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

Environmental Assessment
DOI-BLM-ORWA-R040-2021-0001-EA

Archie Creek Fire
Salvage Harvest and Hazard Tree Removal
Environmental Assessment

August 16, 2021

OR/WA Bureau of Land Management
Roseburg District, Swiftwater Field Office
777 NW Garden Valley Blvd., Roseburg, OR 97471
541-440-4930

Estimated Lead Agency Total Costs Associated with
Developing and Producing this EA: $68,500

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Executive Summary

The Roseburg District, Swiftwater Field Office of the Bureau of Land Management is proposing salvage harvest and hazard tree removal actions (Action Alternatives) within the Archie Creek Fire perimeter. The proposed actions are intended to implement Management Direction found in the Northwestern and Coastal Oregon Record of Decision and Resource Management Plan.

This Environmental Assessment (EA) analyzes the environmental impacts of the proposed salvage harvest and hazard tree removal actions and evaluates three Action Alternatives. The BLM provides information on a No Action Alternative in which none of the three Action Alternatives nor any other action is taken. This EA analyzes the impacts of these Action Alternatives on various dimensions of the human and natural environment where BLM-administered lands are located, including soils, vegetation, wildlife, cultural resources, and recreation.

Most impacts to the environment resulting from the three Action Alternatives are expected to be minimal or beneficial. All three Action Alternatives are similar in terms of their expected impact on natural and cultural resources, and no significant difference in impact on natural or cultural resources is expected among the three Alternatives.

The BLM proposes to salvage harvest timber in the Harvest Land Base land use allocation and remove hazard trees in all land use allocations within the Archie Creek Fire perimeter.

Table i. Comparison of Action Alternatives

Management Activity	Alternative 2 *"Salvage Harvest"*	Alternative 3 *"Helicopter Yarding"*	Alternative 4 *"No Road Construction"*
Timber Harvest (Acres)*	6,221 acres	6,314 acres	5,503 acres
Hazard Tree Removal Activities (Acres)*	2,197 acres for Maintenance Level 3, 4, & 5 Roads	2,197 for Maintenance Level 3, 4, & 5 Roads	2,197 acres for Maintenance Level 3, 4, & 5 Roads
	223 acres for Recreation sites	223 acres for Recreation sites	223 acres for Recreation sites
	125 acres for Pump Chances and Resource Roads	125 acres for Pump Chances and Resource Roads	127 acres for Pump Chances and Resource Roads
	49 acres for adjacent private infrastructure and home sites	49 acres for adjacent private infrastructure and home sites	49 acres for adjacent private infrastructure and home sites
Salvage Harvest Dependent Hazard Tree Removal Activities (Acres)*	2,037 acres for Haul Routes	2,228 acres for Haul Routes	1,983 acres for Haul Routes
	477 acres for Unit RR	447 acres for Unit RR	447 acres for Unit RR
Roadwork (Miles)**	12 miles of Road Construction	6 miles of Road Construction	0 miles of Road Construction
	303 miles of Road Renovation	307 miles of Road Renovation	292 miles of Road Renovation
	15 miles of Road Maintenance	17 miles of Road Maintenance	15 miles of Road Maintenance
	2 miles of Road Decommission	2 miles of Road Decommission	1 mile of Road Decommission
Supporting Actions (Acres)*	249 acres of yarding corridors	169 acres of yarding corridors	148 acres of yarding corridors
	0 acres of Helicopter Landing Construction	85 acres of Helicopter Landing Construction	0 acres of Helicopter Landing Construction
	986 acres of post-harvest and hazard tree removal fuels treatment	934 acres of post-harvest and hazard tree removal fuels treatment	877 acres of post-harvest and hazard tree removal fuels treatment
	80 acres subsoiling	75 acres subsoiling	76 acres subsoiling
Total Acres Analyzed	12,644 acres	12,846 acres	11,630 acres

*Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.**Roadwork miles may vary slightly from the total miles. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

1. Introduction

The Roseburg District Swiftwater Field Office of the Bureau of Land Management (BLM) has prepared the Archie Creek Fire Salvage Harvest and Hazard Tree Removal Environmental Assessment (EA) to evaluate the effects of salvage harvesting, hazard tree removal, and associated timber management activities and treatments on wildlife habitat, soils, and other resources. This chapter provides a description of the proposed actions including the locations, the purpose and need, the decisions to be made, conformance with management direction and applicable laws and regulations, issues submitted during internal and public scoping, and the scope of the analysis.

1.1. Project Area Location

The proposed actions would occur on BLM-administered lands within the Swiftwater Field Office of the Roseburg District in Douglas County, Oregon.

Salvage Harvest Locations

Salvage harvest actions and associated timber management activities are proposed within a checkerboard ownership pattern in the following Public Land Survey System description.

Table 1. Project Area Location

Township	Range	Sections*
24 South	1 West	31
25 South	1 West	5, 6, 7, 17, 18, 19, 21, 26, 29, and 30
25 South	2 West	1, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 26, 27, 29, 31, 33, 34, and 35
25 South	3 West	5, 9, 13, 17, 19, 23, 25, 27, 29, 32, 33, 34, and 35
26 South	2 West	1, 2, 3, 7, 9, 10, 11, 12, 13, 14, 15, 19, 20, 21, 23, 26, 27, 29, 30, 31, and 33
26 South	3 West	1, 3, 11, 13, 15, 21, 23, 25, 26, 27, and 35
**All locations are based off the Willamette Meridian*		

Hazard Tree Removal Locations

Hazard tree removal actions are proposed on BLM-administered lands and rights-of-ways within the Archie Creek Fire perimeter, both in the specific Sections identified above as well as in other Sections where the BLM has responsibility for removing hazard trees and other debris in the fire area.

Appendix A includes maps of the proposed action locations.

1.2. Background

The Archie Creek Fire started on September 8, 2020, on the Umpqua National Forest. At approximately the same time, another fire, the Star Mountain Lane Fire, was reported seven miles to the west on BLM-administered lands within the Roseburg District. By nightfall on September 8th, both fires spotted south across the North Umpqua River and had grown together into one large fire which is now known as the Archie Creek Fire. When the Archie Creek Fire was declared controlled on November 16, 2020, the fire had burned approximately 40,600 acres of BLM-administered lands within the Swiftwater Field Office.

Fire severity was estimated using satellite information to create two maps of the fire useful for planning post-fire recovery. Burned Area Reflectance Classification (BARC) is used for identifying areas of soil stability

concern. Preliminary Rapid Assessment of Vegetative Condition after Wildfire (RAVG) is used for identifying areas likely needing reforestation (see Appendix J for more information). These two datasets for BLM-administered lands are summarized in Table 2. Comparison of Estimated Fire Severity using Two Metrics (BARC and RAVG GIS Data, USDA 2020).

Table 2. Comparison of Estimated Fire Severity using Two Metrics

Severity Class					
Severity Measurement	**Unburned or Very Low Severity acres (percent)**	**Low Severity acres (percent)**	**Moderate Severity acres (percent)**	**High Severity acres (percent)**	**Total Acres***
BARC – Acres by Soil Burn Severity	4,221 (10%)	6,390 (16%)	14,729 (36%)	15,278 (38%)	40,618
RAVG – Acres by Composite Burn Index	4,857 (12%)	6,779 (17%)	8,455 (21%)	20,527 (50%)	40,618

The fire impacted timber resources and wildlife habitat, created soil stabilization issues, exposed cultural sites, created health and safety issues, and left a landscape that will favor the colonization and spread of noxious weed populations. The BLM is responsible for assessing all impacts and taking appropriate actions for post-fire recovery.

In response to this wildfire, the BLM began planning and implementing post-fire recovery efforts including suppression repair of resources affected by firefighting activities, Emergency Stabilization actions, and determining a planning area for future management actions directed in the 2016 Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (NCO ROD/RMP). This EA identifies the planning area and analyzes three Action Alternatives for accomplishing those management actions. The proposed actions, described in greater detail in Chapter 2, include a combination of activities:

1. Salvage harvest of dead trees and trees damaged or dying within the Harvest Land Base (HLB) Land Use Allocation (LUA) within the Archie Creek Fire perimeter; and
2. Remove hazard trees on BLM-administered lands within any LUA that threaten people and/or infrastructure in recreation sites, along roadways, and adjacent to private infrastructure within the Archie Creek Fire perimeter.

The proposed actions would occur within the Calapooya Creek, Rock Creek, Canton Creek, Little River, Middle North Umpqua River, and Lower North Umpqua River fifth-field watersheds (Hydrologic Unit Code (HUC) 10). Table 3 displays the Land Use Allocations of the BLM-administered acres within the Archie Creek Fire perimeter. The LUAs are determined and described in the NCO ROD/RMP and identify the activities and foreseeable development that are allowed, restricted, or excluded from the LUAs based on the desired future conditions of the lands (NCO ROD/RMP, pp. 2-8, 297).

Table 3. BLM Land Use Allocation Acres within the Archie Creek Fire Perimeter*

CRNLCS	DDR	LSR	RR	HLB LITA	HLB MITA	Total
2,210	1,913	17,659	5,637	10,046	3,153	40,618

***BLM Land Use Allocations are defined in the NCO ROD/RMP** CRNLCS = Congressionally Reserved Lands & National Conservation Lands; DDR = District Designated Reserve; LSR = Late Successional Reserve; RR = Riparian Reserve; HLB = Harvest Land Base; LITA = Low Intensity Timber Area; MITA = Moderate Intensity Timber Area.

Salvage Harvest

Proposed actions for salvage harvest would occur in fire burned stands aged 40-160 years old at the time they were fire-affected within the Archie Creek Fire perimeter. Salvage harvest in the HLB LUAs would focus on those areas affected by moderate to high severity fire where the stocking level of live green trees is inadequate to provide for continued growing stock (site occupancy) for future harvest opportunities. Of the 13,199 acres designated as HLB LUA within the fire perimeter, pre-fire age classes include, 71 percent of the acres (9,371 acres) is in the 40-80 year age class; 21 percent (2,772 acres) is in the 0-30 year age class, and eight percent (1,056 acres) is in the 81+ age class. To facilitate salvage harvest actions, this project would include associated timber management activities such as road construction, road renovation, road maintenance, helicopter landings, yarding wedges or yarding corridors, and/or treatment of activity fuels as well as road decommissioning that would occur on any LUA. The BLM has identified roads that would be available for wet season haul, depending on road surface type and current condition.

Hazard Tree Removal

Removal of both imminent and likely to fail hazard trees that have high risk potential for structural failure and are a risk to human safety and/or infrastructure is proposed along roads, in campgrounds and recreation sites, adjacent to private infrastructure and homesites, and adjacent to pump chances (water sources for firefighting) and their access roads. Hazard tree removal within moderate to high severity burn areas would include likely to fail trees with a 60 percent or greater probability of mortality. Within moderate and low severity burn areas with functional spotted owl habitat, only imminent hazard trees would be removed while likely to fail hazard trees would be assessed and monitored by the BLM to be considered for removal over time as necessary but retained in the short-term (2-10 years) for habitat purposes.

Hazard tree removal distances would vary based on topography and individual tree heights. Distances would range from 0 to 300 feet from infrastructure, including roads, for individual trees or locations. For this EA, it is expected that hazard tree falling and/or removal would occur, on average, up to 150 feet from the centerline of roads (300 feet total width) and 150 feet from the edge of public or private infrastructure.

1.3. Purpose and Need for Action

The purpose of the Archie Creek Fire Salvage Harvest and Hazard Tree Removal EA is to analyze and document the effects of the proposed actions to comply with the statutory mandates of the Oregon and California Revested Lands Sustained Yield Management Act of 1937 (43 U.S.C. § 2601), commonly referred as the O&C Act, and the Federal Land Policy and Management Act of 1976 (FLPMA) (43 U.S.C. 1701 et seq.) under the specific management objectives and direction established through the NCO ROD/RMP. The NCO ROD/RMP provides the objectives, land use allocations, and management direction for managing BLM-administered lands in the Roseburg District and declares the Allowable Sale Quantity (ASQ) for the Roseburg Sustained Yield Unit (SYU), as required by the O&C Act. Land use allocations and management direction are designed to accomplish the NCO ROD/RMP management objectives. Management objectives describe the desired future conditions/outcomes for each land use allocation and resource program. The BLM has a purpose and need to implement the following direction:

1. ***Conduct timber salvage harvest of Harvest Land Base lands after disturbance events to recover economic value from timber and contribute to the attainment of the declared Roseburg District Allowable Sale Quantity (NCO ROD/RMP, pp. 5-8, 59, 62-63).***

   Timely salvage harvesting of high and moderate severity burn areas within the HLB LUA is needed to recover economic value from timber following the Archie Creek Fire before wood deterioration occurs and affected stands are no longer capable of contributing towards the Roseburg SYU ASQ. As time progresses (2-3 years), fire-killed trees lose economic value due to insects, staining, and checking (cracks in the wood that occur as the burned wood dries). By late summer of 2022, the economic value of timber stands with high and moderate burn severity (where tree mortality is at or near 100 percent), could be

reduced to the point that economic recovery would no longer be viable and would not contribute to the Roseburg SYU ASQ (Lowell et al. 1992; Lowell et al. 1996). However, if the salvageable timber continues to have economic value, the BLM would continue salvage harvesting beyond late summer of 2022.

Timber volume from the HLB LUA in the Roseburg Sustained Yield Unit (SYU) must be offered for sale annually to achieve the Roseburg District ASQ target. The BLM's declared annual ASQ for the Roseburg SYU is 32 MMbf; however, the NCO ROD/RMP includes an amount of variation in the volume of timber that the BLM will offer for sale in each SYU. The Roseburg ASQ can vary the actual volume of timber HLB LUA offered for sale by 40 percent annually. Over a decade of implementation, the Roseburg ASQ volume may vary by as much as 30 percent from the 32 MMbf summed over the entire decade (NCO ROD/RMP, p. 6).

In response to the need to contribute to the declared annual ASQ, the BLM would offer for sale timber from salvage harvesting in the HLB LUA, as well as contribution of ASQ from hazard trees removed from the HLB LUA, within the Archie Creek Fire perimeter, not to exceed 44.8 MMbf each year. The BLM offers this sustained-yield volume of timber only from the HLB LUA, which has specific objectives for sustained-yield timber production (NCO ROD/RMP, pp. 5-6, 59, 62). Deferring salvage now would forego the opportunity to 1) recover the economic value from timber following the 2020 fire event; and 2) contribute volume toward meeting the declared ASQ (NCO ROD/RMP, pp. 5-6, 59, 62).

2. ***Conduct hazard tree removal to protect public safety, roads, and infrastructure and maintain access by keeping roads and infrastructure clear of debris (NCO ROD/RMP, pp. 56, 65, 68, 75).***

   Hazard tree removal within the Archie Creek Fire perimeter is necessary to protect human life and infrastructure and ensure access to public lands is maintained. Due to the checkerboard ownership and the amount of traffic related to forest management activities and public access, as well as the legal obligation to provide access to private industrial timber lands and holders of rights-of-way grants, permanent closure of roads and other facilities/infrastructure within the Archie Creek Fire perimeter is not a viable option.

1.4. Decisions to be Made

The BLM will decide whether to authorize salvage harvest and hazard tree removal in the Calapooya Creek, Rock Creek, Canton Creek, Little River, Middle North Umpqua River, and Lower North Umpqua River fifth-field watersheds as described in the project location and purpose and need above. Timber management activities associated with salvage harvest would include road construction, road renovation, road maintenance, helicopter landings, subsoiling, yarding wedges, yarding corridors, and treatment of activity fuels as well as road decommissioning. These associated activities are proposed on all LUAs.

In addition, the BLM will decide whether to conduct hazard tree removal as described in the project location and purpose and need above.

Salvage harvest and hazard tree removal decisions would include Project Design Features (PDFs) and Best Management Practices (BMPs) and whether to implement related actions based on the following:

- How well the actions would achieve the purpose and need for the project;
- How effective the actions are at addressing the issues analyzed in detail while meeting the purpose and need; and
- Compliance with management direction and objectives from the NCO ROD/RMP and applicable laws including, but not limited to the Clean Water Act, the Endangered Species Act (ESA), the O&C Act, the Archaeological Resources Protection Act, and the National Historic Preservation Act.

The BLM will also determine if the impacts of the proposed actions are within the range analyzed in the 2016 Proposed Resource Management Plan/Final Environmental Impact Statement for Western Oregon (PRMP/FEIS). If effects are determined to be insignificant, then a Finding of No Significant Impact (FONSI) would be signed and issued, and the Decision Records would be written and implemented for site-specific salvage harvest and hazard tree removal actions. All Decision Records shall conform with management direction from the NCO ROD/RMP as well as all applicable laws, regulations, and policies.

1.5. Conformance with Land Use Plan

The BLM signed the Northwestern and Coastal Oregon Record of Decision and Resource Management Plan on August 5, 2016. The Archie Creek Fire Salvage Harvest and Hazard Tree Removal EA conforms to the NCO ROD/RMP, which addresses how the BLM will comply with applicable laws, regulations, and policies in western Oregon including, but not limited to the: O&C Act, FLPMA, ESA, National Environmental Policy Act (NEPA), Archaeological Resources Protection Act, Clean Air Act, and Clean Water Act. In addition, the BLM interdisciplinary team (IDT) has developed resource specific analysis and specialists reports for this project. These specialist reports consider the effects of the alternatives as they relate to the NCO ROD/RMP, the PRMP/FEIS, laws, regulations, and policies where applicable. These specialist reports and analysis are on file with the Swiftwater Field Office at the Roseburg District Office, 777 NW Garden Valley Blvd., Roseburg, OR, 97471.

Management direction for salvage harvesting includes requirements for retention of live trees or snags and requirements for reforestation that differ among the MITA and the LITA. Salvage harvest is proposed on HLB acres where the timber is between 40 and 160 years of age and is impacted by high and moderate burn severity; however, the salvage harvest volume from the HLB would be limited to the annual ASQ allowed by NCO ROD/RMP direction. The Roseburg District's declared ASQ allows for a 40 percent variation from 32 MMbf on an annual basis; therefore, the maximum contribution each year is 44.8 MMbf and the minimum is 19.2 MMbf (NCO ROD/RMP, p. 6).

1.6. Public Input and Alternative and Issues Development

The BLM published a notice of project initiation in the Roseburg District Quarterly Planning Update (October 2020), informing the public of the potential for proposed post-fire actions as a result of the Archie Creek Fire. The specific proposal to conduct salvage harvest in the Archie Creek Fire area was included in the Roseburg District Quarterly Planning Update in January 2021.

The BLM mailed letters to landowners with property adjacent to BLM administered lands where the Archie Creek Fire Salvage Harvest and Hazard Tree Removal EA is proposing actions including those whose property lies beside or astride identified haul routes (referred to as adjacent landowners) on December 8, 2020. The BLM received no responses.

The BLM mailed scoping letters to the district-wide mailing list on December 8, 2020. Recipients were encouraged to share any concerns or special knowledge of the project area that they may have. A virtual public meeting was conducted on December 16, 2020 and was attended by 35 members of the public. Scoping comment letters were received from 10 organizations, 30 unique comments from individuals, and over 975 form letters. All scoping comment letters and emails received can be found in the project file.

The BLM IDT reviewed the scoping responses and used the relevant comments in identifying issues and developing alternatives and PDFs. Comments, questions, and issues were raised by individuals, organizations, and BLM's interdisciplinary team. Issues are points of discussion, dispute, or debate about the environmental effects of proposed actions. Issues and concerns raised were considered in the formulation of alternatives, PDFs, and/or environmental effects (See Section 2.7). Some comments were not related to the decision to be made, were procedural concerns, or were already decided by law, regulation, policy, or direction.

Issues Identified for Analysis

Through internal and external scoping, the IDT identified the following issues to be analyzed in detail in Chapter 3 of this environmental assessment.

Issue 1. How would the proposed forest management activities (salvage harvest and hazard tree removal actions) in the Harvest Land Base affect recovery of economic value from timber harvest following a disturbance event and contribute towards the achievement of the Allowable Sale Quantity for the Roseburg District SYU?

Issue 2. How would proposed vegetation management affect soils and water quality?

Issues Considered but not Analyzed in Detail

In general, issues considered but not carried forward in Chapter 3 are those that are:

1) Outside the scope of the proposed action;
2) Already decided by law, regulation, or other higher level decision;
3) Not necessary to make an informed choice among alternatives;
4) Addressed by PDFs that remove the possibility of significant effects; and
5) Resources that are not present in the proposed action area or would be unaffected by proposed actions.

Issues considered but not analyzed in detail are addressed in Appendix C of this EA. Appendix C includes issues raised by the public and the BLM during scoping for this project that are addressed by the project's design (Chapter 2) or are beyond the scope of this project. Requests for information that would not further contribute to making a reasoned and fully informed decision for the project would not be included in the EA. Appendix C of the EA describes how these conclusions were reached.

2. Alternatives

This chapter describes the No Action Alternative and the Action Alternatives. The BLM has identified three Action Alternatives to analyze in detail: Alternative 2 (Ground/Cable Salvage Harvest and Hazard Tree Removal), Alternative 3 (Ground/Cable/Helicopter Salvage Harvest and Hazard Tree Removal), and Alternative 4 (No New Road Construction and Hazard Tree Removal). Project Design Features and Best Management Practices for Action Alternatives considered in detail in this EA are in Appendix B. Issues not analyzed in detail are presented in Appendix C.

Throughout this document, analysis figures and reference maps depict salvage harvest units and road locations using Geographic Information Systems (GIS) mapping techniques. Estimates are intended to aid the reader in understanding the proposed actions. Although electronic technology can produce information that appears precise, GIS projections are subject to refinement during the implementation phase. Unit size and shape, road length, proposed surfacing, location, and post-harvest disposition would be refined during layout so minor changes may occur; however, these changes would not alter effects analysis conclusions. Table 4, Table 5, and Table 6 provide details of proposed activities for Action Alternatives considered for the Archie Creek Fire Salvage Harvest and Hazard Tree Removal EA.

All Action Alternatives are designed to avoid incidental take of northern spotted owls (NSO). The BLM will not authorize timber sales that would cause the incidental take of NSO territorial pairs or resident singles from timber harvest until implementation of a barred owl management program consistent with the assumptions contained in the Biological Opinion on the RMP has begun (NCO ROD/RMP, p. 30). The proposed actions would be modified or deferred to ensure that actions do not cause incidental take.

In developing the Action Alternatives, the IDT determined that the focus for salvage harvesting would be on areas affected by moderate to high severity fire in lands allocated to the HLB LUA with timber in the 40 to 160-year old age class. The IDT used the following criteria for the preliminary identification of fire-damaged salvage harvest units in the HLB LUA, ensuring the NCO ROD/RMP management direction for implementing timber salvage harvest after disturbance events to recover economic value and minimize commercial loss or deterioration of damaged trees was considered:

- Approximately 1,250 acres were included for this analysis from previously proposed harvest units that were undergoing analysis by the BLM. Most of the units with high stand volumes had been included in the previous analysis.
- Approximately 300 acres are from a previously completed EA. This was a timber sale that had been prepared for the October 2020 timber sale auction. However, because the fire burned the previously green trees, it was necessary for these units to be re-analyzed under this salvage harvest EA.
- Stands 60 years to 160 years were included in the analysis because all stands in these age classes are projected to have sufficient volume to support salvage harvest despite decay losses due to delayed harvest schedules.
- Stands 50 years of age or less were excluded due to low volume projections; however, approximately 450 acres of stands ages 40 years to 50 years, with volumes of 25 thousand board feet (mbf) per acre or greater that could be accessed by road renovation or minimal road construction were included. This average volume per acre is economically viable because the value of timber exceeds logging and road construction costs. The effects of delayed harvest schedules were also considered when selecting these stands for salvage.

Estimated hazard tree removal acres are based on GIS and Facility Asset Management System (FAMS) data of the roads and other infrastructure or facilities within or adjacent to the Archie Creek Fire perimeter. Removal of hazard trees would occur if the assessment for failure potential (i.e., the likelihood that a tree or its parts will fail during a certain time-period) is either 1) imminent or 2) likely failure potential. The definitions of those two terms come from the 2016 Field Guide for Danger-Tree Identification and Response along Forest Roads and Work Sites in Oregon and Washington (USDA, Forest Service) ("2016 Field Guide"), and are listed below:

- Imminent-failure potential: Trees or their parts are so defective or decayed that it would take little effort to make them fail. These trees or parts have a high probability of failure within one year.
- Likely failure potential: Trees or their parts are defective or decayed, but it would take moderate effort to make them fail. These trees or parts have a high probability of failure within 3 to 5 years.

2.1. Activities Common to All Action Alternatives

Section 2.1 contains the implementation requirements, activities, and methods that apply to all analyzed Action Alternatives. See also Appendices A through J for more information.

Incidental Take Avoidance and PDFs Specific to Northern Spotted Owls

The NCO ROD/RMP establishes salvage harvest as appropriate in the HLB LUA provided the harvest actions do not cause incidental take of NSO territorial pairs or resident singles until a barred owl management program is implemented (NCO ROD/RMP, pp. 30-31, 105). To date, no barred owl management program has been implemented. Thus, the BLM Roseburg District would not allow salvage harvest implementation that would cause incidental take of NSO territorial pairs or resident singles for salvage harvest actions analyzed in this EA.

The Biological Opinion for the Archie Creek Fire proposed Action Alternatives concluded that incidental take of northern spotted owls is not reasonably certain to occur. Although adverse effects to spotted owls and their designated critical habitat are anticipated from the proposed actions, the U.S. Fish and Wildlife Service (FWS) concludes that the BLM's implementation of the proposed actions is not likely to jeopardize the

continued existence of the spotted owl or to destroy or adversely modify their critical habitat. Due to the extent of minimization measures incorporated into the EA, reasonable and prudent measures and their implementing terms and conditions were not identified by the FWS.

Planned areas for salvage harvest and associated timber management activities and/or hazard tree removal proposed actions may be affected by occupied northern spotted owl nest sites/activity centers in unpredictable ways (i.e., the planned harvest or other activity may be modified or deferred due to NSO avoidance requirements). "Occupied" northern spotted owl nest sites/activity centers include not only known spotted owl sites that were classified as occupied based on recent (2019/2020) two-year protocol surveys but also unsurveyed historical nest sites/activity centers (presumed occupied).

Northern spotted owls may shift locations because owls use alternate nest sites/activity centers from year to year and are being displaced by barred owls, so their location is not entirely predictable. A shift is defined as the condition where the habitat is still functional and considered occupied, but the core use area may move to the best available habitat immediately adjacent to the prior activity center or to another location in habitat within the immediate area. This means NSO sites the BLM currently classifies as occupied may be vacated in the future due to barred owls or other disruptions while other sites may become occupied. In addition, the occupied sites may have shifted due to fire effects on habitat within the action area. Where activity centers are affected by fire (any range of severities) site fidelity may cause northern spotted owls to increase the size of their home ranges or shift locations to encompass the best available habitats rather than vacate the burned site (King et al. 1998, p. 3; Clark 2007, p. 112; Clark et al. 2013, p. 683; Jones et al. 2016, pp. 303-304, Davis 2017, pers. comm). Both northern spotted owls and barred owls are expected to respond to post-fire habitat conditions the same; therefore, owls are expected to compete for remaining residual habitat within the fire perimeter.

The BLM will adhere to the NSO Situational Management Approach to Avoid Northern Spotted Owl Incidental Take (Project Design Criteria) (Appendix B, Table B-1, WL-1; FWS Biological Opinion p. 150) before and while implementing any proposed actions for the purpose of avoiding incidental take of northern spotted owl territorial pairs or resident singles, as well as adhering to all wildlife and other resources PDFs. The BLM and the FWS have determined occupancy status at nest sites/activity centers based on results from a combination of broadcast call surveys and passive audio recording devices following a breeding survey season. The BLM also would conduct site-specific assessments of habitat conditions within an occupied northern spotted owl site (at the nest patch, core-use area, and home range spatial scales), prior to implementation of proposed actions. Where unsurveyed NSO nesting, roosting, and foraging (NRF) habitats exist within the fire perimeter, the BLM presumes those habitat acres are occupied by resident or territorial spotted owl(s), unless protocol surveys provide evidence to the contrary. This is typical and consistent with past approaches to unsurveyed NRF habitat on the Roseburg District. Implementation of PDFs would exclude salvage of timber that is classified as NRF and/or dispersal-only habitat. In salvage harvest units, the PDFs would also maintain burnt-NRF which functions as foraging habitat within 500 feet of unburned NRF.

Depending upon site specific conditions (i.e., location of salvage harvest units and associated timber management activities and/or hazard tree removal actions relative to known activity centers, current habitat conditions, etc.) within an occupied or presumed occupied northern spotted owl site and type of northern spotted owl habitat potentially affected at the time of sale preparation, the BLM would modify or defer salvage harvest activities in those units to avoid incidental take of northern spotted owls by following the NSO Situational Management Approach (Appendix B, Table B-1, WL-1; FWS Biological Opinion, p. 150). This approach was developed by the Umpqua Level One Team and is described in the Biological Assessment (BA) for the Archie Creek Fire Salvage Harvest and Hazard Tree Removal on the Roseburg District BLM (USDI BLM 2021) and was incorporated into the FWS Biological Opinion.

Estimated habitat conditions for the northern spotted owl (Appendix A, Figure A-30) was developed using GIS data from the Roseburg District habitat database (Dec. 10, 2020), post-fire aerial photography (2020), post-fire imagery (2020), and some field reconnaissance (2020-present). Actual field-verified habitat

conditions would be updated based on habitat classification reviews prior to salvage harvest implementation; therefore, the habitat classification may differ than what is presented in the EA.

In addition, based on the FWS's Appendix X – Considerations for Evaluating Effects of Post-Wildfire Conditions to Northern Spotted Owls and Their Habitat (USDI FWS 2020), the BLM would apply specific Project Design Features (PDF; Appendix B, Table B-1, WL-2) developed to minimize effects to occupied sites, unsurveyed areas, and to NRF habitat and dispersal-only habitat.

Hazard Tree Removal

Hazard trees within the Archie Creek Fire perimeter are any standing live or dead trees, including snags, with evidence of deterioration or physical damage to the root system, trunk, or stem, that when in proximity to people or infrastructure the failure of any tree or part thereof would cause injury, death, or property damage.

Consistent with management direction for the LUA and resources managed by the BLM, management of hazard trees would occur as necessary to mitigate safety concerns, retain access, or protect structures. Depending on the LUA, cut trees would be available for sale, retained as down woody material, or moved for placement in streams for fish habitat restoration.

Hazard tree removal would occur under all Action Alternatives following management direction for each LUA in the NCO ROD/RMP. To determine the appropriate disposition of felled hazard trees, the BLM would follow the purposes for which the lands are reserved or allocated to identify the priority for disposition as directed by the NCO ROD/RMP (pp. 56, 57, 61, 62, 63, 65, 68, 79, 83). Within each Action Alternative, additional hazard tree removal is identified which would be related to the proposed salvage harvest units and actions. This additional hazard tree removal would only occur if a salvage harvest unit is designed and offered for sale (see also, sections 1.3 Purpose and Need and 1.5 Conformance with Land Use Plan). The description and acres associated with salvage-harvest-related hazard tree removal is described under the description for each action alternative.

Table 4. Hazard Tree Removal Common to All Action Alternatives by Land Use Allocation[1]

Action Area	CRNLSCS	RR	LSR	DDR-SMRA	DDR-Waterbody Area or Wetland	DDR-TPCC	DDR-Roads	HLB-LITA	HLB-MITA	Private Property	Total Acres
Maintenance Level 3, 4, & 5	23	300	1,102	19	8	46	156	400	143	0	2,197
Recreation Site	75	54	17	34	12	5	2	9	3	12	223
Pump Chance and Resource Road[2]	0	41	51	0	3	2	8	34	4	0	143
Adjacent private infrastructure and home sites	5	5	21	0	0	0	1	11	6	0	49
Total Acres[3]	**103**	**400**	**1,191**	**53**	**23**	**53**	**167**	**454**	**156**	**12**	**2612**

[1] BLM Land Use Allocations are defined in the NCO ROD/RMP CRNLCS = Congressionally Reserved Lands & National Conservation Lands; DDR = District Designated Reserve; LSR = Late Successional Reserve; RR = Riparian Reserve; HLB = Harvest Land Base; LITA = Low Intensity Timber Area; MITA = Moderate Intensity Timber Area.

[2] Pump Chance and Resource Road Hazard Tree Removal acres overlap other management actions (125 acres are outside of other management actions)

[3] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

Hazard tree removal would occur if dead trees or trees damaged or dying would strike or slide onto a BLM road or impact other infrastructure within the Archie Creek Fire perimeter. The primary assessment zone for determining the need to remove hazard trees on BLM-administered roads is 200 feet uphill and 150 feet downhill of roads and BLM easements. For Assessment purposes in this EA, it is assumed that hazard tree falling and/or removal would occur, on average, up to 150 feet from the centerline of roads (300 feet total

width) and up to 150 feet from the edge of infrastructure. However, hazard tree removal distances, would vary based on topography and individual tree heights and could range from 0 to 300 feet for individual trees or locations.

The BLM proposes the cutting and removal and/or disposal of imminent and likely to fail hazard trees across all LUAs that were killed, have a high-risk potential for structural failure, and are considered a risk to human safety or infrastructure. This includes trees within moderate to high severity burn areas with a 60 percent or greater probability of mortality; however, within moderate and low severity burn areas with functional spotted owl habitat, only imminent hazard trees would be removed to retain habitat function. Hazard tree identification and probability of mortality would be based primarily upon visual estimate of the percentage of the pre-fire crown that has been killed, as measure by percentage of scorched. Evidence of cambium death, pathogen, or insect infestation would also be evaluated using the 2016 Field Guide for Danger-Tree Identification and Response along Forest Roads and Work Sites in Oregon and Washington (USDA, Forest Service) ("2016 Field Guide"), the USFS Marking Guidelines for Fire-Injured Trees in California (Smith & Cluck, 2011), and the Field Guide for Danger Tree Identification and Response (Toupin et al. 2008).

Hazard tree removal is proposed along mainline and collector roads, including legal public access routes; within and adjacent to recreation sites and other BLM infrastructure; around pump chances and along resource roads providing access; and adjacent to private property infrastructure.

Hazard tree removal under any Action Alternative would occur on:

- Approximately 84 miles (approximately 2,200 acres) of BLM-administered mainline and connector roads (Maintenance Level 3, 4, and 5) within the Archie Creek Fire perimeter that require hazard tree assessment and potential removal.
- Approximately two miles (approximate 125 acres) of BLM-administered roads in areas where the BLM manages five pump chances (ponds or tanks designated as fire-fighting water sources) which are located outside of proposed salvage harvest units to ensure the safety of and continued access to this fire infrastructure.
- Eight campgrounds and recreation sites would require approximately 233 acres of treatment to ensure public safety and protection of infrastructure as well as be performed prior to reconstruction of facilities.
- Approximately 49 acres (25 locations) of hazard tree removal would occur on BLM-administered lands adjacent to private infrastructure or home sites.

Salvage Harvest

All Action Alternatives evaluate the BLM's proposal to salvage high and moderate severity burn areas in the HLB to recover economic value of timber following the Archie Creek Fire before wood deterioration occurs and affected stands are no longer capable of contributing towards the Roseburg SYU ASQ. Except for operational and safety needs, live trees (trees with a probability of mortality that is less than 60 percent) would be retained within salvage units to promote complex early-successional systems. However, to facilitate removal, some dead and dying trees or incidental live trees may be felled and removed for construction of yarding corridors, landings, and road construction.

Required retention of live trees or snags within salvage harvest units is described under the NCO ROD/RMP and based on the LUA.

Harvest Land Base – Low Intensity Timber Area

In timber salvage harvest units, retain at least 15 percent of pre-harvest stand basal area in live trees or snags in individual harvest units (NCO ROD/RMP, p. 62). Retain trees and snags in a variety of spatial patterns, including aggregated groups and individual (dispersed) trees (NCO ROD/RMP, p. 62).

Harvest Land Base – Moderate Intensity Timber Area

In timber salvage harvest units, retain at least five percent of pre-harvest stand basal area in live trees or snags in individual harvest units (NCO ROD/RMP, p. 63). Retain trees and snags in a variety of spatial patterns, including aggregated groups and (dispersed) individual tree trees (NCO ROD/RMP, p. 63).

Candidate areas for both HLB-LITA and HLB-MITA ($\geq$ 0.25 acres) for aggregate retention would include but are not limited to the following:

- Patches of green trees or green trees mixed with snags to provide clumps with structural complexity;
- Concentrations of trees/snags that are older and larger than the prevailing stand conditions for provision of long term coarse woody debris retention;
- Concentrations of existing large down wood;
- Unique habitats such as seeps, rock outcrops, and areas of ecological diversity; and
- Areas of unstable or potentially unstable soils greater than one-quarter acre that are not located above or adjacent to a stream. Yarding corridors would be allowed in some retained aggregates where they would not be expected to increase the risk of slope failures.

Dispersed retention would focus on dominant and co-dominant trees, some of which would be expected to provide snags and large down wood in the harvested area. Operational considerations could affect placement of dispersed retention. Candidates for dispersed retention (<0.25 acres) would include but are not limited to the following:

- Live green trees with a 60 percent or less probability of mortality;
- Legacy hardwood and conifer trees;
- Minor conifer tree species; and
- Areas of unstable or potentially unstable soils less than one-quarter acre in size.

Road and Landing Construction

For Alternative 4, no new road construction would be authorized; however, new landings with temporary operator spurs (approximately 500 feet or less), may be built using the following methods/standards where necessary to move landings off heavily travelled roads, improve safety, or access landing locations that would reduce impacts to natural resources.

Road and landing construction activities would include the use of trucks, heavy equipment and/or handheld power equipment. The BLM would construct road segments to move landings off heavily travelled roads to avoid user conflict, improve safety, and/or access landing locations that would reduce impacts to natural resources. Road construction would include only the construction of roads necessary for accessing units and for allowing yarding and decking of logs. Road construction would also be utilized to access landing locations that provide satisfactory yarding deflection or corridor alignment to facilitate environmentally responsible yarding.

Constructed roads and landings would be located on geologically stable locations, such as, ridge tops, stable benches or flats, and gentle-to-moderate side-slopes (NCO ROD/RMP, p. 143). Roads and spurs would be designed no wider than needed for the intended use to minimize soil disturbance (NCO ROD/RMP, p. 143), generally, with a 14-foot-wide road surface and an average road right-of-way clearing width of 40 feet. However, road shoulders, landings, vehicle turnouts, and curve widening could result in wider than a 14-foot road surface and road right-of-way clearing wider than 40 feet. Factors requiring rights-of-way greater than 40 feet would include slope steepness, turnouts, and a safe line-of-sight on approaches to curves. Road construction would occur during the dry season (typically, mid-May through mid-October) but may be adjusted based on weather conditions.

Road construction would only occur within RR in situations when there is no other operationally feasible and economical viable way to accomplish resource management objectives (NCO ROD/RMP, p. 68).

Road Maintenance

Road maintenance would be performed with trucks, heavy equipment, self-powered, self-propelled equipment and/or manually with hand tools including chain saws. The extent of the road activities may extend to five feet beyond the toe of fill and five feet beyond the top of the cut within the existing road prism. In most cases, the extent of the road maintenance activity extends to 45 feet in width (22.5 feet on both sides of the centerline of the road).

Road maintenance would consist of road work necessary to maintain the integrity of the existing road surface and may be subject to stipulations by holders of reciprocal rights-of-way, easements, or other legal interests. Road maintenance activities include, but are not limited to:

- Cleaning of ditches, catch basins, and culverts;
- Cutting brush and removing vegetation from roadway;
- Repairing potholes;
- Grading the road surface, turnouts, truck turnarounds, stockpile sites, and landings;
- Road surfacing (rocking, asphalt, chip sealed);
- Stock piling rock resources;
- Compacting road surface, turnouts, truck turnarounds, stockpile sites, landings, and/or the bedding of culverts;
- Removing landslide debris and repairing minor road slumps;
- Installing, repairing, and replacing cross drains (relief) culverts and culverts on non-fish bearing streams;
- Installing and repairing waterbars and waterdips;
- Road realignment (widening curves for site distance safety and adjusting junction direction for haul route);
- Rebuilding barricades/barriers to block roads.

Road Renovation

Road renovation would consist of road work necessary to restore original road design conditions. Road renovation would also include activities described in the road maintenance section. This work can be conducted on any existing inventoried or un-inventoried road and would include brushing; tree removal within or protruding into the road prism; ditch cleaning; surface grading; slump removal; road realignment; replacing or installing drainage structures; and/or adding rock surfacing where necessary. Road realignment would be needed when renovated roads have an existing narrow road width, existing road failure, existing roads grades above 20 percent, and/or additional curve widening to be greater than 40-degree radius curves. The road prism variable clearing limits extend five feet beyond the top of cut and the toe of the fill of the road on either side of the road prism in straightaways, and 25 feet beyond the inside edge of the road prism during horizontal curves in the road. In addition, the road prism variable clearing limits are subject to the variable side slopes of the previous road construction, the need for culvert replacement/installations, and operational turnouts/log truck turn arounds. Road maintenance and renovation would occur during the dry season (typically, mid-May through mid-October) but may be adjusted based on weather conditions.

Road Decommissioning

Road decommissioning would be accomplished in a variety of ways based upon evaluation of circumstances specific to each road. At a minimum, decommissioning would include leaving roads in a well-drained condition and blocking access to vehicular use with barriers such as trenches, rocks, or logs. It may also include removing drainage structures, subsoiling the roadbed, mulching with straw and

seeding with native grasses or mulching with logging slash to further discourage off-highway vehicle use. Road decommissioning may be subject to stipulations by holders of reciprocal rights-of-way, easements, or other legal interests.

Yarding Corridors

Yarding corridors have been identified for this analysis and would be further refined for site-specific salvage harvest and would be documented using Decision Records. Yarding corridors are primarily used for cable yarding but may also be used for ground-based yarding in situations where logical road locations cannot be constructed to a landing within the unit. Yarding corridors provide for harvest opportunities from existing roadways and are designed for safe and expeditious removal of timber but should be narrow enough to minimize damage to reserve trees.

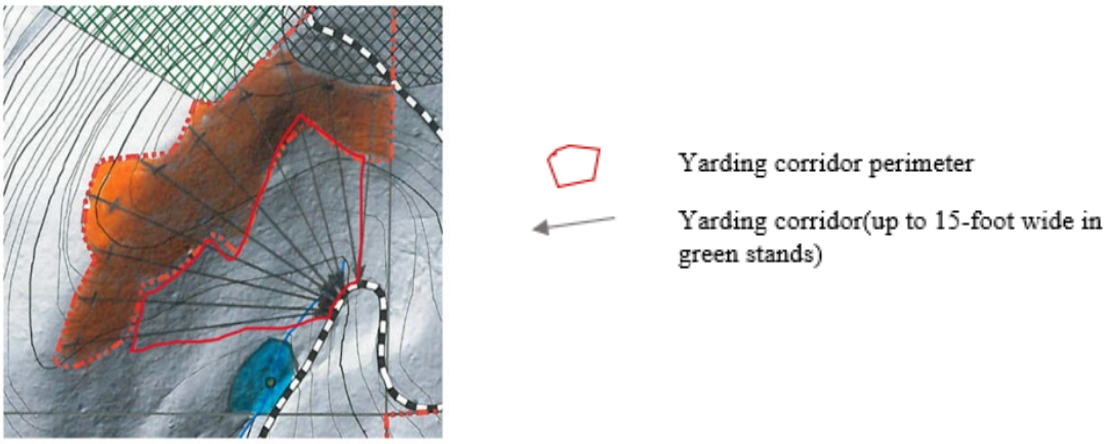
Full canopy removal is expected to occur due to operational safety needs when operating within high and moderate severity burn areas. When necessary to provide for yarding corridors for harvest operations through low or mixed mortality, cable yarding corridors would be limited to 15 feet in width. Sound green trees adjacent to corridors would not be felled.

Yarding corridors would be perpendicular to streams or hillside when feasible and limited in size and number. Per NCO ROD/RMP direction in LSR "where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement, retain cut trees in adjacent stands as down woody material, move cut trees for placement in streams for fish habitat restoration, or sell trees, at the discretion of the BLM (p. 65) and in the RR "where trees are cut for yarding corridors, skid trails, road construction, maintenance, and improvement in the Outer Zone or in Riparian Reserves associated with features other than streams, retain cut trees in adjacent stands as down woody material, move cut trees for placement in streams for fish habitat restoration, or sell trees, at the discretion of the BLM (p. 68).

Proposed yarding corridors would be configured as fan/wedge, parallel, or inclusions (Figures 1-3). Proposed yarding methods on private land are referred to as yarding wedges.

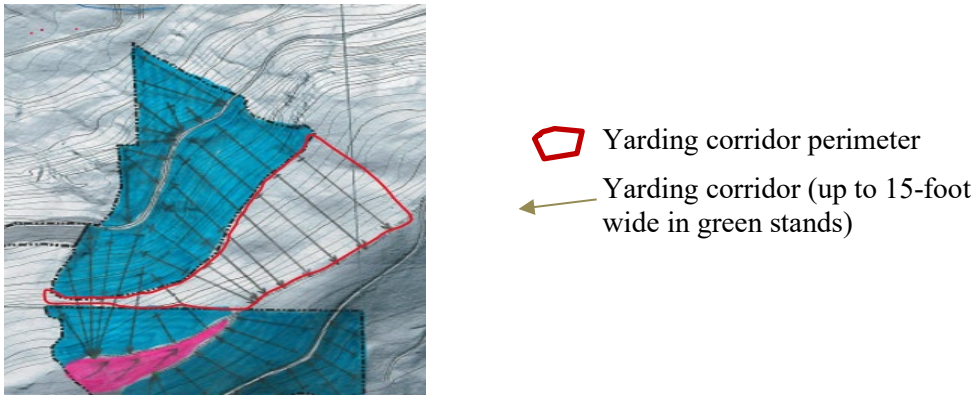
- A **fan configured yarding corridor** (Figure 1) results when a harvest unit is yarded to a fixed location, such as a landing at the end of a road. As the unit harvest progresses, a new corridor is established. Corridor consolidation in the proximity of the landing results in green forest canopy removal ranging from one-tenth acre to two-acre openings. The size of this area would vary, based on the yarding corridor acreage and the tributary unit acreage.

Figure 1. Fan Yarding Corridor Example



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

Figure 2. Parallel Yarding Corridor Example.



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

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

Fuels Management for Proposed Salvage Harvest and Hazard Tree Removal Activities

The BLM proposes to conduct post-harvest fuels treatment in salvage units, hazard tree treatment areas, and landings. All fuels treatments would be in accordance with Department of Interior BLM policy and would follow regulations in the Oregon State Smoke Management Plan, as applicable.

Due to the severity of the Archie Creek Fire, hazardous fuels concerns have lessened considerably for the coming two to 10 years. Remaining activity fuels would provide additional soil stability and nutrients in areas otherwise denuded of vegetation. Priority for treatment of activity fuels would be placed on slash generated along roads, near homes, and near other infrastructure. Logging slash at landings would be piled and burned to remove concentrations of activity slash. In areas of ground-based harvest, if in a priority area, activity fuels may be machine piled and burned. No fuels treatments outside of salvage or hazard tree removal treatment areas is proposed. The PDFs for fuels management are listed in Appendix B of this EA.

Subsoiling

Subsoiling would occur on landings and main skid trails to reduce water concentration and re-direct the water, minimizing the likelihood of erosion and slope failures. Landings and main skid trails would be subsoiled to a minimum depth of 18 inches, if deemed necessary by the soil scientist based on site conditions and risk of future erosion issues. Areas of shallow, rocky soils would not be subsoiled to avoid mixing rock with topsoil. Logging slash, where available, would be placed on at least 50 percent of subsoiled areas to replace some of the displaced duff and surface soil organic matter.

2.2. Comparison of Alternatives

This section summarizes the alternatives by comparing fulfillment of the purpose and need for action.

Table 5. Comparison of Action Alternatives by Management Activity

Management Activity	Alternative 2	Alternative 3	Alternative 4
Timber Harvest (Acres)[1]	Salvage Harvest	Salvage Harvest	Salvage Harvest
	6,221 acres	6,314 acres	5,503
Independent Hazard Tree Removal Activities (Acres) [1]	2,197 acres for Maintenance Level 3, 4, & 5 Roads	2,197 for Maintenance Level 3, 4, & 5 Roads	2,197 acres for Maintenance Level 3, 4, & 5 Roads
	223 acres for Recreation sites	223 acres for Recreation sites	223 acres for Recreation sites
	125 acres for Pump Chances and Resource Roads	125 acres for Pump Chances and Resource Roads	127 acres for Pump Chances and Resource Roads
	49 acres for adjacent private infrastructure and home sites	49 acres for adjacent private infrastructure and home sites	49 acres for adjacent private infrastructure and home sites
Hazard Tree Removal associated with Salvage Harvest Activities (Acres) [1]	2,037 acres for Haul Routes	2,228 acres for Haul Routes	1,983 acres for Haul Routes
	477 acres within Unit RR	447 acres within Unit RR	447 acres within Unit RR
Roadwork (Miles) [2]	12 miles of Road Construction	6 miles of Road Construction	0 miles of Road Construction
	303 miles of Road Renovation	307 miles of Road Renovation	292 miles of Road Renovation
	15 miles of Road Maintenance	17 miles of Road Maintenance	15 miles of Road Maintenance
	2 miles of Road Decommission	2 miles of Road Decommission	1 mile of Road Decommission
Supporting Actions (Acres) [1]	249 acres of yarding corridors	169 acres of yarding corridors	148 acres of yarding corridors
	0 acres of Helicopter Landing Construction	85 acres of Helicopter Landing Construction	0 acres of Helicopter Landing Construction
	986 acres of post-harvest and hazard tree removal fuels treatment	934 acres of post-harvest and hazard tree removal fuels treatment	877 acres of post-harvest and hazard tree removal fuels treatment
	80 acres of subsoiling	75 acres of subsoiling	76 acres of subsoiling

[1] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

[2] Roadwork miles may vary slightly from the total miles. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

2.3. Alternative 1 – No Action Alternative

The No Action alternative serves as a baseline to compare the effects of the actions between the alternatives and describes the existing conditions and continuing trends within the project area. Under the No Action Alternative, salvage harvest and hazard tree removal treatments would not be applied within the project area. No forest management activities as described in this EA would be implemented to accomplish project goals in the foreseeable future. Consideration of this alternative also answers the question: "What would it mean if the objectives were not achieved?"

Alternative 1 would not achieve the purposes and needs for the proposed actions. There would be no economic recovery of burned timber and no contribution to the Roseburg District ASQ. Proposed salvage harvest, and connected forest management actions for these activities, would not occur at this time. Hazard tree removal would be limited to the actions authorized by the Categorical Exclusion prepared by the Swiftwater Field Office under the Emergency Stabilization and Repair authority, which only allows hazard trees to be removed within one year and 21 days of the fire ignition. There would be no road construction needed to provide access for yarding and timber hauling. Road renovation designed to reduce erosion, correct drainage deficiencies, and improve water quality would not be undertaken and would be limited by the Categorical Exclusion the Roseburg District has for routine districtwide road maintenance activities. Decommissioning of roads surplus to long-term transportation and management needs would not occur.

Road maintenance, which is authorized under the Roseburg District Routine Road and Water Source Maintenance Categorical Exclusion (DOI-BLM-ORWA-R000-2016-0006-CX), would be conducted as needed to accommodate reciprocal rights-of-way users, to protect federal investments, and provide resource protection. Reforestation would occur within the planning area regardless of alternative because reforestation would be covered under a separate NEPA analysis.

Selection of Alternative 1 does not constitute a decision to reallocate these lands to non-commodity uses. If the decision maker selects this alternative, the proposed actions would not be conducted at this time. Future activities in the area are not precluded and could be analyzed in subsequent NEPA documents.

2.4. Alternative 2 – Ground/Cable Salvage Harvest & Hazard Tree Removal

The proposed salvage harvest actions include up to 4,842 acres of salvage harvest in HLB-LITA and 1,379 acres of salvage harvest in HLB-MITA for a total of 6,221 acres of potential HLB salvage harvest. The stands proposed for salvage harvest are in the 40 to 160-year age classes at the time they were impacted by fire.

Associated forest management activities (e.g., road maintenance, renovation, and construction and yarding corridors) would occur on all LUAs. Alternative 2 would include hazard tree assessment and removal of approximately 2,037 acres across various LUAs to remove hazard trees specifically associated with haul routes for salvage harvesting and logging operations. Road maintenance, renovation, and construction through the Riparian Reserves within salvage units would require hazard tree removal to protect public safety or to keep roads and other infrastructure clear of debris on 477 acres (NCO ROD/RMP, p. 68). These hazard tree removal acres would be in addition to the acres discussed in the common to all section (See Section 2.1). See Table 6 and Table 7 for Alternative 2 LUA and yarding corridor acres.

Supporting actions would include approximately 12 miles of road construction on all LUAs. Yarding corridors would occur on 187 acres of BLM-Administered lands. Yarding wedges would include approximately 62 acres on private land.

Table 6. Management Activities by Land Use Allocation[1] for Alternative 2

Action	CRNLSCS	RR	LSR	DDR-TPCC	DDR-Roads	HLB-LITA	HLB-MITA	Private Property	Total Acres*
Salvage	0	0	0	0	0	4842	1379	0	6,221
Unit RR Hazard Tree Removal[2]	0	477	0	0	0	0	0	0	477
Hazard Tree Removal along haul routes	97	303	781	57	179	437	183	0	2,037
Yarding Corridor	0	--	53	85	3	42	4	62	249
Total Acres[1]	**97**	**780**	**834**	**142**	**182**	**5321**	**1566**	**62**	**8,984**

[1] BLM Land Use Allocations are defined in the NCO ROD/RMP CRNLCS = Congressionally Reserved Lands & National Conservation Lands; DDR = District Designated Reserve; LSR = Late Successional Reserve; RR = Riparian Reserve; HLB = Harvest Land Base; LITA = Low Intensity Timber Area; MITA = Moderate Intensity Timber Area.
[2] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.
[3] RR yarding corridors are considered interior to units and are addressed in Appendix B, Table B-1.

Appendix I, Table I-3 summarizes the proposed salvage harvest units for Alternative 2. The table includes acres of salvage treatment, acres of hazard tree removal in RR, and the proposed harvest method. This information is also illustrated in Appendix A – Maps. The proposed action also includes guidance to avoid incidental take of northern spotted owls from proposed activities. For more details, refer to the Situational Management Strategy (Take Avoidance) and PDF Specific to Northern Spotted Owls discussion in Associated Activities Common to All Action Alternatives (See Section 2.1).

Yarding Corridors

Proposed actions would include the construction of yarding corridors or wedges on approximately 249 acres. Yarding corridors would occur on 187 acres of BLM-administered lands (46 acres of HLB, 53 acres of LSR, and 88 acres of DDR LUAs) based on limited access or operational needs due to topography (NCO ROD/RMP, pp. 65, 68). An additional 62 acres of yarding wedges would occur across private lands. See Table 7.

Table 7. Yarding Corridor Type for Alternative 2

Action	Fan-configured yarding corridors	Parallel yarding corridors	Inclusion yarding corridors	Yarding Wedges (private)	Total Acres[1]
Yarding corridors	77	108	2	62	249

[1] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

High and moderate soil burn severity make up approximately 156 acres (84 percent) of proposed yarding corridors on BLM lands. The remaining 31 acres (16 percent) of yarding corridors across BLM lands are proposed in low and unburned soil severity.

Proposed yarding corridors would be configured as fan, parallel, or inclusions (See Figures 1-3; Section 2.1 and Table 7).

Road Management

The BLM would construct approximately 12 miles of road, renovate approximately 303 miles of road, perform maintenance on approximately 15 miles of road, and decommission approximately 2 miles of existing spur road. Road construction through one mile of RR would be necessary for access to the units. All roads would be available for timber hauling during the wet and dry season except two roads, Spur 26-2-14a and Spur 26-2-14e, which are dry season haul only. See Appendix I, Table I-6 for a details of Alternative 2 road management activities in miles.

- Road and Landing Construction (12 miles)
- RR Road construction (1 mile)
- Road Maintenance (15 miles)
- Road Renovation (303 miles)
- Road Decommissioning (2 miles)

Hazard Tree Removal Associated with Salvage Harvest Units

The proposed actions would include hazard tree assessment and removal of approximately 2,514 acres across various LUAs. Hazard tree removal along haul routes would occur on 2,037 acres. Unit RR hazard tree removal would also occur on 477 acres within harvest units.

Fuels Management for Proposed Salvage Harvest and Hazard Tree Removal Activities

The proposed actions would include piling and burning approximately 986 acres of logging slash to remove concentrations of activity fuels. In areas of ground-based harvest, if in a priority area, activity fuels would be machine piled and burned.

Subsoiling

Subsoiling would occur on approximately 80 acres of landings and main skid trails to reduce water concentration and re-direct the water, minimizing the likelihood of erosion and slope failures.

2.5. Alternative 3 – Ground/Cable/Helicopter Logging Salvage Harvest & Hazard Tree Removal

Alternative 3 was developed and based on issues identified internally through IDT meetings and external comments generated through the scoping process. Alternative 3 identified stands that could be harvested by helicopter in lieu of road construction. Potential helicopter units were identified by eliminating segments of road construction for difficult to access units. This alternative has the potential to mitigate road construction costs and expedite time sensitive salvage logging by avoiding the need to delay salvage harvest while building roads or possible seasonal restriction delays. Most road construction for timber sales offered in late fall could not be built during the winter wet season, further delaying access to rapidly decaying timber. A helicopter alternative provides an opportunity to avoid road construction and quickly access dead timber during the winter months. Accessing timber quickly before it loses significant commercial value may offset the higher operating costs of helicopter logging.

The proposed salvage harvest actions include 4,935 acres of salvage harvest in HLB-LITA and 1,379 acres of HLB-MITA for a total of 6,314 acres of HLB salvage. For this alternative, approximately 1,110 acres would be designated for helicopter yarding of which an additional 93 acres of salvage harvest is proposed in HLB-LITA that are only accessible by helicopter. Construction of 57 helicopter landings (approximately 85 acres) are required to support helicopter logging. Road construction would not be necessary to access helicopter units and would be reduced from 12 miles to 6 miles. However, an additional 4 miles of road renovation would be needed to access helicopter landings. The stands proposed for salvage harvest are in the 40 to 160-year age classes at the time they were impacted by fire. Associated activities (e.g., road

maintenance, renovation, and construction and yarding corridors) would occur on all LUAs. In addition, the proposed actions would include hazard tree assessment and removal of approximately 2,675 acres across various LUAs.

Road renovation and road construction through the RR within salvage units would require hazard tree removal to protect public safety or to keep roads and other infrastructure clear of debris (NCO ROD/RMP, p. 68). Hazard tree removal along haul routes would occur on 2,228 acres. Unit RR hazard tree removal would also occur on 447 acres within harvest units. Fewer acres of RR hazard tree removal (25 acres) are a result of the reduced road construction under this alternative. These hazard tree removal acres would be in addition to the acres discussed in the common to all section (See Section 2.1). See Table 8 and Table 9 for Alternative 3 LUA and yarding corridor acres.

Supporting actions would include approximately 6 miles of road construction on all LUAs. Yarding corridors would occur on 137 acres of BLM administered lands. Yarding wedges would include approximately 32 acres on private land. See Table 8.

Table 8. Management Activities by Land Use Allocation[1] for Alternative 3

Action	CRNLSCS	RR	LSR	DDR-TPCC	DDR-Roads	HLB-LITA	HLB-MITA	Private Property	Total Acres[3]
Salvage	0	0	0	0	0	4,935	1,379	0	6,314
Unit RR Hazard Tree Removal[2]	0	447	0	0	0	0	0	0	447
Hazard Tree Removal along haul routes	97	339	838	65	196	490	203	0	2,228
Yarding Corridors	0	--	53	74	2	8	0	32	169
Helicopter Landings	1	5	17	2	14	44	2	0	85
Total Acres[3]	**98**	**791**	**908**	**141**	**212**	**5,477**	**1,584**	**32**	**9,243**

[1] BLM Land Use Allocations are defined in the NCO ROD/RMP CRNLCS = Congressionally Reserved Lands & National Conservation Lands; DDR = District Designated Reserve; LSR = Late Successional Reserve; RR = Riparian Reserve; HLB = Harvest Land Base; LITA = Low Intensity Timber Area; MITA = Moderate Intensity Timber Area.
[2] RR yarding corridors are considered interior to units and are addressed in Appendix B, Table B-1.
[3] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

Appendix I, Table I-4 summarizes the proposed salvage harvest units for Alternative 3. The table includes acres of salvage treatment, acres of hazard tree removal in RR, and the proposed harvest method. This information is also illustrated in Appendix A – Maps.

Yarding Corridors

Proposed actions would include the construction of yarding corridors or wedges on approximately 169 acres. Yarding corridors would occur on 137 acres of BLM administered lands; on HLB (8 acres), LSR (53 acres), and DDR (76 acres) LUAs based on limited access or operational needs due to topography (NCO ROD/RMP, pp. 65, 68). An additional 32 acres of yarding wedges would occur across private lands. See Table 9.

Table 9. Yarding Corridor Type for Alternative 3

Action	Fan-configured yarding corridors	Parallel yarding corridors	Inclusion yarding corridors	Yarding Wedges (private)	Total Acres[1]
Yarding corridors	48	87	2	32	169

[1] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

High and moderate soil burn severity make up approximately 105 acres (77 percent) of proposed yarding corridors on BLM lands. The remaining 31 acres (23 percent) of yarding corridors across BLM lands are proposed in low and unburned soil severity.

Proposed yarding corridors would be configured as fan, parallel, or inclusions (See Figures 1-3; Section 2.1 and Table 9).

Road Management

The BLM would construct approximately 6 miles of road, renovate approximately 307 miles of road, perform maintenance on approximately 17 miles of road, and decommission approximately 2 miles of existing spur road. Road construction through one (1) mile of RR would be necessary for access to the units. All roads would be available for timber hauling during the wet and dry season except roads Spur 26-2-14a and Spur 26-2-14e, which are dry season haul only. See Appendix I, Table I-7 for a details of Alternative 3 road management activities in miles.

- Road and Landing Construction (6 miles)
- RR Road construction (<1 mile)
- Road Maintenance (17 miles)
- Road Renovation (307 miles)
- Road Decommissioning (2 miles)

To ensure capturing the most economic value of the salvageable volume, helicopter landings were considered within Alternative 3. A total of six (6) miles of new construction were removed from Alternative 3. New road construction accessing cable ground that was determined unfeasible to build was removed from Alternative 3. The road construction feasibility took into account the difficulty, timeliness and efficiently to build. The following combinations of criteria were used to determine feasibility of road construction with the option to helicopter log:

- New construction roads that required full bench construction greater than 1000 feet.
- Total new construction road system lengths that exceeded 2500 feet.
- New construction roads that access units within one (1) mile that operationally allow flying logs to the same proposed helicopter landing(s).

Additional road maintenance and road renovation work was needed to access the addition of helicopter landings within Alternative 3. In comparison to Alternative 2, a total of two (2) miles of road maintenance miles and four (4) miles of road renovation were added to Alternative 3 with the addition of the helicopter landings.

Hazard Tree Removal Associated with Salvage Harvest Units

The proposed actions would include hazard tree assessment and removal of approximately 2,675 acres across various LUAs. Hazard tree removal along haul routes would occur on 2,228 acres. Unit RR hazard tree removal would also occur on 447 acres within harvest units.

Fuels Management for Proposed Salvage Harvest and Hazard Tree Removal Activities

The proposed actions would include piling and burning approximately 934 acres of logging slash to remove concentrations of activity fuels. In areas of ground-based harvest, if in a priority area, activity fuels would be machine piled and burned.

Subsoiling

Subsoiling would occur on approximately 75 acres of landings and main skid trails to reduce water concentration and re-direct the water, minimizing the likelihood of erosion and slope failures.

2.6. Alternative 4 – No New Road Construction & Hazard Tree Removal

Alternative 4 was developed and based on issues identified internally through IDT meetings and external comments generated through the scoping process. Alternative 4 identifies stands that would be harvested with no new road construction. Most road construction for timber sales offered in late fall could not be built during the winter wet season, further delaying access to rapidly decaying timber. A no roads alternative provides for conventional harvest (cable and tractor yarding) from existing infrastructure while avoiding road construction to quickly access dead timber during the summer and winter months.

The proposed salvage harvest actions include 4,296 acres of salvage harvest in HLB-LITA and 1,207 acres of HLB-MITA for a total of 5,503 acres of HLB salvage. Hazard tree removal associated with salvage harvest actions would occur on 447 acres of RR. However, fewer acres of RR hazard tree removal (25 acres) are a result of the reduced road construction under this alternative. The stands proposed for salvage harvest are in the 40 to 160-year age classes at the time they were impacted by fire. Associated activities (e.g., road construction and yarding corridors) would occur on all LUAs. In addition, the proposed actions would include hazard tree assessment and removal of approximately 2,430 acres across various LUAs. These hazard tree removal acres would be in addition to the acres discussed in the common to all section (See Section 2.1). See Table 10 and Table 11 for Alternative 4 LUA and yarding corridor acres.

Road renovation and road construction through the RR within salvage units would require hazard tree removal to protect public safety or to keep roads and other infrastructure clear of debris (NCO ROD/RMP, p. 68). Hazard tree removal along haul routes would occur on 1,983 acres. Unit RR hazard tree removal would also occur on 477 acres within harvest units. These hazard tree removal acres would be in addition to the acres discussed in the common to all section (See Section 2.1 and Table 4).

Supporting actions would include 0 miles of road construction on all LUAs. Yarding corridors would occur on 104 acres of BLM administered lands. Yarding wedges would include approximately 44 acres on private land.

Table 10. Management Activities by Land Use Allocation[1] for Alternative 4

Action	CRNLSCS	RR	LSR	DDR-TPCC	DDR-Roads	HLB-LITA	HLB-MITA	Private Property	Total Acres*
Salvage	0	0	0	0	0	4,296	1,207	0	5,503
Unit RR hazard tree removal[2]	0	447	0	0	0	0	0	0	447
Hazard tree removal along haul routes	85	299	728	51	186	445	189	0	1,983
Yarding corridors	0	--	22	74	2	5	1	44	148
Total Acres[3]	**85**	**746**	**750**	**125**	**188**	**4,746**	**1,397**	**44**	**8,081**

[1] BLM Land Use Allocations are defined in the NCO ROD/RMP CRNLCS = Congressionally Reserved Lands & National Conservation Lands; DDR = District Designated Reserve; LSR = Late Successional Reserve; RR = Riparian Reserve; HLB = Harvest Land Base; LITA = Low Intensity Timber Area; MITA = Moderate Intensity Timber Area.
[2] RR yarding corridors are considered interior to units and are addressed in Appendix B, Table B-1.
[3] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

Appendix I, Table I-5 summarizes the proposed salvage harvest units for Alternative 4. The table includes acres of salvage treatment, acres of hazard tree removal in RR, and the proposed harvest method. This information is also illustrated in Appendix A – Maps. The proposed action also includes guidance to avoid incidental take of northern spotted owls from proposed activities. For more details, refer to the Situational Management Strategy (Take Avoidance) and PDF Specific to Northern Spotted Owls discussion in Associated Activities Common to All Action Alternatives (See Section 2.1).

Yarding Corridors

Proposed actions would include the construction of yarding corridors or wedges on approximately 148 acres. Yarding corridors would occur on 104 acres of BLM administered lands; on HLB (6 acres), LSR (22 acres), and DDR (76 acres) LUAs based on limited access or operational needs due to topography (NCO ROD/RMP, pp. 65, 68). An additional 44 acres of yarding wedges would occur across private lands. See Table 10 and Table 11 for Alternative 3 LUA and yarding corridor acres.

Table 11. Yarding Corridor Type for Alternative 4

Action	Fan-configured yarding corridors	Parallel yarding corridors	Inclusion yarding corridors	Yarding Wedges (private)	Total Acres[1]
Yarding corridors	40	62	2	44	148

[1] Harvest acres may vary slightly from the total acres. Differences are due to data origination and process methods and are negligible for the analysis in this EA.

High and moderate soil burn severity make up approximately 73 acres (70 percent) of proposed yarding corridors on BLM lands. The remaining 31 acres (30 percent) of yarding corridors across BLM lands are proposed in low and unburned soil severity.

Proposed yarding corridors would be configured as fan, parallel, or inclusions (See Figures 1-3; Section 2.1 and Table 11).

Road Management

Under Alternative 4 no permanent roads will be constructed. However, where necessary, temporary operator spurs (approximately 500 feet or less) and landings would be constructed to move landings off heavily

travelled roads, improve safety, or access landing locations that would reduce impacts to natural resources. Temporary operator spurs and landings would be decommissioned after use. Alternative 4 proposes to renovate approximately 292 miles of road, perform maintenance on approximately 15 miles of road, and decommission approximately one (1) mile of existing road. See Appendix I, Table I-8 for a details of Alternative 4 road management activities in miles.

- Road Maintenance (15 miles)
- Road Renovation (292 miles)
- Road Decommissioning (1 mile)

Hazard Tree Removal Associated with Salvage Harvest Units

The proposed actions would include hazard tree assessment and removal of approximately 2,430 acres across various LUAs. Hazard tree removal along haul routes would occur on 1,983 acres. Unit RR hazard tree removal would also occur on 447 acres within harvest units.

Fuels Management for Proposed Salvage Harvest and Hazard Tree Removal Activities

The proposed actions would include piling and burning approximately 877 acres of logging slash to remove concentrations of activity fuels. In areas of ground-based harvest, if in a priority area, activity fuels would be machine piled and burned.

Subsoiling

Subsoiling would occur on approximately 76 acres of landings and main skid trails to reduce water concentration and re-direct the water, minimizing the likelihood of erosion and slope failures.

2.7. Alternatives Considered but Eliminated from Detailed Analysis

The following alternatives meet one or more of the possible reasons listed in the BLM NEPA Handbook as a potential reason to exclude an alternative from detailed analysis. The specific reason to exclude the alternative is described below.

Retain All Cut Hazard Trees in Reserve LUAs

The BLM received comments during public scoping requesting consideration of an alternative that suggested the BLM consider an alternative that does not log in the riparian reserve or the LSR. The BLM determined that the retention of all cut hazard trees in the reserve LUAs would not be economically feasible. The cost to the BLM to only cut and leave these trees would be estimated to be between $2 to $4 million dollars. The BLM has received approximately $44,000 dollars for hazard three cutting in recreation sites and an additional $174,000 dollars for Coho Salmon stream structures (in which hazard trees would be used for placement into streams). However, this funding only treats a portion of the total need in the fire perimeter (+/- 400 acres funded vs +/- 2,000 acres of hazard tree removal needs in reserve LUAs). Effective and efficient removal of hazard trees throughout the fire perimeter to ensure public safety and infrastructure protection would require reliance on budget cycles and future funding is not timely and/or a certainty. As such providing for hazard tree removal options that would not require additional funding is necessary to meet public safety and infrastructure protection goals. For these reasons, an alternative that does not sell hazard trees was considered, but not analyzed in detail.

Biodiversity Alternative

The BLM received comments during public scoping requesting consideration of an alternative that suggested the BLM consider a biodiversity alternative. This proposed alternative included providing for retention of all green trees, retention of owl habitat, retention of down wood, providing for no actions within of 200 feet or more of riparian areas, provision of a buffer to undamaged areas, retaining structural components for carbon

sequestration and minimizing extraction processes that would increase chances of erosion. Associated actions common to all alternatives (EA Chapter 2) and PDFs (Appendix B) of the EA provide for substantially similar elements as the proposed biodiversity alternative. The primary difference between BLM's proposed alternatives and the biodiversity alternative is that green tree removal would be allowed to provide for operational feasibility. In riparian areas, actions are permitted as necessary to provide for operational feasibility and safety (access and or hazard tree removal). Restricting any removal of green trees and restricting all actions within riparian zones would not provide for protection of public safety or infrastructure from hazard trees or provide for operational feasibility for salvage harvest. The BLM determined that a biodiversity alternative within the Archie Creek Fire perimeter does not meet the purpose and need identified for the Archie Creek Fire Salvage and Hazard Tree Removal EA. For this reason, a biodiversity alternative was considered, but not analyzed in detail.

Treat Fewer Acres and Retain More Green Trees

The BLM received comments during public scoping requesting consideration of an alternative that would treat fewer acres and retain more green trees. The commentor did not provide a description or specific number for the request fewer acres.

Hazard tree removal within the Archie Creek Fire perimeter is necessary to protect human life and infrastructure and ensure access to public lands is maintained. Due to the checkerboard ownership and the amount of traffic related to forest management activities and public access, as well as the legal obligation to provide access to private industrial timber lands and holders of FLPMA rights-of-way grants, permanent closure of roads and other facilities/infrastructure within the Archie Creek Fire perimeter is not a viable option. Hazard tree removal of green trees would only occur for safety and operational reasons and is a necessary component across all Action Alternatives. BLM salvage harvest in the HLB LUAs would focus on those areas affected by moderate to high severity fire where the stocking level of live green trees is inadequate to provide for continued growing stock. Except when necessary for operational feasibility, PDFs across all alternatives provide for retention of green trees in salvage harvest units which have a probability of mortality of less than 60%.

The BLM analyzed three Action Alternatives. Alternative 4, proposes harvest that is approximately 700 fewer acres than Alternative 2 and approximately 800 fewer acres than Alternative 3. In response to the need to contribute to the declared annual Roseburg SYU ASQ, (regardless of the alternative implemented) the BLM would offer for sale timber from salvage harvest actions in the HLB LUA within the Archie Creek Fire perimeter, not to exceed 44.8 MMbf each year. The BLM determined that an alternative that treats fewer acres and retains more green trees would be substantially similar in effect to alternatives already analyzed in detail. For this reason, an alternative that would treat fewer acres and retain more green trees was considered, but not analyzed in detail.

Retain Higher Basal Area

The BLM received comments during public scoping requesting consideration of an alternative that would not log down to the minimum allowed by the RMP (greater than 5 percent basal area for HLB-MITA; greater than 15 percent pre-harvest basal area for HLB-LITA. The BLM does not propose logging down to the minimum basal area retention. All alternatives describe retention to be **at least** 5 percent of the pre-harvest stand basal area in live trees or snags in individual harvest units for MITA and **at least** 15 percent of the pre-harvest stand basal area in live trees or snags in individual harvest units for LITA. The BLM determined the EA provides for retention levels above the minimum allowed. For this reason, an alternative that would not log down to the minimum allowed by the RMP (greater than 5 percent basal area for HLB-MITA; greater than 15 percent pre-harvest basal area for HLB-LITA) was considered to be substantially similar in effect to existing alternatives; therefore, was considered but not analyzed in detail.

3. Affected Environment and Environmental Consequences

This chapter describes the affected environment and the environmental consequences of the alternatives discussed in Chapter 2, as they relate to the issues identified for detailed analysis. The BLM has combined the affected environment and the environmental consequence into this single chapter to provide all the relevant information on an issue in a single discussion. The general format of this chapter is organized by the issue statements that were identified by the IDT through internal and external scoping. For each issue statement, the BLM describes the potential effects to the environment, how they might occur, and the methodologies and assumptions of the analysis. The BLM answers the questions captured in the issue statements by describing the environmental consequence of the alternatives analyzed in detail, including the No Action Alternative.

3.1. Introduction to Cumulative Effects Analysis

The cumulative effects of the BLM timber management program on the Roseburg District were described and analyzed in the PRMP/FEIS (pp. 12, 25, 119-122), incorporated herein by reference. Unless stated otherwise, cumulative effects analyses were based on the actions discussed below and only included for issue statements where it is relevant.

The BLM considered the cumulative effect of non-BLM management actions. The BLM assumes that industrial timber lands are utilized primarily for timber production. Harvest location and scheduling on privately managed industrial forest lands is proprietary information; therefore, throughout this analysis the BLM assumed late-seral forest stands on private land have been converted to early-or mid-seral conditions. The BLM assumed large industrial owners would continue to manage their lands primarily for timber production on a rotation of 40 to 65 years based on observed trends. The BLM assumes intensive timber management on private lands would include the use of herbicides for control of competing vegetation, resulting in highly simplified vegetative communities. It is assumed that industrial forest managers would follow the Oregon Forest Practices Act and other such requirements (PRMP/FEIS, pp. 168, 340).

Summary of Present/Ongoing Actions

Ongoing BLM actions in Calapooya Creek, Rock Creek, Canton Creek, Little River, Middle North Umpqua River, and Lower North Umpqua River fifth-field watersheds (Hydrologic Unit Code (HUC) 10) include:

- Dispersed recreation
- Recreation sites clean-up of sites within the Archie Creek Fire perimeter
- Special forest products gathering
- Noxious weed treatments
- Aquatic restoration projects
- Culvert repair and replacement
- Cultural sites protection and condition assessments
- Reforestation
- Emergency Stabilization hazard tree removal activities
- Honey Creek Quarry Expansion
- Utility Corridor Rights-of-Way hazard tree removal
- ODOT Spoils Site (Clay-Honey) – small footprint of approximately 1.2 acres.
- Non-discretionary hazard tree removal on BLM administered lands allowed under the reciprocal rights-of-way authority.
- Salvage Logging on nearby Private Lands – The exact amount of logging and reforestation on nearby private lands is difficult to ascertain because private companies and individuals are not always willing to share that information.

Using GIS analysis of RAVG (Rapid Assessment of Vegetation Condition after Wildfire) data, there are approximately 90,866 acres of private land within the Archie Creek Fire perimeter. Approximately 15,356 acres incurred 0 percent basal area mortality, 8,594 acres incurred less than 25 percent mortality, 11,999 acres incurred 25-75 percent mortality, and 54,916 acres incurred 75-100 percent mortality (Table 12). Based upon observed past salvage practices, we can estimate no salvage logging is taking place in areas that incurred 0-25 percent basal area loss and we can estimate up to 66,915 acres of salvage on nearby private lands has occurred, is occurring, or may occur in the near future. This will also vary upon the pre-fire stand age and current market value of the salvage timber. It is assumed that industrial harvesting would follow the Oregon Forest Practices Act and other relevant requirements.

Table 12. Basal Area Loss on Private Lands from RAVG

Basal Area Loss	Acres[1]
Class 1 = 0 percent	15,356
Class 2 = < 25 percent	8,594
Class 3 = 25 - 75 percent	11,999
Class 4 = 75 - 100 percent	54,916
Total	**90,865**

[1] The acreage produced from the RAVG data is not as precise as BLM GIS acres. As a result, the total acreage displayed in the Table 12 may differ from GIS calculated private land acres.

Summary of Reasonably Foreseeable Actions

Foreseeable projects that may occur on the Roseburg District in the next five years include three timber harvest plans for potential harvest beginning in fiscal year 2023. Other reasonably foreseeable actions include:

- Sampling for research (with the USDA Forest Service – Pacific Northwest research station, Seattle)
- Salvage Logging on nearby Private Lands – The exact amount of logging and reforestation on nearby private lands is difficult to ascertain because private companies and individuals are not always willing to share that information.
- Emergency Stabilization hazard tree removal activities.

The cumulative effect of private land actions includes the consideration of private lands for those resources whose analysis area is beyond the timber sale units. The assumption for industrial timber lands is that those lands are utilized primarily for timber production. Harvest location and scheduling on privately managed industrial forest lands is proprietary information; therefore, throughout this analysis, the BLM assumed late-seral forest stands on private land have been converted to early- or mid-seral conditions. It is assumed that industrial forest managers would follow the Oregon Forest Practices Act and other such requirements (PRMP/FEIS, pp. 168, 340).

3.2 Issue 1: How would the proposed forest management activities (salvage harvest and hazard tree removal actions) in the Harvest Land Base affect recovery of economic value from timber harvest following a disturbance event and contribute towards the achievement of Allowable Sale Quantity (ASQ) for Roseburg District SYU?

Methodology

The stand boundaries for the proposed salvage harvest and associated forest management activities in the Harvest Land Base were determined by evaluating the district's Forest Operations Inventory (FOI), which provides information regarding age, species, stand location, size, silvicultural needs, and recommended treatments based on stand conditions and productivity. Adjacent FOI stands with similar stand attributes

were combined for analysis for this environmental assessment. Stand ages for this project were also derived from the FOI data and represent pre-fire ages.

Estimates of current and potential timber volume expected from salvage harvesting was determined from stand-specific inventory data, i.e., stand exams and Light Detection and Ranging (LiDAR) derived metrics. The Forest Vegetation Simulator (FVS) growth model was used to update the stand data to the current year through growth simulations, where necessary (Dixon 2002, Smith-Mateja et. al 2015).

Salvage opportunities were analyzed for two years post fire. Although economically viable salvage harvest opportunities may exist beyond a two-year period, it is assumed these opportunities would become more limited in scope due to advancing decay reducing recoverable volume (Lowell et al. 1992).

Values used to provide a comparison of alternatives with respect to economic recovery assumed the following parameters:

Volume Limitation:

For this economic analysis, the total harvest volume for the two years post fire is limited to 85 MMbf due to the maximum ASQ allowed in the NCO ROD/RMP. It is assumed that 40 MMbf would be offered for sale in fiscal year (FY) 2021 and 45 MMbf in FY 2022 (NCO ROD/RMP, p. 6).

Base Timber Value:

A base pond value of $630 per thousand board feet is assumed based on current market conditions. All logging and transportation costs subtracted from base pond value equals the net value for an alternative.

Recovery:

Gross timber volume estimates are reduced to net volumes by applying deductions for defect and decay caused by fire, insect and fungi damage, and breakage in falling and yarding. The timing of potential sales affects whether purchasers/operators will be subject to various seasonal restrictions, (e.g., the ability to construct roads, and varies by alternative primarily driven by the amount of new road construction). Delays in access for timber harvest increase losses due to wood deterioration and decay (Kimmey and Furniss 1943). Percent recovery factors applied are 60 percent, 65 percent, and 75 percent for Alternatives 2, 3, and 4, respectively based on local District Appraiser experience (Snider, 2021) and literature (Kimmey and Furniss, 1943) that consider the timing of harvest relative to the initial fire damage. Alternative 2 has the highest amount of new road construction proposed and Alternative 4 has none. Alternative 3 is intermediate but includes additional construction costs for helicopter landings which affects harvest timing opportunities.

Harvest Costs:

Harvest costs are summarized below in Table 13.

a) Road Renovation and Construction Costs:

Road work costs include road maintenance/renovation, road construction, and helicopter landing construction. Total estimated costs are intended to provide a means to compare the relative cost of road work among alternatives and would not be “actual” expenses of road work for a given alternative. Costs vary by alternative.

b) Timber Yarding and Hauling:

Yarding costs vary by alternative in relation to the proportion of different harvest types and the expected net volume recovery. Timber hauling costs are assumed to be a constant $60 per thousand board feet for all three Action Alternatives.

c) *Miscellaneous Costs:*

The BLM acknowledges additional, miscellaneous activities associated with a salvage harvest project that incur a monetary cost. Examples of such miscellaneous activities include road use fees, maintenance and rock-wear fees, slash disposal, sub-soiling, road decommissioning, intermediate support and lift trees, and equipment cleaning. However, these miscellaneous expenses were not considered for comparing alternative outcomes since they are generally a minor component of harvest costs.

Table 13. Comparison of Harvest Costs by Alternative

Alternative	Cost Centers			Total Estimated Logging Cost
	Road Renovation and Construction	Timber Yarding	Timber Haul	
Alternative 2	$ 171	$ 257	$ 60	$ 488
Alternative 3	$ 165	$ 351	$ 60	$ 576
Alternative 4	$ 138	$ 204	$ 60	$ 402
Costs are shown as $ per thousand board feet of potential timber harvested				

Spatial Scale

The spatial scale for this analysis includes areas proposed for salvage harvest within the Archie Creek Fire perimeter.

Temporal Scale

The temporal scale for this analysis is FY 2021 and FY 2022. These years would be the timeframe when the prospect for economic salvage harvest is most likely. By year three post-fire, trees within the general range of sizes proposed for salvage harvest would have volume loss of approximately 80 percent (Kimmey and Furniss, 1943), reducing the likelihood of economically viable salvage sales beyond FY 2022. Limited opportunities may exist for incidental harvest beyond FY 2022; however, the salvage harvest is not expected to substantially contribute towards annual ASQ goals.

Affected Environment

Prior to the Archie Creek Fire, the proposed project areas consisted of mixed-conifer forest of various ages dominated primarily by Douglas-fir (*Pseudotsuga menziesii*) and associated minor tree species.

The areas proposed for salvage harvesting have experienced a moderate to high level of tree mortality from the effects of the fire.

Environmental Effects (Direct, Indirect, Cumulative)

Alternative 1 - No Action Alternative

The no action alternative would result in no salvage harvest from the Harvest Land Base within the Archie Creek Fire perimeter. If the BLM does not conduct salvage harvest contributing to the Roseburg District's annual ASQ target within the Archie Creek Fire perimeter, the BLM would have to locate replacement ASQ volume in other projects on the District that are in various states of preparedness.

The O&C Act (43 U.S.C. 1181a *et seq*.) provides that the revested O&C lands be managed "for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield…" The O&C Act goes on to state that "[t]he annual productive capacity for such lands shall be determined and declared….not less than the annual sustained yield capacity….shall be sold annually….." The declared ASQ (referred in the O&C Act as "annual sustained yield capacity") for the Roseburg District is 32 MMbf. Considering decay rates and a maximum allowable ASQ variance of 40 percent a year (19 MMbf to 44.8 MMbf per year), it is estimated that at a minimum, two years of worth of ASQ (approximately

85 MMbf) that could have contributed towards the Roseburg SYU goals for ASQ would be lost due to decay with the No Action Alternative.

Fire-killed trees experience rapid loss of volume and value (Lowell et al. 2010). Decomposition rates would vary by weather conditions, bole size, and tree species; however, the ASQ volume in dead and dying trees would not be recoverable in future years due to rapid deterioration in wood quality (Lowell et al. 1992; Lowell et al. 1996; Kimmey and Furniss 1943).

Even with an accelerated schedule, the extensive time requirements for adequate analysis, planning, and preparation of other project areas within the Roseburg SYU would likely preclude the BLM from successfully meeting annual ASQ for fiscal year (FY) 2021 without the proposed salvage harvest.

Comparison of Alternatives

There is no difference among Action Alternatives in the amount of ASQ volume proposed for harvest. All Action Alternatives will provide the allowed maximum ASQ of 85 MMbf for the Roseburg District over the next two years (NCO ROD/RMP, p. 6).

Alternative 4 has the potential to provide the highest dollar return. Alternative 3 has the lowest potential, and Alternative 2 is intermediate (See Table 14). Logging cost differences between alternatives affects the net return in value realized.

Table 14. Comparison of ASQ Volume and Net Timber Value by Alternative

Action Alternative Number	Net Timber Volume Harvested (million board feet)	Base Value of Timber $ (Pond Value)	Estimated Total Logging Cost	Net Value (Stumpage)	Total Timber Value
2	85 MMbf	$ 630	$ 488	$ 142	$ 12,049,600
3	85 MMbf	$ 630	$ 576	$ 54	$ 4,556,000
4	85 MMbf	$ 630	$ 402	$ 228	$ 19,394,450
Costs are shown as $ per thousand board feet of potential timber harvest					

Alternative 2 – Ground/Cable Salvage Harvest & Hazard Tree Removal

The estimated total volume of all salvage harvest units analyzed under Alternative 2 would be approximately 189 MMbf. Implementing PDFs listed in Appendix B during sale layout would be expected to reduce the total volume estimate with deferral of entire units and/or portions of units. However, it is expected that the annual ASQ allowed by NCO ROD/RMP (maximum of 44.8 MMbf per year, p. 6) would be available for salvage harvest in fiscal years 2021 and 2022.

Alternative 2 provides road access for conventional salvage harvesting systems but has the lowest volume recovery factor (60%) of the three Action Alternatives. Economic recovery of timber is affected by timing of salvage harvest and the associated salvage harvest volume. Road construction necessary for salvage harvest in FY 2022 would not occur until after the wet season (typically, mid-May through mid-October). The need for road construction and completion of salvage harvest activities in FY 2022 would delay salvage harvest by almost two years post fire. This would decrease the salvage harvest volume within individual harvest units, resulting in increased average logging costs for the alternative (Table 14).

Compared to other Action Alternatives, Alternative 2 would provide for road infrastructure to be placed in locations which are more conducive to providing access to FOIs for economic recovery on HLB lands given current environmental standards. The NCO ROD/RMP directs the BLM to provide a road transportation system that serves resource management needs (administrative/commercial) and to construct roads where needed to meet resource management objectives (NCO ROD/RMP, p. 81). The economic feasibility of forest management actions is affected by the ease of access from the forest road system.

Alternative 3 – Ground/Cable/Helicopter Salvage Harvest & Hazard Tree Removal

The estimated total volume of all salvage harvest units analyzed under Alternative 3 would be approximately 194 MMbf. Implementing PDFs listed in Appendix B during sale layout would be expected to reduce the total volume estimate with deferral of entire units and/or portions of units. However, it is expected that the annual ASQ allowed (maximum of 44.8 MMbf per year) by the NCO ROD/RMP (p. 6) would be available for salvage harvest in fiscal years 2021 and 2022.

When compared to Alternative 2, Alternative 3 provides reduced road development needs for timber salvage harvest by incorporating aerial logging systems. Aerial logging systems would provide access to salvage harvest areas that are not feasible with conventional ground-based and cable methods resulting in the ability to salvage harvest more area with less reliance roads. When compared to Alternative 2, this would result in reduced delays for salvage harvest in FY 2022 that would be associated with road construction.

Higher logging costs associated with helicopter yarding affects the economic recovery of timber. As these costs (approximately $510-$630 per Mbf) approach the value of the timber being salvage harvested ($630 per Mbf for this analysis), an individual timber sale would become increasingly at risk of being economically un-viable. Due to shifting economics and decay of timber volume over time, individual units would need to be evaluated with respect to current costs and value to determine economic viability at the time of sale preparation. Costs can be minimized by reducing road development needs, providing short yarding distances (1/4 mile or less), and focusing salvage to areas with relatively higher value (larger diameter trees).

Alternative 4 – No New Roads Salvage Harvest & Hazard Tree Removal

The estimated total volume of all salvage harvest units analyzed under Alternative 4 would be approximately 163 MMbf. Implementing PDFs listed in Appendix B during sale layout would be expected to reduce the total volume estimate with deferral of entire units and/or portions of units. Limiting salvage harvest to existing road infrastructure results in the deferral of approximately 700 to 800 additional acres that would otherwise available under Alternatives 2 and 3, respectively. Although Alternative 4 has reduced available acres to choose from in meeting ASQ goals, it is expected that the annual ASQ allowed (maximum of 44.8 MMbf per year) by the NCO ROD/RMP (p. 6) would be available for salvage harvest in fiscal years 2021 and 2022.

Alternative 4 proposes salvage harvest to those harvest units that can be accessed from existing road infrastructure. Landings and temporary operator spurs (approximately 500 feet or less) would be constructed to move landings off heavily travelled roads, improve safety, or access landing locations that would reduce impacts to natural resources.

Salvage Harvest without road and landing construction costs provides for lower logging costs and a higher return (see Table 14). Harvesting using existing road infrastructure; however, would result in portions of units being untreated due to inadequate access for operational feasibility and/or due to existing roads which are in locations that are not conducive towards minimizing impacts to other resources, (downhill yarding to a streamside road in a high severity burn area). Due to portions of units being inaccessible for salvage harvest it is expected that higher levels of retention would occur within individual salvage units and a higher number of available treatment areas would be needed to accomplish an equivalent level of salvage harvest (ASQ) compared to other Action Alternatives. Compared to other Action Alternatives, Alternative 4 provides the least flexibility for accessing individual salvage units for economic recovery.

Cumulative Effects

The cumulative effects spatial scale for this issue is the sustained yield unit, which encompasses the Roseburg District. The temporal span the last seven years of the decade that began in 2019. The 2019 year marks the first year the calculation of decadal volume target variance (NCO ROD/RMP, pp. 7-8). For the fiscal years 2023 to 2028 it is expected that the Roseburg District will offer for sale between 19.2 million and

44.8 million board feet per year from lands designated as Harvest Land Base. Revenues from those sales would depend on actual volume sold and the current market conditions at the time of sale and speculation on macro-economic conditions over the life of the sale contracts.

Un-salvaged fire-killed trees being unable to grow and add further volume increment will not contribute to sustained yield and therefore ASQ.

3.3 Issue 2: How would proposed vegetation management affect soils and water quality?

This issue was analyzed in detail due to concerns identified during internal BLM analysis and during public scoping.

The Archie Creek fire largely burned at high and moderate soil burn severities, changing existing baseline soil conditions. Due to the loss of soil cover and nutrient loss from the Archie fire, all proposed actives were evaluated for effects to soils and water quality. Post-fire soil conditions are vulnerable to surface erosion which could lead to long-term declines in soil productivity and impacts to water quality such as increased sediment load and turbidity. Soil productivity is reduced in intensely burned areas through losses of organic matter and nutrients. Best management practices were designed to minimize post-fire soil impacts from tree removal operations and road building, focusing on erosion control and nutrient retention.

Wildfires increase the susceptibility of soils to erosion, which depends on multiple factors, including fire severity, site specific characteristics (e.g., watershed area, topography, geology, vegetation, sediment availability), and variability in precipitation. (Moody et al. 2013).

Compared to lower severity fires, higher severity fires consume a greater proportion of above ground vegetation, forest litter, and other organic matter (e.g., roots) within the soil. These impacts expose more of the soil to precipitation and, in some cases, increase erosion by several orders of magnitude (Smith et al. 2011). The greatest erosion events typically occur before vegetation has redeveloped and often coincide with episodic, short-duration, high intensity rainstorms immediately following severe wildfire (Moody and Martin 2001).

The BLM has specific direction related to soil management as outlined in the NCO ROD/RMP that states "limit detrimental soil disturbance from forest management operations to a total of <20 percent of the harvest unit area. Where the combined detrimental soil disturbance from implementation of current forest management operations and detrimental soil disturbance from past management operations exceeds 20 percent of the unit area, apply mitigation or amelioration to reduce the total detrimental soil disturbance to <20 percent of the harvest unit area". (NCO ROD/RMP, pp. 89-90). The BLM management objective for the soil resource is to "maintain or enhance the inherit soil function".

The BLM's primary water quality protection strategy is composed of the Riparian Reserve land use allocation, especially the inner zone along streams, management direction for the Riparian Reserve and hydrology, and the BMPs (PRMP/FEIS, p. 411). Maintaining soil and water quality is essential for forest health and an integral part of forest management.

Methodology

The project area was evaluated using soil burn severity mapping, LiDAR, Natural Resources Conservation Service (NRCS) soil data (USDA 1994), soil monitoring data, Timber Production Capability Classification (TPCC), Emergency Stabilization and burned area Rehabilitation (ESR) assessments, and field observations. Units were evaluated based on soil burn severity, past disturbance from logging operations, soil type, and erosion susceptibility. Erosion hazard ratings and soil burn severity were used to identify where accelerated erosion could occur to estimate the effects that proposed activities would have on surface erosion.

Soils and water quality were analyzed by measuring effects to 1) surface erosion potential and ground cover, 2) nutrient levels and coarse woody debris, 3) and detrimental soil conditions from the proposed actions. The

amount of surface erosion potential and detrimental soil conditions would correspond to potential impacts to water quality.

Spatial Scale

The analysis area includes salvage harvest units (Appendix I) and corresponding landings, hazard tree removal segments, new road segments, and areas immediately downslope of units.

Temporal Scale

Soil effects can be short-term and long-term depending on soil burn severity and disturbance from past activity. Soil cover is expected to recover in the short-term, typically 1-2 years for ground recovery in this environment (USDI BLM 2018). Short term time frame ranges from 5-20 years for soil productivity which pertains to soil erosion, light compaction, and nutrient replacement. Long term time frame ranges from 20-60 years and pertains to strong soil compaction, soil nutrient status, and coarse woody material recovery (Miller et al. 2004; Rab et al. 2005).

Affected Environment

The project area is within the Western Cascade Range that consists of deep narrow valleys and rugged topography. The rock formations have been extensively modified by stream erosion and slope instability. Landslides, debris, and earth flows are common occurrences and are natural processes within the Western Cascade terrain.

The main soils within the proposed salvage units are from volcanic origin and formed from colluvium and residuum basalt, andesite, welded tuff, and ash flow tuff, and sedimentary rock. Some of the soil types are extremely rocky. Dominant textures include extremely gravelly loams and gravelly clay loams. Soils vary from shallow to moderately deep and range from well drained to somewhat poorly drained and have a low to moderate potential for compaction.

Erosion hazard ratings ranged from moderate to very severe in the treatment area. Approximately half of treatment areas are rated as moderate, and the other half rated as severe and very severe. Ratings are largely based on topography. Erosion ratings were used to develop ground cover requirements and predict potential effects. Erosion hazard ratings are largely based on slope, but soil erosion factor K and rainfall erosivity are other factors in assigning ratings.

Areas of high risk, fragile soils, and unsuitable soils for timber were identified using Timber Production Capability Classification (TPCC) mapping and are not included in salvage units (USDI BLM 1986). Questionable areas will be reviewed, and field verified by the soil scientist before operations begin. Lands classified as non-suitable woodland by TPCC mapping were excluded from salvage units. Some small sections are present in yarding corridors but will be reviewed prior to yarding. Non-suitable woodlands include landslide prone areas and other unstable soils, are identified as not suitable for timber harvest.

Past timber harvest operations have contributed to legacy ground disturbance and were found throughout the planning area in the form of stumps, skid trails, roads, and landings. Most landings and roads were highly compacted with no soil cover. These areas were detrimentally disturbed due to the altered hydrology and the subsequent effect on tree growth. Field observations showed varying levels of legacy compaction within the old skid trails, from highly compacted to fully recovered. Some units showed no evidence of past logging and possibly fully recovered after many years. Pre-fire existing detrimental soil disturbance was estimated to range from 0-4 percent within the proposed units (Brame, S. 2021 Soils Specialist Report).

Fire Effects on Soils

Fire affects physical, biological, and nutritional properties of soil (Nearly et al. 2005). The Archie Creek Fire altered existing soil conditions by consuming the forest floor and canopy, resulting in changes in hydrology, infiltration, and nutrient levels (USDI ESR 2020).

Soil Burn Severity

Soil burn severity (SBS) is the effect of fire at and below the ground surface, specifically how the fire changes the physical and chemical composition of the soils. Soil burn severity is a better indicator of overall watershed response to burning and natural vegetative recovery after the fire than simply vegetation burn intensity. A Burned Area Reflectance Classification (BARC) map (Appendix J), a satellite-derived map of pre- and post-fire vegetation conditions, was adjusted to reflect soil burn conditions. Soil burn severity was mapped as part of the post fire BLM ESR and Forest Service Burned Area Emergency Response (BAER) analysis which is intended to provide data for a rapid assessment. It should be noted mapping is only an estimation. Several mapped high soil burn areas are a mixture of high and moderate severities and were difficult to fully capture with the mapping. Field observations since then have shown that many high soil burn severity mapped areas were moderately burned (Brame, S. 2021 Soil Specialist Report).

The soil burn severity map was used to estimate soil impacts since it correlated well with ground cover consumption and therefore erosion potential. A large majority of the Archie Creek Fire burned with moderate and high soil burn severities. Approximately 38 percent burned at high soil burn severity, 36 percent burned at moderate soil burn severity, and 26 percent burned at low soil burn severity. The Archie Creek Fire burned 41,000 acres overall on BLM land and is rated as low, moderate, or high (USDI ESR 2020). The soil burn severity classes are described in Table 15.

Table 15. Soil Burn Severity Classes Unique to the Archie Creek Fire Burn Area

Soil Burn Severity	Characteristics
Unburned to Very Low	Unburned areas within the fire perimeter and areas where little to no ground fire occurred. Vegetation canopy, ground cover, and soil characteristics are not altered from pre-fire conditions. Occasionally a thin weak layer of water repellency found to occur naturally.
Low	Surface organic layer was mostly consumed but some needles, leaves, and small branches are recognizable on the forest floor. Trees and shrubs may be scorched but upper canopy is still intact. Fine roots are present and soil structure is intact. A weak to moderate, thin water-repellent layer may be present at the ash-soil interface.
Moderate	Surface organic layer is entirely consumed, and a thin layer of ash may remain. Unburned and recognizable charred leaf litter and twigs may remain within a very thin ash layer. Fine roots are present and soil structure is intact. Trees and shrubs are completely scorched but an upper canopy of brown needles is providing needle cast. A moderate, thin water-repellent layer is present but discontinuous about 1-2 centimeters deep.
High	Surface organic layer is entirely consumed, and thin to moderate layers of ash may remain. Fine roots may be present but there has been some consumption and soil structure has broken down on the soil surface, and high amounts of soil surface appears orange or red in color. Bare ground is present in over 90 percent of the area. No canopy cover is remaining and there is no potential for needle cast. There is a discontinuous, moderate to strong water repellency layer about 1-4 centimeters deep.

The following tables summarizes each proposed treatment under each alternative with the corresponding soil burn severity. High soil burn severity accounts for 38 percent, moderate 40 percent, and low 23 percent of the proposed treatment areas. Majority of proposed units under high soil burn severity are proposed to be cable logged (Table 16). Yarding corridors are included in the proposed salvage unit acreage.

Table 16. Proposed Treatments with Corresponding Soil Burn Severities Under Each Alternative

	Soil Burn Severity (acres)		
Treatments-Alternative 2	**Low/unburned**	**Moderate**	**High**
Cable Units	939	1,812	1,660
Ground Units	383	902	813
Hazard tree removal	1,165	1,786	1,610
Total	**2,487**	**4,500**	**4,083**

	Soil Burn Severity (acres)		
Treatments-Alternative 3	**Low/unburned**	**Moderate**	**High**
Cable Units	787	1,537	1,140
Ground Units	334	835	736
Helicopter Units	84	387	565
Hazard tree removal	1,202	1,829	1,649
Total	**2,407**	**4,588**	**4,090**

	Soil Burn Severity (acres)		
Treatments-Alternative 4	**Low/unburned**	**Moderate**	**High**
Cable Units	877	1,554	1,275
Ground Units	339	857	748
Hazard tree removal	1,146	1,752	1,569
Total	**2,362**	**4,163**	**3,592**

*Data generated from the final Archie Creek Fire BARC data.

Observations from past fires have shown good ground recovery within a year following a wildfire, even in many moderate and high soil burn severity areas. The 2017 Horse Prairie Fire with similar soils and climate, showed after nine months vegetation cover in most high soil burn severity areas ranged from 40-85 percent, and on southern aspects with high very gravelly soils ranged from 15-30 percent (USDI BLM 2018). Due to the high gravel content of many of the soils in the treatment area, ground cover is estimated to be 15-60 percent in high soil burn severity areas by the time harvest activities begin.

Surface Erosion Potential and Ground Cover Effects

Erosion is a concern following wildfire due to the loss of vegetation and ground cover and is the greatest immediately following wildfire. Effects of soil erosion and ground cover are directly related and are analyzed together. Changes in ground cover greatly increases potential for erosion and runoff. Erosion potential is a function of soil characteristics, topography, vegetation and ground cover, and precipitation. Surface erosion potential is directly tied to effective soil cover which consists of duff and litter, low-growing vegetation, and woody debris. Surface cover along with surface rock fragments reduces erosion potential by improving porosity, intercepting, and reducing the detachment energy of raindrops, preventing soil sealing, and increasing surface roughness (Larsen et al. 2009)

Erosion potential is further increased by fire induced water repellency. When organic matter is consumed by fire, hydrocarbons are vaporized and released. As smoke settles the vaporized compounds move through the soil profile. As the compounds condense a waxy substance is formed that produces a water-repellent layer that can impede water movement. Water repellency can last 1-2 years or shorter and is weakened with each

rain event (Neary et al. 2005). Field observations showed water repellency diminishing in many sections of the fire. Several high soil burn areas that originally displayed high water repellency directly after the fire either showed low or none after several winter rain events.

Hill slope erosion post fire was evaluated during the Emergency Stabilization Assessment. Estimates were based on modeling using the FS-Disturbed WEPP model using soil survey data and site parameters. Hillslope erosion modeling showed a potential of 8-25 tons per acre in high soil burn severity areas with steep slopes if the areas receive a 6-year return interval storm before vegetation begins to establish. For a 3-year return interval storm, the erosion rate was estimated to be as high as 22 tons per acre. For a 1 ½-year return interval storm, the erosion rate was estimated to be 15 tons per acre in clay loam soils with slower infiltration rates. For gravelly soils, erosion rates were estimated to be 8 tons per acres in a 6-year return interval storm, 6 tons per acre in a 3-year return interval storm, and 3 tons per acre on steep slopes. (USDI ESR 2020). Erosion rates will decrease over times as ground cover increases as vegetation recovers.

Soil Productivity Effects and Detrimental Soil Disturbance

Soil productivity is the inherent capacity of soil to support growth and forest communities. Soils function as a living ecosystem that sustains forest productivity and depends on continuous organic matter inputs for nutrient cycling. Organic matter includes duff, needle cast and leaf litter, roots, and course and fine woody material. Long-term soil productivity is dependent on organic matter in the form of course woody material (Harvey et al. 1987). Soil productivity can be measured by the percent of harvest area impacted by detrimental soil disturbance (DSD). Detrimental soil disturbance generally represents unacceptable erosion levels, organic matter loss, soil compaction, soil displacement, severe heating to seeds or microbes and can have profound effects on soil productivity.

To assess potential loss of soil productivity, soil erosion rates were compared to the tolerable soil loss (T) estimates published by NRCS. The T factor estimates the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained in tons per acre. All dominant soil groups within the treatment area have a T factor of 5 tons/acre/year. Many salvage units on moderate and high SBS ground have estimated erosion rates (3-25 tons/acre/year) that greatly exceed T values. Erosion estimates were based on conditions immediately following the fire, and in response to a storm of a certain magnitude. Actual erosion will vary depending on how the rain falls and how vegetation reestablishes.

Nutrients and Coarse Woody Debris Effects

Nutrients are greatly transformed during a wildfire and have large effects on soil fertility. Soil carbon and nitrogen in the forest floor and surface layers are oxidized or volatilized during intense wildfire. Burning rapidly accelerates decomposition of nutrients in organic matter and typically results in lower nutrient content and higher short-term nutrient availability to plants (Neary et al. 2005). Soil fertility is greatly affected from loss of the forest floor, which is the largest source of above ground N and other nutrients (Powers et al. 2005).

Environmental Effects (Direct, Indirect, Cumulative)

Timber activities can affect soil and hydrologic functions by decreasing infiltration, gas exchange, nutrient cycling, and increasing the potential for soil loss and productivity. Because postfire logging takes place in an environment in which the canopy and soil have already been modified, it is reasonable to conclude that logging will not add measurably to the altered hydrology. However, to the extent that logging results in soil compaction, it may exacerbate enhanced runoff and soil movement (Peterson et al. 2009). The effects can be minimized by implementing proper PDFs and BMPs.

Surface Erosion Potential and Ground Cover Effects

Since fire consumes the protective organic layer, soils are exposed and more vulnerable to soil disturbance and compaction from ground-based logging equipment (Peterson 2009). For ground-based logging, the greatest increase in erosion is associated with skid trails and forwarder trails from compaction and reduced surface cover, however, can be reduced by the adding surface cover or logging slash, and when soils are dry (Wagenbrenner 2015). Compaction can further reduce infiltration in hydrophobic soils where surface litter has been consumed and increase erosion risk. Protecting the soil surface by minimizing ground equipment use, seasonal and slope restrictions will greatly minimize soil impacts.

Machinery used during post-fire logging activities effects soil roughness, shear strength, and bulk density which can increase erosion and post-fire runoff. Many studies showed increased erosion in burned watersheds following logging (Slesak et al. 2015; Wagenbrenner et al. 2015, 2016), however, erosion appears to be short term, as the effects can decline over time (Slesak et al. 2015, Wagenbrenner et al. 2016). The highest risk for runoff and soil erosion after fire or salvage disturbance is typically the first 1-2 years (Robichaud 2020).

Slash retention and needle casts provides ground protections to minimize erosion. Needle casts from burnt trees reduces erosion rates (Pannkuk 2003) and a thin layer can even substantially reduce soil erosion (Peterson 2009). Retaining slash to achieve >60 percent mean ground cover was found to be an effective treatment to reduce soil erosion and post-fire salvage runoff (Robichaud 2020).

Soil Productivity Effects and Detrimental Soil Disturbance

Timber harvest activities affect soil productivity in varying degrees depending on the equipment used, the operator, soil moisture conditions, topography, percent of trees removed, and soil type. Mechanical ground-based yarding operations typically result in higher soil impacts than cable yarding. Detrimental soil conditions are typically in landings and yarding corridors, largely in the form of compaction and rutting. Severe soil compaction can result in reduced volume and height of conifer species (Wert and Thomas 1981). Fire effects further increases soils vulnerability to timber harvest activities due to the loss of ground cover.

Several studies have found that post-fire logging can cause additional soil disturbance and compaction compared to burned untreated stands (McIver and McNeil 2006; Slesak et al. 2015; Wagenbrenner et al. 2015, 2016). The greatest disturbance is from soil displacement originated from equipment and yarding corridors. Skidding logs across bare soil disturbs and compacts soil more than other methods (Peterson 2009) especially under wet soil conditions.

Fuel treatments can contribute to detrimental soil disturbance by topsoil displacement, compaction, and excessive heating from burning and piling. Topsoil displacement and compaction typically occur under mechanical operations. Soil disturbance is driven by fuel sizes, pile sizes, moisture levels, and fire intensity. Smaller fuels and piles typically result in lower levels of soil burn severity. Hand treatments have a low potential to increase detrimental soil conditions. Hand piling and burning associated with the roadside fuel treatments are not considered to be detrimental. Small diameter fuels and smaller piles typically do not contribute to measurable amounts of DSD (PRMP/FEIS, p. 756).

Monitoring from past timber sales (which includes rubber-tired skidders, tractors, excavators, and harvester/forwarder systems) on the Roseburg district has shown the amount of detrimental soil disturbance from ground-based harvest (with appropriate BMPs in place) has ranged from 4 to 10 percent and cable yarding from 2 to 3 percent (USDI BLM 2004, 2006, 2007, 2008, 2009, 2010-2016). These percentages were used to estimate DSD from harvest operations; however, past monitoring was conducted under pre-fire conditions.

To account for the change of soil conditions from the Archie fire DSD percentages were adjusted based on soil burn severity and harvest method, since soil burn severity determines how susceptible a soil is to post

fire erosion and disturbance (Table 17). The DSD percentages are intended to encompass the overall estimated effects to soil productivity.

Table 17. Estimated Soil disturbances from proposed activities based on soil burn severity.

		Soil Burn Severity		
Activity	**Pre-fire %**	**Low/unburned %**	**Moderate %**	**High %**
Ground based harvest	4-10	4-10	6-14	8-18
Cable harvest	2-3	2-3	3-5	4-8
Helicopter harvest	1	1	1	1
Hazard tree removal	2-3	2-3	3-5	4-8

Ground based harvest is expected to have the highest soil disturbance based on past monitoring data. The lack of ground cover leaves soils more vulnerable to soil displacement, compaction, and rutting, and is expected to be the highest in units with high soil burn severity. Moderate soil burn severity areas are also expected to have higher DSD than pre-fire conditions but due to the presence of intact fine and coarse woody debris and needle cast on the forest floor, disturbance levels are estimated to be lower than high severity.

Cable logging usually results in little ground disturbance, but due to the steep slopes and loss of ground cover in the high soil burn severity areas, detrimental soil disturbance is expected to be higher than is typically observed.

Roadside hazard tree removal operations are assumed to have similar DSD percentages as cable logging since harvesting equipment would be limited to the road prism. There are some situations where it might be necessary for operational feasibility to move landings off heavily travelled roads to avoid user conflict, improve safety, or access landing locations that would reduce impacts to natural resources and infrastructure. These are accounted for in the detrimental soil disturbance estimations.

Helicopter logging is assumed to have little impacts to soils because there is no ground disturbance except in the helicopter landings. Soil burn severity is not expected to increase disturbance levels since no tree yarding or equipment is involved.

Road construction is assumed to be a complete loss of soil productivity. The level of soil burn severity is not factored into road construction since road construction is expected to have 100 percent detrimental soil impacts. Exposed bare soil from road construction has potential for erosion and sediment delivery to water ways but can be greatly minimized with the proper PDFs and BMPs as described in the Road Sedimentation Control Plan in Appendix B.

Fuel treatments were included in the detrimental soil disturbance estimations.

Nutrients and Coarse Woody Debris Effects

Removing trees removes carbon, nitrogen, and organic matter, altering nutrient cycling processes. The main source of soil nitrogen is soil organic matter from plant litter and root turnover. Tree growth is dependent on nutrients provided by coarse and fine woody material, duff and litter layers, and live trees and plants. Some studies have shown lasting effects of salvage logging on soil organic carbon (Jennings et al. 2010, Kishchuk et al. 2014). Retaining organic matter by leaving trees, slash, woody debris, and ground cover all important to ensure continued nutrient cycling. Soil microbial communities process these materials and provide future nutrients for tree growth, water retention, and ecosystem resiliency (PRMP/FEIS, p. 749). Soil bacterial and fungal communities have shown to be resilient to the disturbance caused by postfire logging (Jennings et al. 2010).

Soil productivity is dependent on coarse woody debris and organic matter retained following timber operations. Coarse woody debris is a nitrogen source for soil microbes that release nitrogen into the soil through nitrogen fixation. Coarse woody debris (CWD) from tree boles remaining after a fire are an important source and at minimum 10-15-acre tons of CWD (greater than 3 inches in diameter) per acre

should be retained, as well as standing dead snags for future recruitment of coarse woody debris (Brown et al. 2003).

Best Management Practices

Project Design Features and Best Management Practices are listed in Appendix B and were designed to minimize the extent and severity of soil disturbance and subsequent erosion, raveling, and mass wasting, and effects to water quality such as increased sediment and turbidity, as well as to maintain soil productivity by improving soil function through organic matter retention and/or subsoiling. The BLM is directed to "apply best management practices (Appendix B) as needed to maintain or restore soil functions and soil quality and limit detrimental soil disturbance" (NCO ROD/RMP, p. 89-90).

Best Management Practice TH-22 specifies the minimum amount of ground cover needed to control surface erosion based on erosion hazard ratings (NCO ROD/RMP, p. 161). Since the majority of soils within the treatment area have moderate to very severe erosion ratings, TH-22 was modified to require 60-80 percent of effective ground cover (50 percent minimum) after all forest management operations.

Alternative 1 – No Action Alternative

Surface Erosion Potential and Ground Cover Effects

Soil cover for erosion protection would remain unchanged. The erosion rates will decrease over time as ground cover increases and as vegetation recovers. Short term erosion would likely continue especially in areas of high soil burn severity, especially in areas with steep terrain.

Field observation also showed fungi colonization and new plant growth already occurring in sections of the fire. Short-term losses of effective ground cover are expected to reverse toward pre-fire levels with the next two years through the regrowth of vegetation and significant needle fall will further mitigating hill slope erosion in the fire area in the future. Hydrophobicity would slowly diminish and likely be broken up within one to two years post fire.

Soil Productivity Effects and Detrimental Soil Disturbance

Detrimental soil disturbance percentage (existing and new) would remain unchanged, therefore present compaction levels from legacy logging would remain unchanged. There would be no new soil disturbance from new road construction and harvest activities.

Nutrients and Coarse Woody Debris Effects

No nutrients or organic matter would be removed. Fire killed trees would eventually fall onto the forest floor in the next 10-30 years (Brown et al. 2003) and add organic matter inputs. Coarse woody debris would continue to decompose and provide nutrients for soil microbial communities. Nutrient cycling and organic matter dynamics would recover naturally once vegetation reestablishes. The needle casts remaining in the trees in the moderate soil burn severity areas, as well as pockets within the high areas will help in infiltration and nutrient replenishment. Branches and slash from harvest operations would not be dropped on the ground to accelerate decomposition.

Stream Temperature

Severe wildfires can function like streamside timber harvest in raising the temperature of streams due to direct heating of the water surface. When riparian (streamside) vegetation is removed by fire or other means, the stream surface is exposed to direct solar radiation, and stream temperatures increase (Brown 1970). Effective shade is the total solar radiation blocked from reaching the stream over a twenty-four hour period, expressed as a percentage of the total solar radiation. Effective shade can be provided by features such as topography and vegetation. Effective shade is influenced by slope steepness, vegetation species composition, tree height, vegetation density, tree distance from the stream bank, and stream width. Thus, although riparian

vegetation is a physical barrier between the stream and incoming solar radiation, only a portion of the riparian canopy contributes to effective shade. Based on photographic images from before and after the fire, approximately 55 to 70 percent of the effective shade has been lost due to the fire consuming or killing the vegetative canopy. Standing fire-killed trees do provide some shade, however this shade is only provided when the solar angle is low early in the morning or late in the evening when solar energy is also low and shade is not as critical. Some riparian hardwood trees are already resprouting, but it would take several years before sufficient effective shade is provided to the steams within the severely burned areas.

Alternative 2 – Ground/Cable Salvage Harvest and Hazard Tree Removal

Direct and Indirect Effects

The proposed actions can result in detrimental soil disturbance through soil compaction, displacement, loss of organic matter, and subsequent surface soil erosion.

Harvest activities in the proposed action that effects soils include tree falling, cable yarding, and associated mechanical equipment operation and road building. The effects are assumed to be higher under post fire conditions, especially in high burn severity areas. No green intact trees would be removed, and roadside hazard tree removal operations would largely limit equipment to the road prism. Alternative 2 defers from treating Riparian Reserves within salvage units resulting in a 136 to 189 foot no-harvest buffer. Riparian Reserves would be treated within the roadside hazard tree removal segments only. Approximately 80 percent of salvage harvest units are located in HLB-LITA which the NCO ROD/RMP directs to retain at least 15 percent of pre-harvest stand basal area in live trees or snags (p. 62) and 20 percent of salvage harvest units are in HLB-MITA which the NCO ROD/RMP directs to retain at least 5 percent of live trees or snags (p. 63).

Under Alternative 2, 11,219 acres are proposed for treatment, which includes 30 percent (2,098 acres) of ground-based yarding and 70 percent (4,441 acres) of cable yarding of the salvage units. Approximately 12 miles of road construction is proposed along with 5,000 acres of hazard tree removal. The following tables summarizes each proposed treatments including Riparian Reserves with the corresponding soil burn severity (Table 18).

Table 18. Proposed Treatments with Corresponding Soil Burn Severity

	Soil Burn Severity (acres)		
Treatments-Alternative 2	**Low/unburned**	**Moderate**	**High**
Cable Units	939	1,812	1,660
Ground Units	383	902	813
Hazard tree removal	1,165	1,786	1,610
Total	**2,487**	**4,500**	**4,083**

*Data generated from the final Archie Creek Fire BARC data.

Cable yarding

Soil Productivity Effects and Estimated Detrimental Soil Disturbance

Soil disturbance from cable logging is expected to be higher under post fire conditions. Soil displacement and compaction is expected in the landings and yarding corridors. Loss of forest floor cover increases erosion risk and makes soil more vulnerable to soil displacement from yarding. Bare soils with high burn severity on steep slopes (>60 percent) are expected to erode easier and therefore were assigned higher detrimental soil disturbances.

Cable logging in high soil burn severity is estimated to have 4-8 percent DSD, which encompasses a quarter of all salvage units (1,660 acres). Moderate soil burn severity areas are estimated to have 3-5 percent DSD,

encompassing approximately a third (1,812 acres) of all salvage units. Low soil burn areas are estimated to have 2-3 percent DSD, which encompassing less than a quarter (939 aces) of all salvage units.

Surface Erosion Potential and Ground Cover Effects

Plant establishment prior to yarding will help protect the ground from surface erosion. Vegetation recovery in high soil burn units is expected to range from 15-30 percent in the extremely gravelly soils and 40-60 percent in other soils before operations begin. In moderate soil burn severity areas needle casts are expected to provide 80 percent ground cover.

Logging operations would increase ground cover from breakage and slash additions. In addition, ground cover requirements will require 60-80 percent of effective ground cover (at minimum 50 percent) following management operations. Surface erosion from cable yarding would be controlled by ground cover requirements, slash treatments in cable corridors, riparian buffers, yarding corridor spacing and width restrictions.

Ground cover along with Riparian Reserve buffers will act as sediment catches to protect water quality from soil erosion. Riparian Reserves would be 136 to 189 feet from the edge of each stream channel. Studies of post-fire salvage logging stream buffers suggest a 200-foot buffer is sufficient to contain surface runoff and reduce sediment concentration on high burn severity sites within 10 months after wildfire and that rill lengths decreased, and sediment drop-out rates increased with time after fire and vegetation recovery (Robichaud et al. 2020). This distance decreased rapidly with establishment of ground cover to where a 100-foot buffer is sufficient within 22 months post fire. Since salvage operations would begin within this 10-22 month window, the Riparian Reserve distance would be within the 200 to 100-foot buffer range needed to contain surface runoff and reduce sediment concentration.

Ground-based yarding

Soil Productivity Effects and Estimated Detrimental Soil Disturbance

Soil disturbance from ground-based logging is expected to be higher under post fire conditions. Approximately 30 percent of the salvage units are proposed for ground-based. Loss of forest floor increases compaction susceptibility and makes soil more vulnerable to soil displacement and compaction from ground equipment. Ground equipment would be limited to slopes less than 35 percent and would only operate under dry soil conditions. Existing landings and skid trails would be reused wherever feasible.

Soils within the proposed ground-based units have low/moderately susceptibility to compaction ratings and a moderate erosion hazard rating. The direct effect of salvage logging on effective ground cover would be crushing or uprooting vegetation and compaction in areas where equipment travels and landings.

Ground-based logging proposed with high soil burn severity is estimated to have 8-18 percent DSD, which encompasses 12 percent (813 acres) of the total salvage units and moderate soil burn severity are estimated to have 6-14 percent DSD encompassing 14 percent (902 acres) of the total salvage units. Low soil burn areas are estimated to have 4-10 percent DSD, the same as pre-fire conditions, encompassing 383 acres.

Surface Erosion Potential and Ground Cover Effects

Plant establishment prior to yarding would help protect the ground from disturbance. Vegetation recovery in high soil burn units is expected to range from 15-30 percent in the extremely gravelly areas and 40-60 percent in other areas before operations begin. In moderate soil burn severity areas needle casts are expected to provide 80 percent ground cover.

Proposed units have existing soil compaction and rutting from old logging practices would be treated. These areas would benefit from subsoiling and help restore soil productivity in the highly compacted areas. Subsoiling is proposed for all main skid trails and landings and would reduce overall disturbance, improve water infiltration, and decrease erosion risk.

Logging operations would increase ground cover from breakage and slash additions. In addition, ground cover requirements will require 60-80 percent of effective ground cover (at minimum 50 percent) following management operations. Surface erosion from ground-based yarding would be controlled by ground cover requirements, seasonal operating restrictions, slope restrictions, slash treatments, riparian buffers, skid trail spacing and width restrictions.

Road Construction

The 12 miles of road construction acreage was estimating using a 45-foot width and is expected to 65 acres of detrimental soil disturbance. Approximately eight miles are within salvage unit boundaries of approximately 40 proposed salvage units. The estimated soil disturbance within these units ranges from 0-10 percent with the majority being in the 0-4 percent range. Erosion and sediment delivery from exposed soil would be limited due to implementation of PDFs and BMPs described in Appendix B.

Hazard Tree Removal

Hazard tree removal is expected to have similar effects as cable logging since ground equipment would not travel off the road prism, except for operational feasibility as stated above. Any small amount of ground disturbance associated with these exceptions are accounted for in the DSD estimations. Approximately 500 acres are within Riparian Reserves.

Hazard tree removal in high soil burn severity is estimated to have 5-10 percent DSD, which encompasses approximately 1,600 acres. Moderate soil burn severity areas are estimated to have 3-5 percent DSD, encompassing approximately 1,800 acres. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 1,165 acres.

Nutrient and Coarse Woody Debris Effects

All activities

Nutrient dynamics have changed from effects from the fire from reduction of coarse wood debris and forest floor consumption. Removing the over story in the high soil burn severity areas may affect long-term recovery of soil organic matter. Surface organic matter recovery depends on needle falls and snag recruitment since all the fine organic material and needles are consumed in the high burn areas. Finer roots would also provide organic matter inputs. Many of the high and moderate soil burn severity areas have intact, but charred roots under the surface layer.

Harvest activities are expected to generate ground cover from both breakage and slash. Trees would be left to help rebuild soil organic layers over time. Approximately 80 percent of the salvage units would retain 15-30 percent of live trees or snags in LITA. Organic material would be dropped on the ground through timber felling and yarding, especially in cable units (USDI, BLM Roseburg District Annual Program Summary and Monitoring Report, Fiscal Year 2015, pp. 117-118). Adequate amounts of nutrients from fine and course woody debris would be retained with in treatment areas to maintain long-term soil productivity.

Stream Temperature

All activities

Since no timber salvage would occur within the Riparian Reserves, there would be no change in effective shade. Vegetation that intercepts solar radiation between 1,000 and 1,400 hours is critical for providing stream shade and maintaining stream temperature. This vegetation constitutes the primary shade zone. Hazard tree removal within the Riparian Reserve would amount up to approximately 160 acres of removal within the primary shade zone spread out over the entire burn area. Where this removal of primary shade trees creates a gap on the stream, there could be some localized increase in stream temperature until vegetation recovers. Given that approximately 55-70 percent of effective shade has already been lost to the

fire, it is unlikely these gaps will cause a measurable increase in overall stream temperatures. Stream temperature recovery would be similar as Alternative 1.

Alternative 3 – Ground/Cable/Helicopter Salvage Harvest and Hazard Tree Removal

Direct and Indirect Effects

Under Alternative 3, approximately 11,000 acres are proposed for treatment, which includes 30 percent (1,905 acres) of ground-based yarding and 50 percent (3,465 acres) of cable yarding, and 20 percent (1,202 acres) of helicopter harvest of the salvage units. Approximately 6 miles of road construction is proposed along with 4,820 acres of hazard tree removal. The following tables summarizes each proposed treatment with the corresponding soil burn severity (Table 19).

Table 19. Proposed Treatments with corresponding Soil Burn Severity

	Soil Burn Severity (acres)		
Treatments-Alternative 3	**Low/unburned**	**Moderate**	**High**
Cable Units	787	1,537	1,140
Ground Units	334	835	736
Helicopter Units	84	387	565
Hazard tree removal	1,202	1,829	1,649
Total	**2,407**	**4,588**	**4,090**

*Data generated from the final Archie Creek Fire BARC data.

Cable yarding

Soil Productivity Effects and Estimated Detrimental Soil Disturbance

Soil disturbance from cable logging is expected to have the same effects as Alternative 2; however, because less acres are proposed the overall soil disturbance would be lower. Cable logging in high soil burn severity is estimated to have 4-8 percent DSD, which encompasses less than a quarter (1,140 acres) of the proposed salvage units. Moderate soil burn severity areas are estimated to have 3-5 percent DSD, encompassing a quarter (1,537acres) of all salvage units. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 787 acres of all salvage units.

Surface Erosion Potential and Ground Cover Effects

Effects are expected to be similar as Alternative 2.

Ground-based yarding

Soil Productivity Effects and Estimated Detrimental Soil Disturbance

Soil disturbance from ground-based logging is expected to have the same effects as Alternative 2, however because less acres is proposed the overall soil disturbance would be lower. Ground-based logging proposed with high soil burn severity is estimated to have 8-18 percent DSD, which encompasses 11 percent (736 acres) of the proposed salvage units and moderate soil burn severity are estimated to have 6-14 percent DSD encompassing 13 percent (835 acres) of the proposed salvage units. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 334 acres of the proposed salvage units.

Road Construction

The 6 miles of road construction is expected to contribute to 34 acres of detrimental soil disturbance. Approximately 4 miles are within salvage unit boundaries of approximately 30 proposed salvage units. The estimated soil disturbance within these units range from 0-9 percent with the majority being in the 0-4 percent range. Erosion potential from road construction would be lower since less miles are being proposed

under Alternative 3, however erosion and sediment delivery from exposed soil would be limited due to implementation of PDFs and BMPs described in Appendix B.

Hazard Tree Removal

Hazard tree removal is expected to have similar effects as Alternative 2. Hazard tree removal in high soil burn severity is estimated to have 5-10 percent DSD, which encompasses approximately 1,600 acres. Moderate soil burn severity areas are estimated to have 3-5 percent DSD, encompassing 1,546 acres. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 1,154 aces.

Helicopter Logging

Hazard tree removal is expected to have similar effects as Alternative 2. Hazard tree removal in high soil burn severity is estimated to have 5-10 percent DSD, which encompasses approximately 1,600 acres. Moderate soil burn severity areas are estimated to have 3-5 percent DSD, encompassing approximately 1,800 acres. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 1,200 acres.

Nutrient and Coarse Woody Debris Effects

All activities

Effects to nutrients and coarse woody debris levels have similar effects as Alternative 2.

Stream Temperature

All activities

Since no timber salvage would occur within the Riparian Reserves, there would be no change in effective shade. Riparian vegetation would be allowed to recover naturally. Stream temperature recovery would be similar as Alternative 1 and 2.

Alternative 4 – No New Road Construction and Hazard Tree Removal

Direct and Indirect Effects

Under Alternative 4, approximately 10,000 acres is proposed for treatment, which includes 34 percent (1,944 acres) of ground-based yarding and 66 percent (3,706 acres) of cable yarding of the harvest of the salvage units. Approximately 4,051 acres are proposed for roadside hazard tree removal. No road construction is proposed under this Alternative. The following tables summarizes each proposed treatment with the corresponding soil burn severity (Table 20).

Table 20. Proposed Treatments with Corresponding Soil Burn Severities

	Soil Burn Severity (acres)		
Treatments-Alternative 4	**Low/unburned**	**Moderate**	**High**
Cable Units	877	1,554	1,275
Ground Units	339	857	748
Hazard tree removal	1,146	1,752	1,569
Total	**2,362**	**4,163**	**3,592**

*Data generated from the final Archie Creek Fire BARC data.

Cable yarding

Soil Productivity Effects and Estimated Detrimental Soil Disturbance

Soil disturbance from cable logging is expected to have the same effects as Alternative 2, however because less acres is proposed the overall soil disturbance would be lower. Cable logging in high soil burn severity is estimated to have 4-8 percent DSD, which encompasses approximately a quarter (1,275 acres) of the

proposed salvage units. Moderate soil burn severity areas are estimated to have 3-5 percent DSD, encompassing approximately a quarter (1,554 acres) of the proposed salvage units. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 877 acres of the proposed salvage units.

Surface Erosion Potential and Ground Cover Effects

Surface erosion is expected to decrease under Alternative 4 due to no new road construction.

Ground-based yarding

Soil Productivity Effects and Estimated Detrimental Soil Disturbance

Soil disturbance from ground-based logging is expected to have the same effects as Alternative 2, however because less acres is proposed the overall soil disturbance would be lower. Ground based logging proposed with high soil burn severity is estimated to have 8-18 percent DSD, which encompasses 13 percent (748 acres) of the proposed salvage units and moderate soil burn severity are estimated to have 6-14 percent DSD encompassing 15 percent (857 acres) of the proposed salvage units. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 339 acres of the proposed salvage units.

Hazard Tree Removal

Hazard tree removal is expected to have similar effects as Alternative 2. Hazard tree removal in high soil burn severity is estimated to have 5-10 percent DSD, which encompasses 1,569 acres. Moderate soil burn severity areas are estimated to have 3-5 percent DSD, encompassing 1,752 acres. Low soil burn areas are estimated to have 2-3 percent DSD, encompassing 1,146 acres.

Nutrient and Coarse Woody Debris Effects

All activities

Effects to nutrients and coarse woody debris levels would have similar effects as Alternatives 2 and 3.

Stream Temperature

All activities

Effects to stream temperature would have similar effects as Alternatives 2 and 3.

Cumulative Effects

Previous timber harvest has resulted in detrimental soil effects from old skid trails, skid roads, landings, and roads in the form of compaction, rutting, and soil displacement. Pre-fire existing detrimental soil disturbance was estimated to range from 0-4 percent within the proposed units. New road construction is expected to contribute to 1 percent on average on a unit scale. Harvest activities associated with salvage units and hazard tree removal would contribute to 2-18 percent DSD at a unit scale.

Overall, the DSD from proposed actions combined with past management operations is estimated to range from 3-23 percent at a unit scale.

Estimated DSD does not take an account road decommissioning, subsoiling, and reusing old skid trails. Legacy and main skid trails and landings would be reused and subsoiled to remove compacted surfaces. Approximately two miles of road would be decommissioned, and 80 acres were estimated to be subsoiled. Ground-based units with high soil burn severity and new road construction have the highest estimated DSD percentages. Best management practices, road decommissioning, and subsoiling would be applied during and after operations to limit detrimental soil disturbance to 20 percent or less.

Erosion and sediment delivery from exposed soil would be limited due to implementation of PDFs and BMPs described in Appendix B of the EA. The BLM will select BMPs based upon site-specific conditions, technical feasibility, resource availability, and the water quality of those water bodies potentially impacted.

The BMPs listed in Appendix B are derived from Appendix C of the Northwestern and Coastal Oregon ROD/RMP, which includes Oregon Department of Environmental Quality (ODEQ) Oregon Administrative Rules (OAR) numbers to compare these BMPs to similar Oregon Department of Forestry (ODF) or Oregon Department of Fish and Wildlife (ODFW) OARs for protecting water quality.

Current or foreseeable activities mentioned previously in this EA would not result in measurable detrimental soil disturbance within the unit boundaries.

None of these activities are expected to add to DSD conditions within the proposed treatments areas.

Tree planting would likely occur in many areas of the Archie Creek Fire, including hazard tree removal segments and salvage units. Future tree planting would benefit the soil resource by helping to replenish soil organic matter and nutrients lost by the fire, overall improving soil productivity.

Comparison of Alternatives

Proposed treatments for each alternative are summarized below (Table 21).

Table 21. Proposed Activities Summary for Action Alternatives

Activity	Alternative 2	Alternative 3	Alternative 4
Ground based harvest (acres)	2,058	1,905	1,944
Cable harvest (acres)	4,441	3,465	3,706
Helicopter harvest (acres)	0	1,202[1]	0
Roadside hazard tree removal (acres)	4,668	4,820	4,051
Hazard tree removal (acres)	450	450	450
Road construction (miles)	12	6	0
Total (acres)	**11,617**	**11,842**	**10,151**

[1] Includes 90 acres of helicopter landings.

To compare alternatives, acres of each treatment and estimated DSD percentage based on soil burn severity were calculated and summarized below (Table 22). The DSD represents unacceptable erosion levels, organic matter loss, soil compaction, soil displacement, severe heating to seeds or microbes.

Alternative 3 would result in approximately 100 acres less of detrimental soil disturbance compared to the proposed action due to differences in road construction, 200 less acres of ground-based logging, and replacing approximately 1000 acres of salvage treatment with helicopter logging.

Alternative 4 would result in the least amount of soil impacts. Detrimental soil disturbance is expected to be lower due to no new road construction, less acres of roadside hazard tree removal, and less acres of salvage units. Alternative 4 would result in approximately 200 acres less of detrimental soil disturbance compared to the proposed action.

Table 22. Alternatives Compared of Detrimental Soil Disturbance

	Soil Burn Severity			
Activity	**Low/unburned**	**Moderate**	**High**	**Total**
Ground (acres)	15-38	54-126	65-146	195-310
Cable (acres)	19-28	54-91	66-133	139-252
Hazard Tree Removal (acres)	23-35	54-89	64-129	141-253
Road construction (acres)				65
Total (acres)				540-880
				Average ~700

Table 23. Alternative 3 Estimated Detrimental Soil Disturbance from the Proposed Treatments

	Soil Burn Severity			
Activity	**Low/unburned**	**Moderate**	**High**	**Total**
Ground (acres)	13-33	50-117	59-132	122-282
Cable (acres)	16-24	46-77	46-91	108-192
Hazard Tree Removal (acres)	24-36	55-91	66-132	145-259
Road construction (acres)				34
Helicopter landings (acres)				12[1]
Total (acres)				421-767
				Average ~600

[1] The majority of 90 acres of proposed helicopter landings are on previously disturbed ground.

Table 24. Alternative 4 Estimated Detrimental Soil Disturbance from the Proposed Treatments

	Soil Burn Severity			
Activity	**Low/unburned**	**Moderate**	**High**	**Total**
Ground (acres)	13-34	51-120	60-135	124-289
Cable (acres)	18-26	47-78	51-102	116-206
Hazard Tree Removal (acres)	23-34	53-88	63-126	139-248
Road construction (acres)				0
Total (acres)				379-702
				Average ~500

Conclusion

While fire effects could lead to accelerated surface erosion and loss of soil productivity, the proposed actions would have minimal effect based on the extent and degree of expected soil disturbance. The proposed action is expected to contribute to 3-19 percent DSD on a per unit basis depending on the treatment and soil burn severity. Ground disturbance would be limited to yarding corridors, landings, and new road construction. Soil function would be maintained by the application of BMPs.

Based on the amount of expected ground cover remaining after management operations, ground recovery from past fires, slash treatments, Riparian Reserve buffers, and the amount of estimated soil disturbance, any erosion would be contained within the treatment areas and/or within the immediate downslope areas and would not measurably contribute to increased sediment or turbidity effects to water quality. Surface erosion would decrease over time as ground vegetation reestablishes in the next two years. Soil productivity would slowly recover in 10-20 years as duff and litter layers begin to reestablish and as nutrients are replenished by root turnover, decaying vegetation, and fine woody material.

Based on post-fire estimated detrimental soil disturbance, Riparian Reserve buffers, ground recovery from past fires, and PDFs, the Archie Creek Salvage Project would be in compliance with the NCO ROD/RMP direction to maintain soil quality and would be within the 20 percent NCO ROD/RMP direction to limit detrimental soil disturbance to 20 percent.

3.4 Monitoring

Monitoring would be conducted in accordance with provisions contained in the NCO ROD/RMP, Appendix B. Effectiveness monitoring efforts would focus on consideration of the following resources: aquatics, soils, wildlife habitat, special status species, cultural resources, socio-economics, tribal treaty rights and consultation, and fire/fuels management. All or portions of any implemented actions may be included in implementation monitoring per NCO ROD/RMP Appendix B.

3.5 Issues Considered but not Analyzed in Detail

This section presents issues that have been raised that are not being analyzed in the detail and the justification for undertaking detailed analysis. See Appendix C for detailed descriptions of issues considered but not analyzed in detail.

4. Consultation and Coordination

4.1. Endangered Species Act Consultation

Formal consultation under Section 7 of the Endangered Species Act (1973 as amended) with the U.S. Fish and Wildlife Service (FWS) for the PRMP/FEIS, for Western Oregon (USDI BLM 2016 and USDI FWS 2016 [FWS Reference Number: 01EOFW00-2015-F-02769]) was completed July 20, 2016.

Formal consultation for site specific actions proposed for the Archie Creek Fire Salvage Harvest Plan and Hazard Tree Removal proposed actions affecting the northern spotted owl and its designated critical habitat has been completed. The BLM submitted a Biological Assessment to the U.S. Fish and Wildlife Service (FWS) on March 7, 2021 and the FWS issued a Biological Opinion (BO, Tails #: 01EOFW00-2021-F-0481) on August 5, 2021. The FWS concluded that *"[D]ue to the minimization measures incorporated into the proposed action, incidental take of spotted owls is not reasonably certain to occur."* Although adverse effects to spotted owls and their designated critical habitat are anticipated from the proposed actions, the FWS concluded that the BLM's *"implementation of the area salvage and hazard tree removal is not likely to jeopardize the continued existence of the spotted owl or to destroy or adversely modify their critical habitat."*

The Archie Creek Fire Salvage and Hazard Tree Removal project notification was submitted to the National Marine Fisheries Service (NMFS) for review on April 14, 2021. The ESA compliance for the project was verified on May 5, 2021 by the NMFS. The project is also within the programmatic consultation for the suite of forest management actions that could be implemented under the new RMP's for Western Oregon (Programmatic Forest Management Biological Opinion; NMFS No.: WCR-2017-7574, March 9, 2018).

4.2. Tribal Consultation

On November 23, 2020, the BLM sent consultation letters to the Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz, and the Cow Creek Band of Umpqua Tribe of Indians notifying them of the initiation of the project and encouraging them to provide comments or to provide information on the identification of any special interest they might have in the lands in question regarding the proposed action. The BLM received no responses. On December 8, 2020, the BLM sent scoping letters to the Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz, and the Cow Creek Band of Umpqua Tribe of Indians. The BLM received no responses. The BLM received no responses. In addition, the BLM participated in government-to-government consultation with the Cow Creek Band of Umpqua Tribe of Indians on March 4, 2021, and with the Confederated Tribes of Grand Ronde on March 31, 2021, seeking additional input on the proposed actions. The BLM received no responses.

4.3. List of Preparers

Project Lead	James Mahaffy
Sale Planner	Ashley Wildeman
Botany/Noxious Weeds	Justy Grinter
Cultural Resources	Kelsey Knox
Engineering	Jordan Radford
Fisheries	Jeff McEnroe
Fire & Fuels Management, Air Quality	Krisann Kosel
Forester, Forest Vegetation	Toni Molina
Forester	Werner Krueger
Hydrology	Dan Dammann
Recreation/Visuals	Suzanne Shelp
Soils	Sarah Brame
Wildlife	Elizabeth Gayner
Planning & Environmental Coordinator	Susan Parker

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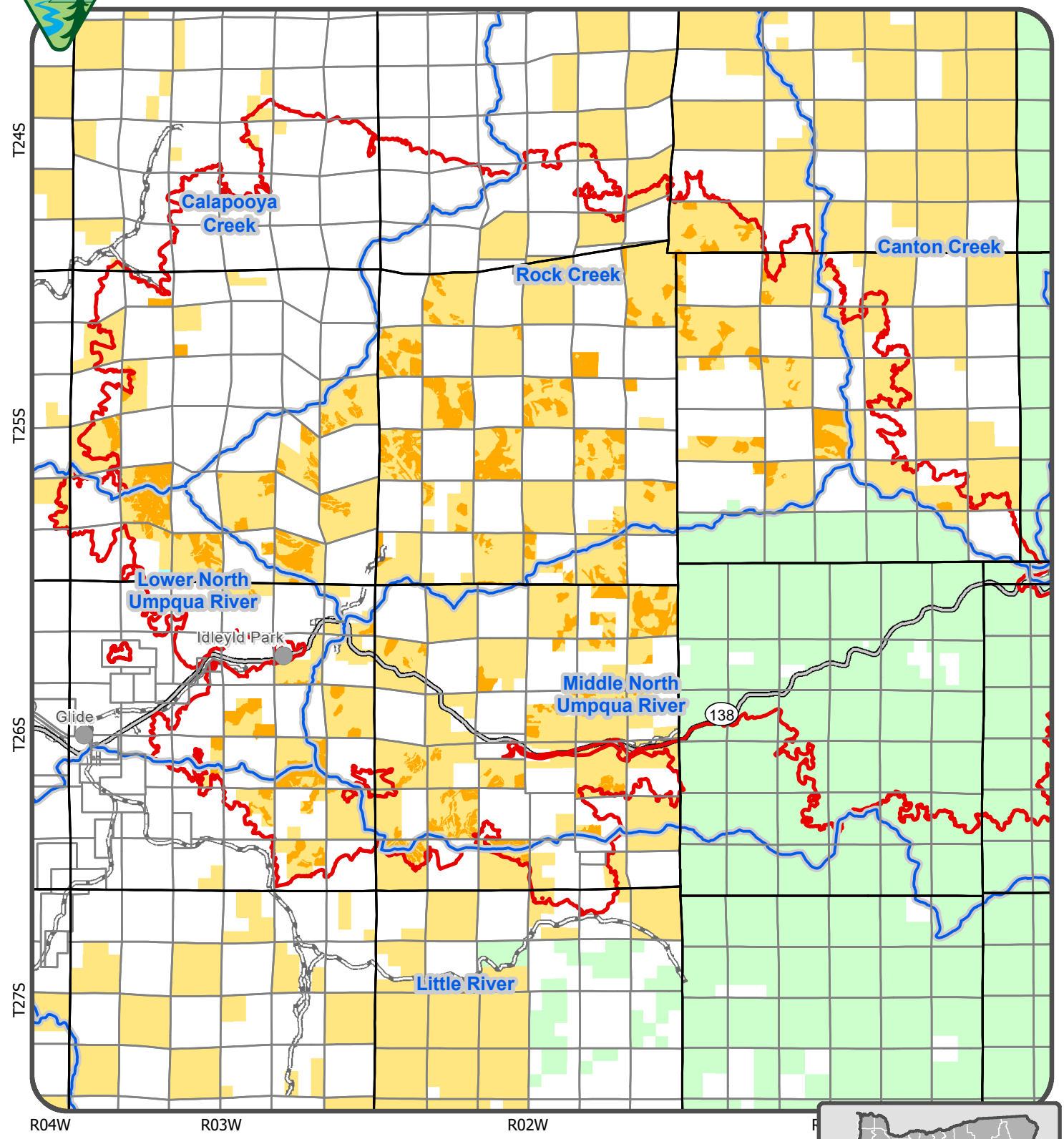
Appendix A – Archie Creek Fire Salvage and Hazard Tree Removal Maps

Archie Creek Fire EA
Figure A-1, Hydrologic Code 10-Watershed



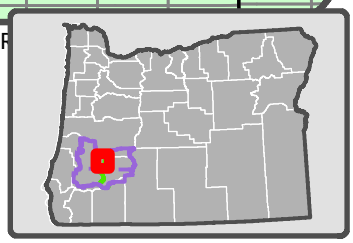
HUC10 -Watershed
Salvage Unit
Archie Creek Fire Perimeter

Land Status
BLM
US Forest Service
State Land
Private/Unknown

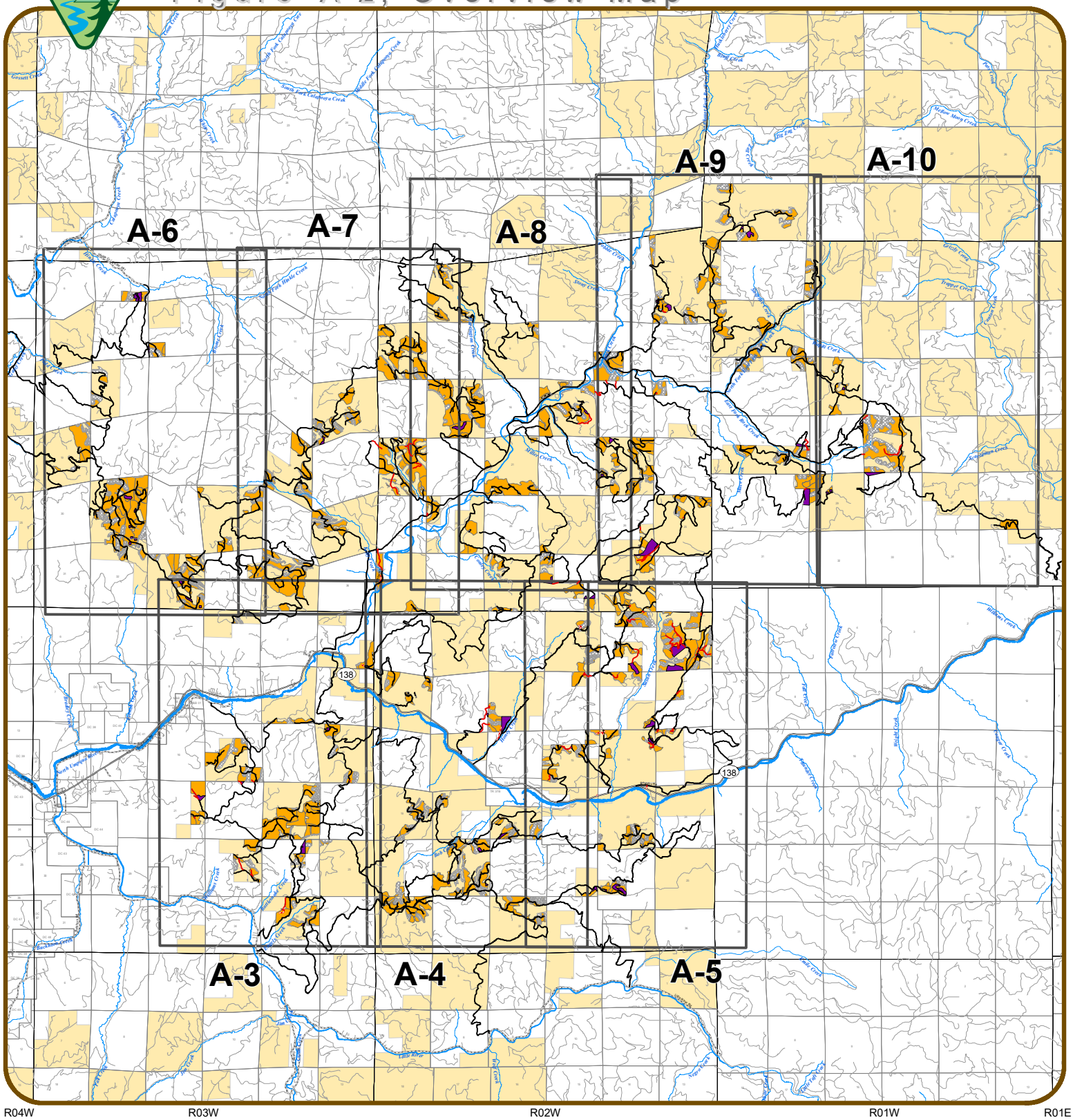
Date: 4/5/2021

N

0 0.5 1 2 3 4 5
Miles



Archie Creek Salvage Plan Alternative 2
Figure A-2, Overview Map



Legend

- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Major Stream
- BLM Land
- Private Land
- Riparian Reserve
- Salvage Unit
- Yarding Corridor

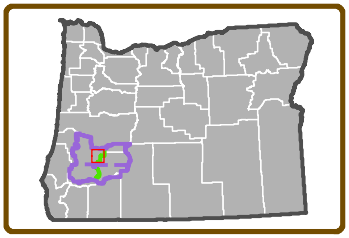
0 0.5 1 1.5 2
Miles

1:147,000

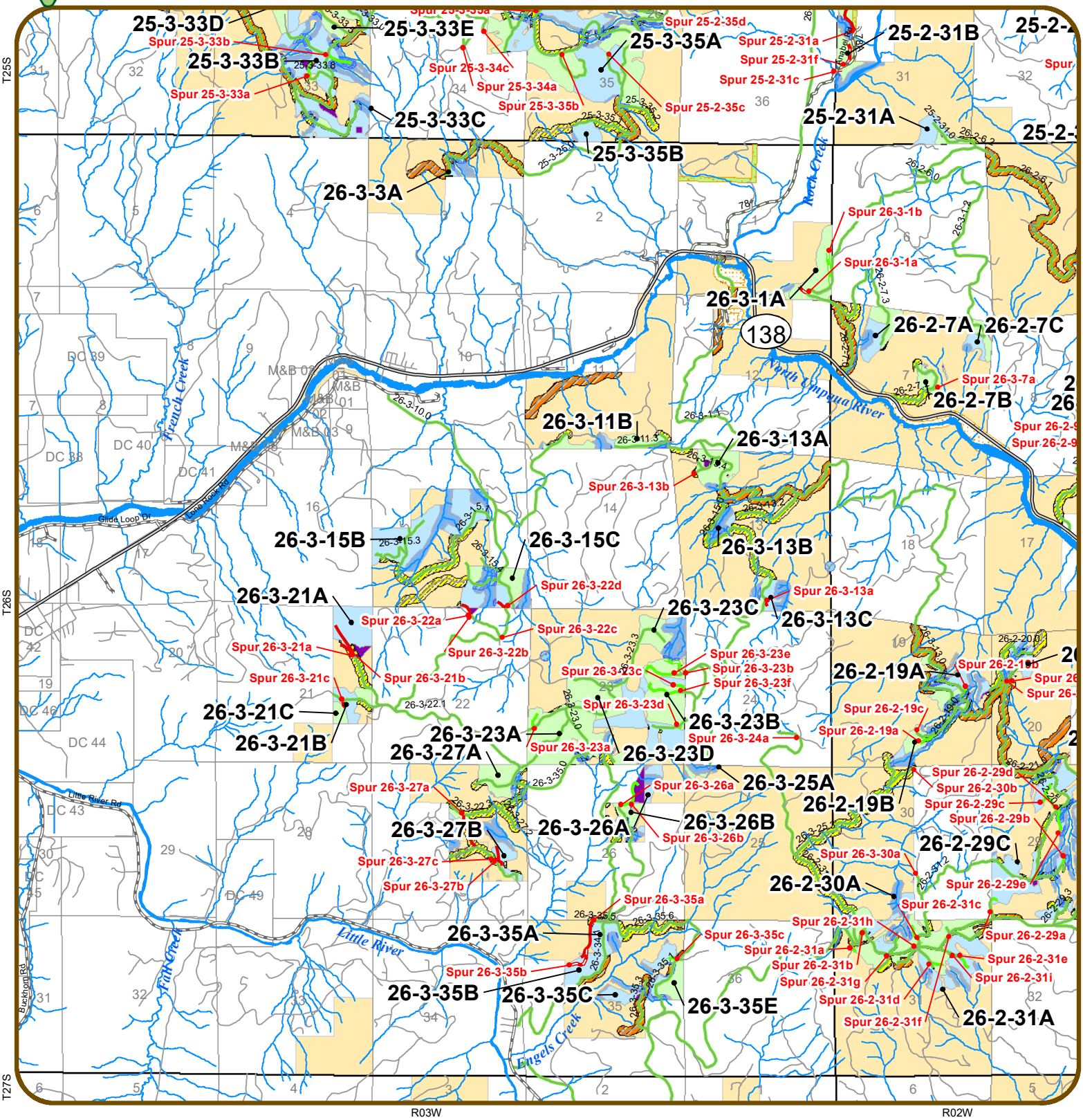
1 inch = 12,250 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-3



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

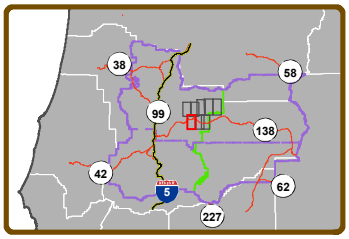
N

1:54,000

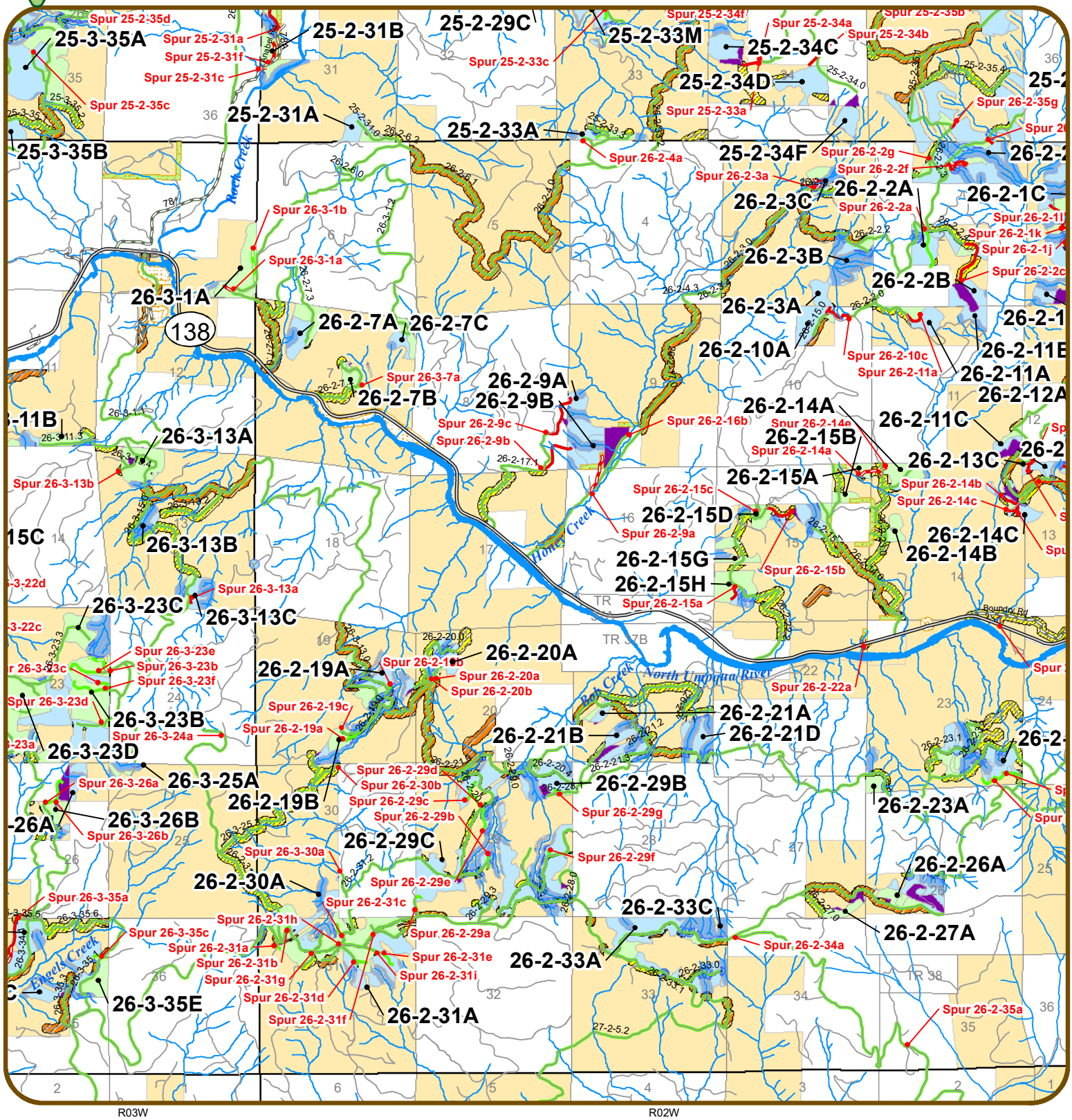
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-4



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

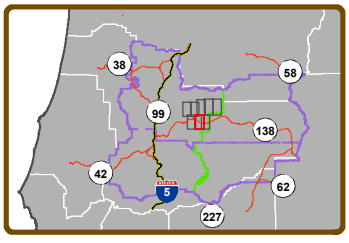
N

1:54,000

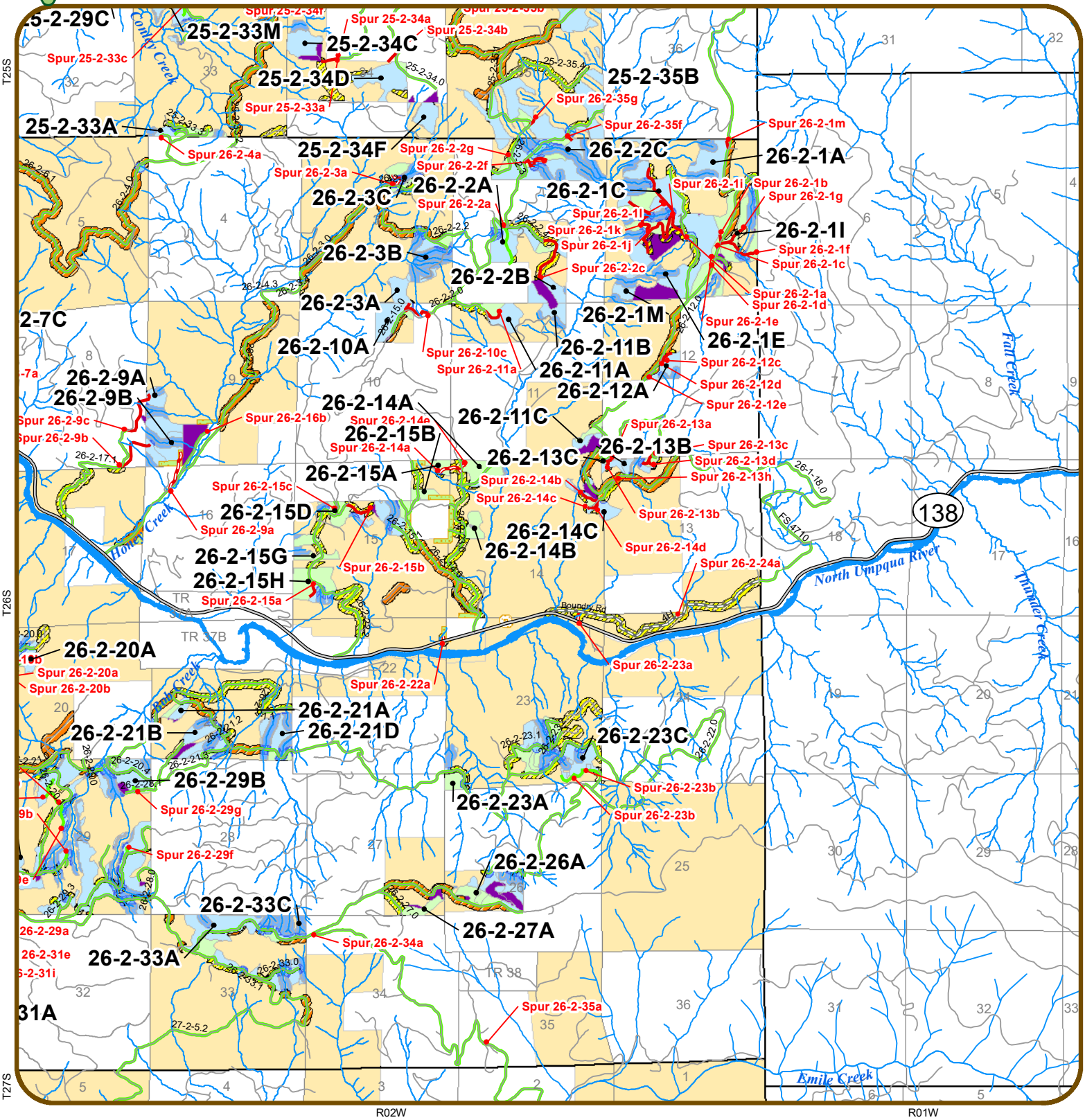
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-5



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

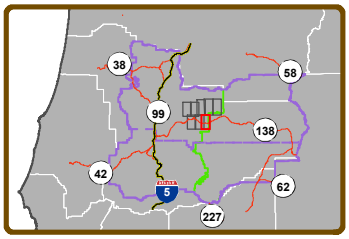
N

1:54,000

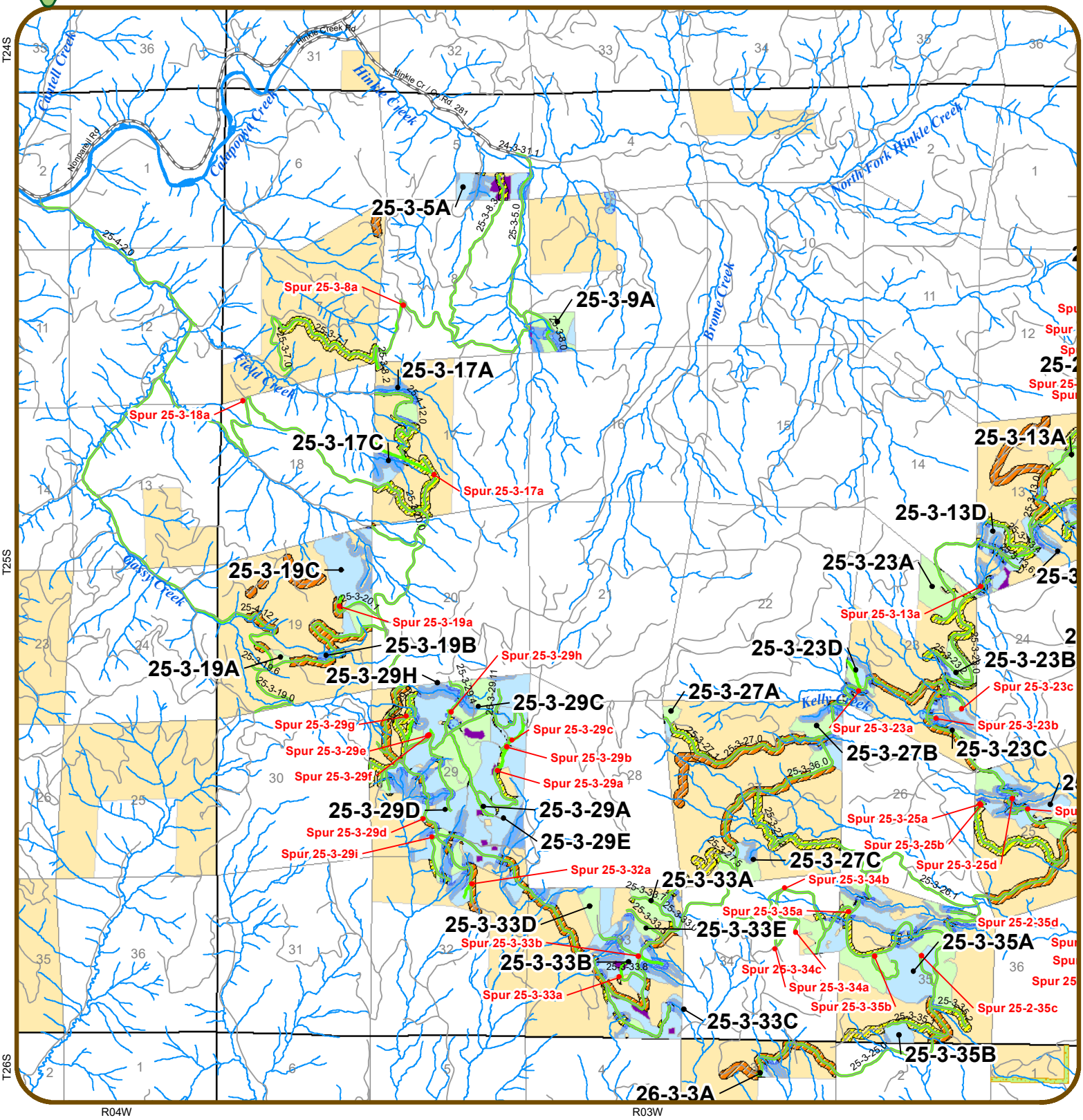
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-6



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

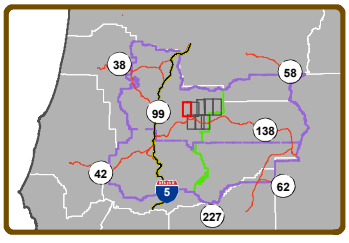
N

1:54,000

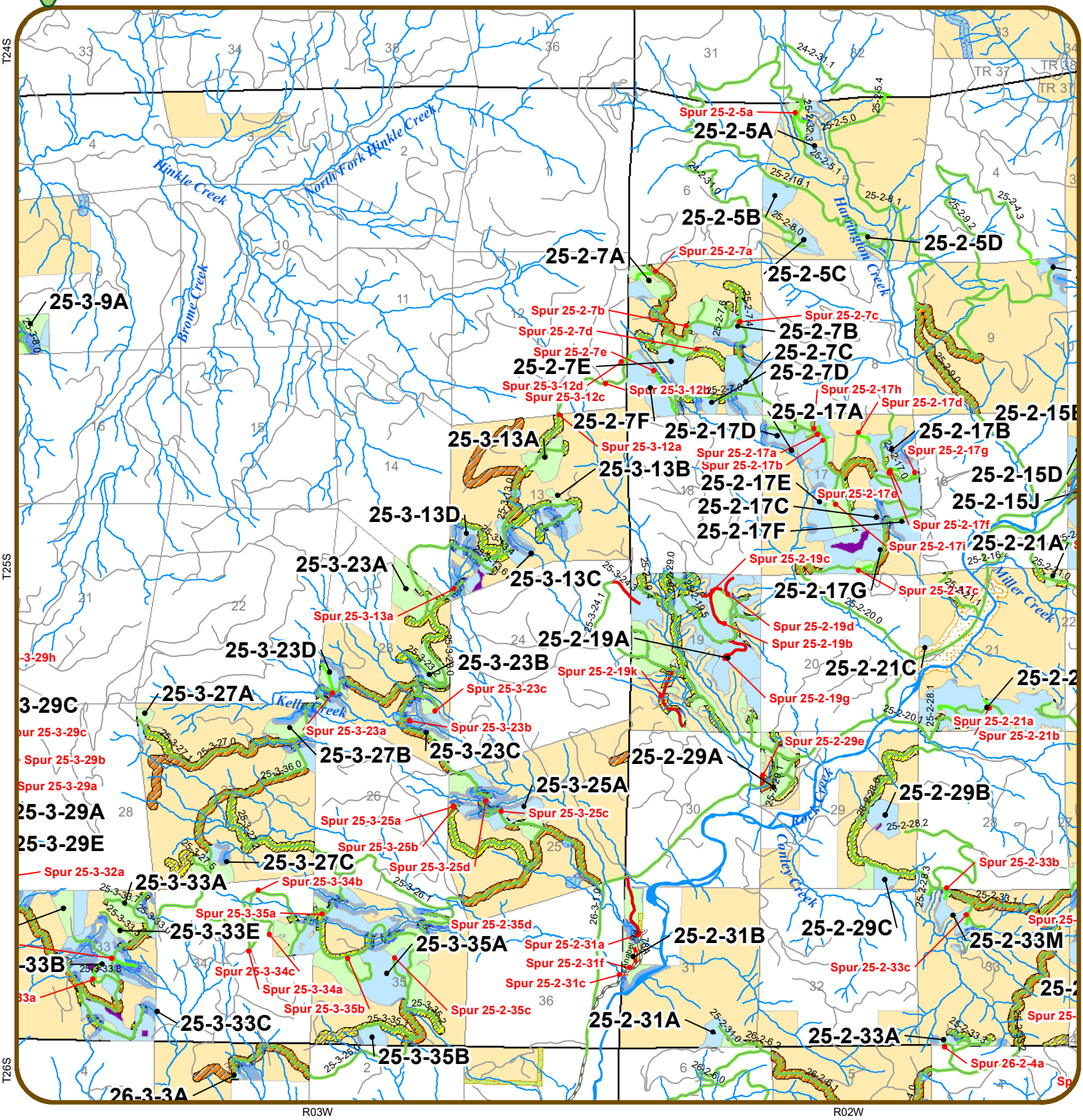
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-7



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

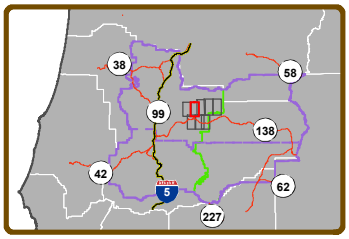
N

1:54,000

1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-8

- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

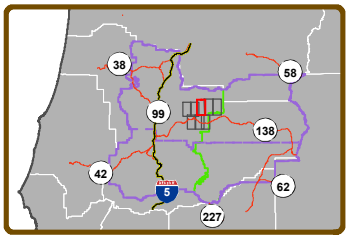
N

1:54,000

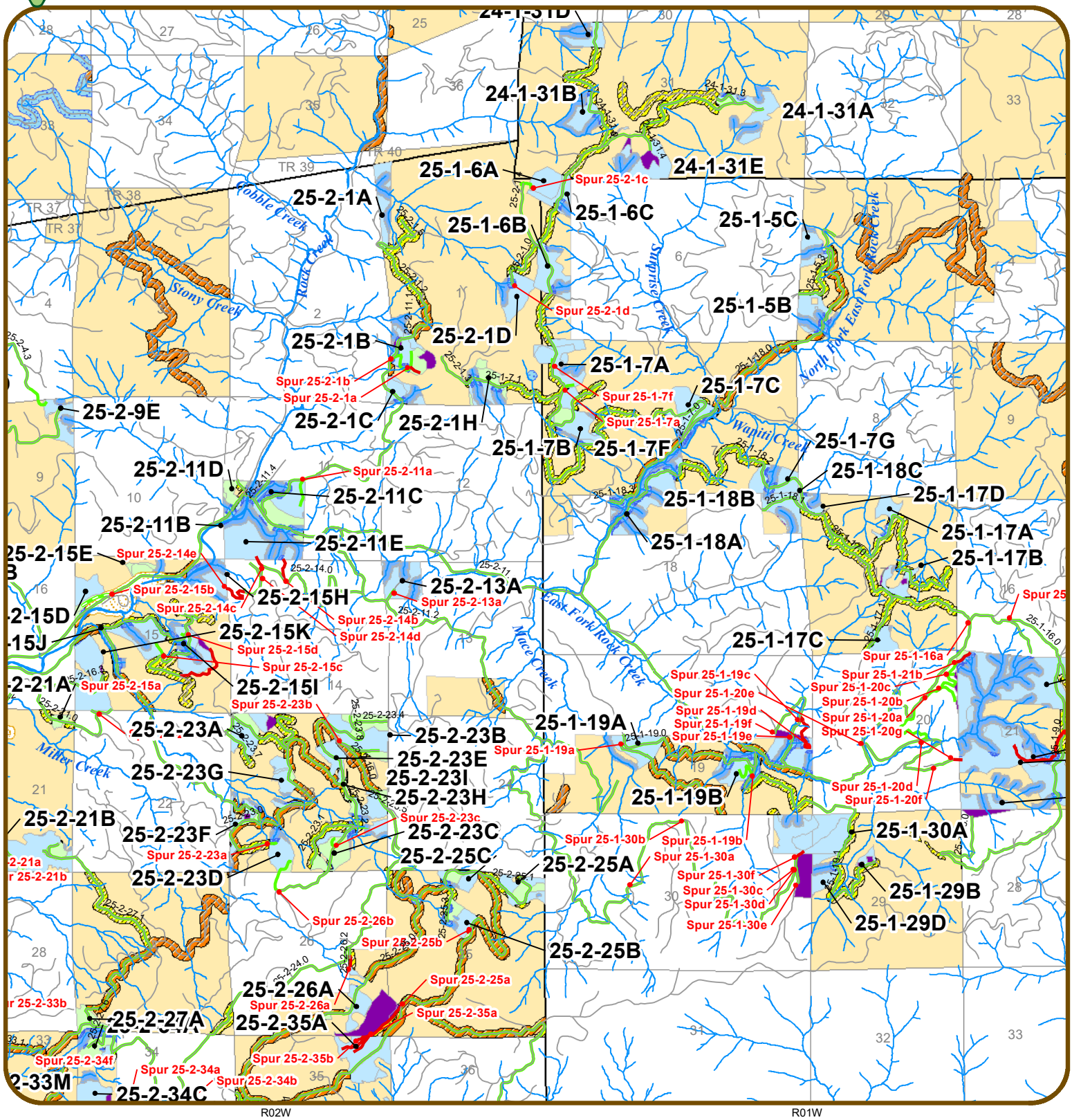
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-9



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

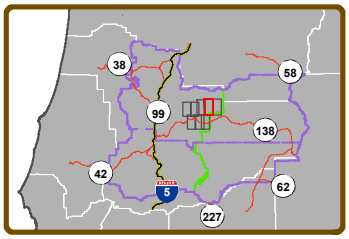
N

1:54,000

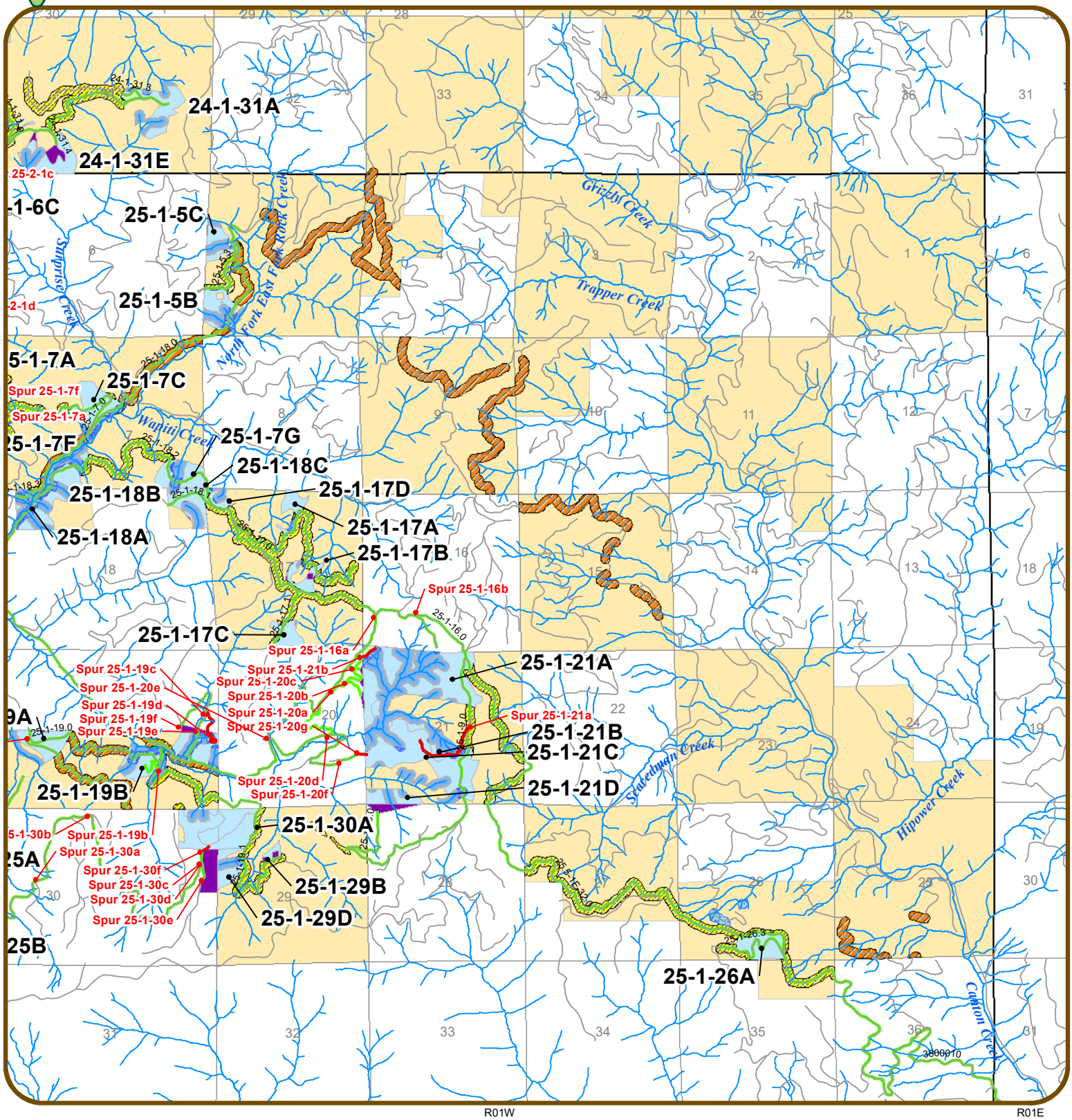
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 2
Figure A-10



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 2
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

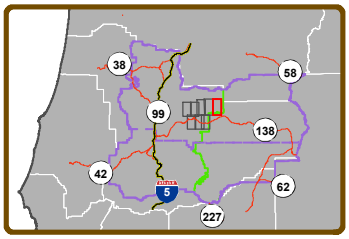
N

1:54,000

1 inch = 4,500 feet

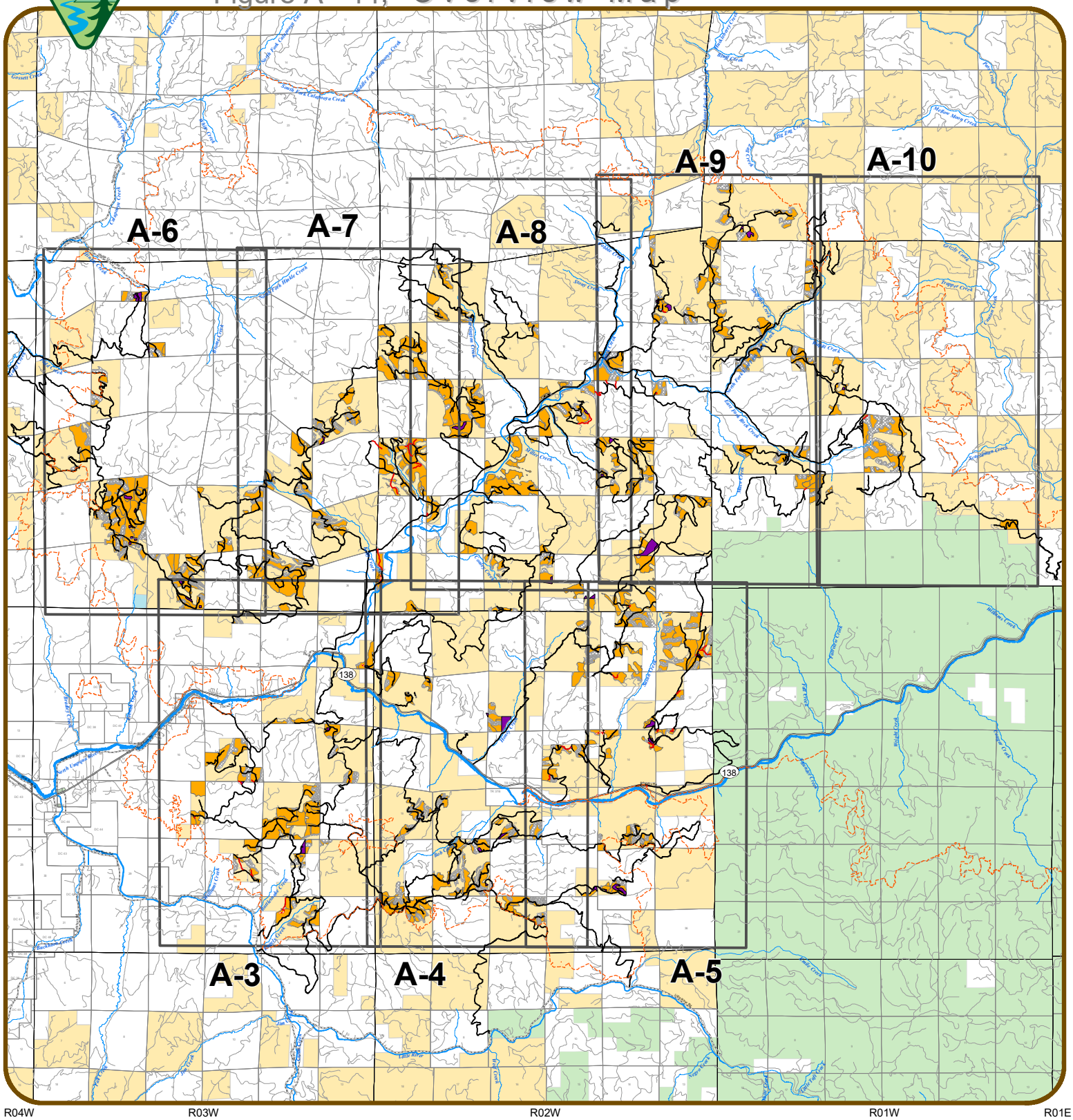
NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Alternative 3

Figure A - 11, Overview Map



Legend

- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Major Stream
- BLM
- USFS
- State
- Private
- Riparian Reserve
- Salvage Unit
- Yarding Corridor
- Archie Creek Fire Perimeter

0 0.5 1 1.5 2

Miles

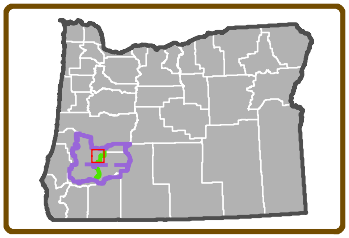
N

1:147,000

1 inch = 12,250 feet

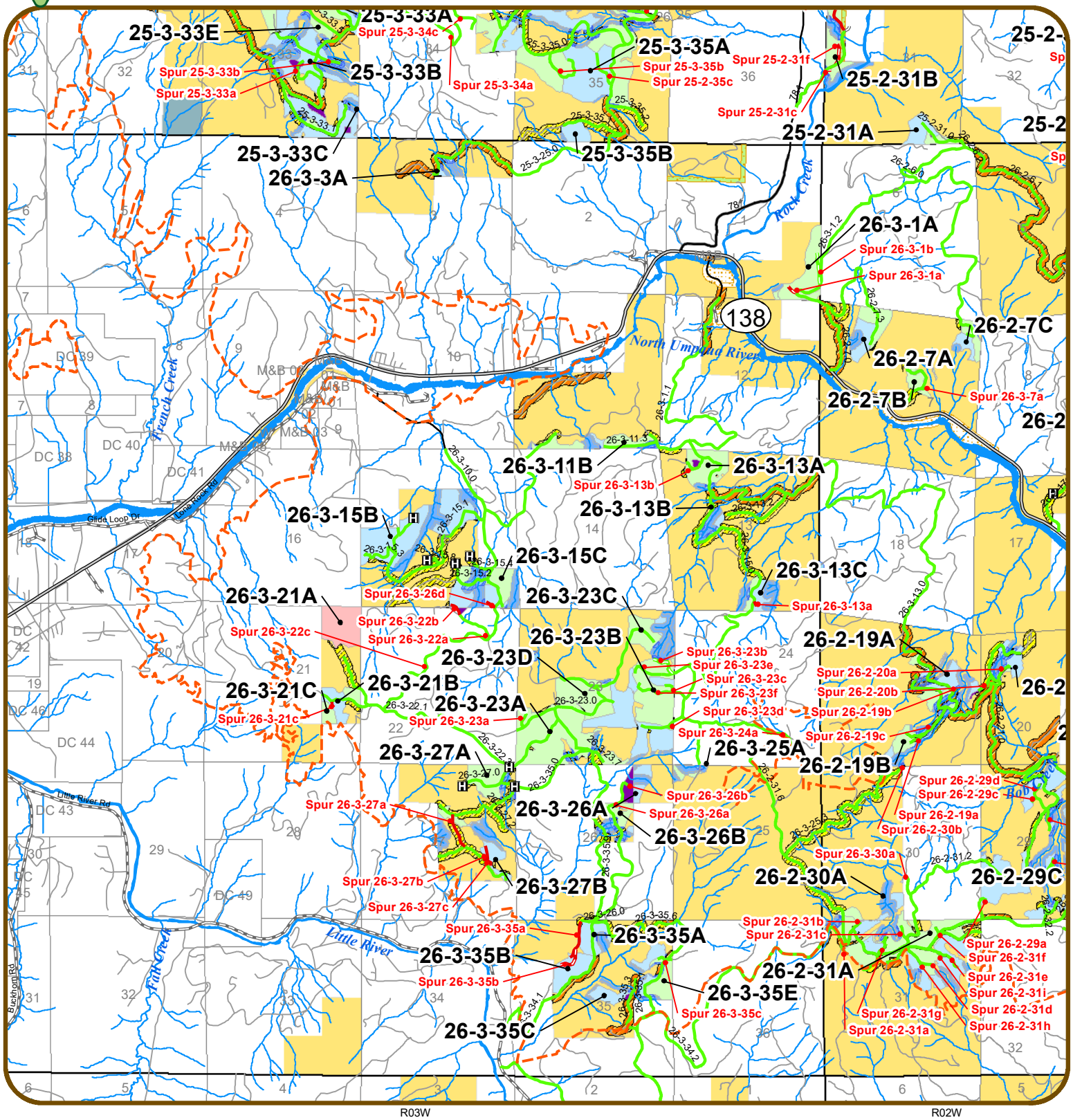
NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 3

Figure A -12



Cable
Ground
Heli
Yarding Corridor
Riparian Reserve
Construction - Retain
Construction - Decommission
Renovation - Retain
Renovation - Decommission
Road Maintenance - Retain
State Highway
Archie Creek Fire Final Perimeter

Existing Road
Hazard Tree Removal Adjacent Homesites
Hazard Tree Removal Recreation Sites
Harzard Tree Removal Pump Chances- Poly
Hazard Tree Removal Haul Route Alt 3
Hazard Tree Removal Maintenance Level 345 Roads
Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
Archie Creek Salvage Helicopter Landings - Alternative 3
Stream
Bureau of Land Management
State/Local Government
Private/Unknown

0 0.5 1
Miles

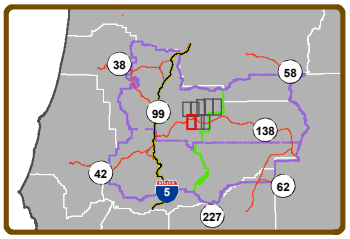
N

1:54,000

1 inch = 4,500 feet

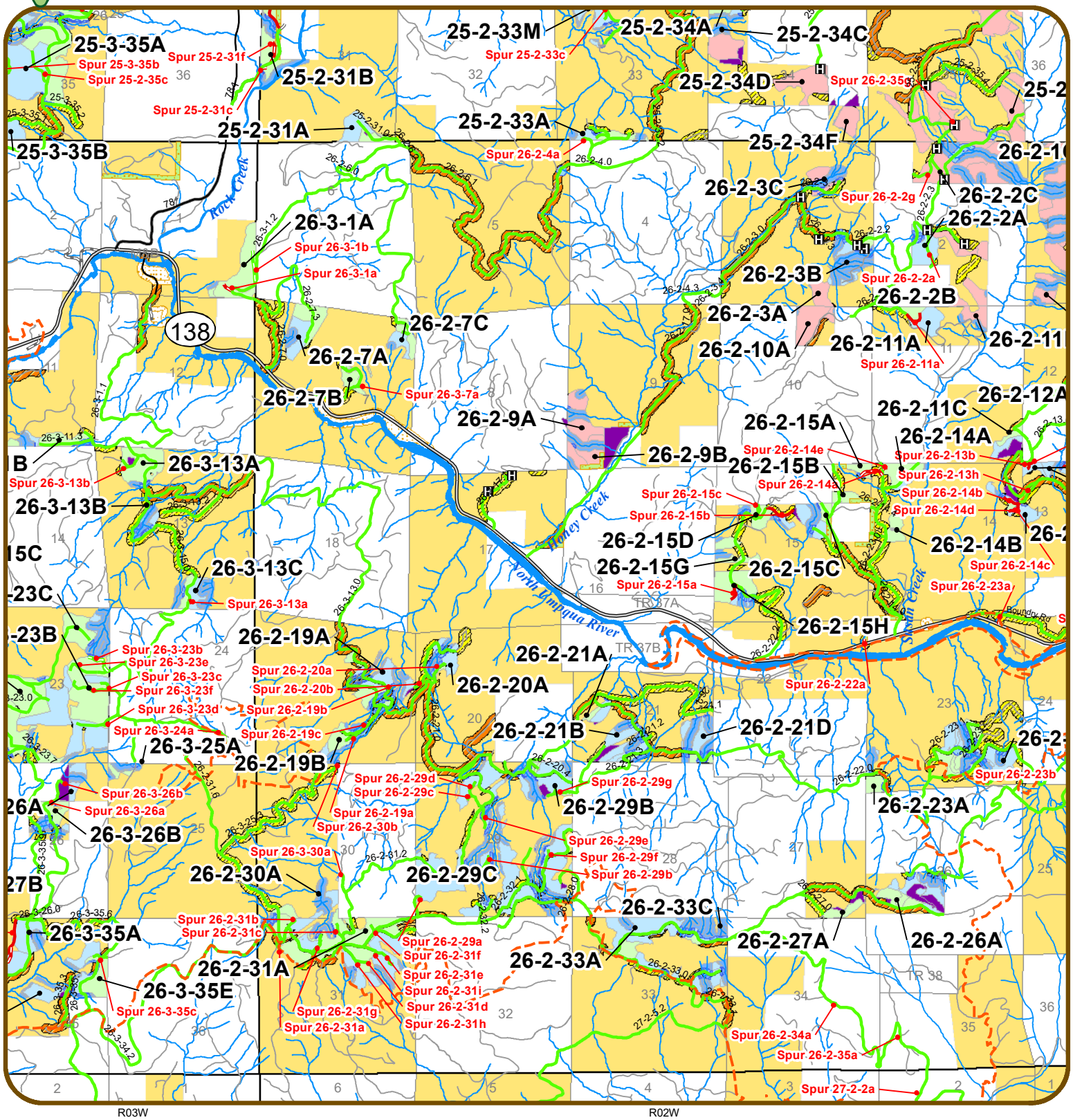
NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 3

Figure A -13



- Cable
- Ground
- Heli
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Archie Creek Fire Final Perimeter
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 3
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
- Archie Creek Salvage Helicopter Landings - Alternative 3
- Stream
- Bureau of Land Management
- Private/Unknown

0 0.5 1

Miles

1:54,000

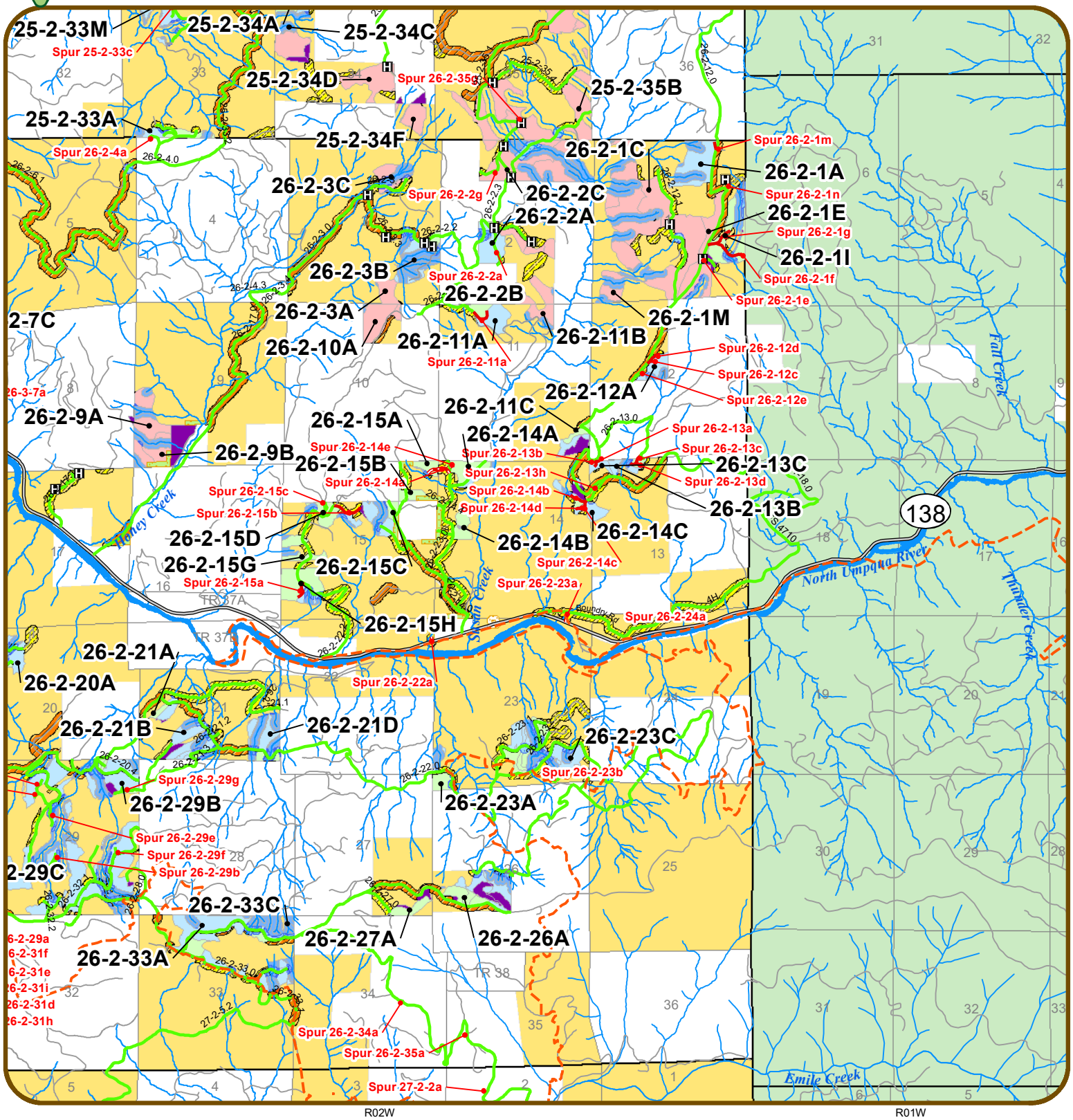
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021

Archie Creek Salvage Plan Units, Alternative 3

Figure A - 14



Cable
Ground
Heli
Yarding Corridor
Riparian Reserve
Construction - Retain
Construction - Decommission
Renovation - Retain
Renovation - Decommission
Road Maintenance - Retain
State Highway
Archie Creek Fire Final Perimeter

Existing Road
Hazard Tree Removal Adjacent Homesites
Hazard Tree Removal Recreation Sites
Harzard Tree Removal Pump Chances- Poly
Hazard Tree Removal Haul Route Alt 3
Hazard Tree Removal Maintenance Level 345 Roads
Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
Archie Creek Salvage Helicopter Landings - Alternative 3
Stream
Bureau of Land Management
U.S. Forest Service
Private/Unknown

0 0.5 1
Miles

1:54,000

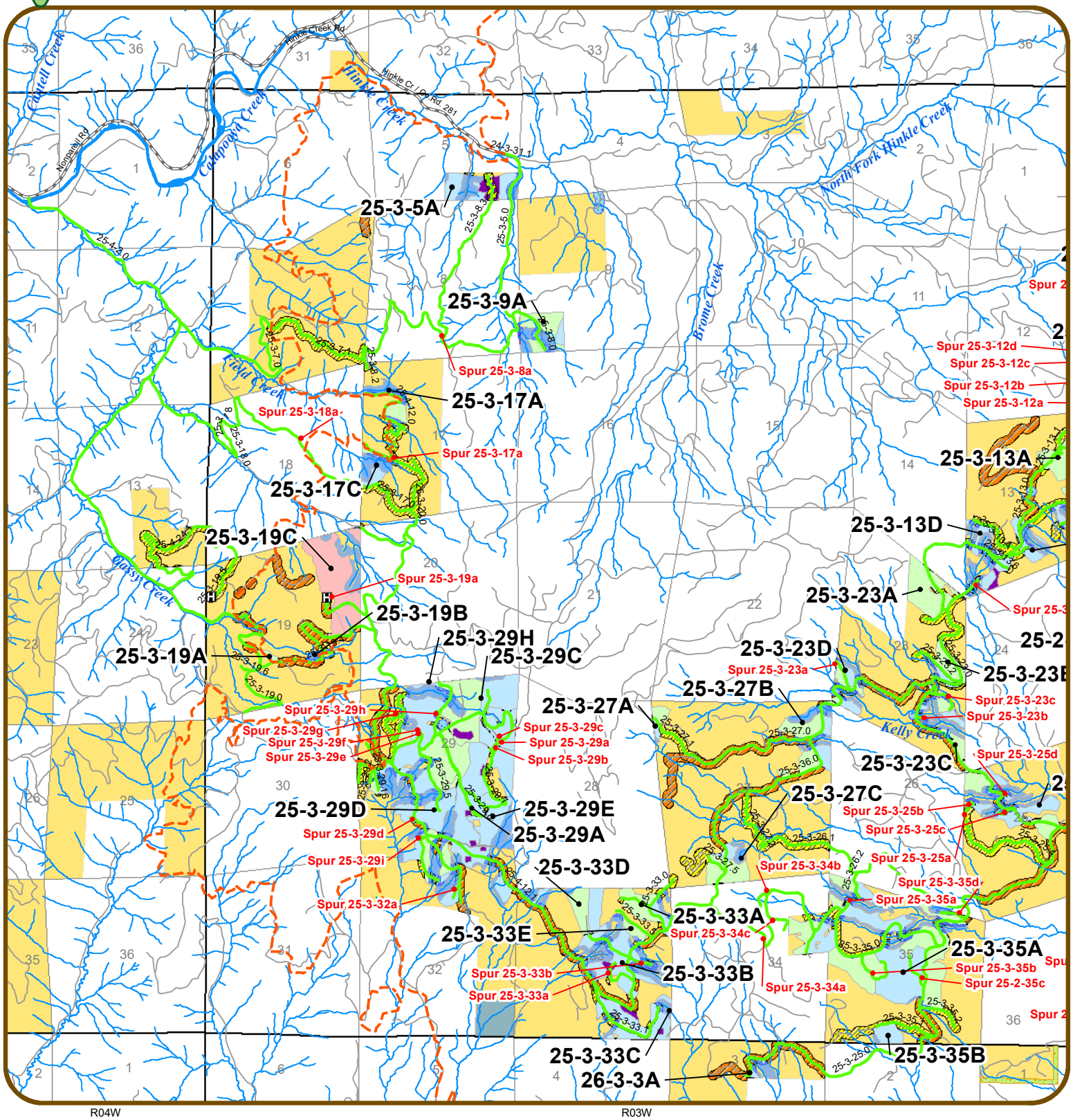
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 3/31/2021

Archie Creek Salvage Plan Units, Alternative 3

Figure A - 15



Cable
Ground
Heli
Yarding Corridor
Riparian Reserve
Construction - Retain
Construction - Decommission
Renovation - Retain
Renovation - Decommission
Road Maintenance - Retain
State Highway
Archie Creek Fire Final Perimeter

Existing Road
Hazard Tree Removal Adjacent Homesites
Hazard Tree Removal Recreation Sites
Harzard Tree Removal Pump Chances- Poly
Hazard Tree Removal Haul Route Alt 3
Hazard Tree Removal Maintenance Level 345 Roads
Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
Archie Creek Salvage Helicopter Landings - Alternative 3
Stream
Bureau of Land Management
State/Local Government
Private/Unknown

0 0.5 1
Miles

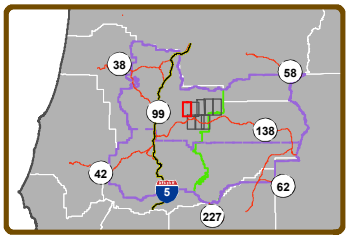
N

1:54,000

1 inch = 4,500 feet

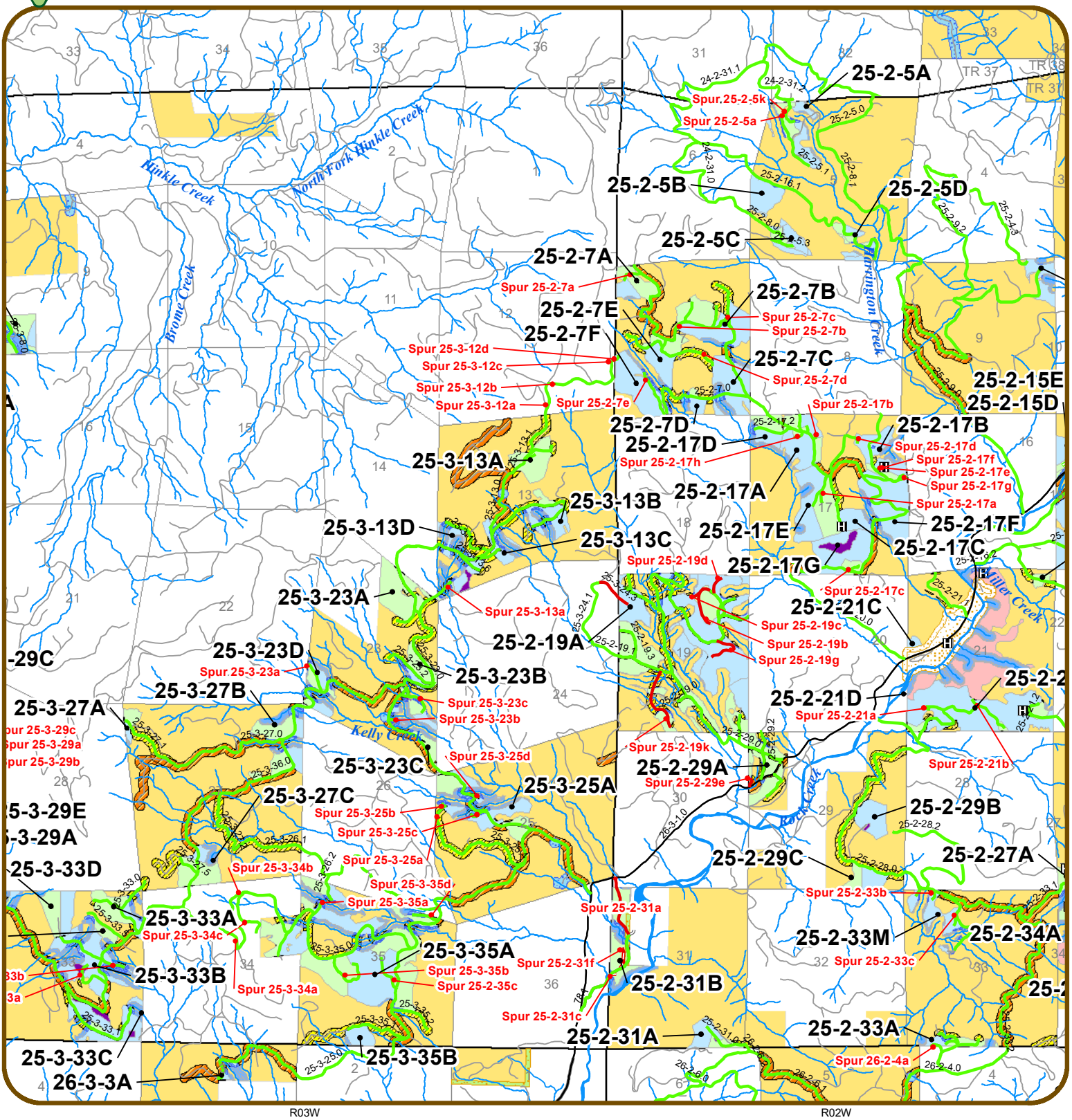
NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 3

Figure A - 16



- Cable
- Ground
- Heli
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Archie Creek Fire Final Perimeter
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 3
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
- Archie Creek Salvage Helicopter Landings - Alternative 3
- Stream
- Bureau of Land Management
- Private/Unknown

0 0.5 1

Miles

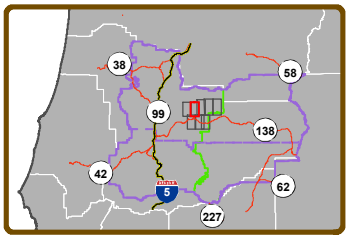
N

1:54,000

1 inch = 4,500 feet

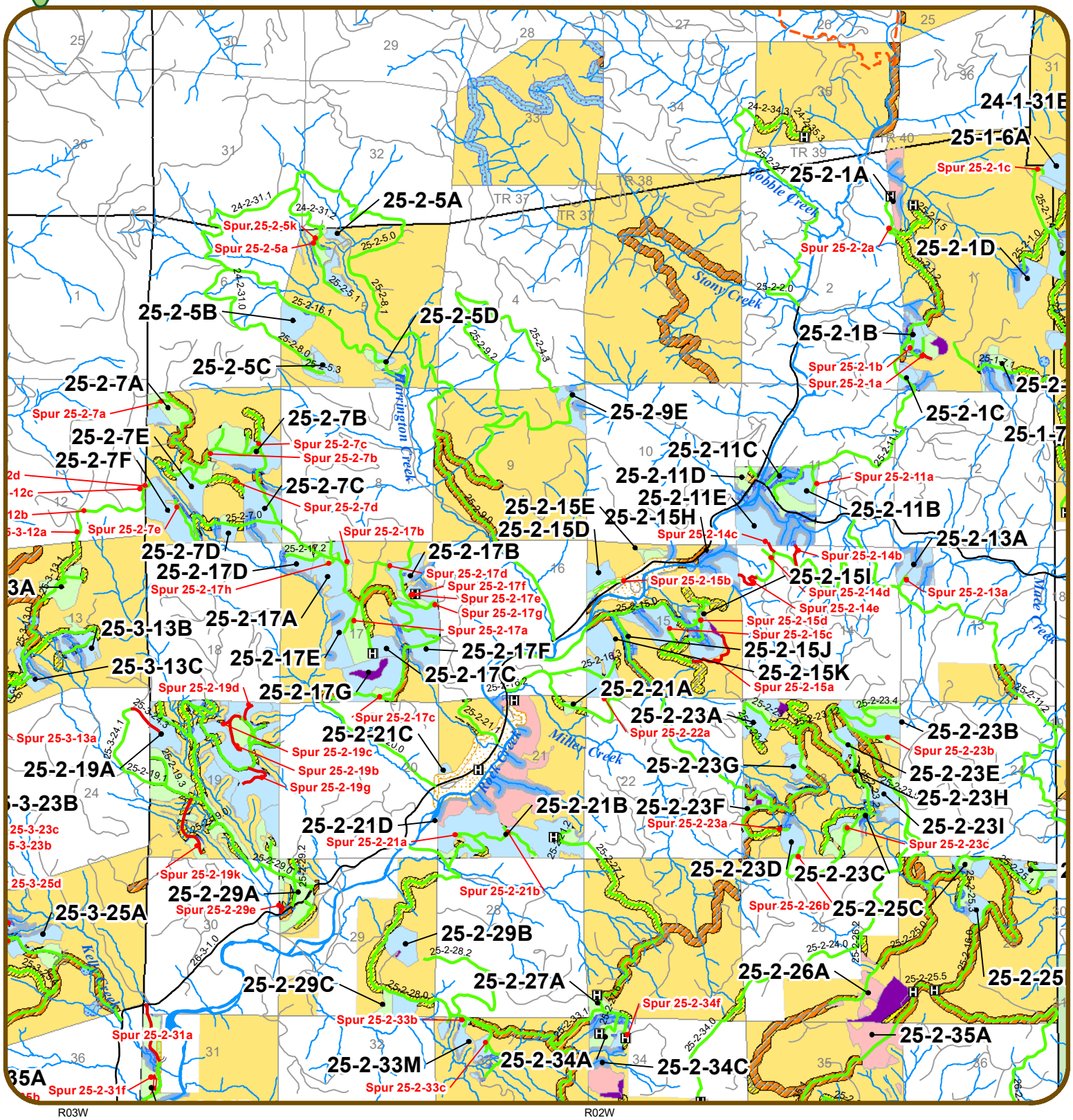
NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 3

Figure A - 17



- Cable
- Ground
- Heli
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Archie Creek Fire Final Perimeter
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 3
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
- Archie Creek Salvage Helicopter Landings - Alternative 3
- Stream
- Bureau of Land Management
- U.S. Forest Service
- Private/Unknown

0 0.5 1

Miles

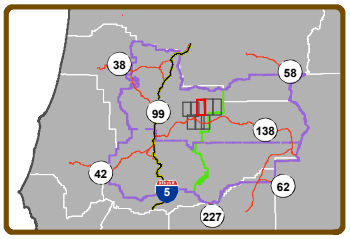
N

1:54,000

1 inch = 4,500 feet

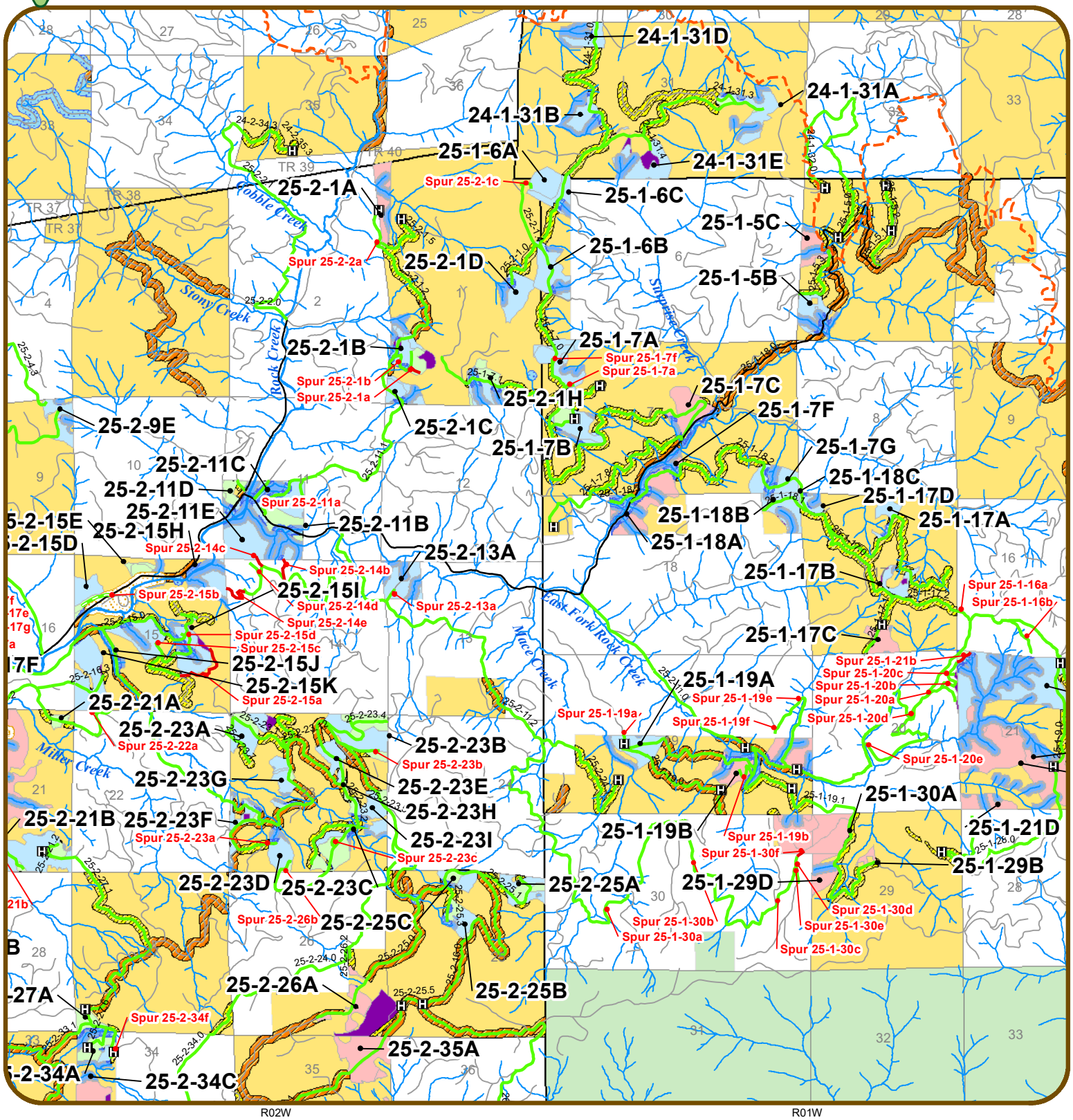
NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 3

Figure A - 18



- Cable
- Ground
- Heli
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Archie Creek Fire Final Perimeter
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 3
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
- Archie Creek Salvage Helicopter Landings - Alternative 3
- Stream
- Bureau of Land Management
- U.S. Forest Service
- Private/Unknown

0 0.5 1

Miles

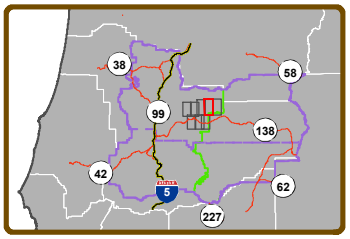
N

1:54,000

1 inch = 4,500 feet

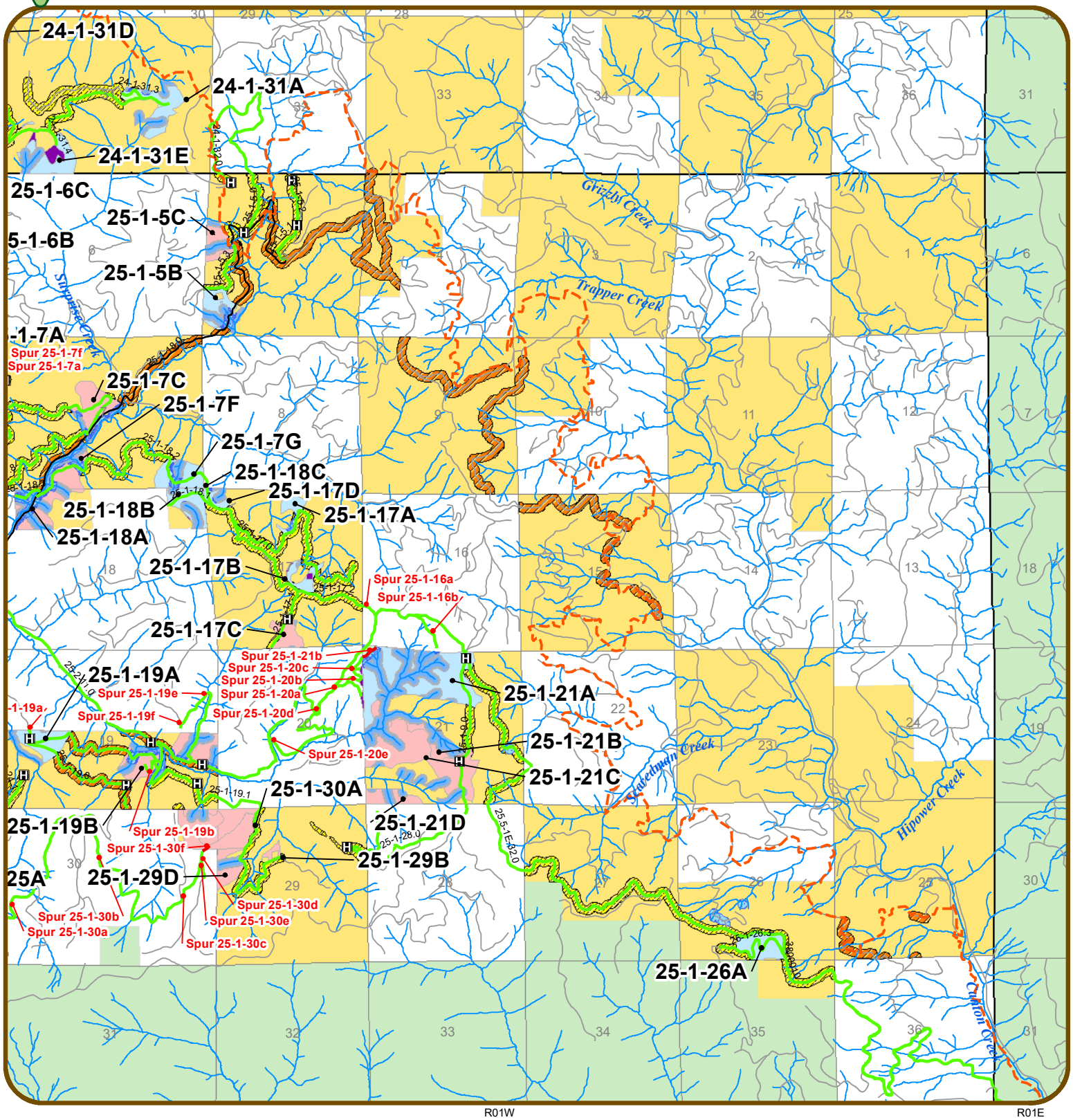
NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Units, Alternative 3

Figure A - 19



- Cable
- Ground
- Heli
- Yarding Corridor
- Riparian Reserve
- Construction - Retain
- Construction - Decommission
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Archie Creek Fire Final Perimeter
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Harzard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 3
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 3
- Archie Creek Salvage Helicopter Landings - Alternative 3
- Stream
- Bureau of Land Management
- U.S. Forest Service
- Private/Unknown

0 0.5 1

Miles

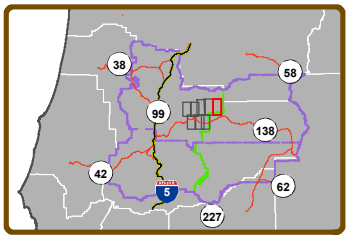
N

1:54,000

1 inch = 4,500 feet

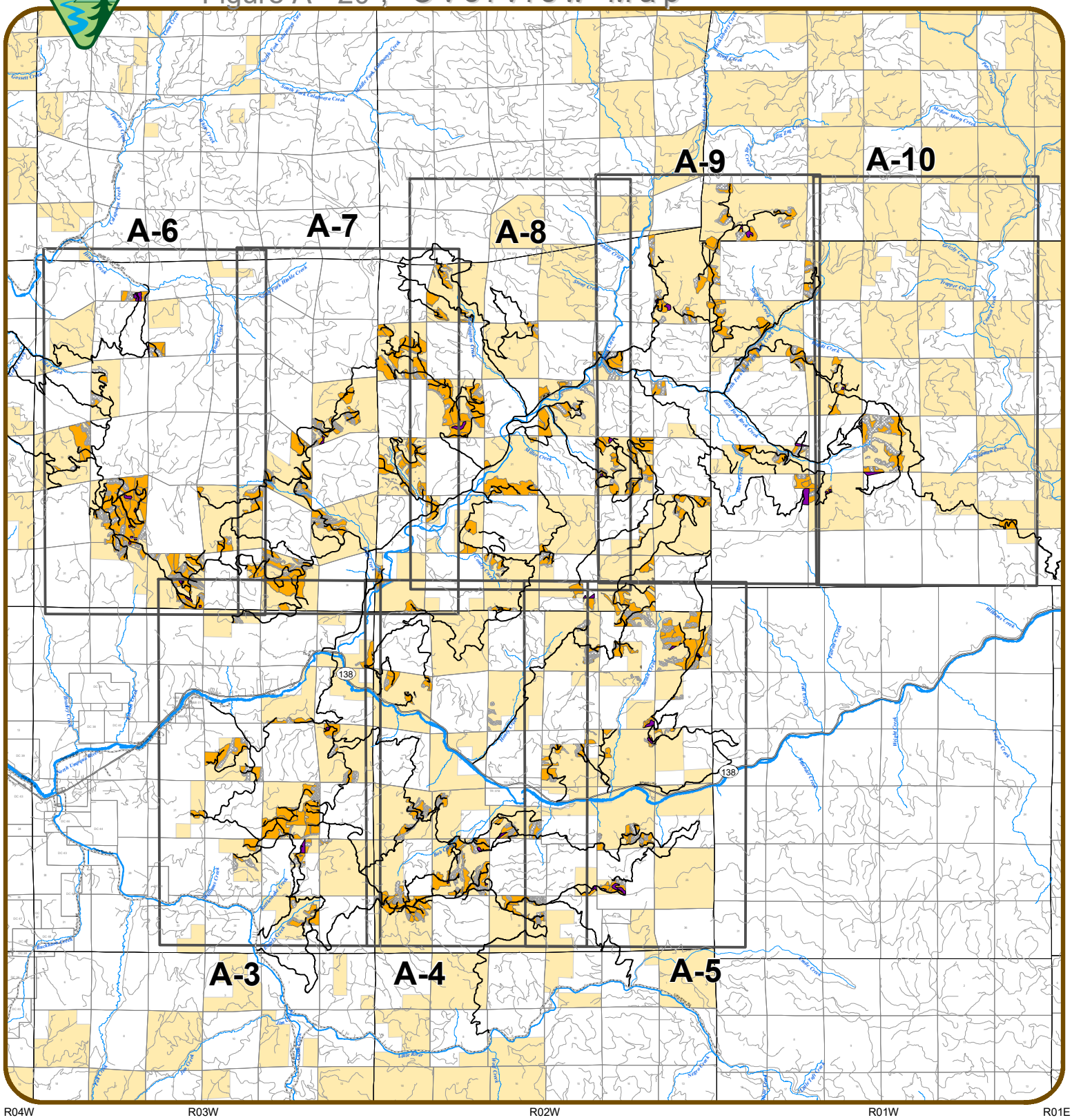
NAD 1983 UTM Zone 10N

Date: 3/31/2021



Archie Creek Salvage Plan Alternative 4

Figure A - 20 , Overview Map



Legend

- Renovation - Retain
- Renovation - Decommission
- State Highway
- Existing Road
- Major Stream
- BLM Land
- Private Land
- Riparian Reserve
- Salvage Unit
- Yarding Corridor

0 0.5 1 1.5 2

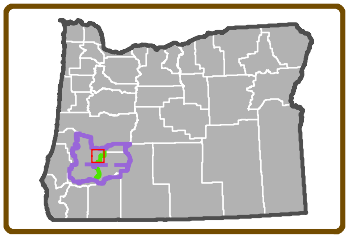
Miles

1:147,000

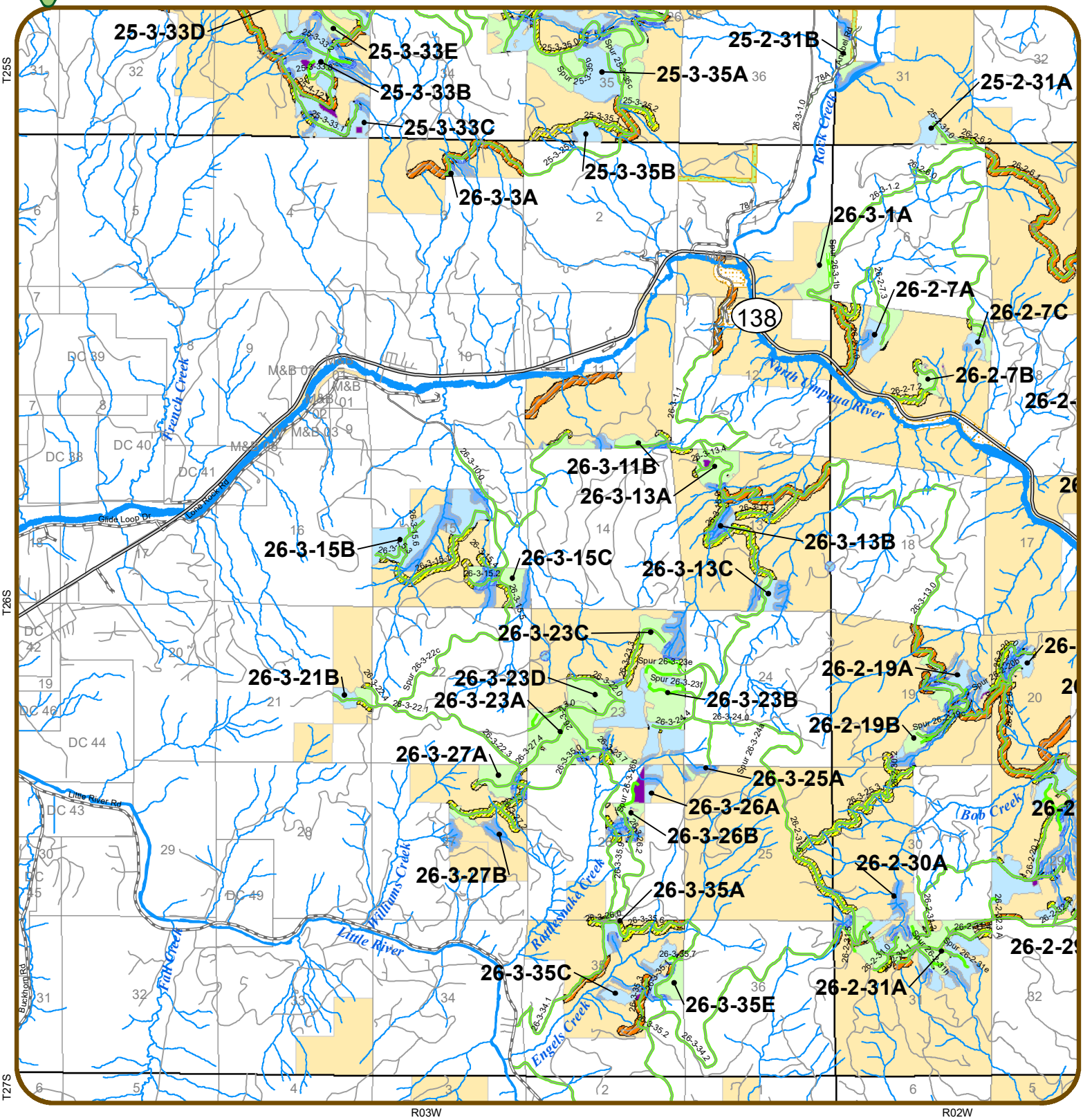
1 inch = 12,250 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



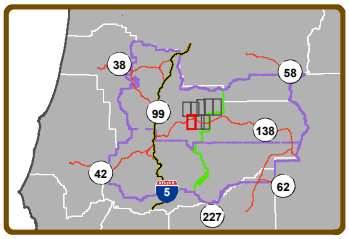
Archie Creek Salvage Plan Units, Alternative 4
Figure A - 21



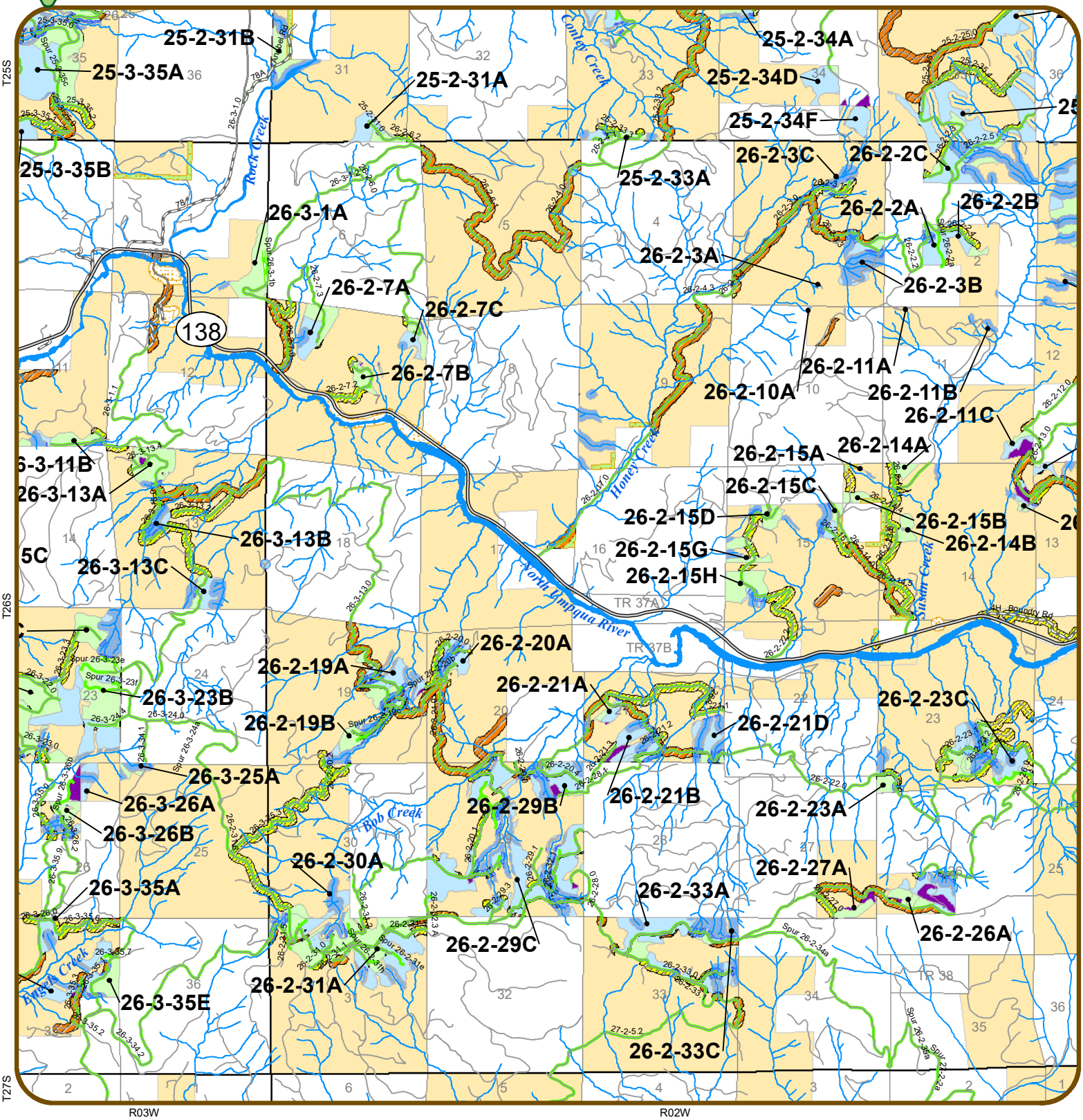
- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

1:54,000
1 inch = 4,500 feet
NAD 1983 UTM Zone 10N
Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 4
Figure A - 22



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

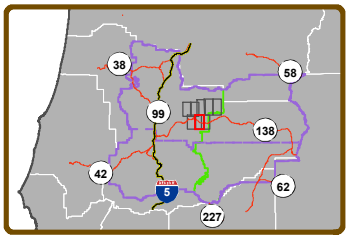
N

1:54,000

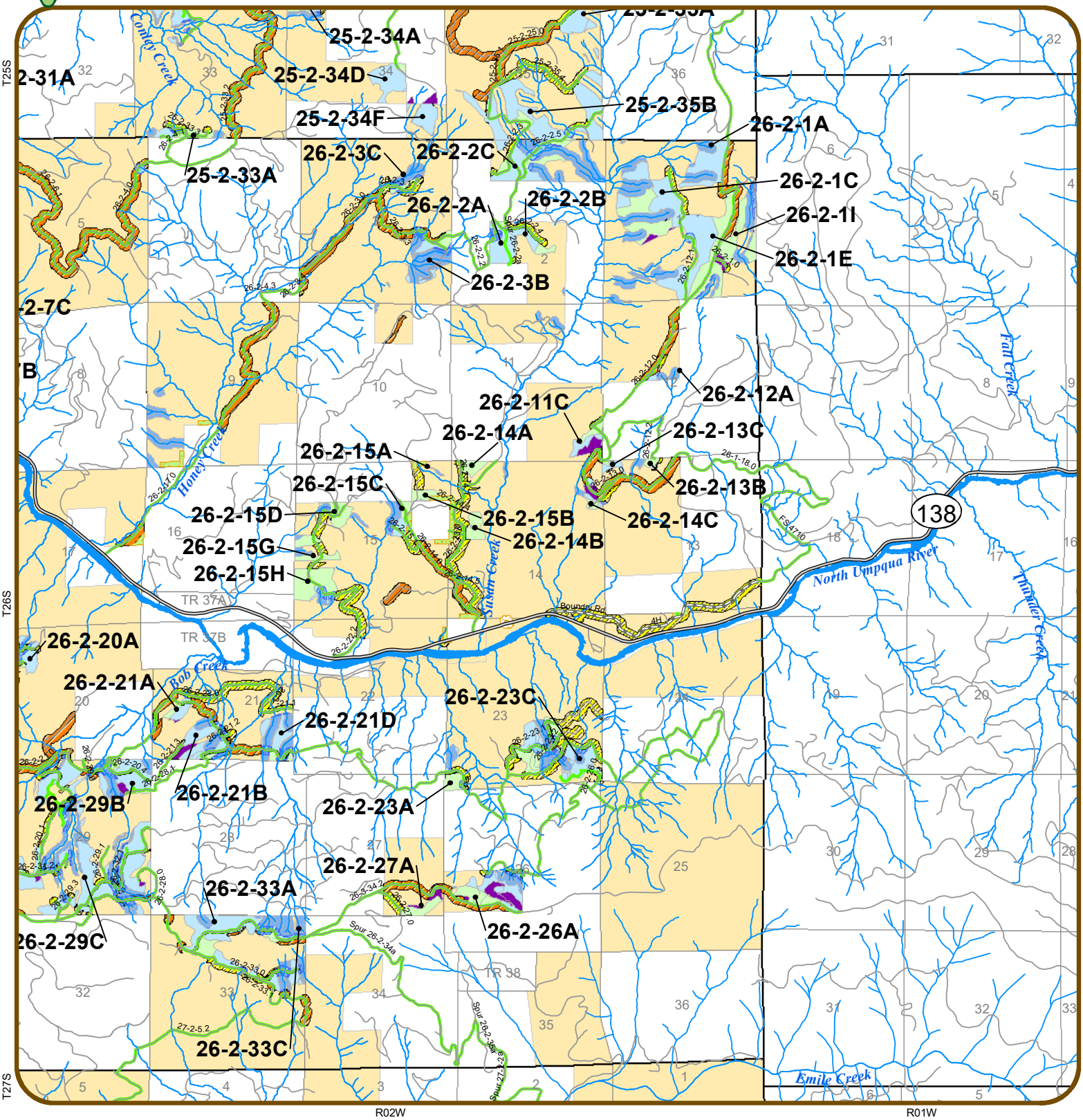
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 4
Figure A - 23



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

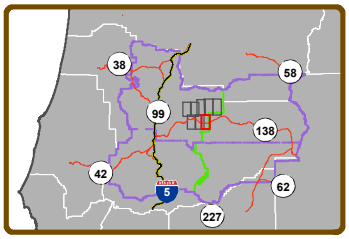
N

1:54,000

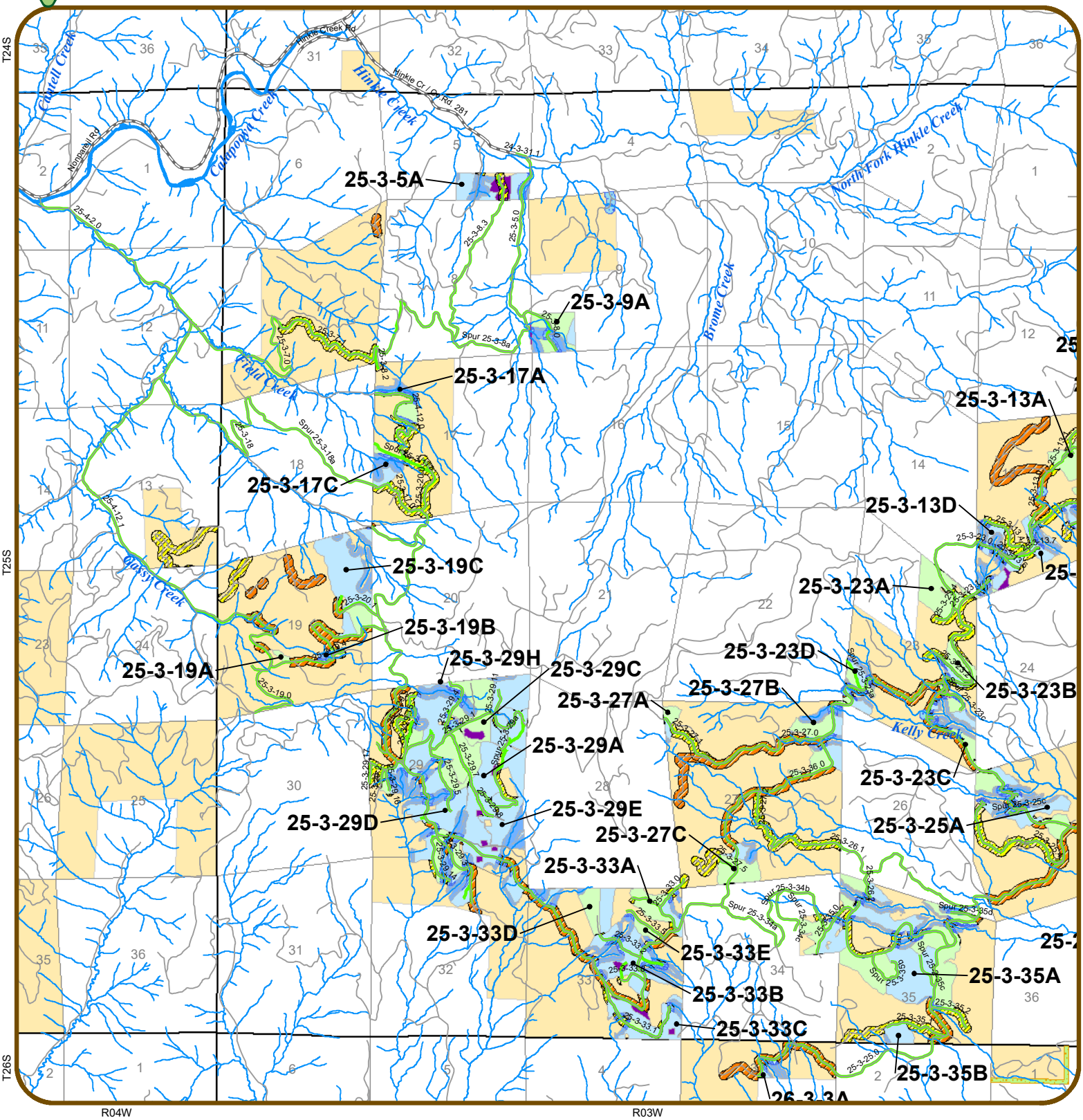
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 4
Figure A - 24



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

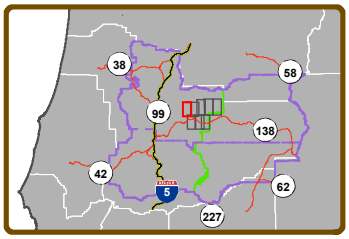
N

1:54,000

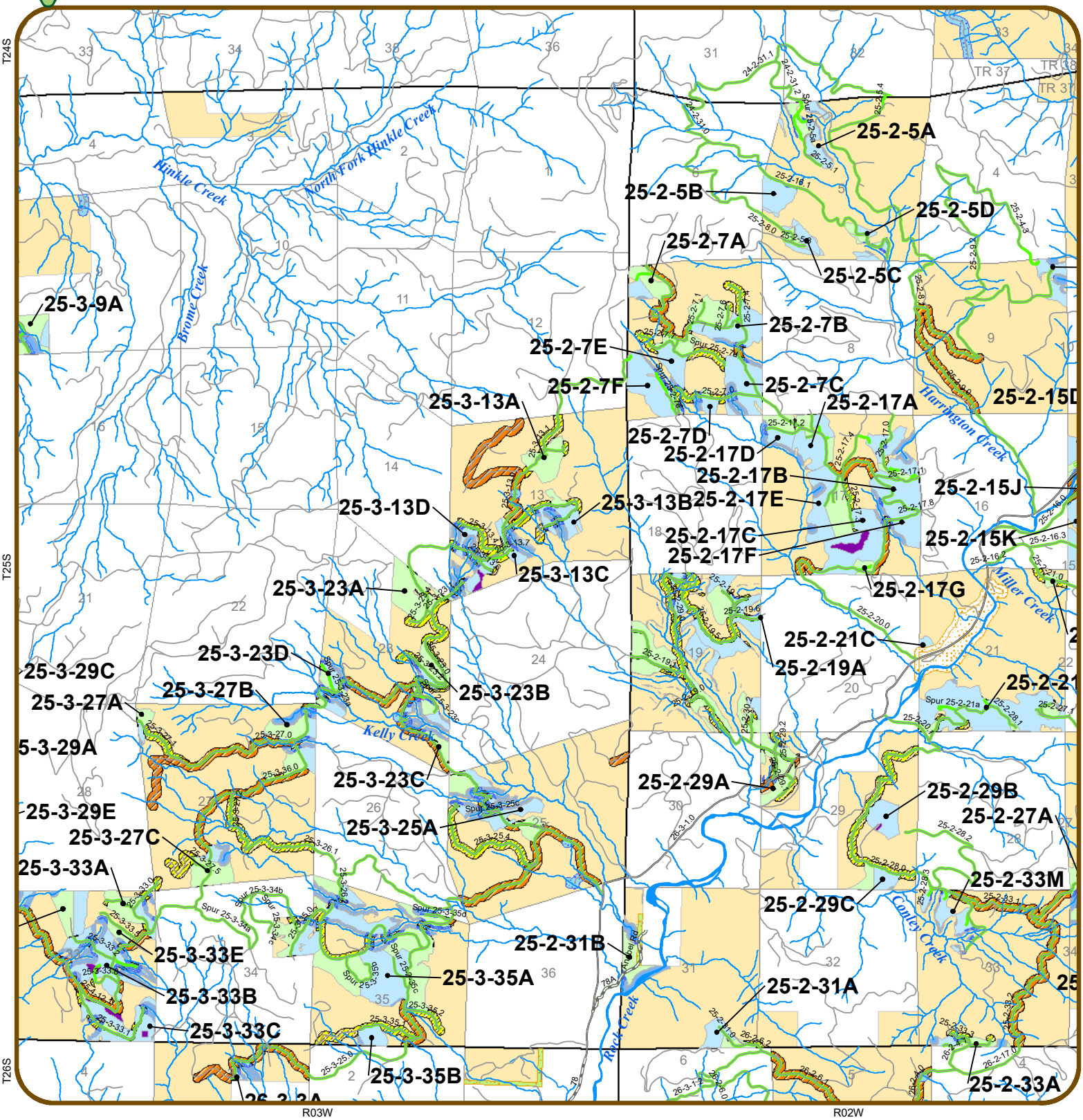
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 4
Figure A - 25



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

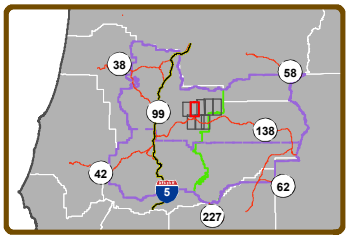
N

1:54,000

1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 4
Figure A - 26

- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

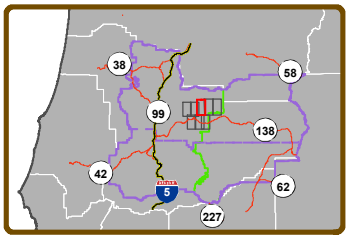
N

1:54,000

1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 4
Figure A - 27

- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

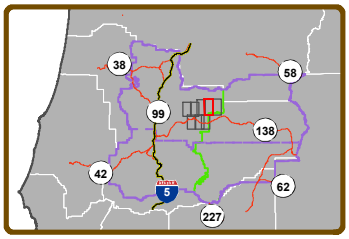
N

1:54,000

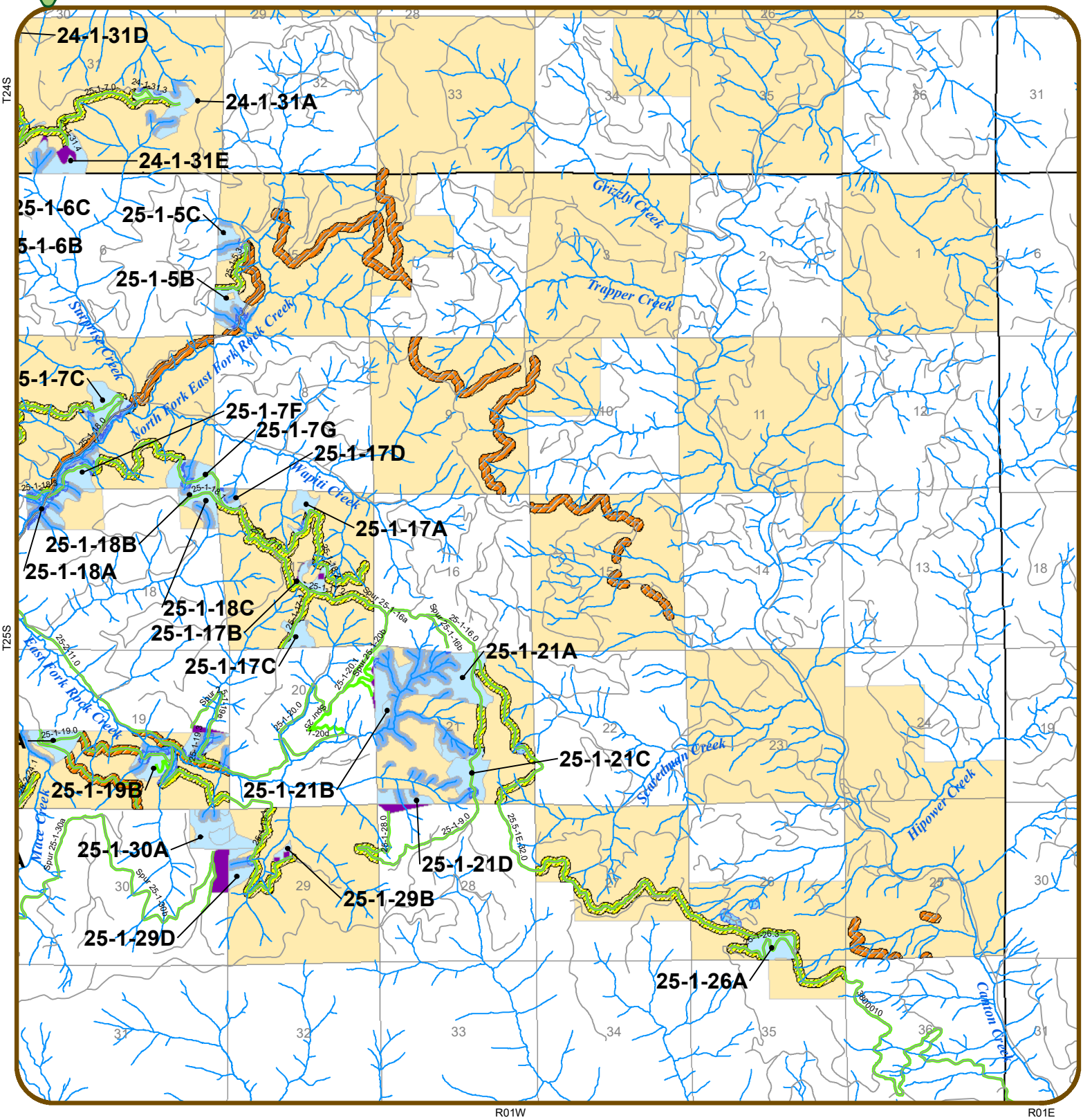
1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021



Archie Creek Salvage Plan Units, Alternative 4
Figure A - 28



- Cable
- Ground
- Yarding Corridor
- Riparian Reserve
- Renovation - Retain
- Renovation - Decommission
- Road Maintenance - Retain
- State Highway
- Existing Road
- Hazard Tree Removal Adjacent Homesites
- Hazard Tree Removal Recreation Sites
- Hazard Tree Removal Pump Chances- Poly
- Hazard Tree Removal Haul Route Alt 4
- Hazard Tree Removal Maintenance Level 345 Roads
- Archie Creek Salvage Unit RR Hazard Tree Removal Alt 4
- Stream
- BLM Land
- Private Land

0 0.5 1
Miles

N

1:54,000

1 inch = 4,500 feet

NAD 1983 UTM Zone 10N

Date: 4/1/2021

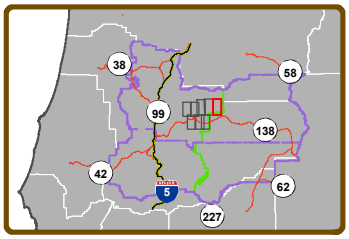
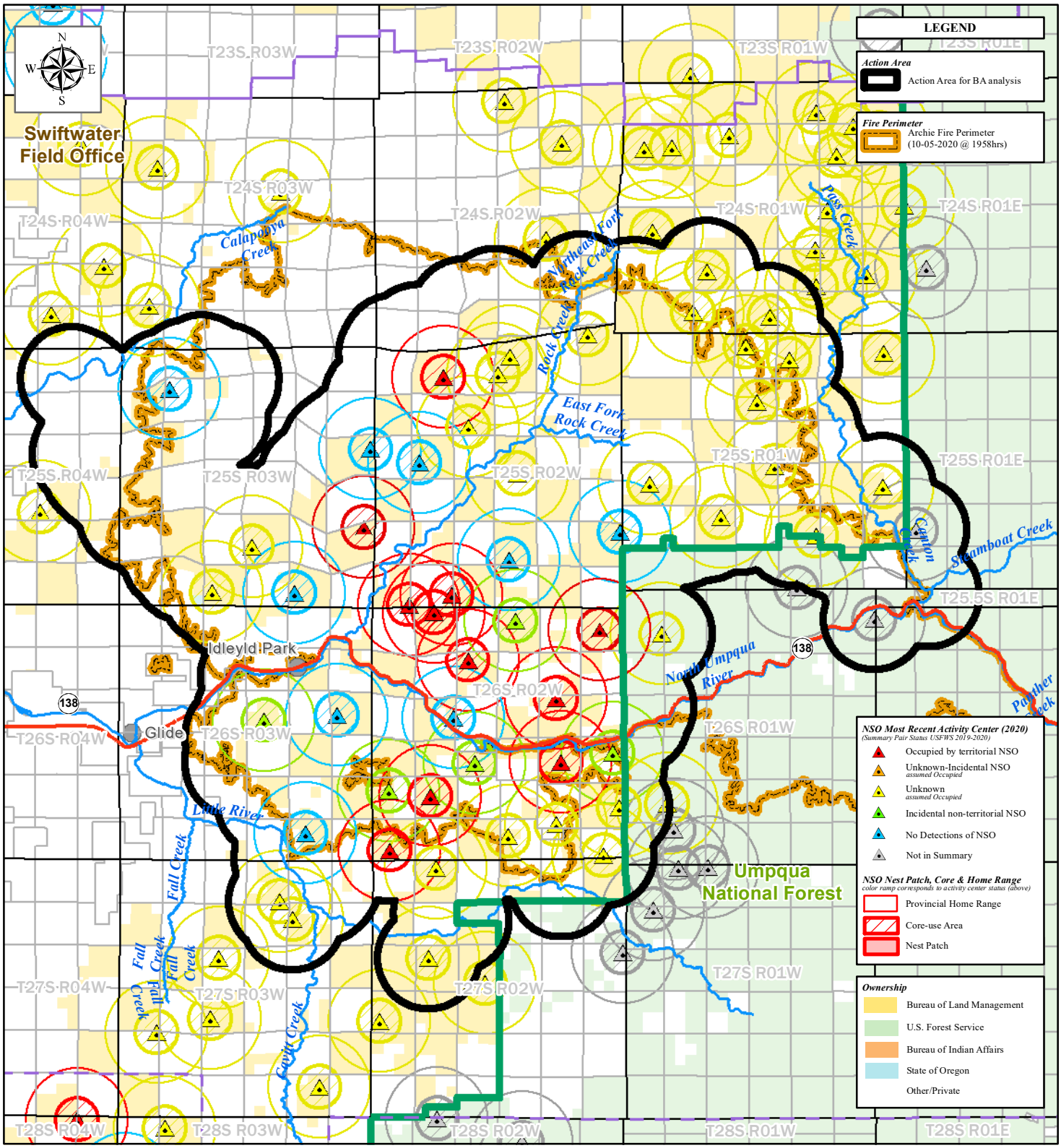


Figure A - 29

Northern Spotted Owl Occupancy Status (2020)



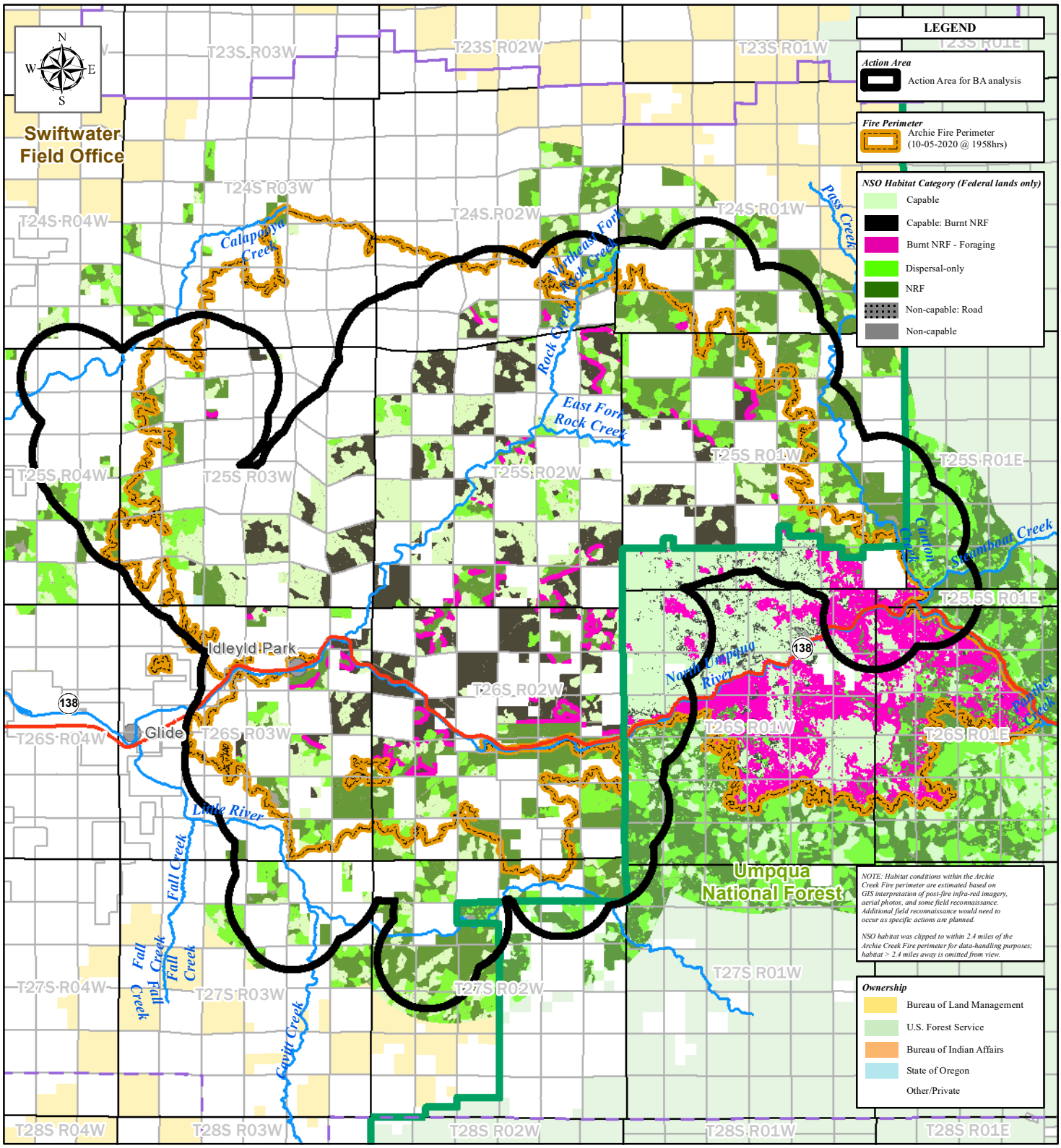
0 2 4 6 8 10 Miles

Map Date: 03-31-2021
Created by: E. Gayner

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.

Figure A - 30

Northern Spotted Owl Estimated Habitat Conditions



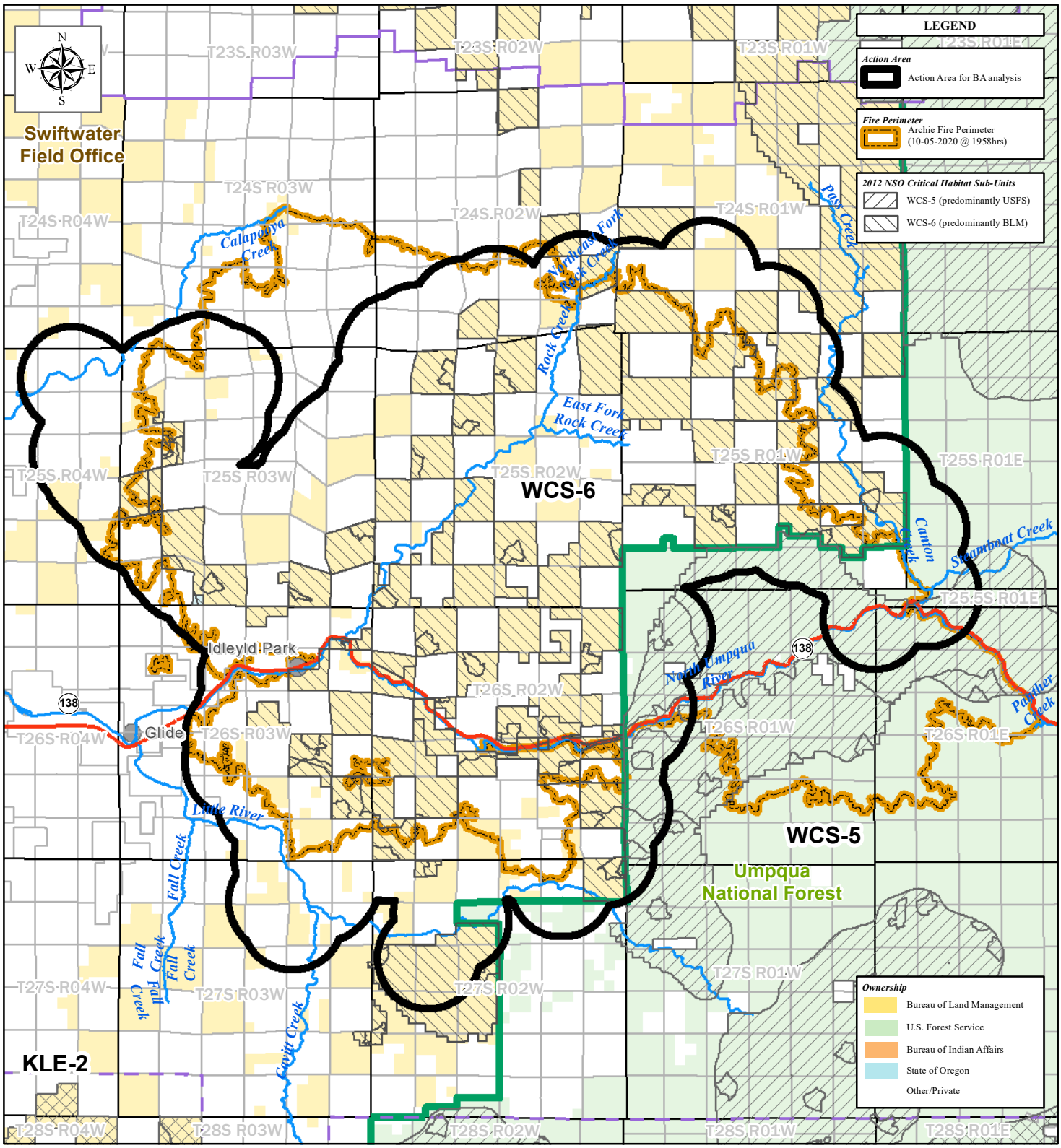
0 2 4 6 8 10 Miles

Map Date: 03-31-2021
Created by: E. Gayner

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.

Figure A - 31

Northern Spotted Owl Designated Critical Habitat (2012)



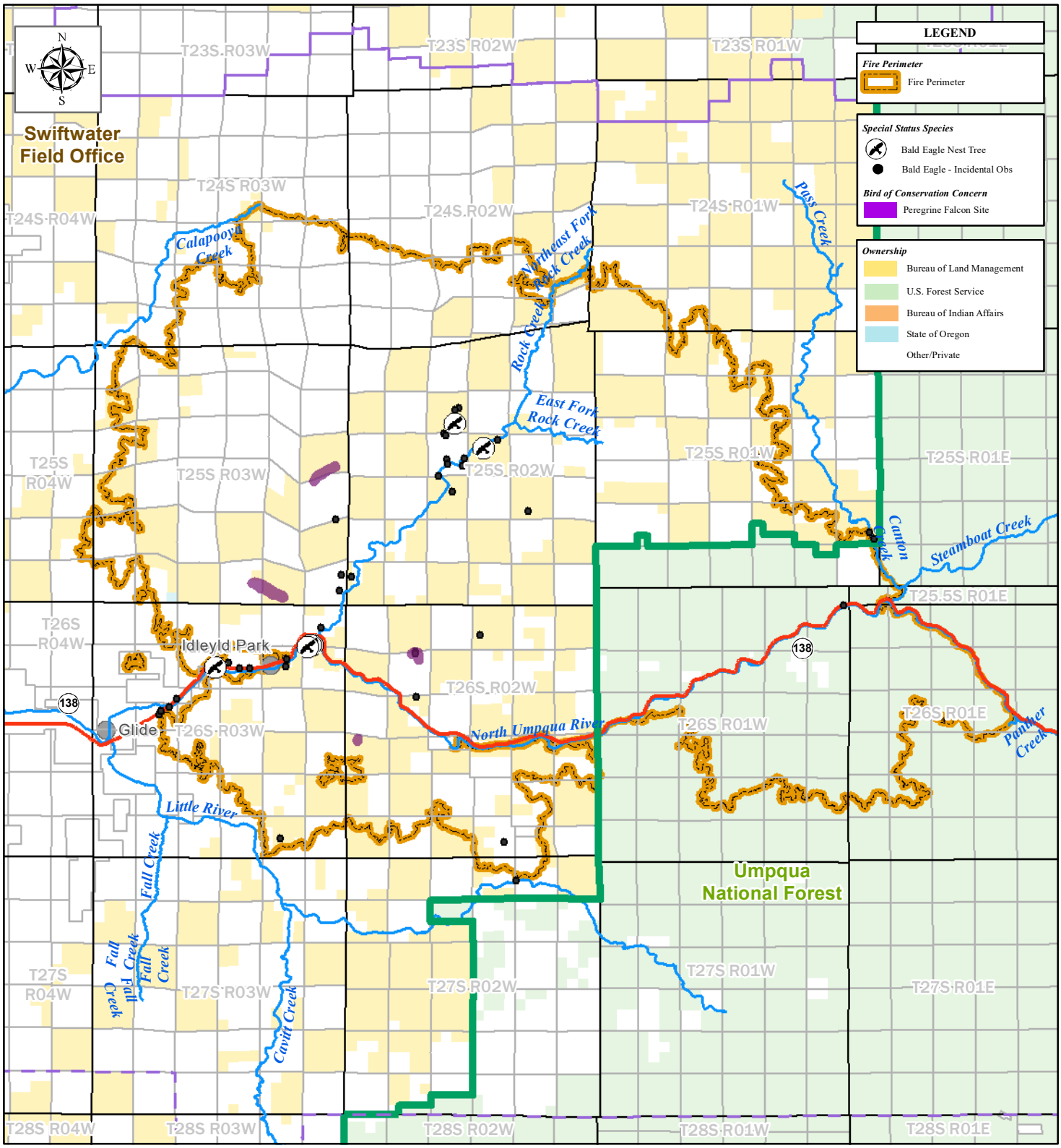
0 2 4 6 8 10 Miles

Map Date: 03-31-2021
Created by: E. Gayner

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.

Figure A - 32

Archie Creek Fire: Bald Eagle and Peregrine Falcon Sites



0 2 4 6 8 10 Miles

Map Date: 03-31-2021
Created by: E. Gayner

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.

Appendix B – Project Design Features and Best Management Practices

Project design features (PDFs) are an integral part of each action alternative and serve to mitigate impacts of activities on resource areas. In addition to best management practices and legal requirements, these measures would be applied during implementation (NCO ROD/RMP, Appendix C, pp. 139-180).

Table B-1. Project Design Features by Resource Area

Identifier	Design Feature	Source/Citation
Cultural		
Cul-1	All previously known and newly recorded sites identified during on-going surveys will be avoided via project redesign. The project will be No Effect to cultural resources. No salvage sale trees will be removed or cut in sensitive cultural areas.	Developed by IDT
Cul-2	In areas where Roadside Hazard Tree Removals cannot be conducted from the roadway or if areas are identified where skidding must take place, cultural surveys must be conducted pre-disturbance.	Developed by IDT
Cul-3	Road maintenance outside of the existing roadbed will be restricted to brushing in culturally sensitive areas and will not extend beyond the road prism.	Developed by IDT
Cul-4	In culturally sensitive areas, maintenance/renovation activities (spot rock, rolling, and blading) in the existing roadbed will be contained to non-native fill and will not extend to native soil.	Developed by IDT
Cul-5	No slash or fuels will be piled and/or burned in sensitive cultural resources areas.	Developed by IDT
Cul-6	No logs will be decked in sensitive cultural resources areas.	Developed by IDT
Cul-7	If any cultural and/or paleontological resources (historic or prehistoric site or object) are discovered during project activities, all operations in the immediate vicinity of such discovery would be suspended until an evaluation of the discovery can be made by the district archaeologist to determine appropriate actions to protect sites of significant cultural or scientific value.	Developed by IDT
Cul-8	If hazard tree removals must be conducted in culturally sensitive areas the following PDFs will be implemented: • An archaeological monitor should be present as determined by the BLM archaeologist. • No heavy equipment should leave established roadways. • All equipment traveling on existing native surface roadways in culturally sensitive areas must be on rubber tires.	Developed by IDT

Identifier	Design Feature	Source/Citation
	• Trees should be directionally felled away from site boundaries and site features or felled out of site boundaries. • Cut trees shall be left in place unless they can be removed without ground disturbance. One end suspension of logs is considered ground disturbance. Logs will only be removed if ground disturbance can be prevented upon removal.	
Botany		
Botany-1	The BLM will use existing data and conduct pre-disturbance clearance surveys to determine the presence of special status botanical species in project areas. Known populations of any Federally Listed Endangered, Federally Listed Threatened, or Bureau Sensitive botanical species and populations found during surveys would be managed consistently with any conservation agreements and strategies. Strategies include the protection and restoration of habitat; alteration of the type, timing, and intensity of actions; and other strategies designed to conserve and maintain populations of the species.	NCO ROD/RMP, p. 87
Botany-2	Roadside Hazard Tree Removal Operations: For roadside hazard tree removal in locations lacking current botanical surveys: • No construction of landings or spur roads beyond the existing road prism • All mechanized harvest equipment will remain on the road prism • Hazard trees will be directionally felled towards the road • All logs will be moved to the road with a minimum of one-end suspension • All sound green trees will be retained. If the removal of any sound green tree is necessary for operations, botany clearance surveys will be required prior to harvest	Developed by IDT
Botany-3	In areas where hazard tree removal activities cannot be completed from the existing road prism as described in Botany-2, the BLM will conduct pre-disturbance clearance surveys for special status botanical species prior to implementation. Any special status plant populations found during surveys would be managed under Botany PDF 1.	Developed by IDT
Botany-4	T26S R03W S27: No road construction, road renovation, timber salvage, or hazard tree removal will occur within Umpqua mariposa lily (*Calochortus umpquaensis*) and Sierra horkelia (*Horkelia congesta* ssp. *congesta*) populations or habitat. No hazard tree removal will occur in this TRS prior to completion of botany surveys where current botany surveys do not exist.	Developed by IDT

Identifier	Design Feature	Source/Citation
	Fuels Management	
Fuels-1	Machine piles would be located away from unit boundaries, retention trees, snags, downed logs, and stumps.	Developed by IDT
Fuels-2	For all machine piling, displacement of duff and topsoil into piles would be avoided to the greatest extent practicable.	USDI/BLM 2001, p. 66
Fuels-3	Total exposed mineral soil resulting from primary skid trails and mechanical site preparation activities would be less than ten percent of ground-based harvest units and less than five percent in cable units.	USDI/BLM 2005, p. 59
Fuels-4	Equipment for machine piling within units would be restricted to small and medium sized excavators or other low-ground pressure equipment.	Developed by IDT
Fuels-6	Machine piling within units would occur between July 15 and October 1. The wet season restriction period may be adjusted in the event of unseasonably wet weather and soil moisture conditions. The soil scientist and contract administrator would monitor soil moisture, compaction, and displacement to determine when operations may need to be suspended.	Developed by IDT
Fuels-7	Piles would be covered with plastic or thick paper to ensure that the core of the pile remains dry, and good consumption of the pile is achieved when burned while minimizing generation of particulates (Oregon SMP 2019).	Developed by IDT
Fuels-8	Up to two small (less than eight feet diameter in size) piles per acre may be left in place for wildlife habitat, where practical.	Developed by IDT
Fuels-9	All pile burning would have an approved “Burn Plan” and be conducted following the requirements of the Oregon Department of Forestry - Smoke Management Plan in a manner consistent with the requirements of the Clean Air Act.	Oregon SMP 2019, Oregon Department of Environmental Quality and Oregon Department of Forestry 1992

Identifier	Design Feature	Source/Citation
Fuels-10	Piles would be burned during the late-fall to mid-spring season when the soil, duff layer (soil surface layer consisting of fine organic material), and large downed wood moisture levels are high and atmospheric conditions are conducive to smoke dispersion and particulate removal.	Developed by IDT
Noxious Weeds and Nonnative Plants		
Weeds-1	Treatment units, yarding wedges, helispots, and new road construction lacking current botanical surveys will be surveyed for nonnative invasive plant species prior to project implementation. *Exception:* Roadside hazard trees may be treated in areas lacking current botanical survey data so long as all equipment remains on the road prism. In these locations, adhere to PDF Botany-2.	*BLM Manual 9015: Integrated Weed Management (1992)*, p. 19-20; *Roseburg District Integrated Weed Control Plan Environmental Assessment* No. OR-100-94-11 (1995); developed by IDT
Weeds-2	BLM will treat existing infestations of priority noxious weed species prior to salvage operations and road renovation/construction as part of implementation. Oregon Department of Agriculture A-list noxious weeds will be treated prior to project implementation and/or be flagged and avoided.	*Roseburg District Integrated Weed Control Plan Environmental Assessment* No. OR-100-94-11 (1995), p. 3.
Weeds-3	Steam clean or pressure wash equipment used in logging and road construction prior to entering BLM-administered lands to remove soil and materials that could transport weed propagules (e.g., seeds, root fragments, etc.). Off-road equipment removed from the contract area during the life of the contract must be re-cleaned before re-entry into the contract area.	*BLM Manual 9015: Integrated Weed Management (1992); Northwestern and Coastal Oregon ROD/RMP* BMP

Identifier	Design Feature	Source/Citation
		SP 03 (2016); *Roseburg District Integrated Weed Control Plan Environmental Assessment* No. OR-100-94-11 (1995).
Weeds-4	Schedule work in uninfested areas prior to infested areas. Areas of concern include BLM recreation sites (campgrounds, trailheads, etc.) along Rock Creek and the North Umpqua River as these sites contain noxious weed species that do not occur at other project locations. If work must occur at these sites prior to work at other project locations, all equipment will be cleaned prior to moving to new project locations. (See PDF Weeds-3).	*BLM Manual 9015: Integrated Weed Management (1992); Northwestern and Coastal Oregon ROD/RMP* BMP SP 03 (2016); *Roseburg District Integrated Weed Control Plan Environmental Assessment* No. OR-100-94-11 (1995).
Weeds-5	Seed and mulch areas disturbed by harvest activities with native grass seed or revegetate with native plant species when natural regeneration is unlikely to prevent weed establishment, as practicable.	*BLM Manual 9015: Integrated Weed Management (1992)*, p. 8-9.
Weeds-6	BLM will conduct post-treatment monitoring for a minimum of three years to implement management measures to identify new invasive plant populations and to control new and existing noxious weed populations.	*BLM Manual 9015: Integrated Weed Management (1992)*, p. 8-9.

Identifier	Design Feature	Source/Citation
Cable Yarding		
Cable Yarding (CY)-1	Occasionally, trees selected for use as tailholds or guyline anchors may be located outside of proposed harvest units. Trees with bald eagle or golden eagle or northern spotted owl nesting structure (e.g., large stick platform nests; additionally, for owls, also includes large snags with cavities/broken tops) would be avoided when selecting anchor trees; work with wildlife biologist when tailhold/guyline use occurs within known eagle or northern spotted owl sites to avoid direct and indirect impacts to known nest trees. Contract provisions require written approval before attaching logging equipment to a tree in the reserve area and precautions would be taken to protect the tree from damage. Protective measures could include tree plates, straps, or synthetic rope, where possible, and minimal notching (less than half the tree diameter) where necessary. Guyline trees are generally cut because they are located in the vicinity of cable yarding equipment and subject to state safety regulations. Anchor trees that are felled for safety reasons may be harvested at the discretion of the government's contract administrator, based on a variety of criteria, including land use allocation, habitat type, existing coarse woody debris, and accessibility.	Developed by IDT
CY-2	Yarding to and hauling off of native-surfaced roads would be restricted to periods of low soil moisture, typically May 15 to October 15. Low soil moisture limits would be determined by qualified specialistsand may be adjusted dependent upon soil moisture conditions.	Developed by IDT
CY-3	Yarding outside unit boundaries would occur on BLM-administered lands adjacent to units: 24-1-31D, 24-1-31E, 25-1-5B, 25-1-5C, 25-1-6B, 25-1-7B, 25-1-17A, 25-1-17B, 25-1-17D, 25-1-18A, 25-1-18C, 25-1-19B, 25-1-21A, 25-1-21B, 25-1-21D, 25-1-29B, 25-2-1A, 25-2-1B, 25-2-1C, 25-2-1D, 25-2-5A, 25-2-5B, 25-2-5D, 25-2-7B, 25-2-9E, 25-2-11C, 25-2-13A, 25-2-15H, 25-2-15I, 25-2-15J, 25-2-15K, 25-2-17G, 25-2-19A, 25-2-21C, 25-2-23A, 25-2-23C, 25-2-23F, 25-2-25A, 25-2-25B, 25-2-25C, 25-2-26A, 25-2-29B, 25-2-31A, 25-2-33A, 25-2-34C, 25-2-34F, 25-2-35A, 25-2-35B, 25-3-5A, 25-3-9A, 25-3-13C, 25-3-13D, 25-3-17C, 25-3-23A, 25-3-23C, 25-3-25A, 25-3-27B, 25-3-29A, 25-3-29C, 25-3-29H, 25-3-33B, 25-3-33C, 25-3-33D, 25-3-33E, 25-3-35A, 26-2-1C, 26-2-1E, 26-2-1I, 26-2-1M, 26-2-2B, 26-2-2C, 26-2-3B, 26-2-9A, 26-2-9B, 26-2-10A,26-2-11A, 26-2-11B, 26-2-11C, 26-2-12A, 26-2-14C, 26-2-15C, 26-2-15D, 26-2-19A, 26-2-19B, 26-2-20A, 26-2-21A, 26-2-21B, 26-2-21D, 26-2-23A, 26-2-23C,26-2-26A, 26-2-27A, 26-2-29B, 26-2-29C,26-2-30A, 26-2-33A, 26-3-3A, 26-3-13A, 26-3-13C, 26-3-21A, 26-3-23C, 26-3-25A, 26-3-26A, 26-3-26B, 26-3-27A, 26-3-27B, 26-3-35C.	Developed by IDT

Identifier	Design Feature	Source/Citation
Ground Based Yarding (GBY)-1	Restrict non-road, in unit, ground-based equipment used for harvesting operations to periods of low soil moisture; typically, October 1 to July 15. Low soil moisturelimits would be determined by qualified specialists and may be adjusted dependent upon soil moisture conditions.	Developed by IDT
GBY-2	Subsoil landings and main skid trails to a minimum depth of 18 inches, if deemed necessary by the soil scientist. Areas of shallow, rocky soils would not be subsoiled to avoid mixing rock with topsoil. A trail where duff and slash are displaced to an extent that 50 percent or more of the trail surface area is exposed to mineral soil would be defined as a main skid trail. Logging slash, where available, would be placed over at least 50 percent of subsoiled areas to replace some of the displaced duff and surface soil organic matter.	Developed by IDT
GBY-3	Trees designated for cutting within 100 feet of the Reserve Areas shall be felled and yarded away from these areas.	Developed by IDT
GBY-4	Equipment operators would avoid using equipment in perennially wet areas.	Developed by IDT
GBY-5	Temporary stream crossings are only allowed during periods of low or no flow, generally between July 1 and September 15. Temporary crossings should be designed to prevent sediment from entering the stream channel and be the minimum needed for timber harvest. All culverts, rock, logs, and sediment associated with temporary crossings must be removed prior to the start of the wet season (typically October).	Developed by IDT
Yarding Corridors/ Wedges (YW)-1	Some yarding corridors/wedges originate from landings located outside of units where logical road locations cannot be constructed and are usually needed to facilitate cable yarding but may also be used for ground-based yarding. These activities are described as yarding wedges when occurring on private lands and yarding corridors when occurring on BLM lands.	Developed by IDT
YW-2	Yarding wedges may be identified during the analysis process but more typically are identified during the final unit layout and are frequently located on private land owned by parties with rights of reciprocal use.	Developed by IDT
YW-3	Yarding wedges or corridors are the minimum size needed to facilitate yarding but may vary in size. For this analysis, 80 yarding corridors or wedges are proposed. The majority range from less than an acre to a few acres. The largest yarding corridor, up to 27 acres, may be necessary.	Developed by IDT

Recreation		
REC-1	Millpond/Lone Pine and Rock Creek Special Recreation Management Areas: • Dead trees would we logged and sold if they are determined to pose a risk to the public and recreation infrastructure within the developed footprint of the SRMA. • Within the SRMA boundary create a 150-foot buffer around the developed portion of the SRMA. • Trees that fall outside of the developed footprint and buffer area would be left standing to retain some of the recreation/visual setting. • Avoid damage to infrastructure and roadways, or soils when felling or removing trees from the site. • Access to areas where tree cutting is occurring would be closed to public entry and monitored with a flagger and/or posted warning signs at the time of cutting. • Equipment would operate only on established roads, trails, campsites, and designated parking areas to remove logs. • At least on-end suspension of the logs is required during the removal process.	Developed by IDT
REC-2	North Umpqua Wild and Scenic River Corridor Special Recreation Management Area The same PDFs established for Millpond/Lone Pine SRMA and Rock Creek SRMA would also be used for the North Umpqua Wild and Scenic River Corridor SRMA. However, work in this SRMA would only focus on the Swiftwater Trailhead, Susan Creek Falls Trailhead and Emerald Waters Recreation Site, (former Douglas County Swiftwater Park).	Developed by IDT
Riparian Reserves		
RR-1	Riparian Reserves would be established based on a site-potential tree height calculated from the average site index of inventory plots located on lands capable of supporting commercial timber stands throughout each watershed. The calculated site-potential tree height for the Canton Creek watershed is 136 feet, for the Middle North Umpqua River watershed it is 152 feet, for the Rock Creek watershed it is 167 feet, for the Lower North Umpqua watershed it is 189 feet, and for the Little River watershed it is 171 feet, and for the Calapooya Creek watershed it is 188 feet. On all intermittent and perennial streams, Riparian Reserves would be one site-potential tree height in width, slope distance, measured from the ordinary high-water line on each side of a stream (136,152, 167, 171, 188, or 189 feet). On all natural ponds, reservoirs, and wetlands greater than one-acre in size, Riparian Reserves would be 100 feet in width; extending from the ordinary high water line. For natural pond and wetlands less than one acre (including seeps and springs), Riparian Reserves would be 25 feet extending from the ordinary high-water line.	NCO ROD/RMP; p. 70
RR-2	Fish-bearing and perennial streams - A “no-harvest” Inner Zone buffer extending 120 feet (slope distance) on each side of the stream channel, as measured from the ordinary high-water line for fish-bearing and perennial	NCO ROD/RMP, p. 71

	streams, would be established to protect streams. The Outer Zone would be 16 feet for the Canton Creek watershed, for the Middle North Umpqua River watershed it would be 32 feet, for the Rock Creek watershed it would be 47 feet, for the Lower North Umpqua watershed it would be 69 feet, for the Little River watershed it would be 51 feet, and for the Calapooya Creek watershed it would be 68 feet.	
RR-3	Intermittent Streams – A "no-harvest" Inner Zone buffer extending 50 feet (slope distance) on either side from the edge of the stream channel, as measured from the ordinary high-water line for intermittent streams, would exclude thinning immediately adjacent to streams. In addition, a Middle Zone extending from 50 feet to 120 feet on either side of side of the intermittent stream channel would exclude commercial harvest within this zone in the Rock Creek, Lower North Umpqua River, Canton Creek, Calapooya Creek, and Little River watersheds. For the Middle North Umpqua River watershed, there is no Middle Zone. The Outer Zone would be 102 feet for the Middle North Umpqua River watershed, for the Rock Creek watershed it would be 47 feet, for the Lower North Umpqua watershed it would be 69 feet, for the Canton Creek watershed it would be 16 feet, for the Calapooya Creek watershed it would be 68 feet, and for the Little River watershed it would be 51 feet.	NCO ROD/RMP, p. 71
RR-4	Waterbodies, seeps, and springs – A "no-harvest" buffer extending 25 feet (slope distance) on all sides of waterbodies and wetlands less than one acre in size (natural and man-made), including seeps, and springs, would exclude thinning immediately adjacent to these water features. If the waterbody or wetland is greater than one acre in size this would be a 100 foot "no-harvest" buffer.	NCO ROD/RMP, p. 70
RR-5	Retain cut trees resulting from yarding corridors, skid trails, road construction, maintenance, and improvement in the Inner and Middle RR zones in adjacent stands as down woody material, moved for placement in streams for fish habitat restoration at the discretion of the BLM.	NCO ROD/RMP, p. 68
RR-6	Retain cut trees for yarding corridors, skid trails, road construction, maintenance, and improvement in the Outer Zone or RR associated with features other than streams, in adjacent stands as down woody material, move cut trees for placement in streams for fish habitat restoration, or sell trees at the discretion of the BLM.	NCO ROD/RMP, p. 68
Soils		
Soils-1	Unstable areas identified by the soil scientist or during lay out will be excluded from timber harvest activities.	Developed by IDT
Soils-2	Limit ground equipment to the road prism for roadside hazard tree removal operations except as necessary for operational feasibility or to move landings off heavily travelled roads to avoid user conflict, improve safety, or access landing locations that would reduce impacts to natural resources and infrastructure.	Developed by IDT
Soils-3	In high soil burn areas install water bars and place slash/mulch in cable yarding corridors that have soil gullying or trenching deeper than one (1) foot for longer than 50 feet on steep slopes 60 percent or steeper, to control surface erosion and reduce potential for channeling water.	Developed by IDT
Soils-4	Limit mechanized equipment used for felling to one pass when working out of skid trails, roads, and landings in ground-based harvest units.	Developed by IDT

Soils-5	Retain 10-15 tons per acre of dispersed course wood (mostly unmerchantable wood) greater than 3 inches in diameter in harvest units.	Developed by IDT
Soils-6	Woody material debris from logging operations should be left on site in high burn severity areas where fuel loadings are expected to be low.	Developed by IDT
Soils-7	Restrict mechanized equipment used for piling fuels and slash to roads, landings, and designated skid trails where feasible.	Developed by IDT
Soils-8	Maintain 60-80 percent of effective ground cover (at minimum 50 percent) needed to control surface erosion where practical, following forest management operations. Ground cover may be provided by vegetation, slash, duff, medium to large gravels, and cobbles.	Developed by IDT
Soils-9	Road construction, maintenance/renovation, winterizing, and decommissioning would be restricted to the dry season (typically May 15 to October 15). The operating season could be adjusted by a BLM contract administrator if unseasonable conditions occur (e.g., an extended dry season beyond October 15 or wet season beyond May 15).	Developed by IDT
Soils-10	In-stream work and culvert installation would be limited to periods of low or no flow, generally between July 1 and September 15.	Developed by IDT
Soils-11	Use of native-surfaced roads for timber hauling would be limited to the dry season (typically May 15 to October 15).	NCO ROD/RMP, p. 159
Soils-12	If necessary, prior to wet season (generally, mid-October through mid-May) haul on surfaced roads, sediment reducing measures such as straw bales, silt fences, or sediment filters would be installed near stream crossings to prevent sediment from reaching the streams.	Developed by IDT
Soils-13	Timber hauling would be suspended during wet weather to prevent damage to the road or if road run-off would deliver sediment to a stream at concentrations higher than existing background conditions.	Developed by IDT
Soils-14	Natural surfaced roads, not decommissioned prior to the wet season, would be winterized. Winterization would include installation of waterbars, mulching the running surface within 100 feet of streams with weed-free straw, and blocking the road with a barrier, such as logs, a gate or a trench to prevent access.	Developed by IDT
Soils-15	Avoid creating piles greater than 16 feet in height or diameter. Pile smaller diameter materials and leave pieces > 12 inches diameter within the unit. Reduce burn time and smoldering of piles by extinguishment with water and tool use.	NCO ROD/RMP, p. 163
Soils-16	When burning machine-constructed piles, preferably locate and consume organic materials on landings or roads. If piles are within harvested units and more than 15 percent of the burned area mineral soil (the portion beneath the pile) surface changes to a reddish color, then consider that amount of area towards the 20 percent detrimental soil disturbance limit.	NCO ROD/RMP, p. 163

Wildlife

Species that are ESA-listed, proposed, or candidates and their habitats would be managed in compliance with the ESA, approved recovery plans, and Bureau Special Status Species policies (ROD/RMP, p. 95). If during implementation of the proposed action, previously undiscovered Special Status Species locations are found, operations would be suspended, by the BLM contracting officer, as necessary, and appropriate protective measures would be implemented before operations would be resumed.

Northern spotted owl: The NSO Situational Management Approach (WL-1), additional PDFs to protect functional habitat (WL-2), and implementation of seasonal restrictions (WL-3 and WL-4) would minimize effects and avoid incidental take of the species. Implementation of PDFs and the Situational Management Approach are applicable specifically to occupied or unknown (unsurveyed/presumed occupied) northern spotted owl sites that have either an "unknown" viability or a "viable" determination.

Situational Management Approach to Avoid Northern Spotted Owl Incidental Take

	Monitoring Metric	**Trigger** *(If the unit[2] is….)*	**Spatial Scale[3]** *(…and the unit[1] is within the…)*	**NSO Habitat Type/ Function**	**Adaptive Management Response** *(…then BLM may take the following actions subject to the other PDCs described in the Proposed Action…)*	
WL-1	NSO Occupancy Based on Protocol Survey[1] Results	OCCUPIED (territorial pair or resident single status)	Nest Patch	NRF, Dispersal-Only, Post-fire Foraging, and Capable	Defer	Biological Assessment (USDI BLM 2021) and Biological Opinion (USDI FWS 2021)
			Core-Use Area Not Habitat-Limited (>50% NRF)[4]	NRF	Defer, Modify, Downgrade, or Remove; however, the extent of modification/downgrade/removal would be limited (a) so as not to reduce the core-use area to one that is habitat-limited (i.e., ≥ 250 acres of NRF habitat would remain) or (b) so as not to reduce interior NRF habitat through additional exposure from edge by newly created capable or non-capable habitats (e.g., through the creation of gaps, corridors, or roads).	
				Dispersal-Only	Defer, Modify, or Remove; however, the modification/removal would not reduce the amount of interior NRF remaining in the core-use area (i.e., removal of dispersal-only would not expose interior NRF to edge).	
				Post-fire Foraging	Defer, Modify, or Remove	
				Capable	Defer, Modify, or Remove	
			Core –Use Area Habitat-Limited (<50% NRF)	NRF	Defer or Modify; however, modification of NRF habitat could occur if there is no loss of interior NRF habitat through additional exposure from edge by newly created capable or non-capable habitats (e.g., through the creation of gaps, roads, or corridors) and if only a small percentage of the existing NRF habitat within the core-use area would be treated.	

				Dispersal-Only	Defer, Modify, or Remove; however, the extent of modification/removal would not reduce the amount of interior NRF remaining in the core-use area (i.e., removal of dispersal-only would not expose interior NRF to edge).	
				Post-fire Foraging	Defer**	
				Capable	Defer, Modify, or Remove	
			Home Range Not Habitat-Limited (> 1,158 acres (40%) NRF)[2]	NRF	Defer, Modify, Downgrade, or Remove; however, the extent of modification/downgrade/removal would be limited so as not to reduce the home range to one that is habitat-limited (i.e., ≥ 40 percent of the home range would remain as untreated NRF habitat).	
				Dispersal-Only	Defer, Modify, or Remove	
				Post-fire Foraging	Defer, Modify, or Remove	
				Capable	Defer, Modify or Remove	
			Home Range Habitat-Limited [<1,158 acres (40%) NRF]	NRF	Defer or Modify; modification of NRF habitat could occur but would still be functional NRF habitat following treatment.	
				Dispersal-Only	Defer, Modify, or Remove	
				Post-fire Foraging	Defer; unless modification/removal and site-specific situations discussed with the Level 1 Team would not cause incidental take (e.g., small unit at the very outer edge of the home range).	
				Capable	Defer, Modify, or Remove	
		UNOCCUPIED	Nest Patch, Core-Use Area, Home Range	NRF, Dispersal-Only, Post-fire foraging, and Capable	Defer, Modify, Downgrade, or Remove	
	**Habitat within and adjacent to harvest units may be modified to accommodate harvest systems. [1] *Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls* (USDI FWS 2012). [2] Applicable to entire or portion of unit [3] Nest Patch = 300-meter circle centered on activity center (70 acres); Core-Use Area = 0.5-mile radius circle centered on activity center (500 acres); Home Range = 1.2-mile radius circle centered on activity center (2,895 acres; Western Cascades Provincial Home Range). [4] Habitat Limited = the provincial home range has less than 40 percent nesting, roosting, and foraging habitat (NRF) habitat available					
WL-2	**Common to all Action ALTs – (regardless of NSO occupancy status and site viability status)** ***Salvage Harvest*** • Road construction, yarding corridors, use of tailhold and guyline trees would maintain NRF habitatfunction at the stand level. Work with area wildlife biologist(s) to ensure the habitat continues to function (where created openings may impact habitat functionality provide for					Developed by IDT based on USDI FWS, Appendix X, 2020.

	wildlife review). • Stands or portions of stands that continue to function as NRF or dispersal-only habitat would beexcluded from salvage. • Except for operational and safety needs, green trees (trees with a probability of mortality that is lessthan 60 percent) would be retained within salvage units to promote complex early-successional systems. To retain NSO foraging habitat, exclude salvage of burnt-NRF within 500 feet of functional NRF habitat. *Burnt-NRF beyond 500 feet of functional NRF is considered "capable" habitat, whereasburnt-NRF within 500 feet of functional NRF is considered "foraging" habita* ***Hazard Trees*** • Removal of hazard trees along roadsides and campgrounds will be focused in areas of full mortality and will not impact function of NSO habitat. • Unsound trees that are imminent hazards within functional NRF and dispersal only habitat would be removed or felled and not expect to change habitat function. **Occupied or Presumed Occupied Site (with "Viable or "Unknown" Site Viability)** ***Salvage*** • Exclude salvage harvest from within the nest patch or core-use area of a known occupied owl site. ***Hazard Trees*** • Hazard trees felled within occupied northern spotted owl nest patches will be cut and left on site except where necessary to clear infrastructure of debris. **Unsurveyed NRF** ***Salvage*** • No salvage would occur within 300 meters of unsurveyed NRF habitat capable of supporting NSO at the core-use spatial scale.	

WL-3

DISRUPTION: If nesting NSO move within the disruption distance, seasonal restrictions would be applied from **March 1 to July 15.** This would reduce the likelihood that noise disruption and habitat modification or removal would not cause NSO to abandon nests or fledge prematurely.

Seasonal restrictions may be waived until March 1 of the following year if current calendar year surveys indicate: 1) NSO are not detected, 2) NSO are present, but not attempting to nest, or 3) NSO are present, but nesting attempt has failed. If subsequent surveys locate a new NSO nest tree within 1.2 miles (home range radius distance from nest tree) of a proposed unit, harvest within the home range would be re-evaluated by the BLM and the Service. Disturbance, disruption and/or physical injury distance thresholds for northern spotted owls from a variety of activities (based on USDI FWS 2016b; Table 227, pp. 597-600). Restrictions for specific activities applicable to this project are listed below:

Project Activity	**No Effect** *(Mar 1 – Sept 30)*	**May Affect: NLAA** disturbance distance *(Mar 1 – Sept 30)*	**May Affect: LAA - Harass** early nesting season disruption distance *(Mar 1–Jul 15)*	**May Affect: LAA - Harass** late nesting season disruption distance *(Jul 16–Sept 30)*	**May Affect: LAA – Harm** direct injury and/or mortality *(Mar 1 – Sept 30)*
Light maintenance (*e.g.*, road brushing and grading) at campgrounds, administrative facilities, and heavily-used roads	>0.25 mile	≤ 0.25 mile	NA[1]	NA	NA
Log hauling on heavily-used roads	>0.25 mile	≤ 0.25 mile	NA[1]	NA	NA
Chainsaws (includes felling hazard/danger trees)	>0.25 mile -	66 yards to 0.25 mile -	≤ 65 yards[2]	NA	NA
Heavy equipment for road construction, road repairs, bridge construction, culvert replacements, etc.	>0.25 mile	66 yards to 0.25 mile	≤ 65 yards[2]	NA	NA
Pile-driving (steel H piles, pipe piles) Rock Crushing and Screening Equipment	>0.25 mile	120 yards to 0.25 mile	≤ 120 yards[3]	NA	≤ 5 yards (injury)[3]
Blasting	>1 mile	0.25-mile to1 mile	≤ 0.25 mile[4]	NA	≤ 100 yards (injury)[4]

2016 PRMP BO (USDI FWS, 2016; Table 227, pp. 597-600 & Table 50, pp. 230-232)

Helicopter: Chinook 47d	>0.5 mile	266 yards to 0.5 mile	≤ 265 yards[5]	≤ 100 yards[6] (hovering only)	NA
Helicopter: Boeing Vertol 107, Sikorsky S-64 (SkyCrane)	>0.25 mile	151 yards to 0.25 mile	≤ 150 yards[7]	≤ 50 yards[6] (hovering only)	NA
Helicopters: K-MAX, Bell 206 L4, Hughes 500	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards[8]	≤ 50 yards[6] (hovering only)	NA
Small fixed-wing aircraft (Cessna 185, etc.)	>0.25 mile	111 yards to 0.25 mile	≤ 110 yards	NA	NA
Tree Climbing	>66 yards	26 yards to 65 yards	≤ 25 yards[9]	NA	NA
Burning (prescribed fires, pile burning)	>1 mile	0.25 mile to 1 mile	≤ 0.25 mile[10]	NA	NA

NLAA = "not likely to adversely affect."
LAA = "likely to adversely affect" ≥ is greater than or equal to, ≤ is less than or equal to.

1. NA = not applicable. Based on information presented in Temple and Guttiérez (2003, pg. 700), Delaney *et al*. (1999, pg. 69), and Kerns and Allwardt(1992, pg. 9), we anticipate that spotted owls that select nest sites in close proximity to open roads either are undisturbed by or habituate to the normal range of sounds and activities associated with these roads.
2. Based on Delaney *et al*. (1999, pg. 67) which indicates that spotted owl flush responses to above-ambient equipment sound levels and associated activities are most likely to occur at a distance of 65 yards (60 meters) or less.
3. Impulsive sound associated with pile-driving is highly variable and potentially injurious at close distances. A review compiled by Dooling and Popper (2007, pg. 25) indicates that birds exposed to multiple impulses (*e.g.*, pile driving) of sound at 125 decibels (dBA) or greater are likely to suffer hearing damage. We have conservatively chosen a distance threshold of 120 yards for impact pile-driving to avoid potential effects to hearing and to account forsignificant behavioral responses (*e.g.*, flushing) from exposure to loud, impulsive sounds. Based on an average maximum sound level of 110 dBA at 50 feet for pile-driving, exposure to injurious sound levels would only occur at extremely close distances (*e.g.*, ≤ 5 yards).
4. Impulsive sound associated with blasts is highly variable and potentially injurious at close distances. We selected a 0.25-mile radius around blast sites as a disruption distance based on observed prairie falcon flush responses to blasting noise at distances of 0.3 – 0.6 miles from blast sites (Holthuijzen *et al*. 1990, pg. 273). Exposure to peak sound levels that are >140 dBA are likely to cause injury in the form of hearing loss in birds (Dooling and Popper 2007, pgs. 23-24). We have conservatively selected 100 yards as an injury threshold distance based on sound levels from experimental blasts reported by Holthuijzen *et al*. (1990, pg. 272), which documented peak sound levels from small blasts at 138 – 146 dBA at a distance of 100 meters (110 yards).
5. Based on an estimated 92 dBA sound-contour (approx.. 265 yd) from sound data for the Chinook 47d presented in Newman *et al*. (1984, Table D.1).
6. Rotor-wash from large helicopters is expected to be disruptive at any time during the nesting season due the potential for flying debris and shaking oftrees located directly under a hovering helicopter. The hovering rotor-wash distance for the Chinook 47d is based on a 300-foot radius rotor-wash zone for large helicopters hovering at < 500 above ground level (from WCB 2005, pg. 2 – logging safety guidelines). We reduced the hovering helicopter rotor-wash zone to a 50-yard radius for all other helicopters based on the smaller rotor-span for all other ships.
7. Based on an estimated 92 dBA sound contour from sound data for the Boeing Vertol 107 the presented in the San Dimas Helicopter Logging Noise Report (USFS 2008, chapters 5, 6).
8. The estimated 92 dBA sound contours for these helicopters is less than 110 yards (*e.g.*, K-MAX (100 feet) (USFS 2008, chapters 5, 6), and Bell 206 (85-89 dBA at 100 meters) (Grubb *et al*. 2010, pg. 1277).
9. Based on Swarthout and Steidl (2001, pg. 312) who found that 95 percent of flush responses by spotted owls due to the presence of hikers on trails occurred within a distance of 24 meters.
10. Based on recommendations presented in Smoke Effects to Northern Spotted Owls (USDI FWS 2008, pg. 4).

WL-4	To avoid harm to fledgling spotted owls, timing restrictions would be implemented from July 15 – August 15 within unsurveyed NRF habitat or occupied nest patches - unless surveys indicate either non-occupancy or non-nesting of spotted owls.	USDI BLM 2021 p. 25.
WL-5	Species that are ESA-listed, proposed, or candidates and their habitats would be managed in compliance with the ESA, approved recovery plans, and Bureau Special Status Species policies (ROD/RMP, p. 95). If during implementation of the proposed action, previously undiscovered Special Status Species locations are found, operations would be suspended, by the BLM contractingofficer, as necessary, and appropriate protective measures would be implemented before operations would be resumed. Eagles: The NCO RMP/ROD management direction for eagles (WL-5 and Wl-6) is to "Protect known bald eagle or golden eagle nests (including active nests and alternate nests) and bald eagle winter roosting areas. Prohibit activities that will disrupt bald eagles or goldeneagles that are actively nesting" (NCO RMP, p. 96). There are no known bald eagle winter roosting areas within the project area. Do not conduct timber harvest operations (including road construction, tree felling, and yarding) during the breeding season (January 1 - August 31, both days inclusive) within 660 feet of bald eagle or golden eagle nests. Decrease the distance to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, or after eggs laid in another nest within the territory have hatched.	NCO RMP/ROD, p. 96
WL-6	Do not remove overstory trees within 330 feet of bald eagle or golden eagle nests, except for removal of hazard trees.	NCO RMP/ROD, p. 96
WL-7	Do not conduct timber harvest operations (including road construction, tree felling, and yarding) during the breeding season (March 1 through August 31, both days inclusive) within 0.25 miles of a peregrine falcon nest site. Restriction distance may be reduced based on site-specifics of the cliff complex in relation to its proximity to harvest units and activities (e.g., topographical features, proximity of harvest units to rock/cliff face, etc.,). Restrictions may be waived if monitoring surveys determine no occupancy, nest failure, or successful fledging of young. The need to implement seasonal restrictions may be based on availability of post-fire habitat conditions (site reviews still need to be conducted) that support prey species (i.e., small birds) and ongoing private harvest activities within the nesting territory that may already be causing noise and visual disturbance.	NCO RMP/ROD, p. 96
WL-8	Where feasible and safe to do so (e.g., within aggregates), retain legacy structure and special habitat features within salvage harvest units, including large snags or live trees with cavities or hollows (e.g., "catface").	Developed by IDT based on USDI FWS, Appendix X, 2020.

Table B-2. Best Management Practices

Identifier	Best Management Practice	Source/Citation
Timber Harvest		
TH-02	Directionally fall trees to lead for skidding and skyline yarding to minimize ground disturbance when moving logs to skid trails and skyline corridors.	NCO ROD/RMP, p. 158
TH-06	Implementation erosion control measures such as water bars, slash treatment, and seeding in cable yarding corridors where the potential for erosion and delivery to waterbodies, floodplains, and wetlands exist.	NCO ROD/RMP, p. 159
TH-08	Limit ground-based yarding equipment to designated skid trails, using pre-existing trails to the greatest extent practicable. Limit designated skid trails for thinning, regeneration, and salvage harvest to less than or equal to 15 percent of the harvest unit area. Incorporate existing skid trails and landings where feasible, into a designated trail network for ground-based harvest equipment, with proper spacing of skid trails, skid trail direction, and location. Space skid trails at least 150 feet apart, or average 150 feet apart.	NCO ROD/RMP, p. 159 and developed by IDT
TH-09	Limit width of skid roads or what is operationally necessary for the approved equipment. Where multiple machines are used, provide a minimum sized pullout for passing.	NCO ROD/RMP, p. 159
TH-10	Ensure leading-end of logs is suspended when skidding.	NCO ROD/RMP, p. 159
TH-11	Restrict non-road, in unit, ground-based equipment used for harvesting operations to periods of low soil moisture (typically May 15 to October 15). Low soil moisture varies by texture and is based on site specific considerations. Low soil moisture limits will be determined by qualified specialists to determine an estimated soil moisture and texture. The BLM would immediately shut down all timber harvest and yarding operations if excessive soil damage would occur due to weather or soil moisture conditions.	NCO ROD/RMP, p. 159
TH-12	Where feasible, incorporate existing skid trails and landings as a priority over creating new trails and landings into a designated trail network for ground-based harvest equipment.	NCO ROD/RMP, p. 159
TH-13	Limit non-specialized skidders or tracked equipment to slopes less than 35 percent, except when using previously constructed trails or accessing isolated ground-based harvest areas requiring short trails over	NCO ROD/RMP, p. 160

Identifier	Best Management Practice	Source/Citation
	steeper pitches. Also, limit the use of this equipment when surface displacement creates trenches, depressions, excessive removal of organic horizons, or when disturbance would channel water and sediment as overland flow.	
TH-16, 17, 18	Subsoil, water bar, and place slash upon newly created and reused old skid trails, landings, and compacted equipment areas. Block skid trails to prevent public motorized vehicle and other unauthorized use.	NCO ROD/RMP, p. 160
Road Sedimentation Control Plan		
R-01	Locate temporary and permanent roads and landings on stable locations, e.g., ridge tops, stable benches, or flats, and gentle-to-moderate side slopes. Minimize road construction on steep slopes (>60 percent).	NCO ROD/RMP, p. 143
R-05	Design roads to maintain width needed for intended use as referenced in BLM Manual 9113-1-Roads Design Handbook (USDI BLM 2011).	NCO ROD/RMP, p. 143
R-08	End Haul material excavated during construction, renovation, or maintenance where side slopes generally exceed 60 percent and any slope where side-cast material may enter wetlands, floodplains, and waters of the State.	NCO ROD/RMP, p. 144
R-26	Disconnect road runoff to the stream channel by outsloping the road approach. If outsloping is not possible, use runoff control, erosion control and sediment containment measures. These may include using additional cross drain culverts, ditch lining, and catchment basins. Minimize ditch flow conveyance to streams by placing cross drains above stream crossings.	NCO ROD/RMP, p. 147
R-30	Effectively drain the road surface by using crowning, insloping or outsloping, grade reversals (rolling dips), and waterbars, or a combination of these methods. Avoid concentrated discharge onto fill slopes unless the fill slopes are stable and erosion resistant.	NCO ROD/RMP, p. 148
R-35	Install underdrain structures when roads cross or expose springs, seeps, or wet areas rather than allowing intercepted water to flow down gradient in ditchlines.	NCO ROD/RMP, p. 148
R-39	Locate cross drains to prevent or minimize runoff and sediment conveyance to waters of the State. Implement sediment reduction techniques, such as settling basins, brush filters, sediment fences, or check dams to prevent or minimize sediment delivery.	NCO ROD/RMP, p. 149

Identifier	Best Management Practice	Source/Citation
R-40	Space cross drain culverts at intervals sufficient to prevent water volume concentration and accelerated ditch erosion.	NCO ROD/RMP, p. 149
R-42	Locate surface water drainage measures (e.g., cross drain culverts, rolling dips, or water bars) where water flow would be released on convex slopes or other stable and non-erodible areas that will absorb road drainage and prevent sediment flows from reaching wetlands, floodplains, and waters of the State. Where possible, locate surface water drainage structures above road segments with steeper downhill grades.	NCO ROD/RMP, p. 149
R-44	Discharge cross drain culverts at ground level on non-erodible material. Install downspout structures or energy dissipaters at cross drain outlets or drivable dips where alternatives to discharging water onto loose material, erodible soils, fills, or steep slopes are not available.	NCO ROD/RMP, p. 150
R-63	Apply native seed and certified weed free mulch to cut and fill slopes, ditchlines, and waste disposal sites with the potential for sediment delivery to wetlands, Riparian Reserve, floodplains, and waters of the State. Apply seed upon completion of construction and as early as practicable to increase germination and growth. Reseed if necessary, to accomplish erosion control. Select seed species that are fast growing, provide ample ground cover and have adequate soil-binding properties. Apply mulch that would stay in place and at site specific rates to prevent erosion.	NCO ROD/RMP, p. 153
R-69	Prior to the wet season, provide effective road surface drainage maintenance. Clear ditch lines in sections where there is lowered capacity or is obstructed by dry ravel, sediment wedges, small failures, or fluvial sediment deposition. Remove accumulated sediment and blockages at cross-drain inlets and outlets. Grade natural surface and aggregate roads where the surface is uneven from surface erosion or vehicle rutting. Restore crowning, outsloping or insloping for the road type for effective runoff. Remove or provide outlets through berms on the road shoulder. After ditch cleaning prior to hauling, allow vegetation to reestablish or use sediment entrapment measures (e.g., sediment trapping blankets and silt fences).	NCO ROD/RMP, p. 154
R-77	Inspect and maintain culvert inlets and outlets, drainage structures, and ditches before and during the wet season to diminish the likelihood of plugged culverts and the possibility of washouts.	NCO ROD/RMP, p. 155
R-78	Repair damaged culvert inlets and downspouts to maintain drainage design capacity.	NCO ROD/RMP, p.155

Identifier	Best Management Practice	Source/Citation
R-79	Blade and shape roads to conserve existing aggregate surface material, retain or restore the original cross section, remove berms and other irregularities that impede effective runoff or cause erosion, and ensure that surface runoff is directed into vegetated, stable areas.	NCO ROD/RMP, p.155
R-93	On active haul roads during the wet season, use durable rock surfacing and sufficient rock depth to resist rutting or development of sediment on road surfaces that drain directly to wetlands, floodplains, or waters of the State.	NCO ROD/RMP, p. 157
R-98	To reduce sediment tracking from natural surface roads during active haul, provide a gravel approach before entrance onto surfaced roads.	NCO ROD/RMP, p. 158

Appendix C – Issues Not Analyzed in Detail

Northern Spotted Owl (*Strix occidentalis caurina*)

The northern spotted owl is federally listed as a threatened species under the Endangered Species Act (ESA) by the US Fish and Wildlife Service (FWS) and is present throughout the Roseburg District.

The analysis area for the northern spotted owl is the extent defined by a composite of the proposed action(s), a 1.2-mile radius polygon around the proposed action(s), and the home range of those spotted owl sites around the most recent northern spotted owl activity centers whose most recent activity center contains a portion of the proposed action(s) within the Archie Creek Fire Salvage project area. In the Archie Creek Fire Salvage project, the northern spotted home range is (i.e., Western Cascades provincial home-range) diameter circles [1.2 miles; 2,895 acres). There are approximately 153,589 acres within the analysis area, of which 47 percent (71,687 acres) occurs on federal lands (BLM-administered = 55,608 acres and US Forest Service = 16,079 acres).

1. What effects would harvest activities have on habitats that support the Northern Spotted Owl?

For this discussion, northern spotted owl habitat is categorized into four types: 1) nesting, roosting, and foraging (NRF), 2) dispersal-only, 3) burnt NRF-foraging, and 4) capable (non-functioning forest habitat). Although NRF habitat also functions as dispersal habitat, these terms are used separately for this analysis (except where otherwise noted). Non-capable is a category that refers to BLM-administered lands that are not capable of becoming conifer forest habitat in the future. Detailed definitions for habitat types can be found in Appendix E.

The baseline and effects to habitat for northern spotted owls was completed using GIS data from the Roseburg BLM District habitat database (Dec. 10, 2020), post-fire aerial photography (2020), post-fire imagery (2020), and some field reconnaissance (2020-present). Estimate of habitat conditions (acres) in this analysis are an overestimate because it does not consider habitat that has been removed under past and on-going non-discretionary, reciprocal Rights-of-Ways authorities within the analysis area. Although the BLM plans to field review all forested stands to determine post-fire habitat conditions within the Archie Creek Fire perimeter, field reconnaissance efforts prior to implementation would prioritize areas where proposed actions would occur.

Table C-1 provides a summary of the preliminary assessment of the post-fire environmental baseline for habitats within the proposed action area as well as the affected habitat based on alternatives. Of the 71,688 acres capable of supporting habitat for the northern spotted owl in the analysis area, it is estimated that 29 percent (21,024 acres) is functioning as NRF and 16 percent as dispersal-only habitat (Table C-1). An additional 19 percent (13,854 acres) is burnt NRF resulting from the 2020 fire event of which 4 percent (3,096 acres) is considered to function as foraging habitat because it is located within 500 feet of unburned NRF (Table C-1). The remaining 10,758 acres of burnt NRF beyond 500 feet of unburned NRF is considered capable habitat; therefore, there is a total of 34,608 acres of capable land (burnt NRF (10,758 acres) + capable (23,850 acres)) in the analysis area.

Of the 71,688 acres of habitat within the northern spotted owl analysis area, Archie Creek Fire Harvest Plan actions are proposed on 15 percent (10,927 acres) of habitats under Alternative 2, 16 percent (11,185 acres) of habitats under Alternative 3, and 10 percent (7,292 acres) under Alternative 4 (Table C-1).

Table C-1. Estimated Environmental Baseline of Habitats and Capable Land for the Northern Spotted owl and Acres of Habitats Affected by Each Alternative within the Action Area.

Proposed Action Area	NRF	Dispersal-Only	Burnt NRF - Foraging	Burnt NRF – Capable Land	Capable Land	Total Acres
Post-fire Baseline	21,024	11,333	3,096	10,758	23,850	71,688
Alternative 1	0	0	0	0	0	0
Alternative 2	1,360	2,590	371	1,516	5,092	10,927
Alternative 3	1,445	2,685	369	1,563	5,123	11,185
Alternative 4	662	2,111	209	653	3,657	7,292

Table C-2 provides a summary of northern spotted owl habitat acres affected by each proposed activity associated with the Archie Creek Fire Salvage Harvest Plan that could result in the removal or modification of habitat. Road construction or yarding activities that occur within unit boundaries were analyzed as part of the salvage harvest treatment.

Table C-2. Summary of Archie Creek Fire Salvage Plan Acres Proposed within Northern Spotted Owl Habitats.

Habitat Type/ Function	Salvage Harvest Acres[1]			Hazard Tree Removal Acres[2]			Road Construction Outside of Units Acres[2]			Yarding Corridors Outside of Units Acres[2]			Helicopter Landings Outside of Units Acres[1]		
	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4
NRF	354	366	227	1,002	1,032	419	2	1	0	17	40	15	0	6	0
Burnt NRF - Foraging	206	208	155	163	156	54	2	1	0	0	2	1	0	2	0
Dispersal -only	1,930	1,926	1,820	660	726	244	0.1	0.1	0	0.3	29	29	0	4	0

1 Implementation of PDF (Appendix B, Table B-1, WL-2) would avoid the modification or removal of habitat functioning as NRF, burnt NRF-foraging, or dispersal-only habitats.

2 Implementation of PDF (Appendix B, Table B-1, WL-2) would avoid the removal of habitat functioning as NRF or dispersal-only habitats.

Under each proposed action alternative, implementation of PDF for salvage and hazard tree removal would minimize affects to habitats that support northern spotted owls (Appendix B, Table B-1, WL-2). Stands or portions of stands that continue to function as NRF (Alternative 2 – 354 acres; Alternative 3 – 407 acres; Alternative 4 – 227 acres) or dispersal-only habitat (Alternative 2 – 1,930 acres; Alternative 3 – 1,944 acres; Alternative 4 – 1,820 acres) would be excluded from salvage. NRF stands that were burned and now function as foraging habitat would also be retained within 500 feet of NRF (Alternative 2 – 206 acres; Alternative 3 – 211 acres; Alternative 4 – 155 acres) (Table C-2). Therefore, only salvage units that contain burned forested stands that are not functioning as habitat (i.e., capable land) for the northern spotted owl would be salvaged (Alternative 2 –3,775 acres of capable; Alternative 3 – 3,724 acres of capable; Alternative 4 – 4,310 acres of capable). In addition, supporting activities (e.g., road construction, yarding corridors, or hazard tree removal along the haul route, etc.,) for units that would be excluded from salvage would also not occur. Sound green trees within salvage units would also be retained where operationally feasible. In addition, activities associated with salvage (i.e., yarding, road construction) in functional spotted owl habitat would also be excluded.

Removal of hazard trees along roadsides and campgrounds would be focused in areas of full mortality (e.g., capable and burnt NRF) and would not impact the function of NRF or dispersal-only habitats (Appendix B, Table B-1, WL-2). However, due to the potentially hazardous conditions to roads or infrastructure, hazard tree removal would remove 163 acres under Alternative 2, 156 acres under Alternative 3, and 54 acres under Alternative 4 of burnt NRF-foraging habitat. Unsound trees that are imminent hazards within functional NRF (Alternative 2 – 1,002 acres; Alternative 3 – 1,032 acres;

Alternative 4 – 419) or dispersal-only habitat (Alternative 2 – 660 acres; Alternative 3 – 726 acres; Alternative 4 – 244 acres) would be removed or felled and not expect to change habitat function at the stand level.

Road construction and yarding corridors in LSR may be placed in habitat (e.g., NRF or dispersal-only) if the forest stand continues to support the same northern spotted owl life history requirements as prior to the action (NCO RMP 2016, p. 64). Road construction and yarding would remove habitat in linear corridors; however, even though the action could modify habitat, it would not cause further loss of habitat function because sufficient habitat components (e.g., canopy cover, large-diameter trees, snags, large woody material) would continue to persist within the stand. Because the fire event has fragmented and reduced stands of NRF within the fire area, isolating them amongst 100 percent burned forest habitat, some stands are not expected to support nesting activities. However, these isolated stands of NRF are expected to continue to support roosting, foraging, and dispersal activities. Alternate 3 would result in the construction of the highest number of acres of linear corridor than the other two proposed action alternatives (Table C-2), affecting 40 acres of NRF (0.2 percent of 21,024 acres of baseline), 29 acres of dispersal-only (0.3 percent of 11,333 acres of baseline), and 1 acre of burnt NRF – foraging (0.03 percent of 3,096 acres of baseline).

Implementation of PDFs (Appendix B, Table B-1, WL-2) would exclude the removal of NRF, or dispersal-only habitats associated with construction of helicopter landings under Alternative 3. However, to facilitate salvage harvest under Alternative 3, the construction of helicopter landings (~1.5 acres in size) would result in the removal of five (5) total acres of burnt NRF-foraging habitat distributed amongst five helicopter landings. Although the construction of helicopter landings would create gaps ranging from 0.6 to 1.5 acres (mean = 1.0 acre) the foraging function of these stands is not expected to change (Table C-2).

In conclusion, there is no substantial difference in acres of habitat affected between proposed action Alternative 2 (12 percent of functional habitat baseline [NRF, dispersal-only, and burnt NRF – foraging = 35,453 acres) and Alternative 3 (13 percent of functional habitat baseline), and Alternative 4 would result in the least acres of habitat affected (8 percent of functional habitat baseline). Salvage and hazard tree removal under all proposed action alternatives, and helicopter landing construction proposed under Alternative 3 would not result in the loss nor would change the function of NRF and dispersal-only habitats that support the northern spotted owl. And while hazard tree removal would. In addition, although the construction of roads and yarding corridors would remove linear corridors of habitat, function of NRF and dispersal-only habitat is expected to be maintained under all three proposed action alternatives. Therefore, effects to the northern spotted owl habitats were eliminated from detailed analysis because the Archie Creek Fire Salvage Harvest Plan would not result in the loss of NRF and dispersal-only habitats that support northern spotted owls and overall, the current amount of these habitats and their function is expected to be maintained within the analysis area.

Cumulative adverse effects to northern spotted owl habitat will likely continue within the analysis area. The Oregon Forest Practices Act requires protection of a 70-acre area around occupied nest sites and does not provide any protection or conservation of other surrounding habitat. To date, the Roseburg District BLM has received requests to remove hazard trees within the action area under non-discretionary, reciprocal Rights-of-Ways authorities from private industry (i.e., approx. 400 acres [Mahaffy, pers. Comm., 02-08-2021]) and from other adjacent landowners (i.e., 20 acres and 8 miles of road [DOI-BLM-ORWA-R040-2020-0006-CX, 12-07-2020]). Removal of NRF and dispersal habitat on private lands and removal of NRF, dispersal-only, and burnt NRF – foraging habitat on BLM-administered lands through Rights-of-Ways authorities would further reduce habitat available by approximately 420 acres for the northern spotted owl in the analysis area.

2. What effects would harvest activities have on occupancy of northern spotted owl sites?

The analysis for site occupancy of northern spotted owls was conducted using GIS data from the Roseburg BLM district Northern Spotted Owl database (2020). Definitions for occupancy status and analytical spatial scales can be referenced in Appendix E. In addition, supporting tables displaying occupancy data and habitat baseline for northern spotted owl sites within the action area can be referenced in Appendix E.

There are 54 northern spotted owl home ranges within the analysis area (Appendix E, Table E-1). Twenty-eight (28) sites have an unknown occupancy status because survey effort was not completed in these areas. The BLM completed protocol surveys at 25 of the 54 sites in 2019-2020 prior to the fire event and resulted in 9 sites with no detections, 5 sites with incidental detections, and 11 sites with occupied status (Table C-3; Appendix E, Table E-3).

For this analysis, a post-fire evaluation of habitat conditions was completed to ascertain site viability at the nest patch, core-use area, and home range scales – to determine whether a site could potentially support, at a minimum, activities associated with owl survival (roosting, foraging and dispersal activities) and does not necessarily account for supporting nesting activities at any spatial scale. Site viability was based on amount of NRF habitat in the core-use area, the amount of NRF habitat in the home range, and the additional amount of green dispersal-only habitat available to support northern spotted owls at the core-use area (refer to Appendix E for details). Table E-1 and Table E-2 (Appendix E) provide the estimate of habitat conditions in each northern spotted owl site and Table E-3 provides the pre-fire occupancy status and post-fire site viability determination for each based on habitat conditions presented in Table E-1. Results from this analysis would be used to determine where to implement PDFs and the Situational Management Strategy. It is not for the purpose of assessing habitat-fitness at a site. Refer to Appendix E, Table E-3 for more specifics.

Table C-3 provides a summary of site occupancy and site viability assessment presented in Appendix E, Table E-3. Based on estimated post-fire conditions, sufficient habitat remains in 24 home ranges and are considered still to be viable for supporting spotted owl survival while 18 home ranges were determined to no longer be viable because they do not contain sufficient functional habitat for the northern spotted owl (Appendix E, Table E-1 and Table E-2). For the remaining 12 sites, it is unknown if there is sufficient habitat to support northern spotted owls because there is a “moderate” amount of residual green, intact habitat remaining (e.g., unknown viability sites have between 36-111 acres of NRF remaining [Appendix E, Table E-1 and Table E-4]) and the BLM is uncertain if this residual amount of habitat would or would not support spotted owl survival at these sites. Therefore, unknown viability sites need further assessment after field reconnaissance of habitat conditions and spotted owl surveys. Implementation of PDFs and the Situational Management Strategy are specifically applicable to occupied or unknown (unsurveyed/presumed occupied) northern spotted owl sites that have either an “unknown” viability or “viable” determination (refer to Appendix E, Table E-3).

Table C-3. Summary of Site Occupancy Status and Site Viability based on Preliminary Estimates of Habitat Conditions within Known Northern Spotted Owl Sites in the Action Area.

Site Occupancy Status[1]	Not Viable	Unknown	Viable[2]	Total
Occupied	4	4	3	**11**
Incidental	1	0	4	**5**
No Detections	6	2	1	**9**
Unknown – Not Surveyed	7	6	16	**29**
Total	***18***	***12***	***24***	***54***

1. Occupancy status based on survey results conducted in 2019-2020 using the *Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls* (USDI FWS 2012).
   Unknown = no survey effort completed and therefore, status is unknown and assumed occupied.
2. **Not Viable** = site does not contain sufficient (e.g., < 8 percent NRF core and < 10 percent NRF home range) habitat to support NSO roosting, foraging and dispersal activities.
   Viable = site contains sufficient (e.g., > 25 percent NRF; or NRF between 8-25 percent and > 100 acres of dispersal-only in core) habitat available to support at a minimum roosting, foraging and dispersal activities and does not necessarily account for supporting nesting activities.
   Unknown = unknown if sufficient habitat is available to support NSO. Field reconnaissance is needed to make further assessment.

Based on estimated post-fire habitat conditions, four (Kelly Green, Harrington Creek, Hiatus Creek, and Honey Creek) of the 11 occupied sites no longer support spotted owls because no functional habitat exists within the sites (Appendix E, Table E-4). Based on preliminary habitat estimates, it is unknown if habitat conditions are sufficient to support spotted owls at four occupied sites (Conley Creek, Hill Creek, Smith Springs, and Susan Creek). Habitat conditions at these sites may continue to support (at a minimum) roosting, foraging, and dispersal activities for northern spotted owls. And habitat conditions within the remaining three occupied sites (Bob Butte, Greenthunder, and South Susan) have sufficient habitat after the fire event (Table C-3, Appendix E, Table E-1, Table E-2, and Table E-4).

Implementation of the Situational Management Strategy (Appendix B, Table B-1, W-1) and additional PDF (Appendix B, Table B-1, W-2) under any of the action alternatives would avoid the removal of NRF and dispersal-only habitats within occupied nest patches or core use areas (Appendix B, Table B-1, W-2). In addition, salvage and large-scale hazard tree removal would occur only in stands or portions of stands that burned at high severity and therefore, are not functioning as NRF or dispersal-only habitat. Large-scale hazard tree removal of burnt NRF-foraging habitat would be removed within 150 feet of roads and infrastructure. However, functioning NRF and dispersal-only habitats, and burnt NRF-foraging that is not adjacent to roads would be maintained not only within occupied sites or unsurveyed habitat, but in the entire analysis area.

Thus, this issue was not analyzed in detail because the Archie Creek Fire Salvage Harvest Plan is not expected to change site occupancy status (including those sites of unknown viability) or reduce habitat-fitness within any home range because the amount and function of NRF and dispersal-only habitats that support northern spotted owls would be maintained at all three spatial scales, as well as within the analysis area in general. And burnt NRF – foraging, where not associated with large-scale hazard tree removal adjacent to roads and infrastructure, would also be maintained to provide additional acres for foraging northern spotted owls.

3. What effects would harvest activities have on Designated Critical Habitat for the Northern Spotted Owl?

Critical Habitat for the northern spotted owl was designated in 1992, revised in 2008, and revised again in 2012 (77 FR 71786) and describes the Physical and Biological Features (PBFs) (i.e., space, food, cover, and protected habitat) that support nesting, roosting, foraging, and dispersal. Designated critical habitat for the northern spotted owl was most recently revised in the Final Rule published on January 15, 2021 (86 FR 4820). The action area would contain 6,698 acres of designated critical habitat under the 2021 rule and proposed activities would occur on 215 acres. The Final Rule is scheduled to take effect on April 30,

2021 (86 FR 11892) but is currently under review by the Administration; therefore, the analysis of spotted owl critical habitat is based on the current rule currently in place (i.e., the 2012 Final Rule).

In identifying those physical or biological features within an area, the focus is on the principal biological or primary constituent elements (PCEs—such as roost sites, nesting grounds, rainfall, canopy cover, soil type) that are essential to the conservation of the species (USDI FWS 2012b, p. 92). PCE 2 provides for nesting and roosting habitat for northern spotted owls while PCE 3 provides foraging habitat for northern spotted owls (77 FR 71906). Burnt NRF within 500 feet of NRF also provides foraging habitat for northern spotted owls and therefore burnt NRF – foraging is considered PCE 3 (USDI FWS 2021). PCE 4 provides habitat to support the transience and colonization phases of dispersal of northern spotted owls (77 FR 71939). Designated critical habitat also includes forestland that is currently unsuitable but has the capability of becoming nesting habitat in the future (USDI FWS 2012b, p. 92).

Approximately 89 percent (63,734 of 72,689 acres) of federal lands in the northern spotted owl action area is within the Western Cascades critical habitat unit (99,558 acres) and encompasses two subunits, WCS 5 (10,367 acres/15 percent; on USFS) and WCS 6 (53,367 acres/74 percent; on BLM) (Table C-4). Table C-4 displays the estimated post-fire environmental baseline of habitats distributed in each subunit within northern spotted owl action area.

Table C-4. Summary of Environmental Baseline Acres of Northern Spotted Owl Habitats in Critical Habitat Subunits within the Analysis Area.

Subunit	NRF (PCE 2 & PCE 3	Dispersal-Only (PCE 4)	Burnt NRF – Foraging (PCE 3)	Burnt NRF - Capable	Capable	Non-Capable	Total Acres
WCS 5	2,269	1,131	1,068	540	5,080	279	10,367
WCS 6	13,722	6,086	1,643	9,189	11,775	952	53,367

All proposed actions that would potentially affect PCEs in critical habitat located on BLM-administered lands in subunit WCS 6. Table C-5 displays the post-fire habitat baseline and distribution of NRF habitat (PCE 2 and PCE 3), burnt NRF-foraging (PCE 3), and dispersal-only habitat (PCE 4) within critical habitat subunit WCS 6. In addition, Table C-5 displays habitats/PCEs affected by each alternative. Of the total post-fire baseline of designated critical habitat (42,415 acres), Alternative 2 would affect 20 percent (8,660 acres), Alternative 3 would affect 21 percent (8,987 acres), and Alternative 4 would affect 14 percent (5,729 acres) in the action area.

Table C-5. Summary of Habitat Acres of Designated Critical Habitat for Northern Spotted Owl Affected by the Proposed Archie Creek Fire Salvage Harvest Plan.

WCS 6	NRF (PCE 2 & PCE 3	Dispersal-Only (PCE 4)	Burnt NRF – Foraging (PCE 3)	Burnt NRF - Capable	Capable	Total Acres
Post-fire Baseline	13,722	6,086	1,643	9,189	11,775	42,415
Alternative 1	0	0	0	0	0	0
Alternative 2	1,087	1,944	372	1,304	3,953	8,660
Alternative 3	1,287	2,026	367	1,309	3,998	8,987
Alternative 4	517	1,597	196	582	2,837	5,729

Table C-6 provides a summary of northern spotted owl habitat acres affected in designated critical habitat by each proposed activity that would remove or modify habitat in the Archie Creek Fire Salvage Harvest Plan. Road construction or yarding activities that occur within unit boundaries were analyzed as part of the salvage harvest treatment. Habitats that contain PCEs for the northern spotted owl are indicated in bold font in Table C-6.

Table C-6. Summary of Archie Creek Fire Salvage Plan Acres Proposed within Northern Spotted Owl Critical Habitat.

Habitat Type/ Function	Salvage Harvest Acres[1]			Hazard Tree Removal Acres[2]			Road Construction Outside of Unit Acres[2]			Yarding Corridors Outside of Unit Acres[2]			Helicopter Landings Acres[1]		
	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4
NRF (PCE 2 & PCE 3)	245	230	144	834	1,022	371	2	1	0	11	27	2	0	4	0
Burnt NRF – Foraging (PCE 3)	190	208	143	138	156	52	2	1	0	1	2	1	0	2	0
Dispersal-only (PCE 4)	1,405	1,421	1,389	527	595	197	0.1	0.1	0	1	12	12	0	3	0

1 Implementation of PDF (Appendix B, Table B-1, WL-2) would avoid the modification or removal of habitat functioning as NRF, burnt NRF ("foraging"), or dispersal-only habitats.

2 Implementation of PDF (Appendix B, Table B-1, WL-2) would avoid the removal of habitat functioning as NRF or dispersal-only habitats. Stand may be modified, but habitat function would be maintained.

Under all proposed action alternatives, implementation of PDF for salvage and hazard tree removal would minimize affects to habitats and PCEs that support northern spotted owls (Appendix B, Table B-1, WL-2). In addition, supporting activities (i.e., road construction, yarding corridors, hazard tree removal along haul routes, etc.,) for units that would be excluded from salvage would also not occur. Stands or portions of stands that continue to function as NRF (Alternative 2 – 245 acres; Alternative 3 – 230 acres; Alternative 4 – 144 acres) or dispersal-only habitat (Alternative 2 – 1,405 acres; Alternative 3 – 1,421 acres; Alternative 4 – 1,389 acres) would be excluded from salvage. Burnt NRF stands that were severely burned and now functioning as foraging habitat would also be retained within 500 feet of NRF (Alternative 2 – 190 acres; Alternative 3 – 208 acres; Alternative 4 – 143 acres). Therefore, only proposed salvage units that contain burned forested stands that are not functioning as habitat for the northern spotted owl would be harvested. Sound green trees within salvage units would also be retained where operationally feasible. Because implementation of PDF would exclude salvage harvest of NRF or dispersal-only habitats under either action alternative, PCE 2, PCE 3, and PCE 4 for the northern spotted owl would not be removed within critical habitat.

Removal of hazard trees along roadsides, campgrounds, and other infrastructure would be focused in areas of full mortality (Appendix B, Table B-1, WL-2) and therefore, largescale hazard tree removal would not remove NRF or dispersal-only habitats. Unsound trees that are an imminent threat within low to moderate severity burned stands of NRF (Alternative 2 – 834 acres; Alternative 3 – 1,022 acres; Alternative 4 – 371 acres) and dispersal-only habitat (Alternative 2 – 527 acres; Alternative 3 – 595 acres; Alternative 4 – 197 acres) would be felled or removed but are not expected to change habitat function at the stand level. However, due to the potentially hazardous conditions along roads or other infrastructure, hazard tree removal would remove burnt NRF (Alternative 2 – 1,133 acres; Alternative 3 – 1,149 acres; Alternative 4 –366 acres), including 138 acres under Alternative 2, 156 acres under Alternative 3, or 52 acres under Alternative 4 of burnt NRF functioning as foraging habitat (PCE 3). Because implementation of PDF would exclude large scale hazard tree removal of NRF or dispersal-only habitats under any proposed action alternative, PCE 2, PCE 3, and PCE 4 for the northern spotted owl would not be removed within critical habitat. However, hazard tree removal would result in the loss of PCE 3 (burnt NRF-foraging habitat), by removing eight percent (138 of 1,643 acres of baseline acres) under Alternative 2, nine percent (156 of 1,643 acres) under Alternative 3, or three percent (52 of 1,643 acres) under Alternative 4 within WCS 6.

Of the 10,832 acres of burnt NRF with legacy features within critical habitat, the proposed action (i.e., salvage and hazard tree removal) would remove 13.4 percent (1,456 acres) under Alternative 2, 13.5 percent (1,460 acres) under Alterative 3, or 11.0 percent (1,195 acres) under Alternative 4. However,

Alternative 3 would maintain additional large legacy structure (≥ 40 inches DBH) on 541 acres salvage units. Therefore, approximately 86 percent of the burnt NRF with legacy features would remain within critical habitat under Alternative 2 and 89 percent would remain under Alternative 3 and Alternative 4. As these stands regenerate, some large legacy features (e.g., snags and down wood) would likely persist and provide micro-site structure for prey species (e.g., small mammals) as stands develop and begin functioning as dispersal-only habitat in 40 to 50 years.

Although the construction of roads and yarding corridors under Alternative 2 and Alternative 3 and yarding corridors under Alternative 4 would modify NRF, dispersal-only, and burnt NRF-foraging habitats, PCEs would not be removed because respective habitat function is expected to be retained within each habitat type.

Therefore, this issue was not analyzed in detail because the Archie Creek Fire Salvage Harvest Plan would not remove PCEs (NRF or dispersal-only habitat) within critical habitat. And although there would be a loss of PCE 3 (burnt NRF-foraging) due to hazard tree removal under any proposed action alternative, or construction of helicopter landings under Alternative 3, these activities would remove less than one percent of this PCE within the action area. Thus, the Archie Creek Fire Salvage Harvest Plan in critical habitat for the northern spotted owl would not preclude or appreciably reduce owl movement between watersheds, between critical habitat units, or within the Physiographic Province below the current conditions.

4. What disruption effects would harvest activities have on the Northern Spotted Owl?

Noise, human intrusion, and mechanical movement may cause some form of disruption or disturbance to the normal behavioral patterns of nesting northern spotted owls. The disruption threshold is the distance activities occurring during the critical breeding period that could disrupt the normal behavior pattern of an individual or breeding pair (i.e., flushing from a nest or cause a feeding attempt to fail) (USDI FWS 2004).

During the critical breeding period, activities occurring within the disruption distances, shown in Appendix B (Table B-1, WL-3), from occupied spotted owl sites or unsurveyed NRF habitat could cause injury by disrupting the normal behavior pattern of individual animals or breeding pairs. However, PDFs would be implemented to minimize potential adverse effects at occupied sites and unsurveyed habitat and therefore, there would be no potential for significant effects (Appendix B, Table B-1, WL-3). Use of these recommended distances with the PDF provided in Appendix B would minimize disruption affects associated with the proposed action during the northern spotted owl's critical breeding period (March 1 through July 15) for harvest plan activities. Removal of NRF habitat due to the construction of roads or yarding corridors would not occur where survey effort has not been conducted in 2019 and 2020.

Therefore, disruption to northern spotted owls was eliminated from detailed analysis because the implementation of PDF would minimize potential adverse effects at occupied sites and unsurveyed habitat and therefore, there would be no potential for significant effects to the species.

Bureau Sensitive Terrestrial Wildlife Species

5. What effects would harvest activities have on BLM Bureau Sensitive terrestrial wildlife species and their respective habitats?

The FEIS for the RMPs for Western Oregon described the effects of harvest on Bureau Sensitive Terrestrial wildlife species and their respective habitats and concluded that the PRMP would lead to an increase in habitat in 50 years for roughly half of the species for whom habitat was modeled. In addition, the PRMP would provide increased habitat availability for 34 species modeled. Species associated with special habitats that would be protected, would have no change in habitat availability. That discussion is incorporated here by reference (USDI BLM 2016, pp. 830-850).

Of those analyzed in the PRMP, 33 of the Bureau Sensitive wildlife species are known or suspected to occur on the Roseburg District were considered in this analysis. Appendix F: Bureau Sensitive & Bureau Strategic Wildlife Species contains a summary of general habitat requirements, status of species within the project area, and specific habitat impacts of the proposed action on each of the species (Table F-1).

The 33 Bureau Sensitive wildlife species are eliminated from detailed discussion for reasons documented in Table F-1. In summary, 11 species are out of range or have no suitable habitat available within the Archie Creek Fire Salvage Harvest Plan area. Eleven species would be protected within buffers in RRs and around waterbodies except where hazard tree removal would occur within areas that burned at high severity. Anticipated effects to the remaining 11 Bureau Sensitive species are summarized in Table F-1 and were not analyzed in detail because the Archie Creek Fire Salvage Harvest Plan is not expected to cause measurable effects to these species within the project area or at their respective population level within the Calapooya Creek, Canton Creek, Little River, Lower North Umpqua River, Middle North Umpqua River, and Rock Creek (fifth-field; HUC 10) watersheds.

The bald eagle (*Haliaeetus leucocephalus)* is present within the Archie Creek Fire Salvage Area and are regularly observed along the North Umpqua River, Rock Creek and its tributaries, and Canton Creek. Two nest territories are known, and three additional nest territories are suspected within the fire perimeter (Appendix F). Eagles have been confirmed to persist at one known site that was impacted by the fire. However, it is unknown if bald eagles will persist at the other known territory due to the loss of habitat resulting from high severity fire throughout the territory. The BLM plans to monitor the two known nest sites and attempt to locate potential nest sites where eagles have been observed within proximity to proposed activities.

To address disruption or potential habitat impacts to bald eagles, seasonal restrictions would be implemented during the breeding season (Appendix B, Table B-1, WL-5). Thus, salvage would occur outside of the breeding season and would require that overstory trees are not removed within 330 feet of the nest tree (Appendix B, Table B-1, WL-6) and that nest trees would not be damaged, modified, or removed during salvage or hazard tree removal activities (Appendix B, Table B-1, WL-6). The bald eagle was eliminated from detailed analysis because implementation of seasonal restrictions would reduce habitat affects and disruption to nesting bald eagles (Appendix F, Table F-1).

Landbird Species

6. What effects would harvest activities have on Landbird Species and their respective habitats?

The FEIS for the RMPs for Western Oregon described the effects of harvest on landbird species and their respective habitats and concluded that the PRMP would lead to an increase in habitat abundance in 50 years for a majority of the 34 landbird species for whom habitat was modeled. In addition, the BLM would manage landbird species under the Migratory Bird Treaty Act and following guidance provided by WO IB 2010-110, the Memorandum of Understanding between the BLM and U.S. Fish and Wildlife Service to promote the conservation of migratory birds (August 31, 2010). The BLM would follow migratory bird conservation measures as appropriate and consistent with agency missions. Because the landbird species have a broad range of habitat associations, that discussion is incorporated here by reference (USDI BLM 2016, pp. 850-851).

Recently, on January 7, 2021, the MBTA was revised so that the take prohibitions of migratory birds only criminalize actions that are specifically directed at migratory birds, their nests, or their eggs (86 FR 1134). However, the current administration has begun processes to again revise the MBTA; specifically, the effective date of the revised 2021 MBTA was delayed a month until March 8, 2021 (86 FR 8715) and the Solicitor's M-Opinion 37050 (December 22, 2017) regarding the MBTA that was the primary driver behind the January. 7, 2021 MBTA revision was recently permanently revoked/withdrawn in M-37065 (March 8, 2021).

For this analysis on landbird species, the Archie Creek Fire perimeter is the analysis area. Table G-1 in Appendix G summarizes general habitat requirements and status for landbird species within the project area, as well as provide impacts of the proposed action for each on the Roseburg District. Of the 26 species of landbird species, the marbled murrelet *(Brachyramphus marmoratus)* is listed as a Federally Threatened species, and the bald eagle and Oregon vesper sparrow *(Pooecetes framineus affinis*) are also listed as a Bureau Sensitive Species. Thus, these three species are addressed in the previous issue not analyzed in detail and in Appendix F.

The Archie Creek Fire event has increased habitat conditions for early successional dependent species including, the western bluebird *(Sialia Mexicana)* and rufous hummingbird (*Selasphorus rufus*). There are approximately 25,023 acres of early successional habitat (0-30 years of age) on BLM-administered lands within the fire perimeter, of which 12,187 acres (49 percent) is considered complex early successional habitat because they contain legacy features (e.g., large snags and down wood) resulting from high severity burn of late successional forests and 12,836 acres (51 percent) that is considered simple early successional habitat because these areas were previously managed and lack complexity (e.g., large snags and down wood) (Table C-7).

Table C-7. Summary of Baseline Habitat and Effects to Habitat for Landbird Species by Forest-Successional Stage within the Archie Creek Fire Perimeter and Proposed Acres of Treatment by Alternative.

	Landbird Habitat by Successional-Stage (*acres*)				
Proposed Action Area	**Late Successional[1]**	**Mid Successional[2]**	**Complex Early Successional[3]**	**Simple Early Successional[4]**	**Total**
Post-fire Baseline	9,967	7,444	12,187	12,836	42,434
Alternative 1	0	0	0	0	0
Alternative 2	463	2,281	824	3,339	6,907
Alternative 3	370	2,267	815	3,349	6,800
Alternative 4	944	2,447	802	3,241	7,433

1. Late successional forest habitat at 70 years and older.
2. Mid successional forest habitat at 31-69 years old.
3. Complex early successional from 0-30 years old containing legacy features (large snags and downed wood, and possibly live trees).
4. Simple early successional from 0-30 years old with little to no complexity due to lack of snags, down wood, and live trees.

Salvage and hazard tree removal would reduce the quality of complex early successional habitat by removing dead and dying trees on 579 acres (salvage – 538 acres, hazard tree removal – 41 acres) under Alternative 2, 563 acres (salvage – 538 acres, hazard tree removal – 25 acres) under Alternative 3, and 636 acres (salvage – 250 acres, hazard tree removal – 386 acres) under Alternative 4 (Table C-8). Implementation of PDF (Appendix B, Table B-1, WL-1) in proposed units would retain 1,798 acres of complex early successional habitat within 500 feet of intact late-successional habitat and would provide for edge habitat conditions favorable for some species of landbird species (e.g., olive-sided flycatcher (*Contopus cooperi*), pileated woodpecker (*Dryocopus pileatus*). Therefore, of the 12,187 acres of complex early successional habitat within the fire perimeter, approximately 95 percent (under all action alternatives) would continue to persist on BLM-administered lands in the Archie Creek Fire perimeter.

Table C-8. Summary of Archie Creek Fire Salvage Plan Acres Proposed within Landbird Habitats.

Proposed Action Affect to Habitat	Late Successional (*acres*)			Mid Successional (*acres*)			Complex Early Successional (*acres*)			Simple Early Successional (*acres*)		
	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4	Alt 2	Alt 3	Alt 4
Removal	0	0	0	264	50	456	579	591	636	3,240	3,305	3,199
Modification	79	65	706	188	188	278	18	16	12	252	197	285

Implementation of PDF for dispersal-only habitat (Appendix B, Table B-1, WL-2) for the northern spotted owl would also benefit landbird species that favor mid successional forests by retaining more than 93 percent of the mid successional habitat within the fire perimeter. The Archie Creek Fire Harvest plan would reduce mid successional forest habitat (primarily in the 30-year cohort) within the fire perimeter by -3.7 percent (264 acres) under Alternative 2, by -0.7 percent (50 acres) under Alternative 3, and by -6.1 percent (456 acres) under Alternative 4. Implementation of PDFs would modify an additional 3 percent (188 acres) under Alternatives 2 or 3 and would modify 4 percent (278 acres) under Alternative 4 due to the removal of imminent hazard trees. The removal of dead or dying trees would reduce micro site habitat components favorable to some landbird species (e.g., brown creeper (*Certhia americana*), pileated woodpecker).

Implementation of PDF for NRF habitat (Appendix B, Table B-1, WL-2) for the northern spotted owl would also benefit landbird species that favor late successional forests by retaining all late successional habitat within the fire perimeter. Although there may be some modification of late successional forest due to harvest tree removal, construction of yarding corridors (15 – 40 acres) and roads (up to two acres), these activities are not expected to reduce the amount of late successional habitat available within the fire perimeter. Road construction outside of proposed salvage units would permanently remove habitat components in a linear corridor and would result in the loss of up to two acres under Alternative 2 and one acre under Alternative 3. No road construction would occur under Alternative 4. Construction of linear corridors (assumed to be 45 feet wide) would remove or damage micro site habitat components (e.g., down wood, trees, shrubs) and modify canopy cover in late successional habitat. Construction of yarding corridors would primarily affect canopy conditions in a linear pattern that may be unfavorable for some species (e.g., varied thrush, hermit warbler, Hutton's vireo) due to loss of canopy closure or benefit other species (e.g., Hammond's flycatcher, rufous hummingbird, Pacific wren, Wilson's warbler) because open canopy conditions may foster the development of shrubs and forbs on the forest floor. Altman and Alexander (2012) synthesize studies reporting mixed affects due to forest fragmentation and edge effects on bird species where some species may benefit while other species would be negatively affected by fragmentation and edge effects. Manuwal and Manuwal (2002, cited in Alman and Alexander 2012) reported that although individual species did exhibit differences, community-level bird species richness and abundance varied little in differing degrees of fragmented forest.

Road maintenance and renovation along 307 - 322 miles of roads would also cause localized effects to landbird species due to modification or removal of vegetation within road prisms (e.g., shrubs on roadside), particularly if activity occurred during the breeding season that would result in the destruction of nest sites or harm to young/adults. In addition, hazard tree removal around 27 ponds/pump chances (125-127 acres) may modify habitat conditions for some species (e.g., warblers, willow flycatcher (*Empidonax traillii*); habitat conditions are expected to recover where willows and other shrub components persist around pond features. There are also PDFs for other resources (Appendix B) that would benefit landbird species by avoiding ground disturbance in areas of resource concern (e.g., botany - [Botany-2], cultural - [Cul-1], fuels - [Fuels-8], soils [Soils -1, Soils-2]) or maintain micro site habitat features (e.g., fuels – [Fuels-1], soils [Soils-6]).

Landbird species populations (particularly songbirds) within the large-scale high severity burn areas, primarily north of the North Umpqua River, are not expected to be robust within the first few years after the fire event due to lack of vegetation (e.g., forbs, shrubs). In addition, none of these landbird species are endemic solely to the analysis area and surrounding populations would be unaffected by the proposed action. The proposed action would modify less than one percent (Alternatives 2 and 3) to seven percent (Alternative 4) of green forest (mid or late successional) habitat and therefore over 93 percent of these habitat types would remain untreated by the proposed actions within the fire perimeter. In addition, the proposed action would remove snags and dead trees on 30 percent of early successional habitat under all action alternatives (Table C-7) with approximately 25 percent occurring in simple early successional habitat. Of the 12,187 acres of complex early successional habitat, approximately 95 percent of this habitat type would remain within the fire perimeter.

In conclusion, over 89 percent of the habitats would remain untreated and an additional 0.9 to 1.4 percent of the mid and late successional forests would be modified and therefore, over 90 percent of the habitat would continue to persist with the full assortment of down wood and fire-killed snags within the fire perimeter on BLM-administered lands. Therefore, landbird species were not analyzed in detail because habitat affects would be localized and region-wide population effects to landbird species are unlikely.

7. What disturbance effects would harvest activities have on Landbird Species (e.g., Focal Species, Birds of Conservation Concern)?

Units requiring northern spotted owl seasonal restrictions (March 1st – July 15th) or bald eagle seasonal restrictions (January 1st – August 31st) at time of harvest would indirectly benefit nesting landbird species by providing disturbance protections during their breeding season (April – July) where landbird species are coincident with eagle or spotted owl nest sites. There are also PDFs for other resources (Appendix B) that would benefit landbird species by reducing disturbance during the nesting season in some areas (e.g., cable yarding – [CY-2], ground-based yarding).

There are four known peregrine falcon nest sites within the fire area, and all were exposed to high severity burn within one mile or more of their respective site. Two of the four sites would be affected by salvage and hazard tree removal. It is currently unknown if peregrines have persisted at these sites since the fire event. If the landscape within approximately one mile or more of the nest sites does not contain vegetation that would support prey species, it is anticipated peregrine falcons would either abandon the site, not attempt to nest, or fail in their attempt to nest due to lack of prey (e.g., songbirds). The BLM plans to monitor the sites during the nesting season to determine occupancy and nesting status at all four sites.

Two sites (Taylor Creek and Scott's Terrace) each have proposed salvage units immediately adjacent to the cliff site. Both sites have been highly productive (typically fledging 2-3 young per year) prior to the fire event. The proposed salvage unit at the Taylor Creek site is located on the backside of the cliff face, but falcons roosting or perching on top of the cliff complex would be in line-of-sight of the harvest unit. However, the cliff face and primary roost locations (based on past monitoring survey effort) would be located out of line-of-sight of the harvest unit, which may provide some disturbance buffer to peregrines. The Scott's Terrace site has a proposed salvage unit immediately adjacent and in-line-of-site to the cliff face (Appendix F, Table F-1). Harvest activities during the breeding season would cause disruption, resulting in peregrines to abandon the site or disrupt normal behaviors (i.e., courting, breeding, foraging, feeding and caring for young) and ultimately cause nest failure. Project Design Features would be implemented during the breeding season (March 1 – August 31, both days inclusive) to avoid disruption of peregrine falcon breeding and nesting activities (Appendix B, Table B-1, W-7). Implementation would allow peregrines to continue and maintain natural behaviors and activities without disturbance due to logging operations. Restrictions would be waived if monitoring surveys determine no occupancy, nest

failure, or successful fledging of young that are beyond the dependency period (when fledglings are still being fed by adults).

In areas where seasonal restrictions would not be implemented for the other landbird species, harvest activities that occur during the breeding season would affect individuals or localized avian populations within the area of operations. Disturbance to nesting landbird species may cause breeding birds to move off territory, abandon nests, cause destruction or destroy nests and eggs, and/or death of young birds. However, given the habitat conditions within salvage units in particular, bird populations are not expected to be robust due to the lack of vegetation in high severity burn areas and because these disturbance affects would occur at the local level for approximately one to two years (duration of harvest implementation), the Archie Creek Fire Salvage Harvest Plan is not expected to cause measurable effects to landbird species at the population level. Because the landbird species (Appendix F) are not endemic to the analysis area, the affects under any of the proposed action alternatives would not further push a species population trend towards listing under the BLM's Special Status Species 6840 Policy.

8. What effects would harvest activities have on habitat for big game ungulate species?

The Roseburg District BLM should consider the effects of the proposed action (e.g., timber harvest) on deer and elk habitat based on guidance from IM-2018-062 and the OR/WA FY2019 budget directives. In areas with mild winters and limited snowpack, Columbian black-tailed deer (*Odocoileus hemionus columbianus*) do not migrate and occupy the same general range year-round (ODFW 2008; p. 11) – such as in the Archie Creek Fire Salvage Harvest Plan project area which is between 800-4,000 feet elevation in the Western Cascades. Black-tailed deer in the North Umpqua drainage near Roseburg OR exhibited limited or no seasonal movement although deer near Medford OR move seasonally from low-elevation winter range to high-elevation summer range (ODFW 2008; pp. 10-11).

Secretarial Order (S.O.) 3362 (Improving Habitat Quality in Western Big-Game Winter Range and Migration Corridors) emphasizes the importance of conserving and improving deer habitat. In particular, S.O. 3362 directs that the BLM "*appropriately apply site-specific management activities, as identified in State land use plans, site-specific plans, or the Action Plan that conserve or restore habitat necessary to sustain local and regional big-game populations…*" (IB-2019-005). The Oregon Conservation Strategy authored by the Oregon Department of Fish & Wildlife (ODFW) is the State's action plan for conserving fish and wildlife species. Implementation of the Black-tailed Deer Management Plan incorporated here by reference (ODFW 2008, pp. 1-69), is linked to priorities described in the Oregon Conservation Strategy (ODFW 2008; p. ii). Relevant findings in the management plan are that early successional habitats created by logging or fire had higher deer densities, provide substantial and nutritious forage for black-tailed deer (p. 11), and primary reasons for population declines are likely the decrease in quantity of early successional habitat, particularly on federal lands (p. 21). A strategy proposed in the Black-tailed Deer Management Plan to promote healthy deer populations is to coordinate with public forest managers to promote black-tailed deer habitat improvement efforts including development of early successional habitat (p. 45).

This analysis tiers to the Deer & Elk analysis in the FEIS (pp. 862-869). The FEIS identified that populations of Columbian black-tailed deer are declining and are below management objectives established by ODFW (p. 862). The analysis in the FEIS concluded that: black-tailed deer densities are higher in early successional forests, the availability of early successional forest is a potential limiting factor for black-tailed deer, and high-quality forage conditions persist for 10-15 years following clearcut or stand-replacing natural disturbance (p. 863). In addition, local camera-trap survey information indicate that forest recently treated with BLM commercial thinning prescriptions have greater black-tailed deer relative abundance (0.047 detections/trap-night) and frequency (63 percent of camera stations) than in adjacent (within ~600 feet) unthinned forest of similar structure (0.028 detections/trap-night; 30 percent of camera stations) (McGraw, *unpub. data*, 2018).

There are approximately 25,023 acres of early successional forest on BLM-administered lands (within the fire perimeter that will provide foraging habitat for deer and elk. The influx of early successional habitat and forage resulting from the Archie Creek fire is expected to lead to an increase in the local black-tailed deer populations for the next 10-15 years as well. The Archie Creek Fire Salvage Harvest Plan area proposes to salvage harvest or remove hazard trees on a total of 6,907 acres under Alternative 2, 6,800 under Alternative 3, or 7,433 acres under Alternative 4. However, implementation of PDF would reduce these activities to approximately 4,025 acres under Alternative 2, 3,848 acres under Alternative 3, or 4,390 acres under Alternative 4, which would occur primarily in early successional habitat. The 2020 fire event has reset these acres to early successional forest and as a result, forage species are in the early stages of regeneration within high severity fire areas. Because the salvage and harvest tree removal activities would primarily remove standing dead trees, habitat quality is not expected to change for ungulates. Removing standing dead trees would offer additional areas for grasses, forbs, and shrubs to establish in the short term.

The FEIS concluded that under the RMPs the amount of high-quality forage habitat would increase on BLM-administered lands at the FEIS decision area-scale in the first decade (from 53,459 acres to 86,427 acres) (PRMP/FEIS, pp. 865-866, 1700). The Archie Creek Fire Salvage Harvest Plan itself is not expected to change the current habitat conditions for deer and elk within the project area because vegetative cover is just beginning to reestablish after the fire. Quality of forage habitat is expected to increase as vegetative cover regenerates. But vegetation is expected to reinitiate post-harvest and/or would be replanted by BLM. Early planting would foster the development of forage habitat sooner than through natural regeneration. Therefore, there is no potential for effects on deer and elk habitat beyond that already described in the PRMP/FEIS and this issue was not analyzed in further detail.

9. How would soil disturbance and changes in canopy cover affect Special Status botanical species?

Background

Botany surveys have been completed in portions of the EA analysis area using intuitive control methodology. Special status plant species occurrences identified during botanical surveys are recorded in the BLM's corporate geodatabase, Geographic Biotic Observations (GeoBOB). GeoBOB, the U.S. Forest Service Natural Resource Information System database, and the Oregon Biodiversity Information Center (ORBIC) database were queried for presence of special status plant species within and adjacent to the EA analysis area.

The EA analysis area for the special status plant species analysis was defined as all BLM and associated private checkerboard land within the 2020 Archie Creek Fire. Five (5) special status plant species occur within the EA analysis area. Three (3) additional species were identified as potentially occurring within the analysis area.

Species with known occurrences within EA analysis area are coffee cliffbrake (*Pellaea andromedifolia*), lung lichen (*Lobaria linita*), Sierra horkelia (*Horkelia congesta* ssp. *congesta*), Thompson's mistmaiden *(Romanzoffia thompsonii*), and Umpqua mariposa lily (*Calochortus umpquaensis*). Species which are not found within the EA analysis area but have potential habitat within the analysis area are California swordfern (*Polystichum californicum)*, Kincaid's lupine (*Lupinus oreganus*), and wayside aster (*Eucephalus vialis*). Kincaid's lupine is a Federally Threatened species; all other special status plant species with occurrences and/or habitat in the EA analysis area are BLM Sensitive species.

An analysis of habitat potential was also completed for rough popcornflower (*Plagiobothrys hirtus*). Rough popcornflower is a Federally Endangered species, and a historic (and most likely extirpated) population is reported in the ORBIC database on private land 1.7 miles north of the EA analysis area. This plant has restrictive habitat requirements and is only found at low elevations; no potential habitat for this species is present within the EA analysis area.

A complete list of Federally listed plant species and BLM special status plants known or suspected to occur on Roseburg District is presented in Appendix D.

Conclusion

Actions taken to provide for the conservation of BLM special status botanical species and to conserve and contribute toward the recovery of ESA-listed plant species would occur under all alternatives, including the No Action Alternative, as required by the Northwestern and Coastal Oregon ROD and RMP. Project-specific PDFs that would be applied to all action alternatives are included in Appendix B.

PDF Botany-1 would require completion of botanical surveys prior to disturbance activities to determine whether special status plant species are present at project locations. Populations of special status species known from project locations or found during pre-disturbance surveys would be managed consistent with conservation agreements and strategies. Conservation measures would be implemented to avoid soil disturbance and changes in canopy cover where special status plant species are found; no soil disturbance or changes in canopy cover would occur in these locations.

Hazard tree removal activities are addressed by PDFs Botany-2 and Botany-3 under all action alternatives. Implementation of PDFs Botany-2 and Botany-3 would minimize effects to potential special status plant habitat. In locations where soil disturbance cannot be minimized during hazard tree removal operations, PDF Botany-1 would be implemented to protect special status plant populations.

Two special status plant species are known from project activity units located in T26S R03W S27. No adverse impacts would occur to these populations with implementation of PDF Botany-4.

Botany PDFs 1 - 4 are designed to protect rare plants and rare plant habitat within the project area by eliminating or minimizing effects to habitat occupied by special status plant species. The effect of soil disturbance and changes in canopy cover on special status plant species was eliminated from detailed analysis since implementation of the PDFs would minimize potential adverse effects to rare plant populations within project activity units. There would be no significant effects under any of the action alternatives.

10. How would changes in forest canopy cover, road management, and soil disturbance affect the spread and persistence of noxious weed species?

Background

Botany surveys have been completed in portions of the EA analysis area using intuitive control methodology. Nonnative invasive plant species occurrences identified during these surveys are recorded in the BLM's National Invasive Species Information Management System (NISIMS) Database. This database was queried for the presence of State and County listed noxious weed species within the EA analysis area.

Thirty-one (31) noxious weed species occur within the EA analysis area. The EA analysis area for the noxious weed analysis was defined as all BLM and associated private checkerboard land within the 2020 Archie Creek Fire. Although BLM only conducts botany surveys on BLM land, noxious weed occurrences have been mapped on roads crossing through private land in some locations, and these data, though incomplete, are included in this analysis.

The most common noxious weeds listed by the Oregon Department of Agriculture (ODA) and/or Douglas County found within the EA analysis area are Scotch broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus armeniacus*), and tansy ragwort (*Sececio jacobaea*). The great majority of these infestation acres occur along roadways. Some of these acres are on private land along haul routes.

The most common noxious weeds within the salvage treatment units are the same three as listed above: Scotch broom infestations are mapped on 146.4 acres in Alternative 2, 148.5 acres in Alternative 3, and 142.4 acres in Alternative 4; Himalayan blackberry on 39.7 acres in Alternative 2, 40.2 acres in

Alternative 3, and 38.4 acres in Alternative 4; and tansy ragwort with 15.4 acres in both Alternatives 2 and 3 and 15.2 acres in Alternative 4.

Scotch broom, Himalayan blackberry, and tansy ragwort are designated by both ODA and Douglas County as B list noxious weeds. As defined by ODA, B list noxious weeds are species of economic and environmental importance which are regionally abundant but may have limited distribution in some counties. Douglas County defines B list noxious weeds as those that are common and well established in Douglas County. Biological control is often the primary treatment for B list weeds, though intensive control on small, isolated populations is recommended. B list weeds are treated on the Roseburg District at high priority sites. These sites include but are not limited to: Special Status plant species locations, areas with special management designations, and within project treatment units where there is a high risk of spreading weed species during project implementation.

A list weeds are those nonnative invasive plant species occurring in the state or county in small enough numbers to make eradication or containment possible. In some cases, the plant is not yet known to occur in the state or county but is located in neighboring states/counties and future invasion is considered imminent. A list weeds are subject to intensive control and/or eradication. No ODA A list weeds are known from the EA analysis area. Three Douglas County A list weeds are present: common gorse (*Ulex europaeus*), North Africa grass (*Ventenata dubia*), and striated broom (*Cytisus striatus*).

A complete list of noxious weed species found within the project area is included in Appendix H.

Conclusion

Changes in forest canopy cover, road management, and soil disturbance would be similar under all action alternatives, though Alternative 4, which has fewer acres of proposed treatment, would also have fewer acres of disturbance. Most noxious weed species increase with increased disturbance, such as soil disturbance and road construction and renovation. Many noxious weed species are shade intolerant and would benefit from a reduction of canopy cover.

Actions taken to contain, control, and eradicate existing infestations of noxious weed species would continue to be implemented under the Roseburg District Integrated Weed Control Plan (USDI BLM 1995b or future approved NEPA) under all alternatives, including the No Action Alternative. These actions include inventory of infestations, assessment of risk for spread, and application of control measures including the release of biological control agents, mowing, hand-pulling, and the use of approved herbicides.

PDFs have been developed which would prevent the introduction of new noxious weed species from outside of the EA analysis area and limit spread of noxious weed species in treatment units during project implementation. These PDFs include surveying for noxious weed species prior to project implementation, treating infestations of priority noxious weed species prior to project implementation, cleaning equipment to remove weed propagules prior to entry on BLM land, scheduling project implementation activities in less infested areas prior to more infested areas, seeding and mulching disturbed areas, and conducting post-implementation monitoring for a minimum of three years. Project-specific PDFs that would be applied to all alternatives are included in Appendix B.

Implementation of the proposed PDFs would prevent the introduction of new weed species to the project area and would limit the spread of weed species already present at project locations. Although there may be an increase in noxious weed species populations in the short term, with the implementation of the proposed PDFs there would be no significant difference between the alternatives in noxious weed establishment and spread when analyzing at the twenty to fifty-year time scale. Therefore, the effect of changes in forest canopy cover, road management, and soil disturbance on noxious weed spread and persistence was eliminated from detailed analysis.

11. How would timber management activities affect recreation use and opportunities?

This issue has been dropped from detailed analysis because timber management activities will not affect recreation use and opportunities within developed recreation sites during the normal recreation season.

The disruption of dispersed recreation uses could occur during timber management activities. These disruptions would be temporary in nature; therefore, this issue is dropped from detailed analysis. Informing the public through media or on-site signage regarding the timeframe of timber harvest activities would help the public when making choices on where to recreate.

12. How would the proposed timber management and road activities affect the Visual Resource Management Class (VRM) IV landscape?

This issue was dropped from detailed analysis because, the objective of this VRM class is to provide for management activities, which would or could require a major modification of the existing landscape. These management activities may dominate the view and be the major focus of viewer attention. However, mitigation may be developed to minimize the impact of management activities such as leaving a buffer of trees along roads.

13. How would proposed actions affect cultural resources?

Cultural Resource inventories within the proposed treatment areas are complete with all proposed timber cutting units having been surveyed at least once, and most two or three times. However due to the change in condition in the amount of vegetation and ground cover, additional surveys focused on high probability areas are being conducted with an expected completion date of May 1, 2021.

Prior to the completion of the additional surveys, one hundred and forty-five pedestrian surveys (Table C-9) have resulted in the identification of forty-two sites (35DO52, 95, 96, 98, 100, 101, 117, 359,383, 398, 433, 458, 507, 655, 657, 663,787, 824, 825, 843, 896, 897, 935, 936, 1087, 1138, 1441, 1449, 1521, 1585, OR-10-362, ACFR- EB-10, EB-02, EM-13, JJ-11, JR-02, KF-01, SKN-07, SKN-03, & TRW-04). Six sites were determined Not Eligible to the National Register of Historic Places (NRHP) before the fire (35DO98, 101, 398, 655, 657, & 663). The condition of these sites will be assessed post-fire to determine if there is a change in site boundaries, density of artifacts, or any other aspect of the site that would warrant reevaluation of the Not Eligible determination. If conditions assessments reveal there is no change to the eligibility, the BLM will not require further management. If condition assessments reveal new aspects of the site which were previously unknown before the fire, the site will be considered unevaluated to the NRHP. Eligible/unevaluated sites will be avoided through unit boundary modification and/or protected via PDFs, best management practices, and stipulations. Therefore, no soil disturbance from timber management, road activities, or hazard tree management would occur within sensitive cultural resource areas. No soil heating from fuels management post-harvest would occur within eligible or unevaluated sites.

If newly identified cultural resources are located as the result of ongoing surveys, they will be avoided via project modification. No soil disturbance from any proposed activities and no soil heating are anticipated to affect historic properties because all known NRHP eligible, or potentially eligible, cultural resources have been protected through project design. Therefore, no detailed analysis was completed for this issue. A post-harvest cultural inventory would be conducted in accordance with Appendix A of the Oregon State Protocol, which requires that 20 percent or more of the project area be surveyed post-treatment.

If any other cultural and/or paleontological resources (historic or prehistoric site or object) are discovered during project activities, all operations in the immediate area of such discovery would be suspended until an evaluation of the discovery can be made by a professional archaeologist to determine appropriate actions to prevent the loss of significant cultural or scientific values. The avoidance of known sites and PDFs for unforeseen site discovery during implementation would ensure project compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (amended in 1976, 1980, and 1992), which

is the foremost legislation governing the treatment of cultural resources during project planning and implementation. The project would also be in compliance with other legal foundations including the Antiquities Act, Historic Sites Act, Archeological Resources Protection Act, American Indian Religious Freedom Act, and Native American Graves Protection and Repatriation Act.

Table C-9. Pedestrian Surveys in the Project Area

Cultural Resource Survey Number	Name	Year
018503	NE Fork of Rock Creek Timber Sale	1985
018516	Grizzley Creek Timber Sa	1985
018523	Kelly Green Timber Sale	1985
018527	Downhill Timber Sale	1985
018528	Burnt Mountain Timber Sale	1985
018530	Pebble Ridge Timber Sale	1985
018531	North Umpqua River Inventory	1985
018604	Lower Burnt Mountain Inventory	1986
018605	Hills Return Monitoring (35DO96)	1986
018611	Susan Miller Headwaters T.S.	1986
018614	Little Creek Timber Sale	1986
018618	Harrington II Timber Sale	1986
018620	Clay Hill Inventory	1986
018710	Sunny Shoup T.S.	1987
018711	Calapooya Overview Timber Sale	1987
018713	Powerline Timber Sale	1987
018717	Swiftwater Enhancement Project	1987
018810	Field Creek Timber Sale	1987
018811	Swiftwater Timber Sale	1988
018812	Engles Creek T.S.	1988
018816	Chimney Rock T.S.	1988
018904	Ellis Negotiated Timber Sale	1989
018907	Upper Gassy Creek Timber Sale	1989
018910	Upper Calapooya Creek Timber Sale	1989
018914	Britt Creek Timber Sale	1989
019001	Powerline Timber Sale Revision	1990
019007	Susan Miller Headwaters T.S. Addition	1990
019011	Miller's View Timber Sale	1990
019012	Pond View T.S.	1990
019017	Susan Seed Tree Salvage - Area #1	1990
019018	Susan Seed Tree Salvage - Area #2	1990
019019	Susan Seed Tree Salvage - Area #3	1990
019020	Another Fairview T.S.	1990
019106	Lone Thunder Timber Sale	1990
019109	Rooftop Timber Sale	1991
019109	Rooftop Timber Sale	1991
019203	Mace Mountain Timber Sale Revision	1992
019206	Scaredman Ridge Timber Sale	1992
019207	Lower Conley Timber Sale	1992
019209	Burnt Susan Timber Sale	1922
019212	Copeland Butte Thinning Timber Sale	1992

Cultural Resource Survey Number	Name	Year
019213	Hogback Timber Sale	1992
019215	US West R/W	1992
019218	Kelly Creek Timber Sale	1992
019219	Tom Swift Timer Sale	1992
019220	Harrington II Timber Sale Revision	1992
DW9301	Economic Stimulus Bridge Repair	1993
DW1601	2016 RB District Helipond Maintenance	2016
DW1701	2017 Post Harvest Survey	2017
DW1801	2007-2015 Legacy Post Harvest Survey	2018
DW1802	2018 Post Harvest Survey	2018
MS9306	North Umpqua Primitive Campsite	1993
MS9307	Calapooya Overview Post Harvest Inventory	1993
MS9401	East Fork Rock Creek/Cougar Creek Culvert Repair	1994
MS9402	Mt. Scott Plus Tree Cleaning	1994
MS9410	Rightview Timber Sale	1995
MS9501	Idleyld Timber Sale	1995
MS9506	Bit of Honey Commercial Thinning	1995
MS9507	Bit of Honey Addition	1995
SW9702	Christopher Folley Timber Sale	1997
SW9803	Whatagas Timber Sale	1998
SW9805	Green Thunder Timber Sale	1998
SW9807	Thunder Bob Timber Sale	1998
SW9808	Justification Timber Sale	1998
SW9809	Old Stone Timber Sale	1998
SW9902	Hill Creek Foot Bridge Replacement	1999
SW9903	Thunder Mountain Rock Pit	1999
SW9905	Elementary Watson Timber Sale	1999
SW9910	Horseshoe Timber Sale	1999
SW9912	North Umpqua Wild and Scenic River Inventory	1999
SW0001	PP&L Pole Replacements	2000
SW0008	Lower Rock Creek Inventory	2000
SW0012	Millpond Campground Expansion	2000
SW0103	Relativity Commercial Thinning	2001
SW0104	East Fork Commercial Thinning	2001
SW0108	Right View Post Harvest Inventory	2001
SW0203	Copeland Divide Commercial Thinning	2002
SW0205	Honey Do CT/DM	2002
SW0206	Genetic Test Site Thinning	2002
SW0207	Tioga Segment Trail Reconstruction	2002
SW0407	Green Thunder Addition	2004
SW0504	Upper McComas Basin Section 110	2005
SW0505	South Bank North Umpqua River Inventory	2005
SW0508	Relativity Post-Harvest	2005
SW0601	Honey Creek Restoration	2006
SW0604	East Fork R/W	2006
SW0607	In-Lieu Indemnity Selection	2006
SW0703	Millpond Maintenance Facility	2007

Cultural Resource Survey Number	Name	Year
SW0704	Hinkle Weaver South R/W	2007
SW0811	Corvid Timber Sale	2008
SW0812	Craven Raven Timber Sale	2008
SW0901	Smith Springs DARC	2009
SW0903	Susan Creek Stew WUI & Sec. 110	2009
SW0905	Old Crow Timber Sale	2009
SW1006	Williams Creek Fire Rehabilitation	2010
SW1011	Horseshoe II Commercial Thinning	2010
SW1013	Stone Shoup Commercial Thinning	2010
SW1014	Its All Relative Commercial Thinning	2010
SW1015	Cancoon Timber Sale	2010
SW1101	ODOT Salvage (Honey Creek)	2011
SW1102	Rock Creek Side Channels	2011
SW1104	Thunder Cell Road Improvements	2011
SW1111	Big Thunder Commercial Thinning	2011
SW1112	Thundering Herd Commercial Thinning	2011
SW1113	Rolling Thunder CT	2011
SW1115	Ozzie Creek Section 110 Inventory	2011
SW1205	Fraiser Shingle Salvage	2012
SW1206	Pet Rock Commercial Thinning	2012
SW1207	Pop Rocks Commercial Thinning	2012
SW1208	Susan Creek Mobile Home H20	2012
SW1209	Rock Creek Instream Restoration	2012
SW1301	Stone Ridge Crossing	2013
SW1302	Kelly Creek Slide Repair	2013
SW1303	The Narrows Section 110 Inventory	2013
SW1402	Surprise Creek	2014
SW1404	Green Gas	2014
SW1504	Styx N Stone Timber Sale	2015
SW1505	Taylor Tracks Timber Sale	2015
SW1506	Kernel Klink Timber Sale	2015
SW1508	FIA260202 ROW	2015
SW1510	FIA250234	2015
SW1511	FIA260210-15 ROW	2015
SW1513	FIA260312 ROW	2015
SW1514	Rattlesnake ROW	2015
SW1516	FIA26210-11 ROW	2015
SW1601	Cable Crossing Salvage	2016
SW1703	SW 2017 & 2018 Instream Restoration	2017
DW1701	2017 Post Harvest Survey	2018
DW1801	2007-2015 Legacy Post Harvest Survey	2018
SW1802	Mt. Scott 5 Road Construction	2018
SW1803	F260202 Road Construction	2018
SW1806	Happy Harrington Crossing	2018
SW1808	Harry Shoup R/W	2018
SW1810	Umpqua Sweets	2018
SW1813	F260326 Road Construction	2018

Cultural Resource Survey Number	Name	Year
SW1814	Swiftwater Recreation Parcels	2018
SW2102	F260226 Crossing	2021
SW2104	Archie Creek Instream Restoration	2021
SW2106	Pacific Power Archie Creek	2021
SW2109	Archie Creek Salvage	2021
SW2110	Archie Creek Reforestation	2021
SW2112	Harry Shoup Tramway	2021
SW2114	Shivigny 34 R/W	2021
SW2118	ESR Archie Creek Hazard Tree Removals	2021

14. How would proposed actions affect Native American religious or ceremonial sites?

No Native American religious concerns have been identified by the interdisciplinary team or through correspondence with tribal governments with interests in the area.

15. How would proposed actions affect resistance to stand replacing wildfire in the Harvest Land Base?

Tiering to the PRMP/EIS

This issue tiers to the 2016 Proposed Resource Management Plan/Final Environmental Impact Statement (2016 PRMP/FEIS), Fire and Fuels section, issues analyzed in detail. Specifically, issue 2; the affects predicted on fire resistance at the stand level (2016 PRMP/FEIS pp. 242-253).

Methodology

Analysis Area

The analysis area for this issue was the final fire perimeter derived on 10/05/2020 from previous perimeters and aerial infrared photography. Area outside the fire perimeter was not considered because the fire severity was highest in the center of the fire, creating a more mixed and low fire severity buffer towards the edges. Based on the proposed PDFs, the salvage activity will be concentrated in high severity areas of the fire and lighter, with corresponding less effects, in the moderate to low severity areas.

A more localized analysis area of just the Wildland Development Areas was considered but it was determined there was no change in proportional results between the two sizes of analysis areas.

Two estimates of fire severity were developed for the Archie Creek Fire area; Burned Area Reflectance Classification (BARC) and preliminary Rapid Assessment of Vegetation Condition (RAVG) (see EA Appendix J for further information). Generally, BARC data is designed to identify areas with high probability of soil stability issues while the RAVG data is designed to prioritize reforestation efforts (Safford et al. 2007). This analysis used RAVG data unless otherwise specified.

Analysis Indicators

The analysis indicators for this issue are acres by stand resistance rating. Assignment of single descriptors to proposed units and the surrounding environment can result in an oversimplification of the actual environment. Small changes in aspect, slope, tree mortality, etc. will often alter the resistance rating within any given stand or unit. In addition, some of the proposed units burned in mixed severity with portions of green trees remaining post fire. However, single characterizations for each proposed treatment unit must be determined to facilitate analysis.

Fire resistance refers to the capacity for an ecosystem to resist the impacts of disturbances without undergoing a substantial change. For example, a wildfire can burn through a resistant forest without substantially altering its structure, composition, or function (Franklin et al. 2013).

The methodology in the 2016 PRMP/FEIS restricted the analysis of this factor to Harvest Land Base, excluding other land use allocations (2016 PRMP/FEIS, p. 249). This analysis also only considers Harvest Land Base within the analysis areas.

Silviculture provided a rule set, based upon estimated fire severity (RAVG) to assign a current, post-fire, forest structural stage and modeled post-treatment forest structural stage for each Alternative (2016 PRMP/FEIS, Appendix C). The 2016 PRMP/FEIS describes fire resistance based upon structural stage and is hereby incorporated by reference. In summary, structural stage was used to estimate probable fire behavior based on vertical and horizontal fuel profile. The resulting classifications were used to interpret relative rankings for resistance to stand-replacement fire (2016 PRMP/FEIS, pp. 242-253).

Stand age is a useful, although not wholly inclusive, indicator of resistance to stand replacing fire. Forest Operations Inventory (FOI) data, modified based upon the RAVG data, was used to infer resistance rating based upon 10-year age class for Harvest Land Base outside the proposed harvest units.

Affected Environment

This project is different than most timber harvest environmental assessments because the area burned in a predominantly high severity fire in 2020. The fire itself was a treatment that homogenized large areas, therefore, the variability typically seen in a proposed harvest area is no longer present post-fire. Using the RAVG data, the Fire Ecologist determined fifty percent of the BLM-administered lands in the fire burned at high severity, three percent at moderate severity, 19 percent at mixed severity, and 28 percent at low or unburned severity. This amount of high severity fire meant approximately half of the BLM-administered lands in the fire perimeter were reset to early successional structural stage regardless of the proposed action.

The post-fire resistance rating on the Harvest Land Base (HLB) in the analysis area is currently estimated as predominantly moderate (70 percent) and low (28 percent). The 2016 PRMP/FEIS modeled stand level fire resistance categories in the Harvest Land Base on the Roseburg District as predominately low (59 percent) and moderate (24 percent) resistance (p. 1325).

Environmental Effects

The 2016 PRMP/FEIS estimated stand level fire resistance after 50 years of implementation and predicted an increase in stand level fire resistance across the dry forest (2016 PRMP/FEIS, p. 244). Specifically, for the HLB in the Roseburg District, the 2016 PRMP/FEIS estimated the percentage of acres with low resistance would halve, acres with mixed resistance would be mostly static, acres with moderate resistance would increase marginally, and acres with high resistance would sextuple over time (2016 PRMP/FEIS, p. 1325).

Alternative 1

Based upon the Silviculture modeled stand structure estimated post-fire for the proposed stands, current unit conditions are mostly moderate resistance (82 percent) with 16 percent low, and one percent mixed when considering all possible salvage units. In Alternative 1, over time, the structural stage of the stands would either continue at the current resistance level or become low resistance to stand replacing wildfire.

Alternative 2, Alternative 3, and Alternative 4

All acres proposed for treatment, including units that were to be untreated for any given Alternative, were considered in each analysis. For untreated units, the current conditions were included in the total to allow for comparison between alternatives.

Regardless of salvage operations, any area of the fire that burned at high severity are now considered early successional structural stage. Therefore, from the year of the fire to approximately ten years post-fire, the fire resistance rating would be mostly moderate. As the planted trees grow and/or natural regeneration occurs the fire resistance would worsen from moderate to low. Stand maintenance would maintain this condition. Once the trees have grown enough to achieve crown closure but not yet have separation of the crown from the ground the fire resistance would continue to be low. As the stands mature enough the trees no longer maintain limbs touching the ground the fire resistance would improve to mixed or high.

A fire of this size and severity was not directly considered in the 2016 PRMP/FEIS. However, conditions remain within the range of variability over the 50-year modeled stand level fire resistance in the Harvest Land Base predicted in the 2016 PRMP/FEIS (p. 1325). Alternatives would not increase the number of acres with high resistance to stand replacement fire until the high severity areas regenerate and mature, approximately 40 years post-fire.

Any action Alternative would decrease mixed and low resistance resulting in an increase to 100 percent moderate resistance. With the PDF and prioritization of salvage areas proposed in this Environmental Assessment, it is anticipated the acres of mixed, high, or low resistance post-fire would persist as those areas survived the fire and would not be entirely salvaged. Small portions of salvage within a given stand would not alter the stand structural stage or the resistance of that stand to wildfire.

Cumulative Effects

Approximately 69 percent of the analysis area is owned by private individuals or commercial timber companies in a checkerboard ownership pattern. To provide an analysis metric for comparison, this analysis assumes commercial timber to be evenly distributed between 0-15 year-old stands, 15-35 year-old stands and 35-60 years old stands being managed on a 40 to 60-year harvest rotation, except for the interior of the fire (2016 PRMP/FEIS, p. 232-233). Within the interior of the fire, where most areas burned at high severity, most private lands have been or will be salvaged and replanted. Based on rough estimation from aerial photography, approximately 19 percent of the private lands in the analysis area have been or will be salvaged. The remaining lands, other than homesites etc. were likely too young prior to the fire to warrant salvage. Those areas may still be planted and maintained for timber production.

Due to the extreme severity of this fire area, the private timber lands will be very similar to the BLM-administered lands in resistance to stand replacement fire and on an almost identical timeline.

On BLM-administered lands, Alternative 1 would treat approximately six percent of the BLM-administered lands within the analysis area. Alternative 2 would treat approximately 29 percent, Alternative 3 would treat approximately 29 percent, and Alternative 4 would treat approximately 27 percent. Added to the estimated salvage on private lands, Alternative 1 would treat approximately 15 percent of the analysis area, Alternative 2 would treat 22 percent of the analysis area, Alternative 3 would treat 23 percent of the action area, and Alternative 4 would treat 21 percent of the analysis area. However, any of the action alternatives will only change the resistance rating on approximately six (6) percent of the Harvest Land Base acres or three (3) percent of the total BLM-administered lands within the analysis area.

As described at some level in each issue analyzed in the 2016 PRMP/FEIS, the proposed action would result in little change in conditions on BLM-administered lands for the Roseburg District mainly because the BLM-administered lands represent a small portion of the analysis area (e.g., 2016 PRMP/FEIS, p. 242). More importantly, the percentage of acres actually modified in resistance to stand replacement wildfire as a result of any action alternative will be less than one percent of the total analysis area.

Differences in effects between the no action and action alternatives are within one or two percentage points because, as stated previously, the fire was severe enough to change the structural stage regardless of post-fire treatments.

Conclusion

This project would not influence landscape scale, wildland urban interface scale, or stand scale fire resistance. Therefore, because there is no risk of significance, this issue was not analyzed in detail. The effects predicted align with those analyzed in the 2016 PRMP/FEIS estimated conditions in 50 years for any action alternative. None of the action alternatives would change the post-fire resistance levels.

16. How would the proposed actions affect fire hazard on BLM-administered lands in close proximity to developed areas?

Tiering to the PRMP/EIS

This issue tiers to the 2016 Proposed Resource Management Plan/Final Environmental Impact Statement (2016 PRMP/FEIS), Fire and Fuels section, issues analyzed in detail. Specifically Issue 3; the affects predicted on fire hazard within close proximity to developed areas (PRMP/FEIS, pp. 253-264). Wildland Development Areas (WDA) are more commonly referred to as Wildland Urban Interface.

Methodology

Analysis Area

The analysis area for this issue was the final fire perimeter derived on 10/05/2020 from previous perimeters and aerial infrared photography. Area outside the fire perimeter was not considered because the fire severity was highest in the center of the fire, creating a more mixed and low fire severity buffer towards the edges. Based on the proposed PDFs, the salvage activity will be concentrated in high severity areas of the fire and lighter, with corresponding less effects, in the moderate to low severity areas.

Two estimates of fire severity were developed for the Archie Creek Fire area; Burned Area Reflectance Classification (BARC) and preliminary Rapid Assessment of Vegetation Condition (RAVG) (see EA, Appendix J for further information). Generally, BARC data is designed to identify areas with high probability of soil stability issues while the RAVG data is designed to prioritize reforestation efforts (Safford et al. 2007). This analysis used RAVG data unless otherwise specified.

Analysis Indicators

The 2016 PRMP/FEIS describes the methodology in analyzing fire hazard in close proximity to developed areas and is hereby incorporated by reference (p. 253). In summary, the Wildland Development Areas (WDA) (known more commonly as Wildland Urban Interface or WUI) data layer provides a delineation of where people live in the wildland. The magnitude of human-caused ignitions that occur within this area illustrates the exposure and demand on firefighting resources as well as the risk to life and property. Units were mapped in relation to the WDA to determine proximity (WWRA 2013).

The analysis indicators for this issue are acres of BLM-administered lands in proximity to WDA by hazard rating. Silviculture provided a rule set, based upon estimated fire severity (RAVG) to assign a current, post-fire, forest structural stage and modeled post-treatment forest for each alternative (2016 PRMP/FEIS, Appendix C). These forest structural stage classifications were used interpret relative rankings for fire hazard (2016 PRMP/FEIS, p. 254).

Affected Environment

This project is different than most timber harvest environmental assessments because the area burned in a predominantly high severity fire in 2020. The fire itself was a treatment that homogenized large areas, therefore, the variability typically seen in a proposed area is no longer present post-fire. Using the RAVG data, the Fire Ecologist determined fifty percent of the BLM-administered lands in the fire burned at high severity, three percent at moderate severity, 19 percent at mixed severity, and 28 percent at low or unburned severity. This amount of high severity fire meant approximately half of the BLM-administered

lands in the fire perimeter were reset to early successional structural stage regardless of the proposed action.

Forest Operations Inventory data, modified using the RAVG data, was used to infer hazard rating based upon 10-year age class for BLM-administered lands outside of the proposed units. Stand age is a useful, although not wholly inclusive, indicator to infer hazard rating within developed areas. Analysis was restricted to only BLM-administered lands within the Wildland Development Areas (WDA) to maintain consistency with the 2016 PRMP/FEIS.

Approximately 55 percent of the Archie Creek Fire Salvage analysis area is considered within the WDA. There are or were several homes directly adjacent to BLM-administered lands as well as a highway and transmission lines.

The BLM-administered lands currently (post-wildfire) in the WDA within the analysis area are predominately moderate hazard (62 percent), mixed hazard (20 percent), and high hazard (18 percent).

Environmental Effects

The 2016 PRMP/FEIS analyzed the number of BLM-administered acres in Wildland Developed Areas (WDA) and predicted a decrease in hazard rating (2016 PRMP/FEIS, p. 260). The 2016 PRMP/FEIS estimated high hazard would be reduced by half, moderate hazard would be static, mixed hazard would decrease slightly, and low hazard would increase in acres by a factor of seven (7) (2016 PRMP/FEIS, p. 1328).

Of the approximately 55 percent BLM-administered lands in the analysis area within the WDA, approximately 17 percent of the total WDA is within proposed units.

Alternative 1

The proposed unit acres within the WDA are 79 percent moderate, 19 percent high hazard, and two percent mixed hazard.

Alternative 2, Alternative 3, and Alternative 4

All acres proposed for treatment, including units that were to be untreated, within the Wildland Development Area (WDA) were considered in each analysis. For untreated units, the current conditions were included in the total to allow for comparison between alternatives.

Regardless of salvage operations, any area of the fire that burned at high severity are now considered early successional. Therefore, from the year of the fire to approximately ten years post-fire, the fire hazard rating would be mostly moderate. As the planted trees grow and/or natural regeneration occurs the fire hazard would worsen from moderate to high. Stand maintenance would maintain this condition. Once the trees have grown enough to achieve crown closure but not yet have separation of the crown from the ground the fire hazard would continue to be high. As the stands mature enough the trees no longer maintain limbs touching the ground the fire hazard would improve to mixed or low.

A fire of this size and severity was not directly considered in the 2016 PRMP/FEIS. However, conditions remain within the range of variability over the 50-year modeled stand level fire resistance in the Harvest Land Base predicted in the 2016 PRMP/FEIS (p. 1325). Alternatives would not increase the number of acres with low hazard rating until the high severity areas regenerate and mature, approximately 40 years post-fire.

The units proposed for treatment make up 17 percent of the BLM-administered lands within WDA in the Analysis Area. Alternative 2 and Alternative 3 result in an increase to 100 percent moderate hazard. Alternative 4 would also produce moderate hazard on all treated acres. However, since there are fewer proposed acres, approximately one percent of the total possible treatment acres would remain mixed hazard. With the PDF and prioritization of salvage areas proposed in this Environmental Assessment, it is

anticipated the acres of mixed, high, or low hazard post-fire would persist as those areas survived the fire and would not be entirely salvaged. Small portions of salvage within a given stand would not alter the stand structural stage or the hazard of that stand.

Cumulative Effects

Approximately 69 percent of the analysis area is owned by private individuals or commercial timber companies in a checkerboard ownership pattern. To provide an analysis metric for comparison, this analysis assumes commercial timber to be evenly distributed between 0-15 year-old stands, 15-35 year-old stands and 35-60 years-old stands being managed on a 40 to 60-year harvest rotation, except for the interior of the fire (2016 PRMP/FEIS, p. 232-233). Within the interior of the fire, where most areas burned at high severity, most private lands have been or will be salvaged and replanted. Based on rough estimation from aerial photography, approximately 19 percent of the private lands in the analysis area have been or will be salvaged. The remaining lands, other than homesites etc. were likely too young prior to the fire to warrant salvage. Those areas may still be planted and maintained for timber production.

Due to the extreme severity of this fire area, the private timber lands will be very similar to the BLM-administered lands in fire hazard and on an almost identical timeline.

On BLM-administered lands, Alternative 1 would treat approximately six percent of the BLM-administered lands within the analysis Area. Alternative 2 would treat approximately 29 percent, Alternative 3 would treat approximately 29 percent, and Alternative 4 would treat approximately 27 percent. Added to the estimated salvage on private lands, Alternative 1 would treat approximately 15 percent of the analysis area, Alternative 2 would treat 22 percent, Alternative 3 would treat 23 percent, and Alternative 4 would treat 21 percent of the analysis area. However, any of the action alternatives would only change the hazard rating on approximately 3.5 percent of the BLM-administered lands within the WDA acres or one (1) percent of the total lands within the WDA.

As described at some level in each issue analyzed in the 2016 PRMP/FEIS, the proposed action would result in little change in conditions on BLM-administered lands for the Roseburg District mainly because the BLM-administered lands represent a small portion of the analysis area (e.g., 2016 PRMP/FEIS, p. 242). More importantly, the percentage of acres modified in fire hazard as a result of any action alternative would be less than one (1) percent of the total analysis area.

Differences in effects between the no action and action alternatives are within one or two percentage points because, as stated previously, the fire was severe enough to change the structural stage regardless of post-fire treatments.

Conclusion

This project would not influence wildland urban interface scale or stand scale fire resistance. Therefore, there is no risk of significance, and this issue was not analyzed in detail. The effects predicted align with those analyzed in the 2016 PRMP/FEIS estimated conditions in 50 years for any action alternative. None of the action alternatives would change the post-fire hazard levels.

17. How would the proposed actions affect fire risk from residual activity fuels on BLM-administered lands?

Tiering to the PRMP/EIS

This issue tiers to the 2016 Proposed Resource Management Plan/Final Environmental Impact Statement (2016 PRMP/FEIS), Fire and Fuels section, issues analyzed in detail. Specifically issue 4; the affects predicted on the number of acres at risk from residual activity fuels associated with timber management (pp. 264-270).

Methodology

Analysis Area

The analysis area for this issue was the final fire perimeter derived on 10/05/2020 from previous perimeters and aerial infrared photography. Area outside the fire perimeter was not considered because the fire severity was highest in the center of the fire, creating a more mixed and low fire severity buffer towards the edges. Based on the proposed PDF, the salvage activity will be concentrated in high severity areas of the fire and lighter, with corresponding less effects, in the moderate to low severity areas.

Analysis Indicators

The analysis indicators for this issue are acres of hazardous residual activity fuels resulting from timber management activity.

In the 2016 PRMP/FEIS, analysis regarding effects of residual activity fuels associated with timber management (Issue 4), the BLM used weighted variables to estimate risk categories based on predicted residual activity fuel following harvest, proximal location to Wildland Development Areas, and Wildland Fire Potential which is hereby incorporated by reference (2016 PRMP/FEIS, p. 266). Wildland Fire Potential utilizes 2012 data from LANDFIRE Vegetation Dynamics Models. These national data layers are designed for use in large scale landscape strategic analyses like the 2016 PRMP/FEIS. Due to the coarse scale and age of those datasets, the application of these data layers at the project level is limited. However, these are the best available data for this analysis. The Wildland Fire Potential used for this analysis was updated in 2020, using the LANDFIRE layer from 2014 and renamed the Wildfire Hazard Potential (WHP) (Dillon and Gilbertson-Day 2020).

Residual fuel load was inferred from harvest method (2016 PRMP/FEIS, p. 266). The Wildland Development Areas (WDA) (known more commonly as Wildland Urban Interface or WUI) data layer provides a delineation of where people live in the wildland. This layer was used to determine proximity to homes as a factor within the analysis to determine risk from residual fuels (WWRA 2013, 2016 PRMP/FEIS, p. 267). Areas outside of close proximity to developed areas are not excluded in this analysis. Instead, proximity to developed areas is a factor in the determination of residual activity fuel hazard rating. Wildland fire potential was estimated from the Wildfire Hazard Potential (formerly known as Wildland Fire Potential) (Dillon and Gilbertson-Day 2020). These three parameters were then used to assign each unit a residual activity fuel hazard rating from timber management activities category (2016 PRMP/FEIS, p. 267).

Affected Environment

This project is different than most timber harvest environmental assessments because the area burned in a predominantly high severity fire in 2020. The fire itself was a treatment that homogenized large areas, therefore, the variability typically seen in a proposed project area is no longer present post-fire. Using the RAVG data, the Fire Ecologist determined fifty percent of the BLM-administered lands in the fire burned at high severity, three percent at moderate severity, 19 percent at mixed severity, and 28 percent at low or unburned severity. This amount of high severity fire meant approximately half of the BLM-administered lands in the fire perimeter were reset to early successional structural stage regardless of any proposed action.

The Wildfire Hazard Potential in the analysis area is almost completely low meaning the residual risk rating is mostly affected by inclusion or exclusion in the WDA and/or the type of proposed management action (2016 PRMP/FEIS, p. 266; Dillon and Gilbertson-Day 2020). Since the proposed action is all within the footprint of the Archie Creek Fire, existing levels of residual fuels are extremely low which was also considered in this analysis.

Environmental Effects

Activity fuels treatments including machine piling in ground-based harvest areas coupled with pile and/or jackpot burning would lessen the residual risk from timber management activities. These additional treatments are planned in targeted locations related to developed areas and specific homes or high use road systems and are not necessarily the entirety of the harvest unit. See Appendix I for estimated acres of activity fuels treatments.

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

Alternative 1

Under the no action alternative, the residual risk from timber management activities would stem only from existing treatments (e.g., hazard tree removal along roadways).

Alternative 2, Alternative 3, and Alternative 4

Differences in harvest method (i.e., cable yarding verses helicopter yarding) would change the amount of residual fuels in a given salvage harvest unit. However, these differences would not be enough to vary the residual risk category estimated post-salvage. Therefore, implementation of any action Alternative would increase residual fuels risk but only in the low category with differences between alternatives being the number of acres treated.

Cumulative Effects

Approximately 69 percent of the analysis area is owned by private individuals or commercial timber companies in a checkerboard ownership pattern. To provide an analysis metric for comparison, this analysis assumes commercial timber to be evenly distributed between 0-15 year-old stands, 15-35 year-old stands and 35-60 year-old stands being managed on a 40 to 60-year harvest rotation, except for the interior of the fire (2016 PRMP/FEIS, pp. 232-233). Within the interior of the fire, where most areas burned at high severity, most private lands have been or will be salvaged and replanted. Based on rough estimation from aerial photography, approximately 19 percent of the private lands in the analysis area have been or will be salvaged. The remaining lands, other than homesites etc. were likely too young prior to the fire to warrant salvage. Those areas may still be planted and maintained for timber production.

Due to the extreme severity of this fire area, the private timber lands will be very similar to the BLM-administered lands in residual fuels risk and on an almost identical timeline.

On BLM-administered lands, Alternative 1 would treat approximately six percent of the BLM-administered lands within the analysis area. Alternative 2 would treat approximately 29 percent, Alternative 3 would treat approximately 29 percent, and Alternative 4 would treat approximately 27 percent. Added to the estimated salvage on private lands, Alternative 1 would treat approximately 15 percent of the analysis area, Alternative 2 would treat 22 percent, Alternative 3 would treat 23 percent, and Alternative 4 would treat 21 percent of the analysis area. However, any of the action alternatives will only change the hazard rating on approximately 3.5 percent of the BLM-administered lands within the WDA acres or one (1) percent of the total lands within the WDA.

As described at some level in each issue analyzed in the 2016 PRMP/FEIS, the proposed action would result in little change in conditions on BLM-administered lands for the Roseburg District mainly because the BLM-administered lands represent a small portion of the analysis area (e.g., 2016 PRMP/FEIS, p. 242). More importantly, the percentage of acres actually modified in residual fuels risk as a result of any action Alternative will be less than one percent of the total AA.

Differences in effects between the no action and action alternatives are within one or two percentage points because, as stated previously, the fire was severe enough to remove most previously existing downed fuels, either naturally occurring or resulting from previous BLM actions.

Conclusion

This project will create untreated surface fuels in concentrated areas, but residual risk from activity fuels is a dynamic factor as fuels degrade over time and new fuels are created elsewhere. There are previous studies and models showing, although surface fuels will increase in the salvaged stands, after 10-15 years the fine fuel loading will be comparable to the un-salvaged areas (Campbell et al. 2016, Peterson et al. 2015). This project will not influence landscape scale, wildland urban interface scale, or stand scale residual fuels risk. Therefore, there is no risk of significance, and this issue was not analyzed in detail. The effects predicted align with those analyzed in the 2016 PRMP/FEIS estimated conditions in 50 years for any action alternative. None of the action alternatives would change the post-fire residual fuels risk levels.

18. How would proposed actions affect carbon sequestration and storage?

The effects of the proposed action on carbon storage and greenhouse gas emissions are not analyzed in detail, because, regardless of project-specific or site-specific information, there would be no reasonably foreseeable significant effects of the proposed action beyond those disclosed in the 2016 Final Environmental Impact Statement.

On August 5, 2016, the BLM issued the Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (NCO ROD/RMP) revising the 1995 RMP for Roseburg District. The NCO ROD/RMP was based on the analysis conducted in the Proposed Resource Management Plan/Final Environmental Impact Statement (PRMP/FEIS) for Western Oregon (USDI BLM 2016). The PRMP/FEIS analyzed the effects of timber harvesting, prescribed burning, and livestock grazing on greenhouse gas emissions and carbon storage, and the potential impacts of climate change on major plan objectives.

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

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

The key points from PRMP/FEIS analyses include (PRMP/FEIS, p. 165):

- Net carbon storage would increase.
- Annual greenhouse gas emissions would increase although annual emissions would remain less than one percent of the 2010 Statewide greenhouse gas emissions.
- Climate change increases the uncertainty that reserves will function as intended and that planned timber harvest levels can be attained, with the uncertainty increasing over time.

- Active management provides opportunities to implement climate change adaptive strategies and potentially reduce social and ecological disruptions arising from warming and drying conditions.

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

The PRMP/FEIS estimated the effects of implementing actions consistent with the Northwestern and Coastal Oregon and the Southwestern Oregon RMPs as shown below:

Table C-10. Current and Future Carbon Storage and Gas Emissions Based on Actions Taken under the PRMP/FEIS

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

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

- The PRMP/FEIS assumed an average annual harvest level of 278 MMbf per year (205 MMbf from the HLB and 73 MMbf from non-ASQ related harvest) over the entire decision area (PRMP/FEIS, p. 307). The expected annual harvest for the Roseburg District is 39 MMbf (32 MMbf from the HLB and 6 MMbf from non-ASQ related harvest) for FY19.
- Activity fuels treatments are aligned with the harvest program with estimated acres of prescribed fire treatment type provided by the Woodstock model (PRMP/FEIS, p. 1300). The decadal average of activity fuels prescribed burning for the first 20 years of the RMP would be an estimated 64,806 acres over the entire decision area (PRMP/FEIS, p. 362). For the Roseburg District, the expected decadal average activity fuels program covers 11,269 acres.
- The PRMP/FEIS assumed that the non-commercial hazardous fuels (natural fuels) treatment levels would not differ from the 2003-2012 period although there is substantial year-to-year variability in the size of the program over the planning area and within any one District (PRMP/FEIS, p. 270). Approximately 173,300 acres of natural fuels treatment is expected to occur on average each decade across the planning area (PRMP/FEIS, p. 167). The expected natural fuels treatment program for the Roseburg District is 5,790 acres per decade, on average.

Under the NCO ROD/RMP no allotments would be available for livestock grazing through the issuance of a grazing lease (PRMP/FEIS, p. 481; NCO ROD/RMP, p. 84). As a result, no greenhouse gas emissions from a regular grazing program would occur.

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

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

1. The harvest levels remain within the range of that analyzed in the PRMP/FEIS. The proposed project would provide a maximum of 93 percent of the Roseburg District's annual ASQ, with the rest provided from other projects not to exceed the limits described in the NCO ROD/RMP (p. 6).
2. The acres of activity fuels prescribed burning and expected tonnage consumed remains within the range analyzed in the PRMP/FEIS. Alternative 2 proposed to treat 348 acres of activity fuels. This is equivalent to approximately 25 percent and 16 percent respectively of the estimated annual average level for the Roseburg District.
3. The acres of natural fuels prescribed burning and expected tonnage consumed does not exceed the levels analyzed in the PRMP/FEIS. The project does not propose treatment of natural fuels.

Based on these factors, the Archie Creek Fire Salvage Harvest Plan project is not expected to significantly affect carbon sequestration and storage that would exceed effects disclosed in the PRMP/FEIS.

19. How would the proposed harvest activities and associated road activities affect slope stability?

The BLM has specific direction related to soil management as outlined in the Northwestern and Coastal Oregon Record of Decision and Resource Management Plan (NCO ROD/RMP). The BLM is directed to:

Avoid road construction and timber harvest on unstable slopes where there is a high probability to cause a shallow, rapidly moving landslide that would likely damage infrastructure (e.g., BLM or privately owned roads, State highways, or residences) or threaten public safety (NCO ROD/RMP, p. 89-90).

Provide landscapes that stay within natural soil stability failure rates during and after management activities.

The project area was evaluated using soil burn severity mapping, LiDAR, NRCS soil data (USDA 1994), soil monitoring data, Timber Production Capability Classification (TPCC), and field observations.

The project area is within the Western Cascade Range that consists of deep narrow valleys and rugged topography. The rock formations have been extensively modified by stream erosion and slope instability. Landslides, debris and earth flows are common occurrences and are natural processes within the Western Cascade terrain. Evidence of soil movement was observed in areas throughout the project area in the form of slumping, pistol butting, scarps, depositional piles, and angled tree growth. Many were historic and did not show signs of active movement. Scarps and slides were common near springs and areas of high ground water. Head scarps at steeper streams were the most active areas of soil movement.

The main soils within the proposed salvage units are from volcanic origin and formed from colluvium and residuum basalt, andesite, welded tuff, and ash flow tuff, and sedimentary rock. Some of the soil types are extremely rocky. Dominant textures include extremely gravelly loams and gravelly clay loams. Soils vary from shallow to moderately deep and range from well drained to somewhat poorly drained.

Areas of high risk, fragile soils, and unsuitable soils for timber were identified using Timber Production Capability Classification (TPCC) mapping and are not included in salvage units (USDI BLM 1986). Questionable areas would be reviewed, and field verified by the soil scientist before operations begin. Lands classified as non-suitable Woodland by Timber Production Capability Classification (TPCC) mapping were excluded from salvage units. Some small sections are present in yarding corridors but will be reviewed prior to yarding. These sections would be excluded if found to be unstable Non-suitable woodlands include landslide prone areas and other unstable soils, are identified as not suitable for timber harvest.

Wildfire can increase landslide susceptibility after wildfire due to the increase of soil moisture and loss of structural support of tree roots from vegetation loss. The cohesion provided by tree roots loose strength following fire, making hillslopes more prone to failure (Abbate et al. 2019). Occurrence of slumps and slides, and raveling, natural to the area will likely be accelerated as fire-killed vegetation roots decay.

Slope failures will continue over the next ten years as soils begins to lose root holding strength of fire-killed trees (Robison et al. 1999).

Timber harvest activities can affect slope stability by altering soil and hydrologic functions. The increase in soil moisture and in water yield, from tree removal can result in increased slope failures in sensitive areas (Bosch and Hewlett 1982, Keppeler et al. 1994, Robison et al. 1999.) The removal of forest canopy can elevate susceptibility to land sliding if a large rain event occurs (USDI/BLM 2016 PRMP\FEIS, pp. 394). Probability of slope failure can be minimized by identifying sensitive areas, partial cuttings, and retaining understory vegetation potential (Dhakal and Sidle 2003).

The analysis area includes salvage harvest units and corresponding landings, hazard tree removal segments, and new road segments. No green intact trees would be removed, and all roadside hazard tree removal operations would limit equipment to the road prism. Both alternatives defer from treating Riparian Reserves within salvage units using 136-189 foot no-cut buffer. Riparian Reserves would be treated within the roadside hazard tree removal segments only.

Project design features and best management practices would lower the probability of slope failure due to: limiting the amount of main skid trails, seasonal operating restrictions, reusing existing landing and skid trails, requiring a minimum of partial log suspension during cable yarding, maintaining soil cover, and constructing landings and roads on geologically stable locations. Subsoiling of main skid trails and landings will further restore the hydrology, lowering the risk of slope failures and erosion by increasing surface infiltration. Subsoiling is proposed for 80 acres.

The likelihood of the proposed activities to cause slope failures is low. Harvesting fire-killed trees would have no effect on slope stability since fire-killed tree roots are already dying and loosing soil binding strength. In addition, unstable areas showing signs of active movement, falling head scarps, and mass movement potential areas that would be worsened by harvest operations would be excluded from harvest units. Most high-risk areas were small head scarps at inception points of stream channels and were not included since they were already in no cut riparian buffers. Unstable areas identified by the soil scientist or during lay out would be excluded from timber harvest activities.

The 2-8 percent of detrimental soil disturbance expected from cable harvest and hazard tree removal areas would have no measurable effect on slope stability. Ground-based yarding on softer slopes would also not affect slope stability.

Road construction would have no effect on slope stability since the proposed road segments are all located on stable slopes and are not proposed in unstable areas.

Tree planting would likely occur in many areas of the Archie creek fire and salvage units. Future tree planting would help stabilize slopes by tree root establishment that provide structural support to hillslopes.

The overall effect on slope stability from the proposed actions would be low because of the retention of green trees, exclusion of unstable areas, and implementation of road Best Management Practices. Based on this conclusion, the Archie creek harvest plan meets soil resource objectives and slope stability requirements outlined in the NCO ROD/RMP (pp. 89-90).

20. How would the proposed salvage affect summer streamflow volume and winter peak streamflow?

Methodology

Hydrological studies of timber harvest have found that removal of trees and leaf area decreases evapotranspiration rates and reduces canopy interception of rainfall leading to increased soil moisture in harvested areas and more water available for stream channels. These effects scale more or less linearly with the amount of vegetation harvested (Harr 1976, Rothacher 1973). This means that the larger the

harvest area the more pronounced the flow changes, and conversely, the smaller the harvest area the less pronounced the flow changes. It is assumed that loss of vegetative cover from wildfire would have similar results. To assess the potential sensitivity to hydrologic impact from the Archie Creek Fire, the amount of area classified as high or moderate Soil Burn Severity (SBS), as was determined from post fire Burn Area Reflectance Classification (BARC) data and GIS data of all the HUC 14 Drainage Areas within the Archie Creek Fire Area. The greater the amount of unrecovered canopy openings within a watershed, the greater the risk for changes in flow to the watershed. For peak flow effects, watershed studies of timber harvest have found the possibility of measurable changes to peak flows occurs when the combination of road area and unrecovered canopy openings results when a value of greater than 19 percent for rain-on-snow dominated hydro-regions, or greater than 29 percent for rain dominated hydro-regions is reached, based on Grant et al. (2008). In the Archie Creek Fire Area, areas with high or moderate BARC classification resulted in almost 100 percent mortality of vegetation. Because high or moderate SBS conditions are so widespread within the burn area, it is expected that this will be the dominate influence of hydrologic response until sufficient vegetation gets reestablished. Because nearly all trees have already been killed by fire, cutting, and removing them for fire salvage would not result in any additional hydrological affect than what is already occurring within the affected Drainage Areas.

For summer low flow effects, no similar threshold has been suggested in the literature to estimate when measurable changes could occur. The work by Perry and Jones (2017) and Segura et al. (2020), advances our understanding about the timing, magnitude, and duration of flow in response to vegetation management activities and subsequent hydrologic recovery, in a site-specific context. Their work builds upon an existing body of literature that federal land management agencies use to inform vegetation treatment design and analyze the effects of our proposed activities with regard to stream flow and water quality. Perry and Jones (2017) indicate that "the magnitude, duration, causes, and consequences of summer water deficits associated with forest plantations are not well understood." For Douglas fir plantations, the magnitude of effect appears to be related to the size of harvest area, the harvest prescription, the age of the recovering stand, and the density of stocking within the stand. The rate and trajectory of low flow hydrologic recovery depend in part upon species-specific water use changes with age (Moore and Wondzell 2005, Perry (2007). Cut areas can produce surplus low flow relative to the pre-harvest condition and transition to deficit low flow relative to the pre-harvest condition as young, densely planted, and vigorously growing trees increase site transpiration. Deficits diminish over time because trees exhibit declining transpiration with increasing stand age (Perry (2007), Perry and Jones (2017), Moore et al. 2004). Perry (2007) and Perry and Jones (2017) found that entirely clearcut catchments produced the largest and most persistent summer streamflow deficits. Since these effects also appear to scale linearly with the amount of area harvested, the thresholds produced from the peak flow studies will be used to guide this analysis as to when further investigation of summer low flows is needed within individual drainage areas in the project area. In cases where vegetation is removed from severe wildfire, it is assumed that reestablished stands would produce similar hydrologic results as it would from timber harvest. It is unknown how stands recovering following wildfire would differ from a harvested stand, or if a naturally restocked stand would result in different flow patterns from a replanted stand.

Spatial Scale

The BLM’s geographic scales for this analysis include the 45 headwater catchments draining the proposed salvage harvest units, the drainages or named streams to which these catchments contribute, and the eleven subwatersheds that contain the catchments, drainages, and proposed salvage units. The project area is located within the Scaredman Creek and Lower Canton Creek HUC 14 Drainage Areas within the Lower Canton Creek HUC 12 Subwatershed; Susan Creek, Cole Creek-North Umpqua River, Bob Creek, Honey Creek, Hogback Creek, and Hill Creek HUC 14 Drainage Areas within the Susan Creek-North Umpqua River HUC 12 Subwatershed; Fall Creek and Burnt Creek-North Umpqua River HUC 14 Drainage Areas within the Thunder Creek-North Umpqua River HUC 12 Subwatershed; Zig Zag Creek, Lower North Fork Rock Creek, Pebble Creek, and Middle Rock Creek HUC 14 Drainage Areas within

the Upper Rock Creek HUC 12 Subwatershed; Wapiti Creek, Surprise Creek, North Fork of East Fork Rock Creek, Upper East Fork Rock Creek, Middle East Fork Rock Creek, Mace Creek, and Lower East Fork Rock Creek HUC 14 Drainage Areas within the East Fork Rock Creek HUC 12 Subwatershed; Woodstock Creek, Harrington Creek, Rock Creek Recreation Site, Miller Creek, Shoup Creek, Mill Pond Recreation Site, Rock Creek Below Mill Pond, Conley Creek, Taylor Creek, Kelly Creek, McComas Creek and Lower Rock Creek HUC 14 Drainage Areas within the Lower Rock Creek HUC 12 Subwatershed; Shivigny Creek, Greenman Creek, Bond Creek and Engles Creek HUC 14 Drainage Areas within the Middle Little River HUC 12 Subwatershed; Rattlesnake Creek and Williams Creek-Little River HUC 14 Drainage Area within the Lower Little River HUC 12 Subwatershed; Britt Creek, Idleyld Park, French Creek and Glide HUC 14 Drainage Areas within the Bradley Creek-North Umpqua River HUC 12 Subwatershed; Hinkle Creek HUC 14 Drainage Area within the Hinkle Creek-Calapooya Creek HUC 12 Subwatershed, and Gassy Creek HUC 14 within the Gassy Creek-Calapooya Creek HUC 12 Subwatershed. Subwatersheds are generally 10,000-40,000 acres in size and have a single outlet. (USDI BLM 2016, Volume 1, p. 386.) Drainage Areas are smaller, nested inside a subwatershed, and may contain one or more proposed harvest units. These scales of analysis are appropriate because they allow for a meaningful analysis of hydrologic effects downstream and facilitate cumulative effects analysis.

Temporal Scale

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

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

Low flow analysis, unlike peak flow analysis, has no threshold or linear envelope curve (Grant et al. 2008, p. 35) to facilitate comparison of proposed BLM harvest treatments and study results. The rate and trajectory of low flow hydrologic recovery occur on a continuum influenced by not only stand age and the intensity and arrangement of harvest, but also species composition, stocking density, site productivity, disturbance, precipitation, soils, geology, aspect, elevation, and hydrologic regime (rain-dominated versus snow-dominated) (Moore and Wondzell 2005, Perry 2007, Perry and Jones 2016, Brown et al. 2005, Winkler et al. 2010). Perry and Jones (2017) do not give an estimate of years to low flow hydrologic recovery; 37–46-year-old densely stocked plantations in 100 percent clearcut catchments exhibited deficit low flow relative to the 100+ year-old stands they replaced. Perry (2007, p. 102) does suggest, based on limited information from entirely clearcut catchments, that stand level transpiration may return to near old-growth levels by 130 years in Douglas-fir dominated stands. The BLM considers this 130-year figure as a coarse screen for hydrologic recovery to historical low flow conditions.

Affected Environment

There are approximately 113 miles of stream adjacent to or within the proposed units. Approximately 72 percent of this stream length is classified as intermittent (i.e., they stop flowing in the dry season and surface water is no longer transported downstream), and 28 percent is classified as perennial (i.e., surface water flows year-round with the channels passing some volume of water throughout the year). There are 52 waterbodies (49 less than one acre) and 25 seeps/springs within the project units. All of these features would be allocated Riparian Reserves and no harvest buffers as discussed in Chapter 2.

Peak Flow Response

Several investigations have concluded that lower severity wildfires produce small or no measurable effects on postfire peak flows while the combination of moderate to high severity burns and short-intense precipitation events can produce peak flows that are 5- to 870-times larger than those previously observed in unburned catchments.

Based on a compilation of watershed studies in the Pacific Northwest, completed in small catchments, a peak flow response is detected when at least 29 percent of the drainage area is harvested in rain dominated watersheds (Grant et al. 2008, p. 35). No experimental study shows a peak flow increase when less than 29 percent of a drainage area in the rain dominated hydroregion has been harvested (2008 Final EIS, p. 353). For rain-on-snow watersheds this threshold is 19 percent (Grant et al. 2008, p. 35).

Summer Low Flow Response

Previously, common understanding on this issue has been that summer streamflow would increase following clear-cut logging, and then recover 10 to 15 years later after a new stand of trees gets established. Perry and Jones (2017) document that conversion of 130 to 450+ year old mature and old-growth forest to Douglas-fir plantations causes an increase in evapotranspiration (p. 10), and a reduction in summer stream flows within 15 years of conifer plantation establishment with the deficit persisting and intensifying in 50 year-old forest stands (p. 8). The reduction can be up to 50 percent less than flows from nearby mature and old-growth forests. The research was conducted in catchments that were 22 to 250 acres in size.

Perry and Jones found that the largest summer streamflow surpluses and the largest, persistent summer streamflow deficits resulting from the growth of dense plantations were produced by the largest openings (49 to 247 acres).

Environmental Effects

For the Archie Creek Salvage area, 20 of the HUC 14 Drainage Areas have greater than 60 percent of their area in the rain-on-snow hydroregion and therefore will be analyzed using the 19 percent harvested threshold for rain on snow watersheds. The rest of the project area falls under the 29 percent harvested threshold for rain dominated watersheds.

Increases in peak flow can also occur when roads and other impermeable areas occupy more than 12 percent of a drainage that is in a rain-on-snow hydroregion (2008 Final EIS, p. 355). Within the project area, roads occupy approximately three to six percent of the drainages and do not pose a risk of increased peak flows.

Soil Burn Severity was assessed as part of the Emergency Stabilization and Burned Area Rehabilitation Plan, which was completed in early October 2020. A Burned Area Reflectance Classification (BARC) is a satellite-derived map of post-fire changes in spectral reflectance. Landsat imagery was acquired and was used in combination with a pre-fire Landsat image from a similar time of year to produce the BARC for the Archie Creek Fire.

The BARC map was evaluated by field visits to produce the final soil burn severity maps. In past fires, the resulting postfire soil burn severity was typically scattered across the burn area with pockets of high or moderate soil burn severity, surrounded by larger areas of lower severity. The Archie Creek Fire resulted in a vastly larger area burned and unique weather conditions created extreme fire behavior that left a wide area of high and moderate burn severity within the interior of the burn area surrounded by lower burn severity around the edges of the fire perimeter. A rare weather event with extremely low humidity and very strong east winds resulted in a fast-moving fire which burnt 97,000 acres within the first 24 hours after the fire start. This fire behavior resulted in burn area conditions that did not fit well into the post-fire soil burn severity categories described in the *Field Guide for Mapping Post-Fire Soil Burn Severity (*Parsons et al. 2010) handbook. Most of the burn area was a hybrid of high and moderate soil burn severity characteristics. Surface organic matter was entirely consumed across the burn area.

Very subtle differences were found in the presence of surface roots, surface soil structure, presence of hydrophobicity, and residual canopy conditions. Very dry conditions seem to have resulted more thorough consumption or organic matter, and the speed of the fire driven by strong winds reduced the residence time, which may have reduced the possibility of greater soil damage. The BARC was evaluated by field visits, which showed that edits were needed to reflect on the ground conditions. The BARC data was adjusted to more closely reflect on the ground observations. In general, more of the burn area was moved into the moderate category, both from the high and the low categories to produce the soil burn severity map.

Table C-11 displays a summary of soil burn severity acres and percentages by class for the entire Archie Creek Fire burn area following soil burn severity mapping and adjustment of BARC data.

Table C-11. Acres by Soil Burn Severity Class

Soil Burn Severity	Acres	Percent
Archie Creek Fire		
High	43,200	33
Moderate	57,900	44
Low	18,600	14
Unburned to Very Low	11,800	9
Total	**131,500**	**100**

The Archie Creek fire was dominated by high and moderate soil burn severities. Surface organic matter was generally consumed across the entire burn area and vegetation mortality approaches 100 percent in most areas. There are some pockets where the canopy has been scorched, but brown leaves and needles are still present and will provide an effective mulch to the soil in these areas. However, even in areas with high soil burn severity, the fire does not appear to have significantly altered soil structure in most areas. Although there was some water repellency observed immediately after the fire, that layer has rapidly been breaking down based on recent field observations. The soil burn severity classes are described in EA Chapter 3, Table 15.

Timber Salvage would occur in areas dominated by high and moderate soil burn severity. Of the 45 HUC 14 Drainage Areas within the planned salvage area, 31 of them have greater than 90 percent of the total drainage area burned by the fire. C-Six of the drainage areas have less than 25 percent of their area burned. In terms of Soil Burn Severity, 23 of the drainage areas have greater than 80 percent of their total area, classified as high or moderate soil burn severity. These drainages are concentrated in the Susan Creek-North Umpqua River, East Fork Rock Creek and Lower Rock Creek HUC 12 Subwatersheds. Out of all 45 drainage areas, only 10 do not exceed the ECA thresholds where measurable changes in flow are expected. The other 35 drainage areas exceed thresholds for flow response based on fire caused loss of vegetation. This is summarized in Table C-12.

Table C-12. Fire Induced Equivalent Clearcut Area (ECA) each HUC 14 Drainage within the Archie Fire Salvage project area. (Based on percent of Drainage Area with High or Moderate Soil Burn Severity)

HUC 14 Drainages	Drainage Size (Acres)	ECA Threshold (%)	Drainage Area Burned (%)	ECA (%) High or Mod SBS
Scaredman Creek	1576	19	63	14
Lower Canton	2963	29	44	9
Susan Creek	3282	19	100	98
Cole Creek-North Umpqua River	2853	29	77	52
Bob Creek	2177	19	98	51
Honey Creek	3323	29	100	98
Hogback Creek	4235	29	94	62
Hill Creek	6074	29	97	89
Fall Creek	2177	19	100	100
Burnt Creek-North Umpqua River	1508	19	99	94
Zig Zag Creek	3372	19	10	1
Lower North Fork Rock Creek	1626	19	23	1
Pebble Creek	1998	19	90	47
Middle Rock Creek	1500	29	100	90
Wapiti Creek	1639	19	100	66
Surprise Creek	1610	19	100	47
North Fork East Fork Rock Creek	1938	19	69	12
Upper East Fork Rock Creek	1852	19	100	91
Middle East Fork Rock Creek	2368	29	100	96
Mace Creek	1979	19	100	99
Lower East Fork Rock Creek	2910	29	100	88
Woodstock Creek	1356	19	100	97
Harrington Creek	4829	19	100	97
Rock Creek Recreation Site	1525	29	100	95
Miller Creek	1694	19	100	92
Shoup Creek	1324	19	100	97
Mill Pond Recreation Site	1041	29	100	100
Rock Creek below Mill Pond	1745	29	100	99
Conley Creek	1874	29	100	92
Taylor Creek	1797	29	100	98
Kelly Creek	2966	19	100	96
McComas Creek	2075	19	100	100
Lower Rock Creek	2335	29	100	100
Shivigny Creek	2431	29	29	56
Greenman Creek	1858	19	16	7
Bond Creek	986	29	10	2
Engles Creek	1058	29	94	18
Rattlesnake Creek	1193	29	97	56
Williams Creek	4286	29	13	4
Britt Creek	1962	29	99	81
Idleyld Park	4017	29	87	64
French Creek	2988	29	71	57
Glide	10950	29	19	8
Hinkle Creek	11092	29	97	34
Gassy Creek	6039	29	36	17

Alternative 1 - No Action

Canopy Opening Impacts on Peak Flow and Low Summer Flow Susceptibility

Several investigations have concluded that lower severity wildfires produce small or no measurable effects on postfire peak flows while the combination of moderate to high severity burns and short-intense precipitation events can produce peak flows that are 5- to 870-times larger than those previously observed in unburned catchments worldwide (Moody and Martin 2001). Fire has a range of effects on stream flows and severe wildfire has a much larger effects on peak flows. The Tillamook Burn in 1933 in Oregon increased the total annual flow of two watersheds by 1.09-fold and increased the annual peak flow by 1.45-fold (Anderson el al. 1976). Effects on peak flows are highly variable and depend on the intensity of rainfall and size of the watershed. The smallest drainages have the greatest effect as well as more intense rainfall resulting in the greatest peaks. It is not unreasonable to expect up to 40 to 50 percent increase in streamflow peaks in the first few years following sever wildfire. It is expected that forest recovery would diminish the risk of peak flows within 7 to 10 years based on typical rates of tree growth in western Oregon.

For summer low flow effects, based on timber harvest studies, in those drainage areas most heavily affected by fire, it is expected that summer flows would increase for 10 to 15 years, and then likely decrease for up to 50 to 80 years depending on the rate of reforestation. Partial recovery would likely occur between 80-130 years. This is due to the scale of watersheds affected by severe fire with approximately half of the HUC 14 Drainage Areas within the Archie Creek Fire burn area experiencing over 80 percent high or moderate soil burn severity with complete loss of vegetative cover.

Road Impacts on Peak Flow Susceptibility

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

Fuels Management Impacts on Peak Flow and Low Summer Flow Susceptibility

Under the No Action Alternative, no fuels management would occur. Therefore, no additional peak flow and summer low flow response is expected, beyond what is already occurring due to the effects of the fire.

Alternative 2, 3 and 4 Canopy Opening Impacts on Peak Flow Summer Low Flow.

Because postfire logging takes place in an environment in which the canopy and soil have already been modified, it is reasonable to conclude that logging will not add measurably to the altered hydrology (Peterson et al. 2009). Therefore, effects from Alternative 2, 3 and 4 would be similar as would occur under Alternative 1.

Road Impacts on Peak Flow and Summer Low Flow Susceptibility

There would be approximately 12 miles of new road construction under Alternative 2, approximately 6 miles of new road construction under Alternative 3 and none under Alternative 4. Within the Archie Creek Salvage area, HUC 14 Drainage Areas with road construction currently have between 3-6 percent of the area in road. The addition of new road construction would increase these percentages by 0.01 to 0.51 percent. Approximately 1.3 to 1.7 miles of road in the project area would also be decommissioned following use (q.v. Road Activities, p. 21). Although the net amount of roads within the project area would increase, the resulting area covered by roads within the project area drainages would remain unchanged at approximately 3 to 6 percent, which is less than the 12 percent threshold where measurable increases in peak flows would be expected (Harr et al. 1975). Since there is no measurable change in the percent of unrecovered area due to roads, there would also be no measurable change in summer low flows.

Fuels Management Impacts on Peak Flow and Low Summer Flow Susceptibility

The fuels management activity would have no measurable effect on hydrologic function within the project area. Therefore, peak flow and summer low flow would not be affected and there would be no susceptibility of increased peak flow or decreased summer flow beyond what is already occurring due to the effects of the fire.

Conclusion

Due to the scale of watersheds affected by severe fire with approximately half of the HUC 14 Drainage Areas within the Archie Creek Fire burn area experiencing over 80 percent high or moderate soil burn severity with complete loss of vegetative cover, effects on peak flows are expected to be highly variable and depend on the intensity of rainfall and size of the watershed. BLM Salvage operations which would remove already fire killed trees would not measurably increase the potential for increase in flow from the fire altered hydrology. There is likely to be up to 40 to 50 percent increase in streamflow peaks in the first few years following sever wildfire. It is expected that forest recovery would diminish the risk of peak flows within 7 to 10 years based on typical rates of tree growth in western Oregon.

For summer low flow effects, based on timber harvest studies, in those drainage areas most heavily affected by fire, it is expected that summer flows would increase for 10 to 15 years, and then likely decrease for up to 50 to 80 years depending on the rate of reforestation. Hydrologic recovery would likely occur between 80-130 years.

21. How would proposed road management, timber harvest, and roadside safety treatments affect special status fish species and habitat, including Oregon Coast Coho salmon critical habitat, and Essential Fish Habitat?

This issue was considered, but not analyzed in detail because initial analysis yielded no measurable effects from the proposed actions to fish or aquatic habitat. Additionally, recent analysis (Horse Prairie Fire Recovery Plan EA DOI-BLM-ORWA-R050-2018-0002-EA and Rabbit Mountain Fire LSR Recovery EA (DOI-BLM-OR-R050-2014-0004-EA) evaluated similar proposed actions in the Umpqua Basin and no measurable effects were identified.

The Archie Creek Fire was a rare disturbance event that resulted in nearly a 100 percent loss of all vegetation in most of the BLM lands within the fire perimeter (EA Chapter 1, pp. 3-4). The proposed actions are focused in this area of very high tree mortality. Riparian areas and streams within the project area have lost 98-100 percent of their vegetative shade. Burned Area Emergency Response (BAER) teams used watershed modeling to analyze the Archie Creek fire. As a result of the fire, storm response flows are expected to have higher peak flow rates (200-2100 percent of normal) and a much greater amount of sediment and debris delivery (Archie Creek Fire ESR & BAER Plan, pp. 64-66).

Project design features and BMPs would be used to minimize sedimentation of streams potentially generated from harvest related operations such as yarding corridors, road management, and log haul. Commercial road use would be suspended “where the road surface is deteriorating due to vehicular rutting or standing water, or where turbid runoff is likely to reach stream channels” (NCO ROD/RMP, p. 80). Roseburg District specialists have monitored the effectiveness of aquatic and riparian related PDFs and BMPs. Monitoring results suggest the PDFs and BMPs are highly effective at minimizing or eliminating sediment transport from haul routes to streams (per communication with Albin, 2018).

Tree felling would only occur in Riparian Reserves during hazard tree removal portions of the proposed project as directed by the NCO ROD/RMP. “Maintain access to roads and facilities by removing hazard trees and blowdown from roads and facilities. Retain such logs as down woody material within adjacent stands or move for placement in streams for fish habitat restoration, unless removal of logs, including through commercial harvest, is necessary to maintain access to roads and facilities.” (NCO ROD/RMP, p. 68). A BLM Fish Biologist has identified over 1000 trees in Riparian Reserves to be placed in streams in

the project area or retained as down woody debris in riparian areas. The results of the 98-100 percent mortality of riparian trees in the project area will be an unnaturally large input of woody material to streams over the next 5 to 10 years. Hazard trees harvest in the project area will not have a measurable effect on the amount of instream woody material entering streams in the project area.

Salvage harvest would not occur in Riparian Reserves (160 feet average site potential tree height) during the salvage harvest portions of the proposed project. There is no potential for stream sedimentation from harvest operations because there would be no hydrologic connectivity between harvest units and streams. Additionally, no treatment buffers larger than 33 feet have been shown to be effective at intercepting and filtering sediment from upslope areas (Rashin et al. 2006). Salvage would not occur in Riparian Reserves, so "no-treatment" areas for this project would be more than four times greater than what has been shown to effectively filter sediment from upslope areas. Any sediment generated during salvage harvest would be immeasurable against the expected increased sediment loads as a result of the fire.

There are 0.76 miles of new road construction proposed in Riparian Reserves under Alternative 2, 0.25 miles under Alternative 3, and none under Alternative 4. All of which are hydrologically disconnected from streams and not adjacent to fish bearing channels.

Conclusion

Detailed analysis would not provide any information to make an informed decision between the alternatives, because there would not be any measurable impacts to special status fish species and habitat, including Oregon Coast Coho salmon critical habitat, and Essential Fish Habitat. The haul routes are in good condition and PDFs and BMPs would be applied. Proposed actions would not measurably affect streamside shade, so there would be no effect to stream temperature. All wood needed for stream restoration and coarse woody debris in inner zones would be retained on site. Habitat forming wood would increase, stream temperature would not be expected to increase from proposed actions, spawning gravel and juvenile rearing habitat would not be affected because there would be no detectable increase in sedimentation from proposed actions.

22. How would proposed hazard tree removal affect the Outstandingly Remarkable Values (ORVs) of the North Umpqua Wild and Scenic River (WSR) Corridor?

The North Umpqua Wild and Scenic River Corridor is managed to retain and/or enhance the following Outstandingly Remarkable Values. Outstandingly Remarkable Values (ORVs) are those values for which the river was designated under the Wild and Scenic Rivers Act of 1968. Prior to designation the river corridor is studied to determine which values are present. To be eligible for designation, a river must be free-flowing and contain at least one ORV, i.e., scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar value.

- Water Quality and Quantity
- Cultural
- Fisheries
- Recreation
- Scenic

The Archie Creek Fire impacted the scenic ORV in that many of the trees are dead or are completely burned. However, many of the other scenic features were not impacted, such as the emerald, green color of the water, rock cliffs, and geologic formations. The cutting/felling and removal of hazard trees could contribute to a temporary change in the scenic condition; however, hazard tree removal is needed to maintain public health and safety and protection of infrastructure for recreation sites and transportation routes.

Hazard tree removal of imminent and likely to fail hazard trees that have high risk potential for structural failure and are a risk to human safety or infrastructure is proposed in campgrounds and recreation sites

and adjacent to private infrastructure and homesites and their access roads. Hazard tree removal includes trees within moderate to high severity burn areas with a 60 percent or greater probability of mortality.

The Archie Creek Fire Salvage Harvest Plan EA is in conformance with the 2016 NCO RMP/ROD and the North Umpqua Wild and Scenic River (WSR) Corridor Management Plan which contains specific management direction for hazard trees removal. Hazard tree removal under this EA falls into two categories within the North Umpqua Wild and Scenic River Corridor.

1. Cutting/felling and removal of all dead trees and those likely to fail around developed recreation sites for public and infrastructure safety. It is a required part of maintenance operations to provide for public health and safety and to protect infrastructure. Meet legal requirements for visitor health and safety (NCO RMP/ROD p. 88). Remove trees that could pose a hazard to the public; for example, trees that could fall on people in stationary settings such as trailheads, benches, picnic tables, camping sites, etc. as well as trees that could fall and damage recreation site infrastructure such as picnic pavilions, restroom buildings, campsites etc.
2. Cutting/felling and removal of all dead trees and those likely to fail along roadways within the WSR corridor, to prevent injuries to public and keep the roadways clear for access. Per the North Umpqua River Management Plan "Manage, maintain and enhance transportation facilities for safe access to recreation facilities and opportunities within the corridor" (p.17). "The BLM will construct and maintain roads and trails in accordance with the standards in BLM Manual H-9114-1- Trails (USDI BLM 1987) and other professional resources" (NCO RMP/ROD, p. 275). "Maintain a comprehensive travel network that best meets the full range of public use, resource management, and administrative needs" (NCO RMP/ROD, p. 93).

Hazard tree cutting would occur and is on-going under the following authorities.

1. Non-discretionary hazard tree removal performed under Rights-Of-Way Authority by the Oregon Department of Transportation (ODOT) and PacificCorp.
2. The majority of hazard tree abatement around recreation sites has occurred under the Archie Creek Fire ESR Hazard Tree Categorial Exclusion (DOI-BLM-ORWA-R040-2021-003-CX).

Project Design Features (PDFs) (See Appendix B, p. 7) would be implemented to minimize impacts from cutting and removal of trees. Potential negative effects to the ORVs from actions described in this EA have been mitigated by these PDFs; therefore, this issue was dropped from detailed analysis.

Appendix D – Botanical Species Considered but Not Analyzed in Detail

Fifty-five Special Status plant species are known or suspected to occur on the Roseburg District (Table D-1). Two of these are Federally listed: rough popcornflower (*Plagiobothrys hirtus*, Federally Endangered) and Kincaid's lupine (*Lupinus oreganus*, Federally Threatened). No populations of any Federally listed plant species are known from the EA analysis area. No rough popcornflower habitat exists in the EA analysis area. Potential habitat for Kincaid's lupine is not expected but could exist.

Botany PDFs 1 - 4 are designed to protect rare plants and rare plant habitat, known and unknown, within the project area.

Table D-1: Roseburg BLM Special Status Plant Species, Habitat Requirements, and Presence within the EA Analysis Area

Scientific Name	Common Name	Habitat	Status
Adiantum jordanii	California maidenhair	Rocky stream banks, seepage areas, shaded hillsides, moist woods. 100 - 500 m.	Not present
Arabis koehleri var. *koehleri*	Koehler's rockcress	Basalt outcrops. 100 - 500 m.	Not present
Arctostaphylos hispidula	Gasquet manzanita	Serpentine chaparral and open forests on sandstone. 100 - 1100 m.	Not present
Asplenium septentrionale	forked spleenwort	Exposed or shady rocky crevices. 400 - 1700 m.	Not present
Bensoniella oregana	Oregon bensoniella	Wet meadows, bogs, shady fir forests. 1000 - 1600 m.	Not present
Bryum calobryoides	bryum moss	On acid and basic rocks and soil in shaded to exposed boulder fields, montane to alpine meadows, cliffs, and outcrops. Forest associations probably include *Tsuga heterophylla*, *Pseudotsuga menziesii*, *Abies amabilis*, *Abies concolor*, and *Abies lasiocarpa*.	Not present
Calicium adspersum	spike lichen	On bark of living *Abies grandis*, *Pseudotsuga menziesii*, *Quercus* sp., *Sequoia sempervirens* and *Thuja plicata*. In the PNW all known occurrences are on trees older than 200 years. < 650 m.	Not present
Calochortus coxii	Cox's mariposa lily	Serpentine grasslands and summit balds. 200 - 800 m.	Not present
Calochortus umpquaensis	Umpqua mariposa lily	Serpentine meadows and ridgelines. 300 - 900 m.	Present
Camassia howellii	Howell's camas	Open grassy or gravelly meadows, *Pinus jeffreyi* slopes, oak-madrone savanna, usually on serpentine soils. 200 - 700 m.	Not present

Scientific Name	Common Name	Habitat	Status
Carex brevicaulis	shortstem sedge	Stabilized coastal sand dunes, usually in dry meadow plant communities. Not found with European beach grass. 0 - 400 m.	Not present
Carex comosa	longhair sedge	Marshes, lake margins, wet meadows, bogs, and wet thickets.	Not present
Cephaloziella spinigera	spiny threadwort	On peat and over peat forming mosses; in coastal and montane fens.	Not present
Cicendia quadrangularis	Oregon timwort	Open places. < 2700 m.	Not present
Cryptantha milo-bakeri	Milo Baker's cryptantha	Gravelly or serpentine-derived soil, grasslands, chaparral, forest openings. 400 - 1400 m.	Not present
Cypripedium fasciculatum	clustered lady's slipper	Mixed conifer forests. 50 - 1900 m.	Not present
Delphinium nudicaule	red larkspur	Moist wooded talus slopes. 0 - 2600 m.	Not present
Entosthodon fascicularis	banded cord-moss	On seasonally wet, exposed soil in seeps or along intermittent streams. Usually hidden among grasses, other mosses, and litter. Known habitats are grassland, oak savanna, grassy balds, and rock outcrops.	Not present
Epilobium oreganum	Grants Pass willowherb	Bogs, small streams. 550 - 1800 m.	Not present
Eschscholzia caespitosa	tufted poppy	Open chaparral. 0 - 1500 m.	Not present
Eucephalus vialis	wayside aster	Dry open oak or coniferous woods. 200 - 500 m.	Not present, habitat exists
Frasera umpquaensis	Umpqua frasera	Mountain meadows. 1700 -1900 m.	Not present
Gymnomitrion concinnatum	braided frostwort	On peaty soil of cliffs and rock outcrops, full exposure or shaded. Has been found in CA from 115 - 1800 m elevation, but in OR and WA has only been found in subalpine parkland areas in *Tsuga mertensiana* and *Abies lasiocarpa* associations.	Not present
Horkelia congesta ssp. *congesta*	Sierra horkelia	Wet to dry remnant prairies generally near valley bottoms, or on balds of low hills in oak-conifer woodlands, generally on volcanic soil. 80 - 700 m.	Present

Scientific Name	Common Name	Habitat	Status
Horkelia tridentata ssp. *tridentata*	threetooth horkelia	Open areas, primarily in sagebrush communities and conifer woodlands, mainly on granitic or volcanic soil. 300 -2500 m.	Not present
Iliamna latibracteata	California wild hollyhock	Conifer forest, streamsides. 500 - 2000 m.	Not present
Kalmiopsis fragrans	fragrant kalmiopsis	Tuffaceous outcrops within shaded, mesic, coniferous forests; open ridges, bare rock or shallow soil at bases of cliffs or boulders. 400 - 1300 m.	Not present
Lathyrus holochlorus	thinleaf pea	Prairie edge/oak savanna/prairie oak woodland ecotone and anthropogenic habitats with somewhat similar features. Currently-occupied habitats include roadsides, fencerows, partially cleared land, grasslands and pastures, low scrubby vegetation, creek banks, forest edges, and open woods and clearings. 30 - 600 m.	Not present
Lewisia leeana	quill-leaf lewisia	Open north- or northwest-facing granitic or serpentine slopes or cliffs. 1300 - 3400 m.	Not present
Limnanthes alba ssp. *gracilis*	slender meadowfoam	Seasonally wet meadows, rocky slopes and basins, often on serpentine soils. 150 - 1700 m.	Not present
Lobaria linita	lung lichen	Strongly associated with old-growth and climax forests, typically in the *Abies amabilis* to lower *Tsuga mertensiana* zones. Prefers the lower boles of conifers, but in drier habitats or at higher elevations may also occur on moss-covered boulders or rock outcrops in cool, shaded, humid microsites.	Present
Lotus stipularis	balsam bird's-foot trefoil	Open pine forest, stream bends. 600 - 1200 m.	Not present
Lupinus oreganus	Kincaid's lupine	Remnant prairies, edges and openings in oak forests. 50 - 900 m.	Not present, habitat may exist
Meconella oregana	white fairypoppy	Sandy bluffs, meadows and partly sunny, moist banks. 0 - 300 m.	Not present
Nicotiana quadrivalvis	Indian tobacco	Open, well-drained washes, slopes. < 1500 m.	Not present

Scientific Name	Common Name	Habitat	Status
Pellaea andromedifolia	coffee cliffbrake	Dry, open sites with rocky soil. 100 - 900 m.	Present
Perideridia erythrorhiza	red root yampah	In poorly drained, heavy clay soils. < 1525 m.	Not present
Phymatoceros phymatodes	tuberous hornwort	On bare mineral soil which remains moist until late spring or summer.	Not present
Pilophorus nigricaulis	nail lichen	Cool, moist, rocky slopes, often north facing, usually in the open but where sheltered by surrounding topography such as steep narrow valleys. On noncalcareous rock.	Not present
Plagiobothrys hirtus	rough popcornflower	Clay soils in seasonally wet meadows. 0 - 400 m.	Not present, no habitat exists
Polystichum californicum	California swordfern	Cliffs and shaded rocky sites. 0 - 1100 m.	Not present; habitat exists
Porella bolanderi	Bolander's scalemoss	Forming shaded to partly exposed mats on a variety of rock types (siliceous, calcareous, and metamorphic) and trunks of *Quercus*, *Umbellularia*, and *Acer macrophyllum*. Primary forest types are dry *Quercus garryana*, *Pinus ponderosa*, and *Pseudotsuga menziesii* associations.	Not present
Racomitrium depressum	racomitrium moss	Forms mats on rocks in perennial and intermittent streams and in the spray zone of waterfalls between 120 and 2600 m elevations. Habitats are subject to scour during peak flows.	Not present
Romanzoffia thompsonii	Thompson's mistmaiden	Seasonally wet, usually open, rocky, sunny habitats. 230 - 1830 m.	Present
Schoenoplectus subterminalis	swaying bulrush	Freshwater lakes and bogs, submerged to emergent in shallow water, occasionally terrestrial if water levels fall. 0 - 1100 m.	Not present
Scirpus pendulus	rufous bulrush	Marshes, moist meadows, ditches. 50 - 1500 m.	Not present
Sisyrinchium hitchcockii	Hitchcock's blue-eyed grass	Grassy areas, openings in woods, mostly where soil is dry late in season. 50 - 300 m.	Not present

Scientific Name	Common Name	Habitat	Status
Stereocaulon spathuliferum	snow lichen	Basalt blocks of talus slopes, shaded to partially exposed, usually sheltered from precipitation but requiring seasonally cool and moist conditions. Forest types are *Abies amabilis*, *Tsuga heterophylla*, and *Pseudotsuga menziesii* associations.	Not present
Tetraphis geniculata	tetraphis moss	Often on the cut, broken ends or splintered lower sides of large rooted logs or stumps and occasionally on peaty banks in moist coniferous forests from sea level to subalpine elevations.	Not present
Tortula mucronifolia	mucronleaf tortula moss	Forming small turfs or cushions on soil, tree roots and sheltered ledges and crevices of rock outcrops and cliffs. Rock outcrops in *Abies concolor* and *Abies x shastensis* forest in southwestern Oregon.	Not present
Trematodon asanoi	Asano's trematodon moss	Forming loose mats on moist bare soil along the edges of trails, streams and ponds in the subalpine zone. Soils usually have some organic content and are irrigated by meltwater from late-season snowbeds.	Not present
Utricularia gibba	humped bladderwort	Shallow water, mud, mat-forming at surface of deep waters or not. 10 - 2300 m.	Not present
Utricularia minor	lesser bladderwort	Shallow (gen < 30 cm) acidic waters. 800 - 2900 m.	Not present
Wolffia borealis	northern watermeal	Freshwater. 1984 site report for Red Ponds RNA as *W. punctata* (a synonym for both *W. borealis* and *W. brasiliensis*. 100 - 1300 m.	Not present
Wolffia columbiana	Columbian watermeal	Freshwater. 1993 site report from private land near Dixonville. Species occurs with *W. brasiliensis* and *Landoltia punctata*. 0 - 500 m.	Not present

Appendix E – Definitions and Supporting Data Tables for NSO Analysis

Habitat Type and Function

Defining a stand as a particular "habitat type" is a functional assessment based on the relative contribution of each individual stand element. The summation of these conditions estimates the "habitat type" for a stand. Each individual attribute has a particular but variable relative weight (importance) in overall stand function compared to other attributes. Thus, any individual stand of habitat may have relatively greater or lower quantities or quality of any one or several attributes, but the amalgamation of these attributes comprise a condition associated with use by spotted owls.

Determining the lower bound of stand condition that provides habitat function is therefore an analysis based on quantification of attributes extracted from the relevant literature (e.g., Davis et al. 2016) and a qualitative assessment of attribute interactions supported by the literature and professional experience and judgment. There is not a clearly demarcated threshold that can be generically or numerically depicted, but a transition zone where lack of habitat elements or quality make it progressively unlikely that particular stand would provide habitat function. Ultimately the function of a stand can be measured by observational methods (a stand with a successful, active nest is by definition a nest stand), or through professional evaluation of all factors known to be associated with specific use.

For this Assessment, habitat classification was developed through a combination of on-site field review by wildlife biologists and with available information from the District's Forest Operations Inventory (FOI) layer. The FOI was not developed to explicitly map habitat; but it does contain information from which habitat and function may be inferred and modelled (e.g., birthdate of oldest cohort, age of predominant cohort) when site-specific habitat determination is not available. Additionally, post-fire GIS spatial layers were used to estimate habitat conditions within the Archie Creek Fire perimeter.

NRF Habitat

Habitat for the spotted owl used for nesting, roosting, and foraging is also referenced as "NRF" habitat. NRF habitat also provides for dispersal function (described below). There are multiple vegetative components that, when acting together in concert, constitute NRF habitat including: conifer cover, conifer diameter, density of large (≥ 30 inches diameter at breast height (DBH) conifers, stand height, and stand age (refer to Table E-2). Dead vegetative components such as snags and down wood material also contribute to NRF habitat because they provide nesting/roosting structures for spotted owls as well as for small mammal prey (e.g., flying squirrels). The amount of these live or dead vegetative components present in NRF habitat varies by physiographic province.

For this analysis, NRF habitat is generally mature or older coniferous forest that contains large-diameter trees and snags with nesting structure, is multi-storied, and has sufficient vertical and horizontal cover to provide opportunities for nesting, roosting and foraging activities. NRF habitat classification for this analysis was done by either (a) field verification by wildlife biologists or (b) using FOI data where forest 80 years of age or older (i.e., a stand birthdate prior to 1937) in the absence of field verification of habitat function. Stands that were NRF prior to the fire event were retained as NRF if burned at a mosaic of mixed burn intensity throughout the stand including areas of burnt NRF (determined using GIS and/or field review).

Dispersal-only Habitat

Dispersal habitat is essential for the movement of juvenile and non-territorial (e.g., single birds) northern spotted owl to fill territorial vacancies and provide adequate gene flow across the range of the species (USDI FWS 2008). For this analysis, dispersal-only habitat is generally young to mature coniferous forest with a high amount of canopy cover. Classically, dispersal-only habitat for the spotted owl was regarded as conifer-dominated forest stands with canopy cover of 40 percent or greater and an average DBH of 11

inches or greater (Thomas et al. 1990). However, the "marginal" class of habitat, is likely important for supporting dispersal, foraging, and nonbreeding (i.e., floater) individuals (Lesmeister et al. 2018a, p. 252). Dispersal habitat may contain snags, coarse down wood, and prey sources, which are habitat components allowing northern spotted owls to move and forage between blocks of NRF habitat (USDI FWS 2008).

For this analysis, dispersal-only habitat is generally defined as conifer-dominated forest stands approximately 40 to 79 years old. However, dispersal-only habitat classification for this analysis within unit boundaries was done by field verification by wildlife biologists. In the absence of field verification of habitat function, classification of habitat outside of unit boundaries were determined using FOI data where conifer stands with birthdates of 1941 to 1980 (40-79 years old) were considered dispersal-only habitat. Stands that were NRF prior to the fire event may be downgraded to dispersal due to a moderate mortality burn resulting in a substantial number of green trees persisting post-fire with 40-59 percent (ocular estimate) canopy cover.

Burnt NRF-Foraging

Formerly NRF but following a high-severity wildfire event the vegetative condition was altered such that NRF function is no longer maintained but a majority of large, legacy structures (e.g., burned logs and snags) exist post-fire. Some green trees may persist post-fire with less than 40 percent canopy cover. Based on literature review burned NRF located within 500 feet of unburned NRF can be considered to function as foraging habitat by the northern spotted owl. Even with the loss of canopy cover and other key habitat components typically found in NRF habitat after high intensity wildfire, some studies indicate that burned NRF areas will continue to provide habitat value (Clark 2007, Comfort 2013). Clark (2007, pgs. 100-103) found that spotted owls used NRF habitat that burned at moderate to severe intensities more often than those habitats that were available, but the overall use of those habitats was relatively low (e.g., roughly five percent of telemetry locations occurred in high-severity burn habitats). Spotted owls use areas closer to hard edges (within 479 feet) more often than random (504 feet) – but this difference was influenced by large sample sizes (Clark 2007, pg. 101). Edge habitat may provide a benefit (e.g., greater prey availability) to the owls (Clark et al. 2013, pg. 684). Comfort (2013) found NRF habitat within a fire perimeter that was unburned or suffered a low severity fire was selected for by owls in and adjacent to the Timbered Rock fire in Oregon. – which was approximately 29 miles southeast from the Action Area. NRF habitat that burned at a moderate severity was "selected for" as a function of distance from nest site. The preference diminished with distance from the nest. Nesting, roosting, foraging habitat that burned at a high severity was selected over early seral habitat in proportion to its occurrence (Clark 2007).

To the contrary, Eyes (2014) concluded that California spotted owls avoided areas subjected to high severity wildfires, focusing instead on the high contrast edges created by these high severity burns. Results presented by Bond et al. (2009, pg. 1121), suggest that the relative probability of spotted owls foraging in high-severity burned forests within 1,639 feet (500 meters) of an activity center is relatively high and beyond that distance probability of use declines precipitously (Manley 2014, pg. 5). Tempel et al. (2014) concluded that the loss of canopy cover, either from wildfire or logging, would reduce the viability of the habitat for California spotted owl. Increased amounts of past timber harvest, salvage logging, and high-severity burns increased localized extinction probabilities of spotted owls and reduced future occupancy (Clark et al. 2013, pg. 686).

Overall, there appears to be conflicting studies on the value of severely burned forests to the northern spotted owl. The Umpqua Basin Level 1 Team biologists interpret the available scientific information as supportive enough to reasonably consider burnt NRF useful habitat for habitat-limited spotted owls – particularly when it occurs within approximately 500 feet of the edge of unburned NRF habitat.

Capable Land

Capable land are areas that are not currently functioning as NRF, dispersal-only habitats, and burnt NRF-foraging but can develop into dispersal-only and ultimately NRF habitat in the future. For this analysis, capable land is defined as conifer-dominated forest stands less than 40 years old. Capable land includes burnt NRF that is located beyond 500 feet of unburned NRF because it does not support northern spotted owls. Because capable land does not currently contain habitat elements necessary for maintaining northern spotted owl life history functions, it will not be discussed at each of the analytical spatial scales (i.e., home range and core-use area).

Non-Capable

Roads and non-forest lands (open water, agricultural or urban areas, rock outcrops, grasslands, etc.) are considered non-capable. For this analysis, the District assumed that the total width of non-capable lands along existing roads is 16 feet (8 feet from centerline) and that the total width of non-capable habitat along highways is 45 feet (22.5 feet from centerline).

In this analysis, habitat acres treated may exceed harvest acres in the proposed action because of the difference in road-width assumptions. For existing roads, road-width assumptions for the northern spotted owl analysis described above is in contrast with the 45-foot road width used for the proposed action acres and for other resources analyzed which corresponds to the PRMP/FEIS assumptions for the NCO ROD/RMP (USDI - Bureau of Land Management, 2016b, p. 753). The wildlife analysis differs to account for affects for forest habitat that exists within 45 feet of forest roads.

Site Occupancy

A northern spotted owl site is defined as a known or historic nest tree location, or activity center with evidence of use by an individual or pair of northern spotted owls. There may be one or more sites ("alternates") within a northern spotted owl territory. The analysis in this EA was based on the last known northern spotted owl occupied location by a pair or resident single associated with each territory in the analysis area.

There are 57 northern spotted owl sites within the analysis area (Table E-1). Current occupancy status is based on survey results conducted in 2019-2020 using the *Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls* (USDI FWS 2012) (Table E-1). Occupancy is determined with detections of a pair or territorial or resident single NSO. A site with no detections within the last two consecutive years of survey effort is determined to be unoccupied. Thirty-two (32) of the 57 sites within the action area did not receive two-consecutive years of survey effort in 2019 and 2020 and therefore, site status is unknown and assumed occupied (Table E-3).

Analytical Spatial Scale

The analysis area for the northern spotted owl is the extent defined by a composite of a 1.2-mile radius polygon around proposed harvest units and mean Oregon Coast provincial home-range diameter circles (1.2 miles; 2,895 acres) around the most recent occupied northern spotted owl activity centers within the Archie Creek Fire Harvest Plan project area polygon. There are approximately 153,589 acres within the analysis area, of which 47 percent (71,689 acres) occurs on federal (BLM-administered and Forest Service) lands.

Habitat at analytical spatial scales is used to determine habitat condition for a known northern spotted owl site and is assessed by evaluating available NRF and dispersal-only habitat at three analytical scales: home range (1.2-mile radius), core-use area (0.5-mile radius), and nest patch (300-meter radius). The most recent occupied site and its corresponding nest patch, core-use area, and home range were used to

determine habitat impacts for each northern spotted owl site within the Archie Creek Fire Harvest Plan project area (Table E-1).

When assessing habitat function (or habitat modification), it is important to note that the estimate of habitat quantities within the provincial home range/core-use area are derived mean quantities, not absolute thresholds. Any estimate of effect needs to consider variance in actual provincial home range and core-use areas estimated from empirical studies and the composition and arrangement of habitat elements (USDI BLM 2018, p. 23).

Provincial Home Range

The provincial home range (home range) size varies by physiographic province and is the "area traversed by the individual in its normal activities of food gathering, mating, and caring for young" (Burt 1943, p. 351). The northern spotted owl home range in the Western Cascades Province is a 1.2-mile radius circle centered on a site, encompassing 2,895 acres, and is used by northern spotted owls for nesting, roosting, and foraging activities (Thomas et al. 1990 and Courtney et al. 2004). The home ranges of several northern spotted owl pairs may overlap with the habitat shared by adjacent owl pairs and other non-territorial owls. The home range is important for the survival and productivity of northern spotted owls because they are non-migratory birds that remain within their home range year-round (Thomas et al. 1990).

Available science suggests that as the amount of NRF habitat in a northern spotted owl's home range decreases, so does site occupancy, reproduction, and survival (Bart and Forsman 1992, Bart 1995, Forsman et al. 2005). Thomas et al. (1990), Bart and Forsman (1992), Bart (1995), Olson et al. 2004, and Dugger et al. (2005) suggest that when northern spotted owl home ranges are comprised of less than 40 to 60 percent NRF habitat, they were more likely to have lower occupancy and fitness as cited in the BO for the NCO RMP/ROD (USDI FWS 2016, p. 58). In addition, results of Dugger et al. (2005) and Olson et al. (2004) suggest that younger stands do not necessarily contribute to overall habitat-fitness.

The amount of NRF habitat considered necessary to maintain northern spotted owl life functions within a 1.2-mile home range radius is 1,158 acres (40 percent of the total home range acres) (Thomas et al. 1990 and Courtney et al. 2004). In this analysis, "habitat-limited" means that the provincial home range has less than 40 percent (1,158 acres) NRF habitat available.

Core-Use Area

The core-use area is a 0.5-mile radius circle centered on a northern spotted owl site, encompassing an area of approximately 500 acres. The core-use area is used to describe the area most heavily utilized during the nesting season (USDI FWS 2008b). Core-use areas are defended by territorial northern spotted owls and generally do not overlap with other northern spotted owl pairs.

A substantial amount of work has been done to determine how much habitat is necessary for a spotted owl site to be successful. Meyer et al. (1998) examined landscape indices associated within spotted owl sites versus random plots on BLM lands throughout Oregon, and found that across provinces, percent of old forest (approximately 30 percent) were highly positively correlated with the probability of spotted owl occupancy within the 500 acres surrounding the site. Meyer et al. (1998) also determined that territory occupancy decreased following harvest of NRF habitat in the affected core area. Zabel et al. (2003) found in their northwest California study, that the highest probability of owl occupancy occurred when the core-use area was composed of 69 percent nesting/roosting habitat. Bart (1995) found that core-use areas should contain 30-50 percent mature and old growth forest. Most recently, Dugger et al. (2005) showed in their southern Oregon study area that when owl core-use areas had at least 50-60 percent older forest habitat, spotted owl fitness (i.e., survival and reproduction) was relatively higher than in core-use areas with lesser amounts.

Within the core-use area, habitat within 200-300 meters of the nest is important to nest site selection and habitat use by post-fledgling owls (Miller 1989; Swindle et al. 1999; Perkins et al. 2000). The amount of NRF habitat considered essential to maintain northern spotted owl life functions is 250 acres (50 percent) of the core-use area (Irwin et al. 2005, Glenn et al. 2004, and Carey et al. 1992). Other studies determined the probability of spotted owl occupancy and habitat fitness varies according to the amount of NRF within the core-use area (Bart 1995, Meyer et al. 1998, Zabel et al. 2003, and Dugger et al. 2005). These critical values vary from 30 percent (Meyer et al. 1998) to 69 percent (Zabel et al. 2003). Thus, impacts were compared against the mean value of 50 percent (of 500 acres) NRF within the core-use area, which is approximately half-way between the critical values of 30 and 69 percent (Bart 1995, Meyer et al. 1998, Zabel et al. 2003, and Dugger et al. 2005). It also corresponds to 250 acres of NRF considered essential to maintain northern spotted owl life functions (Irwin et al. 2005, Glenn et al. 2004, and Carey et al. 1992). Therefore, for this analysis, "habitat-limited" means the spotted owl core-use area has less than 50 percent (< 250 acres) NRF habitat available.

Nest Patch

The 70-acre nest patch is centered within the core-use area, represented by a circle with a 300-meter radius centered on the nest tree (Perkins 2000; Swindle et al. 1999; Miller 1989) or activity center of a pair or resident single spotted owl. As central place foragers, nesting spotted owls are likely most sensitive to activities that occur near the nest site. Nest patches are usually associated with older forest; however, younger forests may be an important component due to their proximity to the nest site and potential usage by spotted owls (Glenn et al. 2004, p. 48). Relatively minor changes in stand composition or shape of a nest patch may result in substantial reductions in the likelihood of occupancy and reproduction of the territory (Swindle et al. 1999, Perkins 2000).

Environmental Baseline for Habitat within Northern Spotted Owl Sites

Table E-1 presents the post-fire baseline habitat conditions for each northern spotted owl site within the analysis area. Habitat conditions determined through GIS analysis of various GIS post-fire imagery layers (e.g., natural color, infrared, LiDAR, etc.) and some field reconnaissance. There are sites that would need further field reconnaissance to verify habitat conditions.

Table E-1. Baseline of Acres of Habitat at each Site's Spatial Scale on BLM-administered Lands within the Analysis Area.

NSO Site Name MSNO	Nest Patch Acres				Core-Use Area Acres				Home Range Acres			
	BLM Lands	**NRF**	**Burnt NRF-Foraging**	**Dispersal-only**	**BLM Lands** (% of 500 acres)	**NRF** (% of 500 acres)	**Burnt NRF-Foraging**	**Dispersal-only**	**BLM Lands** (% of 2,895 acres)	**NRF** (% of 2,895 acres)	**Burnt NRF-Foraging**	**Dispersal-only**
BARE FOX **0384**	68	64	0	4	340 (68%)	239 (48%)	14	71	2,212 (76%)	954 (33%)	78	562
BOB BUTTE **4364**	70	29	0	15	451 (90%)	169 (34%)	6	96	1,709 (59%)	589 (20%)	116	474
BRITT CREEK **2143**	70	15	0	22	340 (68%)	66 (13%)	0	114	694 (24%)	103 (4%)	29	183
BURNT CREEK **3683**	70	0	0	0	502 (100%)	0 (0%)	0	0	2,729 (94%)	10 (0.3%)	120	12
CAVITT CREEK **1549**	59	0	0	32	247 (49%)	41 (8%)	0	71	753 (26%)	254 (9%)	0	274
CONLEY CREEK **1195**	33	5	23	0	276 (55%)	110 (22%)	60	14	1,564 (54%)	434 (15%)	215	75
EF ROCK CREEK 0356	30	0	0	0	234 (47%)	0 (0%)	0	0	597 (21%)	0 (0%)	0	0
ENGLES CREEK **2104**	66	31	0	34	344 (69%)	137 (27%)	0	112	786 (27%)	358 (12%)	0	192
FIELD CREEK **2202**	13	1	0	0	125 (25%)	48 (9%)	0	10	804 (28%)	358 (12%)	12	214
FRACTURE CREEK **3265**	70	39	22	0	487 (97%)	224 (45%)	73	93	1,422 (49%)	836 (29%)	87	321
FRENCH CREEK **4014**	13	1	0	0	401 (80%)	312 (62%)	0	0	1,065 (37%)	363 (13%)	87	67
GREENMAN CREEK **2532**	69	66	0	1	356 (71%)	160 (32%)	0	87	1,340 (46%)	474 (16)	0	337

NSO Site Name MSNO	Nest Patch Acres				Core-Use Area Acres				Home Range Acres			
	BLM Lands	NRF	Burnt NRF-Foraging	Dispersal-only	BLM Lands (% of 500 acres)	NRF (% of 500 acres)	Burnt NRF-Foraging	Dispersal-only	BLM Lands (% of 2,895 acres)	NRF (% of 2,895 acres)	Burnt NRF-Foraging	Dispersal-only
GREENTHUNDER **3099**	70	33	0	10	380 (76%)	108 (21%)	0	161	1,219 (42%)	487 (17%)	0	415
GRIZZLEY CREEK **1896**	70	68	0	0	367 (73%)	214 (43%)	0	23	1,586 (55%)	1,124 (39%)	0	127
HARRINGTON CREEK **0358**	70	0	0	0	391 (78%)	0 (0%)	0	0	1.075 (37%)	0 (0%)	0	21
HARRINGTON TRIB **0382**	70	0	0	0	353 (70%)	0 (0%)	0	0	1,257 (43%)	32 (1%)	14	81
HIATUS CREEK **1975**	54	0	0	7	269 (54%)	0 (0%)	1	22	1,245 (43%)	141 (5%)	143	22
HILL CREEK **0383**	61	5	24	0	371 (74%)	103 (21%)	67	0	1,406 (49%)	271 (9%)	170	82
HONEY CREEK **0510**	70	0	0	0	313 (62%)	0 (0%)	0	0	1,229 (42%)	0 (0%)	67	87
ITTY BITTY EMILE **0426**	3	1	0	2	137 (27%)	64 (13%)	0	72	1,019 (35%)	571 (20%)	0	407
KELLY CREEK **1794**	70	0	0	0	360 (72%)	0 (0%)	0	0	1,235 (43%)	54 (2%)	0	0
KELLY GREEN **2053**	61	0	0	0	274 (55%)	0 (0%)	0	0	1,308 (45%)	0 (0%)	0	0
LITTLE CAVITT **4017**	70	50	0	0	444 (88%)	270 (54%)	0	2	2,395 (83%)	1,354 (47%)	0	359
LITTLE HONEY **3997**	70	0	0	0	407 (81%)	0 (0%)	0	4	1,574 (54%)	231 (8%)	143	77
LOOKOUT CANYON **4015**	64	64	0	0	297 (59%)	244 (49%)	0	0	1,161 (40%)	825 (29%)	0	47
LOWER JIM CREEK **2154**	51	12	0	11	252 (50%)	73 (14%)	0	110	836 (29%)	167 (6%)	0	440
LOWER STONEY CREEK **0357**	56	0	0	0	299 (60%)	0 (0%)	0	0	1,434 (50%)	0 (0%)	0	20
MACE MOUNTAIN **2531**	70	0	0	0	382 (76%)	0 (0%)	0	0	1,519 (52%)	54 (2%)	0	42

NSO Site Name MSNO	Nest Patch Acres				Core-Use Area Acres				Home Range Acres			
	BLM Lands	**NRF**	**Burnt NRF-Foraging**	**Dispersal-only**	**BLM Lands** (% of 500 acres)	**NRF** (% of 500 acres)	**Burnt NRF-Foraging**	**Dispersal-only**	**BLM Lands** (% of 2,895 acres)	**NRF** (% of 2,895 acres)	**Burnt NRF-Foraging**	**Dispersal-only**
MELLOW MOON **2054**	70	0	0	9	425 (85%)	266 (53%)	0	65	1,369 (47%)	869 (30%)	0	244
MILLER CREEK **2085**	61	0	11	0	321 (64%)	62 (12%)	21	65	1,286 (44%)	167 (6%)	64	275
NF CALAPOOYA **2530**	48	0	0	0	112 (22%)	111 (22%)	0	0	275 (10%)	207 (7%)	0	4
NO BRIDGE **3996**	70	0	0	15	319 (63%)	166 (33%)	0	99	1,168 (40%)	569 (20%)	83	204
PEBBLE CREEK **2055**	70	4	27	0	329 (66%)	71 (14%)	49	42	1,636 (57%)	495 (17%)	139	204
POND VIEW **2192**	66	1	11	0	365 (73%)	49 (10%)	34	0	1,581 (55%)	341 (12%)	139	65
ROOFTOP **3262**	49	0	0	0	229 (46%)	0 (0%)	5	0	1,395 (48%)	26 (1%)	46	3
SAMS PIT **1927**	27	0	0	0	170 (34%)	6 (1%)	20	0	1,238 (43%)	266 (9%)	110	101
SCAREDMAN **0597**	70	57	0	11	501 (100%)	307 (61%)	0	172	2,506 (87%)	1,223 (42%)	4	950
SCAREDMAN CREEK **0309**	46	45	0	0	315 (63%)	301 (60%)	0	0	1,901 (66%)	1,143 (40%)	0	450
SCOTTS TERRACE **4013**	62	0	0	0	339 (67%)	0 (0%)	0	0	1,142 (39%)	44 (2%)	5	33
SHELTER RIDGE **3999**	42	42	0	0	260 (52%)	134 (27%)	0	18	1,415 (49%)	444 (15%)	9	421
SHIVIGNY **2536**	70	45	0	20	501 (100%)	298 (59%)	0	170	2,000 (69%)	1,119 (39%)	1	711
SHOUP CREEK **0511**	70	0	0	0	347 (69%)	0 (0%)	0	64	1,327 (46%)	0 (0%)	0	122
SMITH SPRINGS **2287**	53	0.2	9	0	369 (74%)	36 (7%)	66	0	1,711 (59%)	575 (20%)	205	17
SOUTH SUSAN **4018**	70	58	0	10	499 (99%)	360 (72%)	0	73	1,797 (62%)	1,174 (41%)	105	323

NSO Site Name MSNO	Nest Patch Acres				Core-Use Area Acres				Home Range Acres			
	BLM Lands	**NRF**	**Burnt NRF-Foraging**	**Dispersal-only**	**BLM Lands** (% of 500 acres)	**NRF** (% of 500 acres)	**Burnt NRF-Foraging**	**Dispersal-only**	**BLM Lands** (% of 2,895 acres)	**NRF** (% of 2,895 acres)	**Burnt NRF-Foraging**	**Dispersal-only**
STEAMBOAT INN **0547**	70	0	13	0	502 (100%)	74 (15%)	150	38	2,615 (90%)	371 (13%)	787	219
STONEY CREEK **0354**	70	0	0	0	458 (91%)	0 (0%)	0	0	1,229 (42%)	56 (2%)	24	29
SURPRISE CREEK **2084**	38	0	0	2	261 (52%)	127 (25%)	20	63	1,544 (53%)	886 (31%)	22	403
SUSAN CREEK **1928**	70	0	27	0	487 (97%)	103 (21%)	145	3	1,837 (63%)	269 (9%)	212	9
SWIFT COUGAR **2152**	67	0	0	0	344 (69%)	0 (0%)	0	0	1,315 (45%)	130 (5%)	99	128
TAYLOR CREEK **0359**	58	0	0	0	305 (61%)	0 (0%)	0	0	1,415 (49%)	0 (0%)	0	187
THUNDER BOB **0235**	64	0	0	0	351 (70%)	234 (47%)	2	26	2,150 (74%)	1,012 (35%)	175	396
TRAPPER CREEK **0311**	70	0	0	0	434 (86%)	306 (61%)	0	59	1,546 (53%)	985 (34%)	10	275
WAPITI CREEK **0350**	58	0	0	0	321 (64%)	223 (44%)	0	34	1,868 (65%)	1,166 (40%)	34	362
WILLIAMS RIDGE **4019**	70	0	12	0	466 (93%)	126 (25%)	40	80	2,169 (75%)	391 (14%)	172	419

Table E-2 presents a summary of NRF habitat conditions within the 54 northern spotted owl sites presented in **Table E-1**. A core-use area is considered habitat-limited at less than 50 percent (250 acres) of NRF habitat and a home range is considered habitat-limited at less than 40 percent (1,158 acres) of NRF habitat.

Table E-2. Summary of NRF Habitat Conditions for Northern Spotted owl Sites within the Analysis Area.

NSO Spatial Scale	Number of NSO Sites								
	No Habitat	No NRF	1< 10% NRF	10<20% NRF	20<30% NRF	30<40% NRF	40<50% NRF	50+% NRF	Not Habitat-Limited
Nest Patch	21	30	8	1	1	0	3	11	
Core-Use Area	14	17	5	6	9	3	6	8	8
Home Range	2	7	18	14	3	8	4	0	4

Number of sites with no NRF at both the nest patch and core-use area spatial scales: 17.
Number of sites with no NRF at the nest patch, core-use area, and home range spatial scales: 7.

Northern Spotted Owl Site Viability Evaluation

The analysis for site occupancy of northern spotted owls was conducted using GIS data from the Roseburg BLM district Northern Spotted Owl database (2020). There are 54 northern spotted owl home ranges within the analysis area (Table E-1). Twenty-seven (27) sites have an unknown occupancy status because survey effort was not completed in these areas. The BLM completed protocol surveys at 25 of the 54 sites in 2019-2020 prior to the fire event which resulted in 9 sites with no detections, 5 sites with incidental detections of spotted owls, and 11 sites with occupied status (Table E-3).

Site Viability Evaluation

This site viability analysis is used to evaluate if a site could still reasonably support northern spotted owls following the Archie Creek Fire and to determine where to implement PDFs and the Situational Management Approach. Given the scale and severity of the Archie Creek Fire, the BLM presumes that some of the spotted owl sites were rendered uninhabitable for spotted owl occupancy in their post-fire condition. This evaluation is to determine which of those sites are and which are not expected to support spotted owls on a minimal level (i.e., can a spotted owl reasonably survive at the site). However, this evaluation does not rate the habitat-fitness or how well spotted owls would fare at those sites.

Habitat conditions were estimated through GIS analysis of various post-fire imagery layers (e.g., natural color, infrared, LiDAR, etc.) and limited field reconnaissance due to time constraints. For this Assessment, site viability was based on amount of NRF habitat and/or NRF in combination with supporting habitat (i.e., dispersal-only, burnt NRF-foraging) available to support northern spotted owls at the nest patch, core-use area, and home range scales. Some sites would require further field reconnaissance to verify habitat conditions.

A "viable" site would be expected to, at a minimum, support activities associated with spotted owl survival (roosting, foraging and dispersal activities) and does not necessarily account for supporting nesting activities at any of the spatial scales.

The BLM determined the assumptions by reviewing the distribution of post-fire habitat within the 54 northern spotted owl sites and placed the greatest emphasis on the core-use area. Based on local knowledge, a minimum NRF threshold of eight (8) percent (40 acres) at the core-use area scale was used based on pre-fire occupancy data within the analysis area, where a pair of spotted owls had been occupying the Harrington Creek (MSNO 0358) site in 7 of the last 10 years while one of its core-use

areas contained 8 percent (40 acres) NRF. Based on this Harrington Creek information, the BLM considered that a core-use area that contained at least 8 percent NRF following the Archie Creek Fire could also be occupied by resident spotted owls – i.e., a core with at least 8 percent NRF would be viable.

Site Viability Criteria

For this analysis, the following criteria were used to determine site viability:

- **Not Viable**
  1. No green, intact NRF at any spatial scale (patch, core-use area, or home range).
  2. No green, intact NRF in nest patch and core-use area.
  3. NRF < 8 percent of core-use area and NRF <10 percent of home range.

- **Viable**
  4. NRF ≥ 25 percent in core-use area.
  5. NRF is between 8 percent and 25 percent in core-use area and > 100 acres of dispersal-only in core-use area.

- **Unknown Viability**
  6. Does not meet criteria 1-5 above.

Viability Results Summary

Based on estimated post-fire conditions, sufficient habitat remains in 24 sites and are considered still to be viable for supporting spotted owl survival while 18 sites were determined to no longer be viable because they do not contain sufficient functional habitat for the northern spotted owl (Table E-3 and Table E-4). For the remaining 12 sites, it is unknown if there is sufficient habitat to support northern spotted owls; each site needs further assessment after field reconnaissance of habitat conditions and spotted owl surveys. Implementation of PDFs and the Situational Management Approach would apply to viable sites and to the sites within an unknown site viability determination.

Table E-3. Summary of Site Occupancy Status and Site Viability based on Preliminary Estimates of Habitat Conditions within Known Northern Spotted Owl Sites in the Action Area.

Site Occupancy Status	Not Viable	Unknown	Viable	Total
Occupied	4	4	3	**11**
Incidental	1	0	4	**5**
No Detections	6	2	1	**9**
Unknown – Not Surveyed	7	6	16	**29**
Total	***18***	***12***	***24***	***54***

1. Occupancy status based on survey results conducted in 2019-2020 using the *Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls* (USDI FWS 2012).
   Unknown = no survey effort completed and therefore, status is unknown and assumed occupied.
2. **Not Viable** = site does not contain sufficient (e.g., < 8 percent NRF core and < 10 percent NRF home range) habitat to support NSO roosting, foraging and dispersal activities.
   Viable = site contains sufficient (e.g., > 25 percent NRF; or NRF between 8-25 percent and > 100 acres of dispersal-only in core) habitat available to support at a minimum roosting, foraging and dispersal activities and does not necessarily account for supporting nesting activities.
   Unknown = unknown if sufficient habitat is available to support NSO. Field reconnaissance is needed to make further assessment.

Table E-4. Summary of NSO Site Viability Evaluation.

NSO Site *(MSNO, Site Name)*	Occupancy *(2019-2020)*	Viability	NRF *(acres)*			NRF *(% core)*		Dispersal-only Core *(acres)*
			Nest Patch	*Core*	*Home Range*	*Core*	*Home Range*	
0235 THUNDER BOB	Incidental	Viable	38	234	1012	47%	35%	26
0309 SCAREDMAN CREEK	Unknown	Viable	45	301	1143	60%	39%	0
0311 TRAPPER CREEK	Unknown	Viable	69	306	985	61%	34%	59
0350 WAPITI CREEK	Unknown	Viable	56	223	1166	44%	40%	34
0354 STONEY CREEK	Unknown	Not Viable	0	0	56	0%	2%	0
0356 EF ROCK CREEK	Unknown	Not Viable	0	0	0	0%	0%	0
0357 LOWER STONEY CREEK	Unknown	Not Viable	0	0	0	0%	0%	0
0358 HARRINGTON CREEK	**Occupied**	Not Viable	0	0	0	0%	0%	0
0359 TAYLOR CREEK	No Detections	Not Viable	0	0	0	0%	0%	0
0382 HARRINGTON TRIB	Unknown	Not Viable	0	0	32	0%	1%	0
0383 HILL CREEK	**Occupied**	Unknown	5	103	271	21%	9%	0
0384 BARE FOX	Incidental	Viable	64	239	954	48%	33%	70
0426 ITTY BITTY EMILE	Unknown	Unknown	1	63	571	13%	20%	71
0510 HONEY CREEK	**Occupied**	Not Viable	0	0	87	0%	3%	0
0511 SHOUP CREEK	No Detections	Not Viable	0	0	0	0%	0%	64
0547 STEAMBOAT INN	Not in Summary	Unknown	1	74	370	15%	13%	38
0597 SCAREDMAN	Not in Summary	Viable	57	307	1223	61%	42%	172
1195 CONLEY CREEK	**Occupied**	Unknown	5	110	434	22%	15%	14
1549 CAVITT CREEK	Unknown	Unknown	0	41	254	8%	9%	71
1794 KELLY CREEK	Unknown	Not Viable	0	0	54	0%	2%	0
1896 GRIZZLY CREEK	Unknown	Viable	68	214	1124	43%	39%	23
1927 SAMS PIT	No Detections	Not Viable	0	6	266	1%	9%	0
1928 SUSAN CREEK	**Occupied**	Unknown	5	103	269	21%	9%	3
1975 HIATUS CREEK	**Occupied**	Not Viable	0	0	141	0%	5%	22
2053 KELLY GREEN	**Occupied**	Not Viable	0	0	0	0%	0%	0
2054 MELLOW MOON	Unknown	Viable	51	266	869	53%	30%	65
2055 PEBBLE CREEK	Unknown	Unknown	4	71	495	14%	17%	42
2084 SURPRISE CREEK	Unknown	Viable	14	127	866	25%	30%	63
2085 MILLER CREEK	Unknown	Unknown	21	62	166	12%	6%	65
2104 ENGLES CREEK	No Detections	Viable	31	137	358	27%	12%	112
2143 BRITT CREEK	Incidental	Viable	15	66	102	13%	4%	114
2152 SWIFT COUGAR	No Detections	Not Viable	0	0	130	0%	4%	0
2154 LOWER JIM CREEK	Unknown	Viable	12	73	167	15%	6%	110
2192 POND VIEW	No Detections	Unknown	1	49	341	10%	12%	0
2202 FIELD CREEK	No Detections	Unknown	1	48	358	10%	12%	10
2287 SMITH SPRINGS	**Occupied**	Unknown	0	36	575	7%	20%	0
2530 NF CALAPOOYA	Unknown	Unknown	48	111	207	22%	7%	0
2531 MACE MOUNTAIN	Unknown	Not Viable	0	0	54	0%	2%	0
2532 GREENMAN CREEK	Unknown	Viable	66	160	474	32%	16%	87
2536 SHIVIGNY	Unknown	Viable	45	298	1119	59%	39%	170
3099 GREENTHUNDER	**Occupied**	Viable	33	108	487	22%	17%	161
3262 ROOFTOP	No Detections	Not Viable	0	0	26	0%	1%	0
3265 FRACTURE CREEK	Unknown	Viable	39	224	836	45%	29%	93
3683 BURNT CREEK	Unknown	Not Viable	0	0	10	0%	0%	0
3996 NO BRIDGE	Incidental	Viable	47	165	569	33%	20%	99
3997 LITTLE HONEY	Incidental	Not Viable	0	0	231	0%	8%	4

NSO Site (MSNO, Site Name)	Occupancy (2019-2020)	Viability	NRF (acres)			NRF (% core)		Dispersal-only Core (acres)
			Nest Patch	Core	Home Range	Core	Home Range	
3999 SHELTER RIDGE	Unknown	Viable	42	134	444	27%	15%	18
4013 SCOTTS TERRACE	No Detections	Not Viable	0	0	44	0%	2%	0
4014 FRENCH CREEK	Unknown	Viable	70	312	363	62%	13%	0
4015 LOOKOUT CANYON	Unknown	Viable	64	244	825	49%	28%	0
4017 LITTLE CAVITT	Unknown	Viable	50	270	1354	54%	47%	2
4018 SOUTH SUSAN	**Occupied**	Viable	58	360	1174	72%	41%	73
4019 WILLIAMS RIDGE	Unknown	Viable	26	126	391	25%	14%	80
4364 BOB BUTTE	**Occupied**	Viable	29	169	589	34%	20%	96

Based on estimated post-fire habitat conditions, four (Harrington Creek, Hiatus Creek, Honey Creek, and Kelly Green) of the nine occupied sites no longer support spotted owls because no functional habitat exists within the core-use area. Based on preliminary habitat estimates, it is unknown if habitat conditions are sufficient to support spotted owls at four other occupied sites (Conley Creek, Hill Creek, Susan Creek, and Smith Springs). Habitat conditions within the remaining three occupied sites (Bob Butte, Green Thunder, and South Susan) have sufficient habitat after the fire event and remain viable (Table E-4). The BLM plans to survey the area in 2021 to determine if spotted owls persist at those sites considered viable or where viability is unknown – contingent on available staffing.

On average, those sites that the BLM considered as not viable for this Assessment have zero (0) NRF in the core-use area (range: 0-6 acres; 0-1percent) and two (2) percent (range: 0-266 acres; 0-9 percent) in the home range (Table E-5). Sites the BLM considered as viable and spotted owl use was reasonably likely to occur have, on average, 42 percent (range: 66-360 acres; 13-72 percent) NRF in the core and 27 percent (range: 102-1354 acres; 4-47 percent) NRF in the home range (Table E-5).

Table E-5. Summary Statistics of NSO Sites based on Viability Evaluation.

Viability	Summary Statistic	NRF (acres)			NRF (% core)		Dispersal-only (Core acres)
		Nest Patch	Core	Home Range	Core	Home Range	
Not	***Mean =***	**-**	**0**	**63**	**0%**	**2%**	**5**
	Minimum =	-	-	-	0%	0%	-
	Maximum =	-	6	266	1%	9%	64
	Count =	18	18	18	18	18	18
Viable	***Mean =***	**45**	**211**	**775**	**42%**	**27%**	**72**
	Minimum =	12	66	102	13%	4%	-
	Maximum =	70	360	1,354	72%	47%	172
	Count =	24	24	24	24	24	24
Unknown	***Mean =***	**8**	**73**	**359**	**14%**	**12%**	**26**
	Minimum =	-	36	166	7%	6%	-
	Maximum =	48	111	575	22%	20%	71
	Count =	12	12	12	12	12	12
ALL	***Mean =***	**22**	**110**	**445**	**22%**	**15%**	**39**
	Minimum =	-	-	-	0%	0%	-
	Maximum =	70	360	1,354	72%	47%	172
	Count =	54	54	54	54	54	54

Implementation of the Situational Management Approach (Appendix B, Table B-1, WL-1) and additional PDF (Appendix B, Table B-1, WL-2) would reduce the removal of NRF and dispersal-only habitats within occupied nest patches or core use areas. In addition, salvage and large-scale hazard tree removal would occur only in stands or portions of stands that are no longer functional NRF or dispersal-only habitats post-fire. Imminent hazard trees would be removed from capable: burnt NRF or post-fire foraging (capable: burnt NRF < 150 feet from green, intact NRF) within 150 feet of roads and infrastructure (e.g., heliponds, pump chances, recreation sites, adjacent home-sites, etc.). However, functioning NRF and dispersal-only habitats, and burnt NRF-foraging that is not adjacent to roads would be maintained not only within occupied sites or unsurveyed habitat, but in the action area.

Appendix F – Bureau Sensitive & Bureau Strategic Wildlife Species

ISSSP List Date: February 25, 2019 (IM-OR-2019-003)

The proposed action would not change the likelihood of or need for Endangered Species Act (ESA) listing of any species as identified in BLM Manual 6840 due to the nature, scope, duration, distribution, and timing of the site-specific project. This appendix provides a summary of the analysis conducted for special status wildlife species. Appendix C includes rationale for not considering species in detail. Special status species potentially affected by proposed actions are assessed in Table F-1.

Except for the northern spotted owl, the Archie Creek Fire Perimeter is considered the project area for this evaluation of Special Status wildlife species. Table F-1 includes special status species which are documented or suspected to occur within the Archie Creek Fire perimeter.

On BLM-administered lands, the BLM shall manage Bureau sensitive species and their habitats under the 6840 Policy (§ .2A1C) to minimize or eliminate threats affecting the status of the species or to improve the condition of the species habitat, by:

1. Determining, to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and evaluating the significance of BLM-administered lands and actions undertaken by the BLM in conserving those species.
2. Ensuring that BLM activities affecting Bureau sensitive species are carried out in a way that is consistent with its objectives for managing those species and their habitats at the appropriate spatial scale.
3. Monitoring populations and habitats of Bureau sensitive species to determine whether species management objectives are being met.
4. Working with partners and stakeholders to develop species-specific or ecosystem-based conservation strategies.
5. Prioritizing Bureau sensitive species and their habitats for conservation action based on considerations such as human and financial resource availability, immediacy of threats, and relationship to other BLM priority programs and activities.
6. Using Land and Water Conservation Funds, as well as other land tenure adjustment tools, to acquire habitats for Bureau sensitive species, as appropriate.
7. Considering ecosystem management and the conservation of native biodiversity to reduce the likelihood that any native species would require Bureau sensitive species status.
8. In the absence of conservation strategies, incorporate best management practices, standard operating procedures, conservation measures, and design criteria to mitigate specific threats to Bureau sensitive species during the planning of activities and projects. Land Health Standards should be used for managing Bureau sensitive species habitats until range-wide or site-specific management plans or conservation strategies are developed. Off-site mitigation may be used to reduce potential effects on Bureau sensitive species.

BLM districts are responsible to assess and review the effects of a proposed action on *Bureau Sensitive* species (IM-OR-2003-054). To comply with Bureau policy, Districts may use one or more of the following techniques:

1. Evaluation of species-habitat associations and presence of potential habitat.
2. Application of conservation strategies, plans, and other formalized conservation mechanisms.
3. Review of existing survey records, inventories, and spatial data.

4. Utilization of professional research and literature and other technology transfer methods.
5. Use of expertise, both internal and external, that is based on documented, substantiated professional rationale.
6. Complete pre-project survey, monitoring, and inventory for species that are based on technically sound and logistically feasible methods while considering staffing and funding constraints.

When Districts determine that additional conservation measures are necessary, options for conservation include, but are not limited to modifying a project (e.g., timing, placement, and intensity), using buffers to protect sites, or implementing habitat restoration activities (IM-OR-2003-054).

Effects for each species noted in Table F-1 is based on known occurrences (or lack of known occurrences), migration, habitat presence/absence, and habitat use.

Table F-1. Effects of the Archie Creek Fire Salvage Harvest Plan on Special Status Wildlife Species.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
Bald Eagle *Haleaeetus leucocephalus*	Late-successional forests with multi-canopies, generally within one mile of a major water source. There are two known territories and three suspected territories within the action area (GeoBOB database query; January 20, 2021). In addition, a pair of courting bald eagles were observed on January 23, 2021 in unit 26-2-13C (pers. comm. Gayner, 2021). Post-fire evaluations at the two known nest sites indicate that the nest trees are in high severity burn areas and nest structures no longer exist (pers. comm. Cross, 2021). However, both pairs of eagles continue to be observed in their respective territories. Trees suitable for nesting have persisted along Rock Creek and the North Umpqua River. Monitoring of the pairs would determine if nesting. There are 67 proposed salvage units for Alternative 2 and 68 for Alternative 3 that are within 0.25 miles of verified fish-bearing stream that eagles would expect to forage on.	Documented	No disruption to foraging eagles due to harvest activities.	No affect to nest sites due to implementation of PDF (Appendix B, Table B-1, WL 4-6). Disruption may occur to eagles foraging along river corridors due to harvest activities on units within 0.25 miles of primary and secondary foraging habitat.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Black Swift *Cypseloides niger*	Strongly associated with waterfalls in mountainous areas. It is considered primarily a mountainous species, occurring over a range of habitats, particularly over rugged terrain and coastal cliffs. Black Swifts nest on canyon walls near water, sheltered by overhanging rock or moss, preferably near waterfalls or on sea cliffs (Stone 2007, p. 8). The nearest known colony of Black Swifts is located on the Roseburg District approximately 1.6 miles south of the Archie Creek Fire Perimeter on the Umpqua NF at Grotto Falls (ORBIC database query, January 20, 2021). There are 45 known waterfalls within the Archie Creek Fire perimeter, but habitat conditions are unknown at these waterfall sites. It is presumed that some may not provide suitable habitat for the species. There are no waterfall sites within a proposed salvage unit.	Documented	No Effect	No Effect	No Effect	No Effect
Bufflehead *Bucephala albeola*	A small diving duck that breeds near ponds, lakes, or slow-flowing rivers. Utilize cavities excavated by Northern Flickers for nesting (Cornell Lab 2020a). Isolated breeding populations occur in Oregon, but these are rare and local, primarily located in the Cascade mountains (Gauthier, 2020). The nearest locations of a bufflehead is >27 miles to the east of the Archie Creek Fire perimeter and > 33 miles NNW of the Archie Creek Fire perimeter (GeoBOB & ORBIC database queries, January 20, 2021). Migrant observations during the fall have been documented along the I-5 corridor in Sutherlin, Roseburg, and Winston, >13 miles from the Archie Creek Fire perimeter (I-Naturalist query, January 20, 2021). There are 58 waterbody features that are lakes, ponds, or reservoirs within the Archie Creek Fire perimeter.	Suspected	Habitat would persist in current conditions.	Except where hazard tree removal would occur around ponds and within RR near salvage units, RR buffer would protect rivers/streams and bank habitat. Retaining trees with cavities around waterbodies maintain nesting habitat and reduce the potential for direct harm to the species during the	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
				nesting season (late winter to April).		
Coastal Marten *Martes caurina*	The marten is associated strongly with mature conifer forests characterized by closed canopies, large trees, and abundant snags and down woody material (Zielinski et al. 2001 p. 478) with a dense shrub component (Zielinski et al. 2001 p. 485). On October 9, 2018, the USFWS proposed to list the coastal distinct population segment (DPS) of Coastal (Humboldt) Marten, as federally threatened (83 FR 50574). A final decision for its listing status as a threatened species under the Endangered Species Act of 1973 was published on October 8, 2020 and the rule is effective as of November 9, 2020. (85 FR 63806). The current, extant range of the Coastal Marten is approximately 47 miles SW of the Archie Creek Fire Perimeter and is not within Roseburg District BLM-administered lands and its administrative boundary.	Out of Range of DPS	No Effect	No Effect	No Effect	No Effect
Columbian White-Tailed Deer *Odocoileus virginianus leucurus*	Oak woodland habitats near and north of Roseburg, OR Bottomlands, oak/hardwood forests; cover for fawning. (USDI FWS 1983). Columbian white-tailed deer (CWTD) fawning habitat is found on BLM—administered lands is predominantly on the BLM's North Bank Habitat Management Area, greater than three miles west of the Archie Creek Fire Perimeter. Approximately 3,050 acres of the CWTD Douglas County Distinct Population Segment (DPS) range overlaps along the western edge of the fire area, including 406 acres (13 percent) of BLM-administered lands. Of the 406 acres, 30 acres in an early-successional habitat favorable to deer. CWTD are expected to use this habitat along the edge of the fire area as vegetation and oak regenerate in areas that burned at high severity. The proposed action includes 17 acres of salvage unit 25-3-5A and its associated 10 acres of yarding corridor. However, this unit was burned at low severity and therefore, implementation of PDF would exclude salvage of this unit. CWTD habitat is expected to increase as vegetation (i.e., grass, forbs, and shrubs) recovers on the 3,050 acres that is currently in early-seral conditions on the DPS that overlaps the fire area.	Documented	No Effect	No Effect	No Effect	No Effect
Crater Lake Tightcoil *Pristiloma crateris*	Perennially wet areas in late-seral forests above 2,000 feet elevation and east of Interstate-5; seeps, springs, riparian areas (Duncan et al. 2003, pp. 20-21, 39). *Also listed as a Bureau Sensitive Species on the SSS list.* The proposed action is located east of I-5 with elevations at or above 2000 feet within riparian areas and perennially wet areas. Although habitat existed prior to the Archie Creek fire, it is unlikely that habitat with riparian vegetation remains in areas that burned at high severity, however habitat may be present in low to moderate severity burn areas. The closest suspected observations of Crater Lake tightcoil is about 13	Documented	Habitat would persist in current conditions.	Implementation of PDF would maintain stands burned at low to moderately burned severity that would contain desired habitat conditions. RR buffers where hazard tree removal is not occurring would maintain	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
	miles to the south of the Archie Creek Fire Perimeter and over 19 miles to the SE on the Umpqua National Forest. (GeoBOB and ORBIC database queries, January 20, 2021).			microsite conditions around waterbodies and RR areas.		
Fender's Blue Butterfly *Plebejus icarioides fender* *Also Fed. Endangered under ESA*	Fender's blue butterfly is strongly associated with Kincaid's lupine and native prairie habitat. Little native prairie habitat occurs on Federal lands in Douglas County. The District's Kincaid's lupine sites were examined in 1990 by a species expert (Paul Hammond, Oregon State University). He concluded that the District populations of lupine were too small to support Fender's blue butterfly (*pers. comm.* with R. Holmes, 1990). There is a 2014 observation of Fender's Blue Butterfly approximately 23 miles N in the NW Oregon District (T20S-R04W-Sec. 29) (GeoBOB & ORBIC database queries, January 22, 2021). There is no Kincaid's lupine habitat or host plants for butterfly larvae known in the Archie Creek Fire Perimeter.	No Habitat	No Effect	No Effect	No Effect	No Effect
Fisher *Pekania pennanti*	Fishers are consistently associated with low- to mid-elevation coniferous and mixed conifer and hardwood forests with characteristics of mid- and late-successional forests (e.g., diverse successional stages, moderate to dense forest canopies, large-diameter trees, coarse downed wood, and singular features of large snags, tree cavities, or deformed trees). Throughout their range, fishers are obligate users of tree or snag cavities for denning (85 FR 29538). The USFWS made a final determination on May 15, 2020 (85 FR 29532) to list the Southern Sierra Nevada (SSN) Distinct Population Segment (DPS) of the fisher as an endangered species and that the Northern California-Southern Oregon (NCSO) DPS does not warrant listing under the ESA. The Archie Creek fire area south of the North Umpqua River is located within the boundary of the NCSO DPS. Although fisher have been detected on USFS-administered lands on the Roseburg District, camera traps on BLM-administered lands have not detected a fisher (6/18/2018-8/09/2020 at 31 stations, 2,985 camera days). The fisher detection on USFS was approximately eight miles east of the fire perimeter.	Documented	There would be no hazard tree removal resulting in the loss of trees containing cavities in mid-and late-successional habitat.	Implementation of PDF would maintain unburned, low, and some moderate severity burned forest habitat. Removal of imminent hazard trees in older forest habitat may occur, but the removal of individual trees that may contain cavities, would not change the overall composition of the habitat conditions. RR would provide connectivity between areas of denning and resting habitat.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Foothill Yellow-legged Frog *Rana boylii*	Low gradient streams/ponds; gravel/cobble, bedrock pools (Corkran and Thoms 1996, pp. 112-114). Yellow-legged frogs are documented within Rock Creek and East Fork Rock Creek prior to and during surveys from 2015 – 2020, and within the North Umpqua River as incidental species observations (GeoBOB database query, January 22, 2021). An adult foot-hill yellow-legged frog was observed at Rock Creek campground post-fire, so likely the species continue to persist within the fire perimeter. There are salvage units along Rock Creek and East Fork Rock Creek, where yellow-legged frog habitat is within the RR. Individual hazard trees may be removed in RR, but equipment	Documented	No Effect	RR buffer would protect river, streams, and bank habitat. Equipment would remain on roads during hazard tree removal in RR.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
	would stay on roads, not affecting the river or streams and bank habitat.					
Franklin's Bumblebee *Bombus franklini*	Franklin's Bumble Bee (*Bombus franklini*) was proposed for listing as endangered in southwestern Oregon (84 FR 40006; August 23, 2019). This bumble bee relies upon floral plants and abandoned rodent burrows for its habitat and requires habitat in proximity to water with a sufficient, continuous blooming supply of floral resources throughout the colony season. The proposed action area is within the historical range of the species, however there are no records of the species in the project area. Currently known only from southern Oregon (Diamond Lake) and northern California between the Coast and Sierra-Cascade Ranges. The closest known documentation of this species is west of Sutherlin, at Ford's Pond (Black et al. 2009*),* approximately 14 miles west of the fire perimeter. Franklin's bumblebee habitat is not expected to occur within the proposed salvage units. Therefore, the proposed action would not directly affect the species, but may create more foraging opportunities in the future.	Unknown	Desired habitat conditions would be reliant on natural development.	Openings created by high severity burn and salvage activities would regenerate with flowering vegetation providing an increase in potential foraging habitat as early successional conditions develop.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Fringed Myotis *Myotis thysanodes*	Hibernacula and roost sites include caves, mines, buildings, and large snags (Weller and Zabel 2001, pp. 489-497). Late-successional forest features (e.g., snags or trees with deeply furrowed bark, loose bark, cavities), caves, mines, bridges, and rock crevices. The species has been documented within two miles NW of the Archie Creek Fire perimeter (GeoBOB & ORBIC database queries, January 22, 2020). Steel et. al. 2019 models predict that fringed myotis occupancy is maximized in areas with 100 percent basal area mortality, therefore the Archie Creek fire area would have a positive effect on fringed myotis populations. Large snags produced by the wildfire would increase available roosting habitat for the species.	Suspected	Large snags produced by the fire would persist throughout the action area.	Salvage and hazard tree removal of large snags may remove hibernacula and roost sites. Although some large snags may be removed, implementation of PDFs would maintain snags in aggregates or live trees with cavities or hollows in salvage units. Approximately 11,608 acres (95 percent) of complex early successional habitat containing legacy features (e.g., large snags) would continue to persist within the fire perimeter on BLM-administered lands. Individuals may be harmed if roosting in a hazard tree at time of removal.	Same effects as addressed under Alternative 2 except 11,596 acres (95 percent) of complex early successional habitat containing legacy features (e.g., large snags) would continue to persist within the fire perimeter on BLM-administered lands.	Same effects as addressed under Alternative 2 except 11,551 acres (95 percent) of complex early successional habitat containing legacy features (e.g., large snags) would continue to persist within the fire perimeter on BLM-administered lands.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
Grasshopper Sparrow *Ammodramus savannarum*	Grasslands, prairies, hayfields, and open pastures with little to no shrub cover and some bare soil (The Cornell Lab, 2020b). The nearest known observation of the grasshopper sparrow is about 19 miles west of the Archie Creek Fire Area (GeoBOB & ORBIC database queries, January 22, 2021). There is no open, grassland/pasture-type habitat on BLM-administered lands within the Archie Creek Fire perimeter.	No Habitat	No Effect	No Effect	No Effect	No Effect
Gray Wolf *Canis lupus*	On March 21, 2019, ODFW designated a new Area of Known Wolf Activity (AKWA) in the southern portion of the Indigo WMU – in 2020, this group of wolves became the Indigo Pack after three of their pups survived the winter (ODFW 2020). The proposed project would be within the known range of the endangered gray wolf (*Canis lupus*) in Western Oregon. The Indigo Pack of gray wolves is located more than 11 miles from the east boundary of BLM-administered lands on the Roseburg District. Currently, there would be no disturbance or disruption to denning gray wolves because den site(s) or rendezvous site(s) of gray wolves from the Indigo group have not been located or confirmed on BLM-administered lands. Although camera traps on BLM-administered lands have not detected a gray wolf to date (2/22/2016-present at 98 stations; 10,519 camera days), they are suspected to have traveled/disperse across BLM-administered lands on the Roseburg District based on unconfirmed observations west of Mount Scott (Glide, Oakland, and Dixonville areas). As grasses, forbs, and shrubs re-establish in moderate and high severity burn areas, prey sources (i.e., elk, deer) are expected to increase within the fire perimeter. If gray wolves establish den or rendezvous site(s) in the project area vicinity in the future, then the following PDF would also be applied to avoid disruption to denning wolves: • restrict activities that create noise or visual disturbance(s) above ambient conditions within one mile of known active gray wolf dens or rendezvous sites from April 1 to July 15 (2019 Wolf LOC p. 9).	Documented	Desired open habitat conditions would be reliant on natural development.	Salvage would have an indirect effect by creating open habitat conditions on 4,083acres which would occur primarily in early successional habitat acres (94 percent) that would promote development of grasses, forbs, and shrubs that benefit prey species. Because the salvage and harvest tree removal activities would primarily remove standing dead trees, habitat quality is not expected to change. Removing standing dead trees would offer additional areas for grasses, forbs, and shrubs to establish in the short term.	Same effects as addressed under Alternative 2, but habitat openings would occur on 3,946 acres (73 percent on early successional habitat).	Same effects as addressed under Alternative 2, but habitat openings would occur on 4,291 acres (89 percent on early successional habitat).
Green Sideband *Monadenia fidelis flava*	Coast Range, riparian forests at low elevations; deciduous trees & shrubs in wet, undisturbed forest - low elevation; strong riparian associate (Fallon et al. 2015b, Frest and Johannes 2000). There have been no documented species observed within the Roseburg District, Swiftwater Resource Area, (GeoBOB database query, January 22, 2021).	Out of Range	No Effect	No Effect	No Effect	No Effect
Hairy Water Flea *Dumontia oregonesis*	This water flea is a small (< 2mm) crustacean (cladoceran) that is part of the zooplankton community in seasonal wetlands, vernal pools/ponds, and wet prairie. *D. oregonensis* is documented in the Table Rocks Area on the Medford District BLM in in the NW Oregon District; the species is suspected to occur on Roseburg	Suspected	No Effect	Except where hazard tree removal would occur, RR and no harvest buffers around waterbodies, seeps, and	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
	District BLM as well (Hietala-Henschell & Blevins 2018, pp. 2-5, 12). Associated with vegetation cover > 60 percent in seasonally wet habitats with shallow or poorly drained soils having no surface water inflow. (Hietala-Henschell & Blevins 2018, pp. 2-5, 12). Although it is not known, vernal pools and seasonal wetlands are suspected to occur within the Archie Creek fire perimeter that would serve as habitat for *D. oregenensis*.			springs would protect suitable habitat where they exist. Implementation of PDFs for hazard tree removal would avoid equipment use, except on roads, in the RR or within seasonal wetlands which would avoid soil and/or vegetation disturbance in potential vernal pool habitat.		
Harlequin Duck *Histrionicus histrionicus*	Mountain Streams in forested areas on west slope of the Cascade Mountains in swift, rocky, large streams or rivers. Nest under rock overhangs, vegetation, or streamside debris. Late spring migrant or summer visitor. The North Umpqua River contains suitable nesting and brooding habitat. In the western Cascades, breeding pairs are observed on low to moderate gradient (1-7 percent) third to fifth-order streams in the western hemlock zone (Dowlan 2003, p. 116). Nesting has not been documented in the Umpqua River Basin (Dowlan 2003, p. 116) or on District. But broods have been documented on the North Umpqua River on the Umpqua National Forest, approximately 7- 12 miles east of the Archie Creek Fire perimeter (ORBIC query, January 25, 2020). The closest documented sighting is about one-tenth mile west of the confluence of Rock Creek and the North Umpqua River (GeoBOB database query, January 25, 2021). There are no proposed salvage units adjacent to the North Umpqua River.	Documented	No Effect	Species typically confined to river and stream corridors. Therefore, RR would maintain river, stream, and bank habitat for nesting, brood rearing, and foraging activities.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Highcap Lanx *Lanx alta*	A small limpet (snail) that found in highly oxygenated, swiftly flowing water (McMullen et al. 2017, pp. 3-4). Highcap Lanx has been documented in the mainstem of the Umpqua River, North Umpqua River, South Umpqua River, and Cow Creek (ORBIC database query, January 25, 2020). The nearest location is < 0.5 miles from the fire perimeter on the North Umpqua River. There is habitat for the Highcap Lanx in the North Umpqua River, Rock Creek, and their tributaries within the fire area. Habitat is located within RR, outside of any proposed salvage unit. Individual hazard trees may be removed but would not affect aquatic habitat.	Documented	No Effect	RR buffer would protect river, stream, and bank habitat. Equipment would remain on roads during hazard tree removal in RR.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Lewis' Woodpecker *Melanerpes lewis*	Most common in open woodland habitats (e.g., burns) in and near the Cascade forests near water; primarily breeds in Oregon white oak, ponderosa pine, and riparian cottonwood communities (Marshall et al., 2003, p. 351). Breeding habitat components include open woodland canopy and large diameter dead/dying trees, snag cavities (Tobalske 1997). Large-scaled burned forest,	Suspected	Foraging habitat would improve as snags decay resulting in an increase of prey (e.g., insects). Woodpecker	Salvage and hazard tree removal of large snags may remove foraging. Although some large snags may be removed, implementation of PDFs	Same effects as addressed under Alternative 2 except 11,596 acres (95 percent) of complex early	Same effects as addressed under Alternative 2 except 11,551 acres (95 percent) of complex early

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
	especially ponderosa pine stands, provide open stand conditions favorable for nesting and foraging, as well as maintaining a source population of Lewis woodpeckers (Saab and Vierling, 2001). Casual visitor in the Umpqua Valley and a regular transient in small numbers west of the Cascades. (Marshall et al.2003, p.351). This species is not known to nest in Douglas County, but has been documented wintering in the Umpqua Valley (e.g., regularly along North Bank Road). The closest known observations of Lewis' Woodpecker are 4-14 miles west miles of the Archie Creek Fire Area (GeoBOB & ORBIC data base queries, January 26, 2021). As a result of the Archie Creek fire, there are large diameter snags or dead/dying trees present within moderate and high severity burn areas. Lewis Woodpecker use is expected to increase within these areas.		populations would be expected to increase over the next 5-10 years.	would maintain snags in aggregates within salvage harvest units. Approximately 11,608 acres (95 percent) of complex early successional habitat containing legacy features (e.g., large snags) would continue to persist within the fire perimeter on BLM-administered lands.	successional habitat containing legacy features (e.g., large snags) would continue to persist within the fire perimeter on BLM-administered lands.	successional habitat containing legacy features (e.g., large snags) would continue to persist within the fire perimeter on BLM-administered lands.
Marbled Murrelet *Brachyramphus marmoratus* *Also Fed. Threatened under ESA*	The Marbled Murrelet is associated with old-growth and mature forests for nesting (Evans-Mack et al, 2003; p. 1). Forest stands that provide nesting habitat typically possess a high density of large trees with platforms, have multiple canopy layers, and are typically older. Studies summarized for Oregon indicate that the density of trees with platforms and the number of platforms in general were the most important variables in predicting marbled murrelet nesting habitat at the stand level (2016 FEIS, p. 896). The majority of marbled murrelets nest within 37 miles of the coast, although nests have been documented up to 52 miles inland in Washington and 47 miles inland in Oregon (2016 FEIS, p. 896). The Archie Creek Fire Area is located >59 miles from the coast.	Outside of Distribution Range	No Effect	No Effect	No Effect	No Effect
Northern Spotted Owl *Strix occidentalis caurina* *Also Fed. Threatened under ESA*	Nesting/Roosting habitat for the Northern Spotted Owl is generally mature or older coniferous forest that contains large-diameter trees and snags with nesting structure, is multi-storied, and has sufficient vertical and horizontal cover to provide opportunities for nesting, roosting, and foraging (BLM 2018, pp. 19-22; USFWS 2018, pp. 12-14). Dispersal-only habitat for the northern spotted owl is generally young to mature coniferous forest with a high amount of canopy cover. Refer to Appendices B, C, and E for more detailed analysis.	Documented	Current habitat conditions would persist.	No NRF or dispersal-only would be removed. Although hazard tree removal would modify these habitats, habitat function is not expected to be downgraded at the stand level. Implementation of PDF would mitigate disruption affects at occupied sites or in unsurveyed habitat.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Oregon Red Tree Vole (North Oregon Coast DPS)	Red tree voles are conifer-obligate, arboreal rodents, found in western Oregon south to northwestern California. They are generally associated with old forests, either nesting within or in the vicinity of forests with sufficient structures to support nests. Their diet consists of conifer needles – predominantly Douglas-fir (USFWS 2019, p. i, 26). Approximately 1,019 acres of the North	Out of Range of DPS	No Effect	No Effect	No Effect	No Effect

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
Arborimus longicaudus	Oregon Coast DPS is on Roseburg District BLM located approximately 21 miles north-west of the Archie Creek Fire perimeter.					
Oregon Shoulderband *Helminthoglypta hertleini*	Suitable habitat for the Oregon Shoulderband is rocky areas, including talus deposits and outcrops, which contain stable interstitial spaces large enough for snails to enter. Within rocky habitat, the species is associated with herbaceous vegetation and deciduous leaf litter, generally within 30 meters (98 feet) of stable talus deposits or other rocky areas. The closest known observation was documented in the North Bank Habitat Management Area (NBHMA) >4 miles from the Archie Creek Fire perimeter (GeoBOB database query, January 26, 2021). Rocky habitat is abundant in the action area, but Oregon Shoulderband requires herbaceous vegetation and leaf litter which is not currently present in proposed salvage units that burned at high severity. Protecting and retaining special habitat features, such as rock outcrops and talus deposits, in salvage areas would promote future habitat for the species. Abundant suitable habitat remains within the fire area, outside of salvage units in unburned, low, and moderate severity burned areas within the fire perimeter.	Suspected	No Effect	Use of salvage logging systems may cause ground disturbance on talus deposits where herbaceous vegetation and leaf litter is present.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Oregon Vesper Sparrow *Pooecetes gramineus affinis*	Grassland, farmland, and sage habitats. Dry, open habitat with moderate herb and shrub cover (Jones and Cornely 2002). Breeds west of the Cascades in the Willamette and Umpqua valleys (Marshall et al., 2003, p. 543). Migrants are rare in the Cascades (Marshall et. al., 2003, p.543). The closest known observations of Oregon Vesper Sparrow are located near Cleveland Hill Road (~18 miles W) and Dixonville Road (~11 miles SW) (eBird database query, July 22, 2020). Except for rare migrants, this species is not expected to occur within the proposed action area.	No Habitat	No Effect	No Effect	No Effect	No Effect
Pacific Pallid Bat *Antrozous pallidus*	Occur in the interior valleys of western Oregon (Verts and Carraway 1998). West of the Cascade Range species is restricted to the drier interior valleys of the southern portion of the state. Usually found in brushy, rocky terrain, but has been observed at edges of coniferous and deciduous woods and in open farmland (Verts and Carraway 1998). Hibernacula and roost sites in caves, mines, rock crevices, bridges, hollow trees, and snags (Lewis 1994). Usually, rocky outcroppings near dry open areas; occasionally near evergreen forests. Pallid bats are ground gleaners, foraging primarily on arthropods in areas of low-lying vegetation (Gervais 2016). Foraging habitat and prey base may be significantly reduced by fire (Gervais 2016), so it is unlikely that they are present in the proposed salvage units until low-lying vegetation develops within salvaged or severely burned areas. The Pallid Bat has been documented approximately five miles west from the Archie Creek fire perimeter within the North Bank Habitat Management Area (GeoBOB & ORBIC data query,	Suspected	Desired open habitat conditions would be reliant on natural development.	Salvage may increase foraging habitat by removing snags and thereby, fostering the development of low-lying vegetation in open areas.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
	January 26, 2021). Species occurrence may increase due to an increase of open habitat resulting from salvage within the fire perimeter.					
Purple Martin *Progne subis*	Snags with woodpecker cavities in open habitats (e.g., grasslands, brush lands, open woodlands); typically found in open areas near water (Brown and Tarof 2013, Horvath 2003). Purple Martins using natural cavities in Oregon rely heavily on Douglas-fir snags, specializing in stands killed by fire or flooding (Rockwell 2018, p. 4). There are known Purple Martin colonies located 3-7 miles away to the W and NW of the Archie Creek Fire perimeter. (GeoBOB data query, January 26, 2021). Purple Martin populations are expected to increase within the Archie Creek Fire Area over time due to the availability of snags in open areas.	Documented	Foraging habitat would improve as flying insect populations increase within the fire area. Woodpecker populations would also be expected to increase over the next 1-10 years, which would subsequently increase nesting habitat as woodpeckers excavate cavities later used by nesting purple martins.	Salvage harvest would be neutral because not all snags would be removed within a harvest unit and most salvage would occur in simple early successional habitat. Approximately 11,608 (95 percent) of complex early successional habitat would persist. Retaining dead trees near ridge tops would be beneficial for nesting Martins	Same effects as addressed under Alternative 2, except on 11,596 acres (95 percent) of complex early successional habitat would persist.	Same effects as addressed under Alternative 2, except on 11,551 acres (95 percent) of complex early successional habitat would persist.
Siskiyou Hesperian *Vespericola sierranus*	This species can be found in appropriate habitat in southern Oregon, from Roseburg south to the state border, east of Cave Junction and west of Klamath Falls. Distribution in Oregon includes sites as far north as Myrtle Creek (Hatfield and Jordan 2015). Primarily a freshwater riparian associate, moist habitat, including springs, seeps and deep leaf litter along stream banks and under debris and rocks. Preferably, moist valleys, ravines, gorges or talus sites near the lower portion of slopes. It may occur in areas with running water or alongside streams and spring pools (Stone and Huff 2010). The closest known site of Siskiyou Hesperian is 16 miles SW of the Archie Creek fire perimeter, near Myrtle Creek (GeoBOB database query, January 26, 2021).	Out of Range	No Effect	No Effect	No Effect	No Effect
Siskiyou Mountains Salamander *Plethodon stormi*	Range is southwestern Oregon primarily in the southern Jackson County and extreme southwest Josephine County in Oregon (Olson et al. 2007). Terrestrial salamander found exclusively with rocky substrates (e.g., gravel to talus) usually in association with forested areas with high canopy cover and large conifers (Olson et al. 2007, pp. 13-14). The closest known site of Siskiyou Mountains Salamander is approximately 43 miles SW of the fire perimeter (GeoBOB database query, January 26, 2021).	Out of Range	No Effect	No Effect	No Effect	No Effect
Siskiyou Short-horned Grasshopper *Chloealtis aspasma*	Habitat for the Siskiyou Short-horned Grasshopper includes forest meadows or forest-edges with abundant grass and decaying woody material. Short-horned grasshoppers lay their eggs in in decaying wood. The Siskiyou Short-horned Grasshopper has been documented in Medford District BLM, Rogue-Siskiyou NF, and the Klamath NF; it is suspected to occur in the Roseburg BLM,	Suspected	Desired habitat conditions would be reliant on natural development.	Salvage and large-scale hazard tree removal would create open conditions to foster the development of grasses creating habitat	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
	NW Oregon BLM, and Klamath Falls Field Office (Brenner et al. 2017, p. 4-5). Proposed salvage units which burned at high severity are not expected to have habitat for this species until grass species establish. Roads that are cleared of hazard trees may be open enough to foster the development of grasses creating habitat conditions favorable to this species.			conditions that may be favorable to this species.		
Townsend's Big-eared Bat *Corynorhinus townsendii*	Late-successional forest features (e.g., snags or trees with deeply furrowed bark, loose bark, cavities), caves, mines, buildings, bridges, tunnels. These bats hang from open surfaces, rather than roosting in crevices which make them very susceptible to disturbance wherever they roost (Gervais, 2017). Timber harvest and fire severity would reduce vegetation diversity and related prey abundance for the species within riparian and forested roost sites (Gervais, 2017). Hibernaculum in caves and mines may be degraded from altered temperature or humidity following harvest or fire (Gervais, 2017). Townsend's Big-eared Bat have been observed within the fire perimeter and the nearest known hibernaculum is located on Mount Scott (GeoBOB database query, January 26, 2021).	Documented	No effect.	Hazard tree removal may remove suitable roost trees. Individuals may be harmed if roosting in a hazard tree at time of removal.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Western Bumblebee *Bombus occidentalis*	Western bumble bees require areas with abundant supplies of floral resources blooming from spring to autumn, including lupine and poppies; and they nest primarily underground 6-18 inches in primarily abandoned rodent burrows (Evans et al. 2008, p.6; Jepsen et al. 2014, pp. 3-6). Closest documented observation is approximately seven miles west of the Archie Creek Fire perimeter at NBHMA (GeoBOB database query, January 26, 2020). Openings created by moderate to high severity burn and salvage activities would regenerate with flowering vegetation providing an increase in potential foraging habitat as early seral conditions develop.	Unknown	Desired habitat conditions would be reliant on natural development.	Openings created by high severity burn and salvage and large-scale hazard tree removal activities would regenerate with flowering vegetation providing an increase in potential foraging habitat as early seral conditions develop.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Western Pond Turtle *Actinemys marmorata*	Marshes, ponds, lakes, streams, and rivers with emergent structure (Csuti et al. 1997). Nesting habitat is in areas of high solar exposure and sparse vegetation consisting of grass, forbs, compact soil composed of clay, silt, or sandy loam and sometimes a mix of soil and gravel/cobble (Rosenberg et. al. 2009). There are documented sightings of Western Pond Turtles in riparian areas and ponds within the perimeter of the Archie Creek fire. Most recently, a western pond turtle was observed on 10 September 2020 while the fire was still burning, persisting approximately 52 feet from the edge of salvage unit 25-3-35A. These semi-aquatic turtles can spend more than ten months away from their aquatic environment (nesting, burrowing, and estivating) and may travel as far as 1.2 miles over land. (Horn and Gervais 2018). Hazard tree removal around ponds may improve habitat conditions by increasing the amount of potential solar radiation and thereby would increase occupancy probability at ponds (Horn and Gervais	Documented	No habitat degradation or harm to individuals would occur.	Removal of hazard trees around ponds would remove the potential for down wood to fall into ponds that provide basking habitat for turtles within ponds. Hazard tree removal around ponds may improve habitat conditions by increasing the amount of potential solar radiation and thereby would increase occupancy probability at	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements and Species Status	Present on Action Area?	Impacts to Bureau Sensitive Species			
			Alternative 1	Alternative 2	Alternative 3	Alternative 4
	2018), equipment use and ground compaction during the harvest of upland salvage units and hazard tree removal in RR can disturb or cause harm to nesting, burrowing or estivating turtles. Limiting equipment to roads in RR and around ponds would reduce these impacts.			ponds (Horn and Gervais 2018), Equipment use may cause ground compaction during the harvest of upland salvage units. These activities could cause harm to dispersing, nesting, burrowing, or estivating turtles. Limiting equipment to roads would reduce these impacts.		
Western Ridged Mussel *Gonidea angulata*	Streams of all sizes in low to mid-elevation watersheds inhabiting mud, sand, gravel, and cobble substrates (Duncan 2008); Umpqua River, major tributaries, and possibly smaller creeks. The Western Ridged Mussel has been documented in the North Umpqua River approximately seven miles west of the Archie Creek fire perimeter (GeoBOB and ORBIC database query, January 26, 2021). Because mussels are confined to the stream/river, there are no affects anticipated due to salvage or hazard tree removal.	Suspected	No Effect	No Effect	No Effect	No Effect
White-headed Woodpecker *Picoides albolarvatus*	White-headed woodpeckers are locally found in the Umpqua River Basin and Siskiyou Mtns of SW Oregon. Nest in open stands with high density of snags (Mellen-McLean et al. 2013, pp. 7, 10-14). They are cavity nesting birds strongly associated with coniferous forests dominated by pines (e.g., open ponderosa pine or dry mixed-conifer forest) or recently burned forests. Prefer low to moderate severity burned forests that are adjacent to unburned forests (Fire Science Brief, October 2011). Documented in the Cable Creek Crossing Fire area in 2015, located within one mile of salvage units in 26-02-19 and 26-03-23, 25, and 26.	Documented	Foraging habitat would improve as snags decay resulting in an increase of prey (e.g., insects). Woodpecker populations would be expected to increase within the next 10 years.	Implementation of PDF would exclude salvage in stands favored by this species. Hazard tree removal in low to moderately burned stands may reduce the number of snags available for nesting. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Appendix G – Landbirds

This appendix provides a summary of the analysis conducted for golden eagle, migratory birds, and other landbirds, including birds of conservation concern based on Bird Conservation Region (BCR) 5 (USFWS 2008, p. 24) and focal avian species (based on Altman & Alexander 2012). Of the 26 species of landbirds), the marbled murrelet is listed as a federally threatened species and, the bald eagle and Oregon vesper sparrow are also listed as a Bureau Sensitive Species and addressed in the previous issue not analyzed in detail and in Appendix F. Appendix C includes rationale for not considering species in detail.

The Archie Creek Fire Perimeter is considered the project area for this evaluation of landbird species. Effects for each species noted in Table G-1 is based on known occurrences (or lack of known occurrences), migration, habitat presence/absence, and habitat use.

Table G-1. Summary of Effects of the Archie Creek Fire Salvage Harvest Plan on Landbirds.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
BALD & GOLDEN EAGLE PROTECTION ACT					
Bald Eagle *Haliaeetus leucocephalus*	Also a *Bureau Sensitive Species*; refer to *Appendix F, Table F-1* for habitat requirements and impacts.				
Golden Eagle *Aquila chrysaetos*	Usually associated with open grassland, pasture, and shrub land conditions. In southwestern Oregon, Golden Eagles nest in a variety of trees including ponderosa pine, Douglas-fir, oak species, and madrone (Csuti et al. 1997; Kochert et al. 2002). Nest on cliffs or in the upper one-third of deciduous and coniferous trees on steep (often south facing) slopes, or on artificial structures (e.g., artificial nesting platforms, electricity transmission towers, windmills). On the Roseburg District, solely documented to nest in large conifer trees on steep slopes within late-seral forests near open habitats (e.g., meadows, valleys, and clear-cuts). There are two known historical nest sites located within the Archie Creek Fire Area. OR-GE-0132 is located adjacent to salvage unit 25-3-25A and 25-2-19A, both in severely burned areas. OR-GE-0312 is located within a mile of salvage units 25-3-33 B, C, and D; 25-3-29A; and 1.2 miles from 25-3-33A. Both eagle sites burned at moderate to high severity. Though habitat conditions have not been field verified to date, based on GIS review of post-fire data, it is expected that these sites no longer support nesting golden eagles.	Post-fire conditions would persist. Foraging habitat would improve over time as snags decay and fall to create more open habitat conditions and microsite conditions for prey species.	Salvage or harvest tree removal would not affect functional nesting habitat. Salvage would improve foraging capabilities by opening habitat and fostering the development of vegetation and shrubs that benefit prey species (e.g., rabbits, deer). Retention of snags and green trees would serve as roosting and hunting perches within salvage areas.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
BIRDS OF CONSERVATION CONCERN – based on BCR 5 (USFWS 2008, p. 24)					
Bald Eagle *Haliaeetus leucocephalus*	Also a *Bureau Sensitive Species*; refer to *Appendix F, Table F-1* for habitat requirements and impacts.				
Marbled Murrelet *Brachyramphus marmoratus*	Also a *Bureau Sensitive Species*; refer to *Appendix F, Table F-1* for habitat requirements and impacts.				
Olive-sided Flycatcher *Contopus cooperi*	Associated with early-seral areas associated with natural or man-made openings with tall trees or snags available for perching and singing (Altman and Alexander 2012). Also, will use large canopy openings in late-successional forest habitat (Altman and Alexander 2012). They make use of snags and open areas in recently burned forests for nesting, roosting, and foraging, especially when insect populations are abundant (The Cornell Lab of Ornithology, 2020c). The fire resulted in an increase of early successional habitat with snags and thereby is expected to benefit this species, particularly in areas of mosaic burn (with remaining large green trees) within the action area. Altman and Alexander (2012) recommend in post-fire habitat, to maintain >40 percent as unsalvaged, and where salvage is occurring, retain all trees and snags >51 cm (21 in) dbh and >50	Post-fire conditions would persist. Foraging habitat would improve over time as snags decay and fall to create more open habitat conditions. Increase in insect population would increase foraging habitat.	Salvage and large-scale hazard tree removal of up to 4,083 acres would reduce habitat favorable for flycatchers in areas where all trees/snags are removed. Will benefit from retention of existing green tree and snags. Burned habitat remaining on LSR and RR will continue to persist for the species within the fire perimeter.	Same effects as addressed under Alternative 2 but would occur on 3,946 acres.	Same effects as addressed under Alternative 2 but would occur on 4,291 acres.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
	percent of those 27–50 cm (12–20 in) dbh. Expected to be common within the Archie Creek Fire perimeter.				
Oregon Vesper Sparrow *Pooecetes framineus affinis*	Also a *Bureau Sensitive Species*; refer to *Appendix F, Table F-1* for habitat requirements and impacts.				
American Peregrine Falcon *Falco peregrines anatum*	Cliffs, rock outcrops; open habitats for hunting birds. There are four known nesting territories within the Archie Creek Fire Area. The site and 0.25-mile disturbance buffer for OE-163 (Taylor Creek) are in moderate to high severity burn and overlap with salvage units 25-3-13B, 13C, and 13D. The site and 0.25-mile disturbance buffer for OE-177 (Scotts Terrace) are in moderate to high severity burn with small patches of low severity burn and overlap with salvage units 25-3-35A and 35B. The site and 0.25-mile disturbance buffer for OE-035 (Honey Creek) are in moderate to high severity burn with small patches of low severity burn and are <0.25 mile from unit 26-2-9A (helicopter logging unit) and are ~0.60 mile from the proposed helicopter landing. The site location and 0.25-mile disturbance buffer for OE-184 (Bob Butte) are in mixed severity burn and is <0.10 mile from salvage unit 26-2-19A. These sites are typically monitored annually and BLM plans to maintain that trend.	Burned habitat around known Taylor Creek and Scotts Terrace sites will persist. Overtime, prey species are expected to increase (e.g., woodpeckers and other species associated with burned early seral habitat).	Two sites would be negatively affected by salvage resulting in the loss of roost trees and habitat for prey species in immediate proximity to nest sites. Prey species would recover in 5-10 years after vegetation (e.g., forbs and shrubs) reestablishes that could support prey species (e.g., songbirds). Without the implementation of PDF (Appendix B, Table B-1, WL-7, harvest activities would cause disruption to nesting peregrines potentially causing failure of nest attempts or harm to young that are not yet capable of sustaining strong flight skills.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Purple Finch *Carpodacus purpureus*	Associated with mixed hardwood-conifer forests (Altman and Alexander 2012). Primarily nest in Douglas-fir, pine or spruce but may use oak, maple, and fruit trees. Prefer open areas or edges of low to mid-elevation mixed coniferous-deciduous forests, frequently breeding in mixed conifer-deciduous forest, on edges of bogs, in riparian corridors, deciduous forests, orchards, and other areas with scattered conifers and shrubs (Csuti et al. 1997). Preferred habitat would remain in areas of mosaic burn where there is unburned and low severity burned forest habitat (e.g., typically within sections near/on the fire perimeter).	No habitat modification or disruption would occur.	PDFs would limit affects to preferred habitat. The exception being the removal of imminent hazards trees in low and moderate severity burned forest habitat. However, the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Rufous Hummingbird *Selasphorus rufus*	Primarily associated with forest edges and openings with a diversity of flowering plants for feeding and open space. Frequently occurs in open habitats that are shrub-dominated and late-successional forest with a highly developed and diverse understory of herbaceous plants and shrubs, particularly within large openings. Need flowering plants and shrubs. Rufous hummingbirds have been observed regularly in the Archie Creek Fire area prior to the fire event (Gayner, *pers. comm*., 2021). Populations are expected to increase with regeneration of shrubs and flowering plants in post-fire early seral habitat.	Desired habitat conditions would be reliant on natural development.	Openings created by high severity burn and salvage and large-scale hazard tree activities on 4,083 acres would regenerate with flowering vegetation and shrub species providing an increase in potential foraging habitat as early seral conditions develop.	Same effects as addressed under Alternative 2, but on 3,946 acres.	Same effects as addressed under Alternative 2, but on 4,291 acres.
Willow Flycatcher *Empidonax traillii*	The willow flycatcher is found in willows at the edges of streams flowing through meadows and marshes, but also breeds in thickets along the edges of forest clearings and, generally, in tall, brushy vegetation in the vicinity of water (Csuti et al. 1997). But in the Pacific Northwest, they may also breed in drier scrubby areas (Cornell University Website 2021). Willow flycatchers are also frequently observed during spring migration within clearcuts with an established shrub component (Gayner, pers. obs. 2021). Not a common breeding species within the fire area, but likely to be present where vegetation persists along riparian corridors, ponds, and lakes. Not likely to be present in salvage units resulting from a moderate to high severity burn.	No effects.	Hazard tree removal may reduce or damage habitat conditions around ponds or streams in RR that contain willows and other desirable shrub species. Disruption may cause migrating birds to vacate or avoid areas where hazard tree activities are occurring. During the nesting season, hazard tree removal may damage existing vegetation around pond habitat or RR and therefore cause harm to nests, young, or adult flycatchers.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
FOCAL AVIAN SPECIES – based on Altman & Alexander 2012					
Band-tailed Pigeon *Columba fasciata*	Typically associated with forests over 80 years old. Conifer forest with high canopy cover and hardwood stands (Bottorff 2007). In Oregon, nest primarily in closed Douglas-fir stands with canopy cover above 70 percent (Leonard 1998). Presence is linked to mineral springs (Altman and Alexander 2012, Sanders and Jarvis 2000). Used mineral sites appear to be scarce in western Oregon and are seemingly essential resources for this species (Sanders and Jarvis 2000). Sanders and Jarvis (2003) indicate availability of food sources may be directly related to the declining band-tailed pigeon population in Oregon. Present in action area prior to fire, but sources of mineral springs are not known. Unlikely to occur in salvage units in moderate to high severity burn due to lack of live forested stands over 80 years old or closed conifer stands with >70 percent canopy cover. Implementation of PDF would not remove forested habitat that burned at low to moderate severity.	No modification of habitat would occur.	Implementation of PDF would maintain unburned or low severity burned forest habitat over 80 years old. Removal of imminent hazard trees in older forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Brown Creeper *Certhia americana*	Optimal habitat appears to be mature and old-growth unmanaged forests where large trees and snags for foraging and nesting are relatively abundant due to natural processes (Altman and Alexander 2012). Archie Creek salvage units with moderate to high severity burn may provide suitable habitat for brown creepers within the first few years post-fire, especially if adjacent to intact natural old-growth Douglas fir stands (Poulin et al, 2020). This species is common within the proposed action area prior to the fire and is expected to persist in older forests that did not burn or burned at low moderate severity.	No disruption or habitat modification would occur.	Preferred habitat conditions would be maintained with implementation of PDF that would retain burned stands >80 years old within 500 feet of intact or patches of >80 years old forest habitat. Hazard tree removal may cause disruption nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Black-throated Gray Warbler *(Setophaga nigrescens)*	Uses a wide range of forests, woodlands, and brushy areas at forest edges, including the brushy regeneration in recent clear-cuts. Can be found in deciduous and mixed deciduous – coniferous forests. Dense moist coniferous forests are avoided (Csuti et al. 1997). In low to moderate elevation (1,070-4,192 feet) is strongly associated within unmanaged forest through the Oregon Cascades, most abundant in young (40-80 years) stands with broadleaf trees (Altman and Alexander 2012). Not expected to occur in salvage units that burned at high severity due to lack of forested stands.	No habitat modification or disruption would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Hammond's Flycatcher *Empidonax hammondii*	An aerial insectivore that uses open space beneath the overstory canopy and between trees. Strongly associated with late-successional stands in low to moderate elevation (1,050-3,182 feet) managed forest through the Central Oregon Cascades (Altman and Alexander 2012). It occupies all forest types on the west slope of the Cascade Mountains (Csuti et al. 1997). Not expected to occur in severely burned salvage units due to lack of habitat components associated with mature or old-growth forests. Habitat components may persist in low to moderately burned areas.	No habitat modification or disruption would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Hermit Warbler	Conifer forests with a high level of canopy cover. It is not associated with a particular forest age class and is common in stands greater than 30 years of age and dominated by Douglas-fir	No habitat modification or disruption would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Dendroica occidentalis	where dense canopy provides foraging and nesting habitat (Altman and Alexander 2012). Not expected to occur in severely burned salvage units.		severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.		
Hutton's Vireo *Vireo huttoni*	Strongly associated (i.e., preferentially selected) with pole forest conditions with a deciduous subcanopy and understory among younger and older forested stands in all elevations of managed forests of the central Oregon Coast Range. Not expected to occur in severely burned salvage units. Commonly found within the Archie Creek Fire area prior the fire event. Expected to persist in areas where forest habitat remains.	No habitat modification or disruption would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Olive-sided Flycatcher *Contopus cooperi*	*Also listed as a BIRD OF CONSERVATION CONCERN; refer to relevant section above.*				
Orange-crowned Warbler *Oreothlypis celata*	A foliage-gleaning insectivore associated with dense deciduous shrubs. Reaches peak abundance in early-seral forests once a shrub layer has developed (5-10 years) and before overstory canopy closure sets in (15-20 years). Also occurs in older multi-layered forest conditions where canopy openings have allowed development of a deciduous shrub understory (Altman and Alexander 2012). This common species is not expected to occur in moderate to severely burned salvage units due to lack of an understory shrub layer. Would occur more frequently once the early seral shrub layer is developed in about 5-10 years post-fire.	No habitat modification or disruption would occur.	Hazard tree removal may reduce or damage habitat conditions around ponds or streams in RR that contain willows and other desirable shrub species. Disruption during the nesting season and large-scale hazard tree removal may damage to existing vegetation around pond habitat or RR and therefore cause harm to nests, young, or adults from May - July.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Pacific-sloped Flycatcher *Empidonax difficilis*	Optimal habitat appears to be low elevation (<3,000 feet) riparian forest in late-successional coniferous forest with a deciduous component and/or wet site coniferous trees such as western hemlock and western red cedar. Also, can be found throughout coniferous forests with some open space beneath or in the canopy. Not expected to occur in severely burned Archie Creek Fire salvage units due to desired habitat components (e.g., canopy cover) of intact coniferous forest.	No habitat modification or disruption would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Pacific Wren *Troglodytes troglodytes*	Species is most commonly found in older structurally complex areas in the forest. Requires forest floor complexity - shrubs, root wads, down logs, ferns, and herbaceous vegetation. Not expected to occur in moderate to severely burned salvage units due to lack of forest floor complexity.	No habitat modification or disruption would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-August; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Pileated Woodpecker *Dryocopus pileatus*	Strongly associated with mature and old growth stands (stands ≥ 80 years) with a multi-layered canopy and dependent on large snags and down wood. Nests in large snags and decadent live trees in mature and old-growth forests. Younger forests can be used for foraging if snags and/or down logs are present. Not expected to occur in severely burned salvage units due to lack of live mature and old-growth trees. Although may occur (e.g., forage) on the edge of salvage units that are adjacent to unburned, low severity, or mixed severity older stands.	No habitat modification or disruption would occur.	Preferred habitat conditions would be maintained with implementation of PDF that would retain burned old-growth within 500 feet of intact old-growth. Hazard tree removal in old-growth stands may cause disruption to territorial and/or nesting birds from April-August; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Red Crossbill *Loxia curvirostra*	Optimal habitat is late-successional forest with high productivity of conifer cone-producing trees. Not expected to occur in severely burned salvage units due to lack of live conifer cone-producing trees.	No disruption or habitat modification would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Rufous Hummingbird *Selasphorus rufus*	*Also listed as a BIRD OF CONSERVATION CONCERN; refer to relevant section above.*				
Varied Thrush *Ixoreus naevius*	Mature forests with high canopy closure, high-stem density, multiple tree layers, a deciduous tree component, and a relatively open low understory and forest floor with much debris in patches. Fruit bearing shrub and tree species, and wet sites with deciduous vegetation. Not expected to occur in severely burned salvage units due to lack of mid-story vegetation and high canopy cover.	No disruption or habitat modification would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur, but the removal of individual trees would not change the overall composition of the habitat conditions. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Vaux's Swift *Chaetura vauxi*	Associated with late-successional forests and large, hollow snags used as nest and roost trees. Availability of suitable large hollow snags and trees is a major limiting factor. Not expected to occur in severely burned salvage units due to lack of live canopy cover. Leaving large diameter burnt snags may provide habitat in the future once stands have regenerated.	No disruption or habitat removal would occur.	Removal of imminent hazards trees in forest habitat that burned at low or moderate severity may occur resulting in the removal of individual trees that may contain suitable nesting and roosting components (e.g., tree cavities, broken tops). Hazard tree removal may cause disruption to nesting and/or roosting birds from	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
			April-October; disruption may include causing harm to nests, young, and/or adults.		
Western Bluebird *Sialia mexicana*	Strongly associated and dependent on snags for nesting (Altman and Alexander 2012). In western Oregon, the western bluebird breeds in forest clear-cuts with standing snags, around farms in agricultural lands, in riparian woodlands, and in open oak-ponderosa pine woodlands (Csuti et al. 1997). Likely to be found in severely burned salvage units where snags are retained for nesting and foraging.	No disruption or habitat removal/modification would occur. Open conditions in severely burned managed stands would rely on natural processes as snags/trees fall that would result in openings.	Salvage and large-scale hazard tree removal would remove potential nest structure within high severity burned areas. Salvage and hazard tree removal may cause disruption to nesting and/or roosting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same effects as addressed under Alternative 2.	Same effects as addressed under Alternative 2.
Wilson's Warbler *Wilsonia pusilla*	Nest in low deciduous vegetation in mature conifer forests, and forages in stands with a diverse deciduous shrub and/or mid-canopy layer. Not expected to occur in severely burned salvage units due to lack of a deciduous shrub layer.	No habitat modification or disruption would occur.	The falling of hazard trees would damage or remove potential nest structure (e.g., shrubs) in green stands. Hazard tree removal may cause disruption to territorial and/or nesting birds from April-July; disruption may include causing harm to nests, young, and/or adults.	Same affects addressed under Alternative 2.	Same affects addressed under Alternative 2.
GAME BIRDS					
Band-tailed Pigeon *Columba fasciata*	*Also listed as a FOCAL AVIAN SPECIES; refer to relevant section.*				
Mourning Dove *Zeneida macroura*	Forests, woodland edges, savannas, grasslands, deserts, suburban and urban areas, and agricultural lands. Frequently seen on the Roseburg District along roadsides and forest openings. Nesting may occur on the ground, on ledges, in bushes and in trees (Otis et al. 2008), in edge-habitats between woodlands/shrubs and open areas (Csuti et al. 1997). Generally, avoids extensive forests and wetlands. Not expected to occur in salvage units because they are located within a once extensively forested area.	No Effect	No Effect	No Effect	No Effect
Wood Duck *Aix sponsa*	Nest in tree cavities in the vicinity of wooded swamps, flooded forest, marsh, or ponds. At least 10 acres of wetland or other aquatic habitat in a contiguous block or in isolated parcels, separated by no more than 100 feet of upland habitat, in close	No Effect	No Effect	No Effect	No Effect

Common Name *Scientific Name*	General Habitat Requirements/ Species Status	Impacts to Species			
		Alternative 1	Alternative 2	Alternative 3	Alternative 4
	proximity to nesting habitat is needed. Open water makes up 25 percent of brood-rearing area with the remainder a mixture of shrubs and herbaceous emergent plants and trees (Hepp and Bellrose 2013). There are 46 waterbody features (about 15 acres total) in/within 100 feet of proposed salvage units but none, alone or in isolated parcels, are 10 acres or larger in size for wood duck habitat. Paris Reservoir is the largest waterbody (7 acres) in T26S-R02S-section 13 is 0.7 miles from salvage unit 26-02-14C. Waterbodies within the salvage units are not large enough to support wood ducks, therefore they are not expected within the action area. Hazard tree removal around larger waterbodies would remove individual trees. Retaining special habitat features such as snags and trees with cavities would protect nesting sites and avoid direct harm to individuals that may be nesting.				

Appendix H – Noxious Weeds

Table H-1. Noxious Weed and Nonnative Invasive Plant Species in the Archie Creek Fire Salvage Harvest Plan EA Analysis Area

Species	Common Name	List[1, 2]	EA Analysis Area Acres	Salvage Unit Acres: Alt 2	Salvage Unit Acres: Alt 3	Salvage Unit Acres: Alt 4
Brachypodium sylvaticum	slender false brome	ODA[3] B	11.2	0.9	1.1	0.9
Carduus pycnocephalus	Italian plumeless thistle	ODA B DC[4] B	0.5	0	0	0
Centaurea ×moncktonii	meadow knapweed	ODA B DC B	16.1	4.0	4.0	4.0
Centaurea solstitialis	yellow star-thistle	ODA B DC B, T	1.0	0	0	0
Centaurea stoebe ssp. *micranthos*	spotted knapweed	ODA B, T DC A, T	0.2	0	0	0
Chondrilla juncea	rush skeletonweed	ODA B, T DC B	0.1	0	0	0
Cirsium arvense	Canada thistle	ODA B DC B	22.6	4.5	4.5	4.5
Cirsium vulgare	bull thistle	ODA B DC B	18.0	8.5	8.5	8.5
Crataegus monogyna	oneseed hawthorn	DC B	0.9	0.1	0.1	0.1
Cytisus scoparius	Scotch broom	ODA B DC B	850.1	146.4	148.5	142.4
Cytisus striatus	striated broom	ODA B, T DC A, T	10.9	0	0	0
Daucus carota	Queen Anne's lace	Not listed	6.1	4.0	4.0	4.0
Digitalis purpurea	purple foxglove	Not listed	6.1	4.0	4.0	4.0
Geranium lucidum	shining geranium	ODA B	0.1	0	0	0
Genista monspessulana	French broom	ODA B DC B	1.6	0	0	0

Species	Common Name	List[1, 2]	EA Analysis Area Acres	Salvage Unit Acres: Alt 2	Salvage Unit Acres: Alt 3	Salvage Unit Acres: Alt 4
Geranium robertianum	Robert geranium	ODA B	1.9	0.2	0.2	0.2
Hedera helix	English ivy	ODA B DC B	10.2	0	0	0
Hypericum perforatum	common St. Johnswort	ODA B DC B	31.6	10.8	10.8	10.6
Ilex aquifolium	English holly	DC B	0.4	0.3	0.3	0.1
Lathyrus latifolius	perennial pea	ODA B	9.2	0.7	0.7	0.7
Leucanthemum vulgare	oxeye daisy	Not listed	19.7	7.3	7.3	7.1
Linaria dalmatica	Dalmatian toadflax	ODA B, T	0.1	0	0	0
Mentha pulegium	pennyroyal	DC B	5.1	1.8	1.8	1.8
Phalaris arundinacea	reed canarygrass	ODA B, T	2.3	2.2	2.2	2.2
Polygonum cuspidatum	Japanese knotweed	ODA B DC B, T	0.3	0.1	0.1	0.1
Rubus armeniacus	Himalayan blackberry	ODA B DC B, T	263.6	39.7	40.2	38.4
Rubus laciniatus	cutleaf blackberry	Not listed	1.1	0.1	0.1	0.1
Senecio jacobaea	tansy ragwort	ODA B, T DC B	72.7	15.4	15.4	15.2
Taeniatherum caput-medusae	medusahead	ODA B DC B	0.1	0	0	0
Ulex europaeus	common gorse	ODA B, T DC A, T	0.4	0.2	0.2	0.2
Ventenata dubia	North Africa grass	ODA B	0.5	0	0	0

[1]In Oregon State, A list weeds are weeds of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent. The recommended action is to eradicate A-listed weeds.

B list weeds are weeds of economic importance which are regionally abundant, but which may have limited distribution in some counties. The recommended action is for limited to intensive control at the state, county or regional level as determined on a site specific, case-by-case basis. Where implementation of a fully integrated, statewide management plan is not feasible, biological control (when available) shall be the primary control method.

T list weeds are a designated group of weed species that are selected and will be the focus for prevention and control by the State of Oregon Noxious Weed Control Program. Action against these weeds will receive priority. T designated noxious weeds are determined by the Oregon State Weed Board and ODA is directed to develop and implement a statewide management plan for these weed species. T designated noxious weeds are selected from the A and B lists.

[2]Douglas County noxious weed classification is based on the classification system developed by ODA. Noxious weed designations may be different at the county level depending on how prevalent the selected weed species is in the county. Some species considered noxious weeds by Douglas County are not considered noxious by the state and vice versa.

[3]Oregon Department of Agriculture

[4]Douglas County

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Appendix I – Supporting Data Tables for Archie Creek Fire Salvage and Hazard Tree Removal Analysis

This Appendix contains the supporting data tables for post-harvest activity fuels treatments, road, and harvest analysis.

Table I-1. Age Class and Land Use Allocations of Archie Creek Fire Salvage Proposed Units

EA Unit	10-Year Age Class	Harvest Land Base Land Use Allocation
24-1-31A	60	LITA, TPCC
24-1-31B	50	LITA
24-1-31D	50	LITA, TPCC
24-1-31E	60	LITA, TPCC
25-1-17A	60	LITA
25-1-17B	60	LITA, TPCC
25-1-17C	60	LITA
25-1-17D	110	LITA
25-1-18A	60	LITA
25-1-18B	60	LITA
25-1-18C	90	LITA, TPCC
25-1-19A	60	LITA, TPCC
25-1-19B	60	LITA, TPCC
25-1-21A	60	LITA
25-1-21B	110	LITA
25-1-21C	60	LITA, TPCC
25-1-21D	110	LITA
25-1-26A	60	LITA
25-1-29B	50	LITA, TPCC
25-1-29D	100	LITA, TPCC
25-1-30A	70-100	LITA
25-1-5B	60	LITA
25-1-5C	60	LITA
25-1-6A	50-60	LITA
25-1-6B	60	LITA
25-1-6C	50-60	LITA
25-1-7A	60	LITA
25-1-7B	50-60	LITA
25-1-7C	60	LITA
25-1-7F	60	LITA
25-1-7G	60	LITA
25-2-11B	60	MITA
25-2-11C	60	MITA
25-2-11D	60	MITA
25-2-11E	70	MITA
25-2-13A	60	MITA
25-2-15D	60	MITA, TPCC
25-2-15E	60	MITA, TPCC
25-2-15H	80	MITA, TPCC
25-2-15I	60	MITA
25-2-15J	60	MITA

EA Unit	10-Year Age Class	Harvest Land Base Land Use Allocation
25-2-15K	60	MITA
25-2-17A	50-60	LITA
25-2-17B	60	LITA
25-2-17B	60	LITA
25-2-17C	60	LITA
25-2-17D	50	LITA
25-2-17E	50	LITA
25-2-17F	40	LITA
25-2-17G	60	LITA
25-2-19A	50-60	LITA
25-2-1A	70	LITA
25-2-1B	60	LITA
25-2-1C	60	LITA
25-2-1D	60	LITA
25-2-1H	60	LITA
25-2-21A	70	LITA
25-2-21B	70	LITA, TPCC
25-2-21C	60	LITA, TPCC
25-2-21D	60	LITA, TPCC
25-2-23A	60	MITA, TPCC
25-2-23B	60	MITA
25-2-23C	60	MITA
25-2-23D	60	MITA
25-2-23E	60	MITA, TPCC
25-2-23F	60	MITA, TPCC
25-2-23G	60	MITA
25-2-23H	40 & 60	MITA, TPCC
25-2-23I	60	MITA
25-2-25A	60	LITA
25-2-25B	60	LITA
25-2-25C	60	LITA
25-2-26A	60	LITA
25-2-27A	110	LITA
25-2-29A	60	MITA
25-2-29B	60	LITA, TPCC
25-2-29C	50	LITA
25-2-31A	40	LITA, TPCC
25-2-31B	60	LITA
25-2-33A	50	LITA
25-2-33M	50	LITA
25-2-34A	110	LITA
25-2-34C	100	LITA
25-2-34D	80	LITA
25-2-34F	80	LITA
25-2-35A	160	LITA, TPCC
25-2-35B	160	LITA
25-2-5A	50	LITA
25-2-5B	50	LITA

EA Unit	10-Year Age Class	Harvest Land Base Land Use Allocation
25-2-5C	50	LITA
25-2-5D	40	LITA
25-2-7A	60	MTIA
25-2-7B	60	MTIA
25-2-7C	60	MTIA
25-2-7D	60	MITA
25-2-7E	50-60	MITA
25-2-7F	60	MITA
25-2-9E	60	LITA
25-3-13A	130	MITA
25-3-13B	50	MITA
25-3-13C	50	MITA
25-3-13D	50	MITA, TPCC
25-3-17A	60	LITA, TPCC
25-3-17C	60	LITA
25-3-19A	60	LITA
25-3-19B	60	LITA
25-3-19C	60-70	LITA
25-3-23A	60	MITA
25-3-23B	50-60	MITA
25-3-23C	40-50	MITA
25-3-23D	60	MITA
25-3-25A	60	LITA
25-3-27A	60	MITA
25-3-27B	40 & 60	MITA
25-3-27C	60	MITA
25-3-29A	60	LITA
25-3-29C	40	LITA
25-3-29D	40	LITA
25-3-29E	40	LITA
25-3-29H	60	LITA
25-3-33A	60	LITA
25-3-33B	50-60	LITA
25-3-33C	50	LITA
25-3-33D	40-50	LITA
25-3-33E	120	LITA
25-3-35A	50-60	LITA
25-3-35B	60	LITA
25-3-5A	60-70	MITA, TPCC
25-3-9A	90	MITA
26-2-10A	130	LITA
26-2-11A	160	LITA
26-2-11B	160	LITA
26-2-11C	80	LITA
26-2-12A	100	LITA
26-2-13B	60	LITA
26-2-13C	120	LITA
26-2-14A	60	LITA

EA Unit	10-Year Age Class	Harvest Land Base Land Use Allocation
26-2-14B	60	LITA
26-2-14C	60	LITA
26-2-15A	60	LITA
26-2-15B	70	LITA
26-2-15C	120	LITA
26-2-15D	70	LITA
26-2-15G	60	LITA
26-2-15H	60	LITA
26-2-19A	70	LITA
26-2-19B	60	LITA
26-2-1A	130	LITA
26-2-1C	130	LITA
26-2-1E	130	LITA
26-2-1I	60	LITA
26-2-1M	130	LITA
26-2-20A	60	LITA
26-2-21A	70	LITA
26-2-21B	60	LITA
26-2-21D	60	LITA
26-2-23A	60	LITA
26-2-23C	60-70	LITA
26-2-26A	60	MITA
26-2-27A	60	MITA
26-2-29B	60	LITA
26-2-29C	50	LITA
26-2-2A	130	LITA
26-2-2B	130	LITA
26-2-2C	130	LITA
26-2-30A	70	LITA
26-2-31A	40	LITA
26-2-33A	60	MITA
26-2-33A	60	MITA
26-2-33C	160	MITA
26-2-3A	130	LITA
26-2-3B	50	LITA
26-2-3C	50	LITA
26-2-7A	40	LITA
26-2-7B	60	LITA
26-2-7C	40	LITA
26-2-9A	120	LITA
26-2-9B	80	LITA
26-3-11B	40	LITA
26-3-13A	50	LITA
26-3-13B	50	LITA
26-3-13C	50	LITA
26-3-15B	40	LITA
26-3-15B	50	LITA
26-3-15C	50	LITA

EA Unit	10-Year Age Class	Harvest Land Base Land Use Allocation
26-3-1A	60	LITA
26-3-21A	80	MITA
26-3-21B	50	MITA
26-3-21C	80	MITA
26-3-23A	60	LITA
26-3-23A	70	LITA
26-3-23B	60	LITA
26-3-23B	70	LITA
26-3-23C	40	LITA
26-3-23D	50	LITA
26-3-25A	60	LITA
26-3-26A	70	LITA
26-3-26B	70	MITA
26-3-27A	50	MITA
26-3-27B	120	MITA
26-3-35A	60	MITA
26-3-35B	120	MITA
26-3-35C	60	MITA
26-3-35E	70	MITA
26-3-3A	60	LITA

Table I-2. Estimated Acres of Activity Fuels Treatments Post-Harvest

EA Unit Number	Alt 2 Harvest Method	Alt 2 Pile Acres [1]**	Alt 3 Harvest Method	Alt 3 Pile Acres [1]**	Alt 4 Harvest Method	Alt 4 Pile Acres [1]**
24-1-31A	Cable/Ground	2.8	Cable/Ground	2.8	Cable/Ground	2.8
24-1-31B	Cable	1.4	Cable	1.4	Cable	1.4
24-1-31D	Cable	1.3	Cable	1.3	Cable	1.3
24-1-31E	Cable	3.2	Cable	3.2	Cable	3.2
25-1-5B	Cable	1.5	Cable	1.5	Cable	1.5
25-1-5C	Cable	1.2	Helicopter	0.6	Cable	1.2
25-1-6A	Cable	2.6	Cable	2.6	Cable	2.6
25-1-6B	Cable	2.9	Cable	2.9	Cable	2.9
25-1-6C	Cable	0.6	Cable	0.6	Cable	0.6
25-1-7A	Cable	3.4	Cable	3.4	Cable	3.4
25-1-7B	Cable/Ground	3.7	Cable/Ground	3.7	Cable/Ground	3.7
25-1-7C	Cable	3.1	Helicopter	2.0	Cable	3.1
25-1-7F	Cable	1.6	Helicopter	0.8	Cable	1.6
25-1-7G	Cable	2.3	Cable	2.3	Cable	2.3
25-1-17A	Cable	1.3	Cable	1.3	Cable	1.3
25-1-17B	Cable	1.3	Cable	1.3	Cable	1.3
25-1-17C	Cable	1.6	Helicopter	0.8	Cable	1.6
25-1-17D	Cable	0.6	Cable	0.6	Cable	0.6
25-1-18A	Cable	1.4	Helicopter	0.7	Cable	1.4
25-1-18B	Cable	0.7	Cable	0.7	Cable	0.7
25-1-18C	Cable	1.2	Cable	1.2	Cable	1.2
25-1-19A	Cable	2.7	Cable	2.7	Cable	2.7

EA Unit Number	Alt 2 Harvest Method	Alt 2 Pile Acres [1]**	Alt 3 Harvest Method	Alt 3 Pile Acres [1]**	Alt 4 Harvest Method	Alt 4 Pile Acres [1]**
24-1-31A	Cable/Ground	2.8	Cable/Ground	2.8	Cable/Ground	2.8
24-1-31B	Cable	1.4	Cable	1.4	Cable	1.4
24-1-31D	Cable	1.3	Cable	1.3	Cable	1.3
24-1-31E	Cable	3.2	Cable	3.2	Cable	3.2
25-1-5B	Cable	1.5	Cable	1.5	Cable	1.5
25-1-5C	Cable	1.2	Helicopter	0.6	Cable	1.2
25-1-6A	Cable	2.6	Cable	2.6	Cable	2.6
25-1-19B	Cable	3.3	Helicopter	2.1	Cable	3.3
25-1-21A	Cable/Ground	16.8	Cable/Ground	16.8	Cable/Ground	16.8
25-1-21B	Cable	1.4	Helicopter	0.7	Cable	1.4
25-1-21C	Cable	16.0	Helicopter	10.0	Cable	16.0
25-1-21D	Cable	1.3	Helicopter	0.6	Cable	1.3
25-1-26A	Cable	3.0	Cable	3.0	Cable	3.0
25-1-29B	Cable	0.6	Helicopter	0.3	Cable	0.6
25-1-29D	Cable	1.4	Helicopter	0.7	Cable	1.4
25-1-30A	Cable	13.6	Helicopter	8.5	Cable	4.3
25-2-1A	Cable	1.5	Helicopter	0.7	Cable	1.5
25-2-1B	Cable/Ground	3.0	Cable/Ground	3.0	Cable/Ground	3.0
25-2-1C	Cable	1.4	Cable	1.4	Cable	0.2
25-2-1D	Cable	2.2	Cable	2.2	Cable	2.2
25-2-1H	Cable/Ground	2.0	Cable/Ground	2.0	Cable/Ground	2.0
25-2-5A	Cable/Ground	3.3	Cable/Ground	3.3	Cable/Ground	3.3
25-2-5B	Cable	2.4	Cable	2.4	Cable	2.4
25-2-5C	Cable/Ground	2.1	Cable/Ground	2.1	Cable/Ground	2.1
25-2-5D	Cable/Ground	1.5	Cable/Ground	1.5	Cable/Ground	1.5
25-2-7A	Cable/Ground	2.4	Cable/Ground	2.4	Cable/Ground	2.5
25-2-7B	Cable/Ground	12.6	Cable/Ground	12.6	Cable/Ground	12.6
25-2-7C	Cable	4.4	Cable	4.4	Cable	4.4
25-2-7D	Cable/Ground	0.9	Cable/Ground	0.9	Cable/Ground	0.9
25-2-7E	Cable/Ground	3.2	Cable/Ground	3.2	Cable/Ground	3.2
25-2-7F	Cable	4.8	Cable	4.8	Cable	4.8
25-2-9E	Cable	1.6	Cable	1.6	Cable	1.6
25-2-11B	Cable/Ground	3.8	Cable/Ground	3.8	Cable/Ground	3.8
25-2-11C	Cable	0.6	Cable	0.6	Cable	0.6
25-2-11D	Ground	1.0	Ground	1.0	Ground	1.0
25-2-11E	Cable	3.9	Cable	3.9	Cable	0.1
25-2-13A	Cable	2.0	Cable	2.0	Cable	2.0
25-2-15D	Cable/Ground	2.2	Cable/Ground	2.2	Cable/Ground	2.2
25-2-15E	Ground	0.9	Ground	0.9	Ground	0.9
25-2-15H	Cable	1.2	Cable	1.2	No Treatment	0.0
25-2-15I	Cable	2.7	Cable	2.7	Cable	0.5
25-2-15J	Cable	2.4	Cable	2.4	Cable	2.4
25-2-15K	Cable	10.0	Cable	10.0	Cable	10.0
25-2-17A	Cable/Ground	4.7	Cable/Ground	4.7	Cable/Ground	4.7
25-2-17B	Cable/Ground	14.2	Cable/Ground	14.2	Cable/Ground	14.2
25-2-17C	Cable	1.4	Cable	1.4	Cable	1.4
25-2-17D	Cable/Ground	2.2	Cable/Ground	2.2	Cable/Ground	2.2

EA Unit Number	Alt 2 Harvest Method	Alt 2 Pile Acres [1]**	Alt 3 Harvest Method	Alt 3 Pile Acres [1]**	Alt 4 Harvest Method	Alt 4 Pile Acres [1]**
24-1-31A	Cable/Ground	2.8	Cable/Ground	2.8	Cable/Ground	2.8
24-1-31B	Cable	1.4	Cable	1.4	Cable	1.4
24-1-31D	Cable	1.3	Cable	1.3	Cable	1.3
24-1-31E	Cable	3.2	Cable	3.2	Cable	3.2
25-1-5B	Cable	1.5	Cable	1.5	Cable	1.5
25-1-5C	Cable	1.2	Helicopter	0.6	Cable	1.2
25-1-6A	Cable	2.6	Cable	2.6	Cable	2.6
25-2-17E	Cable/Ground	12.8	Cable/Ground	12.8	Cable/Ground	12.8
25-2-17F	Cable	2.8	Cable	2.8	Cable	2.8
25-2-17G	Cable/Ground	12.2	Cable/Ground	12.2	Cable/Ground	12.2
25-2-19A	Cable/Ground	79.8	Cable/Ground	79.8	Cable/Ground	47.4
25-2-21A	Ground	0.5	Ground	0.5	Ground	0.5
25-2-21B	Cable/Ground	27.0	Cable/Ground	27.0	Cable/Ground	27.0
25-2-21C	Cable	0.7	Cable	0.7	Cable	0.7
25-2-21D	No Treatment	0.0	Helicopter	12.0	No Treatment	0.0
25-2-23A	Cable/Ground	3.3	Cable/Ground	3.3	Cable/Ground	3.3
25-2-23B	Cable/Ground	11.2	Cable/Ground	11.2	Cable/Ground	11.2
25-2-23C	Cable/Ground	3.5	Cable/Ground	3.5	Cable/Ground	3.5
25-2-23D	Cable/Ground	1.7	Cable/Ground	1.7	Cable/Ground	1.7
25-2-23E	Cable	1.7	Cable	1.7	Cable	1.7
25-2-23F	Cable/Ground	1.5	Cable/Ground	1.5	Cable/Ground	1.5
25-2-23G	Cable/Ground	1.8	Cable/Ground	1.8	Cable/Ground	1.8
25-2-23H	Ground	0.2	Ground	0.2	Ground	0.2
25-2-23I	Cable/Ground	2.0	Cable/Ground	2.0	Cable/Ground	2.0
25-2-25A	Cable/Ground	2.7	Cable/Ground	2.7	Cable/Ground	2.7
25-2-25B	Cable/Ground	1.7	Cable/Ground	1.7	Cable/Ground	1.7
25-2-25C	Cable/Ground	1.3	Cable/Ground	1.3	Cable/Ground	1.3
25-2-26A	Cable/Ground	1.7	Helicopter	0.8	Cable/Ground	0.6
25-2-27A	Ground	1.2	Ground	1.2	Ground	1.2
25-2-29A	Ground	3.4	Ground	3.4	Ground	3.2
25-2-29B	Cable	2.5	Cable	2.5	Cable	2.5
25-2-29C	Cable/Ground	2.0	Cable/Ground	2.0	Cable/Ground	2.0
25-2-31A	Cable/Ground	2.3	Cable/Ground	2.3	Cable/Ground	2.3
25-2-31B	Ground	3.7	Ground	3.7	Ground	2.1
25-2-33A	Cable/Ground	1.2	Cable/Ground	1.2	Cable/Ground	1.2
25-2-33M	Cable	2.4	Cable	2.4	Cable	2.4
25-2-34A	Cable/Ground	1.9	Cable/Ground	1.9	Cable/Ground	1.9
25-2-34C	Cable	1.9	Helicopter	0.9	No Treatment	0.0
25-2-34D	Cable/Ground	2.7	Helicopter	1.3	Cable/Ground	2.3
25-2-34F	Cable	1.4	Helicopter	0.7	Cable	1.4
25-2-35A	Cable	4.7	Helicopter	2.4	Cable	2.2
25-2-35B	Cable/Ground	17.6	Helicopter	11.0	Cable/Ground	17.6
25-3-5A	Cable	2.3	Cable	2.3	Cable	2.3
25-3-9A	Cable/Ground	3.0	Cable/Ground	3.0	Cable/Ground	0.3
25-3-13A	Ground	3.0	Ground	3.0	Ground	0.3
25-3-13B	Cable/Ground	2.3	Cable/Ground	2.3	Cable/Ground	2.3
25-3-13C	Cable/Ground	1.2	Cable/Ground	1.2	Cable/Ground	1.2

EA Unit Number	Alt 2 Harvest Method	Alt 2 Pile Acres [1]**	Alt 3 Harvest Method	Alt 3 Pile Acres [1]**	Alt 4 Harvest Method	Alt 4 Pile Acres [1]**
24-1-31A	Cable/Ground	2.8	Cable/Ground	2.8	Cable/Ground	2.8
24-1-31B	Cable	1.4	Cable	1.4	Cable	1.4
24-1-31D	Cable	1.3	Cable	1.3	Cable	1.3
24-1-31E	Cable	3.2	Cable	3.2	Cable	3.2
25-1-5B	Cable	1.5	Cable	1.5	Cable	1.5
25-1-5C	Cable	1.2	Helicopter	0.6	Cable	1.2
25-1-6A	Cable	2.6	Cable	2.6	Cable	2.6
25-3-13D	Cable/Ground	2.1	Cable/Ground	2.1	Cable/Ground	2.1
25-3-17A	Ground	0.8	Ground	0.8	Ground	0.8
25-3-17C	Cable/Ground	0.8	Cable/Ground	0.8	Cable/Ground	0.8
25-3-19A	Ground	0.3	Ground	0.3	Ground	0.3
25-3-19B	Ground	0.1	Ground	0.1	Ground	0.1
25-3-19C	Cable/Ground	16.4	Helicopter	10.7	Cable/Ground	16.4
25-3-23A	Ground	4.4	Ground	4.4	Ground	4.4
25-3-23B	Cable/Ground	1.9	Cable/Ground	1.9	Cable/Ground	1.9
25-3-23C	Cable/Ground	2.1	Cable/Ground	2.1	Cable/Ground	2.1
25-3-23D	Cable/Ground	2.0	Cable/Ground	2.0	Cable/Ground	2.0
25-3-25A	Cable/Ground	10.6	Cable/Ground	10.6	Cable/Ground	10.6
25-3-27A	Cable/Ground	0.9	Cable/Ground	0.9	Cable/Ground	0.9
25-3-27B	Cable/Ground	4.3	Cable/Ground	4.3	Cable/Ground	4.3
25-3-27C	Cable/Ground	3.1	Cable/Ground	3.1	Cable/Ground	3.1
25-3-29A	Cable/Ground	77.1	Cable/Ground	77.1	Cable/Ground	77.1
25-3-29C	Cable/Ground	21.4	Cable/Ground	21.4	Cable/Ground	21.4
25-3-29D	Cable/Ground	4.8	Cable/Ground	4.8	Cable/Ground	4.8
25-3-29E	Cable	3.0	Cable	3.0	Cable	0.3
25-3-29H	Cable	0.2	Cable	0.2	Cable	0.2
25-3-33A	Cable/Ground	2.8	Cable/Ground	2.8	Cable/Ground	2.9
25-3-33B	Cable	10.6	Cable	10.6	Cable	10.6
25-3-33C	Cable/Ground	4.5	Cable/Ground	4.5	Cable/Ground	4.5
25-3-33D	Cable/Ground	3.5	Cable/Ground	3.5	Cable/Ground	3.5
25-3-33E	Ground	0.6	Ground	0.6	Ground	0.6
25-3-35A	Cable/Ground	68.7	Cable/Ground	68.7	Cable/Ground	68.7
25-3-35B	Cable	1.2	Cable	1.2	Cable	1.2
26-2-1A	Cable	2.6	Cable	2.6	Cable	2.6
26-2-1C	Cable/Ground	16.4	Helicopter	10.7	Cable/Ground	13.2
26-2-1E	Cable/Ground	16.8	Helicopter	10.8	Cable/Ground	16.8
26-2-1I	Ground	2.4	Ground	2.4	Ground	2.4
26-2-1M	Cable	1.0	Helicopter	0.2	No Treatment	0.0
26-2-2A	Cable/Ground	2.1	Cable/Ground	2.1	Cable/Ground	2.1
26-2-2B	Cable/Ground	2.9	Helicopter	1.6	Cable/Ground	1.0
26-2-2C	Cable/Ground	10.8	Helicopter	5.0	Cable/Ground	3.6
26-2-3A	Cable	1.1	Helicopter	0.3	No Treatment	0.0
26-2-3B	Cable/Ground	1.3	Cable/Ground	1.3	Cable/Ground	1.3
26-2-3C	Ground	0.9	Helicopter	0.2	Ground	0.3
26-2-7A	Cable/Ground	3.2	Cable/Ground	3.2	Cable/Ground	3.2
26-2-7B	Ground	1.2	Ground	1.2	Ground	1.1
26-2-7C	Cable/Ground	1.6	Cable/Ground	1.6	Cable/Ground	1.6

EA Unit Number	Alt 2 Harvest Method	Alt 2 Pile Acres [1]**	Alt 3 Harvest Method	Alt 3 Pile Acres [1]**	Alt 4 Harvest Method	Alt 4 Pile Acres [1]**
24-1-31A	Cable/Ground	2.8	Cable/Ground	2.8	Cable/Ground	2.8
24-1-31B	Cable	1.4	Cable	1.4	Cable	1.4
24-1-31D	Cable	1.3	Cable	1.3	Cable	1.3
24-1-31E	Cable	3.2	Cable	3.2	Cable	3.2
25-1-5B	Cable	1.5	Cable	1.5	Cable	1.5
25-1-5C	Cable	1.2	Helicopter	0.6	Cable	1.2
25-1-6A	Cable	2.6	Cable	2.6	Cable	2.6
26-2-9A	Cable	2.8	Helicopter	1.4	No Treatment	0.0
26-2-9B	Cable	1.2	Helicopter	0.6	No Treatment	0.0
26-2-10A	Cable/Ground	2.6	Helicopter	1.3	No Treatment	0.0
26-2-11A	Cable/Ground	2.3	Cable/Ground	2.3	No Treatment	0.0
26-2-11B	Cable	0.9	Helicopter	0.2	No Treatment	0.0
26-2-11C	Cable/Ground	1.1	Cable/Ground	1.1	Cable/Ground	1.1
26-2-12A	Cable	1.0	Cable	1.0	Cable	0.1
26-2-13B	Cable/Ground	0.8	Cable/Ground	0.8	Cable/Ground	0.2
26-2-13C	Cable/Ground	0.5	Cable/Ground	0.5	Cable/Ground	0.5
26-2-14A	Cable/Ground	2.2	Cable/Ground	2.2	Cable/Ground	0.7
26-2-14B	Ground	1.1	Ground	1.1	Ground	1.1
26-2-14C	Cable/Ground	1.6	Cable/Ground	1.6	Cable/Ground	0.6
26-2-15A	Ground	0.7	Ground	0.7	No Treatment	0.0
26-2-15B	Ground	0.8	Ground	0.8	Ground	0.8
26-2-15C	Cable/Ground	1.9	Cable/Ground	1.9	Cable/Ground	1.3
26-2-15D	Cable/Ground	1.5	Cable/Ground	1.5	Cable/Ground	1.2
26-2-15G	Ground	1.3	Ground	1.3	Ground	1.3
26-2-15H	Cable/Ground	3.0	Cable/Ground	3.0	Cable/Ground	2.9
26-2-19A	Cable/Ground	3.1	Cable/Ground	3.1	Cable/Ground	3.1
26-2-19B	Cable/Ground	1.4	Cable/Ground	1.4	Cable/Ground	1.4
26-2-20A	Cable/Ground	1.2	Cable/Ground	1.2	Cable/Ground	1.2
26-2-21A	Cable/Ground	0.9	Cable/Ground	0.9	Cable/Ground	0.9
26-2-21B	Cable/Ground	2.6	Cable/Ground	2.6	Cable/Ground	2.6
26-2-21D	Cable/Ground	1.6	Cable/Ground	1.6	Cable/Ground	1.6
26-2-23A	Cable/Ground	0.9	Cable/Ground	0.9	Cable/Ground	0.9
26-2-23C	Cable/Ground	10.0	Cable/Ground	10.0	Cable/Ground	10.0
26-2-26A	Cable/Ground	4.0	Cable/Ground	4.0	Cable/Ground	4.0
26-2-27A	Ground	0.9	Ground	0.9	Ground	0.9
26-2-29B	Cable/Ground	3.4	Cable/Ground	3.4	Cable/Ground	3.4
26-2-29C	Cable	28.4	Cable	28.4	Cable	28.4
26-2-30A	Cable/Ground	1.2	Cable/Ground	1.2	Cable/Ground	1.2
26-2-31A	Cable/Ground	26.0	Cable/Ground	26.0	Cable/Ground	26.0
26-2-33A	Cable/Ground	12.6	Cable/Ground	12.6	Cable/Ground	12.6
26-2-33C	Cable	0.1	Cable	0.1	Cable	0.1
26-3-1A	Ground	3.9	Ground	3.9	Ground	3.5
26-3-3A	Cable	0.2	Cable	0.2	Cable	0.2
26-3-11B	Cable/Ground	2.4	Cable/Ground	2.4	Cable/Ground	2.4
26-3-13A	Ground	3.5	Ground	3.5	Ground	3.5
26-3-13B	Cable	0.3	Cable	0.3	Cable	0.3
26-3-13C	Cable/Ground	1.4	Cable/Ground	1.4	Cable/Ground	1.4

EA Unit Number	Alt 2 Harvest Method	Alt 2 Pile Acres [1]**	Alt 3 Harvest Method	Alt 3 Pile Acres [1]**	Alt 4 Harvest Method	Alt 4 Pile Acres [1]**
24-1-31A	Cable/Ground	2.8	Cable/Ground	2.8	Cable/Ground	2.8
24-1-31B	Cable	1.4	Cable	1.4	Cable	1.4
24-1-31D	Cable	1.3	Cable	1.3	Cable	1.3
24-1-31E	Cable	3.2	Cable	3.2	Cable	3.2
25-1-5B	Cable	1.5	Cable	1.5	Cable	1.5
25-1-5C	Cable	1.2	Helicopter	0.6	Cable	1.2
25-1-6A	Cable	2.6	Cable	2.6	Cable	2.6
26-3-15B	Cable	17.4	Cable	17.4	Cable	17.4
26-3-15C	Cable/Ground	4.4	Cable/Ground	4.4	Cable/Ground	2.3
26-3-21A	Cable	3.9	Cable	3.9	No Treatment	0.0
26-3-21B	Cable/Ground	2.1	Cable/Ground	2.1	Cable/Ground	1.7
26-3-21C	Ground	0.7	Helicopter	0.2	No Treatment	0.0
26-3-23A	Ground	20.0	Ground	20.0	Ground	20.0
26-3-23B	Cable/Ground	20.2	Cable/Ground	20.2	Cable/Ground	20.2
26-3-23C	Cable/Ground	2.3	Cable/Ground	2.3	Cable/Ground	2.3
26-3-23D	Cable/Ground	15.2	Cable/Ground	15.2	Cable/Ground	15.2
26-3-25A	Ground	0.3	Ground	0.3	Ground	0.3
26-3-26A	Cable	0.8	Cable	0.8	Cable	0.8
26-3-26B	Cable/Ground	1.4	Cable/Ground	1.4	Cable/Ground	1.4
26-3-27A	Ground	2.8	Ground	2.8	Ground	2.8
26-3-27B	Cable/Ground	2.0	Cable/Ground	2.0	Cable/Ground	0.7
26-3-35A	Cable	2.0	Cable	2.0	Cable	0.9
26-3-35B	Cable	2.6	Cable	2.6	No Treatment	0.0
26-3-35C	Cable	1.1	Cable	1.1	Cable	1.1
26-3-35E	Cable/Ground	3.4	Cable/Ground	3.4	Cable/Ground	3.4
Total Acres		**986**	**--**	**934**	**--**	**877**

[1]Under wildlife PDFs, the BLM may defer salvage to avoid incidental take of NSO.
**Acres are approximations and may vary slightly at the time of implementation.

Table I-3. Proposed Harvest Units, Treatment Type, and Harvest Method for Alternative 2

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1]**	Salvage Treatment in HLB-MITA (Acres) [1]**	Hazard Tree Removal in Riparian Reserve (Acres) [1]**	Harvest Method
24-1-31A	29	28	0	<1	Cable/Ground
24-1-31B	16	14	0	2	Cable
24-1-31D	14	14	0	<1	Cable
24-1-31E	26	26	0	<1	Cable
25-1-5B	20	15	0	5	Cable
25-1-5C	13	12	0	1	Cable
25-1-6A	26	26	0	0	Cable
25-1-6B	30	29	0	1	Cable
25-1-6C	7	6	0	2	Cable
25-1-7A	34	34	0	0	Cable
25-1-7B	38	37	0	2	Cable/Ground
25-1-7C	38	31	0	8	Cable

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
25-1-7F	30	16	0	14	Cable
25-1-7G	26	23	0	3	Cable
25-1-17A	14	13	0	2	Cable
25-1-17B	12	12	0	<1	Cable
25-1-17C	16	16	0	0	Cable
25-1-17D	7	6	0	<1	Cable
25-1-18A	29	14	0	15	Cable
25-1-18B	7	7	0	<1	Cable
25-1-18C	12	12	0	<1	Cable
25-1-19A	27	27	0	0	Cable
25-1-19B	58	33	0	24	Cable
25-1-21A	87	84	0	3	Cable/Ground
25-1-21B	17	14	0	3	Cable
25-1-21C	83	80	0	3	Cable
25-1-21D	13	13	0	0	Cable
25-1-26A	30	30	0	0	Cable
25-1-29B	4	4	0	0	Cable
25-1-29D	15	14	0	1	Cable
25-1-30A	68	68	0	0	Cable
25-2-1A	15	15	0	<1	Cable
25-2-1B	28	23	0	4	Cable/Ground
25-2-1C	16	14	0	2	Cable
25-2-1D	24	22	0	2	Cable
25-2-1H	24	20	0	4	Cable/Ground
25-2-5A	34	33	0	1	Cable/Ground
25-2-5B	24	24	0	<1	Cable
25-2-5C	21	21	0	0	Cable/Ground
25-2-5D	16	15	0	1	Cable/Ground
25-2-7A	26	0	26	0	Cable/Ground
25-2-7B	65	0	65	1	Cable/Ground
25-2-7C	47	0	44	3	Cable
25-2-7D	10	0	9	2	Cable/Ground
25-2-7E	33	0	33	1	Cable/Ground
25-2-7F	51	0	48	3	Cable
25-2-9E	17	16	0	<1	Cable
25-2-11B	49	0	38	12	Cable/Ground
25-2-11C	15	0	6	9	Cable
25-2-11D	12	0	11	2	Ground
25-2-11E	39	0	39	0	Cable
25-2-13A	20	0	20	0	Cable
25-2-15D	24	0	22	2	Cable/Ground
25-2-15E	11	0	9	1	Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
25-2-15H	14	0	12	2	Cable
25-2-15I	32	0	25	7	Cable
25-2-15J	35	0	24	11	Cable
25-2-15K	52	0	52	<1	Cable
25-2-17A	48	48	0	0	Cable/Ground
25-2-17B	71	71	0	<1	Cable/Ground
25-2-17C	16	15	0	1	Cable
25-2-17D	22	21	0	1	Cable/Ground
25-2-17E	63	63	0	0	Cable/Ground
25-2-17F	29	28	0	1	Cable
25-2-17G	52	52	0	0	Cable/Ground
25-2-19A	269	266	0	3	Cable/Ground
25-2-21A	5	5	0	0	Ground
25-2-21B	135	135	0	<1	Cable/Ground
25-2-21C	6	6	0	0	Cable
25-2-23A	31	0	31	<1	Cable/Ground
25-2-23B	57	0	57	0	Cable/Ground
25-2-23C	37	0	36	1	Cable/Ground
25-2-23D	19	0	18	2	Cable/Ground
25-2-23E	17	0	17	<1	Cable
25-2-23F	17	0	15	2	Cable/Ground
25-2-23G	20	0	19	1	Cable/Ground
25-2-23H	2	0	2	<1	Ground
25-2-23I	21	0	20	1	Cable/Ground
25-2-25A	27	27	0	0	Cable/Ground
25-2-25B	20	17	0	3	Cable/Ground
25-2-25C	16	14	0	2	Cable/Ground
25-2-26A	18	18	0	<1	Cable/Ground
25-2-27A	14	12	0	2	Ground
25-2-29A	35	0	34	1	Ground
25-2-29B	24	24	0	0	Cable
25-2-29C	20	20	0	0	Cable/Ground
25-2-31A	23	23	0	0	Cable/Ground
25-2-31B	41	37	0	4	Ground
25-2-33A	13	12	0	1	Cable/Ground
25-2-33M	26	24	0	2	Cable
25-2-34A	23	20	0	4	Cable/Ground
25-2-34C	19	19	0	0	Cable
25-2-34D	29	29	0	0	Cable/Ground
25-2-34F	14	14	0	0	Cable
25-2-35A	47	47	0	0	Cable
25-2-35B	88	88	0	0	Cable/Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
25-3-5A	25	0	21	4	Cable
25-3-9A	34	0	30	5	Cable/Ground
25-3-13A	30	0	30	0	Ground
25-3-13B	26	0	23	3	Cable/Ground
25-3-13C	15	0	12	3	Cable/Ground
25-3-13D	26	0	19	7	Cable/Ground
25-3-17A	15	8	0	6	Ground
25-3-17C	10	8	0	2	Cable/Ground
25-3-19A	3	3	0	<1	Ground
25-3-19B	3	1	0	2	Ground
25-3-19C	82	82	0	<1	Cable/Ground
25-3-23A	44	0	44	0	Ground
25-3-23B	23	0	21	2	Cable/Ground
25-3-23C	25	0	21	5	Cable/Ground
25-3-23D	23	0	20	4	Cable/Ground
25-3-25A	61	53	0	8	Cable/Ground
25-3-27A	9	0	9	0	Cable/Ground
25-3-27B	50	0	44	6	Cable/Ground
25-3-27C	32	0	32	0	Cable/Ground
25-3-29A	274	254	0	20	Cable/Ground
25-3-29C	104	102	0	1	Cable/Ground
25-3-29D	54	47	0	7	Cable/Ground
25-3-29E	30	30	0	<1	Cable
25-3-29H	3	2	0	1	Cable
25-3-33A	31	29	0	2	Cable/Ground
25-3-33B	61	50	0	11	Cable
25-3-33C	44	41	0	2	Cable/Ground
25-3-33D	39	35	0	3	Cable/Ground
25-3-33E	7	6	0	1	Ground
25-3-35A	243	229	0	14	Cable/Ground
25-3-35B	12	12	0	<1	Cable
26-2-1A	27	27	0	0	Cable
26-2-1C	90	82	0	8	Cable/Ground
26-2-1E	85	84	0	1	Cable/Ground
26-2-1I	31	24	0	6	Ground
26-2-1M	10	10	0	0	Cable
26-2-2A	24	21	0	3	Cable/Ground
26-2-2B	29	29	0	0	Cable/Ground
26-2-2C	63	54	0	9	Cable/Ground
26-2-3A	11	11	0	<1	Cable
26-2-3B	18	13	0	5	Cable/Ground
26-2-3C	13	9	0	4	Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
26-2-7A	32	32	0	0	Cable/Ground
26-2-7B	11	11	0	<1	Ground
26-2-7C	16	16	0	<1	Cable/Ground
26-2-9A	28	28	0	<1	Cable
26-2-9B	12	12	0	<1	Cable
26-2-10A	26	26	0	<1	Cable/Ground
26-2-11A	23	23	0	1	Cable/Ground
26-2-11B	9	9	0	0	Cable
26-2-11C	11	11	0	0	Cable/Ground
26-2-12A	10	10	0	<1	Cable
26-2-13B	9	8	0	1	Cable/Ground
26-2-13C	5	5	0	0	Cable/Ground
26-2-14A	22	22	0	0	Cable/Ground
26-2-14B	11	11	0	0	Ground
26-2-14C	17	16	0	1	Cable/Ground
26-2-15A	7	7	0	<1	Ground
26-2-15B	8	8	0	0	Ground
26-2-15C	20	19	0	1	Cable/Ground
26-2-15D	17	15	0	2	Cable/Ground
26-2-15G	13	13	0	0	Ground
26-2-15H	34	30	0	4	Cable/Ground
26-2-19A	41	31	0	9	Cable/Ground
26-2-19B	19	15	0	5	Cable/Ground
26-2-20A	18	12	0	5	Cable/Ground
26-2-21A	10	9	0	1	Cable/Ground
26-2-21B	27	22	0	5	Cable/Ground
26-2-21D	21	16	0	5	Cable/Ground
26-2-23A	10	9	0	1	Cable/Ground
26-2-23C	60	50	0	10	Cable/Ground
26-2-26A	32	0	29	3	Cable/Ground
26-2-27A	9	0	9	0	Ground
26-2-29B	36	30	0	5	Cable/Ground
26-2-29C	159	142	0	17	Cable
26-2-30A	11	11	0	<1	Cable/Ground
26-2-31A	134	131	0	3	Cable/Ground
26-2-33A	73	0	65	9	Cable/Ground
26-2-33C	1	0	1	1	Cable
26-3-1A	39	39	0	0	Ground
26-3-3A	4	2	0	2	Cable
26-3-11B	28	24	0	3	Cable/Ground
26-3-13A	35	33	0	1	Ground
26-3-13B	10	3	0	7	Cable

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
26-3-13C	15	15	0	1	Cable/Ground
26-3-15B	89	87	0	2	Cable
26-3-15C	53	44	0	8	Cable/Ground
26-3-21A	39	0	39	0	Cable
26-3-21B	21	0	21	0	Cable/Ground
26-3-21C	7	0	7	0	Ground
26-3-23A	103	100	0	3	Ground
26-3-23B	101	101	0	1	Cable/Ground
26-3-23C	25	24	0	1	Cable/Ground
26-3-23D	76	76	0	<1	Cable/Ground
26-3-25A	4	4	0	1	Ground
26-3-26A	8	8	0	0	Cable
26-3-26B	21	0	14	6	Cable/Ground
26-3-27A	32	0	29	4	Ground
26-3-27B	20	0	20	0	Cable/Ground
26-3-35A	21	0	20	<1	Cable
26-3-35B	26	0	26	0	Cable
26-3-35C	11	0	11	<1	Cable
26-3-35E	37	0	34	3	Cable/Ground
Totals	6,699	4,842	1,379	477	--

[1]Under wildlife PDFs, the BLM may defer salvage to avoid incidental take of NSO.
**Acres are approximations and may vary slightly at the time of implementation.

Table I-4. Proposed Harvest Units, Treatment Type, and Harvest Method for Alternative 3

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres)**	Harvest Method
24-1-31A	29	28	0	<1	Cable/Ground
24-1-31B	16	14	0	2	Cable
24-1-31D	14	14	0	<1	Cable
24-1-31E	26	26	0	<1	Cable
25-1-5B	20	15	0	5	Cable
25-1-5C	13	12	0	1	Helicopter
25-1-6A	26	26	0	0	Cable
25-1-6B	30	29	0	1	Cable
25-1-6C	7	6	0	2	Cable
25-1-7A	34	34	0	0	Cable
25-1-7B	38	37	0	2	Cable/Ground
25-1-7C	38	31	0	8	Helicopter
25-1-7F	30	16	0	14	Helicopter
25-1-7G	26	23	0	3	Cable

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres)**	Harvest Method
25-1-17A	14	13	0	2	Cable
25-1-17B	12	12	0	<1	Cable
25-1-17C	16	16	0	0	Helicopter
25-1-17D	7	6	0	<1	Cable
25-1-18A	29	14	0	15	Helicopter
25-1-18B	7	7	0	<1	Cable
25-1-18C	12	12	0	<1	Cable
25-1-19A	27	27	0	0	Cable
25-1-19B	58	33	0	17	Helicopter
25-1-21A	87	84	0	3	Cable/Ground
25-1-21B	17	14	0	0	Helicopter
25-1-21C	83	80	0	0	Helicopter
25-1-21D	13	13	0	0	Helicopter
25-1-26A	30	30	0	0	Cable
25-1-29B	4	4	0	0	Helicopter
25-1-29D	15	14	0	0	Helicopter
25-1-30A	68	68	0	0	Helicopter
25-2-1A	15	15	0	0	Helicopter
25-2-1B	28	23	0	4	Cable/Ground
25-2-1C	16	14	0	2	Cable
25-2-1D	24	22	0	2	Cable
25-2-1H	24	20	0	4	Cable/Ground
25-2-5A	34	33	0	1	Cable/Ground
25-2-5B	24	24	0	<1	Cable
25-2-5C	21	21	0	0	Cable/Ground
25-2-5D	16	15	0	1	Cable/Ground
25-2-7A	26	0	26	0	Cable/Ground
25-2-7B	65	0	65	1	Cable/Ground
25-2-7C	47	0	44	3	Cable
25-2-7D	10	0	9	2	Cable/Ground
25-2-7E	33	0	33	1	Cable/Ground
25-2-7F	51	0	48	3	Cable
25-2-9E	17	16	0	<1	Cable
25-2-11B	49	0	38	12	Cable/Ground
25-2-11C	15	0	6	9	Cable
25-2-11D	12	0	11	2	Ground
25-2-11E	39	0	39	0	Cable
25-2-13A	20	0	20	0	Cable
25-2-15D	24	0	22	2	Cable/Ground
25-2-15E	11	0	9	1	Ground
25-2-15H	14	0	12	2	Cable
25-2-15I	32	0	25	7	Cable

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres)**	Harvest Method
25-2-15J	35	0	24	11	Cable
25-2-15K	52	0	52	<1	Cable
25-2-17A	48	48	0	0	Cable/Ground
25-2-17B	71	71	0	<1	Cable/Ground
25-2-17C	16	15	0	1	Cable
25-2-17D	22	21	0	1	Cable/Ground
25-2-17E	63	63	0	0	Cable/Ground
25-2-17F	29	28	0	1	Cable
25-2-17G	52	52	0	0	Cable/Ground
25-2-19A	269	266	0	3	Cable/Ground
25-2-21A	5	5	0	0	Ground
25-2-21B	135	135	0	<1	Cable/Ground
25-2-21C	6	6	0	0	Cable
25-2-21D	92	92	0	2	Helicopter
25-2-23A	31	0	31	<1	Cable/Ground
25-2-23B	57	0	57	0	Cable/Ground
25-2-23C	37	0	36	1	Cable/Ground
25-2-23D	19	0	18	2	Cable/Ground
25-2-23E	17	0	17	<1	Cable
25-2-23F	17	0	15	2	Cable/Ground
25-2-23G	20	0	19	1	Cable/Ground
25-2-23H	2	0	2	<1	Ground
25-2-23I	21	0	20	1	Cable/Ground
25-2-25A	27	27	0	0	Cable/Ground
25-2-25B	20	17	0	3	Cable/Ground
25-2-25C	16	14	0	2	Cable/Ground
25-2-26A	18	18	0	<1	Helicopter
25-2-27A	14	12	0	2	Ground
25-2-29A	35	0	34	1	Ground
25-2-29B	24	24	0	0	Cable
25-2-29C	20	20	0	0	Cable/Ground
25-2-31A	23	23	0	0	Cable/Ground
25-2-31B	41	37	0	4	Ground
25-2-33A	13	12	0	1	Cable/Ground
25-2-33M	26	24	0	2	Cable
25-2-34A	23	20	0	4	Cable/Ground
25-2-34C	19	19	0	0	Helicopter
25-2-34D	29	29	0	0	Helicopter
25-2-34F	14	14	0	0	Helicopter
25-2-35A	47	47	0	0	Helicopter
25-2-35B	88	88	0	0	Helicopter
25-3-5A	25	0	21	4	Cable

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres)**	Harvest Method
25-3-9A	34	0	30	5	Cable/Ground
25-3-13A	30	0	30	0	Ground
25-3-13B	26	0	23	3	Cable/Ground
25-3-13C	15	0	12	3	Cable/Ground
25-3-13D	26	0	19	7	Cable/Ground
25-3-17A	15	8	0	6	Ground
25-3-17C	10	8	0	2	Cable/Ground
25-3-19A	3	3	0	<1	Ground
25-3-19B	3	1	0	2	Ground
25-3-19C	82	82	0	0	Helicopter
25-3-23A	44	0	44	0	Ground
25-3-23B	23	0	21	2	Cable/Ground
25-3-23C	25	0	21	5	Cable/Ground
25-3-23D	23	0	20	4	Cable/Ground
25-3-25A	61	53	0	8	Cable/Ground
25-3-27A	9	0	9	0	Cable/Ground
25-3-27B	50	0	44	6	Cable/Ground
25-3-27C	32	0	32	0	Cable/Ground
25-3-29A	274	254	0	20	Cable/Ground
25-3-29C	104	102	0	1	Cable/Ground
25-3-29D	54	47	0	7	Cable/Ground
25-3-29E	30	30	0	<1	Cable
25-3-29H	3	2	0	1	Cable
25-3-33A	31	29	0	2	Cable/Ground
25-3-33B	61	50	0	11	Cable
25-3-33C	44	41	0	2	Cable/Ground
25-3-33D	39	35	0	3	Cable/Ground
25-3-33E	7	6	0	1	Ground
25-3-35A	243	229	0	14	Cable/Ground
25-3-35B	12	12	0	<1	Cable
26-2-1A	27	27	0	0	Cable
26-2-1C	90	82	0	0	Helicopter
26-2-1E	85	84	0	1	Helicopter
26-2-1I	31	24	0	6	Ground
26-2-1M	10	10	0	0	Helicopter
26-2-2A	24	21	0	3	Cable/Ground
26-2-2B	29	29	0	0	Helicopter
26-2-2C	63	54	0	1	Helicopter
26-2-3A	11	11	0	0	Helicopter
26-2-3B	18	13	0	5	Cable/Ground
26-2-3C	13	9	0	4	Helicopter
26-2-7A	32	32	0	0	Cable/Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres)**	Harvest Method
26-2-7B	11	11	0	<1	Ground
26-2-7C	16	16	0	<1	Cable/Ground
26-2-9A	28	28	0	<1	Helicopter
26-2-9B	12	12	0	<1	Helicopter
26-2-10A	26	26	0	0	Helicopter
26-2-11A	23	23	0	1	Cable/Ground
26-2-11B	9	9	0	0	Helicopter
26-2-11C	11	11	0	0	Cable/Ground
26-2-12A	10	10	0	<1	Cable
26-2-13B	9	8	0	1	Cable/Ground
26-2-13C	5	5	0	0	Cable/Ground
26-2-14A	22	22	0	0	Cable/Ground
26-2-14B	11	11	0	0	Ground
26-2-14C	17	16	0	1	Cable/Ground
26-2-15A	7	7	0	<1	Ground
26-2-15B	8	8	0	0	Ground
26-2-15C	20	19	0	1	Cable/Ground
26-2-15D	17	15	0	2	Cable/Ground
26-2-15G	13	13	0	0	Ground
26-2-15H	34	30	0	4	Cable/Ground
26-2-19A	41	31	0	9	Cable/Ground
26-2-19B	19	15	0	5	Cable/Ground
26-2-20A	18	12	0	5	Cable/Ground
26-2-21A	10	9	0	1	Cable/Ground
26-2-21B	27	22	0	5	Cable/Ground
26-2-21D	21	16	0	5	Cable/Ground
26-2-23A	10	9	0	1	Cable/Ground
26-2-23C	60	50	0	10	Cable/Ground
26-2-26A	32	0	29	3	Cable/Ground
26-2-27A	9	0	9	0	Ground
26-2-29B	36	30	0	5	Cable/Ground
26-2-29C	159	142	0	17	Cable
26-2-30A	11	11	0	<1	Cable/Ground
26-2-31A	134	131	0	3	Cable/Ground
26-2-33A	73	0	65	9	Cable/Ground
26-2-33C	1	0	1	1	Cable
26-3-1A	39	39	0	0	Ground
26-3-3A	4	2	0	2	Cable
26-3-11B	28	24	0	3	Cable/Ground
26-3-13A	35	33	0	1	Ground
26-3-13B	10	3	0	7	Cable
26-3-13C	15	15	0	1	Cable/Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres)**	Harvest Method
26-3-15B	89	87	0	2	Cable
26-3-15C	53	44	0	8	Cable/Ground
26-3-21A	39	0	39	0	Cable
26-3-21B	21	0	21	0	Cable/Ground
26-3-21C	7	0	7	0	Helicopter
26-3-23A	103	100	0	3	Ground
26-3-23B	101	101	0	1	Cable/Ground
26-3-23C	25	24	0	1	Cable/Ground
26-3-23D	76	76	0	<1	Cable/Ground
26-3-25A	4	4	0	1	Ground
26-3-26A	8	8	0	0	Cable
26-3-26B	21	0	14	6	Cable/Ground
26-3-27A	32	0	29	4	Ground
26-3-27B	20	0	20	0	Cable/Ground
26-3-35A	21	0	20	<1	Cable
26-3-35B	26	0	26	0	Cable
26-3-35C	11	0	11	<1	Cable
26-3-35E	37	0	34	3	Cable/Ground
Totals	**6,761**	**4,935**	**1,379**	**447**	**--**

[1]Under wildlife PDFs, the BLM may defer salvage to avoid incidental take of NSO.
**Acres are approximations and may vary slightly at the time of implementation.

Table I-5. Proposed Harvest Units, Treatment Type, and Harvest Method for Alternative 4

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
24-1-31A	29	28	0	<1	Cable/Ground
24-1-31B	16	14	0	2	Cable
24-1-31D	14	14	0	<1	Cable
24-1-31E	26	26	0	<1	Cable
25-1-5B	20	15	0	5	Cable
25-1-5C	13	12	0	1	Cable
25-1-6A	26	26	0	0	Cable
25-1-6B	30	29	0	1	Cable
25-1-6C	7	6	0	2	Cable
25-1-7A	34	34	0	0	Cable
25-1-7B	38	37	0	2	Cable/Ground
25-1-7C	38	31	0	8	Cable
25-1-7F	30	16	0	14	Cable
25-1-7G	26	23	0	3	Cable
25-1-17A	14	13	0	2	Cable

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
25-1-17B	12	12	0	<1	Cable
25-1-17C	16	16	0	0	Cable
25-1-17D	7	6	0	<1	Cable
25-1-18A	29	14	0	15	Cable
25-1-18B	7	7	0	<1	Cable
25-1-18C	12	12	0	<1	Cable
25-1-19A	27	27	0	0	Cable
25-1-19B	47	25	0	22	Cable
25-1-21A	79	78	0	1	Cable/Ground
25-1-21B	11	10	0	1	Cable
25-1-21C	35	33	0	2	Cable
25-1-21D	13	13	0	0	Cable
25-1-26A	30	30	0	0	Cable
25-1-29B	4	4	0	0	Cable
25-1-29D	15	14	0	1	Cable
25-1-30A	44	44	0	0	Cable
25-2-1A	15	15	0	<1	Cable
25-2-1B	28	23	0	4	Cable/Ground
25-2-1C	4	3	0	2	Cable
25-2-1D	24	22	0	2	Cable
25-2-1H	24	20	0	4	Cable/Ground
25-2-5A	34	33	0	1	Cable/Ground
25-2-5B	24	24	0	<1	Cable
25-2-5C	21	21	0	0	Cable/Ground
25-2-5D	16	15	0	1	Cable/Ground
25-2-7A	26	0	26	0	Cable/Ground
25-2-7B	65	0	65	1	Cable/Ground
25-2-7C	47	0	44	3	Cable
25-2-7D	10	0	9	2	Cable/Ground
25-2-7E	33	0	33	1	Cable/Ground
25-2-7F	51	0	48	3	Cable
25-2-9E	17	16	0	<1	Cable
25-2-11B	49	0	38	12	Cable/Ground
25-2-11C	15	0	6	9	Cable
25-2-11D	12	0	11	2	Ground
25-2-11E	1	0	1	0	Cable
25-2-13A	20	0	20	0	Cable
25-2-15D	24	0	22	2	Cable/Ground
25-2-15E	11	0	9	1	Ground
25-2-15I	12	0	5	7	Cable
25-2-15J	35	0	24	11	Cable
25-2-15K	52	0	52	<1	Cable

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
25-2-17A	48	48	0	0	Cable/Ground
25-2-17B	71	71	0	<1	Cable/Ground
25-2-17C	16	15	0	1	Cable
25-2-17D	22	21	0	1	Cable/Ground
25-2-17E	63	63	0	0	Cable/Ground
25-2-17F	29	28	0	1	Cable
25-2-17G	52	52	0	0	Cable/Ground
25-2-19A	158	156	0	2	Cable/Ground
25-2-21A	5	5	0	0	Ground
25-2-21B	135	135	0	<1	Cable/Ground
25-2-21C	6	6	0	0	Cable
25-2-23A	31	0	31	<1	Cable/Ground
25-2-23B	57	0	57	0	Cable/Ground
25-2-23C	37	0	36	1	Cable/Ground
25-2-23D	19	0	18	2	Cable/Ground
25-2-23E	17	0	17	<1	Cable
25-2-23F	17	0	15	2	Cable/Ground
25-2-23G	20	0	19	1	Cable/Ground
25-2-23H	2	0	2	<1	Ground
25-2-23I	21	0	20	1	Cable/Ground
25-2-25A	27	27	0	0	Cable/Ground
25-2-25B	20	17	0	3	Cable/Ground
25-2-25C	16	14	0	2	Cable/Ground
25-2-26A	6	6	0	<1	Cable/Ground
25-2-27A	14	12	0	2	Ground
25-2-29A	33	0	32	1	Ground
25-2-29B	24	24	0	0	Cable
25-2-29C	20	20	0	0	Cable/Ground
25-2-31A	23	23	0	0	Cable/Ground
25-2-31B	24	21	0	3	Ground
25-2-33A	13	12	0	1	Cable/Ground
25-2-33M	26	24	0	2	Cable
25-2-34A	23	20	0	4	Cable/Ground
25-2-34D	24	24	0	0	Cable/Ground
25-2-34F	14	14	0	0	Cable
25-2-35A	22	22	0	0	Cable
25-2-35B	88	88	0	0	Cable/Ground
25-3-5A	25	0	21	4	Cable
25-3-9A	34	0	30	5	Cable/Ground
25-3-13A	30	0	30	0	Ground
25-3-13B	26	0	23	3	Cable/Ground
25-3-13C	15	0	12	3	Cable/Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
25-3-13D	26	0	19	7	Cable/Ground
25-3-17A	15	8	0	6	Ground
25-3-17C	10	8	0	2	Cable/Ground
25-3-19A	3	3	0	<1	Ground
25-3-19B	3	1	0	2	Ground
25-3-19C	82	82	0	<1	Cable/Ground
25-3-23A	44	0	44	0	Ground
25-3-23B	23	0	21	2	Cable/Ground
25-3-23C	25	0	21	5	Cable/Ground
25-3-23D	23	0	20	4	Cable/Ground
25-3-25A	61	53	0	8	Cable/Ground
25-3-27A	9	0	9	0	Cable/Ground
25-3-27B	50	0	44	6	Cable/Ground
25-3-27C	32	0	32	0	Cable/Ground
25-3-29A	274	254	0	20	Cable/Ground
25-3-29C	104	102	0	1	Cable/Ground
25-3-29D	54	47	0	7	Cable/Ground
25-3-29E	30	30	0	<1	Cable
25-3-29H	3	2	0	1	Cable
25-3-33A	31	29	0	2	Cable/Ground
25-3-33B	61	50	0	11	Cable
25-3-33C	44	41	0	2	Cable/Ground
25-3-33D	39	35	0	3	Cable/Ground
25-3-33E	7	6	0	1	Ground
25-3-35A	243	229	0	14	Cable/Ground
25-3-35B	12	12	0	<1	Cable
26-2-1A	27	27	0	0	Cable
26-2-1C	66	66	0	0	Cable/Ground
26-2-1E	85	84	0	1	Cable/Ground
26-2-1I	28	24	0	4	Ground
26-2-2A	24	21	0	3	Cable/Ground
26-2-2B	10	10	0	0	Cable/Ground
26-2-2C	44	36	0	7	Cable/Ground
26-2-3B	18	13	0	5	Cable/Ground
26-2-3C	6	3	0	2	Ground
26-2-7A	32	32	0	0	Cable/Ground
26-2-7B	11	11	0	<1	Ground
26-2-7C	16	16	0	<1	Cable/Ground
26-2-11C	11	11	0	0	Cable/Ground
26-2-12A	2	1	0	<1	Cable
26-2-13B	3	3	0	<1	Cable/Ground
26-2-13C	5	5	0	0	Cable/Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
26-2-14A	7	7	0	0	Cable/Ground
26-2-14B	11	11	0	0	Ground
26-2-14C	6	6	0	<1	Cable/Ground
26-2-15B	8	8	0	0	Ground
26-2-15C	14	13	0	1	Cable/Ground
26-2-15D	13	12	0	1	Cable/Ground
26-2-15G	13	13	0	0	Ground
26-2-15H	33	29	0	3	Cable/Ground
26-2-19A	41	31	0	9	Cable/Ground
26-2-19B	19	15	0	5	Cable/Ground
26-2-20A	18	12	0	5	Cable/Ground
26-2-21A	10	9	0	1	Cable/Ground
26-2-21B	27	22	0	5	Cable/Ground
26-2-21D	21	16	0	5	Cable/Ground
26-2-23A	10	9	0	1	Cable/Ground
26-2-23C	60	50	0	10	Cable/Ground
26-2-26A	32	0	29	3	Cable/Ground
26-2-27A	9	0	9	0	Ground
26-2-29B	36	30	0	5	Cable/Ground
26-2-29C	159	142	0	17	Cable
26-2-30A	11	11	0	<1	Cable/Ground
26-2-31A	134	131	0	3	Cable/Ground
26-2-33A	73	0	65	9	Cable/Ground
26-2-33C	1	0	1	1	Cable
26-3-1A	35	35	0	0	Ground
26-3-3A	4	2	0	2	Cable
26-3-11B	28	24	0	3	Cable/Ground
26-3-13A	35	33	0	1	Ground
26-3-13B	10	3	0	7	Cable
26-3-13C	15	15	0	1	Cable/Ground
26-3-15B	89	87	0	2	Cable
26-3-15C	31	23	0	8	Cable/Ground
26-3-21B	17	0	17	0	Cable/Ground
26-3-23A	103	100	0	3	Ground
26-3-23B	101	101	0	1	Cable/Ground
26-3-23C	25	24	0	1	Cable/Ground
26-3-23D	76	76	0	<1	Cable/Ground
26-3-25A	4	4	0	1	Ground
26-3-26A	8	8	0	0	Cable
26-3-26B	21	0	14	6	Cable/Ground
26-3-27A	32	0	29	4	Ground
26-3-27B	7	0	7	0	Cable/Ground

EA Unit Number	Treatment Acres**	Salvage Treatment in HLB-LITA (Acres) [1] **	Salvage Treatment in HLB-MITA (Acres) [1] **	Hazard Tree Removal in Riparian Reserve (Acres) [1] **	Harvest Method
26-3-35A	10	0	9	<1	Cable
26-3-35C	11	0	11	<1	Cable
26-3-35E	37	0	34	3	Cable/Ground
Totals	**5,950**	**4,296**	**1,207**	**447**	**--**

[1]Under wildlife PDFs, the BLM may defer salvage to avoid incidental take of NSO.
**Acres are approximations and may vary slightly at the time of implementation.

Table I-6. Proposed Road Management for Alternative 2

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
24-1-31.0	0	0	1.17	0	Aggregate	Aggregate	0	None
24-1-31.3	0	0	0.17	0	Aggregate	Aggregate	0	None
24-1-31.4	0	0	0.12	0	Native	Aggregate	0	None
24-2-31.0	0	0	1.63	0	Aggregate	Aggregate	0	None
24-2-31.1	0	0	1.60	0	Aggregate	Aggregate	0	None
24-2-31.2	0	0	0.61	0	Native	Aggregate	0	None
24-3-31.1	0	0	0.07	0	Aggregate	Aggregate	0	None
25.5-1E-32.0	0	0	3.15	0	Aggregate	Aggregate	0	None
25-1-16.0	0	0	0.57	0	Native	Aggregate	0	None
25-1-17.0	0	0	0.34	0	Aggregate	Aggregate	0	None
25-1-17.1	0	0	0.81	0	Aggregate	Aggregate	0	None
25-1-17.2	0	0	0.47	0	Aggregate	Aggregate	0	None
25-1-18.0	0	0	0	3.37	Bituminous	Bituminous	0	None
25-1-18.1	0	0	0.35	0	Native	Aggregate	0	None
25-1-18.2	0	0	3.69	0	Aggregate	Aggregate	0	None
25-1-18.3	0	0	0.18	0	Aggregate	Aggregate	0	None
25-1-19.0	0	0	1.50	0	Aggregate	Aggregate	0	None
25-1-19.0	0	0	0.72	0	Native	Aggregate	0	None
25-1-19.1	0	0	2.20	0	Aggregate	Aggregate	0	None
25-1-19.3	0	0	0.22	0	Native	Aggregate	0	None
25-1-20.0	0	0	0.66	0	Native	Aggregate	0	None
25-1-20.1	0	0	1.17	0	Aggregate	Aggregate	0	None
25-1-26.3	0	0	0.69	0	Native	Aggregate	0	None
25-1-28.0	0	0	1.09	0	Aggregate	Aggregate	0	None
25-1-5.3	0	0	0.36	0	Aggregate	Aggregate	0	None
25-1-5.3	0	0	0.15	0	Aggregate	Aggregate	0	None
25-1-7.0	0	0	5.61	0	Aggregate	Aggregate	0	None
25-1-7.1	0	0	0.72	0	Native	Aggregate	0	None
25-1-7.9	0	0	0.52	0	Aggregate	Aggregate	0	None
25-1-9.0	0	0	1.48	0	Aggregate	Aggregate	0	None
25-2-1.0	0	0	0.36	0	Aggregate	Aggregate	0	None
25-2-1.2	0	0	0.79	0	Aggregate	Aggregate	0	None
25-2-1.3	0	0	0.22	0	Aggregate	Aggregate	0	None
25-2-1.4	0	0	0.43	0	Bituminous	Bituminous	0	None
25-2-1.5	0	0	0.14	0	Aggregate	Aggregate	0	None
25-2-11.0	0	0	0	2.47	Aggregate	Aggregate	0	None
25-2-11.0	0	0	2.34	0	Aggregate	Aggregate	0	None
25-2-11.1	0	0	2.41	0	Native	Aggregate	0	None
25-2-11.2	0	0	3.31	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-2-11.3	0	0	0.09	0	Native	Aggregate	0	None
25-2-11.4	0	0	0.16	0	Aggregate	Aggregate	0	None
25-2-13.1	0	0	0.10	0	Aggregate	Aggregate	0	None
25-2-14.0	0	0	0.48	0	Aggregate	Aggregate	0	None
25-2-14.0	0	0	0.84	0	Aggregate	Aggregate	0	None
25-2-15.0	0	0	1.35	0	Aggregate	Aggregate	0	None
25-2-15.1	0	0	0.22	0	Aggregate	Aggregate	0	None
25-2-15.2	0	0	0.06	0	Native	Aggregate	0	None
25-2-16.0	0	0	9.13	0	Aggregate	Aggregate	0	None
25-2-16.1	0	0	2.55	0	Native	Aggregate	0	None
25-2-16.2	0	0	0.07	0	Aggregate	Aggregate	0	None
25-2-16.3	0	0	0.51	0	Aggregate	Aggregate	0	None
25-2-17.0	0	0	0.68	0	Aggregate	Aggregate	0	None
25-2-17.1	0	0	0.12	0	Aggregate	Aggregate	0	None
25-2-17.11	0	0	0.14	0	Aggregate	Aggregate	0	None
25-2-17.2	0	0	0.27	0	Aggregate	Aggregate	0	None
25-2-17.3	0	0	0.36	0	Native	Aggregate	0	None
25-2-17.4	0	0	0.26	0	Aggregate	Aggregate	0	None
25-2-17.5	0	0	0.22	0	Native	Aggregate	0	None
25-2-17.8	0	0	0.01	0	Native	Aggregate	0	None
25-2-19.0	0	0	0.07	0	Native	Aggregate	0	None
25-2-19.1	0	0	0.55	0	Aggregate	Aggregate	0	None
25-2-19.2	0	0	0.29	0	Aggregate	Aggregate	0	None
25-2-19.3	0	0	0.25	0	Native	Aggregate	0	None
25-2-19.4	0	0	0.11	0	Aggregate	Aggregate	0	None
25-2-19.5	0	0	1.00	0	Aggregate	Aggregate	0	None
25-2-19.6	0	0	0.21	0	Aggregate	Aggregate	0	None
25-2-19.7	0	0	0.22	0	Aggregate	Aggregate	0	None
25-2-20.0	0	0	5.63	0	Aggregate	Aggregate	0	None
25-2-20.1	0	0	0.45	0	Native	Aggregate	0	None
25-2-21.0	0	0	0.79	0	Aggregate	Aggregate	0	None
25-2-21.1	0	0	0.46	0	Aggregate	Aggregate	0	None
25-2-21.2	0	0	0.13	0	Aggregate	Aggregate	0	None
25-2-22.0	0	0	0.29	0	Aggregate	Aggregate	0	None
25-2-23.0	0	0	0.36	0	Aggregate	Aggregate	0	None
25-2-23.1	0	0	0.85	0	Aggregate	Aggregate	0	None
25-2-23.10	0	0	0.08	0	Aggregate	Aggregate	0	None
25-2-23.12	0	0	0.38	0	Native	Aggregate	0	None
25-2-23.2	0	0	1.08	0	Native	Aggregate	0	None
25-2-23.3	0	0	0.23	0	Aggregate	Aggregate	0	None
25-2-23.4	0	0	0.41	0	Aggregate	Aggregate	0	None
25-2-23.4	0	0	0.24	0	Aggregate	Aggregate	0	None
25-2-23.5	0	0	0.02	0	Aggregate	Aggregate	0	None
25-2-23.7	0	0	0.40	0	Native	Aggregate	0	None
25-2-23.8	0	0	0.07	0	Native	Aggregate	0	None
25-2-24.0	0	0	2.23	0	Aggregate	Aggregate	0	None
25-2-24.1	0	0	0.98	0	Aggregate	Aggregate	0	None
25-2-25.0	0	0	3.33	0	Aggregate	Aggregate	0	None
25-2-25.1	0	0	0.56	0	Aggregate	Aggregate	0	None
25-2-25.3	0	0	0.25	0	Aggregate	Aggregate	0	None
25-2-25.5	0	0	0.17	0	Aggregate	Aggregate	0	None
25-2-26.2	0	0	0.08	0	Native	Aggregate	0	None
25-2-27.1	0	0	1.11	0	Aggregate	Aggregate	0	None
25-2-27.5	0	0	0.36	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-2-27.6	0	0	0.24	0	Aggregate	Aggregate	0	None
25-2-28.0	0	0	2.48	0	Native	Aggregate	0	None
25-2-28.1	0	0	0.87	0	Native	Aggregate	0	None
25-2-28.1	0	0	0.07	0	Native	Aggregate	0	None
25-2-28.2	0	0	1.27	0	Native	Aggregate	0	None
25-2-28.3	0	0	0.09	0	Native	Aggregate	0	None
25-2-29.0	0	0	2.24	0	Native	Aggregate	0	None
25-2-29.1	0	0	0.22	0	Aggregate	Aggregate	0	None
25-2-29.2	0	0	0.14	0	Aggregate	Aggregate	0	None
25-2-30.2	0	0	0.19	0	Aggregate	Aggregate	0	None
25-2-31.0	0	0	0.11	0	Aggregate	Aggregate	0	None
25-2-31.0	0	0	0.12	0	Aggregate	Aggregate	0	None
25-2-32.3	0	0	0.29	0	Native	Aggregate	0	None
25-2-33.0	0	0	0.09	0	Aggregate	Aggregate	0	None
25-2-33.1	0	0	1.85	0	Aggregate	Aggregate	0	None
25-2-33.2	0	0	1.29	0	Native	Aggregate	0	None
25-2-33.3	0	0	0.18	0	Aggregate	Aggregate	0	None
25-2-34.0	0	0	0.93	0	Aggregate	Aggregate	0	None
25-2-35.1	0	0	0.31	0	Aggregate	Aggregate	0	None
25-2-35.3	0	0	0.13	0	Native	Aggregate	0	None
25-2-35.4	0	0	0.73	0	Aggregate	Aggregate	0	None
25-2-4.3	0	0	0.02	0	Aggregate	Aggregate	0	None
25-2-4.3	0	0	0.75	0	Aggregate	Aggregate	0	None
25-2-5.0	0	0	0.39	0	Native	Aggregate	0	None
25-2-5.1	0	0	0.21	0	Aggregate	Aggregate	0	None
25-2-5.1	0	0	0.03	0	Aggregate	Aggregate	0	None
25-2-5.3	0	0	0.11	0	Native	Aggregate	0	None
25-2-5.4	0	0	0.10	0	Aggregate	Aggregate	0	None
25-2-7.0	0	0	0.76	0	Aggregate	Aggregate	0	None
25-2-7.0	0	0	0.16	0	Aggregate	Aggregate	0	None
25-2-7.1	0	0	0.15	0	Aggregate	Aggregate	0	None
25-2-7.4	0	0	0.33	0	Aggregate	Aggregate	0	None
25-2-7.6	0	0	0.15	0	Aggregate	Aggregate	0	None
25-2-7.7	0	0	0.32	0	Aggregate	Aggregate	0	None
25-2-7.8	0	0	0.19	0	Aggregate	Aggregate	0	None
25-2-8.0	0	0	0.05	0	Aggregate	Aggregate	0	None
25-2-8.0	0	0	0.37	0	Native	Aggregate	0	None
25-2-8.1	0	0	1.71	0	Native	Aggregate	0	None
25-2-9.0	0	0	2.80	0	Aggregate	Aggregate	0	None
25-2-9.2	0	0	1.42	0	Aggregate	Aggregate	0	None
25-3-13.0	0	0	0.47	0	Aggregate	Aggregate	0	None
25-3-13.1	0	0	0.60	0	Aggregate	Aggregate	0	None
25-3-13.13	0	0	0.19	0	Aggregate	Aggregate	0	None
25-3-13.4	0	0	0.39	0	Aggregate	Aggregate	0	None
25-3-13.6	0	0	0.18	0	Native	Aggregate	0	None
25-3-13.7	0	0	0.17	0	Aggregate	Aggregate	0	None
25-3-17.0	0	0	0.21	0	Aggregate	Aggregate	0	None
25-3-18	0	0	0.44	0	Aggregate	Aggregate	0	None
25-3-18.0	0	0	0.10	0	Aggregate	Aggregate	0	None
25-3-19.0	0	0	0.70	0	Aggregate	Aggregate	0	None
25-3-19.4	0	0	0.08	0	Aggregate	Aggregate	0	None
25-3-19.6	0	0	0.08	0	Aggregate	Aggregate	0	None
25-3-20.0	0	0	0.59	0	Native	Aggregate	0	None
25-3-20.1	0	0	0.39	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-3-23.0	0	0	3.01	0	Aggregate	Aggregate	0	None
25-3-23.1	0	0	0.25	0	Aggregate	Aggregate	0	None
25-3-23.2	0	0	0.38	0	Aggregate	Aggregate	0	None
25-3-23.4	0	0	0.17	0	Aggregate	Aggregate	0	None
25-3-24.1	0	0	0.50	0	Aggregate	Aggregate	0	None
25-3-24.3	0.08	0	0	0	Native	Aggregate	0	None
25-3-24.3	0.16	0	0	0	Native	Aggregate	0	None
25-3-25.0	0	0	3.83	0	Native	Aggregate	0	None
25-3-25.4	0	0	0.78	0	Aggregate	Aggregate	0	None
25-3-26.1	0	0	1.69	0	Aggregate	Aggregate	0	None
25-3-26.2	0	0	0.19	0	Native	Aggregate	0	None
25-3-27.0	0	0	0.82	0	Aggregate	Aggregate	0	None
25-3-27.1	0	0	0.46	0	Aggregate	Aggregate	0	None
25-3-27.2	0	0	0.45	0	Aggregate	Aggregate	0	None
25-3-27.5	0	0	0.16	0	Native	Aggregate	0	None
25-3-29.1	0	0	1.20	0	Aggregate	Aggregate	0	None
25-3-29.11	0	0	0.17	0	Native	Aggregate	0	None
25-3-29.12	0	0	0.36	0	Native	Aggregate	0	None
25-3-29.14	0	0	0.11	0	Native	Aggregate	0	None
25-3-29.15	0	0	0.15	0	Aggregate	Aggregate	0	None
25-3-29.16	0	0	0.15	0	Aggregate	Aggregate	0	None
25-3-29.17	0	0	0.14	0	Aggregate	Aggregate	0	None
25-3-29.2	0	0	0.19	0	Native	Aggregate	0	None
25-3-29.3	0	0	0.59	0	Aggregate	Aggregate	0	None
25-3-29.4	0	0	0.25	0	Aggregate	Aggregate	0	None
25-3-29.4	0	0	0.21	0	Aggregate	Aggregate	0	None
25-3-29.5	0	0	0.50	0	Aggregate	Aggregate	0	None
25-3-29.6	0	0	0.11	0	Aggregate	Aggregate	0	None
25-3-29.7	0	0	1.06	0	Native	Aggregate	0	None
25-3-29.8	0	0	0.20	0	Aggregate	Aggregate	0	None
25-3-29.9	0	0	0.54	0	Aggregate	Aggregate	0	None
25-3-33.0	0	0	0.46	0	Native	Aggregate	0	None
25-3-33.1	0	0	0.74	0	Aggregate	Aggregate	0	None
25-3-33.2	0	0	0.33	0	Aggregate	Aggregate	0	None
25-3-33.5	0	0	0.31	0	Aggregate	Aggregate	0	None
25-3-33.7	0	0	0.21	0	Aggregate	Aggregate	0	None
25-3-33.8	0	0	0.19	0	Aggregate	Aggregate	0	None
25-3-33.8	0	0	0.02	0	Aggregate	Aggregate	0	None
25-3-35.0	0	0	1.56	0	Aggregate	Aggregate	0	None
25-3-35.1	0	0	0.41	0	Aggregate	Aggregate	0	None
25-3-35.2	0	0	0.30	0	Aggregate	Aggregate	0	None
25-3-36.0	0	0	5.65	0	Native	Aggregate	0	None
25-3-5.0	0	0	1.13	0	Native	Aggregate	0	None
25-3-7.0	0	0	0.54	0	Aggregate	Aggregate	0	None
25-3-7.1	0	0	1.37	0	Native	Aggregate	0	None
25-3-8.0	0	0	0.40	0	Aggregate	Aggregate	0	None
25-3-8.2	0	0	0.12	0	Aggregate	Aggregate	0	None
25-3-8.3	0	0	1.26	0	Aggregate	Aggregate	0	None
25-4-12.0	0	0	0.97	0	Aggregate	Aggregate	0	None
25-4-12.0	0	0	0.05	0	Native	Aggregate	0	None
25-4-12.1	0	0	8.70	0	Aggregate	Aggregate	0	None
25-4-2.0	0	0	3.94	0	Aggregate	Aggregate	0	None
26-1-18.0	0	0	0.95	0	Native	Aggregate	0	None
26-2-1.0	0	0	0.10	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-2-12.0	0	0	2.55	0	Aggregate	Aggregate	0	None
26-2-12.0	0	0	1.29	0	Aggregate	Aggregate	0	None
26-2-12.1	0	0	0.98	0	Aggregate	Aggregate	0	None
26-2-12.2	0	0	0.23	0	Aggregate	Aggregate	0	None
26-2-13.0	0	0	1.14	0	Native	Aggregate	0	None
26-2-13.0	0	0	1.32	0	Native	Aggregate	0	None
26-2-14.0	0	0	0.28	0	Aggregate	Aggregate	0	None
26-2-14.0	0	0	0.75	0	Native	Aggregate	0	None
26-2-14.1	0	0	0.18	0	Native	Aggregate	0	None
26-2-14.3	0	0	0.11	0	Aggregate	Aggregate	0	None
26-2-14.4	0	0	0.05	0	Aggregate	Aggregate	0	None
26-2-14.5	0	0	0.05	0	Aggregate	Aggregate	0	None
26-2-15.0	0	0	0.71	0	Aggregate	Aggregate	0	None
26-2-15.1	0	0	0.28	0	Aggregate	Aggregate	0	None
26-2-17.0	0	0	2.43	0	Aggregate	Aggregate	0	None
26-2-17.1	0	0	0.87	0	Aggregate	Aggregate	0	None
26-2-17.1	0	0	0.29	0	Aggregate	Aggregate	0	None
26-2-19.0	0	0	0.13	0	Native	Aggregate	0	None
26-2-2.0	0	0	0.05	0	Native	Aggregate	0	None
26-2-2.2	0	0	0.50	0	Aggregate	Aggregate	0	None
26-2-2.3	0	0	1.26	0	Aggregate	Aggregate	0	None
26-2-2.4	0	0	0.29	0	Aggregate	Aggregate	0	None
26-2-2.5	0	0	0.62	0	Aggregate	Aggregate	0	None
26-2-2.5	0	0	0.18	0	Aggregate	Aggregate	0	None
26-2-20.0	0	0	0.19	0	Aggregate	Aggregate	0	None
26-2-20.0	0	0	0.33	0	Native	Aggregate	0	None
26-2-20.1	0	0	1.09	0	Native	Aggregate	0	None
26-2-20.4	0	0	0.45	0	Aggregate	Aggregate	0	None
26-2-21.0	0	0	2.95	0	Aggregate	Aggregate	0	None
26-2-21.1	0	0	0.38	0	Aggregate	Aggregate	0	None
26-2-21.2	0	0	0.06	0	Aggregate	Aggregate	0	None
26-2-21.3	0	0	0.92	0	Aggregate	Aggregate	0	None
26-2-22.0	0	0	7.56	0	Aggregate	Aggregate	0	None
26-2-22.0	0	0	1.09	0	Aggregate	Aggregate	0	None
26-2-22.2	0	0	1.72	0	Aggregate	Aggregate	0	None
26-2-23.0	0	0	2.27	0	Aggregate	Aggregate	0	None
26-2-23.0	0	0	0.20	0	Aggregate	Aggregate	0	None
26-2-23.1	0	0	0.52	0	Aggregate	Aggregate	0	None
26-2-23.1	0	0	0.25	0	Aggregate	Aggregate	0	None
26-2-23.2	0	0	0.12	0	Aggregate	Aggregate	0	None
26-2-26.0	0	0	0.15	0	Aggregate	Aggregate	0	None
26-2-27.0	0	0	0.21	0	Aggregate	Aggregate	0	None
26-2-28.0	0	0	0.34	0	Aggregate	Aggregate	0	None
26-2-28.1	0	0	0.29	0	Aggregate	Aggregate	0	None
26-2-29.0	0	0	0.08	0	Aggregate	Aggregate	0	None
26-2-29.1	0	0	0.26	0	Aggregate	Aggregate	0	None
26-2-29.3	0	0	0.12	0	Aggregate	Aggregate	0	None
26-2-3.0	0	0	0.11	0	Aggregate	Aggregate	0	None
26-2-3.0	0	0	1.43	0	Native	Aggregate	0	None
26-2-3.1	0	0	0.26	0	Bituminous	Bituminous	0	None
26-2-3.2	0	0	0.08	0	Aggregate	Aggregate	0	None
26-2-3.4	0	0	0.09	0	Aggregate	Aggregate	0	None
26-2-30.2	0	0	0.21	0	Bituminous	Bituminous	0	None
26-2-31.0	0	0	0.15	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-2-31.1	0	0	0.18	0	Aggregate	Aggregate	0	None
26-2-31.2	0	0	1.64	0	Aggregate	Aggregate	0	None
26-2-31.3	0	0	0.30	0	Aggregate	Aggregate	0	None
26-2-31.5	0	0	0.04	0	Native	Aggregate	0	None
26-2-31.6	0	0	1.30	0	Aggregate	Aggregate	0	None
26-2-31.6	0	0	0.18	0	Aggregate	Aggregate	0	None
26-2-32.1	0	0	1.11	0	Aggregate	Aggregate	0	None
26-2-32.2	0	0	0.16	0	Aggregate	Aggregate	0	None
26-2-32.3 A	0	0	0.07	0	Native	Aggregate	0	None
26-2-33.0	0	0	0.79	0	Native	Aggregate	0	None
26-2-33.1	0	0	0.77	0	Native	Aggregate	0	None
26-2-4.0	0	0	0.96	0	Aggregate	Aggregate	0	None
26-2-4.1	0	0	0.41	0	Native	Aggregate	0	None
26-2-4.3	0	0	0.21	0	Aggregate	Aggregate	0	None
26-2-6.0	0	0	0.12	0	Aggregate	Aggregate	0	None
26-2-6.1	0	0	2.65	0	Aggregate	Aggregate	0	None
26-2-6.2	0	0	0.13	0	Aggregate	Aggregate	0	None
26-2-7.0	0	0	0.62	0	Native	Aggregate	0	None
26-2-7.2	0	0	0.62	0	Aggregate	Aggregate	0	None
26-2-7.3	0	0	1.03	0	Native	Aggregate	0	None
26-3-1.0	0	0	0	7.01	Aggregate	Aggregate	0	None
26-3-1.1	0	0	0	0.33	Aggregate	Aggregate	0	None
26-3-1.1	0	0	1.84	0	Native	Aggregate	0	None
26-3-1.2	0	0	3.17	0	Aggregate	Aggregate	0	None
26-3-10.0	0	0	0	0.62	Aggregate	Aggregate	0	None
26-3-10.0	0	0	1.61	0	Aggregate	Aggregate	0	None
26-3-10.0	0	0	0.29	0	Aggregate	Aggregate	0	None
26-3-11.3	0	0	0.35	0	Aggregate	Aggregate	0	None
26-3-13.0	0	0	4.27	0	Native	Aggregate	0	None
26-3-13.2	0	0	0.47	0	Native	Aggregate	0	None
26-3-13.4	0	0	0.17	0	Native	Aggregate	0	None
26-3-15.0	0	0	4.07	0	Aggregate	Aggregate	0	None
26-3-15.1	0	0	1.38	0	Aggregate	Aggregate	0	None
26-3-15.2	0	0	0.23	0	Aggregate	Aggregate	0	None
26-3-15.3	0	0	0.31	0	Aggregate	Aggregate	0	None
26-3-15.4	0	0	0.17	0	Aggregate	Aggregate	0	None
26-3-15.5	0	0	0.05	0	Aggregate	Aggregate	0	None
26-3-15.6	0	0	0.05	0	Aggregate	Aggregate	0	None
26-3-15.7	0	0	0.11	0	Aggregate	Aggregate	0	None
26-3-22.0	0	0	0.36	0	Aggregate	Aggregate	0	None
26-3-22.0	0	0	0.06	0	Native	Aggregate	0	None
26-3-22.1	0	0	0.65	0	Aggregate	Aggregate	0	None
26-3-22.1	0	0	0.22	0	Aggregate	Aggregate	0	None
26-3-22.3	0	0	1.19	0	Aggregate	Aggregate	0	None
26-3-22.4	0	0	0.38	0	Aggregate	Aggregate	0	None
26-3-23.0	0	0	0.44	0	Aggregate	Aggregate	0	None
26-3-23.0	0	0	0.34	0	Bituminous	Bituminous	0	None
26-3-23.2	0	0	0.05	0	Aggregate	Aggregate	0	None
26-3-23.3	0	0	0.69	0	Native	Aggregate	0	None
26-3-23.7	0	0	0.11	0	Aggregate	Aggregate	0	None
26-3-24.0	0	0	0.31	0	Aggregate	Aggregate	0	None
26-3-24.1	0	0	0.14	0	Native	Aggregate	0	None
26-3-24.4	0	0	0.29	0	Native	Aggregate	0	None
26-3-25.3	0	0	1.22	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-3-26.0	0	0	0.07	0	Aggregate	Aggregate	0	None
26-3-26.0	0	0	0.02	0	Aggregate	Aggregate	0	None
26-3-26.2	0	0	0.35	0	Native	Aggregate	0	None
26-3-27.0	0	0	0.27	0	Native	Aggregate	0	None
26-3-27.2	0	0	0.16	0	Native	Aggregate	0	None
26-3-27.3	0	0	0.58	0	Native	Aggregate	0	None
26-3-27.4	0	0	0.49	0	Aggregate	Aggregate	0	None
26-3-34.1	0	0	1.78	0	Aggregate	Aggregate	0	None
26-3-34.1	0	0	0.67	0	Native	Aggregate	0	None
26-3-34.2	0	0	10.35	0	Native	Aggregate	0	None
26-3-35.0	0	0	1.52	0	Aggregate	Aggregate	0	None
26-3-35.0	0	0	0.36	0	Native	Aggregate	0	None
26-3-35.1	0	0	0.90	0	Aggregate	Aggregate	0	None
26-3-35.2	0	0	0.07	0	Aggregate	Aggregate	0	None
26-3-35.3	0	0	0.34	0	Aggregate	Aggregate	0	None
26-3-35.5	0	0	0.08	0	Aggregate	Aggregate	0	None
26-3-35.6	0	0	0.60	0	Native	Aggregate	0	None
26-3-35.7	0	0	0.04	0	Native	Aggregate	0	None
26-3-35.9	0	0	0.49	0	Native	Aggregate	0	None
27-2-5.2	0	0	1.97	0	Native	Aggregate	0	None
27-2-9.0	0	0	1.85	0	Native	Aggregate	0	None
3800010	0	0	5.04	0	Native	Aggregate	0	None
4H	0	0	1.40	0	Native	Aggregate	0	None
78	0	0	0	1.12	Native	Aggregate	0	None
78A	0	0	0.66	0	Native	Aggregate	0	None
FS 4710	0	0	1.56	0	Native	Aggregate	0	None
Spur 25-1-16a	0	0	0.11	0	Native	Aggregate	0	None
Spur 25-1-16b	0	0	0.27	0	Native	Aggregate	0	None
Spur 25-1-19a	0	0	0.06	0	Native	Aggregate	0	None
Spur 25-1-19b	0	0	0.21	0	Native	Aggregate	0	None
Spur 25-1-19c	0.05	0	0	0	Native	Aggregate	0	None
Spur 25-1-19d	0.25	0	0	0	Native	Aggregate	0	None
Spur 25-1-19e	0	0	0.56	0	Native	Aggregate	0	None
Spur 25-1-19f	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-1-20a	0	0	0.26	0	Native	Aggregate	0	None
Spur 25-1-20b	0	0	0.30	0	Native	Aggregate	0	None
Spur 25-1-20c	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-1-20d	0	0	0.57	0	Native	Aggregate	0	None
Spur 25-1-20e	0	0	0.85	0	Aggregate	Aggregate	0	None
Spur 25-1-20f	0	0	0.37	0	Aggregate	Aggregate	0	None
Spur 25-1-20g	0.06	0	0	0	Aggregate	Aggregate	0	None
Spur 25-1-21a	0.50	0.11	0	0	Aggregate	Aggregate	0	None
Spur 25-1-21b	0.11	0.08	0	0	Aggregate	Aggregate	0	None
Spur 25-1-30a	0	0	1.94	0	Aggregate	Aggregate	0	None
Spur 25-1-30b	0	0	1.35	0	Native	Aggregate	0	None
Spur 25-1-30c	0	0	0.31	0	Native	Aggregate	0	None
Spur 25-1-30d	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-1-30e	0	0	0.11	0	Native	Aggregate	0	None
Spur 25-1-30f	0.06	0	0	0	Native	Aggregate	0	None
Spur 25-1-7a	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-1-7f	0	0	0.05	0	Native	Aggregate	0	None
Spur 25-2-11a	0	0	0.18	0	Native	Aggregate	0	None
Spur 25-2-13a	0.04	0	0	0	Native	Aggregate	0	None
Spur 25-2-14b	0.15	0	0	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 25-2-14c	0.08	0	0	0	Native	Aggregate	0	None
Spur 25-2-14d	0	0	0.12	0	Native	Aggregate	0	None
Spur 25-2-14e	0.25	0	0	0	Native	Aggregate	0	None
Spur 25-2-15a	0.41	0	0	0	Native	Aggregate	0	None
Spur 25-2-15b	0	0	0.20	0	Native	Aggregate	0.20	Waterbar & Block
Spur 25-2-15c	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-15d	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-2-17a	0	0	0.06	0	Native	Aggregate	0	None
Spur 25-2-17b	0	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-2-17c	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-17d	0	0	0.11	0	Native	Aggregate	0	None
Spur 25-2-17e	0	0	0.02	0	Native	Aggregate	0	None
Spur 25-2-17f	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-2-17g	0	0	0.05	0	Aggregate	Aggregate	0	None
Spur 25-2-17h	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-2-17i	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-2-19b	0.30	0	0	0	Native	Aggregate	0	None
Spur 25-2-19c	0.07	0	0	0	Native	Aggregate	0	None
Spur 25-2-19d	0.12	0	0	0	Native	Aggregate	0	None
Spur 25-2-19g	0.30	0	0	0	Native	Aggregate	0	None
Spur 25-2-19k	0.44	0.01	0	0	Native	Aggregate	0	None
Spur 25-2-1a	0.08	0.01	0	0	Native	Aggregate	0	None
Spur 25-2-1b	0	0	0.31	0	Aggregate	Aggregate	0	None
Spur 25-2-1c	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-1d	0	0	0.07	0	Aggregate	Aggregate	0	None
Spur 25-2-21a	0	0	0.14	0	Aggregate	Aggregate	0	None
Spur 25-2-21b	0	0	0.07	0	Aggregate	Aggregate	0	None
Spur 25-2-22a	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-2-23a	0	0	0.05	0	Native	Aggregate	0	None
Spur 25-2-23b	0	0	0.26	0	Native	Aggregate	0	None
Spur 25-2-23c	0	0	0.07	0	Aggregate	Aggregate	0	None
Spur 25-2-25a	0.44	0	0	0	Native	Aggregate	0	None
Spur 25-2-25b	0.04	0	0	0	Native	Aggregate	0	None
Spur 25-2-26a	0.08	0	0	0	Native	Aggregate	0	None
Spur 25-2-26b	0	0	0.25	0	Native	Aggregate	0	None
Spur 25-2-29e	0.06	0.03	0	0	Native	Aggregate	0	None
Spur 25-2-31a	0.42	0.02	0	0	Native	Aggregate	0	None
Spur 25-2-31c	0.04	0.01	0	0	Native	Aggregate	0.04	Waterbar & Block
Spur 25-2-31f	0.15	0	0	0	Native	Aggregate	0.15	Waterbar & Block
Spur 25-2-33a	0	0	0.84	0	Native	Aggregate	0	None
Spur 25-2-33b	0	0	0.07	0	Native	Aggregate	0	None
Spur 25-2-33c	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-2-34a	0.12	0	0	0	Native	Aggregate	0	None
Spur 25-2-34b	0.08	0	0	0	Native	Aggregate	0	None
Spur 25-2-34f	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-2-35a	0.21	0	0	0	Aggregate	Aggregate	0	None
Spur 25-2-35b	0.08	0	0	0	Native	Aggregate	0	None
Spur 25-2-35c	0	0	0.24	0	Native	Aggregate	0	None
Spur 25-2-35d	0	0	0.18	0	Native	Aggregate	0	None
Spur 25-2-5a	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-7a	0	0	0.15	0	Native	Aggregate	0	None
Spur 25-2-7b	0	0	0.02	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 25-2-7c	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-2-7d	0	0	0.07	0	Native	Aggregate	0	None
Spur 25-2-7d	0	0	0.21	0	Native	Aggregate	0	None
Spur 25-2-7e	0	0	0.15	0	Native	Aggregate	0	None
Spur 25-3-12a	0	0	0.20	0	Aggregate	Aggregate	0	None
Spur 25-3-12b	0	0	0.30	0	Native	Aggregate	0	None
Spur 25-3-12c	0	0	0.27	0	Native	Aggregate	0	None
Spur 25-3-12d	0	0	0.07	0	Native	Aggregate	0	None
Spur 25-3-13a	0	0	0.06	0	Native	Aggregate	0	None
Spur 25-3-17a	0	0	0.43	0	Aggregate	Aggregate	0	None
Spur 25-3-18a	0	0	1.33	0	Native	Aggregate	0	None
Spur 25-3-19a	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-3-23a	0	0	0.20	0	Native	Aggregate	0	None
Spur 25-3-23b	0	0	0.05	0	Native	Aggregate	0	None
Spur 25-3-23c	0	0	0.19	0	Aggregate	Aggregate	0	None
Spur 25-3-25a	0	0	0.14	0	Native	Aggregate	0	None
Spur 25-3-25a	0	0	0.02	0	Native	Aggregate	0	None
Spur 25-3-25b	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-25c	0	0	0.12	0	Native	Aggregate	0	None
Spur 25-3-25d	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-3-29a	0	0	0.49	0	Native	Aggregate	0	None
Spur 25-3-29b	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-3-29c	0	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-3-29d	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-3-29e	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-29f	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-29g	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-3-29h	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-29i	0	0	0.02	0	Native	Aggregate	0	None
Spur 25-3-32a	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-3-33a	0	0	0.01	0	Native	Aggregate	0	None
Spur 25-3-33a	0	0	0.11	0	Native	Aggregate	0	None
Spur 25-3-33b	0	0	0.16	0	Native	Aggregate	0	None
Spur 25-3-34a	0	0	0.51	0	Native	Aggregate	0	None
Spur 25-3-34b	0	0	0.48	0	Native	Aggregate	0	None
Spur 25-3-34b	0	0	0.46	0	Native	Aggregate	0	None
Spur 25-3-34c	0	0	0.39	0	Native	Aggregate	0	None
Spur 25-3-35a	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-3-35b	0	0	0.39	0	Native	Aggregate	0	None
Spur 25-3-8a	0	0	1.32	0	Native	Aggregate	0	None
Spur 26-2-10c	0.23	0.01	0	0	Native	Aggregate	0	None
Spur 26-2-11a	0.15	0	0	0	Native	Aggregate	0	None
Spur 26-2-12c	0.03	0	0	0	Native	Aggregate	0	None
Spur 26-2-12d	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-2-12e	0	0	0.07	0	Native	Aggregate	0	None
Spur 26-2-13a	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-2-13b	0.05	0	0	0	Native	Aggregate	0	None
Spur 26-2-13c	0.11	0.01	0	0	Native	Aggregate	0	None
Spur 26-2-13d	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-2-13h	0	0	0.18	0	Native	Aggregate	0	None
Spur 26-2-14a	0.16	0.01	0	0	Native	Native	0.16	Waterbar & Block
Spur 26-2-14b	0.11	0.01	0	0	Native	Aggregate	0	None
Spur 26-2-14c	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-2-14d	0.03	0	0	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 26-2-14e	0.03	0	0	0	Native	Aggregate	0.03	Waterbar & Block
Spur 26-2-15a	0.12	0	0	0	Native	Aggregate	0	None
Spur 26-2-15b	0.20	0	0	0	Native	Aggregate	0	None
Spur 26-2-15c	0	0	0.06	0	Native	Aggregate	0	None
Spur 26-2-16b	0	0	0.30	0	Native	Aggregate	0	None
Spur 26-2-19a	0	0	0.12	0	Native	Aggregate	0	None
Spur 26-2-19b	0	0	0.03	0	Native	Aggregate	0	None
Spur 26-2-19c	0	0	0.23	0	Native	Aggregate	0	None
Spur 26-2-1a	0.54	0.09	0	0	Native	Aggregate	0	None
Spur 26-2-1b	0.04	0	0	0	Aggregate	Aggregate	0	None
Spur 26-2-1c	0.03	0	0	0	Native	Aggregate	0	None
Spur 26-2-1d	0.03	0	0	0	Native	Aggregate	0	None
Spur 26-2-1e	0.03	0	0	0	Aggregate	Aggregate	0	None
Spur 26-2-1f	0.21	0.09	0	0	Aggregate	Aggregate	0	None
Spur 26-2-1g	0.18	0	0	0	Aggregate	Aggregate	0	None
Spur 26-2-1i	0.53	0.01	0	0	Aggregate	Aggregate	0	None
Spur 26-2-1j	0.34	0.1	0	0	Native	Aggregate	0	None
Spur 26-2-1k	0.02	0	0	0	Native	Aggregate	0	None
Spur 26-2-1l	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-2-1m	0.05	0	0	0	Native	Aggregate	0	None
Spur 26-2-20a	0	0	0.14	0	Native	Aggregate	0	None
Spur 26-2-20b	0	0	0.16	0	Aggregate	Aggregate	0	None
Spur 26-2-22a	0.03	0	0	0	Aggregate	Aggregate	0.03	Waterbar & Block
Spur 26-2-23a	0.07	0	0	0	Aggregate	Aggregate	0.07	Waterbar & Block
Spur 26-2-23b	0	0	0.32	0	Aggregate	Aggregate	0	None
Spur 26-2-24a	0	0	0.04	0	Native	Aggregate	0	None
Spur 26-2-29a	0	0	0.05	0	Native	Aggregate	0	None
Spur 26-2-29a	0	0	0.06	0	Native	Aggregate	0	None
Spur 26-2-29b	0	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-2-29c	0	0	0.05	0	Native	Aggregate	0	None
Spur 26-2-29d	0	0	0.22	0	Aggregate	Aggregate	0	None
Spur 26-2-29e	0	0	0.15	0	Native	Aggregate	0	None
Spur 26-2-29f	0	0	0.04	0	Aggregate	Aggregate	0	None
Spur 26-2-29g	0	0	0.04	0	Native	Aggregate	0	None
Spur 26-2-2a	0	0	0.28	0	Native	Aggregate	0	None
Spur 26-2-2c	0.35	0	0	0	Native	Aggregate	0	None
Spur 26-2-2f	0.22	0.07	0	0	Native	Aggregate	0	None
Spur 26-2-2g	0	0	0.22	0	Native	Aggregate	0	None
Spur 26-2-30b	0	0	0.02	0	Native	Aggregate	0	None
Spur 26-2-31a	0	0	0.04	0	Native	Aggregate	0	None
Spur 26-2-31b	0	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-2-31c	0	0	0.11	0	Native	Aggregate	0	None
Spur 26-2-31d	0	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-2-31e	0	0	0.16	0	Native	Aggregate	0	None
Spur 26-2-31f	0	0	0.05	0	Native	Aggregate	0	None
Spur 26-2-31g	0	0	0.14	0	Native	Aggregate	0	None
Spur 26-2-31h	0	0	0.17	0	Aggregate	Aggregate	0	None
Spur 26-2-31i	0	0	0.12	0	Native	Aggregate	0	None
Spur 26-2-34a	0	0	2.02	0	Native	Aggregate	0	None
Spur 26-2-35a	0	0	0.18	0	Native	Aggregate	0	None
Spur 26-2-35f	0.05	0	0	0	Native	Aggregate	0	None
Spur 26-2-35g	0.05	0	0	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 26-2-3a	0.11	0.09	0	0	Native	Aggregate	0.11	Waterbar & Block
Spur 26-2-4a	0	0	0.11	0	Aggregate	Aggregate	0	None
Spur 26-2-9a	0.26	0	0	0	Native	Aggregate	0.26	Waterbar & Block
Spur 26-2-9b	0.32	0	0	0	Native	Aggregate	0	None
Spur 26-2-9c	0.35	0	0	0	Native	Aggregate	0	None
Spur 26-3-13a	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-3-13b	0	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-3-1a	0.07	0	0	0	Native	Aggregate	0.07	Waterbar & Block
Spur 26-3-1b	0	0	0.21	0	Aggregate	Aggregate	0.21	Waterbar & Block
Spur 26-3-21a	0.23	0	0	0	Native	Aggregate	0	None
Spur 26-3-21b	0.07	0	0	0	Native	Aggregate	0	None
Spur 26-3-21c	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-3-22a	0	0	0.25	0	Aggregate	Aggregate	0	None
Spur 26-3-22b	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-3-22c	0	0	1.08	0	Aggregate	Aggregate	0	None
Spur 26-3-22d	0.07	0	0	0	Native	Aggregate	0	None
Spur 26-3-23a	0	0	0.10	0	Aggregate	Aggregate	0	None
Spur 26-3-23b	0	0	0.18	0	Aggregate	Aggregate	0.18	Waterbar & Block
Spur 26-3-23c	0	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-3-23d	0	0	0.02	0	Aggregate	Aggregate	0	None
Spur 26-3-23e	0	0	0.22	0	Aggregate	Aggregate	0	None
Spur 26-3-23f	0	0	0.24	0	Aggregate	Aggregate	0	None
Spur 26-3-24a	0	0	0.69	0	Aggregate	Aggregate	0	None
Spur 26-3-26a	0	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-3-26b	0	0	0.17	0	Aggregate	Aggregate	0	None
Spur 26-3-27a	0.23	0	0	0	Native	Aggregate	0	None
Spur 26-3-27b	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-3-27c	0.05	0	0	0	Native	Aggregate	0	None
Spur 26-3-27c	0.02	0	0	0	Native	Aggregate	0	None
Spur 26-3-30a	0	0	0.13	0	Aggregate	Aggregate	0	None
Spur 26-3-35a	0.25	0	0	0	Native	Aggregate	0	None
Spur 26-3-35b	0.18	0	0	0	Native	Aggregate	0.18	Waterbar & Block
Spur 26-3-35c	0	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-3-7a	0	0	0.02	0	Aggregate	Aggregate	0	None
Spur 27-2-2a	0	0	1.41	0	Aggregate	Aggregate	0	None
Spur-26-2-23b	0	0	0.02	0	Aggregate	Aggregate	0	None
Totals	**12.01**	**0.76**	**302.16**	**14.92**	**-**	**-**	**1.68**	**-**

**Values are approximations and may vary slightly at the time of implementation.

Table I-7. Proposed Road Management for Alternative 3

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
24-1-31.0	0	0	1.17	0	Aggregate	Aggregate	0	None
24-1-31.3	0	0	0.17	0	Aggregate	Aggregate	0	None
24-1-31.4	0	0	0.12	0	Native	Aggregate	0	None
24-1-32.0	0	0	0.94	0	Aggregate	Aggregate	0	None
24-2-31.0	0	0	1.63	0	Aggregate	Aggregate	0	None
24-2-31.1	0	0	1.70	0	Aggregate	Aggregate	0	None
24-2-31.2	0	0	0.51	0	Aggregate	Aggregate	0	None
24-2-34.3	0	0	0.37	0	Aggregate	Aggregate	0	None
24-2-35.3	0	0	0.24	0	Aggregate	Aggregate	0	None
24-3-31.1	0	0	0.07	0	Aggregate	Aggregate	0	None
25.5-1E-32.0	0	0	3.15	0	Aggregate	Aggregate	0	None
25-1-16.0	0	0	0.57	0	Native	Aggregate	0	None
25-1-17.0	0	0	0.34	0	Aggregate	Aggregate	0	None
25-1-17.1	0	0	0.81	0	Aggregate	Aggregate	0	None
25-1-17.2	0	0	0.47	0	Aggregate	Aggregate	0	None
25-1-18.0	0	0	0	4.19	Bituminous	Bituminous	0	None
25-1-18.1	0	0	0.35	0	Native	Aggregate	0	None
25-1-18.2	0	0	3.69	0	Aggregate	Aggregate	0	None
25-1-18.3	0	0	0.18	0	Aggregate	Aggregate	0	None
25-1-19.0	0	0	1.50	0	Aggregate	Aggregate	0	None
25-1-19.0	0	0	0.72	0	Native	Aggregate	0	None
25-1-19.1	0	0	2.20	0	Native	Aggregate	0	None
25-1-19.3	0	0	0.22	0	Aggregate	Aggregate	0	None
25-1-20.0	0	0	0.66	0	Native	Aggregate	0	None
25-1-20.1	0	0	1.17	0	Native	Aggregate	0	None
25-1-26.3	0	0	0.69	0	Aggregate	Aggregate	0	None
25-1-28.0	0	0	1.09	0	Native	Aggregate	0	None
25-1-5.0	0	0	1.15	0	Aggregate	Aggregate	0	None
25-1-5.1	0	0	0.27	0	Native	Aggregate	0	None
25-1-5.2	0	0	0.36	0	Native	Aggregate	0	None
25-1-5.3	0	0	0.36	0	Aggregate	Aggregate	0	None
25-1-5.3	0	0	0.15	0	Native	Aggregate	0	None
25-1-7.0	0	0	5.61	0	Aggregate	Aggregate	0	None
25-1-7.1	0	0	0.72	0	Aggregate	Aggregate	0	None
25-1-7.8	0	0	1.42	0	Aggregate	Aggregate	0	None
25-1-7.9	0	0	0.52	0	Aggregate	Aggregate	0	None
25-1-9.0	0	0	1.48	0	Native	Aggregate	0	None
25-2-1.0	0	0	0.36	0	Aggregate	Aggregate	0	None
25-2-1.0	0	0	0.07	0	Native	Aggregate	0	None
25-2-1.2	0	0	0.79	0	Aggregate	Aggregate	0	None
25-2-1.3	0	0	0.22	0	Aggregate	Aggregate	0	None
25-2-1.4	0	0	0.43	0	Aggregate	Aggregate	0	None
25-2-1.5	0	0	0.14	0	Aggregate	Aggregate	0	None
25-2-11.0	0	0	2.34	0	Aggregate	Aggregate	0	None
25-2-11.0	0	0	0	2.47	Bituminous	Bituminous	0	None
25-2-11.1	0	0	2.41	0	Aggregate	Aggregate	0	None
25-2-11.2	0	0	3.33	0	Aggregate	Aggregate	0	None
25-2-11.3	0	0	0.09	0	Native	Aggregate	0	None
25-2-11.4	0	0	0.16	0	Native	Aggregate	0	None
25-2-13.1	0	0	0.10	0	Native	Aggregate	0	None
25-2-14.0	0	0	1.32	0	Native	Aggregate	0	None
25-2-15.0	0	0	1.35	0	Aggregate	Aggregate	0	None
25-2-15.1	0	0	0.22	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-2-15.2	0	0	0.06	0	Aggregate	Aggregate	0	None
25-2-16.0	0	0	9.13	0	Aggregate	Aggregate	0	None
25-2-16.1	0	0	2.55	0	Aggregate	Aggregate	0	None
25-2-16.2	0	0	0.07	0	Aggregate	Aggregate	0	None
25-2-16.3	0	0	0.51	0	Native	Aggregate	0	None
25-2-17.0	0	0	0.57	0	Aggregate	Aggregate	0	None
25-2-17.0	0	0	0.12	0	Native	Aggregate	0	None
25-2-17.1	0	0	0.14	0	Aggregate	Aggregate	0	None
25-2-17.1	0	0	0.12	0	Native	Aggregate	0	None
25-2-17.2	0	0	0.27	0	Aggregate	Aggregate	0	None
25-2-17.3	0	0	0.36	0	Aggregate	Aggregate	0	None
25-2-17.4	0	0	0.26	0	Aggregate	Aggregate	0	None
25-2-17.5	0	0	0.22	0	Aggregate	Aggregate	0	None
25-2-17.8	0	0	0.01	0	Aggregate	Aggregate	0	None
25-2-19.0	0	0	0.07	0	Native	Aggregate	0	None
25-2-19.1	0	0	0.55	0	Aggregate	Aggregate	0	None
25-2-19.2	0	0	0.29	0	Native	Aggregate	0	None
25-2-19.3	0	0	0.25	0	Native	Aggregate	0	None
25-2-19.4	0	0	0.11	0	Native	Aggregate	0	None
25-2-19.5	0	0	1.00	0	Aggregate	Aggregate	0	None
25-2-19.6	0	0	0.21	0	Aggregate	Aggregate	0	None
25-2-19.7	0	0	0.22	0	Native	Aggregate	0	None
25-2-2.0	0	0	0.24	0	Aggregate	Aggregate	0	None
25-2-2.1	0	0	1.68	0	Aggregate	Aggregate	0	None
25-2-20.0	0	0	5.63	0	Aggregate	Aggregate	0	None
25-2-20.1	0	0	0.45	0	Aggregate	Aggregate	0	None
25-2-21.0	0	0	0.79	0	Aggregate	Aggregate	0	None
25-2-21.1	0	0	0.46	0	Aggregate	Aggregate	0	None
25-2-21.2	0	0	0.13	0	Aggregate	Aggregate	0	None
25-2-22.0	0	0	0.29	0	Native	Aggregate	0	None
25-2-23.0	0	0	0.36	0	Aggregate	Aggregate	0	None
25-2-23.1	0	0	0.85	0	Aggregate	Aggregate	0	None
25-2-23.10	0	0	0.08	0	Aggregate	Aggregate	0	None
25-2-23.12	0	0	0.38	0	Aggregate	Aggregate	0	None
25-2-23.2	0	0	1.08	0	Aggregate	Aggregate	0	None
25-2-23.3	0	0	0.23	0	Aggregate	Aggregate	0	None
25-2-23.4	0	0	0.41	0	Aggregate	Aggregate	0	None
25-2-23.4	0	0	0.24	0	Native	Aggregate	0	None
25-2-23.5	0	0	0.02	0	Native	Aggregate	0	None
25-2-23.7	0	0	0.40	0	Native	Aggregate	0	None
25-2-23.8	0	0	0.07	0	Aggregate	Aggregate	0	None
25-2-24.0	0	0	2.23	0	Aggregate	Aggregate	0	None
25-2-24.1	0	0	0.98	0	Aggregate	Aggregate	0	None
25-2-25.0	0	0	2.18	0	Aggregate	Aggregate	0	None
25-2-25.1	0	0	0.56	0	Native	Aggregate	0	None
25-2-25.3	0	0	0.25	0	Native	Aggregate	0	None
25-2-25.5	0	0	0.17	0	Aggregate	Aggregate	0	None
25-2-26.2	0	0	0.08	0	Aggregate	Aggregate	0	None
25-2-27.1	0	0	1.11	0	Aggregate	Aggregate	0	None
25-2-27.5	0	0	0.36	0	Aggregate	Aggregate	0	None
25-2-27.6	0	0	0.24	0	Aggregate	Aggregate	0	None
25-2-28.0	0	0	2.48	0	Aggregate	Aggregate	0	None
25-2-28.1	0	0	0.07	0	Aggregate	Aggregate	0	None
25-2-28.1	0	0	0.87	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-2-28.2	0	0	1.27	0	Aggregate	Aggregate	0	None
25-2-29.0	0	0	2.24	0	Aggregate	Aggregate	0	None
25-2-29.1	0	0	0.22	0	Native	Aggregate	0	None
25-2-29.2	0	0	0.14	0	Native	Aggregate	0	None
25-2-30.2	0	0	0.19	0	Native	Aggregate	0	None
25-2-31.0	0	0	0.12	0	Aggregate	Aggregate	0	None
25-2-31.0	0	0	0.11	0	Native	Aggregate	0	None
25-2-33.0	0	0	0.09	0	Native	Aggregate	0	None
25-2-33.1	0	0	1.85	0	Aggregate	Aggregate	0	None
25-2-33.2	0	0	1.29	0	Aggregate	Aggregate	0	None
25-2-33.3	0	0	0.18	0	Aggregate	Aggregate	0	None
25-2-34.0	0	0	0.64	0	Aggregate	Aggregate	0	None
25-2-35.1	0	0	0.31	0	Aggregate	Aggregate	0	None
25-2-35.4	0	0	0.73	0	Aggregate	Aggregate	0	None
25-2-4.3	0	0	0.58	0	Aggregate	Aggregate	0	None
25-2-4.3b	0	0	0.10	0	Native	Aggregate	0	None
25-2-4.3b	0	0	0.04	0	Native	Aggregate	0	None
25-2-4.3b	0	0	0.05	0	Native	Aggregate	0	None
25-2-5.0	0	0	0.39	0	Aggregate	Aggregate	0	None
25-2-5.1	0	0	0.14	0	Aggregate	Aggregate	0	None
25-2-5.3	0	0	0.11	0	Aggregate	Aggregate	0	None
25-2-5.4	0	0	0.10	0	Native	Aggregate	0	None
25-2-7.0	0	0	0.92	0	Aggregate	Aggregate	0	None
25-2-7.1	0	0	0.15	0	Aggregate	Aggregate	0	None
25-2-7.4	0	0	0.33	0	Aggregate	Aggregate	0	None
25-2-7.6	0	0	0.15	0	Native	Aggregate	0	None
25-2-7.7	0	0	0.32	0	Aggregate	Aggregate	0	None
25-2-7.8	0	0	0.19	0	Aggregate	Aggregate	0	None
25-2-8.0	0	0	0.05	0	Aggregate	Aggregate	0	None
25-2-8.0	0	0	0.37	0	Native	Aggregate	0	None
25-2-8.1	0	0	1.79	0	Aggregate	Aggregate	0	None
25-2-9.0	0	0	2.80	0	Aggregate	Aggregate	0	None
25-2-9.2	0	0	1.42	0	Aggregate	Aggregate	0	None
25-3-13.0	0	0	0.47	0	Aggregate	Aggregate	0	None
25-3-13.1	0	0	0.60	0	Aggregate	Aggregate	0	None
25-3-13.13	0	0	0.19	0	Aggregate	Aggregate	0	None
25-3-13.4	0	0	0.39	0	Aggregate	Aggregate	0	None
25-3-13.6	0	0	0.18	0	Aggregate	Aggregate	0	None
25-3-13.7	0	0	0.17	0	Native	Aggregate	0	None
25-3-17.0	0	0	0.21	0	Aggregate	Aggregate	0	None
25-3-18	0	0	0.44	0	Native	Aggregate	0	None
25-3-18.0	0	0	0.10	0	Aggregate	Aggregate	0	None
25-3-19.0	0	0	0.70	0	Aggregate	Aggregate	0	None
25-3-19.4	0	0	0.08	0	Aggregate	Aggregate	0	None
25-3-19.5	0	0	0.13	0	Aggregate	Aggregate	0	None
25-3-19.6	0	0	0.08	0	Aggregate	Aggregate	0	None
25-3-20.0	0	0	0.59	0	Aggregate	Aggregate	0	None
25-3-20.1	0	0	0.39	0	Aggregate	Aggregate	0	None
25-3-23.0	0	0	2.92	0	Aggregate	Aggregate	0	None
25-3-23.1	0	0	0.25	0	Native	Aggregate	0	None
25-3-23.2	0	0	0.38	0	Aggregate	Aggregate	0	None
25-3-23.4	0	0	0.17	0	Aggregate	Aggregate	0	None
25-3-24.1	0	0	0.50	0	Aggregate	Aggregate	0	None
25-3-24.3	0.24	0	0	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-3-25.0	0	0	3.83	0	Aggregate	Aggregate	0	None
25-3-25.4	0	0	0.78	0	Aggregate	Aggregate	0	None
25-3-26.1	0	0	1.69	0	Aggregate	Aggregate	0	None
25-3-26.2	0	0	0.19	0	Native	Aggregate	0	None
25-3-27.0	0	0	0.82	0	Aggregate	Aggregate	0	None
25-3-27.1	0	0	0.46	0	Aggregate	Aggregate	0	None
25-3-27.2	0	0	0.45	0	Aggregate	Aggregate	0	None
25-3-27.5	0	0	0.16	0	Aggregate	Aggregate	0	None
25-3-29.1	0	0	1.20	0	Aggregate	Aggregate	0	None
25-3-29.11	0	0	0.17	0	Aggregate	Aggregate	0	None
25-3-29.12	0	0	0.47	0	Native	Aggregate	0	None
25-3-29.15	0	0	0.15	0	Native	Aggregate	0	None
25-3-29.16	0	0	0.15	0	Aggregate	Aggregate	0	None
25-3-29.17	0	0	0.14	0	Aggregate	Aggregate	0	None
25-3-29.2	0	0	0.19	0	Native	Aggregate	0	None
25-3-29.3	0	0	0.59	0	Aggregate	Aggregate	0	None
25-3-29.4	0	0	0.25	0	Aggregate	Aggregate	0	None
25-3-29.4	0	0	0.21	0	Native	Aggregate	0	None
25-3-29.5	0	0	0.50	0	Aggregate	Aggregate	0	None
25-3-29.6	0	0	0.11	0	Native	Aggregate	0	None
25-3-29.7	0	0	1.06	0	Aggregate	Aggregate	0	None
25-3-29.8	0	0	0.20	0	Native	Aggregate	0	None
25-3-29.9	0	0	0.54	0	Native	Aggregate	0	None
25-3-33.0	0	0	0.46	0	Native	Aggregate	0	None
25-3-33.1	0	0	0.74	0	Aggregate	Aggregate	0	None
25-3-33.2	0	0	0.33	0	Aggregate	Aggregate	0	None
25-3-33.5	0	0	0.31	0	Aggregate	Aggregate	0	None
25-3-33.7	0	0	0.21	0	Native	Aggregate	0	None
25-3-33.8	0	0	0.19	0	Aggregate	Aggregate	0	None
25-3-33.8	0	0	0.02	0	Native	Aggregate	0	None
25-3-35.0	0	0	1.56	0	Aggregate	Aggregate	0	None
25-3-35.1	0	0	0.41	0	Aggregate	Aggregate	0	None
25-3-35.2	0	0	0.30	0	Aggregate	Aggregate	0	None
25-3-36.0	0	0	5.65	0	Aggregate	Aggregate	0	None
25-3-5.0	0	0	1.13	0	Native	Aggregate	0	None
25-3-7.0	0	0	0.54	0	Aggregate	Aggregate	0	None
25-3-7.1	0	0	1.37	0	Aggregate	Aggregate	0	None
25-3-8.0	0	0	0.40	0	Native	Aggregate	0	None
25-3-8.2	0	0	0.12	0	Aggregate	Aggregate	0	None
25-3-8.3	0	0	1.26	0	Aggregate	Aggregate	0	None
25-4-12.0	0	0	0.77	0	Aggregate	Aggregate	0	None
25-4-12.0	0	0	0.94	0	Native	Aggregate	0	None
25-4-12.1	0	0	8.70	0	Aggregate	Aggregate	0	None
25-4-2.0	0	0	3.94	0	Aggregate	Aggregate	0	None
25-4-24.1	0	0	1.80	0	Aggregate	Aggregate	0	None
26-02-21.3	0	0	0.22	0	Aggregate	Aggregate	0	None
26-1-18.0	0	0	0.95	0	Aggregate	Aggregate	0	None
26-2-1.0	0	0	0.10	0	Aggregate	Aggregate	0	None
26-2-12.0	0	0	2.55	0	Aggregate	Aggregate	0	None
26-2-12.0	0	0	1.29	0	Native	Aggregate	0	None
26-2-12.1	0	0	0.98	0	Aggregate	Aggregate	0	None
26-2-12.2	0	0	0.23	0	Native	Aggregate	0	None
26-2-13.0	0	0	1.32	0	Aggregate	Aggregate	0	None
26-2-13.0	0	0	0.75	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-2-14.0	0	0	0.75	0	Aggregate	Aggregate	0	None
26-2-14.0	0	0	0.28	0	Native	Aggregate	0	None
26-2-14.1	0	0	0.18	0	Native	Aggregate	0	None
26-2-14.3	0	0	0.16	0	Aggregate	Aggregate	0	None
26-2-14.5	0	0	0.05	0	Aggregate	Aggregate	0	None
26-2-15.0	0	0	0.54	0	Aggregate	Aggregate	0	None
26-2-15.1	0	0	0.28	0	Native	Aggregate	0	None
26-2-17.0	0	0	2.43	0	Aggregate	Aggregate	0	None
26-2-17.1	0	0	0.54	0	Aggregate	Aggregate	0	None
26-2-19.0	0	0	0.13	0	Native	Aggregate	0	None
26-2-2.0	0	0	0.05	0	Native	Aggregate	0	None
26-2-2.2	0	0	0.50	0	Aggregate	Aggregate	0	None
26-2-2.3	0	0	1.26	0	Aggregate	Aggregate	0	None
26-2-2.4	0	0	0.29	0	Aggregate	Aggregate	0	None
26-2-2.5	0	0	0.62	0	Aggregate	Aggregate	0	None
26-2-2.5	0	0	0.18	0	Native	Aggregate	0	None
26-2-20.0	0	0	0.33	0	Aggregate	Aggregate	0	None
26-2-20.0	0	0	0.19	0	Native	Aggregate	0	None
26-2-20.1	0	0	1.09	0	Native	Aggregate	0	None
26-2-20.4	0	0	0.45	0	Native	Aggregate	0	None
26-2-21.0	0	0	2.95	0	Aggregate	Aggregate	0	None
26-2-21.1	0	0	0.38	0	Native	Aggregate	0	None
26-2-21.2	0	0	0.06	0	Aggregate	Aggregate	0	None
26-2-21.3	0	0	0.70	0	Aggregate	Aggregate	0	None
26-2-22.0	0	0	7.56	0	Aggregate	Aggregate	0	None
26-2-22.0	0	0	1.09	0	Native	Aggregate	0	None
26-2-22.2	0	0	1.72	0	Aggregate	Aggregate	0	None
26-2-23.0	0	0	2.27	0	Aggregate	Aggregate	0	None
26-2-23.0	0	0	0.20	0	Native	Aggregate	0	None
26-2-23.1	0	0	0.52	0	Aggregate	Aggregate	0	None
26-2-23.1	0	0	0.25	0	Native	Aggregate	0	None
26-2-23.2	0	0	0.12	0	Aggregate	Aggregate	0	None
26-2-26.0	0	0	0.15	0	Aggregate	Aggregate	0	None
26-2-27.0	0	0	0.21	0	Native	Aggregate	0	None
26-2-28.0	0	0	0.34	0	Aggregate	Aggregate	0	None
26-2-28.1	0	0	0.29	0	Aggregate	Aggregate	0	None
26-2-29.0	0	0	0.08	0	Aggregate	Aggregate	0	None
26-2-29.1	0	0	0.26	0	Aggregate	Aggregate	0	None
26-2-29.3	0	0	0.12	0	Aggregate	Aggregate	0	None
26-2-3.0	0	0	1.43	0	Aggregate	Aggregate	0	None
26-2-3.0	0	0	0.11	0	Native	Aggregate	0	None
26-2-3.1	0	0	0.26	0	Native	Aggregate	0	None
26-2-3.2	0	0	0.08	0	Native	Aggregate	0	None
26-2-3.3	0	0	0.05	0	Native	Aggregate	0	None
26-2-3.4	0	0	0.09	0	Aggregate	Aggregate	0	None
26-2-30.2	0	0	0.21	0	Aggregate	Aggregate	0	None
26-2-31.0	0	0	0.16	0	Aggregate	Aggregate	0	None
26-2-31.1	0	0	0.18	0	Aggregate	Aggregate	0	None
26-2-31.2	0	0	1.64	0	Aggregate	Aggregate	0	None
26-2-31.3	0	0	0.30	0	Aggregate	Aggregate	0	None
26-2-31.5	0	0	0.04	0	Aggregate	Aggregate	0	None
26-2-31.6	0	0	1.30	0	Aggregate	Aggregate	0	None
26-2-31.6	0	0	0.18	0	Native	Aggregate	0	None
26-2-32.1	0	0	1.15	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-2-32.2	0	0	0.11	0	Aggregate	Aggregate	0	None
26-2-32.3 A	0	0	0.07	0	Aggregate	Aggregate	0	None
26-2-33.0	0	0	0.79	0	Aggregate	Aggregate	0	None
26-2-33.1	0	0	0.77	0	Aggregate	Aggregate	0	None
26-2-4.0	0	0	0.96	0	Aggregate	Aggregate	0	None
26-2-4.1	0	0	0.41	0	Aggregate	Aggregate	0	None
26-2-4.3	0	0	0.21	0	Aggregate	Aggregate	0	None
26-2-6.0	0	0	0.12	0	Aggregate	Aggregate	0	None
26-2-6.1	0	0	2.65	0	Aggregate	Aggregate	0	None
26-2-6.2	0	0	0.13	0	Aggregate	Aggregate	0	None
26-2-7.0	0	0	0.62	0	Aggregate	Aggregate	0	None
26-2-7.2	0	0	0.62	0	Native	Aggregate	0	None
26-2-7.3	0	0	1.03	0	Aggregate	Aggregate	0	None
26-3-1.0	0	0	0	8.21	Bituminous	Bituminous	0	None
26-3-1.1	0	0	1.84	0	Aggregate	Aggregate	0	None
26-3-1.1	0	0	0	0.33	Bituminous	Bituminous	0	None
26-3-1.2	0	0	3.17	0	Aggregate	Aggregate	0	None
26-3-10.0	0	0	1.61	0	Aggregate	Aggregate	0	None
26-3-10.0	0	0	0	0.62	Bituminous	Bituminous	0	None
26-3-10.0	0	0	0.29	0	Native	Aggregate	0	None
26-3-11.3	0	0	0.35	0	Aggregate	Aggregate	0	None
26-3-13.0	0	0	4.27	0	Aggregate	Aggregate	0	None
26-3-13.2	0	0	0.47	0	Aggregate	Aggregate	0	None
26-3-13.4	0	0	0.17	0	Native	Aggregate	0	None
26-3-15.0	0	0	4.07	0	Aggregate	Aggregate	0	None
26-3-15.1	0	0	1.38	0	Aggregate	Aggregate	0	None
26-3-15.2	0	0	0.23	0	Aggregate	Aggregate	0	None
26-3-15.3	0	0	0.31	0	Aggregate	Aggregate	0	None
26-3-15.4	0	0	0.17	0	Native	Aggregate	0	None
26-3-15.5	0	0	0.05	0	Native	Aggregate	0	None
26-3-15.6	0	0	0.05	0	Native	Aggregate	0	None
26-3-15.7	0	0	0.11	0	Aggregate	Aggregate	0	None
26-3-15.8	0	0	0.11	0	Aggregate	Aggregate	0	None
26-3-22.0	0	0	0.36	0	Aggregate	Aggregate	0	None
26-3-22.0	0	0	0.06	0	Native	Aggregate	0	None
26-3-22.1	0	0	0.11	0	Aggregate	Aggregate	0	None
26-3-22.1	0	0	0.54	0	Aggregate	Aggregate	0	None
26-3-22.1	0	0	0.22	0	Native	Aggregate	0	None
26-3-22.3	0	0	1.19	0	Aggregate	Aggregate	0	None
26-3-22.4	0	0	0.38	0	Aggregate	Aggregate	0	None
26-3-23.0	0	0	0.34	0	Aggregate	Aggregate	0	None
26-3-23.0	0	0	0.44	0	Native	Aggregate	0	None
26-3-23.2	0	0	0.05	0	Native	Aggregate	0	None
26-3-23.3	0	0	0.69	0	Aggregate	Aggregate	0	None
26-3-23.7	0	0	0.11	0	Native	Aggregate	0	None
26-3-24.0	0	0	0.31	0	Aggregate	Aggregate	0	None
26-3-24.1	0	0	0.14	0	Native	Aggregate	0	None
26-3-24.4	0	0	0.29	0	Aggregate	Aggregate	0	None
26-3-25.3	0	0	1.22	0	Aggregate	Aggregate	0	None
26-3-26.0	0	0	0.07	0	Aggregate	Aggregate	0	None
26-3-26.0	0	0	0.02	0	Native	Aggregate	0	None
26-3-26.2	0	0	0.35	0	Aggregate	Aggregate	0	None
26-3-27.0	0	0	0.27	0	Aggregate	Aggregate	0	None
26-3-27.2	0	0	0.16	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-3-27.3	0	0	0.58	0	Native	Aggregate	0	None
26-3-27.4	0	0	0.49	0	Native	Aggregate	0	None
26-3-34.1	0	0	1.78	0	Aggregate	Aggregate	0	None
26-3-34.1	0	0	0.67	0	Native	Aggregate	0	None
26-3-34.2	0	0	10.22	0	Aggregate	Aggregate	0	None
26-3-35.0	0	0	1.52	0	Aggregate	Aggregate	0	None
26-3-35.0	0	0	0.36	0	Native	Aggregate	0	None
26-3-35.1	0	0	0.90	0	Aggregate	Aggregate	0	None
26-3-35.2	0	0	0.07	0	Aggregate	Aggregate	0	None
26-3-35.3	0	0	0.34	0	Aggregate	Aggregate	0	None
26-3-35.5	0	0	0.08	0	Aggregate	Aggregate	0	None
26-3-35.6	0	0	0.60	0	Aggregate	Aggregate	0	None
26-3-35.7	0	0	0.04	0	Native	Aggregate	0	None
26-3-35.9	0	0	0.49	0	Aggregate	Aggregate	0	None
27-2-5.2	0	0	1.97	0	Aggregate	Aggregate	0	None
27-2-9.0	0	0	1.85	0	Aggregate	Aggregate	0	None
3800010	0	0	5.04	0	Aggregate	Aggregate	0	None
4H	0	0	1.40	0	Aggregate	Aggregate	0	None
78	0	0	0	1.12	Bituminous	Bituminous	0	None
78A	0	0	0.66	0	Aggregate	Aggregate	0	None
FS 4710	0	0	1.56	0	Aggregate	Aggregate	0	None
Spur 25-1-16a	0	0	0.11	0	Native	Aggregate	0	None
Spur 25-1-16b	0	0	0.27	0	Aggregate	Aggregate	0	None
Spur 25-1-19a	0	0	0.06	0	Aggregate	Aggregate	0	None
Spur 25-1-19b	0	0	0.21	0	Native	Aggregate	0	None
Spur 25-1-19e	0	0	0.56	0	Aggregate	Aggregate	0	None
Spur 25-1-19f	0	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-1-20a	0	0	0.26	0	Native	Aggregate	0	None
Spur 25-1-20b	0	0	0.30	0	Native	Aggregate	0	None
Spur 25-1-20c	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-1-20d	0	0	0.57	0	Native	Aggregate	0	None
Spur 25-1-20e	0	0	0.47	0	Aggregate	Aggregate	0	None
Spur 25-1-21b	0.11	0.08	0	0	Native	Aggregate	0	None
Spur 25-1-30a	0	0	1.94	0	Aggregate	Aggregate	0	None
Spur 25-1-30b	0	0	1.35	0	Aggregate	Aggregate	0	None
Spur 25-1-30c	0	0	0.31	0	Aggregate	Aggregate	0	None
Spur 25-1-30d	0	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-1-30e	0	0	0.11	0	Aggregate	Aggregate	0	None
Spur 25-1-30f	0.06	0	0	0	Native	Aggregate	0	None
Spur 25-1-7a	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-1-7f	0	0	0.05	0	Native	Aggregate	0	None
Spur 25-2-11a	0	0	0.18	0	Native	Aggregate	0	None
Spur 25-2-13a	0.04	0	0	0	Native	Aggregate	0	None
Spur 25-2-14b	0.15	0	0	0	Native	Aggregate	0	None
Spur 25-2-14c	0.08	0	0	0	Native	Aggregate	0	None
Spur 25-2-14d	0	0	0.12	0	Native	Aggregate	0	None
Spur 25-2-14e	0.25	0	0	0	Native	Aggregate	0	None
Spur 25-2-15a	0.41	0	0	0	Native	Aggregate	0	None
Spur 25-2-15b	0	0	0.20	0	Native	Aggregate	0.20	Waterbar & Block
Spur 25-2-15c	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-15d	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-2-17a	0	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-2-17a	0	0	0.06	0	Native	Aggregate	0	None
Spur 25-2-17b	0	0	0.03	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 25-2-17c	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-17d	0	0	0.11	0	Native	Aggregate	0	None
Spur 25-2-17e	0	0	0.02	0	Native	Aggregate	0	None
Spur 25-2-17f	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-2-17g	0	0	0.05	0	Native	Aggregate	0	None
Spur 25-2-17h	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-2-19b	0.30	0	0	0	Aggregate	Aggregate	0	None
Spur 25-2-19c	0.07	0	0	0	Aggregate	Aggregate	0	None
Spur 25-2-19d	0.12	0	0	0	Aggregate	Aggregate	0	None
Spur 25-2-19g	0.30	0	0	0	Aggregate	Aggregate	0	None
Spur 25-2-19k	0.44	0	0	0	Aggregate	Aggregate	0	None
Spur 25-2-1a	0.08	0.01	0	0	Native	Aggregate	0	None
Spur 25-2-1b	0	0	0.31	0	Native	Aggregate	0	None
Spur 25-2-1c	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-21a	0	0	0.14	0	Native	Aggregate	0	None
Spur 25-2-21b	0	0	0.07	0	Native	Aggregate	0	None
Spur 25-2-22a	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-2-23a	0	0	0.05	0	Native	Aggregate	0	None
Spur 25-2-23b	0	0	0.26	0	Native	Aggregate	0	None
Spur 25-2-23c	0	0	0.07	0	Native	Aggregate	0	None
Spur 25-2-26b	0	0	0.25	0	Native	Aggregate	0	None
Spur 25-2-29e	0.06	0.03	0	0	Native	Aggregate	0	None
Spur 25-2-2a	0	0	0.29	0	Aggregate	Aggregate	0	None
Spur 25-2-31a	0.42	0	0	0	Native	Aggregate	0	None
Spur 25-2-31c	0.04	0.01	0	0	Native	Aggregate	0.04	Waterbar & Block
Spur 25-2-31f	0.15	0	0	0	Native	Aggregate	0.15	Waterbar & Block
Spur 25-2-33a	0	0	0.09	0	Aggregate	Aggregate	0	None
Spur 25-2-33b	0	0	0.07	0	Native	Aggregate	0	None
Spur 25-2-33c	0	0	0.08	0	Native	Aggregate	0	None
Spur 25-2-34f	0	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-2-35c	0	0	0.24	0	Native	Aggregate	0	None
Spur 25-2-5a	0	0	0.32	0	Native	Aggregate	0	None
Spur 25-2-5k	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-2-7a	0	0	0.15	0	Native	Aggregate	0	None
Spur 25-2-7b	0	0	0.02	0	Native	Aggregate	0	None
Spur 25-2-7c	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-2-7d	0	0	0.28	0	Aggregate	Aggregate	0	None
Spur 25-2-7e	0	0	0.15	0	Native	Aggregate	0	None
Spur 25-3-12a	0	0	0.20	0	Native	Aggregate	0	None
Spur 25-3-12b	0	0	0.30	0	Native	Aggregate	0	None
Spur 25-3-12c	0	0	0.27	0	Native	Aggregate	0	None
Spur 25-3-12d	0	0	0.07	0	Native	Aggregate	0	None
Spur 25-3-13a	0	0	0.06	0	Native	Aggregate	0	None
Spur 25-3-17a	0	0	0.43	0	Native	Aggregate	0	None
Spur 25-3-18a	0	0	1.33	0	Aggregate	Aggregate	0	None
Spur 25-3-19a	0	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-3-23a	0	0	0.20	0	Native	Aggregate	0	None
Spur 25-3-23b	0	0	0.05	0	Native	Aggregate	0	None
Spur 25-3-23c	0	0	0.19	0	Native	Aggregate	0	None
Spur 25-3-25a	0	0	0.16	0	Native	Aggregate	0	None
Spur 25-3-25b	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-25c	0	0	0.12	0	Native	Aggregate	0	None
Spur 25-3-25d	0	0	0.04	0	Native	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 25-3-29a	0	0	0.49	0	Native	Aggregate	0	None
Spur 25-3-29b	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-3-29c	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-29d	0	0	0.04	0	Native	Aggregate	0	None
Spur 25-3-29e	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-29f	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-29g	0	0	0.04	0	Aggregate	Aggregate	0	None
Spur 25-3-29h	0	0	0.03	0	Native	Aggregate	0	None
Spur 25-3-29i	0	0	0.02	0	Native	Aggregate	0	None
Spur 25-3-32a	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-3-33a	0	0	0.13	0	Native	Aggregate	0	None
Spur 25-3-33b	0	0	0.16	0	Native	Aggregate	0	None
Spur 25-3-34a	0	0	0.51	0	Native	Aggregate	0	None
Spur 25-3-34b	0	0	0.94	0	Native	Aggregate	0	None
Spur 25-3-34c	0	0	0.39	0	Native	Aggregate	0	None
Spur 25-3-35a	0	0	0.10	0	Native	Aggregate	0	None
Spur 25-3-35b	0	0	0.39	0	Native	Aggregate	0	None
Spur 25-3-35d	0	0	0.18	0	Native	Aggregate	0	None
Spur 25-3-8a	0	0	0.72	0	Aggregate	Aggregate	0	None
Spur 25-3-8a	0	0	0.60	0	Native	Aggregate	0	None
Spur 26-2-11a	0.15	0	0	0	Native	Aggregate	0	None
Spur 26-2-12c	0.03	0	0	0	Native	Aggregate	0	None
Spur 26-2-12d	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-2-12e	0	0	0.07	0	Aggregate	Aggregate	0	None
Spur 26-2-13a	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-2-13b	0.05	0	0	0	Native	Aggregate	0	None
Spur 26-2-13c	0.11	0.01	0	0	Native	Aggregate	0	None
Spur 26-2-13d	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-2-13h	0	0	0.18	0	Aggregate	Aggregate	0	None
Spur 26-2-14a	0.16	0.01	0	0	Native	Aggregate	0.16	Waterbar & Block
Spur 26-2-14b	0.11	0.01	0	0	Native	Aggregate	0	None
Spur 26-2-14c	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-2-14d	0.03	0	0	0	Native	Aggregate	0	None
Spur 26-2-14e	0.03	0	0	0	Native	Aggregate	0.03	Waterbar & Block
Spur 26-2-15a	0.12	0	0	0	Native	Aggregate	0	None
Spur 26-2-15b	0.20	0	0	0	Native	Aggregate	0	None
Spur 26-2-15c	0	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-2-19a	0	0	0.12	0	Native	Aggregate	0	None
Spur 26-2-19b	0	0	0.03	0	Native	Aggregate	0	None
Spur 26-2-19c	0	0	0.23	0	Native	Aggregate	0	None
Spur 26-2-1e	0.03	0	0	0	Native	Aggregate	0	None
Spur 26-2-1f	0.21	0.09	0	0	Native	Aggregate	0	None
Spur 26-2-1g	0.18	0	0	0	Native	Aggregate	0	None
Spur 26-2-1m	0.05	0	0	0	Native	Aggregate	0	None
Spur 26-2-1n	0	0	0.06	0	Native	Aggregate	0	None
Spur 26-2-20a	0	0	0.14	0	Native	Aggregate	0	None
Spur 26-2-20b	0	0	0.16	0	Native	Aggregate	0	None
Spur 26-2-22a	0.03	0	0	0	Native	Aggregate	0.03	Waterbar & Block
Spur 26-2-23a	0.07	0	0	0	Native	Aggregate	0.07	Waterbar & Block
Spur 26-2-23b	0	0	0.34	0	Native	Aggregate	0	None
Spur 26-2-24a	0	0	0.04	0	Native	Aggregate	0	None
Spur 26-2-29a	0	0	0.11	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 26-2-29b	0	0	0.06	0	Native	Aggregate	0	None
Spur 26-2-29c	0	0	0.05	0	Native	Aggregate	0	None
Spur 26-2-29d	0	0	0.22	0	Native	Aggregate	0	None
Spur 26-2-29e	0	0	0.15	0	Native	Aggregate	0	None
Spur 26-2-29f	0	0	0.04	0	Native	Aggregate	0	None
Spur 26-2-29g	0	0	0.04	0	Native	Aggregate	0	None
Spur 26-2-2a	0	0	0.28	0	Native	Aggregate	0	None
Spur 26-2-2g	0	0	0.22	0	Native	Aggregate	0	None
Spur 26-2-30b	0	0	0.02	0	Native	Aggregate	0	None
Spur 26-2-31a	0	0	0.04	0	Native	Aggregate	0	None
Spur 26-2-31b	0	0	0.08	0	Native	Aggregate	0	None
Spur 26-2-31c	0	0	0.11	0	Native	Aggregate	0	None
Spur 26-2-31d	0	0	0.08	0	Native	Aggregate	0	None
Spur 26-2-31e	0	0	0.16	0	Native	Aggregate	0	None
Spur 26-2-31f	0	0	0.05	0	Aggregate	Aggregate	0	None
Spur 26-2-31g	0	0	0.14	0	Native	Aggregate	0	None
Spur 26-2-31h	0	0	0.17	0	Native	Aggregate	0	None
Spur 26-2-31i	0	0	0.12	0	Aggregate	Aggregate	0	None
Spur 26-2-34a	0	0	2.02	0	Aggregate	Aggregate	0	None
Spur 26-2-35a	0	0	0.18	0	Aggregate	Aggregate	0	None
Spur 26-2-35g	0.05	0	0	0	Native	Aggregate	0	None
Spur 26-2-4a	0	0	0.11	0	Native	Aggregate	0	None
Spur 26-3-13a	0.04	0	0	0	Aggregate	Aggregate	0	None
Spur 26-3-13b	0	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-3-1a	0.07	0	0	0	Native	Aggregate	0.07	Waterbar & Block
Spur 26-3-1b	0	0	0.21	0	Native	Aggregate	0.21	Waterbar & Block
Spur 26-3-21c	0.04	0	0	0	Native	Aggregate	0	None
Spur 26-3-22a	0	0	0.25	0	Aggregate	Aggregate	0	None
Spur 26-3-22b	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-3-22c	0	0	1.08	0	Aggregate	Aggregate	0	None
Spur 26-3-23a	0	0	0.10	0	Native	Aggregate	0	None
Spur 26-3-23b	0	0	0.18	0	Native	Aggregate	0.18	Waterbar & Block
Spur 26-3-23c	0	0	0.08	0	Native	Aggregate	0	None
Spur 26-3-23d	0	0	0.02	0	Native	Aggregate	0	None
Spur 26-3-23e	0	0	0.22	0	Native	Aggregate	0	None
Spur 26-3-23f	0	0	0.24	0	Native	Aggregate	0	None
Spur 26-3-24a	0	0	0.69	0	Aggregate	Aggregate	0	None
Spur 26-3-26a	0	0	0.08	0	Native	Aggregate	0	None
Spur 26-3-26b	0	0	0.17	0	Aggregate	Aggregate	0	None
Spur 26-3-26d	0.07	0	0	0	Native	Aggregate	0	None
Spur 26-3-27a	0.23	0	0	0	Native	Aggregate	0	None
Spur 26-3-27b	0.10	0	0	0	Native	Aggregate	0	None
Spur 26-3-27c	0.07	0	0	0	Native	Aggregate	0	None
Spur 26-3-30a	0	0	0.13	0	Aggregate	Aggregate	0	None
Spur 26-3-35a	0.25	0	0	0	Native	Aggregate	0	None
Spur 26-3-35b	0.18	0	0	0	Native	Aggregate	0.18	Waterbar & Block
Spur 26-3-35c	0	0	0.06	0	Native	Aggregate	0	None
Spur 26-3-7a	0	0	0.02	0	Native	Aggregate	0	None
Spur 27-2-2a	0	0	1.41	0	Native	Aggregate	0	None
Totals	**6.34**	**0.25**	**307.11**	**16.93**	**-**	**-**	**1.317**	**-**

**Values are approximations and may vary slightly at the time of implementation.

Table I-8. Proposed Road Management for Alternative 4

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
24-1-31.0	0.00	0	1.17	0	Aggregate	Aggregate	0	None
24-1-31.3	0.00	0	0.17	0	Aggregate	Aggregate	0	None
24-1-31.4	0.00	0	0.12	0	Aggregate	Aggregate	0	None
24-2-31.0	0.00	0	1.63	0	Aggregate	Aggregate	0	None
24-2-31.1	0.00	0	1.70	0	Aggregate	Aggregate	0	None
24-2-31.2	0.00	0	0.51	0	Aggregate	Aggregate	0	None
24-3-31.1	0.00	0	0.07	0	Aggregate	Aggregate	0	None
25.5-1E-32.0	0.00	0	3.15	0	Aggregate	Aggregate	0	None
25-1-16.0	0.00	0	0.57	0	Aggregate	Aggregate	0	None
25-1-17.0	0.00	0	0.34	0	Aggregate	Aggregate	0	None
25-1-17.1	0.00	0	0.81	0	Aggregate	Aggregate	0	None
25-1-17.2	0.00	0	0.47	0	Aggregate	Aggregate	0	None
25-1-18.0	0.00	0	0	3.1	Bituminous	Bituminous	0	None
25-1-18.1	0.00	0	0.35	0	Aggregate	Aggregate	0	None
25-1-18.2	0.00	0	3.69	0	Aggregate	Aggregate	0	None
25-1-18.3	0.00	0	0.18	0	Aggregate	Aggregate	0	None
25-1-19.0	0.00	0	2.22	0	Aggregate	Aggregate	0	None
25-1-19.1	0.00	0	2.20	0	Aggregate	Aggregate	0	None
25-1-19.3	0.00	0	0.22	0	Aggregate	Aggregate	0	None
25-1-20.0	0.00	0	0.66	0	Aggregate	Aggregate	0	None
25-1-20.1	0.00	0	1.17	0	Aggregate	Aggregate	0	None
25-1-26.3	0.00	0	0.69	0	Aggregate	Aggregate	0	None
25-1-28.0	0.00	0	1.09	0	Aggregate	Aggregate	0	None
25-1-5.3	0.00	0	0.51	0	Aggregate	Aggregate	0	None
25-1-7.0	0.00	0	5.61	0	Aggregate	Aggregate	0	None
25-1-7.1	0.00	0	0.72	0	Aggregate	Aggregate	0	None
25-1-7.9	0.00	0	0.36	0	Aggregate	Aggregate	0	None
25-1-9.0	0.00	0	1.48	0	Aggregate	Aggregate	0	None
25-2-1.0	0.00	0	0.43	0	Aggregate	Aggregate	0	None
25-2-1.2	0.00	0	0.79	0	Aggregate	Aggregate	0	None
25-2-1.3	0.00	0	0.22	0	Aggregate	Aggregate	0	None
25-2-1.4	0.00	0	0.43	0	Aggregate	Aggregate	0	None
25-2-1.5	0.00	0	0.14	0	Aggregate	Aggregate	0	None
25-2-11.0	0.00	0	2.47	0	Aggregate	Aggregate	0	None
25-2-11.0	0.00	0	0	2.5	Bituminous	Bituminous	0	None
25-2-11.1	0.00	0	2.41	0	Aggregate	Aggregate	0	None
25-2-11.2	0.00	0	3.33	0	Aggregate	Aggregate	0	None
25-2-11.3	0.00	0	0.09	0	Aggregate	Aggregate	0	None
25-2-11.4	0.00	0	0.16	0	Aggregate	Aggregate	0	None
25-2-13.1	0.00	0	0.10	0	Aggregate	Aggregate	0	None
25-2-15.0	0.00	0	1.02	0	Aggregate	Aggregate	0	None
25-2-15.1	0.00	0	0.22	0	Aggregate	Aggregate	0	None
25-2-15.2	0.00	0	0.06	0	Aggregate	Aggregate	0	None
25-2-16.0	0.00	0	9.13	0	Aggregate	Aggregate	0	None
25-2-16.1	0.00	0	2.55	0	Aggregate	Aggregate	0	None
25-2-16.2	0.00	0	0.07	0	Aggregate	Aggregate	0	None
25-2-16.3	0.00	0	0.51	0	Aggregate	Aggregate	0	None
25-2-17.0	0.00	0	0.68	0	Aggregate	Aggregate	0	None
25-2-17.1	0.00	0	0.26	0	Aggregate	Aggregate	0	None
25-2-17.2	0.00	0	0.27	0	Aggregate	Aggregate	0	None
25-2-17.3	0.00	0	0.36	0	Aggregate	Aggregate	0	None
25-2-17.4	0.00	0	0.26	0	Aggregate	Aggregate	0	None
25-2-17.5	0.00	0	0.22	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-2-17.8	0.00	0	0.01	0	Aggregate	Aggregate	0	None
25-2-19.0	0.00	0	0.07	0	Aggregate	Aggregate	0	None
25-2-19.1	0.00	0	0.37	0	Aggregate	Aggregate	0	None
25-2-19.3	0.00	0	0.25	0	Aggregate	Aggregate	0	None
25-2-19.5	0.00	0	1.00	0	Aggregate	Aggregate	0	None
25-2-19.6	0.00	0	0.21	0	Aggregate	Aggregate	0	None
25-2-19.7	0.00	0	0.22	0	Aggregate	Aggregate	0	None
25-2-20.0	0.00	0	5.63	0	Aggregate	Aggregate	0	None
25-2-20.1	0.00	0	0.45	0	Aggregate	Aggregate	0	None
25-2-21.0	0.00	0	0.79	0	Aggregate	Aggregate	0	None
25-2-21.2	0.00	0	0.13	0	Aggregate	Aggregate	0	None
25-2-22.0	0.00	0	0.29	0	Aggregate	Aggregate	0	None
25-2-23.0	0.00	0	0.36	0	Aggregate	Aggregate	0	None
25-2-23.1	0.00	0	0.85	0	Aggregate	Aggregate	0	None
25-2-23.10	0.00	0	0.08	0	Aggregate	Aggregate	0	None
25-2-23.12	0.00	0	0.38	0	Aggregate	Aggregate	0	None
25-2-23.2	0.00	0	1.08	0	Aggregate	Aggregate	0	None
25-2-23.3	0.00	0	0.23	0	Aggregate	Aggregate	0	None
25-2-23.4	0.00	0	0.65	0	Aggregate	Aggregate	0	None
25-2-23.5	0.00	0	0.02	0	Aggregate	Aggregate	0	None
25-2-23.7	0.00	0	0.40	0	Aggregate	Aggregate	0	None
25-2-23.8	0.00	0	0.07	0	Aggregate	Aggregate	0	None
25-2-24.0	0.00	0	2.23	0	Aggregate	Aggregate	0	None
25-2-24.1	0.00	0	0.98	0	Aggregate	Aggregate	0	None
25-2-25.0	0.00	0	2.18	0	Aggregate	Aggregate	0	None
25-2-25.1	0.00	0	0.56	0	Aggregate	Aggregate	0	None
25-2-25.3	0.00	0	0.25	0	Aggregate	Aggregate	0	None
25-2-25.5	0.00	0	0.17	0	Aggregate	Aggregate	0	None
25-2-26.2	0.00	0	0.08	0	Aggregate	Aggregate	0	None
25-2-27.1	0.00	0	1.11	0	Aggregate	Aggregate	0	None
25-2-27.5	0.00	0	0.36	0	Aggregate	Aggregate	0	None
25-2-27.6	0.00	0	0.24	0	Aggregate	Aggregate	0	None
25-2-28.0	0.00	0	2.48	0	Aggregate	Aggregate	0	None
25-2-28.1	0.00	0	0.95	0	Aggregate	Aggregate	0	None
25-2-28.2	0.00	0	1.27	0	Aggregate	Aggregate	0	None
25-2-29.0	0.00	0	2.24	0	Aggregate	Aggregate	0	None
25-2-29.1	0.00	0	0.22	0	Aggregate	Aggregate	0	None
25-2-29.2	0.00	0	0.14	0	Aggregate	Aggregate	0	None
25-2-30.2	0.00	0	0.19	0	Aggregate	Aggregate	0	None
25-2-31.0	0.00	0	0.23	0	Aggregate	Aggregate	0	None
25-2-33.0	0.00	0	0.09	0	Aggregate	Aggregate	0	None
25-2-33.1	0.00	0	1.85	0	Aggregate	Aggregate	0	None
25-2-33.2	0.00	0	1.29	0	Aggregate	Aggregate	0	None
25-2-33.3	0.00	0	0.18	0	Aggregate	Aggregate	0	None
25-2-34.0	0.00	0	0.64	0	Aggregate	Aggregate	0	None
25-2-35.1	0.00	0	0.31	0	Aggregate	Aggregate	0	None
25-2-35.4	0.00	0	0.73	0	Aggregate	Aggregate	0	None
25-2-4.3	0.00	0	0.77	0	Aggregate	Aggregate	0	None
25-2-5.0	0.00	0	0.39	0	Aggregate	Aggregate	0	None
25-2-5.1	0.00	0	0.14	0	Aggregate	Aggregate	0	None
25-2-5.3	0.00	0	0.11	0	Aggregate	Aggregate	0	None
25-2-5.4	0.00	0	0.10	0	Aggregate	Aggregate	0	None
25-2-7.0	0.00	0	0.92	0	Aggregate	Aggregate	0	None
25-2-7.1	0.00	0	0.15	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-2-7.4	0.00	0	0.33	0	Aggregate	Aggregate	0	None
25-2-7.6	0.00	0	0.15	0	Aggregate	Aggregate	0	None
25-2-7.7	0.00	0	0.32	0	Aggregate	Aggregate	0	None
25-2-7.8	0.00	0	0.19	0	Aggregate	Aggregate	0	None
25-2-8.0	0.00	0	0.42	0	Aggregate	Aggregate	0	None
25-2-8.1	0.00	0	1.79	0	Aggregate	Aggregate	0	None
25-2-9.0	0.00	0	2.80	0	Aggregate	Aggregate	0	None
25-2-9.2	0.00	0	1.42	0	Aggregate	Aggregate	0	None
25-3-13.0	0.00	0	0.47	0	Aggregate	Aggregate	0	None
25-3-13.1	0.00	0	0.60	0	Aggregate	Aggregate	0	None
25-3-13.13	0.00	0	0.19	0	Aggregate	Aggregate	0	None
25-3-13.4	0.00	0	0.39	0	Aggregate	Aggregate	0	None
25-3-13.6	0.00	0	0.18	0	Aggregate	Aggregate	0	None
25-3-13.7	0.00	0	0.17	0	Aggregate	Aggregate	0	None
25-3-17.0	0.00	0	0.21	0	Aggregate	Aggregate	0	None
25-3-18.0	0.00	0	0.54	0	Aggregate	Aggregate	0	None
25-3-19.0	0.00	0	0.70	0	Aggregate	Aggregate	0	None
25-3-19.4	0.00	0	0.08	0	Aggregate	Aggregate	0	None
25-3-19.6	0.00	0	0.08	0	Aggregate	Aggregate	0	None
25-3-20.0	0.00	0	0.59	0	Aggregate	Aggregate	0	None
25-3-20.1	0.00	0	0.39	0	Aggregate	Aggregate	0	None
25-3-23.0	0.00	0	2.92	0	Aggregate	Aggregate	0	None
25-3-23.1	0.00	0	0.25	0	Aggregate	Aggregate	0	None
25-3-23.2	0.00	0	0.38	0	Aggregate	Aggregate	0	None
25-3-23.4	0.00	0	0.17	0	Aggregate	Aggregate	0	None
25-3-25.0	0.00	0	3.82	0	Aggregate	Aggregate	0	None
25-3-25.4	0.00	0	0.78	0	Aggregate	Aggregate	0	None
25-3-26.1	0.00	0	1.69	0	Aggregate	Aggregate	0	None
25-3-26.2	0.00	0	0.19	0	Aggregate	Aggregate	0	None
25-3-27.0	0.00	0	0.82	0	Aggregate	Aggregate	0	None
25-3-27.1	0.00	0	0.46	0	Aggregate	Aggregate	0	None
25-3-27.2	0.00	0	0.45	0	Aggregate	Aggregate	0	None
25-3-27.5	0.00	0	0.16	0	Aggregate	Aggregate	0	None
25-3-29.1	0.00	0	1.20	0	Aggregate	Aggregate	0	None
25-3-29.11	0.00	0	0.17	0	Aggregate	Aggregate	0	None
25-3-29.12	0.00	0	0.47	0	Aggregate	Aggregate	0	None
25-3-29.15	0.00	0	0.15	0	Aggregate	Aggregate	0	None
25-3-29.16	0.00	0	0.15	0	Aggregate	Aggregate	0	None
25-3-29.17	0.00	0	0.14	0	Aggregate	Aggregate	0	None
25-3-29.2	0.00	0	0.19	0	Aggregate	Aggregate	0	None
25-3-29.3	0.00	0	0.59	0	Aggregate	Aggregate	0	None
25-3-29.4	0.00	0	0.45	0	Aggregate	Aggregate	0	None
25-3-29.5	0.00	0	0.50	0	Aggregate	Aggregate	0	None
25-3-29.6	0.00	0	0.11	0	Aggregate	Aggregate	0	None
25-3-29.7	0.00	0	1.06	0	Aggregate	Aggregate	0	None
25-3-29.8	0.00	0	0.20	0	Aggregate	Aggregate	0	None
25-3-29.9	0.00	0	0.54	0	Aggregate	Aggregate	0	None
25-3-33.0	0.00	0	0.46	0	Aggregate	Aggregate	0	None
25-3-33.1	0.00	0	0.74	0	Aggregate	Aggregate	0	None
25-3-33.2	0.00	0	0.33	0	Aggregate	Aggregate	0	None
25-3-33.5	0.00	0	0.31	0	Aggregate	Aggregate	0	None
25-3-33.7	0.00	0	0.21	0	Aggregate	Aggregate	0	None
25-3-33.8	0.00	0	0.21	0	Aggregate	Aggregate	0	None
25-3-35.0	0.00	0	1.56	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
25-3-35.1	0.00	0	0.41	0	Aggregate	Aggregate	0	None
25-3-35.2	0.00	0	0.30	0	Aggregate	Aggregate	0	None
25-3-36.0	0.00	0	5.65	0	Aggregate	Aggregate	0	None
25-3-5.0	0.00	0	1.13	0	Aggregate	Aggregate	0	None
25-3-7.0	0.00	0	0.54	0	Aggregate	Aggregate	0	None
25-3-7.1	0.00	0	1.37	0	Aggregate	Aggregate	0	None
25-3-8.0	0.00	0	0.40	0	Aggregate	Aggregate	0	None
25-3-8.2	0.00	0	0.12	0	Aggregate	Aggregate	0	None
25-3-8.3	0.00	0	1.26	0	Aggregate	Aggregate	0	None
25-4-12.0	0.00	0	1.72	0	Aggregate	Aggregate	0	None
25-4-12.1	0.00	0	8.70	0	Aggregate	Aggregate	0	None
25-4-2.0	0.00	0	3.94	0	Aggregate	Aggregate	0	None
26-02-21.3	0.00	0	0.22	0	Aggregate	Aggregate	0	None
26-1-18.0	0.00	0	0.95	0	Aggregate	Aggregate	0	None
26-2-1.0	0.00	0	0.10	0	Aggregate	Aggregate	0	None
26-2-12.0	0.00	0	3.84	0	Aggregate	Aggregate	0	None
26-2-12.1	0.00	0	0.98	0	Aggregate	Aggregate	0	None
26-2-12.2	0.00	0	0.23	0	Aggregate	Aggregate	0	None
26-2-13.0	0.00	0	2.07	0	Aggregate	Aggregate	0	None
26-2-14.0	0.00	0	1.03	0	Aggregate	Aggregate	0	None
26-2-14.1	0.00	0	0.18	0	Aggregate	Aggregate	0	None
26-2-14.3	0.00	0	0.11	0	Aggregate	Aggregate	0	None
26-2-14.5	0.00	0	0.05	0	Aggregate	Aggregate	0	None
26-2-15.1	0.00	0	0.28	0	Aggregate	Aggregate	0	None
26-2-17.0	0.00	0	2.43	0	Aggregate	Aggregate	0	None
26-2-19.0	0.00	0	0.13	0	Aggregate	Aggregate	0	None
26-2-2.2	0.00	0	0.50	0	Aggregate	Aggregate	0	None
26-2-2.3	0.00	0	1.26	0	Aggregate	Aggregate	0	None
26-2-2.4	0.00	0	0.29	0	Aggregate	Aggregate	0	None
26-2-2.5	0.00	0	0.80	0	Aggregate	Aggregate	0	None
26-2-20.0	0.00	0	0.52	0	Aggregate	Aggregate	0	None
26-2-20.1	0.00	0	1.09	0	Aggregate	Aggregate	0	None
26-2-20.4	0.00	0	0.45	0	Aggregate	Aggregate	0	None
26-2-21.0	0.00	0	2.95	0	Aggregate	Aggregate	0	None
26-2-21.1	0.00	0	0.38	0	Aggregate	Aggregate	0	None
26-2-21.2	0.00	0	0.06	0	Aggregate	Aggregate	0	None
26-2-21.3	0.00	0	0.70	0	Aggregate	Aggregate	0	None
26-2-22.0	0.00	0	8.65	0	Aggregate	Aggregate	0	None
26-2-22.2	0.00	0	1.72	0	Aggregate	Aggregate	0	None
26-2-23.0	0.00	0	1.48	0	Aggregate	Aggregate	0	None
26-2-23.1	0.00	0	0.77	0	Aggregate	Aggregate	0	None
26-2-23.2	0.00	0	0.11	0	Aggregate	Aggregate	0	None
26-2-26.0	0.00	0	0.15	0	Aggregate	Aggregate	0	None
26-2-27.0	0.00	0	0.21	0	Aggregate	Aggregate	0	None
26-2-28.0	0.00	0	0.34	0	Aggregate	Aggregate	0	None
26-2-28.1	0.00	0	0.29	0	Aggregate	Aggregate	0	None
26-2-29.0	0.00	0	0.08	0	Aggregate	Aggregate	0	None
26-2-29.1	0.00	0	0.26	0	Aggregate	Aggregate	0	None
26-2-29.3	0.00	0	0.12	0	Aggregate	Aggregate	0	None
26-2-3.0	0.00	0	1.54	0	Aggregate	Aggregate	0	None
26-2-3.1	0.00	0	0.26	0	Aggregate	Aggregate	0	None
26-2-3.2	0.00	0	0.08	0	Aggregate	Aggregate	0	None
26-2-3.3	0.00	0	0.05	0	Aggregate	Aggregate	0	None
26-2-3.4	0.00	0	0.09	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-2-30.2	0.00	0	0.21	0	Aggregate	Aggregate	0	None
26-2-31.0	0.00	0	0.16	0	Aggregate	Aggregate	0	None
26-2-31.1	0.00	0	0.18	0	Aggregate	Aggregate	0	None
26-2-31.2	0.00	0	1.64	0	Aggregate	Aggregate	0	None
26-2-31.3	0.00	0	0.30	0	Aggregate	Aggregate	0	None
26-2-31.5	0.00	0	0.04	0	Aggregate	Aggregate	0	None
26-2-31.6	0.00	0	1.48	0	Aggregate	Aggregate	0	None
26-2-32.1	0.00	0	1.15	0	Aggregate	Aggregate	0	None
26-2-32.2	0.00	0	0.11	0	Aggregate	Aggregate	0	None
26-2-32.3 A	0.00	0	0.07	0	Aggregate	Aggregate	0	None
26-2-33.0	0.00	0	0.79	0	Aggregate	Aggregate	0	None
26-2-33.1	0.00	0	0.77	0	Aggregate	Aggregate	0	None
26-2-4.0	0.00	0	0.96	0	Aggregate	Aggregate	0	None
26-2-4.1	0.00	0	0.41	0	Aggregate	Aggregate	0	None
26-2-4.3	0.00	0	0.21	0	Aggregate	Aggregate	0	None
26-2-6.0	0.00	0	0.12	0	Aggregate	Aggregate	0	None
26-2-6.1	0.00	0	2.65	0	Aggregate	Aggregate	0	None
26-2-6.2	0.00	0	0.13	0	Aggregate	Aggregate	0	None
26-2-7.0	0.00	0	0.62	0	Aggregate	Aggregate	0	None
26-2-7.2	0.00	0	0.62	0	Aggregate	Aggregate	0	None
26-2-7.3	0.00	0	1.03	0	Aggregate	Aggregate	0	None
26-3-1.0	0.00	0	0.00	7.0	Bituminous	Bituminous	0	None
26-3-1.0	0.00	0	0.00	0.0	Bituminous	Bituminous	0	None
26-3-1.1	0.00	0	0.00	0.3	Bituminous	Bituminous	0	None
26-3-1.1	0.00	0	1.84	0	Aggregate	Aggregate	0	None
26-3-1.2	0.00	0	3.17	0	Aggregate	Aggregate	0	None
26-3-10.0	0.00	0	1.91	0	Aggregate	Aggregate	0	None
26-3-10.0	0.00	0	0.00	0.6	Bituminous	Bituminous	0	None
26-3-11.3	0.00	0	0.35	0	Aggregate	Aggregate	0	None
26-3-13.0	0.00	0	4.27	0	Aggregate	Aggregate	0	None
26-3-13.2	0.00	0	0.47	0	Aggregate	Aggregate	0	None
26-3-13.4	0.00	0	0.17	0	Aggregate	Aggregate	0	None
26-3-15.0	0.00	0	4.07	0	Aggregate	Aggregate	0	None
26-3-15.1	0.00	0	1.38	0	Aggregate	Aggregate	0	None
26-3-15.2	0.00	0	0.23	0	Aggregate	Aggregate	0	None
26-3-15.3	0.00	0	0.31	0	Aggregate	Aggregate	0	None
26-3-15.4	0.00	0	0.17	0	Aggregate	Aggregate	0	None
26-3-15.5	0.00	0	0.05	0	Aggregate	Aggregate	0	None
26-3-15.6	0.00	0	0.05	0	Aggregate	Aggregate	0	None
26-3-22.0	0.00	0	0.42	0	Aggregate	Aggregate	0	None
26-3-22.1	0.00	0	0.87	0	Aggregate	Aggregate	0	None
26-3-22.3	0.00	0	1.19	0	Aggregate	Aggregate	0	None
26-3-22.4	0.00	0	0.16	0	Aggregate	Aggregate	0	None
26-3-23.0	0.00	0	0.77	0	Aggregate	Aggregate	0	None
26-3-23.2	0.00	0	0.05	0	Aggregate	Aggregate	0	None
26-3-23.3	0.00	0	0.69	0	Aggregate	Aggregate	0	None
26-3-23.7	0.00	0	0.11	0	Aggregate	Aggregate	0	None
26-3-24.0	0.00	0	0.31	0	Aggregate	Aggregate	0	None
26-3-24.1	0.00	0	0.14	0	Aggregate	Aggregate	0	None
26-3-24.4	0.00	0	0.29	0	Aggregate	Aggregate	0	None
26-3-25.3	0.00	0	1.22	0	Aggregate	Aggregate	0	None
26-3-26.0	0.00	0	0.09	0	Aggregate	Aggregate	0	None
26-3-26.2	0.00	0	0.35	0	Aggregate	Aggregate	0	None
26-3-27.0	0.00	0	0.27	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
26-3-27.2	0.00	0	0.16	0	Aggregate	Aggregate	0	None
26-3-27.4	0.00	0	0.49	0	Aggregate	Aggregate	0	None
26-3-34.1	0.00	0	2.45	0	Aggregate	Aggregate	0	None
26-3-34.2	0.00	0	10.22	0	Aggregate	Aggregate	0	None
26-3-35.0	0.00	0	1.89	0	Aggregate	Aggregate	0	None
26-3-35.1	0.00	0	0.90	0	Aggregate	Aggregate	0	None
26-3-35.2	0.00	0	0.07	0	Aggregate	Aggregate	0	None
26-3-35.3	0.00	0	0.34	0	Aggregate	Aggregate	0	None
26-3-35.5	0.00	0	0.08	0	Aggregate	Aggregate	0	None
26-3-35.6	0.00	0	0.60	0	Aggregate	Aggregate	0	None
26-3-35.7	0.00	0	0.04	0	Aggregate	Aggregate	0	None
26-3-35.9	0.00	0	0.49	0	Aggregate	Aggregate	0	None
27-2-5.2	0.00	0	1.97	0	Aggregate	Aggregate	0	None
27-2-9.0	0.00	0	1.85	0	Aggregate	Aggregate	0	None
3800010	0.00	0	5.00	0	Aggregate	Aggregate	0	None
4H	0.00	0	1.40	0	Aggregate	Aggregate	0	None
78	0.00	0	0	1.1	Bituminous	Bituminous	0	None
78A	0.00	0	0.71	0	Aggregate	Aggregate	0	None
FS 4710	0.00	0	1.56	0	Aggregate	Aggregate	0	None
Spur 25-1-16a	0.00	0	0.11	0	Aggregate	Aggregate	0	None
Spur 25-1-16b	0.00	0	0.27	0	Aggregate	Aggregate	0	None
Spur 25-1-19a	0.00	0	0.06	0	Aggregate	Aggregate	0	None
Spur 25-1-19b	0.00	0	0.21	0	Aggregate	Aggregate	0	None
Spur 25-1-19e	0.00	0	0.56	0	Aggregate	Aggregate	0	None
Spur 25-1-19f	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-1-20a	0.00	0	0.26	0	Aggregate	Aggregate	0	None
Spur 25-1-20b	0.00	0	0.30	0	Aggregate	Aggregate	0	None
Spur 25-1-20c	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 25-1-20d	0.00	0	0.57	0	Aggregate	Aggregate	0	None
Spur 25-1-20e	0.00	0	0.47	0	Aggregate	Aggregate	0	None
Spur 25-1-30a	0.00	0	1.96	0	Aggregate	Aggregate	0	None
Spur 25-1-30b	0.00	0	1.36	0	Aggregate	Aggregate	0	None
Spur 25-1-30c	0.00	0	0.31	0	Aggregate	Aggregate	0	None
Spur 25-1-30d	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-1-30e	0.00	0	0.35	0	Aggregate	Aggregate	0	None
Spur 25-1-7a	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-1-7f	0.00	0	0.05	0	Aggregate	Aggregate	0	None
Spur 25-2-11a	0.00	0	0.18	0	Aggregate	Aggregate	0	None
Spur 25-2-15b	0.00	0	0.20	0	Aggregate	Aggregate	0.20	Waterbar & Block
Spur 25-2-15c	0.00	0	0.10	0	Aggregate	Aggregate	0	None
Spur 25-2-15d	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 25-2-17a	0.00	0	0.13	0	Aggregate	Aggregate	0	None
Spur 25-2-17b	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-2-17c	0.00	0	0.10	0	Aggregate	Aggregate	0	None
Spur 25-2-17d	0.00	0	0.11	0	Aggregate	Aggregate	0	None
Spur 25-2-17e	0.00	0	0.02	0	Aggregate	Aggregate	0	None
Spur 25-2-17f	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-2-17g	0.00	0	0.05	0	Aggregate	Aggregate	0	None
Spur 25-2-17h	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-2-1b	0.00	0	0.31	0	Aggregate	Aggregate	0	None
Spur 25-2-1c	0.00	0	0.10	0	Aggregate	Aggregate	0	None
Spur 25-2-21a	0.00	0	0.14	0	Aggregate	Aggregate	0	None
Spur 25-2-21b	0.00	0	0.07	0	Aggregate	Aggregate	0	None
Spur 25-2-22a	0.00	0	0.04	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 25-2-23a	0.00	0	0.05	0	Aggregate	Aggregate	0	None
Spur 25-2-23b	0.00	0	0.26	0	Aggregate	Aggregate	0	None
Spur 25-2-23c	0.00	0	0.07	0	Aggregate	Aggregate	0	None
Spur 25-2-26b	0.00	0	0.25	0	Aggregate	Aggregate	0	None
Spur 25-2-2a	0.00	0	0.29	0	Aggregate	Aggregate	0	None
Spur 25-2-33a	0.00	0	0.09	0	Aggregate	Aggregate	0	None
Spur 25-2-33b	0.00	0	0.07	0	Aggregate	Aggregate	0	None
Spur 25-2-33c	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-2-34f	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-2-35c	0.00	0	0.24	0	Aggregate	Aggregate	0	None
Spur 25-2-5a	0.00	0	0.32	0	Aggregate	Aggregate	0	None
Spur 25-2-5k	0.00	0	0.10	0	Aggregate	Aggregate	0	None
Spur 25-2-7a	0.00	0	0.15	0	Aggregate	Aggregate	0	None
Spur 25-2-7b	0.00	0	0.02	0	Aggregate	Aggregate	0	None
Spur 25-2-7c	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-2-7d	0.00	0	0.28	0	Aggregate	Aggregate	0	None
Spur 25-2-7e	0.00	0	0.15	0	Aggregate	Aggregate	0	None
Spur 25-3-12a	0.00	0	0.20	0	Aggregate	Aggregate	0	None
Spur 25-3-12b	0.00	0	0.30	0	Aggregate	Aggregate	0	None
Spur 25-3-12c	0.00	0	0.27	0	Aggregate	Aggregate	0	None
Spur 25-3-12d	0.00	0	0.07	0	Aggregate	Aggregate	0	None
Spur 25-3-13a	0.00	0	0.06	0	Aggregate	Aggregate	0	None
Spur 25-3-17a	0.00	0	0.43	0	Aggregate	Aggregate	0	None
Spur 25-3-18a	0.00	0	1.33	0	Aggregate	Aggregate	0	None
Spur 25-3-19a	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 25-3-23a	0.00	0	0.20	0	Aggregate	Aggregate	0	None
Spur 25-3-23b	0.00	0	0.05	0	Aggregate	Aggregate	0	None
Spur 25-3-23c	0.00	0	0.19	0	Aggregate	Aggregate	0	None
Spur 25-3-25a	0.00	0	0.16	0	Aggregate	Aggregate	0	None
Spur 25-3-25b	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-3-25c	0.00	0	0.12	0	Aggregate	Aggregate	0	None
Spur 25-3-25d	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 25-3-29a	0.00	0	0.49	0	Aggregate	Aggregate	0	None
Spur 25-3-29b	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 25-3-29c	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-3-29d	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 25-3-29e	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-3-29f	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-3-29g	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 25-3-29h	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 25-3-29i	0.00	0	0.02	0	Aggregate	Aggregate	0	None
Spur 25-3-32a	0.00	0	0.10	0	Aggregate	Aggregate	0	None
Spur 25-3-33a	0.00	0	0.13	0	Aggregate	Aggregate	0	None
Spur 25-3-33b	0.00	0	0.16	0	Aggregate	Aggregate	0	None
Spur 25-3-34a	0.00	0	0.51	0	Aggregate	Aggregate	0	None
Spur 25-3-34b	0.00	0	0.94	0	Aggregate	Aggregate	0	None
Spur 25-3-34c	0.00	0	0.39	0	Aggregate	Aggregate	0	None
Spur 25-3-35a	0.00	0	0.10	0	Aggregate	Aggregate	0	None
Spur 25-3-35b	0.00	0	0.39	0	Aggregate	Aggregate	0	None
Spur 25-3-35d	0.00	0	0.18	0	Aggregate	Aggregate	0	None
Spur 25-3-8a	0.00	0	1.32	0	Aggregate	Aggregate	0	None
Spur 26-2-12e	0.00	0	0.07	0	Aggregate	Aggregate	0	None
Spur 26-2-13h	0.00	0	0.18	0	Aggregate	Aggregate	0	None
Spur 26-2-15c	0.00	0	0.06	0	Aggregate	Aggregate	0	None

Road Number	Construction Length**	Within Riparian Reserve	Road Renovation Length**	Road Maintenance Length**	Existing Surface	Proposed Surface	Decommis-sioning Length**	Decommis-sioning Method
Spur 26-2-19a	0.00	0	0.12	0	Aggregate	Aggregate	0	None
Spur 26-2-19b	0.00	0	0.03	0	Aggregate	Aggregate	0	None
Spur 26-2-19c	0.00	0	0.23	0	Aggregate	Aggregate	0	None
Spur 26-2-1n	0.00	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-2-20a	0.00	0	0.14	0	Aggregate	Aggregate	0	None
Spur 26-2-20b	0.00	0	0.16	0	Aggregate	Aggregate	0	None
Spur 26-2-23b	0.00	0	0.34	0	Aggregate	Aggregate	0	None
Spur 26-2-24a	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 26-2-29a	0.00	0	0.11	0	Aggregate	Aggregate	0	None
Spur 26-2-29b	0.00	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-2-29c	0.00	0	0.05	0	Aggregate	Aggregate	0	None
Spur 26-2-29d	0.00	0	0.22	0	Aggregate	Aggregate	0	None
Spur 26-2-29e	0.00	0	0.15	0	Aggregate	Aggregate	0	None
Spur 26-2-29f	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 26-2-29g	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 26-2-2a	0.00	0	0.28	0	Aggregate	Aggregate	0	None
Spur 26-2-2g	0.00	0	0.22	0	Aggregate	Aggregate	0	None
Spur 26-2-30b	0.00	0	0.02	0	Aggregate	Aggregate	0	None
Spur 26-2-31a	0.00	0	0.04	0	Aggregate	Aggregate	0	None
Spur 26-2-31b	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-2-31c	0.00	0	0.11	0	Aggregate	Aggregate	0	None
Spur 26-2-31d	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-2-31e	0.00	0	0.16	0	Aggregate	Aggregate	0	None
Spur 26-2-31f	0.00	0	0.05	0	Aggregate	Aggregate	0	None
Spur 26-2-31g	0.00	0	0.14	0	Aggregate	Aggregate	0	None
Spur 26-2-31h	0.00	0	0.17	0	Aggregate	Aggregate	0	None
Spur 26-2-31i	0.00	0	0.12	0	Aggregate	Aggregate	0	None
Spur 26-2-34a	0.00	0	2.02	0	Aggregate	Aggregate	0	None
Spur 26-2-35a	0.00	0	0.09	0	Aggregate	Aggregate	0	None
Spur 26-2-35a	0.00	0	0.09	0	Aggregate	Aggregate	0	None
Spur 26-2-4a	0.00	0	0.11	0	Aggregate	Aggregate	0	None
Spur 26-3-13b	0.00	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-3-1b	0.00	0	0.21	0	Aggregate	Aggregate	0.21	Waterbar & Block
Spur 26-3-22c	0.00	0	1.08	0	Aggregate	Aggregate	0	None
Spur 26-3-23a	0.00	0	0.10	0	Aggregate	Aggregate	0	None
Spur 26-3-23b	0.00	0	0.18	0	Aggregate	Aggregate	0.18	Waterbar & Block
Spur 26-3-23c	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-3-23d	0.00	0	0.02	0	Aggregate	Aggregate	0	None
Spur 26-3-23e	0.00	0	0.22	0	Aggregate	Aggregate	0	None
Spur 26-3-23f	0.00	0	0.24	0	Aggregate	Aggregate	0	None
Spur 26-3-24a	0.00	0	0.69	0	Aggregate	Aggregate	0	None
Spur 26-3-26a	0.00	0	0.08	0	Aggregate	Aggregate	0	None
Spur 26-3-26b	0.00	0	0.17	0	Aggregate	Aggregate	0	None
Spur 26-3-30a	0.00	0	0.13	0	Aggregate	Aggregate	0	None
Spur 26-3-35c	0.00	0	0.06	0	Aggregate	Aggregate	0	None
Spur 26-3-7a	0.00	0	0.02	0	Aggregate	Aggregate	0	None
Spur 27-2-2a	0.00	0	1.41	0	Aggregate	Aggregate	0	None
Totals	**0.0**	**0**	**292.0**	**14.70**	**--**	**--**	**0.60**	**--**

**Values are approximations and may vary slightly at the time of implementation.

Appendix J – Estimates of Fire Severity

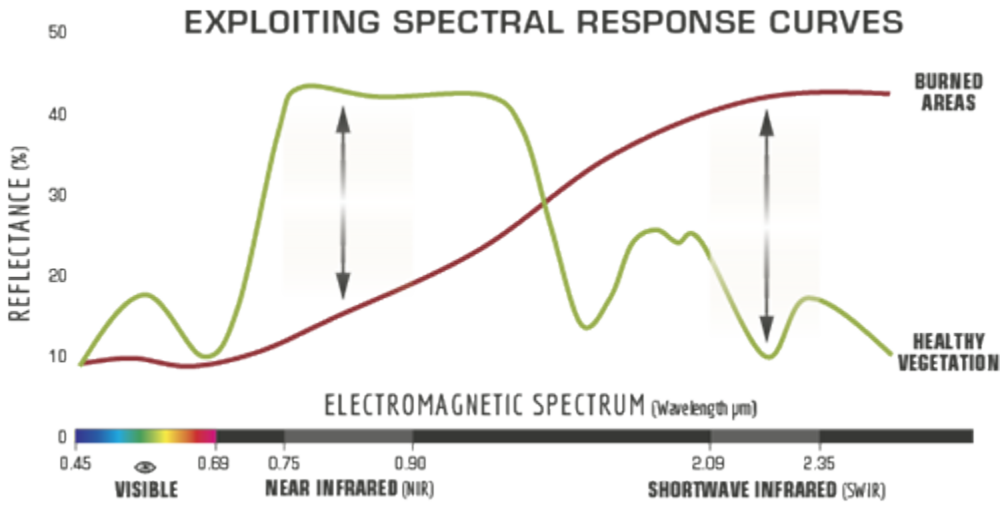
The BLM acquired three datasets for use in ArcGIS to help determine how severe the fire burned in any given location. The datasets are; BARC, RAVG, and Sentinel 2 Satellite imagery. There is overlap and/or repeated data between the datasets. This Appendix will help clarify the data made available to the resource specialists when analyzing for this Environmental Assessment (EA).

Burned Area Reflectance Classification (BARC)

This data is compiled by the USDA Forest Service (USFS) (https://fsapps.nwcg.gov/baer/home) to help with the post-fire recovery effort. Burned Area Reflectance Classification (BARC) is a satellite-derived data layer of post-fire vegetation condition and has four classes representing burn severity: high, moderate, low, and unburned. This product is used as an input to the soil burn severity map produced by the Burned Area Emergency Response (BAER) teams.

BARC data is created by comparing satellite near and mid infrared reflectance values. The rationale behind the process is as follows:

Figure 1: How BARC data is generated, source: https://fsapps.nwcg.gov/baer/faq.



Near infrared light is largely reflected by healthy green vegetation. That means that near infrared bands will be very high in areas of healthy green vegetation and low in areas where there is little vegetation.

Mid infrared light is largely reflected by rock and bare soil. That means that mid infrared band values will be very high in bare, rocky areas with little vegetation and low in areas of healthy green vegetation.

Imagery collected over a forest in a pre-fire condition will have very high near infrared band values and very low mid infrared band values. Imagery collected over a forest after a fire will have very low near infrared band values and very high mid infrared band values.

It is the relationship between these two bands that the BARC utilizes. The best way to do this is to measure the relationship between these bands prior to the fire and then again post fire. The areas where the relationship between the two bands has changed the most are most likely to be severely burned. The areas where that relationship has changed little are likely to be unburned or very lightly burned. To

determine this relationship, analysts perform a band ratio between the mid and near infrared bands. The result is a classification of burned areas.

In the immediate aftermath of a wildfire, an Interagency BAER team is dispatched to the site to prepare an emergency rehabilitation and restoration plan. They do this by making an initial assessment of soil burn severity and to estimate the likely future downstream impacts due to flooding, landslides, and soil erosion. One of the first tasks for this team is the creation of a soil burn severity map that highlights the areas of high, moderate, and low severity. This map then serves as a key component in the subsequent flood modeling and Geographic Information System (GIS) analysis. The BARC data is meant to be used as one of the main inputs into the development of the final soil burn severity map.

Rapid Assessment of Vegetation Condition after Wildfire (RAVG)

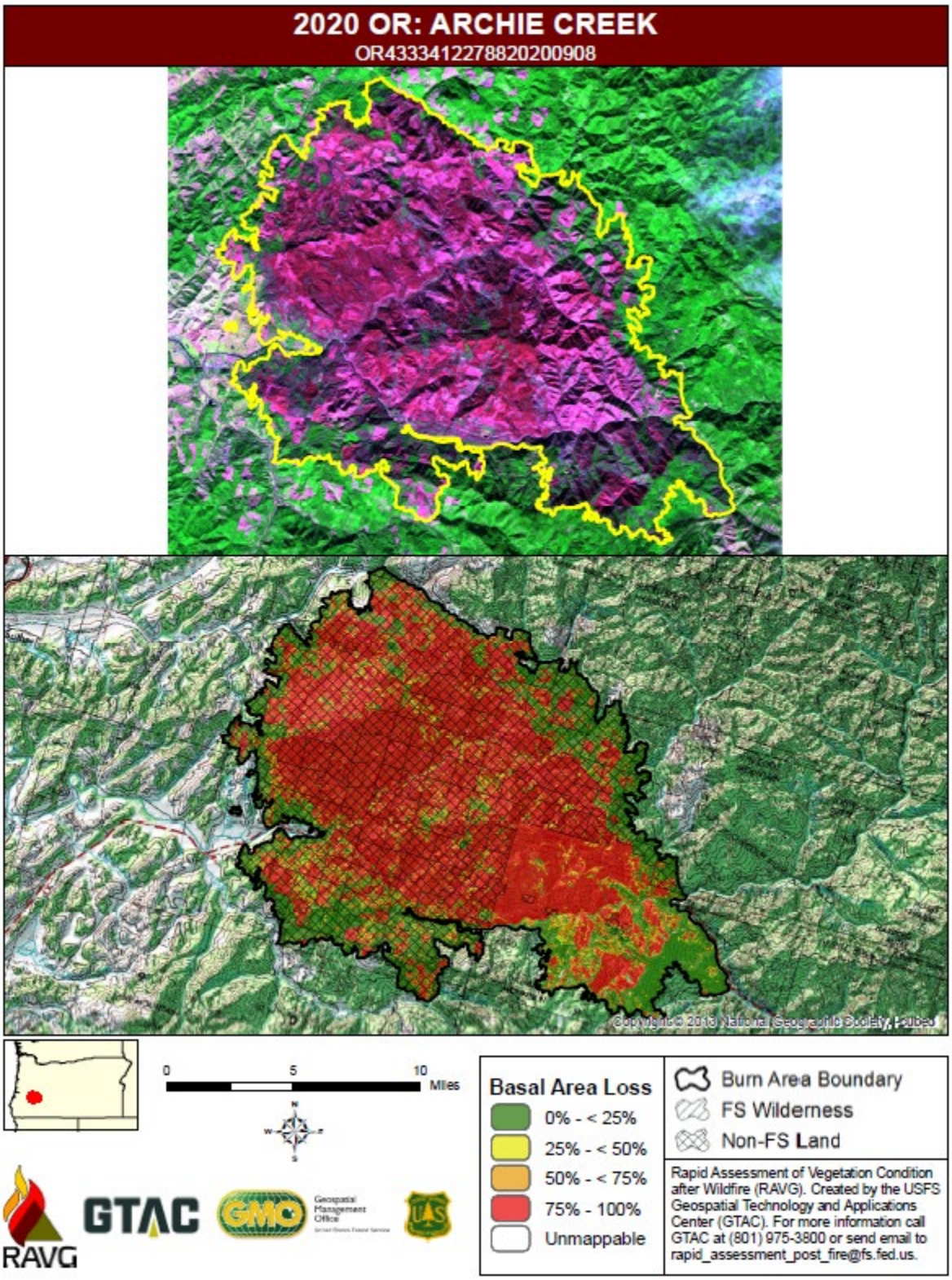
Rapid Assessment of Vegetation Condition after Wildfire (RAVG) products are generated using a two-date change detection process and regression equations that relate imagery-derived burn severity indices to field-based burn severity measures. The analysis starts with a pair of moderate-resolution multi-spectral images (e.g., Landsat imagery); one from before the fire and one from after the fire. The image pair is used to derive a burn-severity index called the Relative Differenced Normalized Burn Ratio (RdNBR, Miller and Thode 2007), which is sensitive to vegetation mortality resulting from the wildfire event.

The RAVG program relies primarily on Landsat imagery (Landsat 8 Operational Land Imager (OLI), Landsat 7 Enhanced Thematic Mapper Plus (ETM+), and, in earlier years, Landsat 5 Thematic Mapper (TM)). As of 2019, imagery from the European Space Agency's Sentinel 2 satellites has also been routinely used. Other multi-spectral sensors can be used provided they have sufficient resolution and the necessary spectral bands. The preferred bands are the near infrared (NIR) and short-wave infrared (SWIR, around 2.2 micrometers), which are ideal for detecting the change from healthy green vegetation to dead vegetation, bare soil, and ash. The two bands are used to calculate three indices: the Normalized Burn Ratio (NBR, one for each image); the Differenced NBR (dNBR, the change in NBR from the pre-fire image to the post-fire image); and the Relative dNBR (RdNBR, a modified dNBR that accounts for pre-fire vegetation density).

Regression equations are used to determine burn severity measures from RdNBR. The regression equations are based on field data (e.g., tree mortality data by species and size class) collected from many fires in the Sierra Nevada and northern California, and contemporary Landsat imagery. The burn severity measures are percent change (loss) in basal area (BA), percent change in canopy cover (CC), and a standardized burn severity metric called the Composite Burn Index (CBI). Thematic (classified) versions of each metric are then created from the continuous products.

Summary tables and maps are produced by integrating the burn metric raster data with existing vegetation and ownership data. The vegetation data are derived from the Landscape Fire and Resource Management Planning Tools Project (LANDFIRE) Existing Vegetation Type (EVT) layer, recoded into eight broad vegetation classes for RAVG purposes. An ownership layer is used to identify the following four classes: USFS non-wilderness, USFS wilderness, non-USFS non-wilderness, and non-USFS wilderness.

Figure 2: Archie Creek preliminary RAVG.



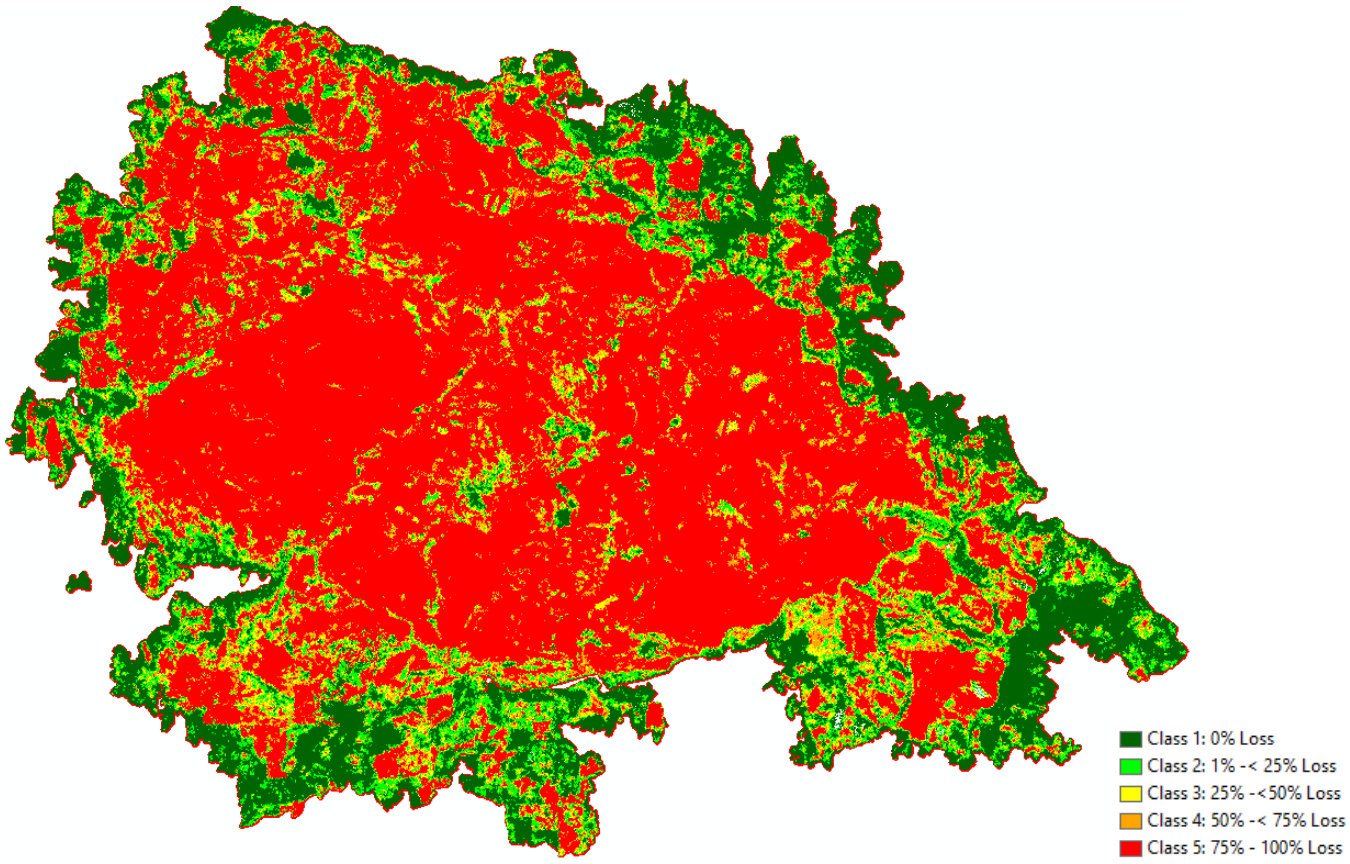
RAVG products include the following for each wildfire:

Geospatial products, including imagery and derived data

- Satellite imagery (Landsat or similar)
    - Pre-fire scene (spatial subset)
    - Post-fire scene (spatial subset)
- Normalized burn ratio and related indices
    - Pre-fire normalized burn ratio (NBR)
    - Post-fire NBR
    - Differenced NBR (dNBR)
    - Relative dNBR (RdNBR)
- Burn severity measures derived from pre- to post-fire change
    - Percent basal area (BA) loss represents the change in live basal area relative to the pre-fire condition. For the continuous version, values range from 0 to 100%. There are two thematic versions. The 7-class basal area loss raster (BA-7) includes the following classes:
        - Class 1: 0%
        - Class 2: 0% - < 10%
        - Class 3: 10% - < 25%
        - Class 4: 25% - < 50%
        - Class 5: 50% - < 75%
        - Class 6: 75% - < 90%
        - Class 7: 90% - 100%
    - A 4-class version (BA-4) is created by recoding the classes:
        - Class 1: 0%
        - Class 2: 0% - < 25%
        - Class 3: 25% - < 75%
        - Class 4: 75% - 100%
    - Percent canopy cover (CC) loss represents the change in canopy cover relative to the pre-fire condition. For the continuous version, values range from 0 to 100%. The 5-class thematic version (CC-5) consists of the following classes:
        - Class 1: 0%
        - Class 2: 0% - < 25%
        - Class 3: 25% - < 50%
        - Class 4: 50% - < 75%
        - Class 5: 75% - 100%
    - The Composite Burn Index (CBI) is a standardized fire severity rating based on a composite of effects to the understory vegetation (grass, shrub layers), midstory trees and overstory trees. Values range from 0 (unchanged) to 3 (highest severity). The thematic product included in the RAVG dataset has the following four classes:
        - Class 1 = unchanged (CBI: 0 - < 0.1)
        - Class 2 = low severity (CBI: 0.1 - < 1.25)
        - Class 3 = moderate severity (CBI: 1.25 - < 2.25)
        - Class 4 = high severity (CBI: 2.25 - 3.0)

The RAVG products are intended primarily for use in assessing fire-related reforestation needs. This RAVG data help staff prioritize areas for further assessment and support reforestation funding requests and decisions. In addition. the data facilitates post-fire vegetation management decision-making by reducing planning and implementation costs. The RAVG data also serve a variety of related Agency objectives, such as wildlife habitat analysis and salvage harvest planning.

Figure 3: RAVG estimated canopy cover loss from pre-fire to post-fire.

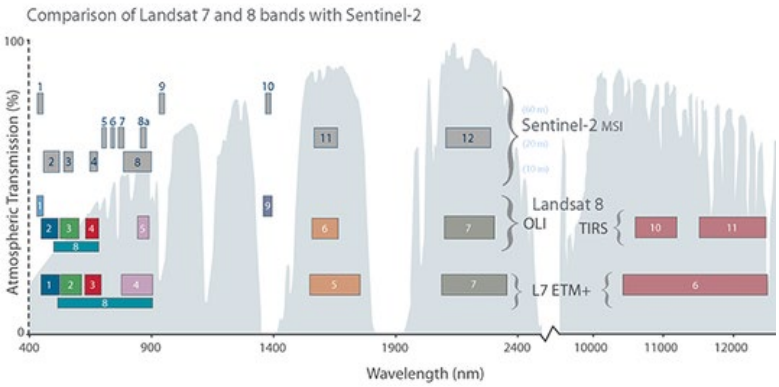


Sentinel 2 Satellite Imagery

This dataset was acquired by the BLM National Operations Center (NOC) GeoSpatial Section for support of the Emergency Stabilization and Rehabilitation after the 2020 wildfire season. This information was provided to the Roseburg Office to clarify the dataset.

About Sentinel 2

The Sentinels are a fleet of satellites developed and deployed by the European Space Agency. Sentinel 2 was designed specifically to monitor land and vegetation. Sentinel 2 carries a high-resolution multispectral imager with 13 spectral bands. The combination of high resolution (10m), novel spectral capabilities (13 bands), and a swath width of 290 km and frequent revisit times (every 5 days) provides unique views of Earth.



Sentinel 2 can be used to map changes in land cover and to monitor the world's forests. It also provides information on pollution in lakes and coastal waters. Images of floods, volcanic eruptions, and landslides contribute to disaster mapping and help humanitarian relief efforts.

Data availability for Sentinel 2 is late June of 2015 to the present.

The raw Sentinel 2 data product contains 13 spectral bands (Table J-1).

Table J-2. Spectral bands of Raw Sentinel 2 Data.

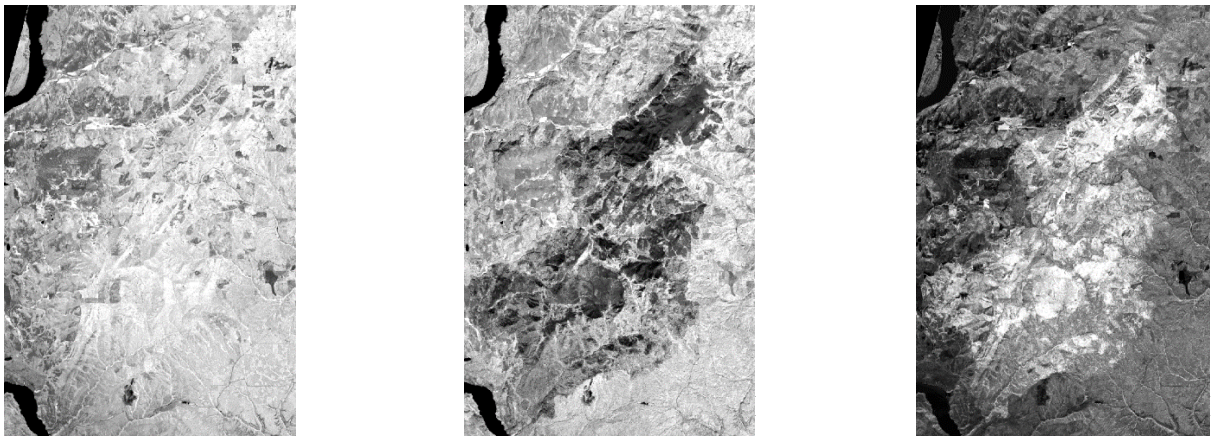
Original Sentinel-2 Bands	Central Wavelength	Resolution	ESR Subset Band #
Band 1 – Coastal aerosol	443	60	excluded
Band 2 – Blue	490	10	1
Band 3 – Green	560	10	2
Band 4 – Red	665	10	3
Band 5 – Vegetation Red Edge	705	20	4
Band 6 – Vegetation Red Edge	740	20	5
Band 7 – Vegetation Red Edge	783	20	6
Band 8 – NIR	842	10	7
Band 8A – Narrow NIR	865	20	8
Band 9 – Water vapor	945	60	excluded
Band 10 – SWIR – Cirrus	1375	60	excluded
Band 11 – SWIR	1610	20	9
Band 12 – SWIR	2190	20	10

About NOC Sentinel 2 products

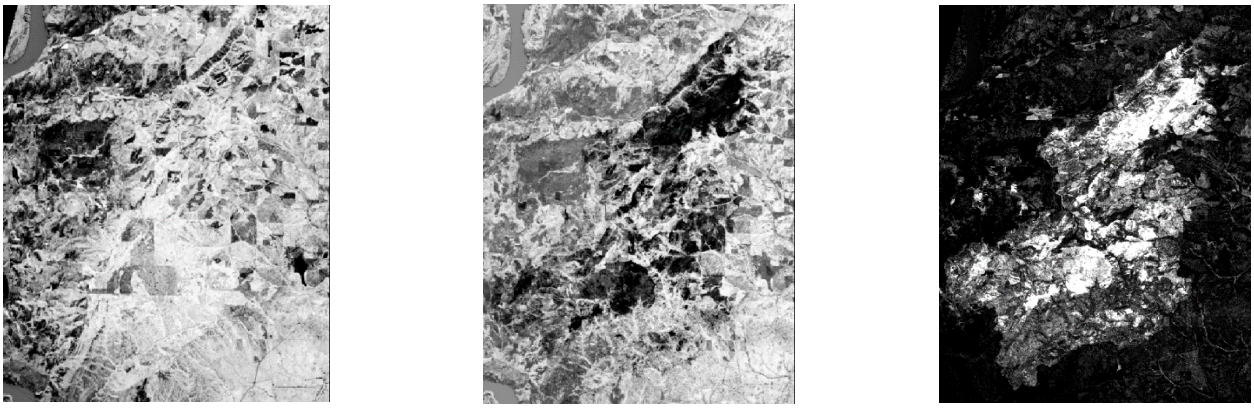
The Sentinel 2 products the NOC have developed have been spatially (geographically) subset to reduce file storage space. Additionally, these products have been spectrally subset from 13 to 10 bands. The subset product includes Blue, Green, Red, Near Infrared, Red Edge, and Shortwave Infrared (SWIR) bands (highlighted in yellow above). The product holds a spatial resolution of 10 meters. Note that the Red Edge and SWIR bands have been resampled from native 20 meters to 10 meters, to match the resolution of the visible to Near Infrared bands. The multispectral data products remain in native unsigned 16 bit integer format and have been corrected to either Top of the Atmosphere (TOA) Reflectance, or, if available, Surface Reflectance.

The NOC also derives spectral indices from the Sentinel multispectral imagery, including the: Normalized Difference Vegetation Index (NDVI); the Normalized Burn Ratio (NBR); the Delta NDVI (dNDVI); and the Delta NBR (dNBR).

The Normalized Difference Vegetation Index (NDVI) is useful for identifying photosynthetically active vegetation. Deriving a Delta NDVI (dNDVI) from two or more dates of imagery can be used to map changes in vegetation areal extent, phenology, and health. The "bright" pixels (compared to the dark pixels) in the dNDVI image on the following page depict moderate to significant change in vegetation between pre and post fire dates.



The Normalized Burn Ratio (NBR), and Delta NBR (dNBR) calculated from pre- and post-fire imagery, can be used to identify burned and unburned vegetation cover following a fire event. Similar to the dNDVI, the dNBR scan be used to map changes in vegetation areal extent, phenology, and health. The "bright" pixels in the dNBR below depict moderate to significant burn scar areas.



Prefire NBR Postfire NBR dNBR

The delta Fire Retardant Index (dFRI) can be used to delineate where fire retardant has been applied for a given event. Very "dark" pixels in the dFRI typically identify retardant applications. This is a custom product which can be derived and disseminated to requesting Emergency Stabilization and Rehabilitation officials in the event that retardant has been employed.

Finally, the NOC makes available a vector classification product, which identifies burned and unburned areas within a fire event.

Usage and restrictions to NOC Sentinel 2 products

There are no restrictions regarding the use and dissemination of Sentinel 2 and it can be used and shared freely with any interests, public, or private.

Conclusion

Visual comparisons between the products are subtle and appear to be related to pixel size (i.e., detail level of each layer). While detail may be different for each dataset, the key is the appropriate use of each dataset.

Using the same color scheme for each dataset:

- Unburned or Unchanged – dark green
- Low Severity – light green
- Moderate Severity – yellow
- High Severity – red

Figure 4: BARC data for the Archie Creek Fire.

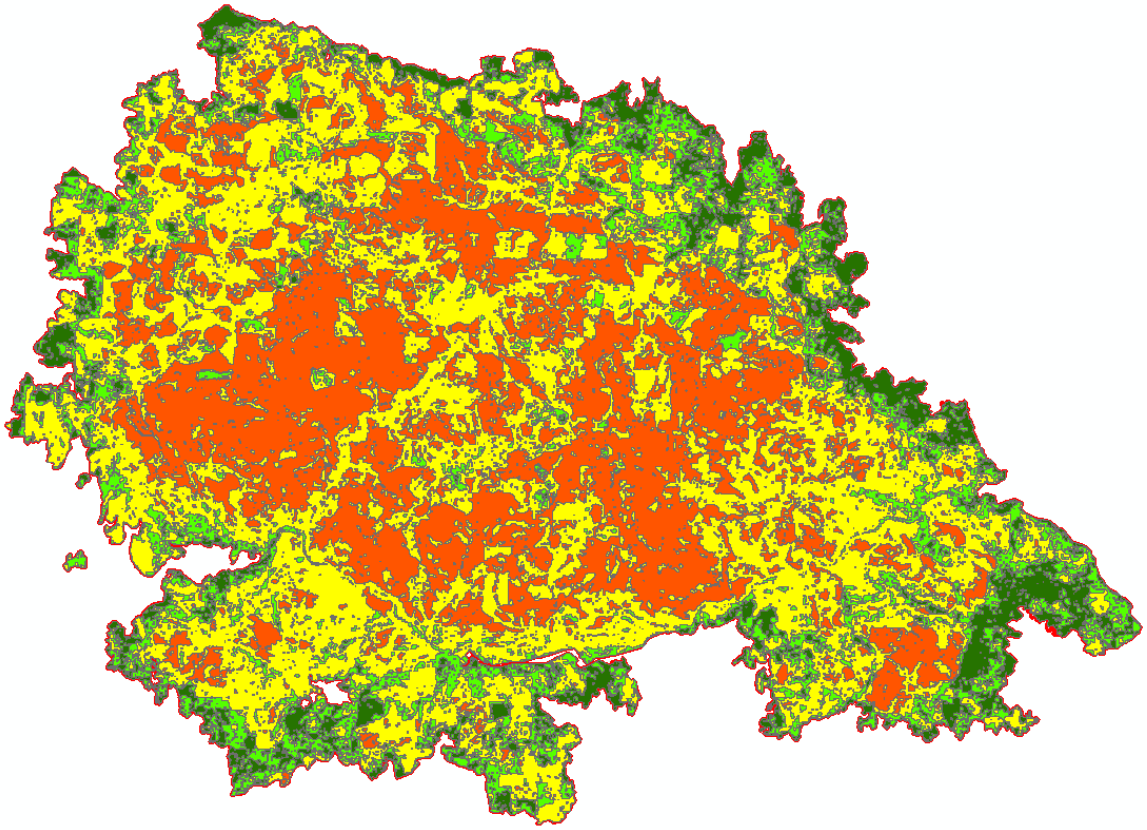


Figure 5: RAVG data for the Archie Creek Fire.

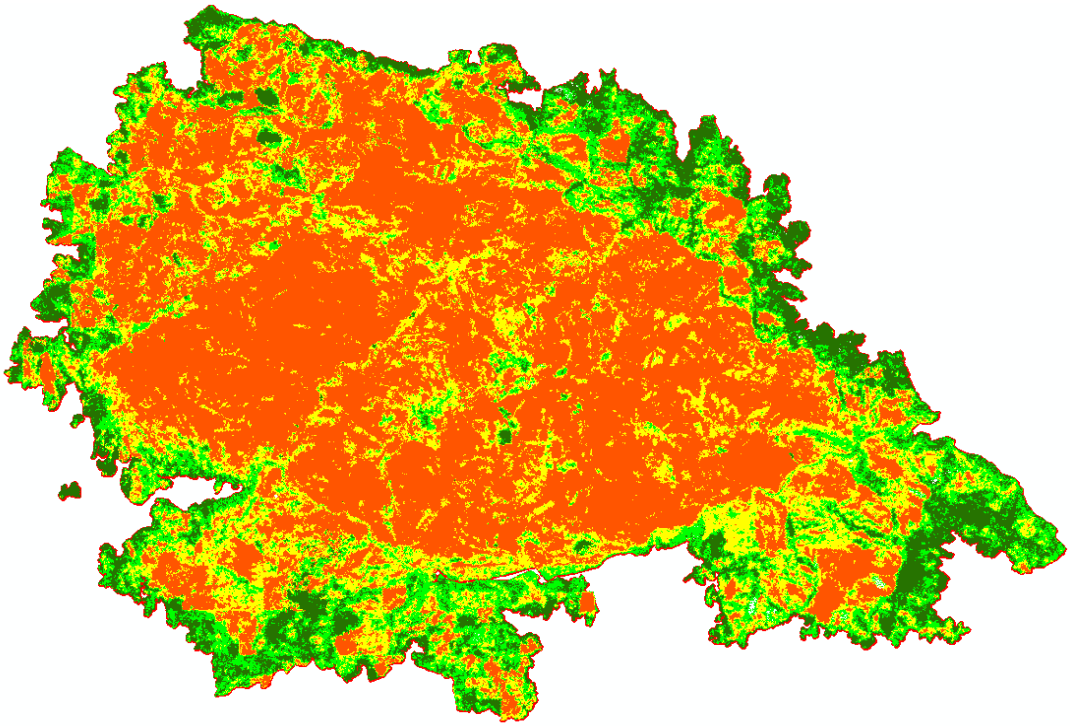


Figure 6: Sentinel 2 Satellite data for the Archie Creek Fire.

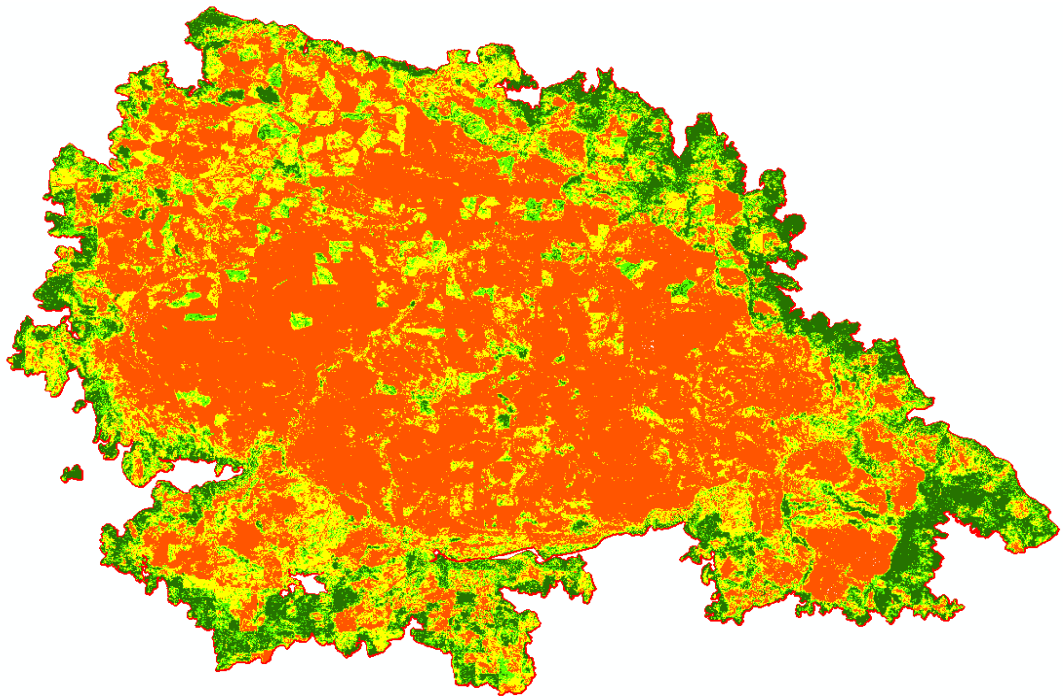
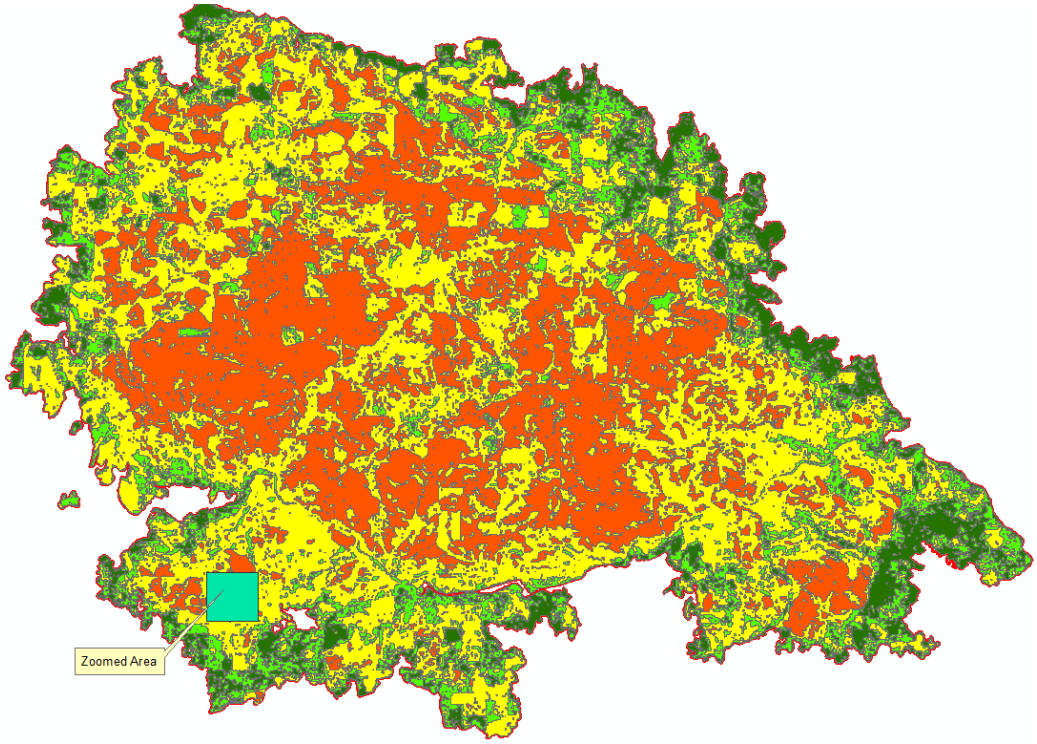


Figure 7: BARC data showing area featured in the following figure.



Below is a zoomed in area example of 26-3-23:

Figure 8:BARC of Section 23.

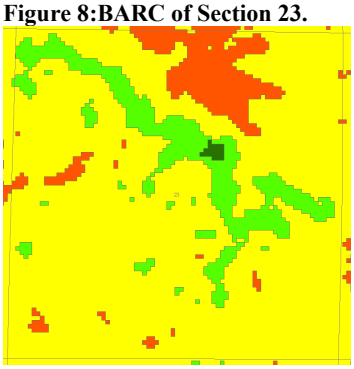


Figure 9: RAVG of Section 23.

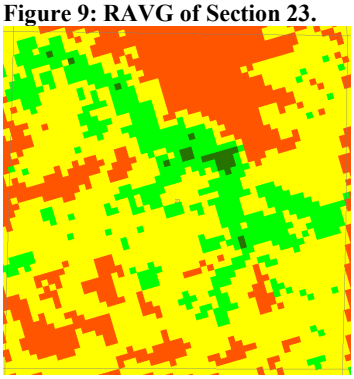
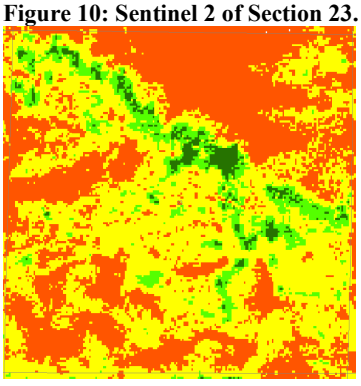


Figure 10: Sentinel 2 of Section 23.



A comparison was made between the three products to indicate differences between datasets. Pre-fire estimated stand age was overlayed with each measure of fire severity, then lumped into age ranges. Each graphic is the proportion of severity in that age range.

Figure 11: BARC data by pre-fire age ranges for the BLM-administered lands within the Archie Creek Fire.

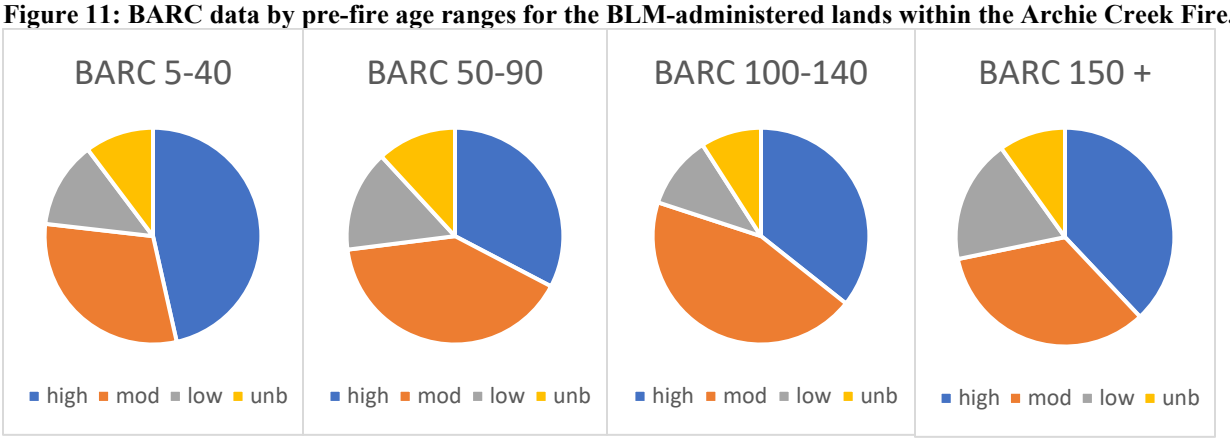


Figure 12: RAVG data by pre-fire age ranges for the BLM-administered lands within the Archie Creek Fire.

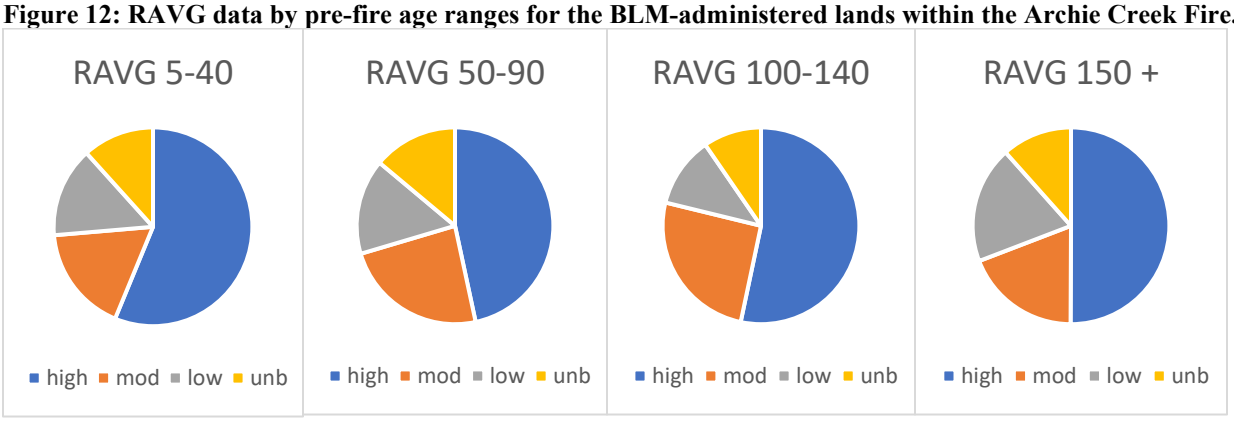
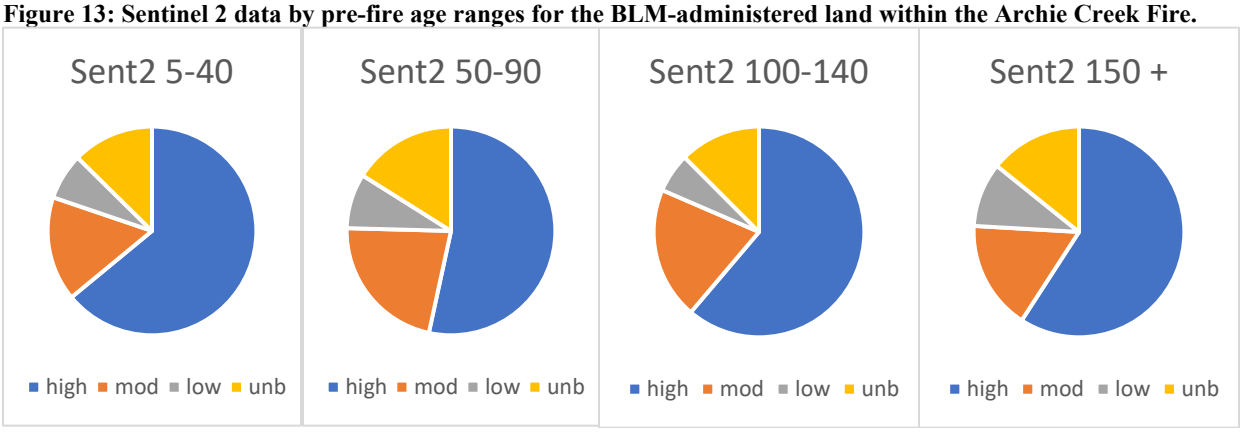


Figure 13: Sentinel 2 data by pre-fire age ranges for the BLM-administered land within the Archie Creek Fire.



References:

Miller, J.D, and Thode, A.E. 2007 Quantifying burn severity in a heterogeneous landscape with a relative version of the delta Normalized Burn Ratio (dNBR). Remote Sensing of Environment. 109: 66-80.