved
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

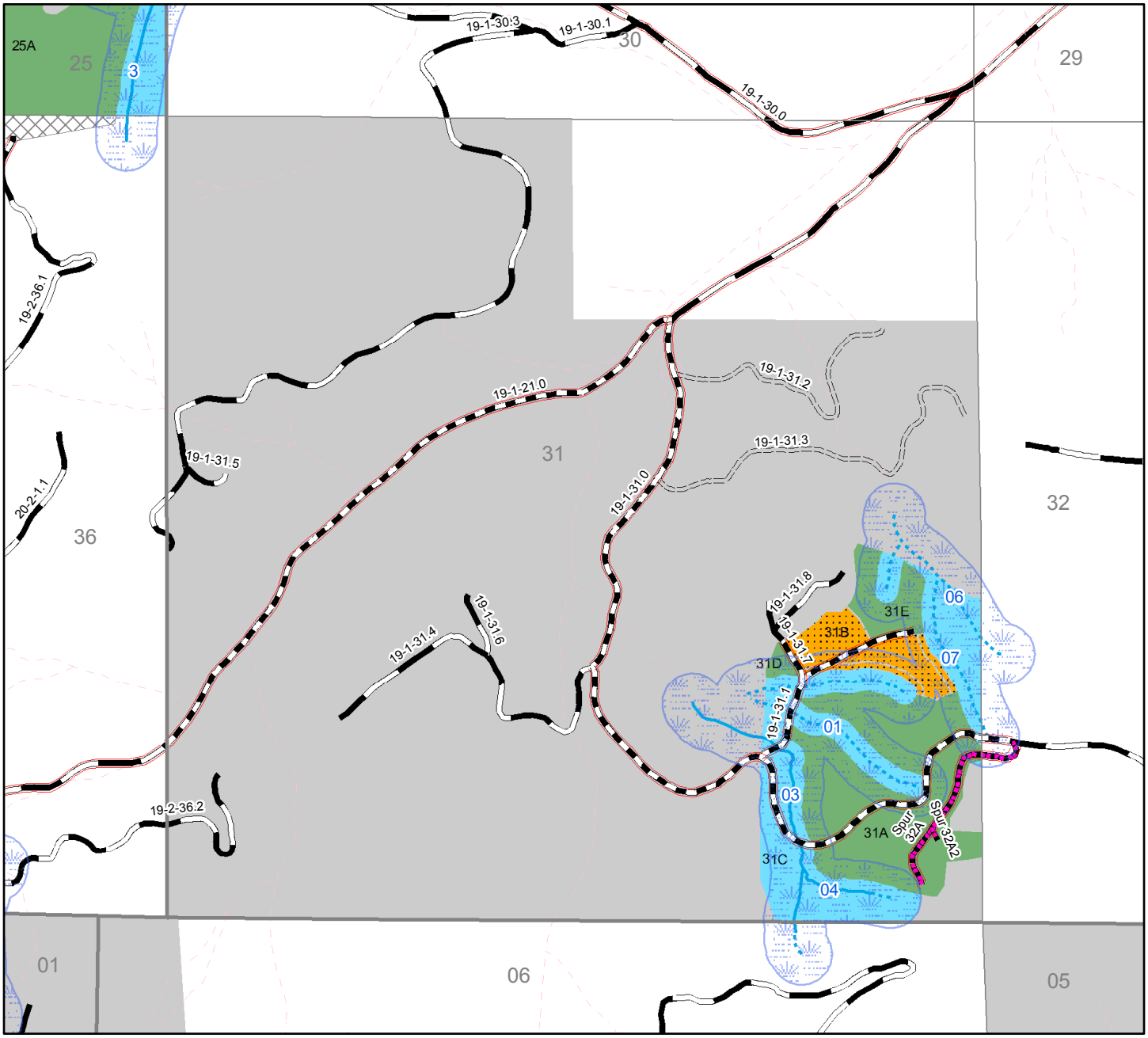
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Anthony Access

T19S-R01W SEC. 31



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Cable
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Riparian Reserve

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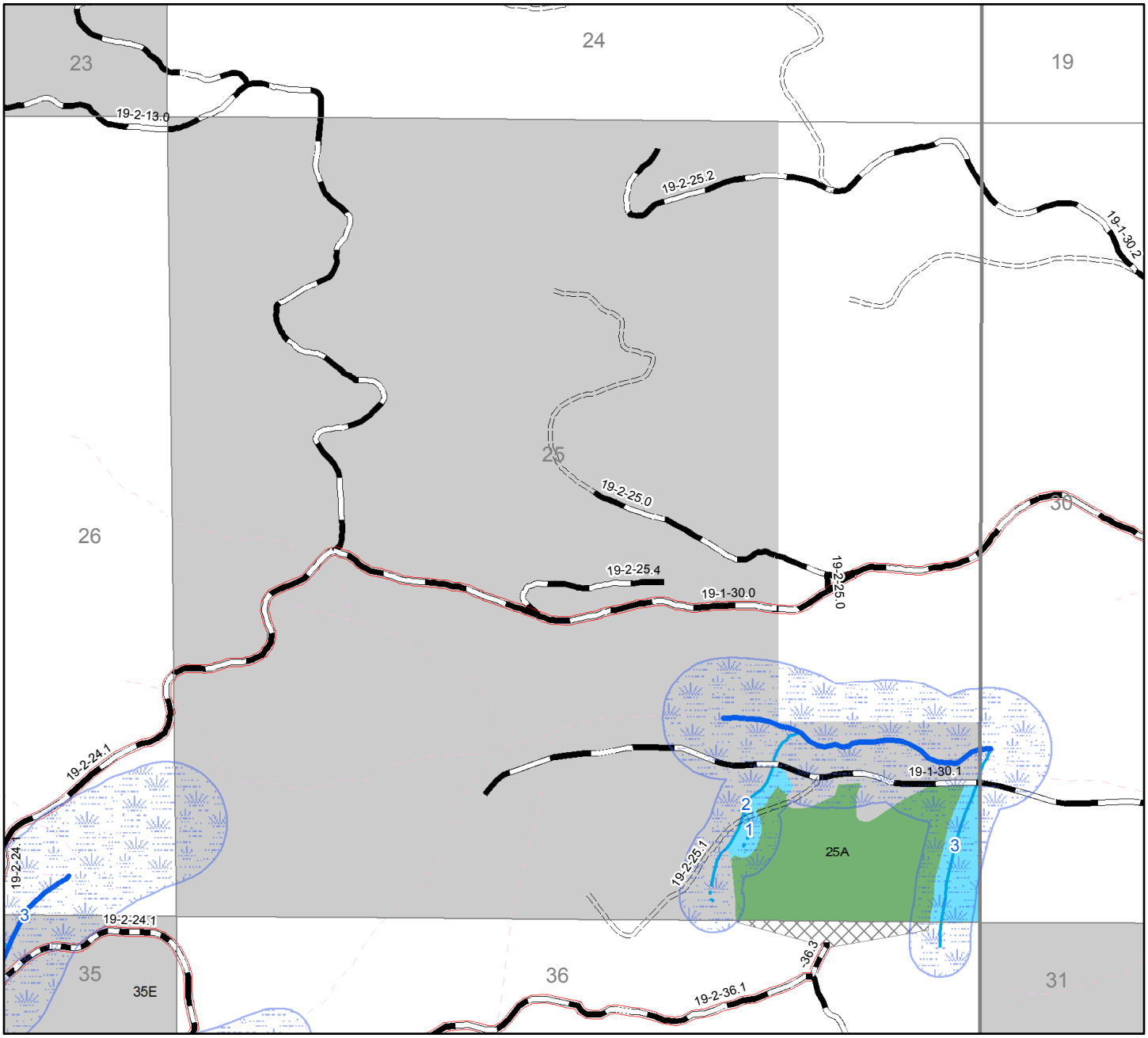
Lost Creek EA - Alt 3

Anthony Access

T19S-R02W SEC. 25



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Cable
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- HaulRoute

Hydrolines

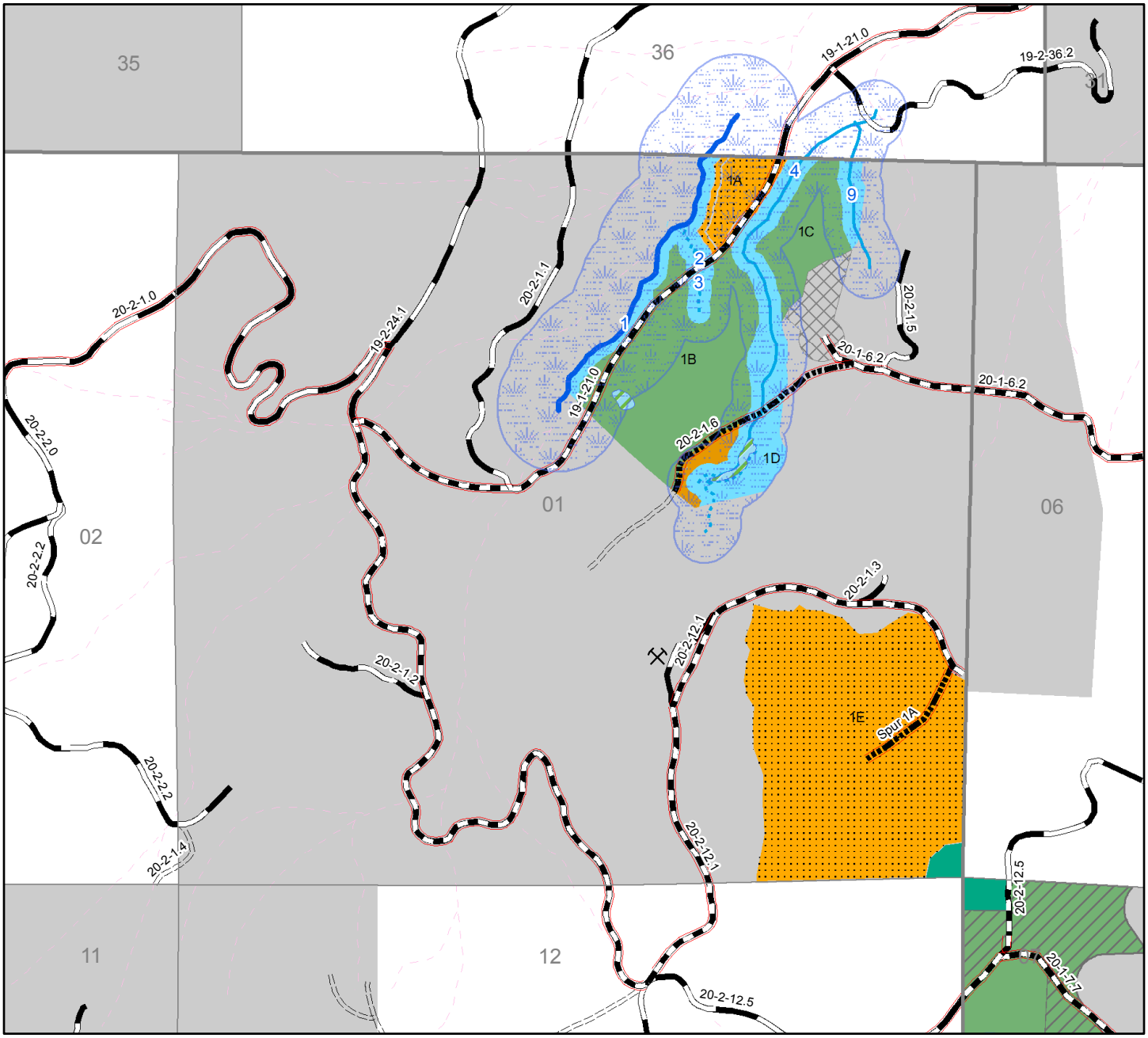
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Anthony Access

T20S-R02W SEC. 01



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Grouped Retention
- Cable
- Optional Prefer Cable
- Ground-based
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- Renovation, Optional Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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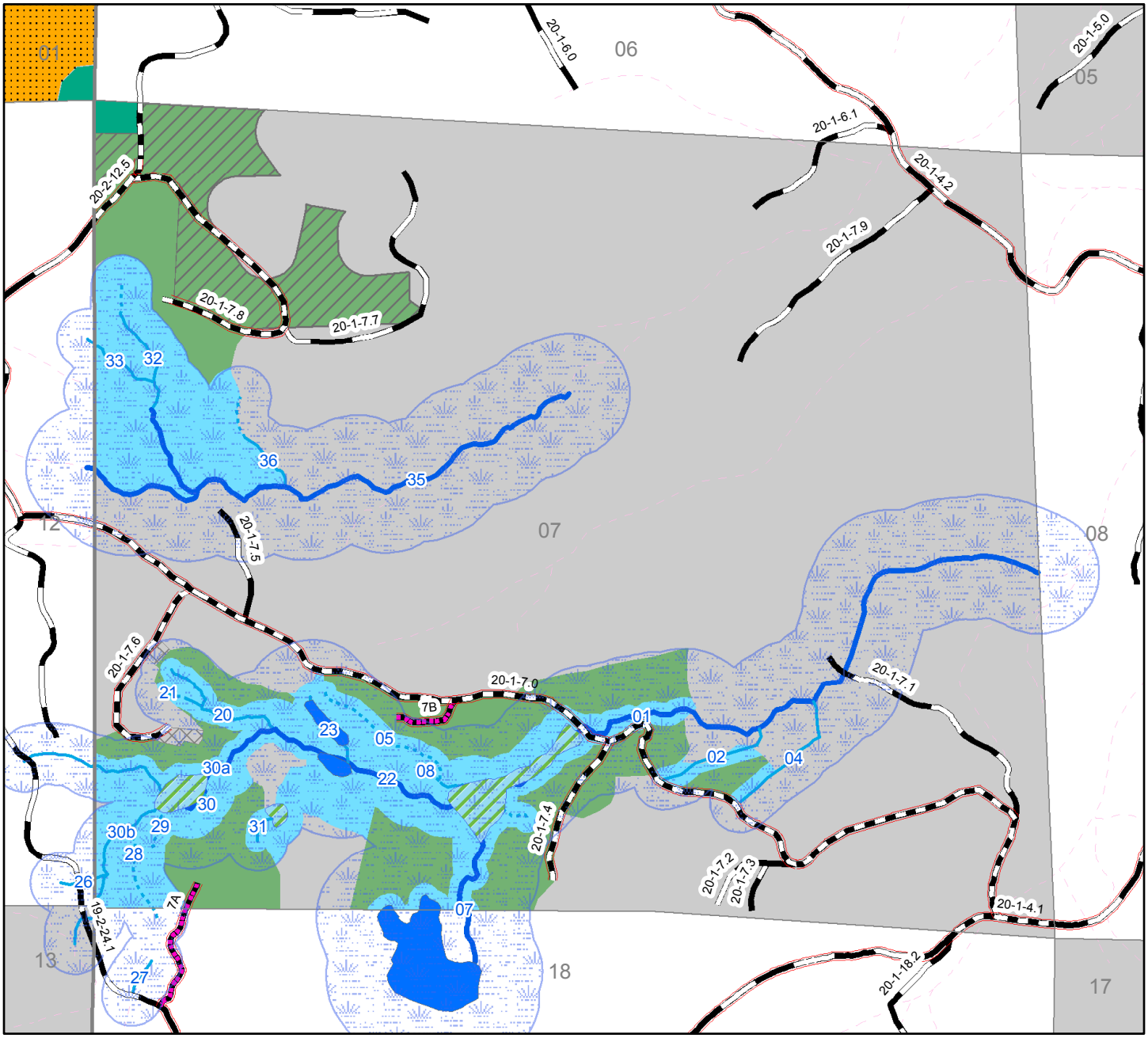
Lost Creek EA - Alt 3

Gosage Incline

T20S-R01W SEC. 07



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Grouped Retention
- Cable
- Optional Prefer Cable
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

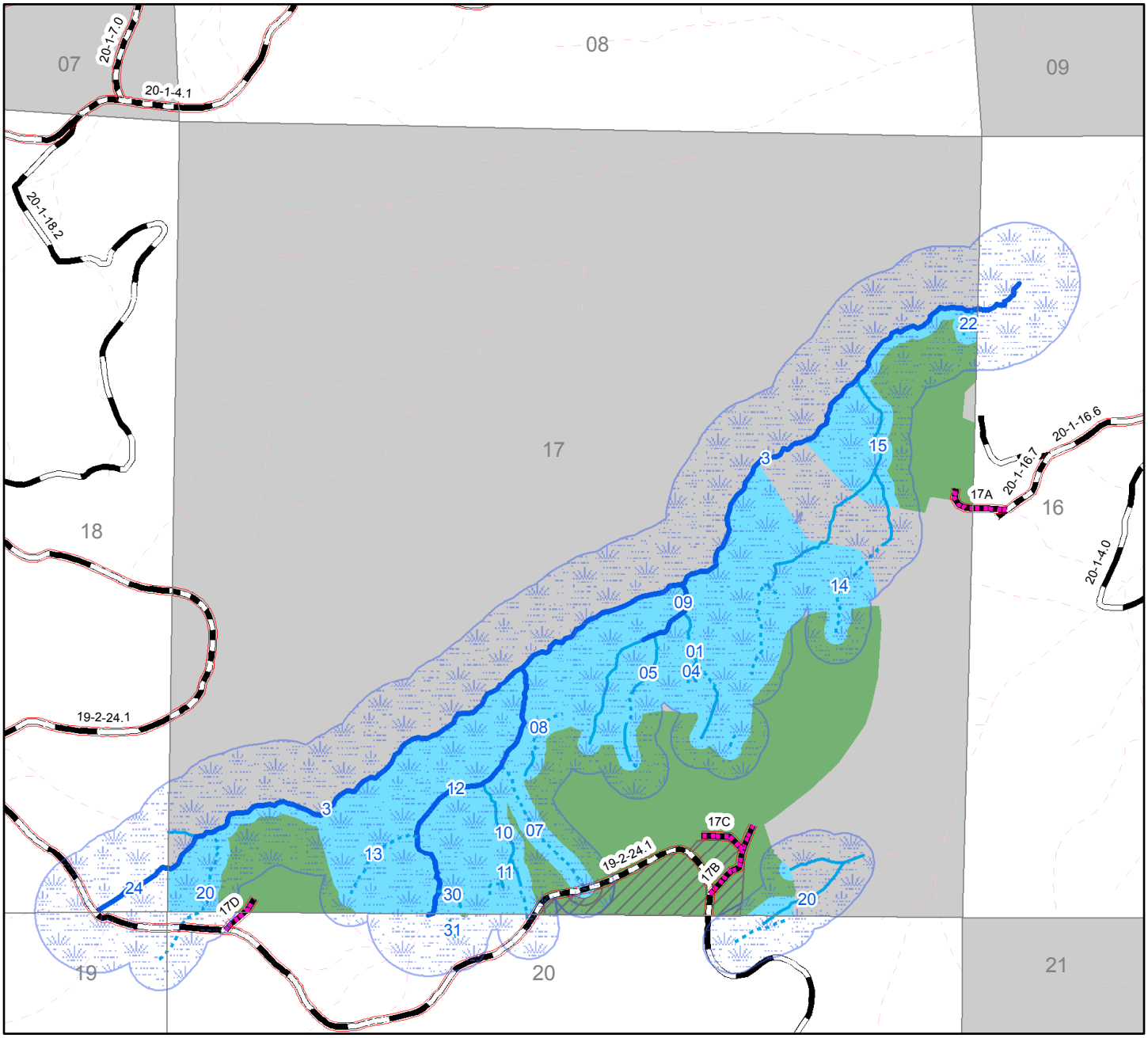
Water Bodies
- Pond
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Gosage Incline

T20S-R01W SEC. 17



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Cable
- Optional Prefer Cable
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

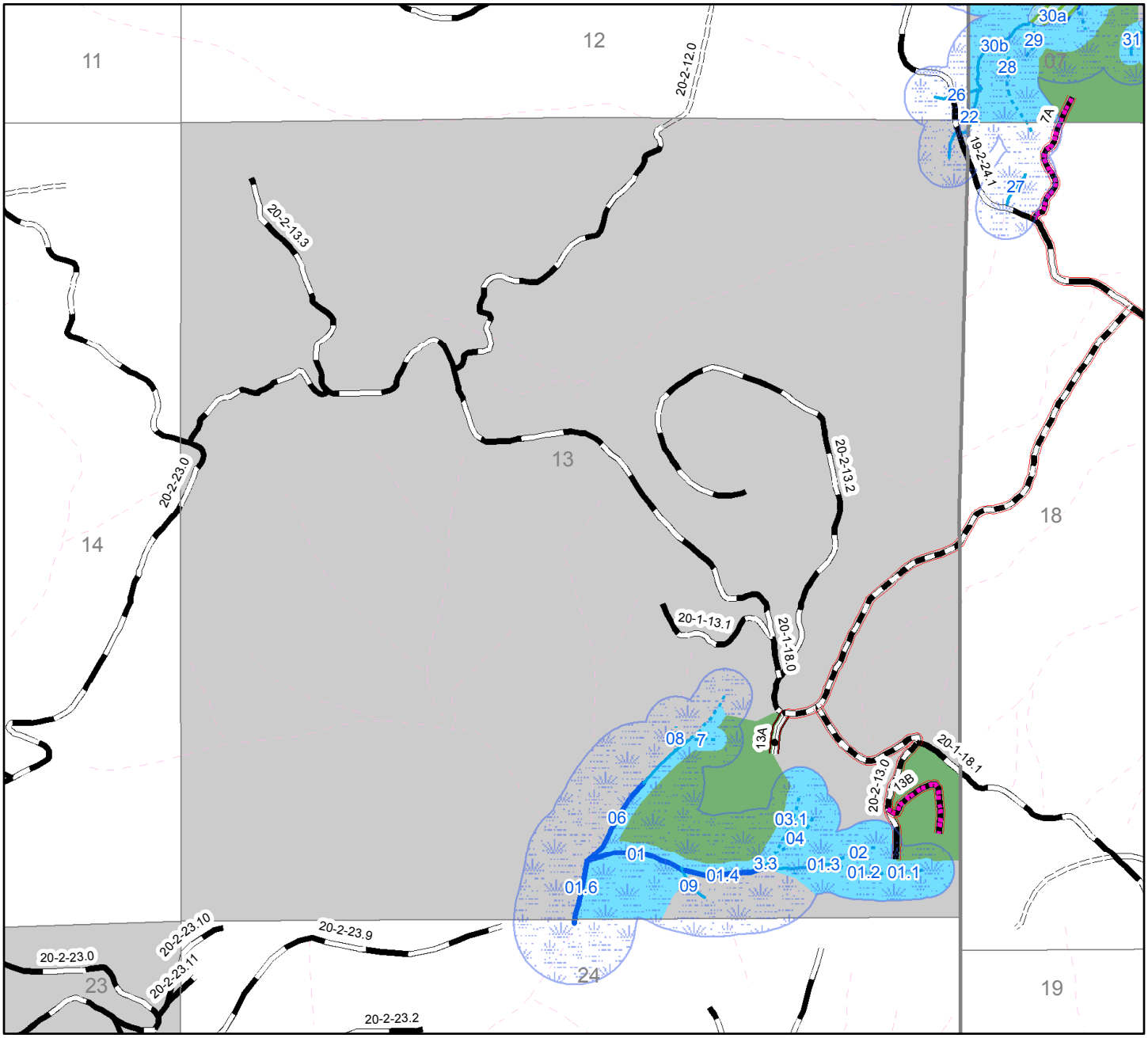
Water Bodies
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Gosage Incline

T20S-R02W SEC. 13



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Cable
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- Improvement, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

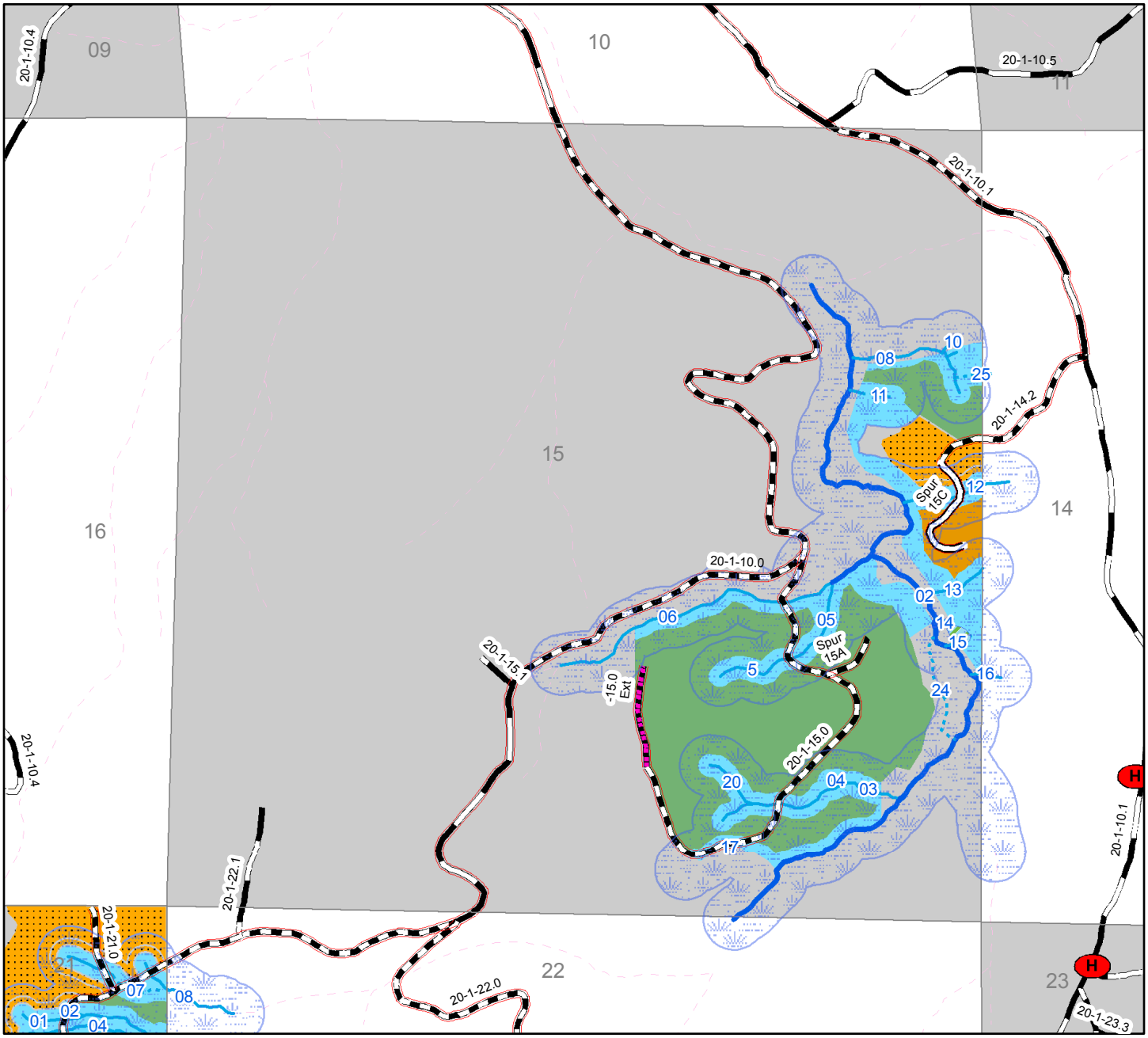
Water Bodies
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Guileless

T20S-R01W SEC. 15



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Cable
- Ground-based
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Helo_Landings
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Rock
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

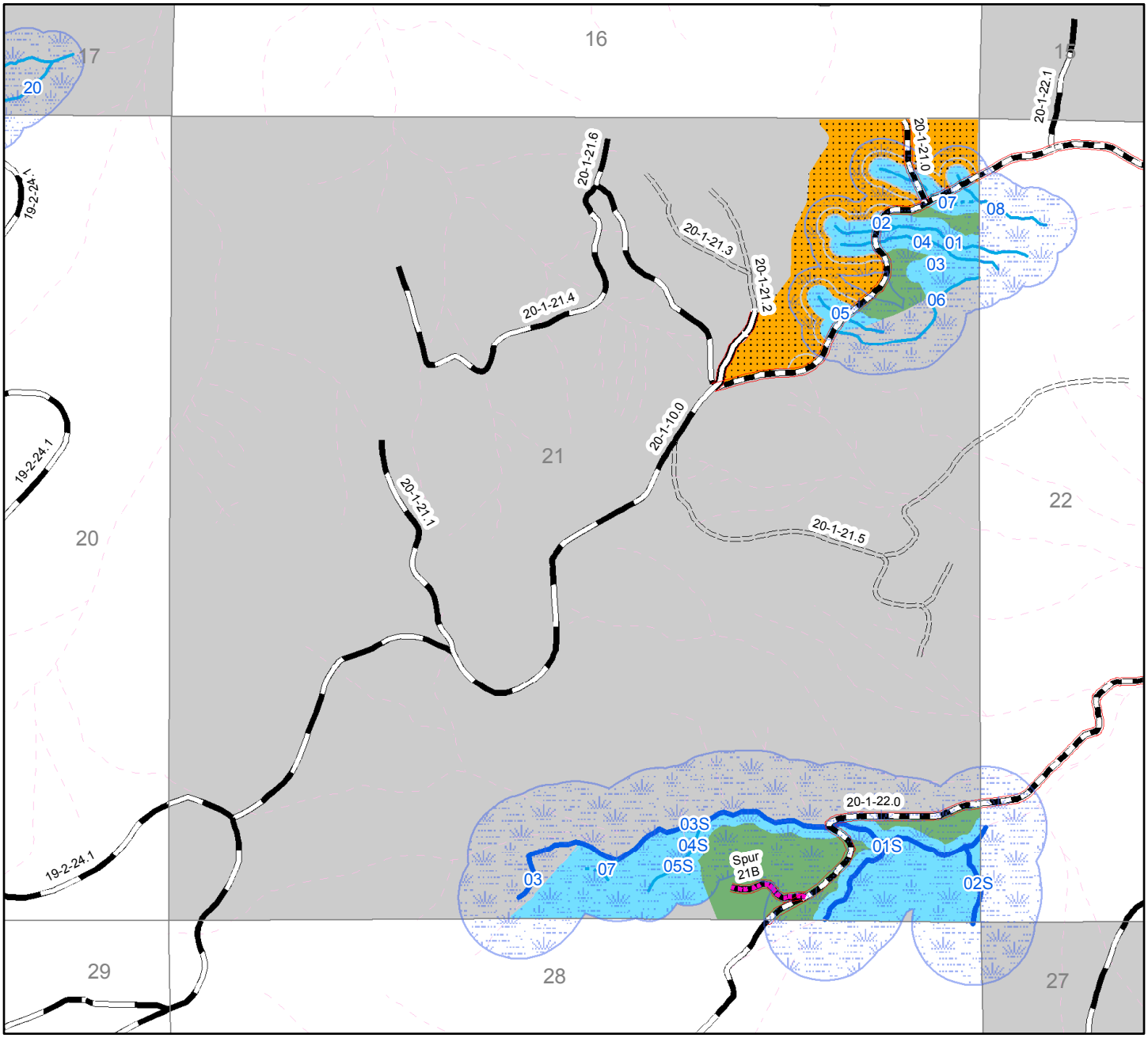
Water Bodies
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Guileless

T20S-R01W SEC. 21



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Cable
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

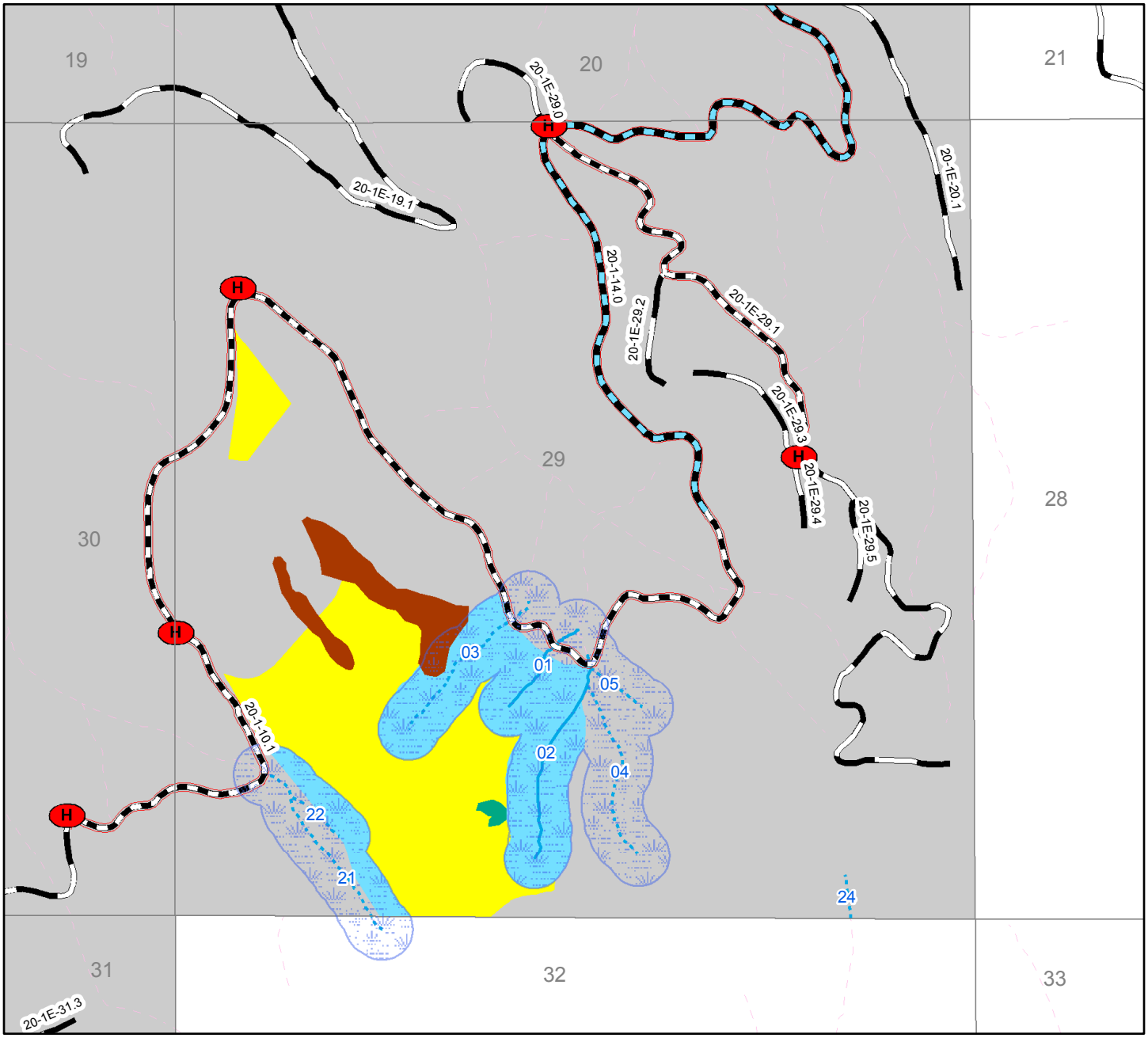
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

John's Last Stand

T20S-R01E SEC. 29



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- TPCC Withdrawn
- Grouped Retention
- Helicopter
- No Cut Hydro Buffer
- H Helo_Landings
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

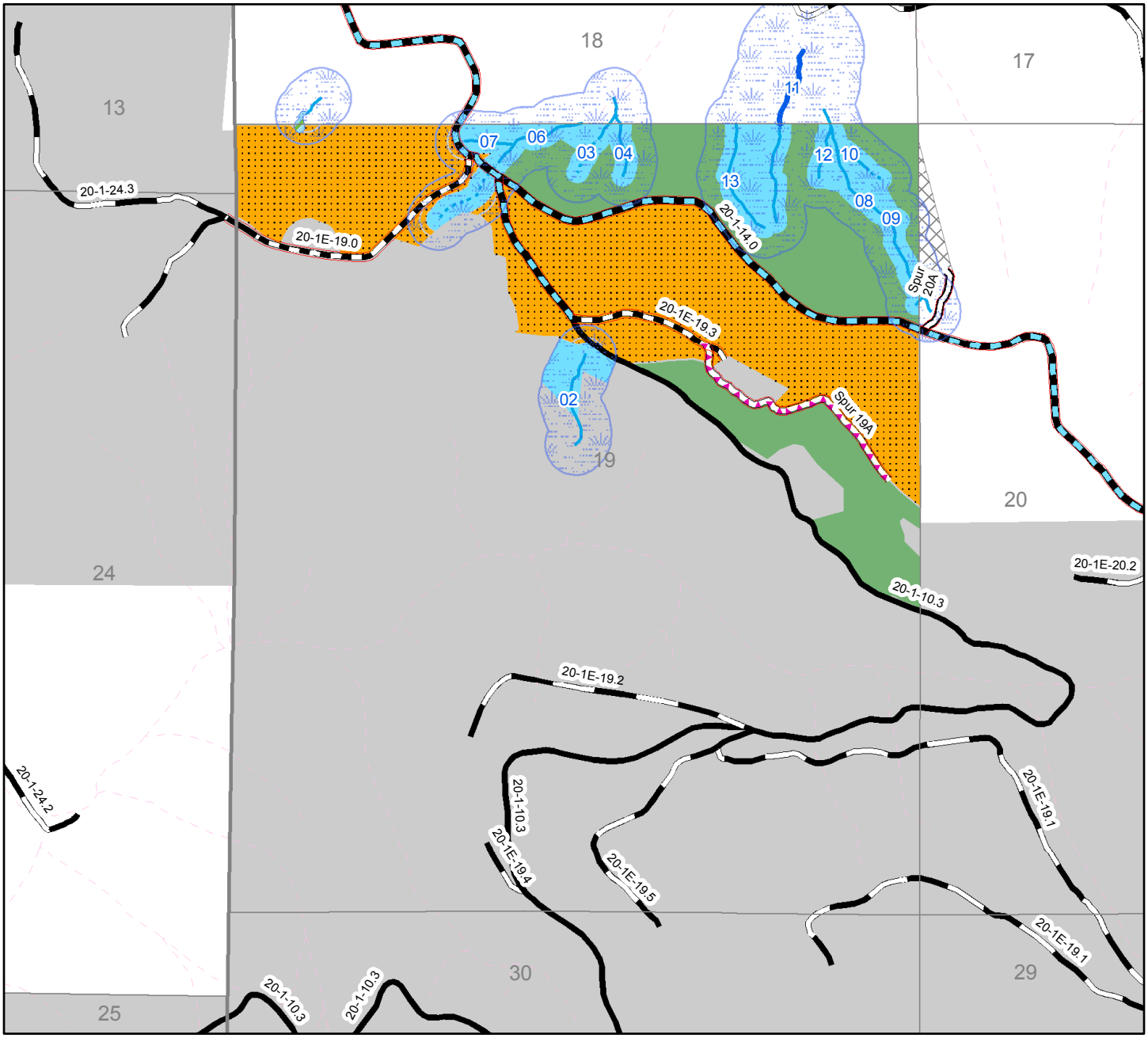
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Missing Links

T20S-R01E SEC. 19



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Cable
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Paved
- Construction, Optional Rock
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

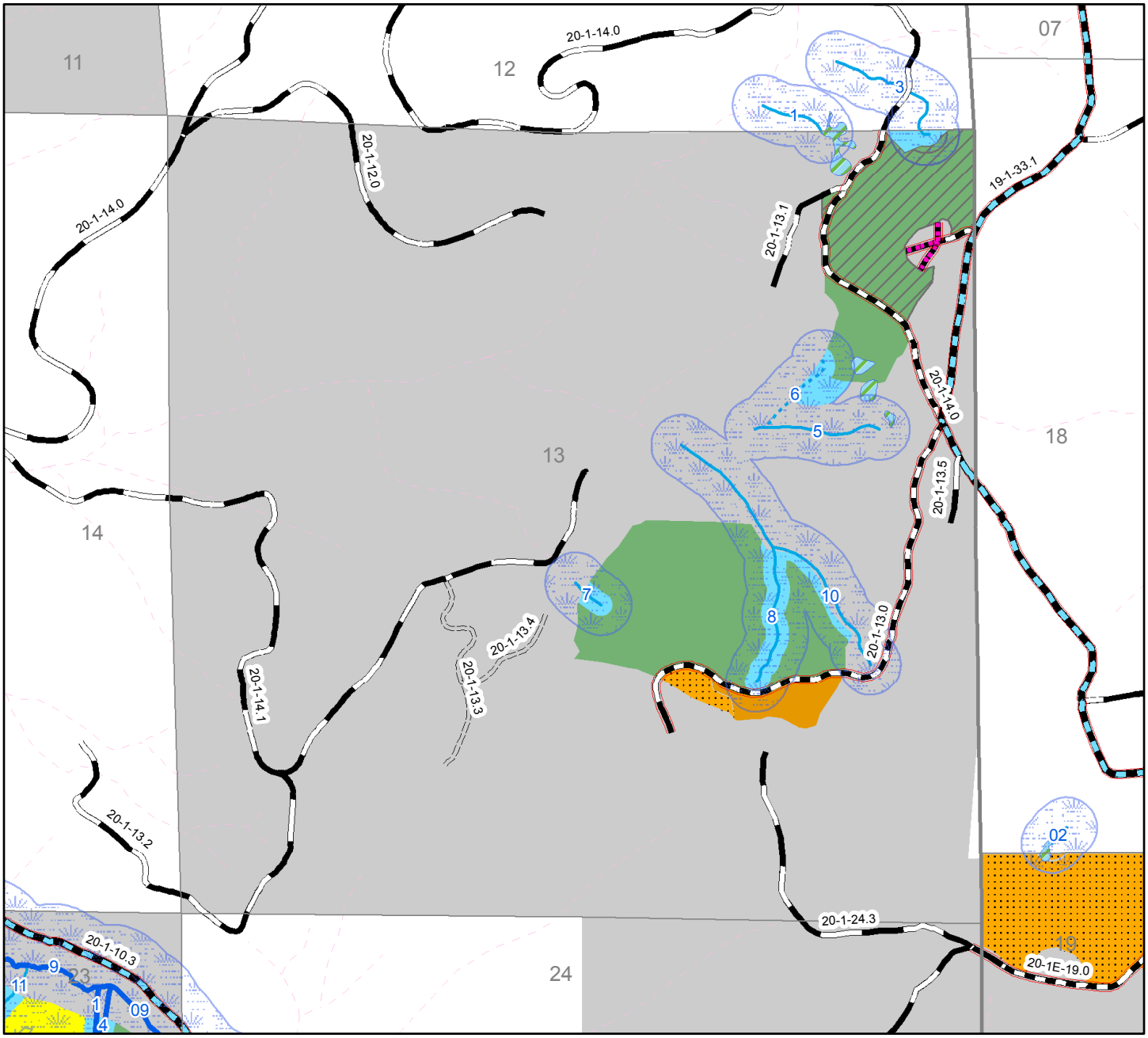
Water Bodies
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 3

Missing Links

T20S-R01W SEC. 13



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Helicopter
- Cable
- Optional Prefer Cable
- Ground-based
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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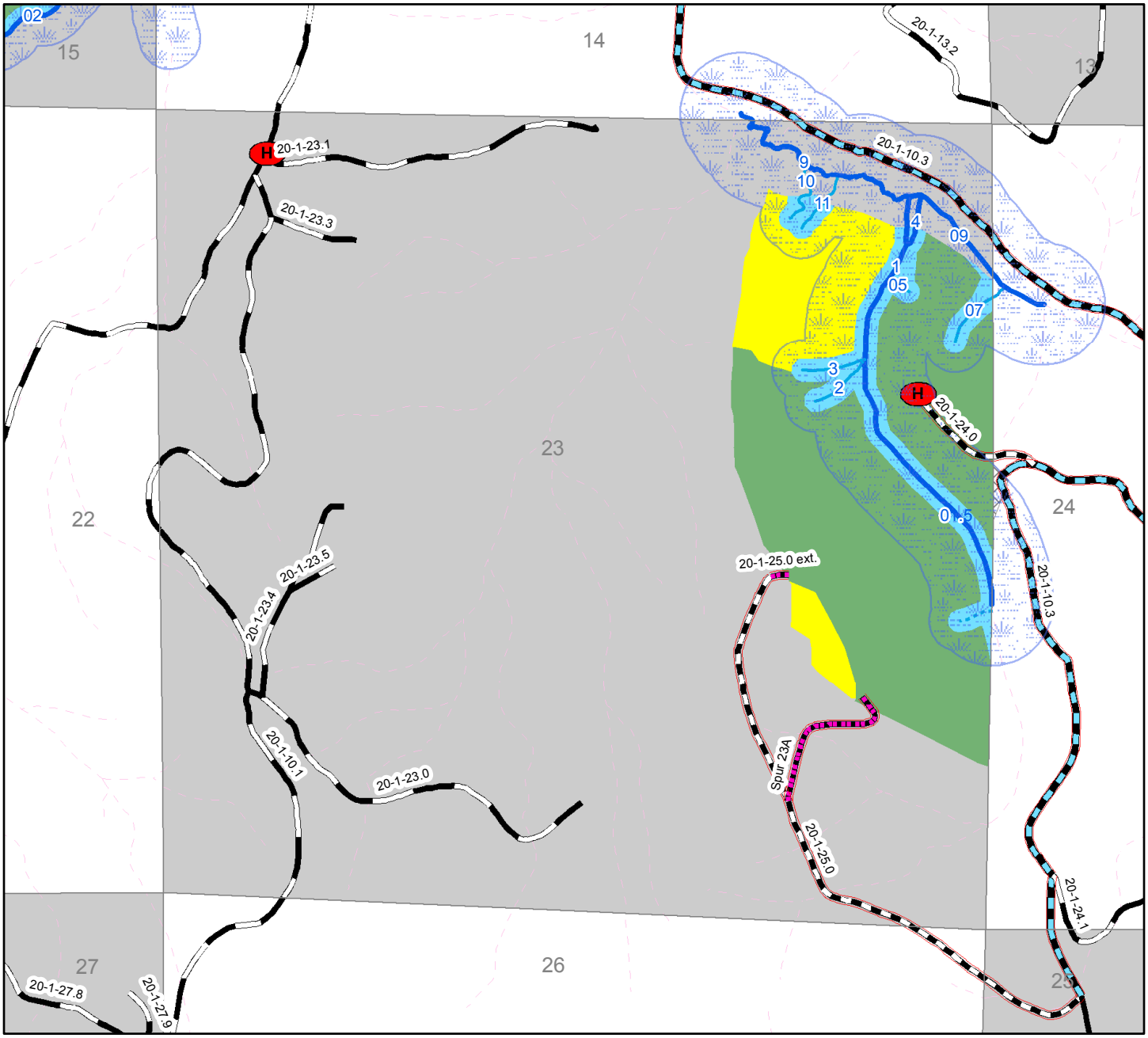
Lost Creek EA - Alt 3

Missing Links

T20S-R01W SEC. 23



N

0 500 1,000 1,500 Feet

Alt3 Yarding Method
- Helicopter
- Cable
- Special Yarding Area
- No Cut Hydro Buffer
- Helo_Landings
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Paved
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

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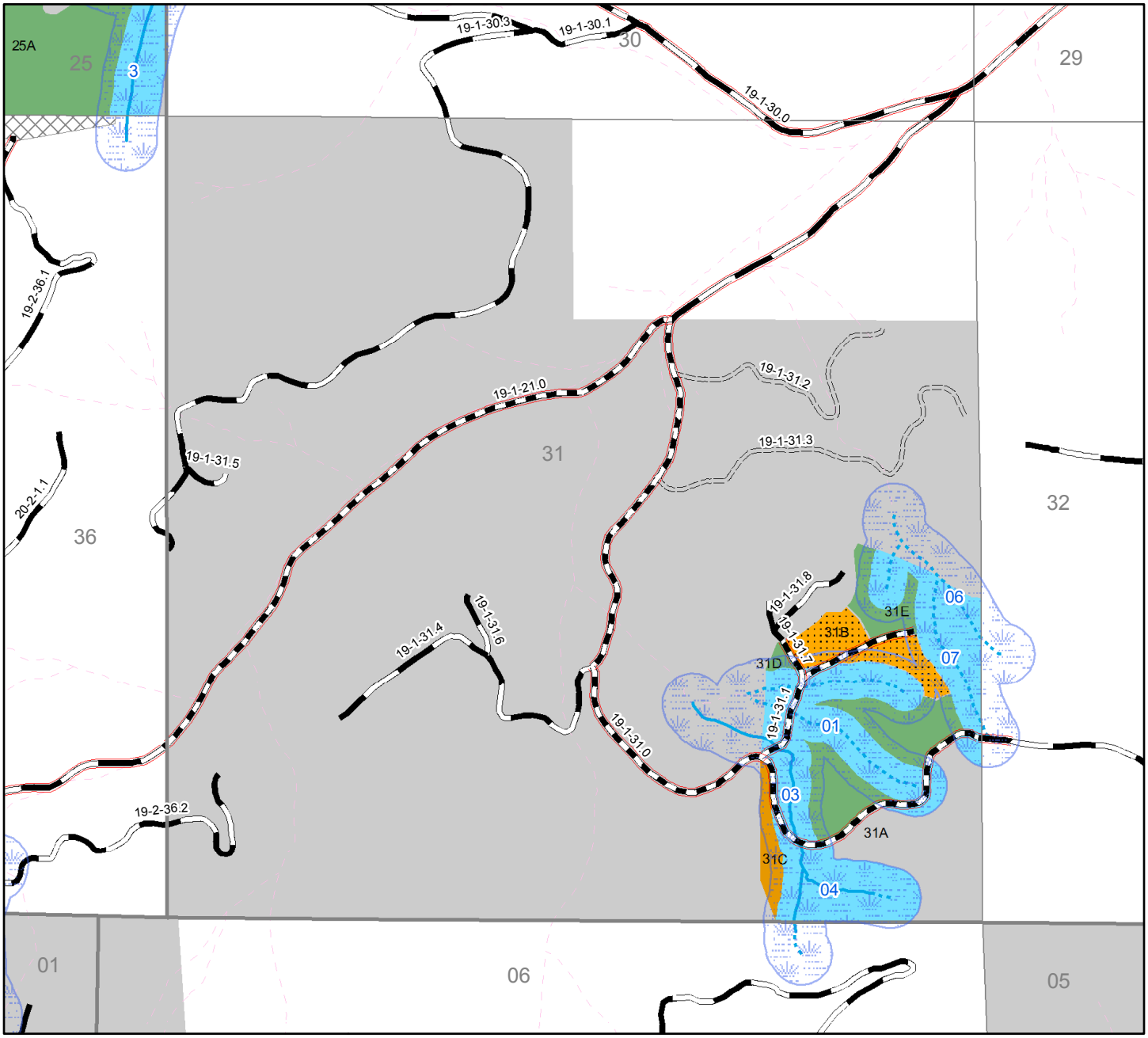
Lost Creek EA - Alt 4

Anthony Access

T19S-R01W SEC. 31



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Ground-based
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Riparian Reserve

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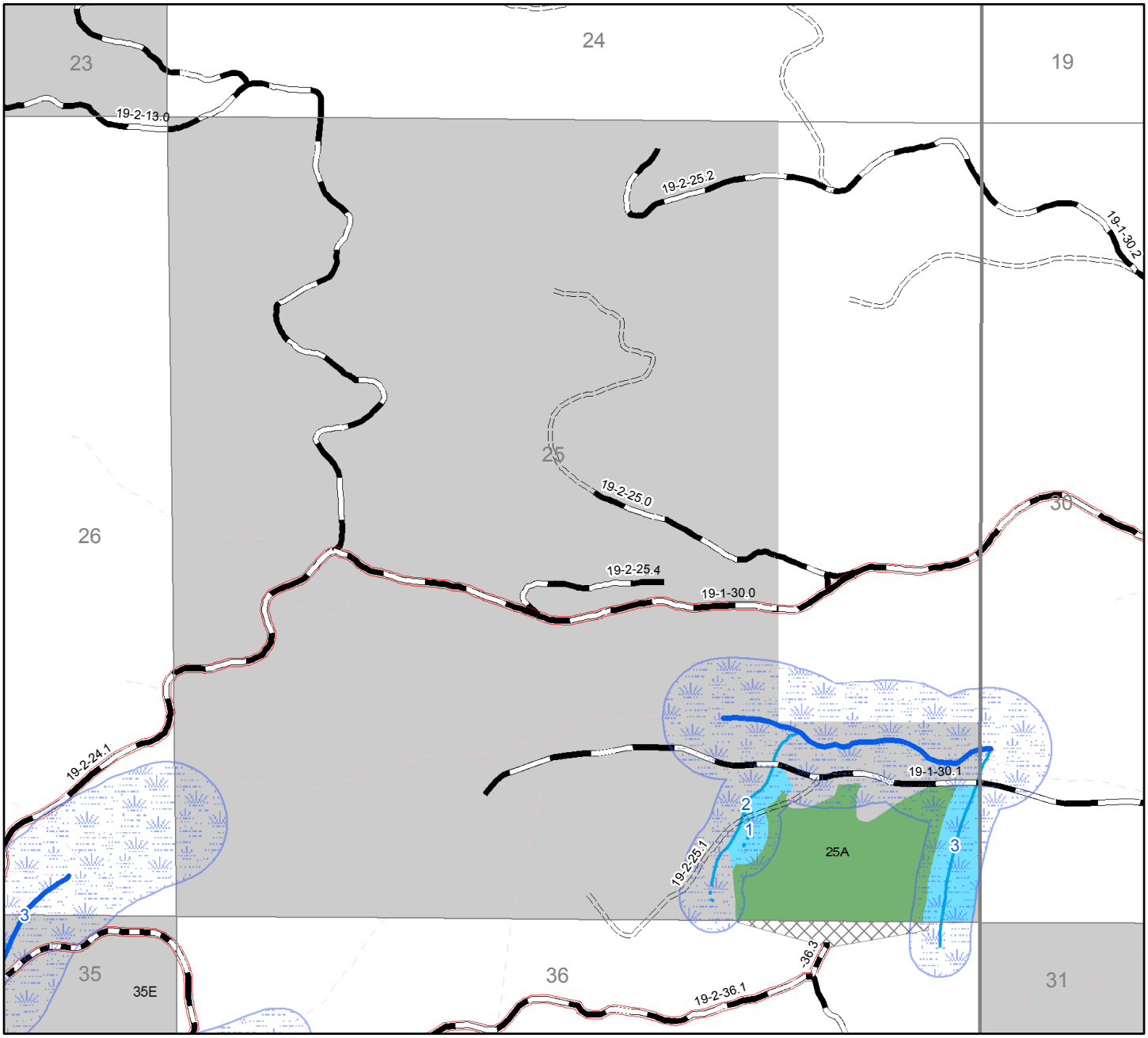
Lost Creek EA - Alt 4

Anthony Access

T19S-R02W SEC. 25



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

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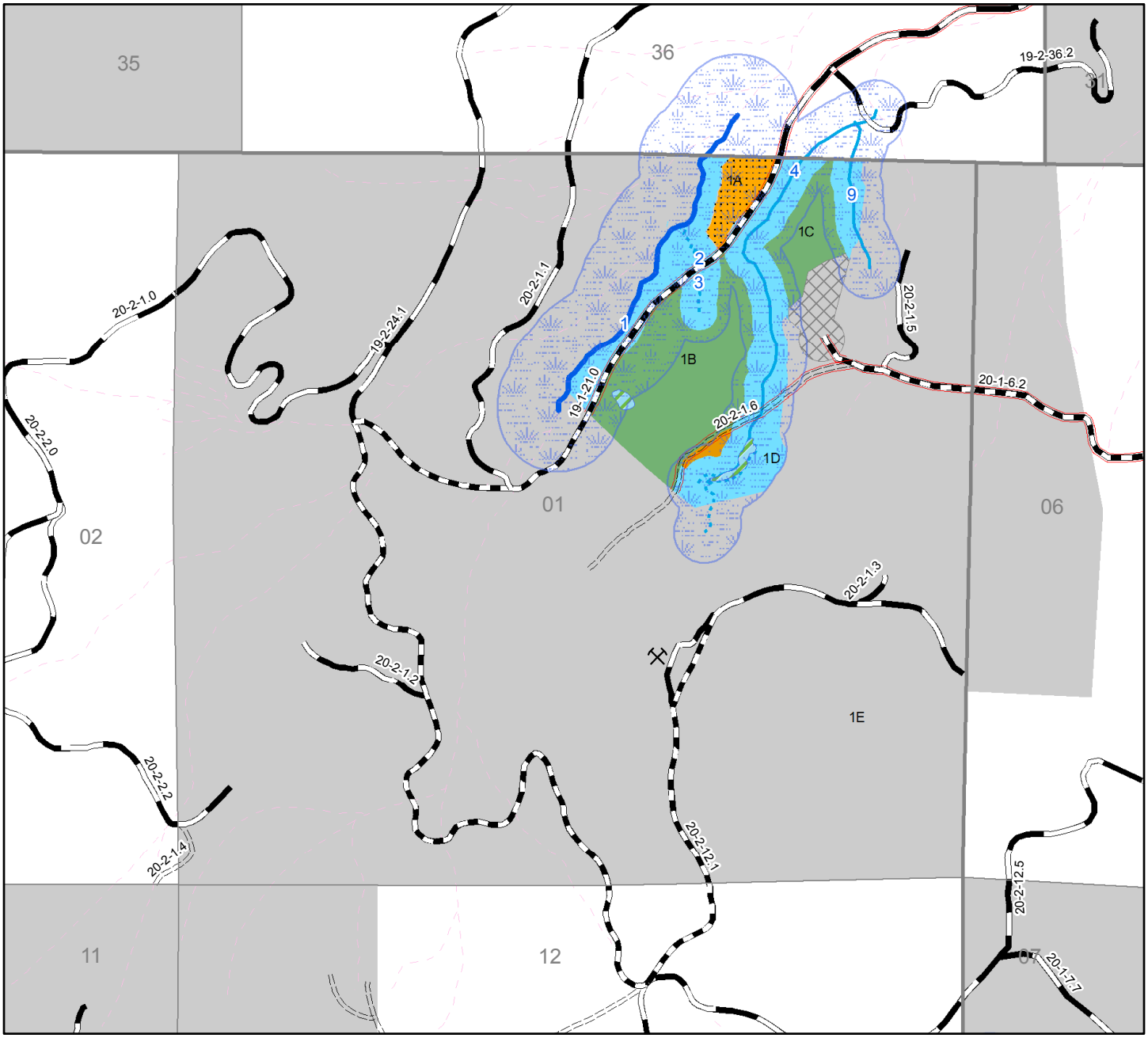
Lost Creek EA - Alt 4

Anthony Access

T20S-R02W SEC. 01



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Ground-based
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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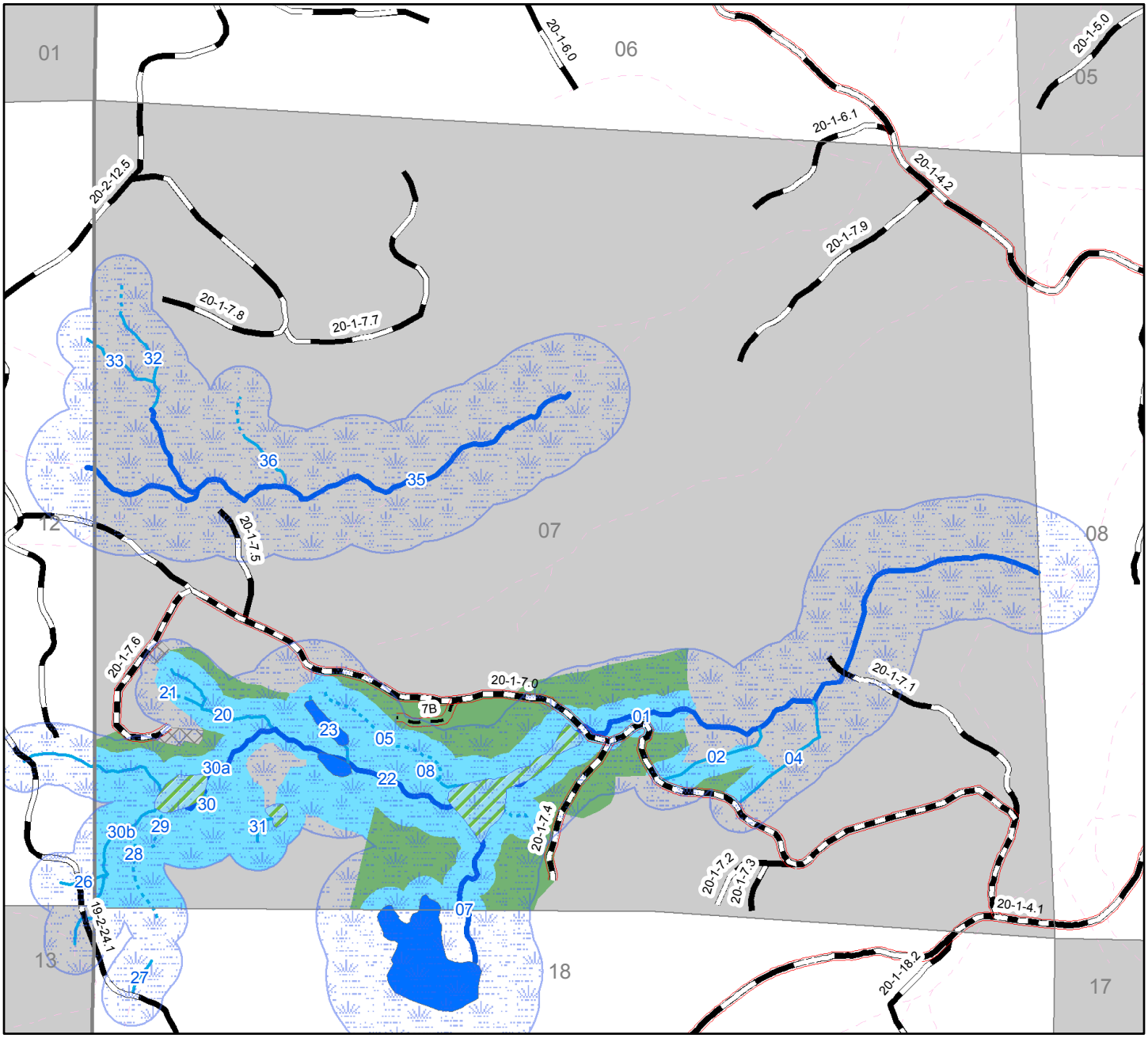
Lost Creek EA - Alt 4

Gosage Incline

T20S-R01W SEC. 07



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Native
- Renovation, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

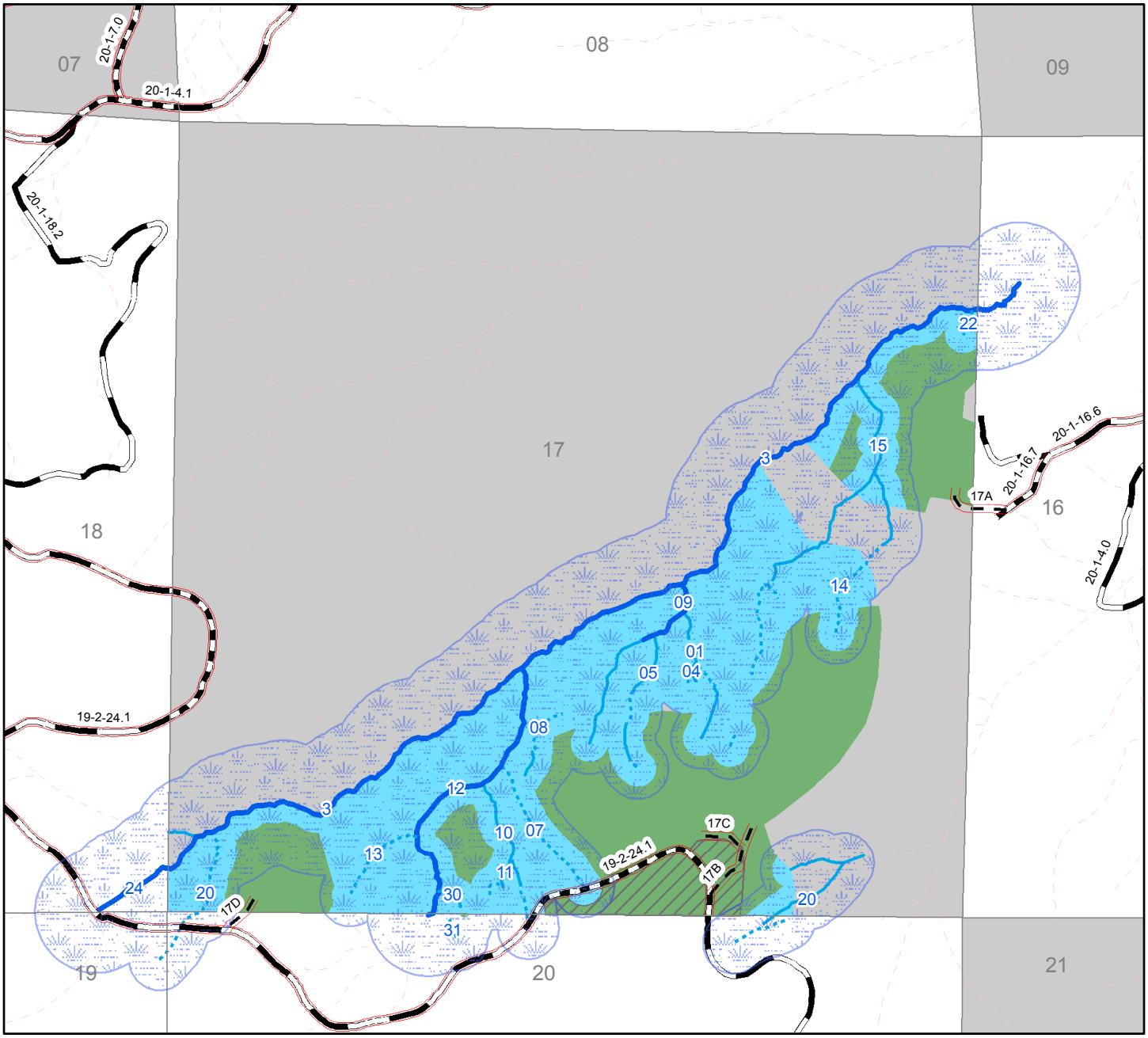
Water Bodies
- Pond
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 4

Gosage Incline

T20S-R01W SEC. 17



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Optional Prefer Cable
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Native
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources and may be updated without notification.

Lost Creek EA - Alt 4

Gosage Incline

T20S-R02W SEC. 13

N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Renovation, Rock
- Improvement, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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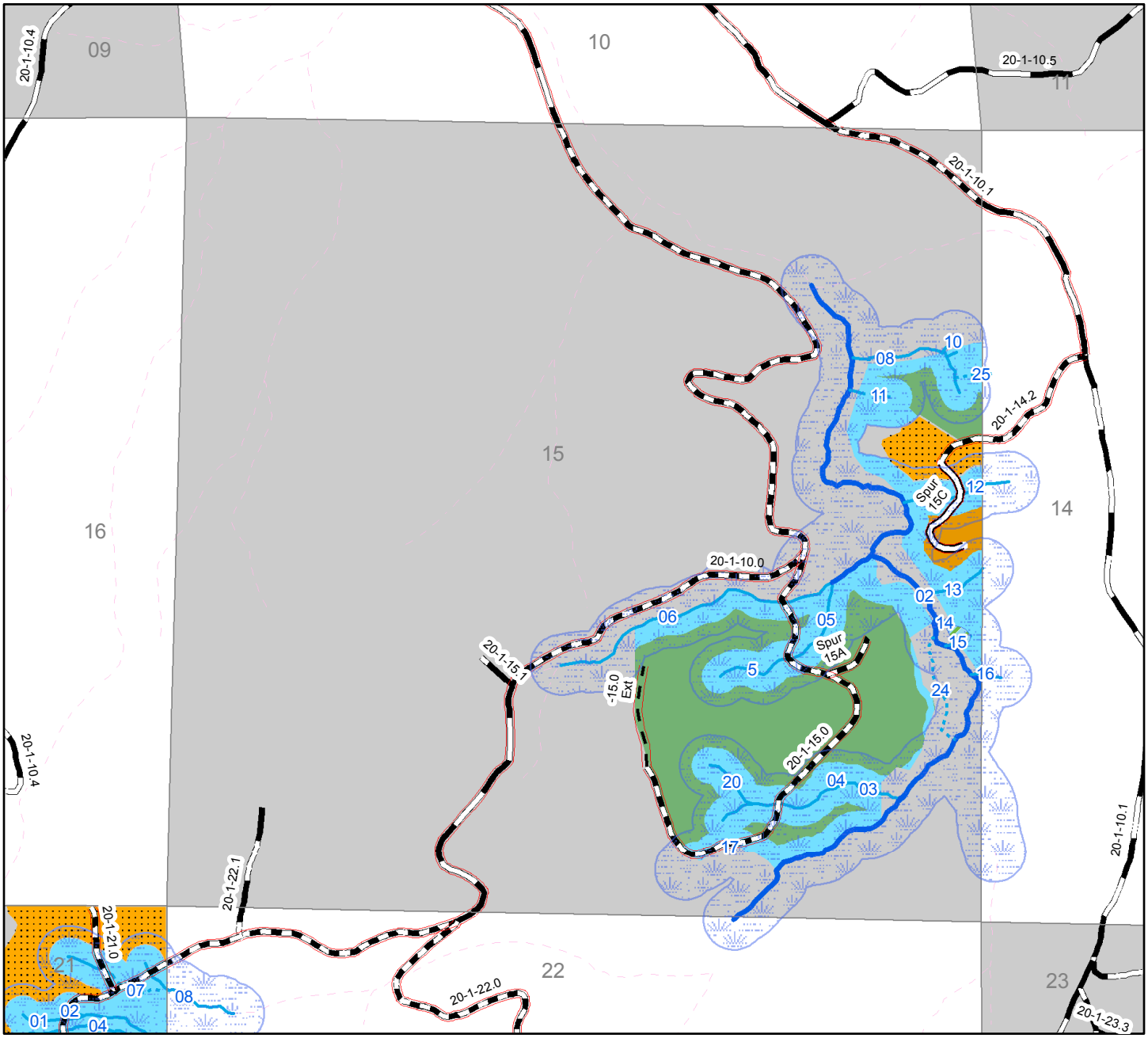
Lost Creek EA - Alt 4

Guileless

T20S-R01W SEC. 15



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Ground-based
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Construction, Native
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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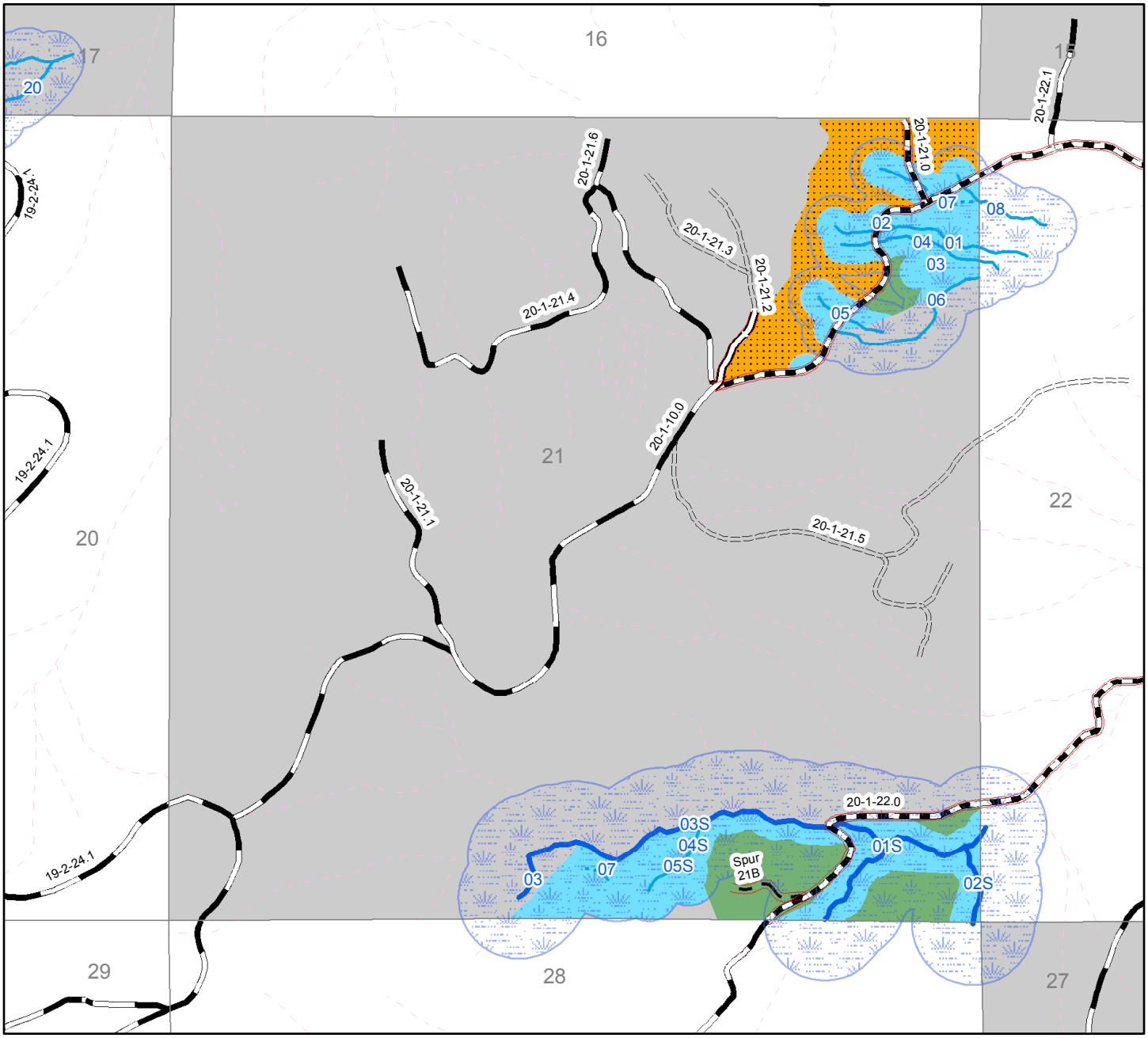
Lost Creek EA - Alt 4

Guileless

T20S-R01W SEC. 21



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Native
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

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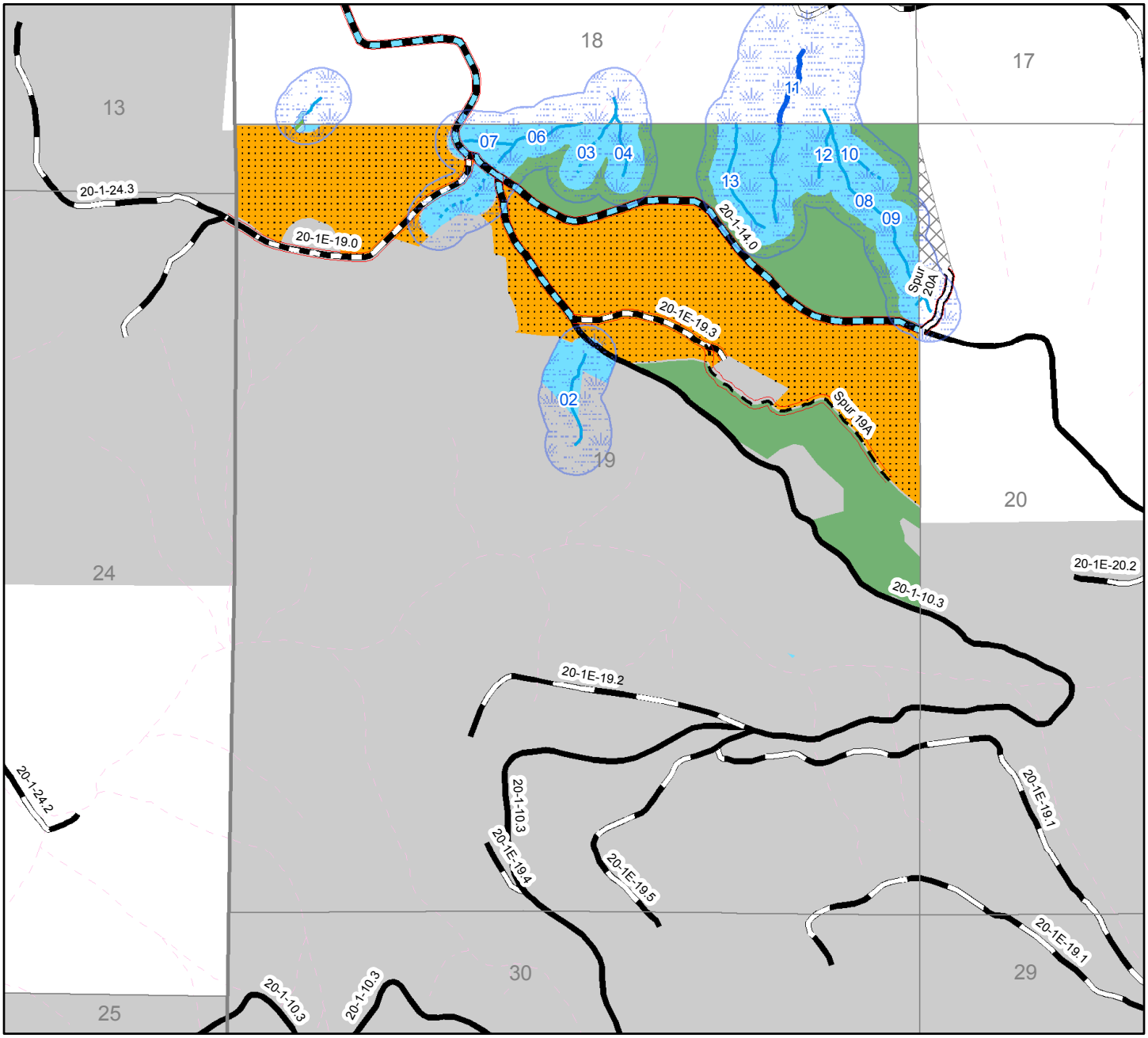
Lost Creek EA - Alt 4

Missing Links

T20S-R01E SEC. 19



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Optional Prefer Ground-based
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Paved
- Construction, Native
- Renovation, Rock
- Renovation, Native
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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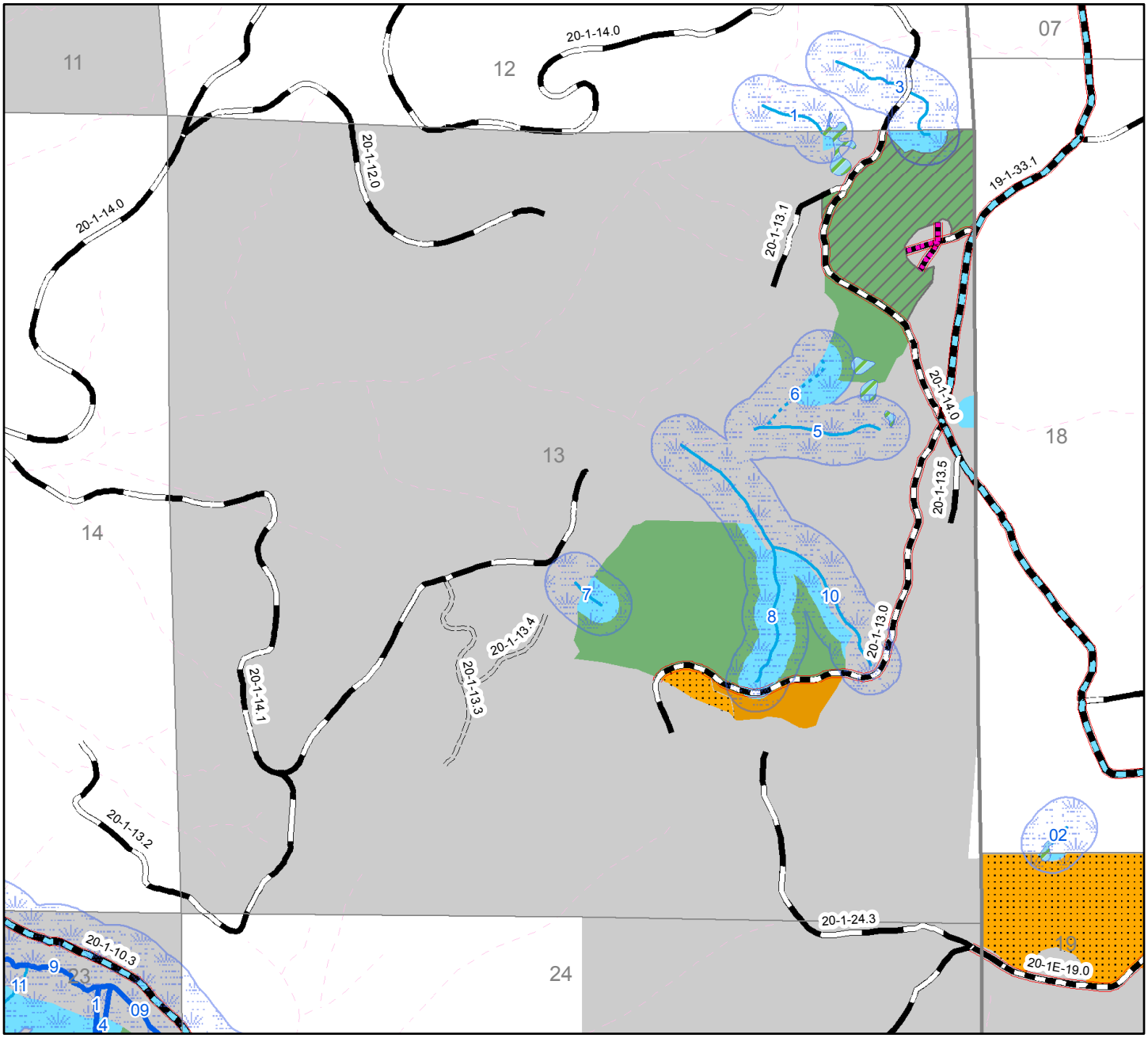
Lost Creek EA - Alt 4

Missing Links

T20S-R01W SEC. 13



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Optional Prefer Cable
- Ground-based
- Optional Prefer Ground-based
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Native; Existing, Unknown
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines
StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish

Water Bodies
- Wetland
- Riparian Reserve

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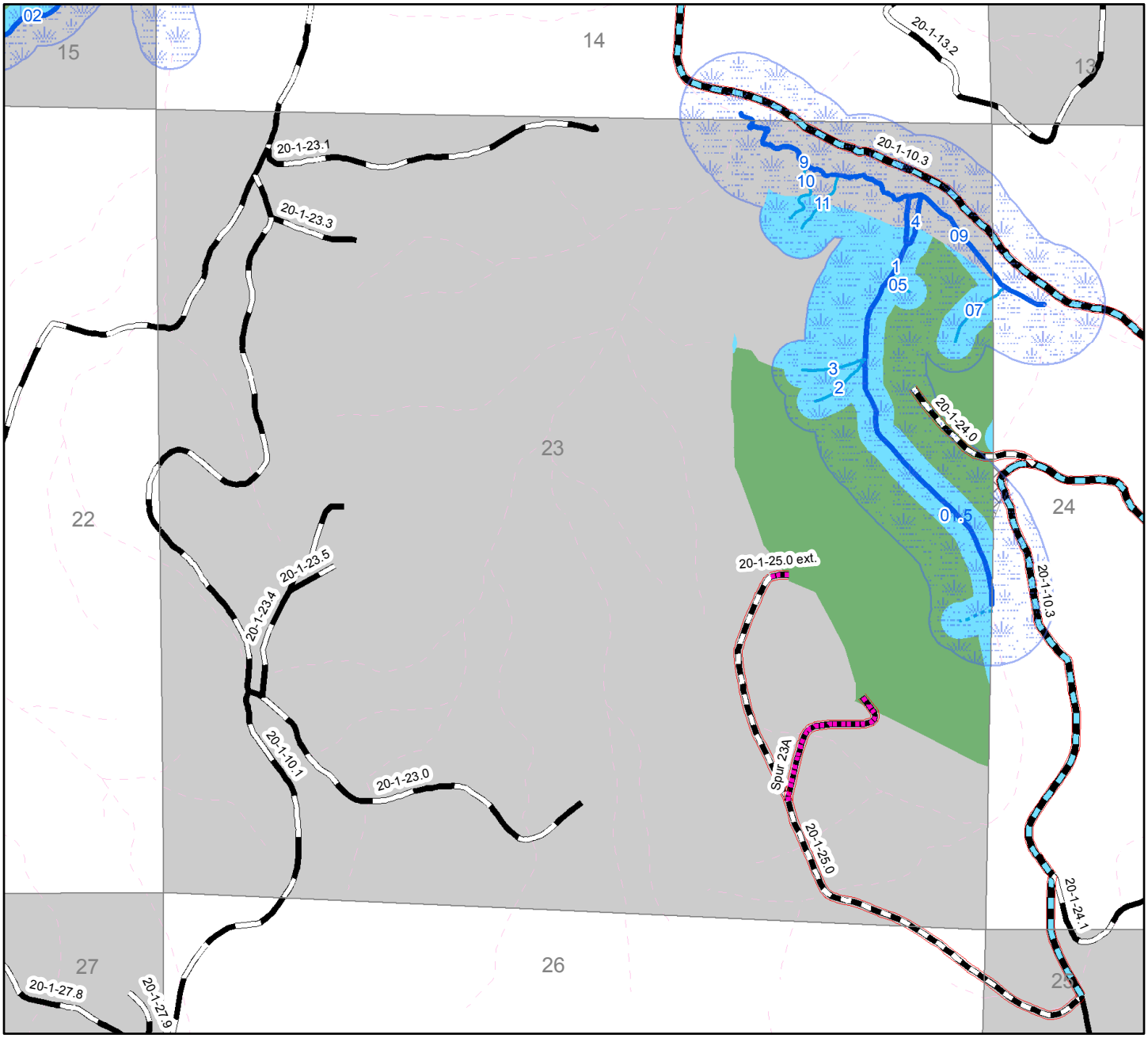
Lost Creek EA - Alt 4

Missing Links

T20S-R01W SEC. 23



N

0 500 1,000 1,500 Feet

Alt4 Yarding Method
- Cable
- Special Yarding Area
- No Cut Hydro Buffer
- Bureau of Land Management

RoadType, SurfaceType
- Renovation, Paved
- Existing, Rock
- Existing, Paved
- Construction, Rock
- Renovation, Rock
- HaulRoute

Hydrolines

StreamDuration, Fish
- Unknown, U
- Intermittent
- Perennial, No Fish
- Perennial, Fish
- Riparian Reserve

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
EUGENE DISTRICT OFFICE

PRELIMINARY FINDING OF NO SIGNIFICANT IMPACT
DOI-BLM-OR-E060-2015-0002-EA
Lost Creek Environmental Assessment

The Bureau of Land Management (BLM) has prepared an Environmental Assessment (EA), (DOI-BLM-OR-E060-2015-0002-EA), for the Lost Creek project, which analyzed the effects of the proposed alternative and alternatives. On the basis of the information contained in the EA, and all other information available to me, it is my determination that the implementation of any of the action alternatives would not have a significant effect on the quality of the human environment, considering the context and intensity of impacts (40 CFR 1508.27). Therefore, an environmental impact statement is not necessary and will not be prepared.

This finding is based on my consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), both with regard to the context and to the intensity of the impacts as described in the EA.

CONTEXT
BLM adopted its Eugene District Resource Management Plan in 1995, incorporating the 1994 Northwest Forest Plan (NWFP) and its EIS. BLM has thus prepared two EISs that consider the significant and potentially significant effects of conducting timber harvest in the Eugene District within stands of the age classes found in this project. The EISs for the NWFP and 1995 Eugene RMP projected effects over the lifetime of that plan to date for 10,260 acres of regeneration harvest. In actuality, the Eugene District offered 3,167 acres of regeneration harvest, only 31% of the projected amount of regeneration harvest. The up to 141 acres proposed for regeneration harvest under the Lost Creek EA would equate to an additional 1.4% of this projection. Given the very large discrepancy between the acreage of regeneration harvest assumed within the effects analysis of the NWFP and RMP EISs and what the Eugene District has actually offered for sale, it is abundantly clear that the incremental effect of the harvest proposed in the Lost Creek EA is well within the effects of the total regeneration harvest projected within the Eugene District's RMP EIS. Even though the incremental harvest within the Lost Creek EA falls within the RMP EIS's effects analysis, the BLM analyzed the specifics effects of the proposed action to determine if the Lost Creek EA timber sales that are in and of themselves significant under NEPA. The BLM has determined the effects are not significant, for the reasons detailed below in our evaluation of the NEPA intensity factors.

This project is a site-specific action that by itself does not have international, national, region-wide, or statewide importance. The actions described in the action alternatives would be limited in scope and geographic application (40 CFR 1508.27(a)). The location of the action is described in the EA (p. 1) and displayed on maps (EA, Appendix F). The physical and biological effects are limited. The affected environment sections of Chapter 3 in the EA describe the locations and current conditions of the various resources. The resource effects sections in Chapter 3 reveal that most of the direct and indirect environmental effects are confined to the project area with some effects extending slightly outside the project area. The direct and indirect effects of the action alternatives along with cumulative effects (incremental effects of the proposed action in light of past, present, and reasonably foreseeable future actions) for each resource are described in Chapter 3 of the Lost Creek EA (p. 21-90). These analyses were reviewed in consideration of the Council on Environmental Quality (CEQ) guidance on cumulative effects analysis, and results were disclosed in the EA.

The actions would occur in the Matrix (General Forest Management Area (GFMA) and Connectivity) and Riparian Reserve Land Use Allocations (LUA) as designated by the 1995 Eugene District Resource

Management Plan (RMP). The RMP anticipated that forest management activities would occur in these LUAs as follows:

Matrix:

- produce a sustainable supply of timber (RMP, p. 34, 84)
- provide early-successional habitat (RMP, p. 85)
- maintenance of valuable structural components, such as down logs and snags (pp. 34)
- produce, over time, forests that have desired species composition, structural characteristics, and distribution of seral or age classes. (RMP, p. 85)
- schedule regeneration harvests to assure that, over time, harvest will occur in stands at or above the age of volume growth culmination (i.e., Culmination of Mean Annual Increment) (RMP, p. 85)

Specifically, for thinning in GFMA:

- increase the proportion of merchantable volume (RMP, p. 200)
- promote development of desired understory vegetation (RMP, p. 200)
- maintain good diameter growth rates (RMP, p. 201)

Specifically, for density management in Diversity/Connectivity Blocks:

- accelerate growth of trees to provide large-diameter snags and down logs (RMP, p. 203)
- promote development of understory vegetation and multiple canopy layers (RMP, p. 203)
- produce larger, more valuable logs (RMP, p. 203)
- harvest mortality of small trees as the stand develops (RMP, p. 203)
- maintain good crown ratios and stable, windfirm trees (RMP, p. 203)
- manage species composition (RMP, p. 203)

Specifically, for regeneration harvests in GFMA:

- Provide for maintenance of long-term site productivity and forest health (RMP, p. 201)

Specifically, for regeneration harvests in Connectivity:

- Approximately 1/15 of the available acres will receive regeneration harvest in any decade (RMP, p. 203)

Riparian Reserve:

- to meet the objectives of the Aquatic Conservation Strategy (RMP, p. 18)
- Apply silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives. (RMP, p. 24)

The action alternatives are in compliance with the RMP, as amended.

INTENSITY

I have considered the potential intensity of the impacts that would result from the action alternatives relative to each of the ten areas suggested for consideration by the CEQ, as detailed below (40 C.F.R. § 1508.27(b)):

1. **Impacts that may be both beneficial and adverse.**

   I considered both beneficial and adverse impacts associated with the action alternatives as presented in the Lost Creek EA. These impacts are within a range of effects identified in the Eugene District Final Proposed Resource Management Plan/Final Environmental Impact Statement (FEIS; 1994) for timber resources (Chapter IV, p. 4-106 to 4-119) and other resources as they relate to timber management (Soils, p. 4-15 to 4-20; Water, p. 4-21 to 4-25; Fish, p. 4-66 to 4-67; Wildlife, p. 4-51 to 4-65; Recreation, p. 4-103 to 4-105; Cultural Resources, p. 4-97; and Climate Change, p. 4-9) and the NWFP EIS to which this EA is tiered.

The EA for the Lost Creek project identified impacts, both beneficial and adverse, for six issues presented in detail. The potential for adverse impacts from the action alternatives are similar to other projects previous to this one and are not unique to this project. These impacts are minimized and/or avoided using the Project Design Features (PDFs) found in the EA (Appendix A). In BLM'S experience implementing previous projects, we have found similar activities using these or similar design criteria to be effective in avoiding or minimizing adverse effects. The analysis indicates that the disclosed adverse impacts within the range of effects analyzed in the Eugene District RMP/FEIS.

Northern Spotted Owls (EA, p. 24 – 49)

Both suitable and dispersal habitat would be affected through regeneration harvest or thinning. Regeneration harvest would cause adverse effects through habitat removal, while thinning would maintain habitat function while causing indirect beneficial effects through long-term habitat improvement. Although portions of the Lost Creek project would be "likely to adversely affect" spotted owl habitat or sites, there would be no "take" of the species nor would it jeopardize the continued persistence of the species.

No spotted owl critical habitat would be affected by any alternative.

Spotted owl dispersal through the South Willamette-North Umpqua Area of Concern would not be affected.

Red Tree Voles (EA, p. 49 – 53)

There would be no significant effects on red tree voles, the persistence of red tree voles in the analysis area, or contribution towards a need to list the species under the Endangered Species Act from the project. Surveys were conducted in accordance with protocol (Version 3.0, Huff et al 2012) and Habitat Areas (where no harvest would occur under any alternative) were established according to Management Recommendations for the Red Tree Vole, v2.0 (USDA/USDI 2000) in areas where active nests were discovered. The Habitat Areas would protect known active red tree vole nests and allow for an increase in the number of active nests. The Habitat Areas would provide connectivity to the Riparian Reserve network and/or larger blocks of older unmanaged stands.

In accordance with the Pechman Exemptions, Exemption A, no surveys were conducted in stands proposed for thinning under 80 years of age. If red tree voles are present in these areas, there would be a short term (up to 15 year) reduction in habitat quality due to overstory tree removal. However, there would be a long-term (beginning in approximately 20 years) improvement in habitat quality due to accelerated growth of features such as large crowns, nesting structure, large branches, and multiple canopy levels.

Riparian Reserves (EA, p. 53 – 73)

There would be no significant effect on attainment of Aquatic Conservation Strategy Objectives under the Action Alternatives. Mid- to long-term beneficial impacts would include acceleration of development of late-successional characteristics including deep crowns, large branches, multiple canopy layers, and cavities. Short-term adverse impacts would include reduction in canopy cover as well as in shrub and herbaceous plants from harvest activities.

Sustained Yield Management (EA, p. 73 – 76)

All of the action alternatives would contribute to sustained yield management and meeting the Annual Sale Requirement (ASQ) through commercial thinnings on dense, overstocked stands. Alternatives 2 and 3 would also contribute to long-term sustained yield management as regeneration harvests proposed under those alternatives would help re-establish a younger age

class in Lost Creek sub-watershed which would, in turn, be available for future commercial thinning and regeneration harvests.

Recreation Opportunities (EA, p. 76 – 86)

There are no developed recreation sites or facilities within the project area. Legal public access exists only to the John's Last Stand and Missing Links sale areas. Dispersed recreation activities would be displaced during active harvest operations but access roads would be improved as part of the project. Access to nearby hiking trails would be maintained during and after the project.

Carbon Storage (EA, p. 86 – 91)

Carbon stored and harvested on BLM-Administered lands in western Oregon represents 1% of the total carbon stored in forests and harvested wood in the United States, and 0.02% of the global carbon storage in vegetation, soil, and detritus (USDI & Management, 2008, pp. Vol.1, Ch. 3, p. 220). The differences in carbon storage and sequestration among the alternatives over time are too small to reveal differences when placed in the context of regional, national, or global carbon storage.

2. The degree to which the proposed action affects public health and safety.

No aspect of the action alternatives would have an effect on public health and safety.

Smoke management from prescribed burning and pile burning would adhere to the Oregon Smoke Management Plan. Adherence to the Oregon Smoke Management Plan would greatly limit smoke dispersal. Due to the combination of burning only on days with stable atmospheric conditions and limited smoke dispersal, there would be no significant impacts on air quality associated with burning, and hence no significant impacts on public health or safety from burning.

The proposed action would have no impact on geologic conditions or increase risk of catastrophic landslides (EA, p. 23). No drinking water sources are present in the project area and, therefore, would not be affected by the proposed action.

No herbicides would be used in conjunction with this project. The Eugene District does not have clearances to use herbicides within the project area, and no herbicide application is included in any action alternatives. Thus there would be no public health or safety issue presented by the use of herbicides associated with this project.

3. Unique characteristics of the geographic area such as proximity of historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

There would be no significant effects on unique characteristics of the area such as parklands, prime farmlands, wild and scenic rivers, or ecologically critical areas (including areas of Critical Environmental Concern) as there are no such areas in the project vicinity.

Cultural surveys completed for the project identified historic railroad trestles and grades in the initial project area. As a result of these findings, some project boundaries, roads, and logging systems were modified to exclude historic and cultural resources identified during surveys. As these features would be protected from project activities, there would be no effect to historic or cultural resources.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

The effects on the quality of the human environment are not likely to be highly controversial (40 CFR 1508.27(b)(4)). CEQ guidelines relating to controversy refer not to the amount of public opposition or support for a project, but to a substantial dispute as to the size, nature, or effect of the

action. The effects of actions planned under the action alternatives (EA, p. 7-20 and Appendix F) are similar to many other forest management projects implemented within the scope of the 1995 Eugene RMP (FEIS, p. 4-106 to 4-119). Controversy over regeneration harvest on matrix lands was resolved with the NWFP and signing of the Record of Decision for the Eugene District RMP; the implementation of those decisions through project-specific regeneration harvest does not require the BLM to revisit the question of significance associated with any remnants of that controversy every time the agency proposes a timber sale. The EISs for the NWFP and 1995 Eugene RMP projected effects over the lifetime of that plan to date for 10,260 acres of regeneration harvest. In actuality, the Eugene District offered only approximately one-third of the projected regeneration harvest. The up to 141 acres in the Lost Creek project would equate to an additional 1.4% of this projections. Given the very large discrepancy between the acreage of regeneration harvest assumed within the effects analysis of the NWFP and RMP EISs and what the Eugene District has actually offered for sale, it is abundantly clear that the incremental effect of the harvest proposed in the Lost Creek EA is well within the effects of the total regeneration harvest projected within the Eugene District by the NWFP and RMP EISs. The Eugene District BLM acknowledges that there is social controversy or differences of opinion regarding the proposed action, however, no unique or appreciable scientific controversy has been identified regarding the effects of the proposed action, and, therefore, no known scientific controversy exists over the impacts of the project.

Environmental effects of the project are within the scope of those considered in the 1994 FEIS. The NWFP EIS and RMP EIS addressed the social and scientific controversy over matrix harvest, including regeneration harvest. The 1994 FEIS projected that the Eugene District would harvest 570 acres (p. xix) annually through regeneration harvest methods. As of August 2015, the District has harvested approximately one-third of this projection under the 1995 RMP. Harvesting 141 acres would constitute another 1.4% of this projection. To the extent there is any remnant of that controversy, these figures show that Eugene's performance is far, far below the expected level of harvest, and therefore does not present any social or scientific controversy that those EISs did not already address.

Effects are expected to be consistent with those of the published literature cited in the EA, and are not controversial in a scientific sense. The public has had the opportunity to comment on this project through formal scoping. While comments were received expressing disagreement with the BLM timber management program, none established a scientific dispute of the size, nature, or effects of the action alternatives.

The BLM is aware that the Revised Recovery Plan for the Northern Spotted Owl (USFWS 2011) uses the word 'controversy' in its discussion of spotted owls and ecological forestry (Revised Recovery Plan, p. III-11). Ecological forestry projects as implemented by the BLM in the moist forest type have typically been variable retention harvest, one type of regeneration harvest. Any form of regeneration harvest on public lands within the Pacific Northwest (such as the regeneration harvest included in the Lost Creek EA), continues to be opposed by certain groups.

A thorough reading of the full discussion in the Revised Recovery Plan, however, reveals that the controversy in question is largely the social controversy over implementing active forest restoration activities where the spotted owl and its habitat would benefit over the long term. The Revised Recovery Plan does not assert that the effects of ecological forestry themselves are controversial in any kind of meaningful scientific or biological sense, but rather that ecological forestry, as one part of "active forest management," will help address the uncertainty of the extent to which land managers can influence the changes occurring on forests across the Pacific Northwest. The controversy, thus, is not evidence of a substantial dispute over the size, nature, or effect of ecological forestry, but instead to the ongoing societal controversy over management of the Pacific Northwest forests.

The BLM is aware that the Revised Recovery Plan identified that [t]he majority of published studies support this general approach for Pacific Northwest forests, although there is some disagreement regarding how best to achieve it. We received widely varying recommendations for meeting this goal from knowledgeable scientists. Most of this variance in opinion is due to the scientific uncertainty in: (1) accurately describing the ecological "reference condition" or the "natural range of variability" in historical ecological processes, such as fire and insect outbreaks across the varied forest landscape within the range of the spotted owl (e.g., see Hessburg et al. 2005, and Keane et al. 2002, 2009); and (2) confidently predicting future ecological outcomes on this landscape due to rapid, climate-driven changes in these natural processes, with little precedent in the historical (or prehistoric) record (Drever et al. 2006, Millar et al. 2007, Long 2009, Littell et al. 2010). These are very real problems that should be addressed with more research (Strittholt et al. 2006, Kennedy and Wimberly 2009).

In the meantime, addressing this uncertainty in a careful but active manner is the challenge of this Revised Recovery Plan and of forest management in general.

Therefore, while the FWS in the Revised Recovery Plan identified differences of scientific opinion regarding the informational needs for active forest management to achieve the goals of forest restoration, including owl recovery, this difference in scientific opinion does not rise to the level of a highly controversial scientific debate that requires an EIS for this single site-specific project. Nor does the scientific difference of opinion on informational needs at the broader scale of owl recovery demonstrate a scientific controversy over using active forest management to restore ecological processes. As the Revised Recovery Plan stated: "There is a scientific and social consensus emerging that land managers must restore more sustainable (resistant and resilient) ecological processes to forests at various landscape scales (Hessburg et al. 2004, Millar et al. 2007, Long 2009, Moritz et al. 2011) (See Revised Recovery Plan at III-12)." The FWS Revised Recovery Plan identification of the emerging "consensus" on this issue demonstrates that any scientific controversy that may have existed over the use of active forest management through projects like the proposed action to achieve long-term spotted owl recovery is largely being laid to rest. Indeed, the Revised Recovery Plan goes on to state that:

> Federal land managers should apply ecological forestry principles where long-term spotted owl recovery will benefit, even if short-term impacts to spotted owls may occur (Franklin et al. 2006) to improve the resiliency of the landscape in light of threats to spotted owl habitat from climate change and other disturbances…This includes early-successional ecosystems on some forest sites (Swanson et al. 2010, Perry et al. 2011).
>
> and
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> …management designed under an ecological forestry framework should avoid existing high value habitat, if possible, while meeting long-term restoration goals. Within provincial home ranges but outside core-use areas, opportunities exist to conduct vegetation management to enhance development of late-successional characteristics or meet other restoration goals in a manner compatible with retaining resident spotted owls. Restoration activities conducted near spotted owl sites should first focus on areas of younger forest less likely to be used by spotted owls and less likely to develop late-successional forest characteristics without vegetation management. Vegetation management should be designed to include a mix of disturbed and undisturbed areas, retention of woody debris and development of understory structural diversity to maintain small mammal populations across the landscape. (See Revised Recovery Plan at III-17)

Again, the controversy referenced in the Revised Recovery Plan reveals references to "controversy" are principally referring to the social controversy of implementing active forest management to achieve restoration goals. The Revised Recovery Plan also identifies differences in scientific opinion over the information needs that exist in regard to implementing such actions, but not over whether such actions should be undertaken.

The BLM is also aware that the fundamental nature of science requires disagreement and vigorous debate, and that as a result some disagreement will always be present in any scientific discussion. The topic of regeneration harvest is no exception. The BLM is aware of articles in peer-reviewed scientific literature, such as DellaSalla, et al (2013), which express some reservations and disagreements with ecological forestry applications. The BLM also notes that much of DellaSalla (2013) relates to the ongoing social controversy over management practices and refinement of land management goals and practices. Where the article discusses the size, nature, and effects of ecological forestry, and discusses perceived shortcomings in the framework principles, it also acknowledges the positive aspects of the framework, and notes that the details of its management are "yet to be described." (DellaSalla et al (2013), pp. 420-421). As noted previously, unanimity in science is rarely, if ever, present. That some discussion and debate in peer-reviewed scientific forums continues to occur is a sign not of controversy as NEPA uses the term, but of a healthy discussion and questioning of hypotheses and projections that are essential to the scientific process. In the end, however, while the BLM acknowledges this debate, NEPA and the principles which underlie it do not require unanimity, nor that an EIS be prepared for every project for which it does not exist. Articles such as DellaSalla (2013) are limited in direct application, and are more focused on advocacy and social policy. Rather than present scientific debate on the effects of implementing ecological forestry on matrix lands available for regeneration harvest, the articles question or propose a different tack on whether ecological forestry is the appropriate tool to address the current and changing conditions of forests in the Pacific Northwest. These broadly stated positions do not generate and are not evidence of a substantial dispute over the size, nature, and effects of the proposed action at issue here, however, and thus do not give rise to a "controversy" under NEPA that necessitates preparation of an EIS.

The BLM is, as noted, aware that social controversy is ongoing over the existence and practices of the BLM's timber harvest program across western Oregon. This societal debate, reflected in the comments received by the BLM and addressed as applicable in the EA (p. 5-7), is precisely the public opposition or support that the CEQ guidelines have identified as not relevant to the term 'controversy' as applied to NEPA.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

The action alternatives would not impose highly uncertain or involve unique or unknown risks. The analysis has not shown that there would be any unique or unknown risks to the human environment not previously considered and analyzed in 1994 FEIS, to which this decision is tiered. Timber harvest is a common practice on lands managed by the BLM in western Oregon, and the activities and associated design criteria incorporated with this decision are well-established land management practices. The risks are well known and understood. None of the public comments received during scoping indicated unique or unknown risks to the human environment. Based on this, and previous similar actions, the probable effects of this decision on the human environment, as described in the EA, do not involve effects that are highly uncertain or involve unique or unknown risks.

As discussed above, the Revised Recovery Plan discusses the informational needs for active forest management to achieve the goals of forest restoration for achieving owl recovery, specifically (1) accurate ecological baseline information, and (2) confident predictions of outcomes of actions to restore conditions, given uncertainty in climate conditions. As discussed in more detail below, this project presents no serious question as to uncertain effects regarding harvest within the stands included within the action alternatives.

Within the Lost Creek watershed there are approximately 13,436 acres in BLM management, of which 5,920 acres are in the BLM harvest land base under the RMP. Less than 20 acres are under 15 years old. The maximum proposed for regeneration harvest under any action alternative would be 2.4% of the harvest land base acres in the watershed and is in context with historically plausible

patterns and occurrences of early seral forest in this area. (EA p. 73-75) There is no highly uncertain information about baseline conditions in the action area.

Climate change and greenhouse gas emissions have been identified as an emerging resource concern by the Secretary of the Interior (Secretarial Order No. 3226; January 16, 2009), the OR/WA BLM State Director (IM-OR-2010-012, January 13, 2010), and by the general public through comments on recent project analyses. It is currently beyond the scope of existing science to identify a specific source of carbon emissions and designate it as the cause of specific climate impacts at an exact location. As an aid to decision-making, the EA analysis estimates carbon flux to the analysis area associated with the proposed action.

Carbon stored and harvested on BLM-Administered lands in western Oregon represents 1% of the total carbon stored in forests and harvested wood in the United States, and 0.02% of the global carbon storage in vegetation, soil, and detritus (USDI, 2008, pp. Vol.1, Ch. 3, p. 220). The differences in carbon storage and sequestration among the alternatives over time are too small to reveal differences when placed in the context of regional, national, or global carbon storage. (EA p. 87-91)

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

This project neither establishes a precedent nor represents a decision in principle about future actions. The timber management program on BLM managed lands in western Oregon is well established and this project would not establish a new precedent of management for this program. The action alternatives are consistent with actions appropriate for the Matrix and Riparian Reserve land use allocations as designated by the RMP.

This project will not bind any future BLM actions and will not shape or determine BLM forestry methods or strategies beyond this project. As with any project, BLM will use information learned from implementing the project; this does not mean those learnings commit BLM to any course of action with any future project or overall forest management strategy beyond this individual project, and as such this factor does not weigh in favor of an EIS or raise a serious question on this issue.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

The Interdisciplinary Team evaluated the project in context of past, present, and reasonably foreseeable actions and determined that there is not a potential for significant cumulative effects beyond those analyzed in the Eugene District RMP / FEIS and the NWFP FEIS. There are no individual or cumulatively significant impacts identified by the analysis conducted for the Lost Creek EA. Cumulative effects analysis for the project area, by Issue, were presented in Chapter 3 of the EA. Effects from the action alternatives were largely localized with minimal impacts outside the project area.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historic resources.

Cultural surveys completed for the project identified historic railroad trestles and grades in the initial project area. As a result of these findings, some project boundaries, roads, and logging systems were modified to exclude historic and cultural resources identified during surveys. As these features would be protected and remain intact and undamaged by project activities, there would be no effect to historic or cultural resources. No other significant scientific, cultural, or historic resources are within the project area.

9. **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.**

Terrestrial Species

The Upper Willamette Resource Area initiated Section 7 consultation with the U.S. Fish and Wildlife Service (FWS) for evaluation of effects of the Lost Creek Project to the northern spotted owl. The project was submitted as part of a batched consultation document "Willamette Planning Province FY2016/17 Biological Assessment of LAA Projects with the Potential to Modify the Habitat and/or Disrupt Northern Spotted Owls" (USDA/USDI 2015). This Biological Assessment (BA) considered effects to overall habitat availability due to habitat modification, effects to site occupation and reproduction due to habitat modification, and effects to nesting behavior due to noise disruption. The BLM determined in this BA that the Lost Creek Project would be "likely to adversely affect" northern spotted owl habitat and four northern spotted owl sites through habitat modification. No adverse effects from noise disruption would occur. These effects determinations are described in Issue 1 (EA, p. xxx-xx). A Biological Opinion is anticipated from the FWS in October 2015 that confirms these effects determinations.

"Likely to adversely affect" effects determinations at spotted owl sites are due to existing low levels of available spotted owl habitat, combined with the Lost Creek project effects. However, these effects are not significant because:

• No "take" would occur. Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. In the context of forest management activities, take can occur incidentally as harm to spotted owls. No harm to spotted owls would occur in the Lost Creek project because either the affected habitat is low-quality, the affected habitat is of low value due to its location at the periphery of a site, or because the spatial distribution of the potential harvest units would not preclude spotted owl use of affected sites.

• East-west dispersal through the South Willamette - North Umpqua Area of Concern would not be affected and spotted owls would still be able use the project area and vicinity to disperse between the Coast Range and Western Oregon Cascades provinces. This would allow for continued genetic exchange and demographic support between these provinces.

• No spotted owl critical habitat would be affected and it would continue to provide for the recovery and conservation of the species as described in the 2012 Critical Habitat Rule.

• The Lost Creek project is consistent with the Northern Spotted Owl Recovery Plan (2011), which is the most up-to-date guidance from the FWS. The project is consistent with Recovery Actions 10 and 32. Recovery Action 10 calls for avoiding adverse effects at high-priority spotted owl sites, while Recovery Action 32 calls for the protection of high-value spotted owl habitat wherever it occurs. The project combined with other reasonably foreseeable future actions would remove a maximum of 1.7% of the existing habitat in the Lost Creek sub-watershed. (EA, p. 40)

• The amount of spotted owl habitat and the number of spotted owl sites affected would produce undetectable effects when considered at the 7.2 million acre Willamette Planning Province scale, which the FWS has determined is appropriate for batched consultation of federal actions. Therefore the conservation needs of the spotted owl would continue to be met and the Lost Creek Project would not affect spotted owl recovery or conservation.

For these reasons, the Lost Creek project would not appreciably diminish the effectiveness of the conservation efforts established under the Revised Recovery Plan for the Spotted Owl, the Northwest Forest Plan, or the Critical Habitat Rule. Reasonably foreseeable future actions on adjacent private lands in the project area, Lost Creek watershed, and Willamette Planning province would not result in cumulative effects that would change these effects determinations.

There are no other Threatened or Endangered wildlife or botany species within the project area, and there is no causal mechanism for the project to affect any Threatened or Endangered terrestrial species outside of the project area.

Aquatic Species

There are no Threatened or Endangered fish species or their critical habitat within the project area and no causal mechanism for the project to affect any Threatened or Endangered fish species outside of the project area.

The only federally listed fish species near the project area is the federally threatened Upper Willamette River Chinook. Critical Habitat for this species is located approximately ½ mile downstream from the nearest timber sale unit. Most timber sale units are much further upstream (1-3 miles). Only imperceptible effects at the site scale are predicted to occur from any action alternative; therefore, these effects at the site scale would have no effect further downstream on Chinook salmon or their critical habitat. Given the lack of a perceptible site-specific impact, the project does not contribute any incremental effect that would possibly have a synergistic effect with the effects of any other past, present, or reasonably foreseeable future action, and therefore has no cumulative effect with any such action. Due to lack of proximity of proposed harvest areas and haul routes being disconnected from Critical Habitat, this project would have *No Effect* on Upper Willamette River Spring Chinook salmon or their Critical Habitat. (EA, p. 91)

Implementation of the proposed actions would not change the likelihood of and need for listing of any Special Status Species under the ESA as identified in BLM Manual 6840 and BLM OR/WA 6840 policy.

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

The action alternatives do not threaten to violate any Federal, State, or local laws imposed for the protection of the environment including, but not limited to, the Clean Water Act, Clean Air Act, and Endangered Species Act. The action alternatives comply with the 1995 Eugene RMP, which provides direction for the protection of the environment on public lands. Project design criteria listed in the EA would assure compliance with these laws. The EA also meets National Environmental Policy Act disclosure requirements.

Pursuant to Executive Order 13212, the BLM must consider the effects of this decision on the President's National Energy Policy. As there would be no impact to the exploration, development, or transportation of undeveloped energy sources from the proposed action, a Statement of Adverse Energy Impacts is not required.

CONCLUSION

Based on the information contained in the EA (DOI-BLM-OR-E060-2015-0002-EA), and all other information available to me, I have determined that the action alternatives would not have a significant impact on the human environment within the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969, and that an Environmental Impact Statement is not required. I have determined that the effects of the proposed activities would be in conformance with the 1995 Record of Decision/Resource Management Plan for the Eugene District.

Signature of the Responsible Official:

unsigned
William O'Sullivan
Upper Willamette Field Manager
Eugene District Office

unsigned
Date: